

*HERPETOLOGIA
PETROPOLITANA*

**Proceedings
of the
12th Ordinary General Meeting
of the
Societas Europaea Herpetologica**

12 – 16 August 2003
Saint-Petersburg, Russia



Edited by
Natalia Ananjeva and Olga Tsinenko

Saint-Petersburg, 2005

HABITAT VARIATION IN *Rana arvalis* OF NORTHEASTERN UKRAINE

I. Kotserzhynska¹

Keywords: *Rana arvalis*, short-legged and long-legged forms, habitat differentiation.

INTRODUCTION

The moor frog, *Rana arvalis* Nilsson, 1842 is a widely distributed Eurasian species ranging from eastern France and the Netherlands in the west to Yakutia in the east, and from the Polar Circle, southern Yamal Peninsula and Putoran Plateau in the north to the southern part of the Pannonian Basin, Altai Mountains, and Transbaikalia in the south (Borkin, 1998).

Previously, the frogs of the Pannonian lowlands (including Transcarpathian Ukraine) were assigned to a separate subspecies *R. a. wolterstorffi* Fejérváry, 1919, while frogs from the northern area of the Pannonian Basin were recognized as *R. a. arvalis* Nilsson, 1842. The former subspecies is characterized by slender habitat with longer hind legs and larger body size (Fejérváry, 1919). According to Tarashchuk (1984), the long-legged form inhabits both Transcarpathia and some central and southern regions of Ukraine. Other authors, however, questioned the validity of *R. a. wolterstorffi* (Shcherbak and Shcherban, 1980; Babik and Rafiński, 2000). They suggested that the body shape differences in this species may be resulted from the phenotypic plasticity and clinal variation correlating with local climatic factors. Moreover, genetic divergence between those groups proved to be relatively low (Rafiński and Babik, 2000). Indeed, *R. arvalis* demonstrated obvious clinal variation in the leg length (Toporkova, 1965; Bannikov et al., 1977; Ishchenko, 1978): the southern frogs have longer legs in comparison with that of the northern latitudes.

In northeastern Ukraine, both forms of *R. arvalis* were found in the same territory but in different habitats.

MATERIAL AND METHODS

The studies of *R. arvalis* populations were carried out in 2000 – 2003 in the Desnyansko-Starogutskii National Nature Park and adjacent territories (Sumy Oblast', northeastern Ukraine, the forest zone, Fig. 1), throughout an

area of about 42 × 16 km. Four kinds of habitats were recognized: the coniferous forest, the deciduous forest, bogs, and river meadows. 323 frogs were registered by the transect sampling method. Among them, 110 individuals, including males, females, and juveniles, were taken for morphometric measuring (33 from a pine forest, 35 from river meadows, 27 from oak-and-birch forests, 8 from a wooded river bank, and 7 from a marsh). After treatment, all animals were released to habitats, respectively. For each frog 24 external measurements (in mm) were taken with a calliper (with an accuracy of 0.1 mm): L., L.c., Lt.c., D.r.n., Sp.n., D.r.o., D.n.o., L.o., L.tym., D.tym.o., Sp.oc., Lt.p., Sp.p., L.m., D.p., Lt.m., F., T., C.s., D.p.4, Lt.c.s., D.p.1, C.int., H.int. Eventually, 15 indices were calculated: L./L.c., L.c./Lt.c., L.c./Sp.n., L.c./L.o., L.c./L.tym., L.c./D.r.o., Sp.oc./D.r.o., D.p.1/C.int., T./C.int., L./T., F./T., D.p.1/D.p.4, D.p.4/C.int., L./(F. + T.), C.int./H.int. 44 samples (817 specimens) from Ukraine and 2 samples (46 specimens) from Russia were analyzed with respect to the hind leg length. Standard statistical methods (factor and cluster analyses, *t*-test) were used. Calculations were performed using STATISTICA 5.0.



Fig. 1. Region of investigation.

¹ Schmalhauzen Institute of Zoology, National Academy of Science of Ukraine, Bogdana Khmel'nitskogo 15, 01601 Kiev, Ukraine; E-mail: kotserzh@hotbox.ru.

steppe and forest-steppe zones, and the forest zone covers the northern and mountain regions only. Our results, therefore, can be regarded as an evidence that, as a rule, the long-legged form of *R. arvalis* inhabits the steppe and forest-steppe zones while the short-legged form occurs in the forest one.

Thus, in northeastern Ukraine, the both forms of the moor frog can be found, however, they inhabit different habitats. It seems likely that the southern long-legged form spreaded across steppe and disturbed areas (including pine forests) near large rivers, while the short-legged form invaded from Russia through native deciduous forests. In the territory under the study, the two forms of *Rana arvalis* are sympatric.

So far it is not possible to assert whether these forms of the moor frog have genetic differences or they are merely ecological races based on epigenetic phenomenon (like some fishes). Appropriate genetic studies are going to be arranged in the nearest future. However, the problem is that the draught of the last two years caused a significant decline in local populations of the moor frog. Further research will only be possible if its populations will renew.

Acknowledgments. I am very grateful to M. A. Kaporulya, the Director of the Desnyansko-Starogutskii National Park, S. Panchenko and G. Gavris for their help during the field work as well as to E. M. Pisanets (Kiev, Ukraine) for an opportunity to work with museum collections. L. J. Borkin (St. Petersburg, Russia) and L. Luiselli (Rome, Italy) provided valuable, and sometimes, critical comments, and D. Palets (Kiev, Ukraine) made English corrections.

REFERENCES

- Babik W. and Rafiński J.** (2000), “Morphometric differentiation of the moor frog (*Rana arvalis* Nilss.) in Central Europe,” *J. Zool. Syst. Evol. Res.*, **38**, 239 – 247.
- Bannikov A. G., Darevsky I. S., Ishchenko V. G., Rustamov A. K., and Shcherbak N. N.** (1977), *Guide to Amphibians and Reptiles of the USSR [Opredelitel' Zemnovodnykh i Presmykayushchikhsya SSSR]*, Prosveshchenie, Moscow [in Russian].
- Borkin L. J.** (1998), “Amphibians,” in: Ananjeva N. B., Borkin L. J., Darevsky I. S., and Orlov N. L. (eds.), *Amphibians and Reptiles. Encyclopedia of the Nature of Russia [Zemnovodnye i Presmykayushchiesya. Éntsiklopediya Prirody Rossii]*, ABF, Moscow, pp. 19 – 174 [in Russian].
- Fejérváry G. J.** (1919), “On two south-eastern varieties of *Rana arvalis* Nilss.,” *Ann. Mus. Nat. Hung.*, **17**, 178 – 183.
- Ishchenko V. G.** (1978), *Dynamic Polymorphism in Brown Frogs of the USSR Fauna [Dinamicheskii Polimorfizm Bur'ykh Lyagushek fauny SSSR]*, Nauka, Moscow [in Russian].
- Rafiński J. and Babik W.** (2000), “Genetic differentiation among northern and southern populations of the moor frog *Rana arvalis* Nilsson in Central Europe,” *Heredity*, **84**, 610 – 618.
- Shcherbak N. N. and Shcherban M. I.** (1980), *Amphibians and Reptiles of Ukrainian Carpathians [Zemnovodnye i Presmykayushchiesya Ukraïnskikh Karpat]*, Naukova Dumka, Kiev [in Russian].
- Tarashchuk S. V.** (1984), “On the variation in *Rana arvalis* in the territory of Ukraine,” *Vestnik Zool. Kiev*, **5**, 80 – 82 [in Russian].
- Toporkova L. J.** (1965), “On the geographic variation of amphibians,” *Dokl. Vyssh. Shkoly. Biol. Nauki*, **1**, 31 – 36 [in Russian].