

## AMPHIBIANS AND REPTILES OF MOLDAVIA: ADDITIONS AND CORRECTIONS, WITH A LIST OF SPECIES

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The hybrid *Rana esculenta* (diploid) is first recorded for Moldavia. *Bombina variegata* was previously confused with *B. bombina*, as well as *Rana dalmatina* was confused with the long-legged *R. arvalis*. The first confirmed locality of *Lacerta vivipara* is given. The occurrence of *Eremias arguta* in Moldavia is mentioned. The check-list of 12 species of amphibians and 15 species of reptiles of Moldavia is published.

**Key words:** *Bombina*, *Rana esculenta* complex, *Rana dalmatina*, *Lacerta vivipara*, *Eremias arguta*, genome size, check-list, Moldavia.

### HISTORICAL BACKGROUND

Above 150 years ago, first data on amphibians and reptiles of Moldavia have been published. Nordmann (1840) listed 13 species of reptiles collected by the Demidoff's Expedition to the Pontic [Black Sea] area of the Russian Empire and adjacent countries. The Expedition's team has also visited the territory of recent Moldavia. Only one species, "*Coluber trabilis*" [now *C. caspius*], was reported to have obviously Moldavian record ("pres de Bender").

In his general review of "natural history of Bessarabia," Tardent (1841, quoted from Brauner, 1907; Tofan, 1966a) mentioned several kinds of herpetiles, without Latin names (a tortoise from Akkerman, some frogs and toads, the "wall" and "green" lizards, and "water" snakes). However, Tofan (1966a) suggested that these animals were found from the vicinity of Akkerman town (now Belgorod Dnestrovskiy, Odessa Region, Ukraine) where Tardent has stayed.

Doengingk (1857) published a short note with a table of first spring appearances of animals in Kishinev (now Chişinău) area between 1845 and 1856. His table included a green frog, the common toad and the sand lizard.

Kulagin (1888) mentioned five species of anurans (1), lizards (3) and snakes (1). Animals were pre-

sented by A. N. Korchagin and F. F. Kavrajsky mostly from the vicinity of Kishinev.

Brauner (1907) published the first quite complete list consisting of 26 species of amphibians and reptiles of "Bessarabia." A. I. Osterman (1912) described the collection of the Bessarabian Museum which included 19 species (eight amphibians and eleven reptiles) originated from "Bessarabia," and only a few species were supplied with more detailed labels. These animals have been collected by her husband F. F. Osterman, the former curator of the Museum. Some Museum (F. F. Osterman and A. I. Osterman) data were used by Brauner (1907) as well.

Long time, Bessarabia was a province of the Russian Empire. Since 1918, "Basarabia" became a province of Romania. In his review of the herpetofauna of the country, Călinescu (1931) also compiled data on the Bessarabian amphibians and reptiles based mostly on Brauner (1907)'s paper (incorrectly cited as "1908"). Among his 12 amphibian species of Bessarabia, only seven ones were evidenced by localities to belong to the territory of current Moldavia (Table 1).

Bessarabia covered almost all territory of the nowadays Republic of Moldova (the former Moldavian SSR within the USSR, not to be confused with Moldavia, sometimes "Moldova," the eastern part of Romania) and some adjacent areas of Ukraine (the northernmost portion of Bessarabia named Bessarabian Bukovina is currently a part of Chernovtsy Region, Ukraine; southern Bessarabia is a part of Odessa Region, Ukraine). The recent boundaries of Mol-

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TABLE 1. The Lists of Amphibians and Reptiles of Moldavia Presented by Various Authors

Species	References								
	1	2	3	4	5	6	7	8	9
<b>AMPHIBIANS</b>									
1. <i>Salamandra salamandra</i>	–	+	–	–	–	?	+	–	–
2. <i>Triturus cristatus</i>	+	+	+	+	+	+	+	+	+
3. <i>Triturus vulgaris</i>	+	–	–	+	+	+	+	+	+
4. <i>Bombina bombina</i>	+	+	–	–	+	+	+	+	+
5. <i>Bombina variegata</i>	–	–	–	–	?	+	+	+	+
6. <i>Pelobates fuscus</i>	?	+	–	+	+	+	+	+	+
7. <i>Bufo bufo</i>	+	–	+	+	+	+	+	+	+
8. <i>Bufo viridis</i>	+	+	+	+	+	+	+	+	+
9. <i>Hyla arborea</i>	+	+	+	+	+	+	+	+	+
10. <i>Rana arvalis</i>	+	–	+	–	–	+	+	+	+
11. <i>Rana dalmatina</i>	+	–	+	–	+	+	+	+	–
12. <i>Rana lessonae</i>	–	–	–	+	+	+	+	+	+
13. <i>Rana ridibunda</i>	+	+	+	+	+	+	+	+	+
14. <i>Rana temporaria</i>	–	+	–	–	+	+	+	+	+
<b>Total:</b>	9	8	7	8	11	13	14	13	12
<b>REPTILES</b>									
15. <i>Emys orbicularis</i>	+	+	+	+	+	+	+	+	+
16. <i>Anguis fragilis</i>	+	+	+	+	+	+	+	+	+
17. <i>Pseudopus apodus</i>	–	–	–	+	–	?	–	–	–
18. <i>Eremias arguta</i>	–	–	–	–	+	+	+	+	+
19. <i>Lacerta agilis</i>	+	+	+	+	+	+	+	+	+
20. <i>Lacerta viridis</i>	+	+	+	+	+	+	+	+	+
21. <i>Podarcis taurica</i>	–	–	–	–	–	+	+	+	+
22. <i>Coluber caspius</i>	?	+	+	–	+	+	+	+	+
22. <i>Coronella austriaca</i>	+	+	+	–	+	+	+	+	+
23. <i>Elaphe longissima</i>	+	+	+	–	+	+	+	+	+
24. <i>Elaphe quatuorlineata</i>	+	+	+	–	+	+	+	+	+
25. <i>Natrix natrix</i>	+	+	+	+	+	+	+	+	+
26. <i>Natrix tessellata</i>	+	+	+	+	+	+	+	+	+
27. <i>Vipera berus</i>	+	+	+	–	+	+	+	+	+
28. <i>Vipera ursinii</i>	+	–	+	–	+	+	+	+	+
<b>Total:</b>	11	11	12	7	12	14	14	14	14
<b>Grand total:</b>	20	19	19	15	23	27	28	27	26

**Note.** 1, Brauner (1903, 1905, 1907); 2, Osterman (1912); 3, Călinescu (1931); 4, Chepurinov et al. (1953); 5, Didusenko (1959, 1964, 1966); 6, Tofan (1965, 1966a, 1966b, 1967a, 1967b, 1970a, 1970b, 1970c); 7, Ganya (1981); 8, Popa and Tofan (1982); 9, Kozar (1987).

davia (as a part of the USSR) have been established in 1940. Therefore, only 20 out of 26 Bessarabian species listed by Brauner (1907) did belong to the Moldavian fauna.

In the Soviet epoch, the Moldavian herpetofauna has been studied by zoologists of the Kishinev State University and of the Tiraspol State Pedagogical Institute. The former group mainly consisting of ichthyologists mostly has focused on the southern part of Moldavia and published two lists (Chepurinov et al., 1959; Didusenko, 1959; see Table 1). Dr. V. E. Tofan from Tiraspol became the first profes-

sional herpetologist of the country. He has received his Ph. D. (1966a) in Leningrad (now St. Petersburg) State University. Tofan's research was based on extensive sampling covering almost all parts of Moldavia. The last list of the herpetofauna of the republic has been published by Kozar (1987), also from Tiraspol.

Since Brauner's time, the herpetofauna of Moldavia is considered to be well known. However, the lists presented by various authors are quite different (Table 1).

This paper presents some comments on amphibians and reptiles of Moldavia based on our field and



**Fig. 1.** Distribution of *Bombina bombina* in Moldavia: 1, Kagul; 2, Gotești, 3, Cantemir; 4, Ungeni; 5, Nisporeni; 6, Vulcănești; 7, Kishinev; 8, Lipkani; 9, Lipnik; 10, Ataki; 11, Fitnica; 12, Cetrosi; 13, Soroki; 14, Sturzeni; 15, Bel'tsy [= Bălți]; 16, Leninskii; 17, Curaturi; 18, Erzovo; 19, Novo Limbeni; 20, Rezina; 21, Pohribeni; 22, Susleni; 23, Malovata; 24, Orgeyev; 25, Moroseni; 26, Ivanča; 27, Todirești; 28, Cornești; 29, Redeni Forest Reserve; 30, Volčinec; 31, Čutești; 32, Seliști; 33, Tuzora; 34, Vorniceni; 35, Bykovec; 36, Capriani; 37, Kodry Reserve; 38, Kharitonovka near Kishinev; 39, Vasieni; 40, Delaceu; 41, Gura-Bikului; 42, Cickani; 43, Tomai; 44, Zloti; 45, Abaklia; 46, Nezavertailovka; 47, Olanești, Purkari; 48, Palanka; 49, Roșu; 50, Cairaklia; 51, Etulia. References: Didusenko (1959): 41, 48; Stugren and Popovici (1961): 24; Tofan (1965): 26; Tofan (1966a): 8–18, 22–28, 30, 31, 33–36, 39–47, 49–51; Tofan (1966b): 26, 31, 32; Stugren (1980): 19–21, 38, 47; Kozar (1987): 29, 37; our samples (▲): 1–7; *B. bombina* (●): 8–25, 27, 29, 30, 34, 37–51; Tofan's "*B. variegata*" (●): 26, 28, 31–33, 35, 36.

museum studies. The data on occurrence of the Danube newt, *Triturus dobrogicus*, have been already published (Litvinchuk and Borkin, 1995).

## MATERIAL AND METHODS

In the course of field trips associated with our study of newts of the *Triturus cristatus* superspecies and discoglossid toads of the genus *Bombina*, Litvin-

chuk has collected some amphibians and reptiles from the territory of Moldavia. Small samples have been taken from the southern and central parts of the country (in 1995 and 1996, respectively). The specimens are deposited at the Zoological Institute, Russian Academy of Sciences, St. Petersburg (ZISP).

Administrative boundaries of districts of Moldavia are given in concordance with Levadnyuk (1990).

The amount of nuclear DNA (genome size) from erythrocytes was measured by means of flow cytometry for each specimen. Mouse thymocytes and erythrocytes of *Rana temporaria* were used as the standard. The details of the technique have been published by Borkin et al. (1987) and Vinogradov et al. (1991).

## RESULTS AND DISCUSSION

### 1. *Bombina variegata* or *B. bombina*?

Based on the occurrence of *Bombina variegata* in Romania ("Moldavia"), Nikolsky (1905, p. 414, as "*Bombinator pachypus*"; 1918, p. 177, as "*Bombina salsa*") suggested that the species might occur in Bessarabia. Chepurnov et al. (1953) recorded *B. variegata* from the lower Dniestr River between Bendery and Palanka, without any mention on *B. bombina*. However, Didusenko (1959) who collaborated with V. S. Chepurnov pointed out significant variation in the belly coloration of local *B. bombina*. He recognized two kinds of this species in southern Moldavia: the former is a slender form with sharp snout, and the latter is stouter one with wider snout. He also mentioned that the occurrence of *B. variegata* should be confirmed by an examination of additional samples from various parts of Moldavia. Tofan (1965, 1966a, 1966b, 1970a) has also rejected Chepurnov's identification, however, he recorded *B. variegata* from seven localities in the Kodry [= Codru] Height area (Fig. 1).

Tofan mentioned that the belly coloration in Moldavian bombinas is quite variable. He himself examined samples consisting of preserved animals only, and his species identification was based on five body proportions: 1) the head length to the body length, 2) the distance between the nostril and eye to the distance between eye and snout tip, 3) the width of palpebra to the minimum distance between palpebrae, 4) the tibia length to the foot length, and 5) the tibia length to the body length. Tofan (1970a) found no differences in habitats between his presumed "*B. va-*

*riegata*” and *B. bombina*. Moreover, sometimes he recorded both species in the same water bodies (in the Kodry Height area). Tofan’s data were adopted by other authors (e.g., Bannikov et al., 1977, map 11; Rakul et al., 1984; Kozar, 1987).

In the course of our study on the hybridization between these species in Ukrainian Transcarpathians, we collected some samples in adjacent areas and countries. We have examined many samples using DNA flow cytometry and protein electrophoresis (Khalturin et al., 1996). In a framework of our study, Moldavian *B. variegata* would be of special interest. In 1995 and 1996, we (Litvinchuk) collected seven samples from central and southern Moldavia (Fig. 1). One locality (the village Vulcănești, Nisporeni District) is situated in Tofan’s area of *B. variegata* at a distance of 3 – 10 km from villages Seliști and Čutești listed by Tofan (1966a, 1966b).

Table 2 presents the genome size variation in various populations of *B. bombina* and *B. variegata*, including some samples from allopatric areas. All samples from Moldavia have genome size which is very similar to that of *B. bombina* rather than of *B. variegata*. More detailed paper devoted to hybridization between and distribution of both *Bombina* will be published elsewhere.

Thus, we incline to reject *B. variegata* from the list of the Moldavian herpetofauna.

## 2. Green frogs (*Rana esculenta* complex)

Green frogs are widely distributed throughout the territory of Moldavia and occupy all suitable water bodies. The first confirmed record seemed to be published by Doengingk (1857) as “*Rana aquatica viridis*” from Kishinev. Brauner (1905, 1907), Nikolsky (1918) and V. Tarashchuk (1959, map 1) have mentioned the marsh frog, *R. ridibunda* only. However, other authors (e.g., Chepurnov et al., 1953; Didusenko, 1959; Tofan, 1967a, 1967b; Popa and Tofan, 1982; Rakul et al., 1984; etc.) recognized two species: *R. ridibunda* and *R. lessonae* (mainly as “*R. esculenta*”). The former species occurs everywhere. The latter one is considered to be markedly rarer, and Tofan (1967b) mapped six localities only; one of them is situated in the Kodry Height area. Kozar (1987) added two more records of *R. lessonae* from this area: the reserves Kodry and Redensky Les [= Redeni Forest, Ungeni District]. Unfortunately, these authors provided no evidence for reliable identification of the species.

Litvinchuk has also collected a sample of seven frogs alive from the Kodry area (the village Vulcănești, Nisporeni District). Frogs were easily separated into two groups by the amount of nuclear DNA, in relative units as compared with *R. temporaria*: six hybrids of *R. esculenta* (1.412 – 1.416) and one *R. ridibunda* (1.516). All the hybrids were diploid. The level of differences is in good concordance with our numerous data from other regions (Borkin et al., 1987; Vinogradov et al., 1991). Thus, the Vulcănești sample is the first confirmed record of the hybrid form *R. esculenta* for Moldavia. However, this taxon seems to be wider distributed in the forested and forest-steppe areas of Moldavia, in the river valleys in particular.

Unfortunately, we failed to find *R. lessonae* in the Kodry forest area. We suggested that at least some frogs mentioned by previous authors under the names “*R. esculenta lessonae*” or “*R. lessonae*” might belong to the hybrid form. However, true *R. lessonae* could occur in the forest area and in local kind of swamps (“plavni”) situated in the river valleys. Therefore, we incline to classify *R. lessonae* as a presumable species for Moldavia.

## 3. The agile frog, *Rana dalmatina*

This slender brown frog has been mentioned by many authors (Table 1). Brauner (1907) published the first records of “*R. agilis*” from Rezina, Orgeyev (now Rezina) District, and Zagorna, Soroki District; his third locality (Klishkovtsy, Khotin District) is

TABLE 2. Genome Size Variation in *Bombina bombina* and *B. variegata* (as Compared with *Rana temporaria*)

Species, locality		The amount of nuclear DNA (min – max), rel. u.
<b><i>Bombina bombina</i></b>		
1.	Moldavia ( <i>n</i> = 47)	1.894 – 1.918
	Kagul (5)	1.897 – 1.918
	Cantemir (3)	1.906 – 1.913
	Ungeni (3)	1.894 – 1.913
	Gotești (14)	1.897 – 1.912
	Nisporeni (12)	1.896 – 1.914
	Vulcănești (9)	1.894 – 1.910
	Kishinev (1)	1.917
2.	Ukraine ( <i>n</i> = 143)	1.875 – 1.923
3.	Sapanca Lake, Turkey (26)	1.878 – 1.901
<b><i>Bombina variegata</i></b>		
1.	Ukraine ( <i>n</i> = 132)	1.774 – 1.810
2.	Romania ( <i>n</i> = 15)	1.778 – 1.800

currently situated in Chernovtsy Region, Ukraine. This reference was quoted by Nikolsky (1918) and Călinescu (1931).

Didusenko (1959) collected "*R. dolmatica*" in the vicinities of Soroki, Soroki District, and Losovo, Nisporeni District, situated in northern and central Moldavia (the Dnestr River, and Kodry areas). Surprisingly, his faunal list lacked *R. arvalis* (Table 1).

According to Popa and Tofan (1982), among brown frogs of Moldavia, *R. dalmatina* has the largest distribution in the country. The species inhabits the forest and forest-steppe areas and is very common in the central part (the Kodry Height), especially in the Reserve Redensky Les, Ungeni District. Tofan (1966a) mapped 16 localities scattered on many districts of Moldavia. He identified "*R. dalmatina*" (personal communication to Kozar, 1987) using only one very variable character, namely, the relative length of hind legs (the tibiotarsal articulation of hindlimb stretched along the body length protrudes beyond the snout tip). Thus, all long-legged frogs have been assigned by Tofan to *R. dalmatina*. However, sometimes this feature is also expressed in *R. arvalis*, especially in *R. a. wolterstorffi* Fějerváry, 1919 which is distributed in Hungary, Romania, and, probably, western Ukraine (Tarashchuk, 1984; our data). Kozar (1987) has failed to find true *R. dalmatina* in the localities mentioned by Tofan (in Ganya, 1981), and he assumed that Tofan confused *R. dalmatina* with *R. arvalis*. We follow Kozar's explanation and refer Moldavian "*R. dalmatina*" to the synonymy of *R. arvalis*. It could be mentioned that long-legged specimens of some brown frogs (*R. arvalis*, *R. macrocnemis*, and sometimes *R. temporaria*) were often recognized by previous authors (e.g., Brauner, 1903; Nikolsky, 1918) to be "*R. dalmatina*" (= *R. agilis*). So, three Brauner's specimens of "*R. agilis*" kept in the Institute of Zoology, Ukrainian Academy of Science, Kiev, were re-examined by Tarashchuk (1984) and were assigned by him to *R. arvalis*. Thus, in the territory of the former USSR, the agile frog is restricted to the Carpathian area (Zakarpatskaya Region, Ukraine) only where it inhabits plains and foothills (Szczerbak and Szczerban', 1980; our data).

#### 4. *Eremias arguta deserti* (Gmelin, 1789)

Many authors included this species in the list of Moldavian herpetofauna (Table 1). Brauner's (1907) record from the southern Bessarabia (Akkerman, now Belgorod Dnestrovskiy) is currently situated in

Odessa Region, Ukraine. Soukhoff (1927) and Charlemagne (1936) mentioned *E. arguta* from of Tiraspol District of Moldavia (villages Kuchurgan and Grebennyuki, respectively). However, later this territory has been joined to Odessa Region, Ukraine. Tofan (1966a, 1970c) failed to find this species in the former locality, where the steppe area proved to be transformed in agricultural landscape. The first confirmed localities of the species in Moldavia, in fact, were the village Volontirovka, Suvorovo District, and Čimișlia, Čimișlia District, situated in Budjak steppe. In his special monographs, Szczerbak (1974, 1993) mapped numerous localities covered all parts of the species' range, except Moldavia, and he did not quoted Tofan's papers.

#### 5. *Lacerta vivipara* Jacquin, 1787

Normally, the viviparous lizard, *Lacerta vivipara* has not been included in recent lists (e.g., Ganya, 1981; Popa and Tofan, 1982; Kozar, 1987). In the last Soviet guide book (Bannikov et al., 1977, map 83), the species range limit bypasses Moldavia as well. Nevertheless, *L. vivipara* was mentioned by some authors.

Brauner (1907) mentioned *L. vivipara* from the north of Bessarabia (the village Kolenkovtsy). Based on this paper, V. Tarashchuk (1959, p. 184) recorded the species for Moldavia. However, recently this locality is situated in Ukraine (Chernovtsy Region, Ukraine, see Fig. 2).

Nikolsky (1905, p. 159; 1915, p. 322) has mentioned *L. vivipara* from the vicinity of Kishinev, the capital of Moldavia. The record has been based on a specimen kept since 1887 in the Zoological Museum of Moscow University (No. 85) which was formerly identified by Kulagin (1888) as "*L. muralis*." However, Nikolsky's record was considered to be wrong (Burczak-Abramovich, 1954), and *L. vivipara* has not been included in the faunal lists of Moldavia by other authors. Nevertheless, I. S. Darevsky (personal communication) has also examined the Moscow specimen (an adult male, the current No. 2520), and he confirmed the correctness of Nikolsky's identification. It should be mentioned that other collectors failed to find the viviparous lizard in the vicinity of Kishinev.

According to Boulenger (1917, p. 14), "the southern limit of its [*L. vivipara*'s] distribution embraces... Moldavia..." However, his "Moldavia" is in fact a part of Romania.

Tofan (1965, 1966b) assumed that *L. vivipara* might be found in Moldavia but he did not provide any evidence.

Last spring (1996), Litvinchuk has collected two subadults of *L. vivipara* (and two more lizards were observed) in the northern border of a small village Vulcănești, Nisporeni District (Fig. 1), which is situated on the road between villages Nisporeni and Vorniceni at the distance of 10 – 12 km from the former village (not to be confused with larger Vulcănești, a district center in southern Moldavia). This hilly area covered by fragments of the broad-leaved forest is geographically recognized to be a part of the Kodry, the height with maximum altitude of 429 m above sea level. Lizards were found on the shore of pond disposed on the edge of a beech forest, at the elevation above 300 m. The pond was inhabited by newts *Triturus cristatus* and *T. vulgaris*, a discoglossid toad *Bombina bombina*, and green frogs as well as the grass snake, *Natrix natrix*. In the forest, the green lizard, *Lacerta viridis*, quickly climbing on trees, was observed.

Thus, unlike Nikolsky's debatable reference, our sample is the first confirmed record of *L. vivipara* for Moldavia. The Vulcănești population seems to be geographically isolated. The closest localities are known from eastern Romania at the distance about 175 air km and from western Ukraine at the distance about 200 km (Fig. 2).

Zoogeographically, the Moldavian record of *L. vivipara* is not surprising. Some boreal species of amphibians and reptiles with similar zoogeographic affinities reach the southern limit of their distribution in the Kodry Height. These are the grass frog, *Rana temporaria* and the adder, *Vipera berus*, mostly associated with the forest zone (Rakul et al., 1984).

The genome size variation in *Lacerta vivipara* and some lacertid lizards is represented in Table 3. The former species differs by genome size from *L. viridis* and *Podarcis muralis*. However, the DNA amount variation in *L. vivipara* and *L. agilis* is overlapped. Within *L. vivipara*, genome size of lizards originated from the broad-leaved (beech) forests, i.e., the first three samples, seems to be a little higher than that of other samples collected in the boreal zone.

## 6. An annotated list of amphibians and reptiles of Moldavia

This list is based on our field data, some museum collections, and reliable published information. Some

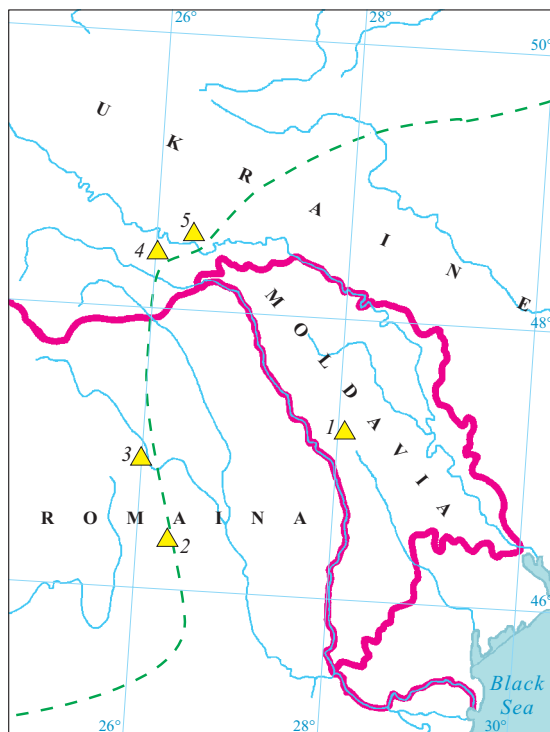


Fig. 2. The record of *Lacerta vivipara* in Moldavia (1 — Vulcănești), with the closest known records in Romania (2 — the Carpathians, Nemira Mountain, village Poiana Uzulei near the railroad station Dărmanești, 800 – 1000 m above sea level, ZISP No. 20577, by S. N. Litvinchuk, May 5, 1996; 3 — Čeahlau Mt.; Fuhn and Vancea, 1961), and Ukraine (4 — Kolenkovtsy; Brauner, 1907, and 5 — the village Zhvantso, Vinnitsa Province; Belke, 1859, “Zwanzietz”). The known range limit is marked by dashed line.

presumable species are briefly discussed as well. Every species is provided with a local synonymy, first reference, and distribution in Moldavia briefly outlined. The synonymy consists of only names which are different from those currently recognized. The collection data of the Department of Herpetology, Zoological Institute, St. Petersburg (ZISP) are attached as well.

## I. CONFIRMED SPECIES

### AMPHIBIANS

#### 1. *Triturus cristatus* (Laurenti, 1768)

*Molge cristata* — Brauner, 1907:156;  
Osterman, 1912:197, 228, 229.

*Molge cristata cristata* — Nikolsky, 1918:203.

*Triturus cristatus danubialis* — Călinescu, 1931:217.

*Triturus cristatus cristatus* × *T. c. dobrogicus* — Ostashko, 1976:97.

The first record, Ivanča, Orgeyev (= Orhei) District, has been published by Brauner (1907). The great crested newt is distributed in almost all parts of Moldavia (the Kodry Height, valleys of the Prut and Dneestr river basins), except the southernmost area in the Prut River Valley, where the species is replaced by *T. dobrogicus* (Litvinchuk and Borkin, 1996).

ZISP No. 2511 — Capriani, Straşeni District, V. Chernavin, August 29, 1911, 1 sp. [Nikolsky, 1918: “Kipriani (circ. Kischenew)”]; Litvinchuk and Borkin, 1995: “Kiperчени, Orgeyev District”).

ZISP No. 4335 — Vorniceni, Calaraş (Kalarash) District, V. E. Tofan, May 27, 1965, 53 sps. (Litvinchuk and Borkin, 1995).

ZISP No. 5436 — Cantemir, Leovo District, Prut River Valley, S. N. Litvinchuk, April 18, 1995, 1 sp. (Litvinchuk and Borkin, 1995: “Kantemir”).

ZISP No. 5437 — Vulcăneşti, Nisporeni District, S. N. Litvinchuk, May 8, 1996, 20 sps.

## 2. *Triturus dobrogicus* (Kiritzescu, 1903)

The first confirmed record of the species (Kagul town) has been published by Litvinchuk and Borkin (1995). The Danube newt seems to be distributed in southern Moldavia only, namely, in the Prut River Valley in Kagul (= Cahul) and Vulcăneşti districts. The species seems to be quite uncommon because of the drainage of local swamps (“plavni”).

ZISP No. 5438 — Kagul, Kagul District, Prut River Valley, S. N. Litvinchuk, April 18, 1995, 1 sp. (Litvinchuk and Borkin, 1995).

## 3. *Triturus vulgaris vulgaris* (Linnaeus, 1758)

*Molge vulgaris* — Brauner, 1907:156.

*Molge vulgaris vulgaris* — Nikolsky, 1918:226.

The first record (Zagorna, Soroki District) has been published by Brauner (1907). The smooth newt ranges all parts of Moldavia.

ZISP No. 2513 — Purkari, Suvorovo District, V. Chernavin, April 15, 1911, 1 sp. [Nikolsky, 1918: “Purkari (circ. Akkerman)”].

ZISP No. 4329 — Căteşti, Nisporeni District, V. E. Tofan, May 7, 1963, 40 sps.

ZISP No. 5439 — Vulcăneşti, Nisporeni District, S. N. Litvinchuk, May 8, 1996, 39 sps.

ZISP No. 5440 — Kishinev, S. N. Litvinchuk, May 9, 1996, 10 sps.

## 4. *Bombina bombina* (Linnaeus, 1761)

*Bombinator bombinus* — Brauner, 1907:156.

*Bombinator igneus* — Osterman, 1912:196.

*Bombina variegata* — Chepurinov et al., 1953:363; Tofan, 1965:123, 1970a:27; Tofan in Ganya, 1981:155; Popa and Tofan, 1982: 19; Kozar, 1987:81.

*Bombina variegata variegata* — Tofan, 1967a:6.

The occurrence of the species in Moldavia was first mentioned by Brauner (1907), unfortunately, without any exact locality. Recent data support Brauner’s suggestion that *B. bombina* ranges throughout Moldavia (Fig. 1).

ZISP Nos. 2441, 2443, 2444, and 2550 — Purkari, Suvorovo District, V. Chernavin, April 16, 1911, 6, 6, 6, and 6

TABLE 3. Genome Size Variation in Some Lacertid Lizards (Mouse Thymocytes are Reference Cells)

No.	Species, locality	The amount of nuclear DNA, rel. u.
1.	<i>Lacerta vivipara</i> ( $n = 14$ ) 0.553 – 0.576	
	Vulcăneşti, Moldavia (2)	0.570, 0.576
	Nemira Mts., Romania (1)	0.562
	Rakovets near L’vov, Ukraine (2)	0.563, 0.569
	Latvia (3)	0.553, 0.554, 0.559
	Boksitogorsk District, St. Petersburg Region, Russia (2)	0.553, 0.555
	Altay Mts., Russia (2)	0.556, 0.557
	Sakhalin Island, Russia (2)	0.553, 0.557
2.	<i>Lacerta agilis</i> ( $n = 10$ ) 0.550 – 0.566	
	Predel Pass, Romania (1)	0.564
	Ukrainian Transcarpathians:	
	Delovoe, Rakhov District (1)	0.566
	Uzhgorod (3)	0.550, 0.557, 0.559
	Ukraine, the Crimea:	
	Simferopol’ (2)	0.554, 0.555
	Chetyrdagh Mts. (3)	0.554, 0.558, 0.559
3.	<i>Lacerta viridis</i> ( $n = 1$ ), Graver Serie, France	0.593
4.	<i>Podarcis muralis</i> ( $n = 4$ ), La Haote Touche, France	0.609, 0.610, 0.615, 0.619

- sps. (Nikolsky, 1918: "circ. Akkerman"; Stugren, 1980).
- ZISP Nos. 4328 and 5075 — Etulia, Vulcănești District, V. E. Tofan, July 23, 1964, 2 sps., and July 17, 1964, 3 sps.
- ZISP No. 5387 — Kagul, Kagul District, Prut River Valley, S. N. Litvinchuk, April 18, 1995, 5 sps. (Litvinchuk and Borkin, 1995).
- ZISP No. 5389 — Cantemir, Leovo District, Prut River Valley, S. N. Litvinchuk, April 18, 1995, 3 sps. (Litvinchuk and Borkin, 1995: "Kantemir").
- ZISP No. 5391 — Ungeni, Ungeni District, S. N. Litvinchuk, April 19, 1995, 3 sps.
- ZISP No. 5441 — Gotești, Kagul District, S. N. Litvinchuk, May 7, 1996, 15 sps.
- ZISP No. 5442 — Nisporeni, Nisporeni District, S. N. Litvinchuk, May 8, 1996, 12 sps.
- ZISP No. 5443 — Vulcănești, Nisporeni District, S. N. Litvinchuk, May 8, 1996, 9 sps.
- ZISP No. 5444 — Kishinev, S. N. Litvinchuk, May 9, 1996, 2 sps.

### 5. *Pelobates fuscus fuscus* (Laurenti, 1768)

- Osterman (1912) pointed out that the species is distributed in Moldavia. However, her mention was not evidenced by any locality. Didusenko (1959) published the first confirmed record (Olanești, Suvorovo District). According to Tofan (1968a), as well as to Popa and Tofan (1982), *P. fuscus* ranges almost all parts of Moldavia but rare. However, Kozar (1987) underlined that the species is declined, and he proposed to enroll it in the Red Data Book of Moldavia.
- ZISP No. 5393 — Ungeni, Ungeni District, S. N. Litvinchuk, April 19, 1995, 1 sp.
- ZISP No. 5394 — Cantemir, Leovo District, Prut River Valley, S. N. Litvinchuk, April 18, 1995, 1 sp. (Litvinchuk and Borkin, 1995: "Kantemir").

### 6. *Bufo bufo bufo* (Linnaeus, 1758)

- Bufo vulgaris* — Doengingk, 1857:250; Brauner, 1907:155.
- The toad has been first recorded by Doengingk (1857) from Kishinev. This species ranges the whole of Moldavia, except the Budjak steppe.
- ZISP No. 5125 — Tiraspol, V. E. Tofan, June 26, 1961, 10 sps.

### 7. *Bufo viridis viridis* (Laurenti, 1758)

- Bufo viridis* — Brauner, 1907:155 (*ex errore*).
- The first records have been published by Brauner (1905, Rezina) and Nikolsky (1905, Kishinev). This is very common toad distributed in all parts of Moldavia.
- ZISP No. 455 — Kishinev, Kuschakewitsch, 1863, 1 sp. (Nikolsky, 1905, 1918).
- ZISP No. 460 — Bessarabia, Kuschakewitsch, 1866, 4 sps. (Nikolsky, 1905, 1918).

- ZISP No. 2467 — Leovo, Leovo District, V. Chernavin, July 14, 1911, 1 sp.
- ZISP No. 2568 — Purkari, Suvorovo District, V. Chernavin, April 12, 1911, 1 sp.

### 8. *Hyla arborea arborea* (Linnaeus, 1758)

- Rezina, Orgeyev (now Rezina) District, has been the first record of tree frogs (Brauner, 1905). The species is quite common and is distributed in all parts of Moldavia.
- ZISP No. 2448 — 27 km north of Leovo, Prut River Valley, Leovo District, V. Chernavin, 1911, 4 sps. (Nikolsky, 1918: "circ. Izmail").
- ZISP No. 2452 — Purkari, Suvorovo District, V. Chernavin, April 17, 1911, 1 sp. (Nikolsky, 1918: "circ. Akkerman").
- ZISP No. 4391 — Moroseni, Orgeyev District, I. A. Chetyrkina, August 1, 1948, 1 sp.
- ZISP No. 4463 — Orgeyev District, I. A. Chetyrkina, July 12, 1947, 1 sp.

### 9. *Rana arvalis* (Nilsson, 1842)

- Rana agilis* — Brauner, 1907:155.
- Rana terrestris* — Tofan, 1965:123.
- Rana dalmatina* — Nikolsky, 1918:71; Călinescu, 1931:233; Tofan, 1965:123, 1967a:6; Popa and Tofan, 1982:34.
- Rana terrestris terrestris* — Călinescu, 1931:237.
- Rana dolmatica* [sic!] — Didusenko, 1959:326 (*ex errore*).

The species has been first recorded by Brauner (1907) from Cornești, Bel'tsy [= Bălți, now Ungeni] District, Zagorna, Soroki District, and Rezina, Orgeyev (now Rezina) District. The species was found in many districts of Moldavia.

### 10. *Rana esculenta* (Linnaeus, 1758)

- The first confirmed locality of the hybrid frog is reported by this paper.
- ZISP No. 5445 — Vulcănești, Nisporeni District, S. N. Litvinchuk, May 8, 1996, 7 sps.

### 11. *Rana ridibunda ridibunda* (Pallas, 1771)

- Rana aquatica viridis* — Doengingk, 1857:250.
- Rana esculenta* var. *ridibunda* — Brauner, 1905:215, 1907:154.
- Rana esculenta* — Kulagin, 1888:36; Nikolsky, 1905:339, 1918:17 and 19 ("Rana esculenta ridibunda" — p. 32); Osterman, 1912:194.
- Doengingk (1857) seemed to publish the first locality of the species (Kishinev). This very common frog ranges throughout Moldavia.
- ZISP No. 457 — Kishinev, Kuschakewitsch, 1863, 1 sp. (Nikolsky, 1905, 1918).
- ZISP No. 2481 — Capriani, Strașeni District, V. Chernavin, August 2, 1911, 2 sps. (Nikolsky, 1918: "Kipriany, circ. Kishinev").



- ZISP No. 3537 — Pohribeni, Orgeyev District, A. A. Brauner, Spring, 1904, 1 sp.  
 ZISP No. 4956 — Kishinev, O. P. Bogdanov, September 28, 1972, 8 sps.  
 ZISP No. 5850 — Kagul, Kagul District, Prut River Valley, S. N. Litvinchuk, April 18, 1995, 1 sp. (Litvinchuk and Borkin, 1995).  
 ZISP No. 5851 — Cantemir, Leovo District, Prut River Valley, S. N. Litvinchuk, April 18, 1995, 1 sp. (Litvinchuk and Borkin, 1995: “Kantemir”).  
 ZISP No. 5446 — Gotești, Kagul District, S. N. Litvinchuk, May 7, 1996, 1 sp.  
 ZISP No. 5447 — Nisporeni, Nisporeni District, S. N. Litvinchuk, May 8, 1996, 1 sp.  
 ZISP No. 5448 — Vulcănești, Nisporeni District, S. N. Litvinchuk, May 8, 1996, 1 sp.  
 ZISP No. 5449 — Kishinev, S. N. Litvinchuk, May 9, 1996, 1 sp.

### 12. *Rana temporaria temporaria* (Linnaeus, 1758)

Surprisingly, only Didusenko (1959) published the first three records of the grass frog: Soroki District, Losovo Forestry, Strașeni (now Nisporeni) District, and the village Bahmut, Calaraș (= Kalarash) District. The species is not common and is restricted to northern and central (the northern Kodry Height area) Moldavia.

## REPTILES

### 13. *Emys orbicularis orbicularis* (Linnaeus, 1758)

The first turtles have been found in the Dnestr River and in the vicinity of Kishinev (Brauner, 1903). The species occurs in all parts of Moldavia.

### 14. *Anguis fragilis fragilis* (Linnaeus, 1758)

*Anguis* [sic!] *fragilis* — Chepurinov et al., 1953:364 (ex errore).

The first record, Rezina, Orgeyev (now Rezina) District, has been published by Brauner (1905). The species is restricted to the forest and forest-steppe areas of Moldavia.

### 15. *Eremias arguta deserti* (Gmelin, 1789)

The species is distributed in the Budjak steppe, extreme southern Moldavia only (see Chapter 4).

### 16. *Lacerta agilis* (Linnaeus, 1758)

*Lacerta agilis* var. *exigua* — Brauner, 1905:215, 1907:151.  
*Lacerta agilis exigua* — Nikolsky, 1915:301 (part.).  
*Lacerta agilis agilis?* — Didusenko, 1959:326, 327.  
*Lacerta agilis exigua?* — Didusenko, 1959:326, 327.

The first record (Kishinev) has been published by Doengingk (1857). Two subspecies are recognized. *L. a. agilis* Linnaeus, 1758 occupies the northwest of Moldavia, and *L. a. chersonensis* Andrzejowski,

1832 ranges the remaining part of the country (Tofan, 1966a, 1967a; Yablokov, 1976).

- ZISP No. 10366 — Cickani Forest, Tiraspol District, A. A. Brauner, April 1904, 1 sp. (Nikolsky, 1915: “Bendersk. distr.”; Yablokov, 1976: “the vicinity of Bendery”).  
 ZISP Nos. 10883 and 10889 — Purkari, Suvorovo District, V. Chernavin, April 15, 1911, 4 sps., and April 10, 1910, 2 sps. (Nikolsky, 1915: “Distr. Akkerman”).  
 ZISP No. 10978 — Toporskaya Datscha, 32 km north of Leovo, Leovo District, V. Chernavin, July 26, 1911, 1 sp. (Nikolsky, 1915: “Distr. Izmail”).  
 ZISP No. 12382 — Capriani, Strașeni District, V. Chernavin, July 29, 1911, 2 sps.  
 ZISP No. 12639 — a forestry check-point, 21 km north of Leovo, Leovo District, V. Chernavin, July 20, 1908, 1 sp.

### 17. *Lacerta viridis viridis* (Laurenti, 1768)

*Lacerta agilis exigua* — Nikolsky, 1915:302 (ZISP Nos. 10887 and 10896).

Kulagin (1888) has published the first record of the species (the vicinity of Kishinev). The species is common in all parts of Moldavia.

- ZISP No. 10887 — Corușeni, 11 km south of Leovo, Prut River Valley, Leovo District, V. Chernavin, July 14 – 17, 1911, 4 sps. (Nikolsky, 1915: “Distr. Izmail”).  
 ZISP No. 10896 — Capriani, Strașeni District, V. Chernavin, August 2 – 29 1911, 5 sps. (Nikolsky, 1915: “Distr. Kishinev”).  
 ZISP No. 10954 and 10955 — Purkari (School of Agriculture), Suvorovo District, V. Chernavin, April 12, 1911, 1 sp., and April 9, 1910, 1 sp. (Nikolsky, 1915: “distr. Akkerman”).  
 ZISP No. 12248 — village Baurči, Čadîr-Lunga District, V. Chernavin, July 1 – 5, 1911, 4 sps.  
 ZISP No. 12249 — Toporskaya Datscha, 32 km north of Leovo, Leovo District, V. Chernavin, July 23, 1911, 2 sps.  
 ZISP No. 12250 — Kagul, Kagul District, V. Chernavin, July 1, 1911, 4 sps.  
 ZISP No. 16973 — Krikovo, 25 – 30 km north of Kishinev, Criuleni District, A. M. Didusenko, April 8, 1957, 4 sps.  
 ZISP No. 16974 — Soroki District, A. M. Didusenko, June 5, 1957, 3 sps.  
 ZISP No. 16975 — Losovo, Nisporeni District, A. M. Didusenko, July 9, 1957, 8 sps.
- ### 18. *Lacerta vivipara* (Jacquin, 1787)
- Only one confirmed locality from the Kodry area is known (Fig. 1).  
 ZISP No. 20576 — Vulcănești, Nisporeni District, S. N. Litvinchuk, May 8, 1996, 2 sps.
- ### 19. *Podarcis taurica taurica* (Pallas, 1814)
- Lacerta taurica taurica* — Călinescu, 1931:244; Tofan, 1967a:6.

*Lacerta taurica* — Tofan, 1965:124, 125, 1970b:144;  
Popa and Tofan, 1982:65; Kozar, 1987:81.

The first record (“not far from Kishinev”) has been mentioned by Tofan (1965). Later, he (1966a, 1970b) listed five districts with the species’ localities. This lizard is distributed in the southern part of Moldavia.

## 20. *Coluber caspius* (Gmelin, 1789)

*Coluber trabalis* — Nordmann, 1840:544.

*Zamenis trabalis* — Kulagin, 1888:24.

*Zamenis gemonensis* var. *caspius* — Brauner, 1907: 153.

*Zamenis gemonensis* — Nikolsky, 1916:85.

*Zamensis* [sic!] *gemonis* [sic!] — Osterman, 1912:189  
(*ex errore*).

*Zamensis* [sic!] *viridiflavus* s. *gemonensis* — Osterman, 1912:217.

*Zamenis gemonensis caspius* — Călinescu, 1931:261.

*Coluber jugularis* — Didusenko, 1959:326, 327, 1966:75;  
Tofan, 1965:124; Popa and Tofan, 1982:89.

*Coluber jugularis caspius* — Tofan, 1967a:6.

The species has been first recorded by Nordmann (1840) from Bendery District (“pres de Bender”). This rare snake occurs in the southern part of Moldavia only.

ZISP No. 11157 — Nou-Ganaseni Dacha, 3 km south of Leovo, Leovo District, V. Chernavin, July 18 – 19, 1911, 1 sp. (Nikolsky, 1916: “circ. Izmail ad flum. Prut”).

## 21. *Coronella austriaca austriaca* (Laurenti, 1768)

The smooth snake has been first found in Kishinev District (Brauner, 1903). The species ranges throughout Moldavia, however, it is quite rare. The species is protected by the Red Data Book of Moldavia.

## 22. *Elaphe longissima longissima* (Laurenti, 1768)

*Coluber longissimus* — Brauner, 1903:50, 1905:215,  
1907:153.

*Coluber longissimus Aesculapii* — Osterman, 1912:189.

*Coluber longissimus longissimus* — Călinescu, 1931:255.

At the first time, the species has been collected in the steppe area of Bendery District (Brauner, 1903). The Aesculapian snake is not common although its range seems to cover all parts of Moldavia.

## 23. *Elaphe quatuorlineata sauromates* (Pallas, 1814)

*Coluber quatorlineatus* [sic!] var. *sauromates* — Brauner, 1903:50, 1907:152.

*Coluber dione* var. *sauromates* — Osterman, 1912:190.

*Elaphe quatuorlineata* — Nikolsky, 1916:135;  
Tofan, 1965:124; Didusenko, 1966:75.

*Coluber quatuorlineatus sauromates* — Călinescu, 1931:255.

*Coluber quatuorlineatus* [sic!] — Popa and Tofan, 1982:94 (*ex errore*).

The first specimens have been found in Orgeyev (= Orhei) and Kishinev districts (Brauner, 1903). Recently, the four-lined snake is very rare and is known from southern Moldavia only (Tofan, 1968b; Popa and Tofan, 1982).

ZISP No. 11175 — Nou-Ganaseni Dacha, 3 km south of Leovo, Leovo District, V. Chernavin, July 18 – 19, 1911, 1 sp. (Nikolsky, 1916: “circ. Izmail ad fl. Prut”).

## 24. *Natrix natrix natrix* (Linnaeus, 1758)

*Tropidonotus natrix* — Brauner, 1903:50, 1905:215,  
1907:152; Osterman, 1912:190, 227, 231.

*Natrix natrix persa* — Zemsch, 1937:98; Didusenko, 1959:325, 327, 1966:75.

Brauner (1903) has published first records of the species (the Dnestr River Valley and the vicinity of Kishinev). The grass snake is quite common and is distributed in all parts of the country.

ZISP Nos. 11165, 11242, and 11246 — Purkari (School of Agriculture), Suvorovo District, V. Chernavin, April 10, 14, and 11, 1911, 1, 1, and 1 sps., (Nikolsky, 1916: “circ. Akkerman”).

## 25. *Natrix tessellata* (Laurenti, 1768)

*Tropidonotus tessellatus* [sic!] — Brauner, 1903:50.

*Tropidonotus* [sic!] *tessellatus* [sic!] — Brauner, 1907:152  
(*ex errore*).

*Tropidonotus tessellatus* — Osterman, 1912:191.

*Natrix tessellata* [sic!] — Chepurinov et al., 364

(*ex errore*).

*N. [atrix] n. [atrix] tessellata* — Didusenko, 1959: 377.

*Natrix tessellata* [sic!] — Didusenko, 1966:75; Popa and Tofan, 1982:83.

The species has first been found in the same localities like the grass snake (Brauner, 1903). This is very common snake which inhabits various water bodies throughout Moldavia.

## 26. *Vipera berus berus* (Linnaeus, 1758)

*Vipera berus* var. *praester* — Brauner, 1907: 153.

First specimens have been found in Orgeyev (= Orhei) and Kishinev districts (Brauner, 1903). The adder ranges the forest and forest-steppe areas of northern and central Moldavia only. The species is recommended to be enrolled in the Red Data Book of Moldavia because of its declining (Kozar, 1987).

## 27. *Vipera ursinii renardi* (Christoph, 1861)

*Vipera renardi* — Brauner, 1903:51, 1907:154;  
Călinescu, 1931:266.

*Vipera ursini* [sic!] — Tofan, 1965:123;

Didusenko, 1966:75; Popa and Tofan, 1982:77.

The first record has been originated from the steppe area of Bendery District (Brauner, 1903). The

Orsini's viper is mostly distributed in the steppe zone, however, sometimes it occurs in the forest-steppe areas. Bannikov et al. (1977) suggested that in Moldavia the species would be represented by two subspecies. *V. u. racosiensis* M,hely, 1835 seems to reach the west of the country, and *V. u. renardi* (Christoph, 1861) occupies the remaining part. However, we don't know any evidence for the occurrence of the former subspecies. Recently, Moldavian vipers are recognized to be a distinct subspecies, *V. u. moldavica* (Nilson et al., 1993).

## II. PRESUMABLE SPECIES

### 1. *Salamandra salamandra salamandra* (Linnaeus, 1758)

*Salamandra maculosa* — Osterman, 1912:197, 230.

The species has been first reported by Osterman (1912). A female with 40 well developed embryos was collected by F. F. Osterman, her husband and previous curator of the Bessarabian Museum, in Bel'tsy [= Bălți] District (July, 1900). Tofan (1965) assumed the occurrence of *S. salamandra* in Moldavia. According to Ganya (1981), the salamander was found in the village Brînzeni, Edinți (= Yedintsy) District. However, Kozar (1987) rejected the species from the list of the country's list. The confirmed distribution of the salamander restricted to the Carpathians only (Szczerbak and Szczerban', 1980).

### 2. *Rana lessonae* (Camerano, 1882)

*Rana esculenta* — ?Brauner, 1907:154; Chepurnov et al., 1953:363; Didusenko, 1959:327; Tofan, 1965:123.

*Rana esculenta lessonae* — Tofan, 1967:32.

Some authors have already discussed the distribution of the species in Moldavia (see Chapter 2). Rakul et al. (1984) mentioned that in the forest Kodry Reserve *R. lessonae* coexists with *R. esculenta*. However, no reliable evidence for the species was given. The confirmation of the pond frog needs an additional examination by precise data and techniques.

### 3. *Pseudopus apodus* (Pallas, 1775)

*Ophisaurus apodus* — Chepurnov et al., 1953:364.

This rare species has been recorded in southern Moldavia; however, unfortunately, no locality was given. Tofan (1965) assumed the occurrence of the lizard. The lists presented by other authors lack the species (Table 1). The closest confirmed records are known from the Crimea.

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