

On the herpetofauna of Lake Vrana and its vicinity (Dalmacia, Croatia) (Amphibia, Reptilia)

Zur Herpetofauna des Vrana Sees und seiner Umgebung (Dalmatien, Kroatien)
(Amphibia, Reptilia)

NUŠA VOGRIN

KURZFASSUNG

Bei herpetologischen Felderhebungen am Vrana See und in der benachbarten adriatischen Küstenregion (Dalmatien, Kroatien) wurde das Vorkommen von 13 Reptilien- und zwei Amphibienarten festgestellt. Der Fundort Drage von *Lacerta oxycephala* liegt 30 km nördlich der bisher bekannten Arealgrenze der Art.

ABSTRACT

Thirteen reptilian and two amphibian species were observed at Lake Vrana and the adjacent Adriatic coastal area (Dalmacia, Croatia). *Lacerta oxycephala* was found in Drage, about 30 km north of the known range of the species.

KEY WORDS

Amphibia, Reptilia; herpetofauna of Lake Vrana, Dalmacia, Croatia; northernmost record of *Lacerta oxycephala*

Knowledge on the herpetofauna of the Adriatic coast in Croatia is basically derived from investigations carried out in Kvarner, i. e. in mountainous areas (e. g., Mt. Velebit and Mt. Biokovo) or on islands (e. g., RADOVANOVIĆ 1951; BRELIH 1961; BRELIH & DŽUKIĆ 1974; MRŠIĆ 1977; MRŠIĆ & al. 1989; TVRTKOVIĆ & KLETEČKI 1993a, 1993b; TOME 1995). The herpetofauna of lowland areas is little known or even lacks any data.

Between August 12 and 20, 1996, herpetological field work was carried out at Lake Vrana and the adjacent Adriatic coastal area (Dalmacia, Croatia) (fig. 1). All types of habitats present were included in the study in which 'Systematic Sampling Survey' (SCOTT 1994) was applied during different times of the day. Some morphometric data of the animals caught were recorded (tables 1 to 2).

Lake Vrana covers 3000 ha being the largest natural lake in Croatia. Most parts of the lake shores are covered with *Phragmites australis*, most strikingly in the ornithological reserve (30 ha) on the northeastern shore. In the flooded areas next to the lake proper the dominant vegetation is *Juncus* sp. Many fields in the vicinity are

irrigated with water from the lake. Parts of the research area are carrigues, where the most common plants are *Juniperus oxycedrus*, *Paliurus australis*, degraded *Quercus ilex*, *Q. pubescens*, *Carpinus orientalis* and *Rubus* sp.; others are covered by planted forests of *Pinus halepensis*, *P. niger dalmatica* and *P. pinea*. In the northeast of the lake there are also some meadows. The biggest towns and villages (Biograd, Pakoštane, Vrana, Drage, Pirovac) are surrounded and interspersed by partly abandoned vineyards and orchards separated by stone walls.

Thirteen reptilian and two amphibian species were found to occur in Lake Vrana and its vicinity.

Bombina variegata ssp. - One specimen seen in a small pool used for irrigating the fields between Pakoštane and camp Vrana. Subspecific status not determined. First record from Lake Vrana. According to TVRTKOVIĆ & KLETEČKI (1993a) the Velebit mountains are inhabited by *B. v. variegata* (LINNAEUS, 1758). For Mt. Biokovo, which lies south of Lake Vrana, the subspecies is not indicated (TVRTKOVIĆ & KLETEČKI 1993b).

Rana sp. - Numerous in the shallow

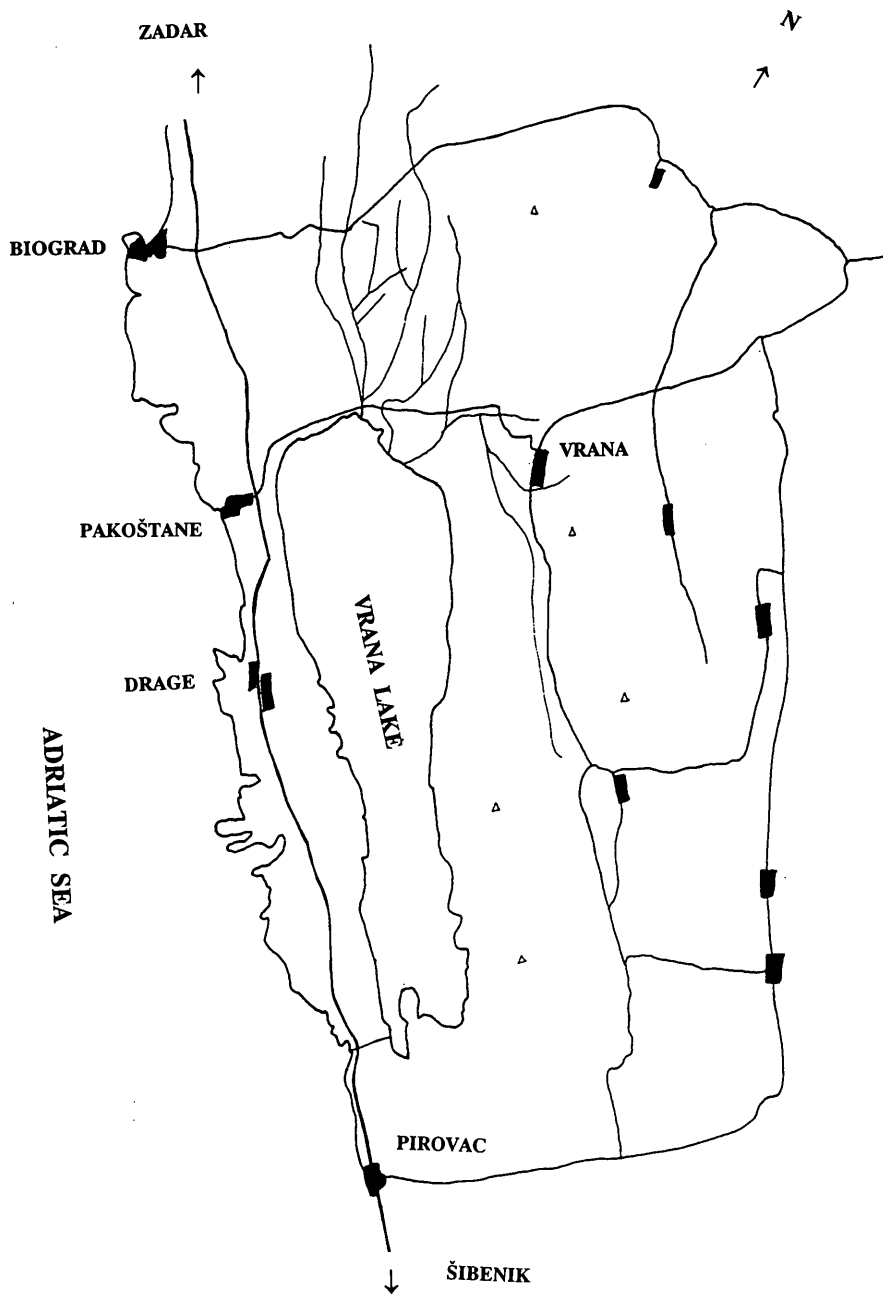


Fig. 1: Lake Vrana and its vicinity (Dalmacia, Croatia).
Abb. 1: Der Vrana See und seine Umgebung (Dalmatien, Kroatien).

water of Lake Vrana, in canals and pools used for irrigating the fields; also in small streams. 30 specimens in a canal which was 30 m long and 1 m wide; up to 10 specimens per pool. The Green frogs of Dalmacia were generally recognized as *R. ridibunda* PALLAS, 1771 (e. g., NÖLLERT & NÖLLERT 1992) which also inhabits Mt. Velebit (TVRTKOVIĆ & KLETEČKI 1993a). Based on bioacoustic evidence (SCHNEIDER & SINSCH 1992; SCHNEIDER & HAXHIU 1994), *R. balcanica* SCHNEIDER & SINSCH, 1992 was described from south of the Plitvica Lakes. Thus, without detailed bioacoustic and enzyme electrophoretic analyses, the systematic status of the Green Frogs of Lake Vrana remains unclear.

Testudo hermanni boettgeri (MOJSISOVICS, 1889) - Numerous in different habitats, especially in carrigues. Frequently found in numbers of 5 to 6 specimens. All captured and measured tortoises were immature females according to the criteria in CARRETERO & al. (1995).

Emys orbicularis (LINNAEUS, 1758) - Common in Lake Vrana and in the neighbouring canals. Juveniles in small pools which are no longer used for irrigating the fields and, thus, are covered by floating vegetation. I found four juveniles in a pool of 9 m² in size. *Emys* was never found in pools that were bare of water vegetation.

Ophisaurus apodus (PALLAS, 1775) - One specimen (approximately 1 m; dead) on the road from Pakoštane to Vrana.

Lacerta trilineata major (BOULENGER, 1887) - Present in various habitats (e. g., clearings, pastures, coastal rocks). The highest density (13.4 specimens/ha) determined by the transect method was found

on a rocky clearing in a *Pinus halepensis* plantation. In coastal areas in Bulgaria, the density of *L. trilineata* was between 22.5 and 25 specimens/ha (NETTMANN & RYKENA 1984).

Lacerta oxycephala DUMÉRIL & BIBRON, 1839 - One specimen on a stone wall near the road in Drage village. The northern limit of the species' range was thought to be the river Krka and the area of the town Sibenik, while records from Zadar might not be reliable (RADOVANOVIĆ 1951; BISCHOFF 1984). The new record from Drage is about 30 km north of the hitherto northernmost locality records of this species.

Podarcis sicula campestris (DE BETTA, 1857) - Most common reptile species in the area, abundant in Pakoštane. For morphometric characters see table 1.

Coluber najadum dahlii SCHINZ, 1833 - One specimen in the camp near Pakoštane, few meters from the see. This species is rare also on Mt. Velebit (MRŠIĆ 1977).

Coluber gemonensis (LAURENTI, 1768) - This snake was found in 40% of the habitats under study (carrigues, clearings, pastures with stone walls). Its density estimated from the transect method was 2.8 specimens/ha in a rocky clearing of a *Pinus* sp. forest. For morphometric characters see table 2.

Elaphe quatuorlineata quatuorlineata (LACÉPÈDE, 1798) - One specimen (dead) on the main road between Pakoštane and Drage.

Elaphe longissima longissima (LAURENTI, 1768) - One adult specimen (dead) on the road between Radovanovici and Banevci. On both sides of the road is car-

Table 1: Descriptive statistics of meristic characters of female (left, n = 8) and male (right, n = 12) *Podarcis sicula campestris* (DE BETTA, 1857) of the study area. \bar{x} - mean value, Min - minimum value, Max - maximum value, Std Dev - standard deviation, Lb - snout-vent length (mm), Ltail - tail length (mm), Lh - head length (mm), Wh - head width (mm), Coll - number of scales forming the collar, Vent - number of transversal rows of ventrals.

Tab. 1: Beschreibende Statistiken meristischer Größen weiblicher (links, n = 8) und männlicher (rechts, n = 12) *Podarcis sicula campestris* (DE BETTA, 1857) aus dem Untersuchungsgebiet. \bar{x} - arithmetisches Mittel, Min - Minimum, Max - Maximum, Std Dev - Standardabweichung, Lb - Kopf-Rumpflänge, Ltail - Schwanzlänge, Lh - Kopfgröße, Wh - Kopfbreite, Coll - Anzahl Halsbandschuppen, Vent - Anzahl Ventralia-Querreiben.

Females / Weibchen	\bar{x}	Min	Max	Std Dev
Lb	63.0	52	70	7.57
Ltail	111.8	94	126	13.36
Lh	13.5	12.1	15.1	1.11
Wh	7.7	7.0	8.3	0.42
Coll	9	7	11	1.35
Vent	28	27	29	0.82

Males / Männchen	\bar{x}	Min	Max	Std Dev
Lb	72.8	59	80	5.55
Ltail	125.9	112	140	10.17
Lh	16.0	9.2	18.8	3.48
Wh	10.7	7.6	17.3	2.34
Coll	9	8	11	1.00
Vent	25	24	27	1.04

Table 2: Meristic characters of 3 specimens of *Coluber gemonensis* (LAURENTI, 1768) of the study area. Lb - snout-vent length (mm), Ltail - tail length (mm), Vent - number of ventrals, Scd - number of subcaudals, Dors - number of longitudinal rows of dorsals at midbody.

Tab. 2: Meristische Merkmale von 3 Exemplaren von *Coluber gemonensis* (LAURENTI, 1768) aus dem Untersuchungsgebiet. Lb - Kopf-Rumpflänge (mm), Ltail - Schwanzlänge (mm), Vent - Anzahl Ventralia, Scd - Anzahl Subcaudalia, Dors - Anzahl Dorsalia-Längsreihen in Rumpfmittle.

Character Merkmal	Specimen No / Exemplar Nr.		
	1	2	3
Lb	680	555	450
Ltail	215	235	205
Vent	166	177	164
Scd	71	101	103
Dors	19	19	19

rigue with some stacks of stone.

Natrix natrix persa (PALLAS, 1814) - Not rare in all kinds of wetland. One out of 11 specimens without longitudinal stripes.

Natrix tessellata tessellata (LAURENTI, 1768) - One specimen (dead) on the

main road between Pakoštane and Vrana, very close to Lake Vrana; one juvenile in the lake.

Telescopus fallax fallax (FLEISCHMANN, 1837) - One adult specimen (dead) on the road between Pakoštane and Vrana.

ACKNOWLEDGMENTS

I am grateful to MILAN VOGRIN for assistance with field work and his comments to the manuscript.

Special thanks to POLONA ŽAGAR for the linguistic improvement of the manuscript.

REFERENCES

- BISCHOFF, W. (1984): *Lacerta oxycephala* DUMÉRIL & BIBRON, 1839 - Spitzkopfeidechse. In: BÖHME, W. (ed.): Handbuch der Reptilien und Amphibien Europas; Band 2/I. Echsen I., Wiesbaden, (AULA).
- BRELIH, S. (1961): Sieben neuen Rassen der Art *Lacerta (Podarcis) sicula* R&F. (Lacertidae, Reptilia) aus dem Gebiete Rovinj - Porec. Bioloski vestnik, Ljubljana; 3: 128-131. [Slovene with German summary].
- BRELIH, S. & DZUKIC, G. (1974): Catalogus faunae Jugoslaviae. IV/2 Reptilia. Ljubljana (SAZU), pp. 32.
- CARRETERO, M. A. & BERTOLERO, A. & LLORENTE, G. A. (1995): Thermal ecology of a population of *Testudo hermanni* in the Ebro Delta (NE Spain). pp. 208-212. In: LLORENTE, G. A. & MONTORI, A. & SANTOS, X. & CARRETERO, M. A. (eds.): Scientia Herpetologica, Papers submitted for 7th O. G. M. of Societas Europaea Herpetologica, Barcelona.
- MRSIC, N. (1977): A contribution to the knowledge of the taxonomy, zoogeography and ecology of the reptiles of the Velebit Mountain-chain. Ljubljana (SAZU), pp. 43. (Slovene with English summary).
- MRSIC, N. & NEMESCHKAL, H. L. & POTOČNIK, F. & SCHWAMMER, G. & SCHWAMMER, H. (1989): Ein Beitrag zur Herpetofauna der Quarner-Inseln (Jugoslawien - Kroatien).- Bioloski vestnik, Ljubljana; 37 (1): 57-74.
- NETTMANN, H. K. & RYKENA, S. (1984): *Lacerta trilineata* BEDRIAGA 1866 - Riesensmaragdeidechse. In: BÖHME, W. (ed.): Handbuch der Reptilien und Amphibien Europas; Band 2/I. Echsen II. Wiesbaden, (AULA).
- NÖLLERT, A. & NÖLLERT, C. (1992): Die Amphibien Europas. Bestimmung - Gefährdung - Schutz. Stuttgart (Franckh - Kosmos).
- OBST, F. J. & MEUSEL, W. (1963): Die Landschildkröten Europas. Wittenberg (Ziemsen), pp. 52.
- RAĐOVANOVIĆ, M. (1951): Vodozemci i gmizavci nase zemlje. Naučna knjiga Beograd. (Serbian with German summary).
- SCHNEIDER, H. & SINSCH, U. (1992): Mating call variation in lake frogs referred to as *Rana ridibunda* PALLAS, 1771: taxonomic implications.- Zool. Syst. Evolut.; 30: 297-315.
- SCHNEIDER, H. & HAXHIU, I. (1994): Mating-call analysis and taxonomy of the Water Frogs in Albania (Anura: Ranidae).- Zool. Jb. (G. Fischer, Jena); 121: 248-262.
- SCOTT, N. J. JR. (1994): Complete species inventories. In: HEYER, W. & al. (ed.): Measuring and monitoring biological diversity. Standard methods for amphibians. Washington and London (Smithsonian Institution Press).
- TOŠIĆ, S. (1995): Kr̄itici pogled na taksonomski položaj primorske kuscariće *Podarcis sicula*.- Ann. Stud. Istriani Medijteranei, Koper; 7: 223-230.
- TVRTRKOVIĆ, N. & KLETECKI, E. (1993a): Vertebrates of the Velebit Mountain (Croatia). Part I: Amphibians. Natura Croatia, Zagreb; 2 (1): 27-46.
- TVRTRKOVIĆ, N. & KLETECKI, E. (1993b): Preliminary investigation of the Biokovo Mountain terrestrial vertebrates.- Acta Biokovica, Makarska; 4: 11-18. (Croatian with English summary).
- VASARA, E. & SOFIANIDOU, T. S. & SCHNEIDER, H. (1991): Bioacoustic analysis of the Yellow-bellied Toad in Northern Greece (*Bombina variegata scabra* L., Anura, Discoglossidae).- Zool. Anz., Jena; 226 (5/6): 220-236.

DATE OF SUBMISSION: January 24th, 1997

Corresponding editor: Heinz Grillitsch

AUTHOR: NUŠA VOGRIN, Vransko 121, SLO-3305 Vransko, Slovenia.