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АНОМАЛИИ И ПАТОЛОГИИ АМФИБИЙ И РЕПТИЛИЙ:

Методология, эволюционное значение, возможность оценки здоровья среды

Материалы международной школы-конференции
Екатеринбург, 23–26 сентября 2013 г.

МИНИСТЕРСТВО ОБРАЗОВАНИЯ И НАУКИ РОССИЙСКОЙ ФЕДЕРАЦИИ
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DIVERSITY AND FREQUENCY OF AMPHIBIAN ANOMALIES IN SEMI-NATURAL AND ANTHROPOGENIC HABITATS IN THE CARPATHIAN BASIN

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Amphibian anomalies have been reported for a long time, with the first description dating back to the eighteenth century, when Vallisneri described an individual with five legs in Italy (1733). In recent times mass deformities have been the focus of herpetological research in the Northern Hemisphere for various reasons (pollution: see e. g. Flyaks, Borkin, 2004, parasite infection: see e. g. Johnson, Hartson, 2009, urban effects: see e. g. Vershinin, 1989).

Аномалии амфибий отмечаются исследователями в течение продолжительного периода времени – первые упоминания относятся к XVIII в., когда Vallisneri описал особь с пятью ногами в Италии (1733). В последнее время массовые аномалии находятся в центре внимания герпетологических исследований в северном полушарии по различным причинам (загрязне-

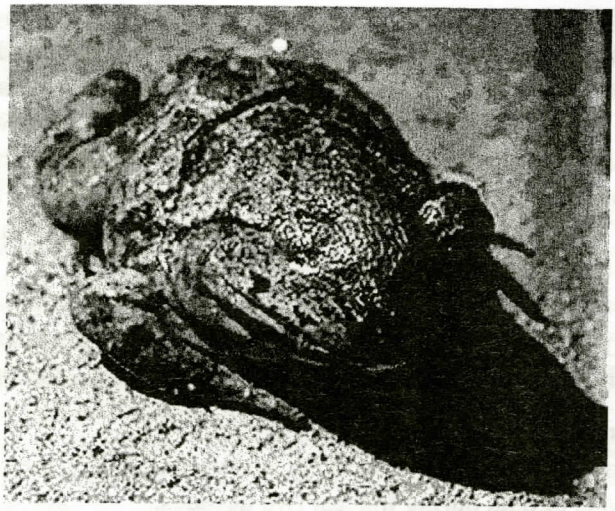
ние: см., напр., Flyaks, Borkin, 2004; паразитарная инфекция: Johnson, Hartson, 2009; влияние урбанизации: Vershinin, 1989).

Recording amphibian anomalies started with describing specimens with large additive body parts (i. e. legs) in the Carpathian Basin. The first note was published in 1910 by Méhely describing a *Hyla arborea* individual with five legs. It was followed by a more detailed paper on a *Pelophylax* (*Rana*) *esculentus* specimen by Dely five decades later (1960), who suggested it was the result of unsuccessful predation during the tadpole phase.

Individual observations on amphibian anomalies have become more frequent from the 1990s. As there was no such methodological description, a survey protocol based on 12 years of field experience was also developed [Fodor, Puky, 2002]. In contrast to only one deformity type recorded from two individuals of two species previously, 13 deformity types were described in 13 taxa and mass events were also detected and analysed from 1994. In recent years professional observations are even complemented by citizen science participants in this field. In the «Watch, create, improve» Carpathian Basin Amphibian and Reptile Photo Data Collection System [Tóth, Puky, 2012], for example, an anopthalmic *Pelobates fuscus* was recorded from Slovakia (Figure).

Approximately 80 % of all deformities described occurred along the Rivers Danube, Ipoly and Tisza [Puky, Fodor, 2002].

The detailed study of amphibian anomalies has also become more intensive from the end of the 1990s in the Carpathian Basin. A very recent example is the work of Mester et al. (2013), who investigated the health status of amphibians in a highly protected semi-natural area, the Egyek-Pusztakócs marsh system, in the Hortobágy National Park, Hungary. They investigated over 5,200 individuals and found a low frequency of anomalies (18 cases in total). Anomalies occured in three strongly water-bound taxa, the *P. esculentus* complex, *Bombina bombina* and *Triturus dobrogicus,* while they could not find anomalies in another six species [Mester et al., 2013]. Ectromely was present in 60 % of the cases mainly in juvenile anurans (*Bombina bombina*, *Pelophylax esculentus* complex). Among deformed newts (*Triturus dobrogicus*) one with a duplicated tail was caught, which is a very rare morphological



Pelobates fuscus with a missing eye from Lucenec, Slovakia, data collected through the «Watch, create, improve» Carpathian Basin Amphibian and Reptile Photo Data Collection System (Photo: Péter Kalmár)

anomaly [Henle et al., 2012]. Because in all other cases limb or tail reductions were recognised, the observed anomalies may be caused by predators, such as birds or fish, which can be abundant in the Egyek-Pusztakócs marsh system.

Similar results were also found in Romania, where a *Pelobates fuscus* population breeding in a mosaic of permanent and temporary ponds and puddles was investigated near Cluj-Napoca for three years [Székely, Nemes, 2003]. Out of 244 individuals, three toads presented polyphalangy, 8 toads were missing 10 toes, and three were missing the lower portion of their arms. Apart from these observations, two male toads presented anophthalmia, which sums up in an anomaly frequency well below 10 %.

From the early 1990s the frequency of amphibian anomalies was often well above the 2 % background value worldwide, frequently reaching 10–30 % in the 1990^{s} and 2000^{s} with occasional findings up to 69–80 % due to e. g. severe pesticide pollution, urban effects, etc. [Dubois, 1979; Quellet et al., 1997; Vershinin, 1989].

Mass anomalies (up to a frequency of 71 %) also occurred in the Carpathian Basin. In the Gemenc floodplain of the Danube, Hungary, the frequency was over 3 % in several species over several years. In two cases the length and weight of juveniles showing anomalies were also significantly shorter and lighter ($p < 0,01$) than those of healthy individuals [Puky, 2006] in the floodplain. Such events were only recorded when the Danube flooded the area, which emphasises the importance of the water in the process.

Since the 1990s amphibian anomalies have been recognised more frequently in the Carpathian Basin than previously. This phenomenon stresses the importance of further studies, especially on floodplains.

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TAIL LOSS AND ANOMALY IN *ZOOTOCA VIVIPARA* AND *LACERTA AGILIS* IN HUNGARY

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An article concerned with tail's morphological anomaly that was founded between L. agilis from different regions of Hungary. No anomalies in Z. vivipara sampled were found.