

The Dice Snake in the Czech Republic (2)

Here is the second part of our series on the distribution of the dice snake in the Czech Republic, a critically endangered species in the Czech part of Silesia.

A surprising discovery in Těšín Silesia

A prospering population of dice snakes (*Natrix tessellata*) was discovered in 2009 in the Czech part of Těšín Silesia, i.e., in a region which is quite far from the known range of the species in the Czech Republic. News of this was published in *Živa* magazine the following year (Vlček & Jablonski, 2010). This surprising discovery was preceded only by unproven oral reports of sightings of this species over a period extending back into the 1980s; however, the first documented discovery of the dice snake in the Czech part of Silesia didn't take place until 1997. On this occasion, two females were discovered (by the first of the authors of this article) in Sušanka Brook, which flows through the northern periphery of Havířov (Vlček 1998). The documented discovery suggested that the biotope and its surroundings, including the nearby reservoirs, may really be inhabited by a permanent population of dice snakes. It was also promising that one of the females that was found was pregnant. During the following three



Hatching of the dice snake in a terrarium



Dark gangue substrate is of essential importance for the Havířov grass snake population. The picture shows a pregnant female in which the eye cloudiness, a characteristic sign of moulting, is well visible

years, another two individuals were found at Sušanka, but convincing proof of a reproducing population was still missing.

It was only at the beginning of May 2009 that, during a casual visit by the author to the water reservoirs near which the Sušanka flows, local fishermen drew his attention to the presence in the area of a large number of water snakes which resemble adders. To his surprise, after only a short period of walking around the shore of one of the reservoirs, P. Vlček spotted several adult dice snake individuals. However, the biggest surprise of the day was the presence of juvenile individuals. This was convincing proof that a reproducing dice snake population is living in the Silesian countryside. The main reason the dice snakes had escaped people's attention for such a long time is that investigations had taken place almost solely around Sušanka Brook after the documented occurrence of this species there in 1997, and the nearby water reservoirs had been visited only rarely, and completely outside the period when dice snakes show the highest level of activity. The snakes thus surprisingly managed to escape the attention of the specialized public for almost twelve years.

The area of occurrence inhabited by the discovered population takes up an area of approximately 22.5 ha, lies at 252 m above sea level, and is located in quadrate No. 6276 of the grid map of species. Its axis is the Sušanka set of seven water reservoirs, which are marked as N 1–N 7 and which were used in the past for

the sedimentation of sludge in water pumped from black coal mines. Geomorphologically, this area lies in the Ostrava basin (the largest coal basin in the Czech Republic), which is a strongly urbanized and densely inhabited area in the Ostrava-Karviná region, with 777 to 1443 inhabitants per km². The sludge basins were created in the floodplain of Sušanka Brook in the period before World War II via the adaptation of former ponds, wetlands, and meadows, and they stopped serving their purpose approximately fifteen years ago. They are arranged in an approximately 1.5 km-long row roughly in a north-south direction; and Sušanka Brook, which later flows into the Lučina River (at the western edge of Havířov), flows along their western edge at an average distance of around 25 metres. The Sušanka has a mainly stony or stony/muddy bottom. Its source is in the woods north of the Těrlícko water reservoir, and it takes water from more minor brooks along the whole of its approximately 15 km length. It passes through inhabited and agricultural areas, but also through territories which have been destabilized to a large degree by mining activities and the existence of fly ash deposits and sludge basins. The bed of the Sušanka's lower course is regulated, and its self-cleaning ability is blocked; therefore, the water in this part of the watercourse is of very low quality. As far as ecology is concerned, the brook is destabilized and the state of its surroundings requires alterations (Prymus 1992). In fact, the impact of deep mining and industry on the living



A view of the western bank of water reservoir N 2 near the town of Havířov, where a dice snake population was discovered. We observed the highest density of snakes at this monitored location. The washed out terrain under the pipeline provided ideal conditions for their concealment and for the successful embryonal development of their eggs (situation as of 10th May 2009)

environment of the whole Ostrava-Karviná region is very prominent. There are anthropogenic sedimentary spoil heaps and gangue from coal mines, including various backfills and dumps (Pavelková 2008).

Snakes came to like the banks formed from dark gangue

Investigations confirmed the occurrence of the dice snake in five out of the seven reservoirs: The reservoir marked as N 4 has been without water for a long time (however, it is being revitalized at present), and we haven't spotted these snakes in reservoir N 7. The highest number of dice snakes during the year was always observed in May. At the beginning of July, their numbers on land dropped significantly, and this state lasted until the onset of autumn. We have also observed a similar correlation in the activities of the grass snake (*Natrix natrix*), which we also observed in the same locality. During our visits to the reservoir, we observed the snakes on land between 11 a.m. and 3 p.m. when the temperature was 18–26°C. The lowest air temperature which we recorded during the observation of dice snakes was 15°C; the temperature of the land surface where the dice snake was lying was 19.5°C, and the water temperature was 19°C on that day (21.6.2009, 2 p.m.). We didn't spot any snakes when the air temperature was over 27°C. The recorded minimum (May) and maximum (July) temperatures of the water in the locality reached 18°C and 28°C respectively. From May to August 2009, we spotted 178 dice snakes (out of which 13 were young) and

41 grass snakes (Viček & Jablonski, 2010). We didn't mark the snakes; thus, it is highly probable that some of the same individuals were spotted repeatedly. For example, on 22nd June 2010, we observed a total (the sum for all the reservoirs) of 33 dice snakes (Viček et al. 2011) when the weather was relatively cold (18°C) and windy. The escape distance when the snakes were disturbed ranged between 1–3 m; some individuals displayed thanatosis (death feigning) when examined more closely. Approximately from the middle of June, an absolute majority of the observed females had a noticeably enlarged hind part of the body, which was a clearly vis-



A similar view after the theft of piping from both banks of the reservoir. The white arrow points at a cavity with the dice snake eggshells discovered there (situation as of 6th December 2009)

ible sign of pregnancy. From the beginning of July, we observed a characteristic cloudiness of the eyes in most of them, which indicated that they were going to lay eggs in the first half of July (usually 10 to 15 days after moulting).

It became apparent from our observation that two factors (two specific landscape elements of anthropogenic origin) are important for the dice snake population in this locality: first, the existence of banks with steep slopes created by the heaping of dark gangue (rock material produced during mine tunnelling), which absorbs and accumulates heat and creates a hospitable, warm microclimate; and second, the presence of pipelines leading along the northern and western bank dams of reservoir N 2, in which we noted the highest number of individuals.

The above-mentioned pipeline provided ideal concealment as well as thermal conditions. In the area under it, which was enlarged by erosion in places, dice snakes probably laid eggs and also spent the winter. At the end of September 2009, however, we discovered that somebody was gradually stealing the piping leading towards the northern part of the reservoir. Even though we reported the action of the unknown thieves to the communal body for the protection of the environment (the Havířov town municipality), as well as to the owner of the land and to the police, further metres of metal material continued to disappear. Havířov's daily newspaper did inform the public that the offenders were profiting successfully and without punishment from the stolen material. In the opening resulting from the theft, we found 75 shells from dice snake eggs, and thus our assumption that snakes use the area under the pipeline as a place for laying eggs was confirmed. Even though the rest of the piping also disappeared from the

western bank eventually, we observed dice snake young in the N 2 reservoir in the following years again, which pleased us greatly.

The Sušanka reservoirs have relatively clear water and plenty of fish. The range of food on offer is sufficient for an ichthyophagous snake species. On the basis of our own investigations and oral information from fishermen, the following fish species (accompanied by their numerous spawn) were found: the common roach (*Rutilus rutilus*), common rudd (*Scardinius erythrophthalmus*) and their cross-breeds, the common bleak (*Alburnus alburnus*), the European chub (*Leuciscus cephalus*), the European perch (*Perca fluviatilis*), the northern pike (*Esox lucius*), the goldfish (*Carassius auratus*), and the common carp (*Cyprinus carpio*). In the past, gudgeon (*Gobio gobio*) and tench (*Tinca tinca*) were also frequently found here. The former can still be found in Sušanka Brook. We observed several local herpetofauna species by the reservoirs, including the sand lizard (*Lacerta agilis*) and the grass snake. We also spotted the pond slider (*Trachemys scripta*), an introduced species. The only batrachofauna seen was the edible frog (*Pelophylax kl. esculentus*).

Characteristics specific to the Haviřov population

The Haviřov dice snake population has several specific characteristics in contrast with populations of that species in other parts of the Czech Republic (comp. Gruschwitz et al. 1999, Mikátová et al. 2001):

- 1) It is the first documented and described occurrence of the species in the Baltic Sea drainage area (Oder River basin).
- 2) Even though the locality of the snake's occurrence lies in the Polonia biogeographic sub-province and the climate is therefore colder there than at similar heights above sea level in the Hercyn sub-province (Culek 1996), the local population isn't bound to the deep-cut river valley ecosystem which provides a suitable microclimate for the snakes.
- 3) The dice snake breeds, spends the winter, and hunts (i.e. lives for the whole year) in the Ostrava basin exclusively in an anthropic biotope featuring standing water.
- 4) The Haviřov population is 145 km away from the nearest prospering population of this kind on the Svratka River near Brno, and it is separated from repeated sightings of snakes of unknown origin on Bečva River (Mikátová et al. 2001) by a distance of 50 km (both watercourses belonging to the Black Sea drainage area).

Probably the remnant of an original population

The range of occurrence of the dice snake almost corresponds to that of the European green lizard (*Lacerta viridis*), and both spe-



Map of the Oder River basin (lighter-coloured field), which belongs to the Baltic Sea drainage area. It schematically depicts fossil and recent dice snake sightings in Czech and Polish Silesia and in North Moravia. Explanation of markings: **black dots** – recent documented sightings of the species; **white dots** – undocumented recent sightings of the species; * – the closest unconfirmed recent occurrence of the species in North Moravia (Bečva River, Black Sea drainage area); **1** – fossils discovered in the Mladeč caves in North Moravia (the Morava River basin, Black Sea drainage area); **2** – fossils discovered in the Frog Cave (Jaskinia Żabia, Poland)

cies live syntopically (together) within deep-cut river valley ecosystems. In connection with this, the historic occurrence of the European green lizard near the town of Ustron in the Polish part of Silesia (Juszczyk 1987) should be mentioned. Polish sightings of the European green lizard are only 27 and 17 km away from the Haviřov dice snake population and the Polish sightings of the same species. Also, it is highly likely that the European green lizard occurred in the Czech part of Silesia as well as in North Moravia in the past (Hudeček & Šuhaj, 1993). At present, this species of lizard doesn't occur in Silesia.

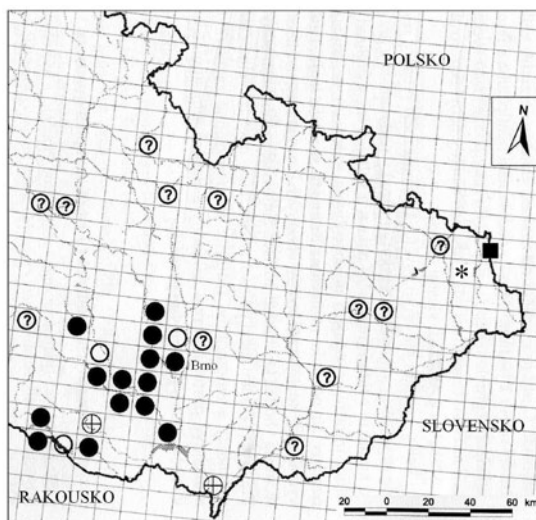
The discovery of a prospering dice snake population near Haviřov naturally provoked consideration of its origin. The ability of the species to migrate and its proximity (10 km) to the border with the Republic of Poland showed the theoretical possibility of its occurrence also in the Polish part of Těšin Silesia. Up until fairly recently, the dice snake hadn't been reported in Poland (Juszczyk 1987, Najbar 1995, Gruschwitz et al. 1999, Berger 2000). We informed Dr. Bartłomiej Najbar from the university in the Polish town of Zielona Góra

about the situation regarding its occurrence in the Czech part of Silesia, closely adjacent to the southern border of Poland. Dr. Najbar observed and photographed a juvenile dice snake individual on 13th July 2009 during exploration of the terrain on the Polish bank of the Olza River between the villages of Kaczyce Górne and Brzezówka (241 m above sea level, quadrature No. 6177). It is absolutely the first confirmed occurrence of this species in the Republic of Poland (Viček et al. 2010). The link between this discovery and the Haviřov population will be the subject of further investigation.

Many published as well as unpublished findings of varying informative value from this newly described drainage area confirm the theory which we support, i.e., that it is an original population in a new drainage area. Also, credible oral information from local inhabitants is in favour of the possibility of the autochthonous origin of the Haviřov population. For example, Jiří Jančar observed the dice snake, which he distinguishes well from the grass snake, in the Sušanka reservoirs for the first time in 1954 or 1955, when he was still a child; and he has



Not long after it had been disturbed, the dice snake raised itself and checked its surroundings. A shot from the water surface of reservoir N 2 in Havířov



Natrix tessellata (Laurenti, 1768)

- * occurrence of the stable population in Czech Silesia with an aerial view of the range area
- confirmation of the species occurrence in Polish Silesia
- species occurrence in 1990-2001
- species occurrence in 1960-1989
- ⊕ species occurrence prior 1960
- ⊙ problematic figure

Map of the eastern part of the Czech Republic, with locations of dice snake occurrences in Moravia and Silesia marked (adapted according to Mikátová et al. 2001). On the right, there is an aerial view of the Sušanka reservoir in Havířov, where the only stable population of the dice snake in Silesia was discovered

been spotting them in this locality ever since, right up to the present day. (The last time he saw one was in 2010.) He has, however, reported a notable decrease in the number of snakes.

We assume that a remnant of a larger population left over from what was a warmer period of the current interglacial (comp. e.g. Böhme 1989) lives on the southern edge of the Baltic Sea drainage area. A genetic comparison of the three metapopulations in the Czech Republic from the Black, North, and now also the Baltic Sea drainage areas is still waiting to be processed.

At the same time, our summary of published news and oral reports of sightings of the dice snake in Czech Silesia (Viček et al. 2011) suggests rather the autochthonous origin of the species in this territory. However, it needs to be pointed out that none of these observations have been checked so far, though many of them

come from credible zoologists. Also of value is the finding of a dead dice snake in a location not far from the Morávka River, in the Moravian-Silesian Beskids. This individual is kept preserved in alcohol without localization at the Faculty of Science at Ostrava University. Also, the above-mentioned sightings in the drainage area of the Bečva River (Mikátová et al. 2001) in North Moravia undeniably deserve increased attention.

The sightings from Silesia and from North Moravia probably confirm that the population is a remnant of a natural recent occurrence in this region. Rich findings of dice snake fossils from the lower Pleistocene (lower Biharian) in Mladeč Caves in the Olomouc region show that, in this period, a continuous area containing this species still probably reached up to today's northern border of the Czech Republic (Ivanov 1997a). This assumption is also confirmed indi-

rectly by the finding of a fossil of a snake which is very similar to the dice snake (*Natrix cf. tessellata*) at an equally old location, Jaskinia Żabia. This lies near Podlesice, in Polish Silesia (Ivanov 1997b), which is only 105 km north-east from the Olza River, which in places constitutes the Czech-Polish border.

Based on these facts, we tentatively consider the occurrence of the dice snake in Silesia to be autochthonous.

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