Snakes in the herpetological collection of the Natural History Museum in Split (Croatia) collected from 1924 until 2015

STJEPAN MEKINIĆ[1,3,*], NEDILJKO ŽEVRNJA[2], JOSIP BOBAN[2], GVIDO PIASEVOLI[1] & DALIBOR VLADOVIĆ[2]

[1]*Public Institution for the Management of Protected Areas in the County of Split and Dalmatia – „Sea and karst", Prilaz braće Kaliterna 10, 21000 Split, Croatia*

[2]*Natural History Museum and Zoo, Kolombatovićevo šetalište 2, 21000 Split, Croatia*

[3]*Gata 73, 21253 Gata, Croatia*

[*]*Corresponding Author: smgata@yahoo.com*

Abstract

Analysis of the herpetological collection of the Natural History Museum in Split found that snakes were represented in the herpetological collection by 183 inventory numbers with 224 samples. Samples in the collection belong to 4 families, 5 subfamilies, 11 genera and 15 species of snakes, with *Vipera ammodytes* being the most numerous species. The largest number of samples was collected by Cvitanić A. and Girometta U. in the Dalmatian part of the Adriatic. A large part of the collection contains no information of the collector or collection date. The material is stored in alcohol and in formalin with the exception of 27 samples that are stored as dermoplastic preparations.

Key words: snakes, herpetological collection, Natural History Museum in Split, Croatia

INTRODUCTION

The Natural History Museum in Split was founded on 10 March 1924 (ŽEVRNJA ET AL., 2004). From the very beginning of the Museum's opening, its founder, the first director and curator Mr. Umberto Girometta, started to collect materials for the herpetological collection, the integral part of which was also the collection of snakes. His work on the herpetological collection was continued by Mr. Novak and Mr. Cvitanić. The present-day herpetological collection of the Natural History Museum in Split is the result of work and material collected in the period from the 1920's to the end of 2014. During that period the collection was only supplemented without revision of samples or taxonomic information.

MATERIALS AND METHODS

During June 2013 and July 2014 the herpetological collection of the Natural History Museum was analysed, and the collection of snakes being the integral part of it. The material is stored in alcohol with the exception of 29 dermoplastic preparations. While working on the analysis of the collection, the "Book of inventory: vertebrates, fish, amphibians, reptiles, birds, mammals" of the Natural History Museum in Split was used, and to identify certain species we used available literature (ARNOLD AND BURTON, 2002, MARKOVIĆ, 2004, COX ET AL., 2006, TVRTKOVIĆ ET AL., 2006, JELIĆ ET AL., 2012). During the analysis we also conducted

taxonomic revision of snake samples in the herpetological collection.

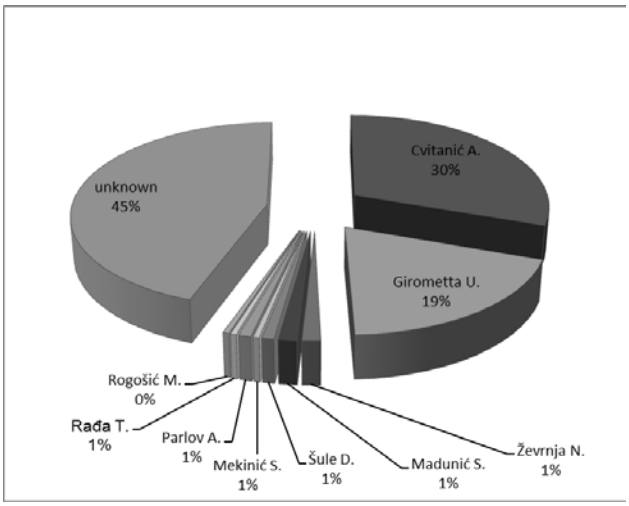

Figure 1. Distribution of samples by collectors

Figure 2. *Vipera ursinii* (ID 39), exchange with the Vienna museum (NHMW)

RESULTS

Analysis of the herpetological collection of Natural History Museum in Split found that snakes were represented in the herpetological collection by 183 inventory numbers with 224 samples. In the herpetological collection there are samples of snakes belonging to 4 families, 5 subfamilies, 11 genera and 15 species. The most represented samples are from Natracinae and Viperidae families, in fact genera *Natrix* and *Vipera*. However, 100 samples (45%) do not contain any information about the collector and 86 samples (38%) do not contain information about the locality. The same case is with the dates of collection, which are missing for 130 (58%) samples. For 84 samples (38%) there is no data about collector or collection date or locality where the specimens were collected. The largest number of specimens (Figure 1.) was collected by Girrometa, U. and Cvitanić, A. in Dalmatia region of Croatia. The oldest specimen was collected in 1926, and the most recent in 2013.

Table 1. Snakes in herpetological collection of the Natural History Museum Split. Author notes and additions are written in square brackets [].

species	inventory number ID	locality	date	No. of specimens	collector
Boa constrictor Linnaeus, 1758	234	ZOO vrt (Split)		2	
Coronella austriaca Laurenti, 1768	18	Slovenija [SLO]	1930	1	Girometta U.
	19	Svilaja	[1924-1939]	1	Girometta U.
	20	Troglav	1927	1	Girometta U.
	21	Mosor	[1924-1939]	1	Girometta U.
	110	Metković	1957	1	Cvitanić A.
Elaphe quatuorlineata (Lacépède, 1789)	114	Šibenik	23 August 1924	1	Girometta U.
	252	ZOO vrt (Split)		2	
	267			1	
	268			1	
	269			1	
	292			1	
	294			1	
	302			1	
	305			2	
	325	Vis, Hum	30 April 2013	1	Parlov I.
Hierophis gemonensis (Laurenti, 1768)	10	Pakleni otoci	[1924-1939]	1	Girometta U.
	11	Split	[1924-1939]	1	Girometta U.
	13	Split	[1924-1939]	1	Girometta U.
	29	Split	[1924-1939]	1	Girometta U.
	71	Metković	1957	1	Cvitanić A.
	75	Split	1955	1	Cvitanić A.
	80	Kaštela	[1955-1983]	1	Cvitanić A.
	106	Marjan	1957	1	Cvitanić A.
	130	Split - Tršćenica	4 September 1959	1	Cvitanić A.
	135	Split	August 1958	1	Cvitanić A.
	143	Marjan	30 September 1960	1	Cvitanić A.
	247			1	
	248			1	
	249			1	
	264	Muć Gornji - Progon	23 June 1998	1	
	279			5	
	287			2	
	291			2	
	324	Vis, Hum	30 April 2013	1	Parlov I.
	326	Dugopolje	21 June 2013	1	Ževrnja N.
	329	Dugopolje - Balići	7 September 2013	1	Ževrnja N.

Platyceps najadum (Eichwald, 1831)	12	Kaštela	[1924-1939]	1	Girometta U.
	14	Mostar [BiH]	[1924-1939]	1	Girometta U.
	15	Split, Marjan	28 August 1942	1	Girometta U.
	16	Split		1	Girometta U.
	17	Kaštela	[1924-1939]	2	Girometta U.
	116	Split	September 1958	1	Cvitanić A.
	330	Kašuni	November 2012	1	Ževrnja N.
Telescopus fallax (Fleischmann, 1831)	1	Bol, otok Brač	[1924-1939]	1	Girometta U.
	2	Jelsa	[1924-1939]	1	Girometta U.
	3	Mostar [BiH]	[1924-1939]	1	Girometta U.
	4	Split, Marjan	[1924-1939]	1	Girometta U.
	73	Milna (Brač)	August 1973	1	Cvitanić A.
	100	Split	1957	1	Cvitanić A.
	236	Grohote	July 2010	2	Dinko Š.
	242			1	
	243			1	
	261			1	
	262			1	
	263	Bobovišće - Brač	5 October 1973	1	
	286			1	
	303			2	
Zamenis longissimus (Laurenti, 1768)	5	Split	[1924-1939]	1	Girometta U.
	79	Bokarac		1	Cvitanić A.
	115	Zadar	23 August 1924	1	Girometta U.
	139	Zelovo	19 July 1961	1	Cvitanić A.
	265	Nerežišće - Brač	18 June 1970	1	
	273			1	
	276			1	
	318	Šćadin	28 October 2011	1	Mekinić S.
Zamenis situla (Linnaeus, 1758)	7	Korčula	[1924-1939]	1	Girometta U.
	22	Split	[1924-1939]	1	Girometta U.
	23	Mosor	1927	1	Girometta U.
	24	Marušići - Omiš	25 May 2005	1	
	25	Marjan	[1924-1939]	1	Girometta U.
	26	Novalja	[1924-1939]	1	Girometta U.
	27	Kozjak	[1924-1939]	1	Girometta U.
	28	Zadar	[1924-1939]	1	Girometta U.
	67	Marjan	August 1956	1	Cvitanić A.
	68	Marjan	1956	1	Cvitanić A.
	74	Kaštela	April 1924	1	Cvitanić A.
	280			1	
	281			1	
	112	Kaštela	[1955-1983]	1	Cvitanić A.

	113	Split, Marjan	[1955-1983]	1	Cvitanić A.
	117		[1955-1983]	1	Cvitanić A.
	142	u gradu Splitu, Marjan	12 March 1961	1	Cvitanić A.
	155	Marjan	18 October 1962	1	Cvitanić A.
	157	Split - Marjan	3 October 1967	1	Cvitanić A.
	272	Split	1 September 1979	1	
	289			1	
	290			4	
	301			1	
	304			1	
Natrix natrix (Linnaeus, 1758)	8	Split, Marjan	[1924-1939]	1	Girometta U.
	9	Stobreč	[1924-1939]	1	Girometta U.
	65	terarij ZOO vrta	7 July 1957	4	Cvitanić A.
	72	Split	1955	1	Cvitanić A.
	88	Metković	1957	1	Cvitanić A.
	89	Metković	August 1957	1	Cvitanić A.
	90	Metković	August 1957	1	Cvitanić A.
	91	Metković	August 1957	1	Cvitanić A.
	92	Metković	August 1957	1	Cvitanić A.
	93	Metković	August 1957.	1	Cvitanić A.
	94	Metković	August 1957	1	Cvitanić A.
	95	Metković	August 1957	1	Cvitanić A.
	96	Metković	August 1957	1	Cvitanić A.
	97	Metković	August 1957	1	Cvitanić A.
	98	Metković	August 1957	1	Cvitanić A.
	99	Metković	August 1957	1	Cvitanić A.
	101	Vučevica	1957	1	Cvitanić A.
	111	terarij Split	7 July 1957	2	Cvitanić A.
	141	ZOO vrt Terarij	July 1960	4	Cvitanić A.
	144	terarij	July 1960	2	Cvitanić A.
	240			1	
	283	Solin	15 May 1980	1	
	298			1	
	299			1	
	307			1	
Natrix tessellata (Laurenti, 1768)	250			1	
	251			1	
	282			4	
	300			2	
	310			1	
	311			2	
	312			1	
	313			4	
	327	ZOO vrt Terarij	July 1960	2	Cvitanić A.

Malpolon insignitus (Geoffroy Saint-Hilaire, 1827)	6	Split	1926	1	Girometta U.
	70	Stobreč	1957	1	Cvitanić A.
	78	Marjan	[1955-1983]	1	Cvitanić A.
	105	Stobreč	1957	1	Cvitanić A.
	245			1	
	246			1	
	274			1	
	277			1	
	278			1	
	295			1	
	296			1	
	297			1	
	308			1	
	309			1	
Naja naja (Linnaeus, 1758)	233	ZOO vrt (Split)		2	
Vipera ammodytes (Linnaeus, 1758)	30	Mosor	[1924-1939]	1	Girometta U.
	31	Žrnovo (Korčula)	[1924-1939]	1	Girometta U.
	32	Mosor	[1924-1939]	1	Girometta U.
	33	Mostar [BiH]	[1924-1939]	1	Girometta U.
	34	Svilaja	[1924-1939]	1	Girometta U.
	35	Svilaja	[1924-1939]	1	Girometta U.
	76	Labin	[1955-1983]	1	Cvitanić A.
	77	Labin	[1955-1983]	1	Cvitanić A.
	102	Dugopolje	1956	1	Cvitanić A.
	103	Dugopolje	1957	1	Cvitanić A.
	104	Mosor	1957	1	Cvitanić A.
	107	Dugopolje	1957	1	Cvitanić A.
	108	Dugopolje	1957	1	Cvitanić A.
	109	Dugopolje	1957	1	Cvitanić A.
	121	Hercegovina, Ljubinje [BiH]	26 September 1960	2	Cvitanić A.
	133	Dugopolje	23 July 1960	1	Cvitanić A.
	140	Istočna Srbija [SRB]	8 January 1962	2	Cvitanić A.
	148	Hercegovina [BiH]	1 February 1961	1	Cvitanić A.
	241			1	
	244			1	
	253			1	
	254			2	
	255	Mosor	3 April 1978	1	
	256	Bobovišće - Brač	September 1978	1	
	257	Cista Velika	8 October 1967	1	Madunić S.
	258			3	
	259	Cista Velika	9 October 1967	2	Madunić S.
	270	Zagora - Dugopolje	1980	1	

	271			1	
	275			1	
	284			2	
	285			1	
	288			1	
	293			1	
	306			1	
	322	Dugopolje	17 May 2013	1	Rogošić M.
	331		2013	1	
Vipera berus (Linnaeus, 1758)	36	Hrebljina [Hrbljina, BiH]	1930	1	Girometta U.
	37	Beč(Bečki muzej) [AUS]	[1924-1939]	1	Girometta U.
	122	Slavonija	September 1960	1	Cvitanić A.
Vipera ursinii (Bonaparte, 1835)	38	Dinara	1927	1	Girometta U.
	39	Beč(Bečki muzej) [AUS]	[1924-1939]	1	Girometta U.
	40	Vitorog [BiH]	1927	2	Girometta U.
	320	Dinara, na makadamskom putu od Vještić gore prema Rupama	14 August 2011	1	Rađa T.

DISCUSSION

The herpetological collection of the Natural History Museum in Split was mostly in very bad condition because a lot of data was missing. Umberto Girometta was a director of Natural History Museum in Split from 1924 to 1939 (ŽEVRNJA ET AL., 2004), therefore we presume that all of his specimens are from that period. The same applies to the samples collected by A. Cvitanić, who was director from 1955 to 1983 (ŽEVRNJA ET AL., 2004). During 2013 the liquid was changed in all the containers, so the preparations are in alcohol now. On that occasion new labels were added in containers which were missing them and the original ones were left in containers where they were found. Original old Latin names were harmonized with the new nomenclature (JELIĆ, 2014). Preparations are preserved well enough that they are suitable for examination and measuring. Information about the locality of species from Croatia, for which that information exists in the "Book of inventory: vertebrates, fish, amphibians, reptiles, birds, mammals", matches with the habitats of species (JELIĆ ET AL., 2012, JELIĆ, 2014). Among 138 samples, Split is stated as the locality of species for 13 of them. During the formation of the collection, Split had the ZOO on Marjan and it is reasonable to assume that a large number of samples with the locality "Split" originated from the ZOO on Marjan, although there are also 20 samples in the collection with the locality "ZOO" or "Marjan". It is the same case with the samples of *Vipera berus* (ID 36) and *Vipera ursinii* (ID 39) (Figure 2.), where the locality "Vienna" (Viennese museum) indicates exchange with the Vienna museum (NHMW – Natural History Museum Wien). Samples of *Boa constrictor* (ID 234) and *Naja naja* (ID 233) do not belong to the Croatian herpetofauna (JELIĆ, 2014), but those individuals were the part of an exhibition in the Split ZOO and they were stored in the herpetological collection after their death. Specimens of species

Platyceps najadum (ID 14) and *Telescopus fallax* (ID 3) are very rare, probably the oldest records of these species for the city of Mostar, which is known from the literature as one of the northernmost localities for such thermophilic species of herpetofauna in Bosnia and Herzegovina (Lelo & Jusić, 2010). The sample of *Vipera ursinii* (ID 40), collected in Vitorog (B&H), is the first finding of this species on that mountain, so it would be desirable to investigate that locality in the future and to try to confirm that population, considering that it is the priority NATURA 2000 species (JELIĆ ET AL. 2012). In the case of the sample of *Platyceps najadum* (ID 15), the year of finding is probably written by mistake (1942 instead of 1924), because the inventory number matches the period of U. Girometta as collector, and he died in 1939, so the date of finding – 28 August 1942 – is not possible. Locality Hrebljina for the sample of *Vipera berus* (ID 36) is probably an erroneously written name of the locality. That locality is probably Hrbljina Mountain near the town of Glamoč in B&H. According to the "Book of inventory: vertebrates, fish, amphibians, reptiles, birds, mammals" herpetological collection of Natural History Museum in Split contains 224 samples of 17 snake species. Analyzing the collection, it was found that 31 samples were incorrectly determined: 1 sample of *Coronella austriaca* (ID 110) was considered *Natrix natrix*, 3 samples of *Hierophis gemonensis* (ID 13, 29 and 143) as *Platyceps najadum*, 1 sample of *Hierophis gemonensis* (ID 71) as *Natrix tessellata*, 3 samples of *Hierophis gemonensis* (ID 135, 287) as *Natrix natrix*, 1 sample of *Platyceps najadum* (ID 116) as *Coluber jugularis*, 1 sample of *Zamenis longissimus* (ID 265) as *Hierophis gemonensis*, 1 sample of *Zamenis longissimus* (ID 276) as *Natrix natrix*, 1 sample of *Zamenis situla* (ID 74) as *Elaphe quatourlineata*, 1 sample of *Zamenis situla* (ID 117) as *Hierophis viridiflavus*, 2 samples of *Natrix natrix* (ID 298 and 307) as *Zamenis longissimus*, 1 sample of *Natrix tessellata* (ID 250) as *Natrix natrix*, 14 samples of *Natrix tessellata* (ID 282, 300, 310, 311, 312 and 313) as *Coronella girondica* and 1 sample of *Malpolon insignitus* (ID 78) as *Platyceps najadum*. Therefore, the herpetological collection of the Natural History Museum in Split now has 224 samples of 15 species of snakes.

REFERENCES

Anonymous, Knjiga inventara: Kralježnjaci, Ribe, Vodozemci, Gmazovi, Ptice, Sisavci (Book of inventory: vertebrates, fish, amphibians, reptiles, birds, mammals). Prirodoslovni muzej i zoološki vrt, Split.

Arnold, E.N. & Burton, J. A. (2002): A field guide to the Reptiles and Amphibians of Britain and Europe. Harper Collins Publishers, London, 288 pp.

Cox, N., Chanson, J. & Stuart, S. (2006): The Status and Distribution of Reptiles and Amphibians of the Mediterranean Basin. IUCN, Gland, Switzerland and Cambrige, UK, 42 pp.

Jelić, D., Kuljerić, M., Koren, T., Treer, D., Šalamon, D., Lončar, M., Podnar-Lešić, M., Janev Hutinec, B., Bogdanović, T., Mekinić, S. & Jelić, K. (2012): Crvena knjiga vodozemaca i gmazova Hrvatske. Ministarstvo zaštite okoliša i prirode / Državni zavod za zaštitu prirode, Zagreb, 233 pp.

Jelić, D., Ajtić, R., Sterijovski, B., Crnobrnja-Isailović, J., Lelo, S. & Tomović, Lj. (2012): Distribution of the genus *Vipera* in the western and central Balkans (Squamata: Serpentes: Viperidae). Herpetozoa, 25 (3/4): 109 –132.

Jelić, D. (2014): Checklist of Croatian amphibians and reptiles with bibliography of 250years of research. Natura Sloveniae, 16(2): 17-72.

Marković, D. (2004): Crveni popis ugroženih biljaka i životinja Hrvatske. Državni zavod za zaštitu prirode, Zagreb, 112 pp.

Suvad, L. & Jusić, B. (2010): Novi nalazi šilca, Platyceps najadum (Eichwald, 1831) (Squamata: Ophidia, Colubridae), u Bosni i Hercegovini. UZIZAŽ BIOSPELD 6: 54-59.

Tvrtković, N., Janev Hutinec, B., Kletečki, E., Lazar, B., Podnar Lešić, M., Skejić, J. & Tadić. Z. (2006): Crvena knjiga vodozemaca i gmazova Hrvatske. Ministarstvo kulture: Državni zavod za zaštitu prirode, Zagreb, 94 pp.

Ževrnja, N., Golubić, V., Kokan, B. & Vrgoč, S. (2004): Kratki povijesni prikaz osnivanja prirodoslovnog muzeja i zoološkog vrta. Muzeologija 39: 18–27.