

Taxonomic notes on the snakes of Northern Cyprus, with observations on their morphologies and ecologies

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Abstract

A total of 66 specimens belonging to eleven snake species, some of which were collected during the field studies of 17–31 July and 3–25 September 2003, and some others which have been previously collected and all have been deposited into the collection of ZDEU (Zoology Dept. Ege University), were evaluated taxonomically. 25 of the specimens belonged to Typhlopidae, 37 to Colubridae, three to Viperidae and one to Boidae. These specimens were evaluated from the points of view of pholidosis, pattern and coloration and morphological measurements. Some biological and ecological information were also given with the brief geological history of eastern Mediterranean region.

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Keywords

Snakes; Northern Cyprus; herpetofauna; morphology; taxonomy

Introduction

According to Schätti (1985) the herpetofauna of Cyprus, the largest island in the eastern Mediterranean, is relatively less investigated than Rhodes and Crete islands. The few studies are relatively concentrated to the southern parts of the island (Schätti, 1985; Schätti and Sigg, 1989; Wiedl and Böhme, 1992; Böhme and Wiedl, 1994) and there are only some general studies on the snake fauna of northern Cyprus (Göçmen et al., 1996; Atatür and Göçmen, 2001; Göçmen and Böhme, 2002). An endemic snake species, *Dolichophis cypriensis* (Schätti, 1985) was described from the southern parts of the island, however races such as *Telescopus fallax cyprianus*, *Natrix natrix cypriaca* and *Macrovipera lebetina lebetina* are also endemic to Cyprus. A breeding population of *Natrix natrix cypriaca*, which was believed to become extinct since nineteen

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sixties, was rediscovered on the island in 1992 (Wiedl and Böhme, 1992; Böhme and Wiedl, 1994).

In this paper we aim to clarify the taxonomic status of the snakes in northern Cyprus. We evaluated 66 specimens collected from northern Cyprus during various field studies. The specimens belonged to eleven different species of the Typhlopidae, Boidae, Colubridae and Viperidae families. Field observations provided some information on the biology and ecology of these species. The data on the species were evaluated pholidotically, morphometrically and regarding pattern and coloration characteristics. Faunal similarities of these species with those from the Southern Cyprus and the Anatolian mainland are established.

Material and methods

The majority of the material was collected from Northern Cyprus (NC) during two excursions conducted between 17–31 July and 3–25 September 2003, and some of the material has been collected previously between the years 1960 and 2002. We collected from under the stones or from the open fields by hand or by means of a net. The collections were made between 07.00 and 19.00 hours in the daytime. Nocturnal collections were conducted between 22.00 and 01.00 hours. The pattern and coloration characteristics of the specimens were recorded, together with details on their biotopes. We anesthetized the animals with ether. Generally these specimens then were fixed with 10% formalin–70% ethanol mixture injection and kept in glass jars with 70% ethanol. But the specimens collected during the last excursion were fixed with 95% ethanol and then kept in 70% ethanol to allow for future DNA analysis of the material. The material list of each species contains the museum code and number, sex, number of specimens, collection locality (also as a map number) (Fig. 1), the collector and the collection date. Some data on environmental or habitat characteristics, such as altitude, temperature, etc., were given within the text, but not for all of the species. The Dowling system (Dowling, 1951) was used for pholidotical evaluation of the samples. A ruler of 0.1 mm sensitivity and a digital caliper of 0.01 mm sensitivity were used for body measurements and a stereo microscope was utilized for scale and plate counts. Morphometrical data in millimeters are shown within related tables, together with pholidotical data.

The terminology used in describing the specimens conforms to Dowling (1951) and Baran (1976). All scale counts are indicated as “left/right (L/R)”. Countable and measurable characteristics used are given below (Baran, 1976).

Ventral Plates (VP): Wide and large ventral plates from neck to anal plate, counted according to Dowling (1951).

Subcaudals (SCa): Alternating plates under the tail, from anal cleft to the single plate at the tip of the tail.

Dorsal Scales (DS): Number of dorsal scales at mid-body in a single row, from ventral to ventral plates.

Anal Plate: Posterior to ventrals, the large plate free posterior margin of which covers the anal cleft. It is undivided or divided to two plates in different species.

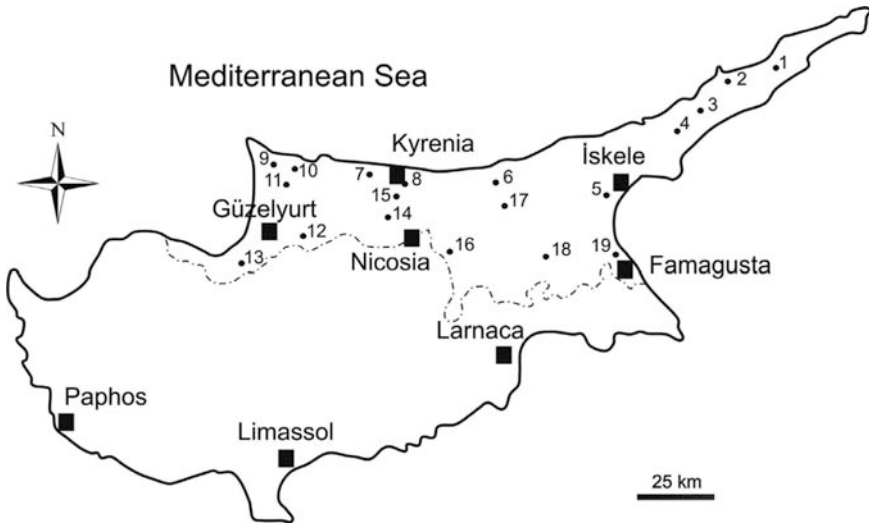


Figure 1. The study area in Cyprus. The numbers of localities are as follows. 1: Dipkarpaz, 2: Yeni Erenköy, 3: Ziyamet, 4: Mehmetçik, 5: İskele, 6: Ergenekon, 7: Lapta, 8: Kyrenia (Girne), 9: Koruçam, 10: Geçitköy, 11: Tepebaşı, 12: Güzelyurt, 13: Taşpınar, 14: Gönyeli, 15: Dikmen, 16: Nicosia (Lefkoşa), 17: Serdarlı, 18: Dörtöl, 19: Famagusta (Gazimagusa).

Rostral Height (RH): The vertical distance from the lowest part of the plate at the mouth tip to its highest part.

Rostral Width (RW): The distance between the widest two points of the plate.

Frontal Length (FL): The longest dimension of the plate.

Frontal Width (FW): The anterior widest part of the plate.

Pileus Length (PL): The distance between the tip of the rostrum and the posterior edge of the parietal plates.

Pileus Width (PW): The distance between the posterior outer edges of the supraocular plates.

Head + Trunk Length (HTL): The distance from the tip of the rostrum to the posterior edge of anal plate.

Tail Length (TL): The distance from the posterior edge of the anal plate to the tip of the tail.

Total Length (ToL): The distance from the tip of the rostrum to the posterior edge of the tail.

Results

Typhlopidae

Typhlops vermicularis (Merrem, 1820)

Material. n = 25 (♂♂+♀♀). ZDEU 36/1989, 1-2, Lapta-Girne, [7], Leg. B. Göçmen, 23.07.1989, ZDEU 72/1994, 1, Lapta-Kyrenia Leg. B. Göçmen, 18.08.1994, ZDEU 34/1995, 1-2, Gönyeli-Nicosia eg. B. Göçmen, 08.05.1995,

ZDEU 12/1996, 1-9, Gönyeli-Nicosia Leg. B. Göçmen, 25.04.1996, ZDEU 6/2002, 1-9, Gönyeli-Nicosia Leg. B. Göçmen, 18.03.2002, ZDEU 33/2003, 1-2, Mehmetçik-Famagusta Leg. H. Bahar-B. Göçmen, 23.07.2003.

General aspect and pholidosis. A slender snake with a vermiculate aspect. Similar looking dorsal and ventral scales are cycloidal. Eyes are under the head plates and 0.26–(0.29)–0.31 mm (SD: 0.01, SE: 0.003) in diameter. Blunt tail short, with a small tail spine. Rostral, the largest head plate is nearly the 1/3 of head width and extends back to the eye level. A pair of nasals are partly divided; preocular 1/1; supralabial plates 4/4. Number of scales around the trunk was found to be 22–(22.84)–24 (in ten specimens it was 24, in one 23 and in fourteen 22) (SD: 0.99, SE: 0.20).

Body measurements and ratios. We were not able to determine the sex of our specimens. Total length (ToL) range was 136.4–(198.88)–264 mm (SD: 36.20, SE: 7.24), and body diameter 2.14–(3.83)–5.44 mm (SD: 0.73, SE: 0.15). HTL values were 134–(195.11)–259 (SD: 31.96, SE: 6.39), and those of TL 2.4–(3.76)–4.95 (SD: 0.61, SE: 0.12). The ratio of HTL/TL was computed as 51.79.

Pattern and coloration. In live specimens (Figure 2) the dorsum was pinkish brown, while the venter was yellowish. In ethanol preserved specimens from ZDEU collection, the dorsum was yellowish brown and the venter was yellowish white.

Biological and ecological observations. The specimens were collected from sparsely vegetated moist and rocky regions. They were found in moist soil under rocks near grain fields, or at grasslands under moist stones.

Taxonomical evaluation. *Typhlops vermicularis* is the only species of the Typhlopidae in NC. The first record in Cyprus goes back to Unger and Kotschy (1865; in Osenneg,



Figure 2. General aspect of *Typhlops vermicularis* (Gönyeli-Nicosia, photo by B. Göçmen, bar = 13 mm).

1985). Jan (1864) and Boulenger (1913) had reported large specimens of *T. vermicularis* of 420 and 356 mm (ToL), respectively (Osenegg, 1989). Such large specimens were not encountered again in later studies. According to Schätti (1985), the total lengths of the four specimens collected by Knoepffler (1963) ranged between 130–240 mm, while six others collected by Osenegg (1989) were between 152–260 mm. Total lengths of specimens collected from Turkey varied between 97–297 mm (Baran, 1976). In NC the same measure varied between 136.4–(198.88)–264 mm. In six *T. vermicularis* from SC, 22–24 scale rows were counted around the trunk (Osenegg, 1989). The same count was verified for NC specimens during the present study. The species is widespread in northern NC, its range extends from Afghanistan to Turkey, Cyprus, Greece, southern Bulgaria, Albania and southern Yugoslavia (Baran and Atatür, 1998). Data obtained from the present study for *T. vermicularis* is in accordance with those given by Baran (1976), Başoğlu and Baran (1980), Baran and Atatür (1998) and Osenegg (1989).

Boidae

Eryx jaculus (Linnaeus, 1758)

Material. n = 1. ZDEU 116/1960, ♀, 1, Gönyeli-Nicosia [14], Leg. Ö. Kaya Gülen, 12.09.1960.

General aspect and pholidosis. The rostrum was roundish in the single specimen from ZDEU collection. A neck constriction was not present and the tail tip was conical. Internasals distinct, with a pair of prefrontals behind. Five plates between the eyes, in rings surrounding the eyes 8/8 scales were counted. Two scale rows were present between the eyes and the labials, and 3/3 scales were counted between the eyes and the nasal plate. On both sides of head supralabials were 10/10. The body scales were smooth, but they gradually became slightly keeled towards the tail. There were 168 ventrals and 21 subcaudals in a single row. 47 scale rows were counted around the mid-trunk.

Body measurements and ratios. HTL of the specimen was 141 mm, tail length 14.1 mm and ToL 155.1 mm. RH was 1.08 and RW 2.35. Ratio of RW to RH was 2.17, that of HTL to TL was 9.95.

Pattern and coloration. Dorsum of the ethanol preserved specimen was brownish or pinkish brown, venter light brown to whitish. Under the trunk indistinct light brown maculations were present. These were absent under the tail. The pattern of the dorsum became partly indistinct due to the long ethanol preservation.

Biological and ecological observations. No data is yet available.

Taxonomical evaluation. Three races of *E. jaculus* live in the nearest mainland, Anatolia. The nominate race, *E. j. jaculus*, is known from the vicinity of Şanlıurfa, *E. j. turcicus* lives in southern and western Anatolia and Turkish Thrace, *E. j. familiaris*

in eastern Anatolia (Baran and Atatür, 1998). Two scale rows are present between the eye and labials in *E. j. turcicus*, but only one row in *E. j. jaculus* and *E. j. familiaris*. In *E. j. turcicus* yellowish-white maculations are evident on the venter (Baran, 1976). The characteristics of our specimen are in accordance with those of *E. j. turcicus*, given by Baran (1976) and Başoğlu and Baran (1980).

In spite of the single *E. jaculus* specimen from NC in the ZDEU collection, the presence of *E. jaculus* in NC is dubious, because no specimen was encountered either in northern or SC during several herpetofaunistic studies in recent years. We were also not able to find a specimen in NC during our field studies. However, we cannot rule out the possibility that we might have missed this species because we did not search during spring months.

Colubridae

Dolichophis jugularis (Linnaeus, 1758)

Material. n = 12 (10♂♂, 2♀♀). ZDEU 26/1962, ♂ juv., 1, Nicosia, [16], Leg. Hürmüz A. Cemal, 01.09.1962, ZDEU 69/1994, ♀ juv., 1, Bostancı, Güzelyurt-Nicosia, [12], Leg. B. Göçmen, 24.08.1994, ZDEU 70/1994, ♂ juv., 1, Lapta-Kyrenia, [7], Leg. B. Göçmen, 20.08.1994, ZDEU 71/1994, ♂, 1, Tepebaşı-Kyrenia, [11], Leg. B. Göçmen, 21.08.1994, ZDEU 95/1994, ♂ juv., 1, Gönyeli-Nicosia, [14], Leg. B. Göçmen, 08.05.1994, ZDEU 35/1995, ♀ juv., 1, Gönyeli-Nicosia, [14], Leg. B. Göçmen, 08.05.1995, ZDEU 1/2002, ♂, 1, Kırnı-Nicosia, [16], Leg. B. Göçmen, 18.03.2002, ZDEU 37/2003, ♂, 1, Taşpınar, Güzelyurt-Nicosia, [13], Leg. H. Bahar-B. Göçmen, 20.07.2003, ZDEU 38/2003, ♂, 1, Serdarlı-Famagusta, [17], Leg. H. Bahar-B. Göçmen, 27.07.2003, ZDEU 39/2003, ♂, 1, Doğançı, Güzelyurt-Nicosia, [12], Leg. H. Bahar-B. Göçmen, 20.07.2003, ZDEU 45/2003, ♂ Sad., 1, Famagusta, [8], Leg. H. Bahar-B. Göçmen, 18.09.2003, ZDEU 46/2003, ♂ Sad., 1, Arapköy-Kyrenia, [8], Leg. H. Bahar-B. Göçmen, 15.09.2003.

General aspect and pholidosis. From above, rostrum was acute angled. A narrow neck region was distinct. Iris was round. Tail was narrow and long. Typical colubrid head plates were present. Preocular count was always 2/2. The top preocular was larger than the bottom one. Also 2/2 postoculars. Nasal plate was cleft at top and bottom, external naris in the middle of the plate. Loreal (Frenal) plate 1/1; temporals 2/2 in ten specimens, in one specimen 3/4 (right top plate in two pieces) and in one other 4/2 (right top plate in three pieces). Posttemporals 3/3 in eleven specimens, while in one specimen the count was 4/3 (right top plate divided). Supralabials 8/8 in eleven specimens, while in one the count was 8/9. Sublabials 10/10 in eleven specimens and 11/10 in one specimen. A cleft anale was present; there were 19 rows of smooth dorsal scales at mid-trunk (table 1).

A specimen from SC is also present within the ZDEU collection (ZDEU 121/1960, 1, juv. ♂, Larnaca, Leg. Ö. Kaya Gülen, September 1960). With a ToL of 840 mm; it had 205 ventrals, 102 subcaudals and 19 rows of dorsal scales at mid-trunk. Subcaudal and ventral counts for *D. jugularis* are given in table 2, including measurements by other authors.

Table 1.
Some pholidotic characteristics of various colubrid species from NC

	<i>D. jugularis</i>			<i>H. nummifer</i>			<i>T. fallax</i>			<i>N. tessellata</i>			<i>M. monspes- sulanus</i>			<i>P. najad- um</i>			<i>Z. stitula</i>			<i>N.</i>
	n	Mean±SD/SE Range	n	Mean±SD/SE Range	n	Mean±SD/SE Range	n	Mean±SD/SE Range	n	Mean±SD/SE Range	n	Mean±SD/SE Range	n	n	n	n	n	n	n	n		
Preoculars Left	12	2.00±0.0/0 2-2	11	2.91±0.30/0.09 2-3	6	1.00±0/0 1-1	2	2.50±0.71/0.50 2-3	2	1.00±0/0 1-1	1	2	1	1	1	1	1	1	1	1		
Preoculars Right	12	2.00±0/0	11	3.00±0/0	6	1.00±0/0	2	2.50±0.71/0.50	2	1.00±0/0	1	2	1	1	1	1	1	1	1	1		
Postoculars Left	12	2.00±0/0 2-2	10	2.82±0.40/0.12 2-3	6	2.00±0/0 2-2	2	4.00±0/0 4-4	2	2.00±0/0 2-2	1	2	1	2	1	2	1	3	3	3		
Postoculars Right	12	2.00±0/0	11	2.91±0.54/0.16	6	2.00±0/0	2	4.00±0/0	2	2.00±0/0	1	2	1	2	1	2	1	3	3	3		
Supralabials Left	12	8.00±0/0 8-8	11	9.18±0.60/0.18 9-11	6	8.00±0/0 8-8	2	8.00±0/0 8-8	2	8.00±0/0 8-8	1	8	1	8	1	8	1	7	7	7		
Supralabials Right	12	8.08±0.29/0.08	11	9.09±0.30/0.09	6	8.00±0.63/0.26	2	8.00±0/0	2	8.00±0/0	1	8	1	8	1	8	1	7	7	7		
Sublabials Left	12	10.16±0.38/0.11 10-11	10	10.00±0.47/0.15 9-11	6	11.00±0.52/0.21 10-11	2	10.00±0/0 10-10	2	10.50±0.71/0.50 10-11	1	10	1	10	1	10	1	10	10	10		
Sublabials Right	12	10.00±0/0	10	10.00±0.48/0.15	6	11.00±0.40/0.17	2	10.00±0/0	2	10.00±1.41/1	1	10	1	10	1	10	1	10	10	10		
Temporals Left	12	2.25±0.62/0.18 2-4	11	2.45±0.52/0.16 2-3	6	2.67±0.52/0.21 2-3	2	1.00±0/0 1-1	2	2.00±0/0 2-2	1	2	1	2	1	2	1	1	1	1		
Temporals Right	12	2.17±0.58/0.17	11	2.55±0.52/0.16	6	2.83±0.75/0.31	2	1.00±0/0	2	2.00±0/0	1	2	1	2	1	2	1	1	1	1		
	2-4		2-3		2-4		1-1		2-2													

(Continued)

Table 1.
(Cont.,)

	<i>D. jugularis</i>			<i>H. nummifer</i>			<i>T. fallax</i>			<i>N. tessellata</i>			<i>M. monspes- sulanus</i>			<i>P. najad- um</i>			<i>Z. situla</i>			<i>N. natrix</i>	
	n	Mean±SD/SE Range	n	Mean±SD/SE Range	n	Mean±SD/SE Range	n	Mean±SD/SE Range	n	Mean±SD/SE Range	n	Mean±SD/SE Range	n	n	n	n	n	n	n	n	n	n	
Posttemporals Left	12	3.08±0.29/0.08 3-4	11	3.36±0.50/0.15 3-4	6	3.83±0.41/0.17 3-4	2	2.00±0/0 2-2	2	3.00±0/0 3-3	1	3	1	3	1	2	2	2	2	2	2	2	
	12	3.00±0/0	11	3.09±0.30/0.09 3-4	6	3.83±0.41/0.17 3-4	2	2.00±0/0	2	2.50±0.71/0.50 2-3	1	3	1	3	1	2	1	2	1	2	1	2	
Posttemporals Right	11	201.82±2.68/0.81 196-205	11	208.55±5.85/1.77 201-216	6	201.5±3.27/1.34 196-205	2	176.00±1.41/1.00 175-177	2	167.00±1.41/ 1.00	1	214	1	222	1	180	1	1	1	1	1	1	
	10	110.60±5.74/1.81 103-118	10	88.80±4.26/1.35 83-98	6	62.83±1.17/0.48 62-65	2	66.50±7.77/5.55 61-72	2	85±2.82/2 83-87	1	117	1	63	1	68	1	1	1	1	1	1	
DS	12	19.00±0/0 19-19	12	24.33±0.65/0.19 23-25	6	21.00±0/0 21-21	2	19.00±0/0 19-19	2	17.00±0/0 17-17	1	17	1	25	1	19	1	1	1	1	1	1	

Table 2.Some pholidotic characteristics of *Dolicophis jugularis*, according to various authors

Author	Osenegg (1989)	Schätti (1985)	Baran (1976)	Present study
Locality	SC	SC	Turkey	NC
VP	♂♂ + ♀♀ 196-(202.9)-207 n: 21	♂♂ 199-(203.2)-209 n: 23 ♀♀ 202-(205.1)-208 n: 7	♂♂ + ♀♀ 189-(202.6)-215 n: 45	♂♂ 196-(201.7)-205 n: 9 ♀♀ 201-(202)-203 n: 2
SCa	♂♂ + ♀♀ 102-(112.6)-118 n: 12	♂♂ 107-(112.5)-118 n: 23 ♀♀ 101-(105.7)-113 n: 7	♂♂ + ♀♀ 99-(111.08)-128 n: 38	♂♂ 103-(111)-118 n: 8 ♀♀ 104-(107.5)-111 n: 2
DS	19 n: 22	19 n: 30	19 n: 45	19 n: 12

Body measurements and ratios. The ratio of RW/RH was 1.26; of FL/FW was 1.56; that of PL/PW was 2.14 and that of HTL/TL was 2.68. Some specimens were omitted from the evaluation because of trunk or tail traumas. Pholidotic characteristics of the specimens are given in tables 1 and 3, together with body measurements.

Pattern and coloration. In a freshly caught mature male specimen (ZDEU 37/2003) the dorsum was glossy black; venter was also black with randomly distributed reddish maculations (Figure 3). These maculations were a little faded, for the specimen was not in breeding season. These became redder towards the tip of the tail. The venter of the tail tip was homogenously red. Venter of the head had yellowish-reddish maculations starting from the level of sublabials. These were also seen on pre- and postoculars. In juveniles, the ground coloration of the dorsum changed between gray, brownish and olive green; while the venter was white with black maculations. These maculations continued from the beginning of the ventrals to the tip of the tail. The laterals of the ventrals also had blackish maculations, which became scarcer towards the tail. Dorsum is generally covered with four lobed black maculations, which might be separate or joined together. This design was also seen in the subadults. Only in one subadult specimen (ZDEU 46/2003 ♂) the large part of the dorsum was glossy black-grayish, for the specimen was an intermediate between a subadult and adult form.

Biological and ecological observations. This species is widespread in NC, especially in the vicinity of wheat fields. Because it feeds on agricultural pests such as mice, it has a biological pest control potential, so usually does not get killed by the local people. The specimen was collected during a July noontime at Taspinar-Güzelyurt (Nicosia) under

Table 3.
Some measurements (in mm) of various colubrid species from NC

<i>D. jugularis</i>		<i>H. nummifer</i>		<i>T. fal-</i> <i>lax</i>		<i>N. tessellata</i>		<i>M. monspessulanus</i>		<i>P. najadum</i>		<i>Z. situla</i>		<i>N.atrix</i>	
n	Mean±SD/SE Range	n	Mean±SD/SE Range	n	Mean±SD/SE Range	n	Mean±SD/SE Range	n	Mean±SD/SE Range	n	Mean±SD/SE Range	n	Mean±SD/SE Range	n	n
PL	19.24±5.20/1.50		15.16±2.28/0.60		10.60±2.45/1.00		10.55±0.37/0.27		14.44±0.88/0.62						
12	10.28-26.27	11	11.68-20.02	6	7.57-13.79	2	10.28-10.81	2	13.82-15.06	1	9.98	1	12.04	1	13.3
PW	8.97±2.36/0.68		7.55±1.03/0.31		5.21±0.87/0.35		4.11±0.25/0.18		7.22±0.13/0.09						
12	4.80-12.13	11	5.88-9.74	6	4.07-6.32	2	3.93-4.28	2	7.13-7.31	1	4.73	1	5.79	1	5.7
HTL	658.92±257.14/74.22		464.33±142.76/41.21		347.83±138.29/56.46		234.50±30.41/21.50		382.50±58.69/41.50						
12	264-1010	12	235-713	6	163-499	2	213-256	2	341-424	1	228	1	286	1	403
TL	245.67±101.45/29.29		126.76±42.63/12.85		68.95±28.14/11.48		59.28±5.45/3.86		113.50±13.44/9.50						
12	77-446	11	61.7-209	6	35.6-106	2	55.42-63.13	2	104-123	1	75	1	51.4	1	100.6
FL	6.63±1.41/0.40		5.48±0.73/0.21		3.88±0.70/0.28		3.28±0.10/0.07		6.01±0.54/0.38						
12	4.25-8.82	12	4.47-6.88	6	3.05-4.65	2	3.21-3.35	2	5.63-6.39	1	3.63	1	4.03	1	4.98
FW	4.25±1.15/0.33		3.96±0.63/0.18		3.05±0.65/0.27		2.16±0.05/0.04		2.88±0.34/0.24						
12	2.50-6.05	12	2.89-5.14	6	2.33-3.97	2	2.13-2.20	2	2.64-3.12	1	2.31	1	2.87	1	3.71
RH	3.51±1.29/0.37		2.14±0.47/0.14		1.41±0.18/0.07		1.38±0.13/0.10		2.20±0.28/0.20						
12	1.81-5.50	11	1.72-3.42	6	1.08-1.54	2	1.28-1.47	2	2.00-2.39	1	1.04	1	1.68	1	2.36
RW	4.43±1.42/0.41		3.43±0.65/0.20		2.31±0.43/0.17		2.16±0.13/0.09		2.98±0.33/0.23						
12	2.34-6.41	11	2.6-4.7	6	1.68-2.72	2	2.07-2.25	2	2.75-3.21	1	1.81	1	2.92	1	3.24
TOL	904.58±347.27/100.25		580.53±184.25/53.19		416.78±166.15/67.83		293.78±35.86/25.36		496±72.12/51.00						
12	341-1426	11	296.70-922.00	6	198.60-605.00	2	268.42-319.13	2	445-547	1	303	1	337.4	1	503.6

a nylon bag among several *Prunus persica* and *Cupressus semipervirens* trees. Another specimen collected at Serdarli-Famagusta was found under a large stone on a small dry and rocky hill, surrounded by *Triticum* (wheat) fields. At the foot of the hill was a partly dried stream. A specimen was also caught at Doganci-Güzelyurt (Nicosia) near an irrigating canal, again near a wheat field. Other specimens obtained from Kyrenia and Arapköy were collected from ecologically similar localities. Hemipenial structure of *Dolicophis jugularis* was shown in Figure 4.

A quick biting but non-venomous species that strongly constricts hands or wrists when caught. Specimens caught during our field studies were usually not far from water.

In biotopes where our specimens were caught, the lizard species *Ophisops elegans*, *Chalcides ocellatus* and *Cyrtopodion kotschy* were also observed. During our field studies, two adult specimens were found dead on road (DOR) at Lapta (Kyrenia) and Serdarli (Famagusta); plus three skin sheddings were seen at Güzelyurt, Nicosia and Karpas.

Taxonomical evaluation. Nagy et al., (2004) have referred 5 Asian and eastern Mediterranean species, previously assigned to *Hierophis* by Schätti and Utiger (2001), to *Dolichophis*, including *Dolichophis jugularis*. The first records of the species from Cyprus belong to Unger and Kotschy (1865) and Boulenger (1888) (Osenegg, 1989). Regarding ventral plate counts, no discernible difference was observed between the investigated male and female specimens; while regarding subcaudals, males had a higher count than females.



Figure 3. Pattern and general aspect of *Dolichophis jugularis cypriacus* (ZDEU 37/2003, ♂, Taspınar-Güzelyurt, photo by B. Göçmen, bar = 10 mm).

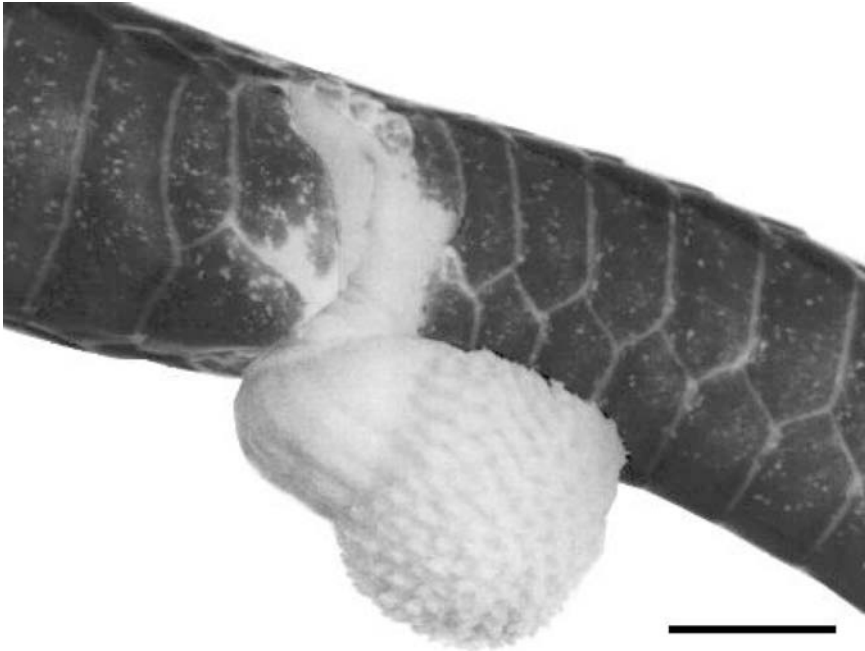


Figure 4. Hemipenial structure and ventral aspect of *Dolicophis jugularis cypriacus* (ZDEU 1/2002, ♂, Kirni-Nicosia, photo by H. Bahar, bar = 4,5 mm).

A comparison of ventral and subcaudal counts between the southern (Osenegg, 1989; Schätti, 1985) and NC specimens (the present work) indicate very similar values (Table II); while Baran's (1976) results indicate higher ventral and subcaudal counts from Turkish specimens, with respect to those from Cyprus. However, when the mean values are considered, the difference is not significant. 19 rows of dorsal scales were counted at mid-trunk in all of the material. The same value, i.e. 19 rows of dorsal scales, was given both for the material from SC and Turkey (Baran, 1976; Schätti, 1985; Osenegg, 1989; Atatür and Göçmen, 2001).

The species is widespread in Cyprus, and can also be found in Turkey, Syria, Iraq, Jordan and Israel. Zinner (1972), who commented on the relatively docile behavior of "*Coluber jugularis*" compared with the "ferocious" behaviour of "*C. caspius*", recognized three subspecies of the former species:

1. *C. j. jugularis* Linnaeus, 1758, with red throat, in Anatolia and northern Syria (he proved the terra typica, Egypt, as erroneous);
2. *C. j. asianus* Boettger, 1880, with black and white throat, in southern Syria, Lebanon, Jordan and Mediterranean Israel;
3. *C. j. cypriacus* Zinner, 1972, with mostly black venter, anteriorly speckled with some red, on Cyprus.

Our findings from the investigated material are in accordance with data given by Baran (1976), Başoğlu and Baran (1980), Schätti (1988), Osenegg (1989), Atatür and Göçmen (2001) for *Dolicophis jugularis* and also *D. j. cypriacus* suggested by Zinner (1972).

Hemorhois nummifer (Reuss, 1834)

Material. n = 12 (7 ♂♂, 5 ♀♀). ZDEU 25/1962, ♂ juv., 1, Nicosia, [16], Leg. Ö. Kaya Gülen, 01.09.1962, ZDEU 316/1977, ♂, 1, Famagusta, [19], Leg. M. Başoğlu, 10.08.1977, ZDEU 35/1989, ♂ juv., 1, Tepebaşı-Kyrenia, [11], Leg. B. Göçmen, 07.07.1989, ZDEU 88/1993, ♀ juv., 1, Lapta-Kyrenia, [7], Leg. B. Göçmen, 21.07.1993, ZDEU 68/1994, ♀, 1, Lapta-Kyrenia, [7], Leg. B. Göçmen, 20.08.1994, ZDEU 49/2000, ♂ juv., 1, Dipkarpaz-Famagusta, [1], Leg. B. Göçmen, 26.07.2000, ZDEU 29/2003, ♀, 1, Ziyamet-Karpas, [3], Leg. Ersan Korudağ, 30.07.2003, ZDEU 30/2003, ♂, 1, Lapta-Girne, [7], Leg. H. Bahar-K. Sağlam, 18.07.2003, ZDEU 34/2003, ♂, 1, Lapta-Kyrenia, [7], Leg. H. Bahar-B. Göçmen, 26.07.2003, ZDEU 43/2003, ♀ juv., 1, Kumyalı-Karpas, [1], Leg. H. Bahar-B. Göçmen, 20.09.2003, ZDEU 44/2003, ♂ S. ad., 1, Girne, [8], Leg. H. Bahar-B. Göçmen, 21.09.2003, ZDEU 47/2003, ♀ S. ad., 1, Upper Dikmen-Kyrenia, [15], Leg. H. Bahar-B. Göçmen, 23.09.2003.

General aspect and pholidosis. In our specimens all of the head plates were present; from above, only a small part of the rostral was visible. Head large, with a distinct neck, pupil round. Largely separate but sometimes partly joined roundish maculations were seen on the dorsum. Towards the tail, these maculations gradually came together to form a straight line. Preocular plates were in contact with the tips of frontal plate.

In one of our specimens (ZDEU 34/2003) the head was partly battered, so some measurements and counts were not taken. In ten specimens preoculars were 3/3, while in one the count was 2/3. Loreal count was 1/1 in nine specimens, 2/2 in one and 2/1 in two others. Postoculars were 3/3 in seven specimens, 2/2 in two, 3/4 in one and -/3 (the left one was damaged). Supralabial count was 9/9 in nine specimens, 9/10 in one and 11/9 in one other. Sublabials were 10/10 in five, 10/9 in three, 11/10 in one and 9/10 in one other specimen. Temporals were 3/3 in five, 2/2 in five and 2/3 in one specimen. There were 3/3 posttemporals in seven specimens, 4/3 in three and 4/4 in one. Anale was divided; ventrals were 201-(210.8)-216 in five females while the same count was 202-(206.6)-214 in six males. Subcaudals were 83-(86.5)-89 in four females and 85-(90.3)-98 in six males.

While subcaudal count was higher in males, regarding ventral counts there was no discernible difference between the sexes. Dorsal scales were smooth; dorsal scale rows at mid-trunk were counted as 25 in five, 24 in six and 23 in one specimen. Number of maculations on dorsum was 49-(54.8)-64. Some comparative values on these counts are given in table 1.

Body measurements and ratios. The ratio of HTL/TL was 3.82. RW/RH was 1.56; PL/PW was 2.01; FL/FW was 1.38. Total lengths of our specimens were shorter than those from Turkey [276-(593)-1323]. Pholidotic characteristics and measurements of our specimens are given in tables 1 and 3. In table 4 some pholidotic characteristics of our specimens are compared to those by other authors.

Pattern and coloration. In live specimens top of the head was brown-gray, with dark brown maculations. Roundish dark brown maculations over supraocular plates and longitudinal brown maculations beneath the eyes and lateral to them were seen. Temporal stripes continued to the end of supralabial plates. Over the parietal plates, a pair of longitudinal maculations was present, which diverged towards the trunk (fig. 5).

Subadults and adults shared the same pattern and coloration. On the dorsum roundish dark brown maculations with black rims, usually separate but sometimes partly joined, were present. These started immediately behind the head and usually remained separate over the trunk; they began to join together near the tail and formed a straight line towards the tail tip.

On the flanks, two longitudinal rows of roundish maculations extended. The one below disappeared at the level of the anal plate, while the upper row continued towards the tail, but became indistinct. The venter was white with blackish-gray maculations, which became more prominent towards the tail.

Biological and ecological observations. A mature specimen from Lapta-Kyrenia was caught in the shade of a rock within the lemon (*Citrus sinensis*) garden of a house, two

Table 4.
Some pholidotic characteristics of *Hemorhois nummifer* according to various authors

Author	Osenegg (1989)	Schätti (1985)	Baran (1976)	Present Study
Locality	SC	SC	Turkey	NC
VP	♂♂ + ♀♀ 206-(209.6)-215 n: 3	♂♂ 197-(203.4)-206 n: 5 ♀♀ 210-(214)-221 n:5	♂♂ 196-(202.84)-214 n: 38 ♀♀ 204-(211.38)-216 n: 29	♂♂ 202-(206.6)-214 n: 6 ♀♀ 201-(210.8)-216 N: 5
SCa	♂♂+ ♀♀ 85-(86)-87 n: 2	♂♂ 84-(87)-90 n: 5 ♀♀ 82-(87)- 98 n: 5	♂♂ 80-(89.79)-100 n: 33 ♀♀ 76-(87.83)-102 n: 24	♂♂ 85-(90.3)-98 n: 6 ♀♀ 83-(86.5)-89 n: 4
DS	25 n: 4	25 n: 5	23-25 n: 69	23-25 n: 12
Dorsal maculations	54-(60.67)-67	-	-	49-(54.8)-64

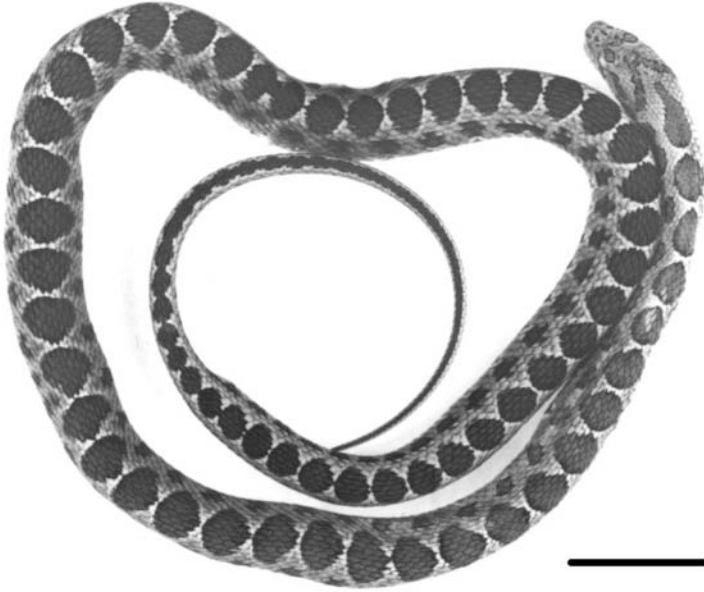


Figure 5. Dorsal pattern and general aspect of *Hemorhois nummifer* (ZDEU 30/2003, ♂, Lapta-Girne, photo by H. Bahar, bar = 25 mm).

other adult specimens were found DOR; another specimen was found killed by the owner in a lemon orchard. Because these specimens were damaged too much, they were left out of our evaluation. Another female was found at Karpas in the noontime, basking near a pool of water in the garden of an old house.

The other specimens were caught within human habitations not far from water. This species was scarce in dry and rocky places. They shared their biotopes with lizards such as *Ophisops elegans*, *Chalcides ocellatus* and *Cyrtopodion kotschy*, also with *Dolicophis jugularis*.

Pattern and coloration of this species, together with its behavioral displays, mimic the vipers, e.g., it forms a coil when approached, hisses loudly and rises its triangular head in an attack behavior. The local people mistake this species with *Macrovipera lebetina*, and thinking it as venomous, usually kill it. The local names “Batsallı” (“spotted”) and “Sagır Yılan” (“deaf snake”) are usually used for both of these species.

Taxonomical evaluation. Until recently, *Hemorhois nummifer* was regarded as a subspecies of *Coluber ravergeri*, then, because of its different dorsal pattern and higher scale row count at mid-trunk, was accepted as a separate species (Werner and Avitali, 1980; Osenegg, 1989).

The dorsal maculations of *Coluber ravergeri* are usually joined and extend to the flanks, while in *H. nummifer* the maculations are separate and roundish (Atatür and Göçmen, 2001). In our specimens the dorsal maculations were generally separate, sometimes two were joined. Only in one specimen (ZDEU 25/1962, ♂ juv.) the dorsal

maculations were not exactly round and some extended towards the flanks. In this specimen scale row count at mid-trunk was 23, while in others it was 24–25.

While in males the subcaudal plate counts were a little higher, there was no gender difference regarding ventral counts. Ventral and subcaudal values from SC and Turkish specimens were found to be very similar to those from NC (Table IV).

In NC this species is found at and in the vicinities of human habitations; it is also distributed in Syria, Lebanon, Israel, Jordan, Egypt, Aegean islands and Turkey (Atatür and Göçmen, 2001). Our results on *Hemorrhhois nummifer* are in accordance with those given by Baran (1976), Schätti (1985), Osenegg (1989) and Atatür and Göçmen (2001).

Platyceps najadum (Eichwald, 1831)

Material. n = 1. ZDEU 27/1962, ♂ juv., 1, Küçük Kaymakli-Nicosia, [16], Leg. Hürmüz A. Cemal, 01.09.1962.

General aspect and pholidosis. Body was slender and long, with a distinct head and a neck region. From above, rostral was visible. Pupils round. Neck with blackish round maculations at the sides. Preocular count 2/2 with a larger upper plate.

Body measurements and ratios. The ratio of HTL/TL was 3.04 and that of RW/RH was 1.74; while the ratio of PL/PW was 2.1 and the ratio of FL/FW was 1.57. Pholidotic characteristics and body measurements of this specimen are given in Tables I and III.

Pattern and coloration. In the ethanol preserved specimen (Figure 6), the roundish black maculations which began at the neck region extended backwards as two lateral rows. The first five pairs of maculations gradually got smaller and towards the middle of the trunk the maculations disappeared completely. A freno-temporal stripe was absent. The ground color of the dorsum was brown, that of venter light brown and immaculate.

Biological and ecological observations. Recently, a single live specimen was seen in an orchard, Lapta-Kyrenia in late May, at noontime. Air temperature was around 28°C (Göçmen et al., 1996). Very quick moving, keeps anterior part of its body above ground while speeding along, hence nicknamed as “arrow snake” by local people.

Taxonomical evaluation. The first record on the presence of *Platyceps najadum* in Cyprus was in Boulenger (1910), but no specimen from that date exists (Schätti, 1985). This species got in some herpetological lists due to its resemblance to *Dolichophis cypriensis*, the only endemic snake species from SC (Osenegg, 1989). Until recently, its presence in the island was doubtful, for no new material was found nor any specimens were seen during the field observations. But a live *Platyceps najadum* was seen in Lapta-Kyrenia, NC, on a *Prunus domestica* tree in an orchard (Göçmen et al., 1996). During the present study, the species was again searched for in that locality (but not during the spring months), without any results. Obviously very rare in Cyprus, the only specimen

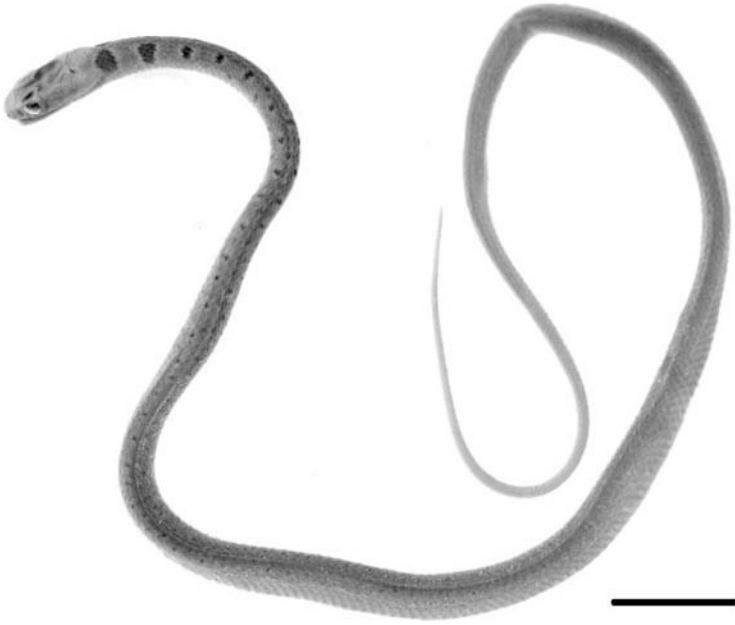


Figure 6. Dorsal pattern of the single preserved material of *Platyceps najadum* (ZDEU 27/1962-♂, Küçük Kaymaklı-Nicosia, photo by B.Göçmen, bar = 12 mm)

in the ZDEU collection indicates that it may be on the brink of extinction on the island.

The single specimen (juv.) from the island had 214 ventrals, 117 subcaudals and 17 rows of dorsal scales at mid-trunk. In specimens from geographical neighboring Turkey, 200-236 ventrals, 100-140 subcaudals; generally 19, rarely 17 rows of dorsal scales were recorded (Baran and Atatür, 1998).

The specimen investigated in present study is quite similar to descriptions given by Baran (1976), Başoğlu and Baran (1980), Baran and Atatür (1998) and Atatür and Göçmen (2001) for *Platyceps najadum*.

Zamenis situla (Linnaeus, 1758)

Material. n = 1. ZDEU 28/1962, ♂, 1, Küçük Kaymaklı-Nicosia, [16], Leg. Hürmüz A. Cemal, 01.09.1962.

General aspect and pholidosis. It has a distinct neck and a head. From above the rostrum was visible as a roundish shape; all of the head plates were present. Nasal plate was divided. Frenal count was 1/1. There were 2/2 temporals (the lower one bigger). Anal was divided.

Body measurements and ratios. The ratio of HTL/TL was 5.56, that of RW/RH 1.73. The ratio of PL/PW was 2.07, that of FL/FW 1.4. Body measurements and pholidotic characteristics of this specimen are given in tables 1 and 3.

Pattern and coloration. Top of the head of the ethanol preserved specimen was brown, with two longitudinal brown maculations with black rims, which started just behind the parietal plates. Temporal stripes began behind the postoculars and continued to the end of labial plates. The dorsum was light brown, with longitudinal black lines. These lines extended down to ventral plates on flanks. Head venter was without maculations, the venter dark brown all the way to the tail tip (the given coloration accompanying the pattern is that of an alcohol preserved specimen).

Biological and ecological observations. No data is available yet.

Taxonomical evaluation. There is a single *Zamenis situla* specimen in ZDEU collection, no second specimen has been found during herpetological studies on Cyprus. That specimen had 222 ventrals, 63 subcaudals and 25 rows of dorsal scales at mid-trunk. Specimens collected from Turkey displayed relatively higher subcaudal counts (220–260 ventrals, 68–90 subcaudals) (Başoğlu and Baran, 1980; Baran and Atatür, 1998). Data on the Cyprus specimen, together with its pattern and coloration and pholidotic characteristics, are in accordance with those given by Baran (1976), Başoğlu and Baran (1980) and Baran and Atatür (1998) for *Zamenis situla*.

With a known distribution in southern Italia, Balkan countries, Aegean islands, Anatolia, Caucasus and Crimea, the presence of the species in NC is doubtful, because the single ethanol preserved specimen is quite old dated and no other specimen has been found or seen since then. However, no excursions were made to its known habitat since 1974, because the area is now within the buffer zone between SC and NC.

Malpolon monspessulanus (Hermann, 1804)

Material. n = 2 (1 ♀, 1 ♂). ZDEU 50/2000, ♀ Sad., 1, Yeni Erenköy-Famagusta, [2], Leg. B. Göçmen, 20.07.2000, ZDEU 2/2002, ♂ Sad., 1, Boğaz-Kyrenia, [8], Leg. B. Göçmen, 20.03.2002.

General aspect and pholidosis. Tip of the rostrum acute; above the head, between the eyes a longitudinal depression (groove) was present. This groove began caudate to the internasal plates and extended to the mid-frontal plate. Pupils round. There were 2/2 frenals. Of the 2/2 temporals the upper ones were larger. Anal plate was divided; there were 166 ventrals in the male and 168 in the female specimen, while the subcaudal counts were 87 and 83 in male and female specimens, respectively.

Body measurements and ratios. The ratio of HTL/TL was 3.37, that of RW/RH, 1.35; while the ratio of PL/PW was found as 2.0 and that of FL/FW, 2.08. Measurements and pholidotic characteristics of these specimens are given in tables 1 and 3.

Pattern and coloration. On the ethanol preserved museum material, the youth pattern was evident, i.e., two longitudinal rows of black maculations extended from just behind the head to the tail (fig. 7). These gradually converged towards the tip of the tail



Figure 7. Dorsolateral pattern and general aspect of *Malpolon monspessulanus* (Dipkarpaz-Karpas, Photo: B. Göçmen, Bar 15 mm).

and became a single row. The ground color of the dorsum was grayish brown. The edges of the head plates were speckled with white, while under the head yellowish brown maculations were present. The venter was white with yellowish maculations. The joint of ventral plates with dorsal scales had black specks.

Biological and ecological observations. During our July field studies, an approximately two weeks old dead specimen was found in an orchard at Lapta-Kyrenia. It was largely putrefied, so we could not study it, but identified the specimen from its head groove. Again in July, at Taşpinar-Güzelyurt (Nicosia), near an animal farm, two skin casts of the species were found.

Taxonomical evaluation. While, according to Osenegg (1989) and Böhme (pers. com.), this is the second most abundant snake in Cyprus after *Dolicophis jugularis*, it is rare in NC. In 11 specimens from SC, 161-(165.5)-169 ventrals, 78-(83.9)-88 sub-caudals and 17 dorsal scale rows at mid-trunk were counted (Osenegg, 1989). The same counts in specimens from Turkey were 156-(169.88)-180 and 67-(80.97)-90 respectively (Baran, 1976). All these values are similar to those obtained from NC specimens.

Data on NC specimens, together with their pattern and coloration and pholidotic characteristics, are in accordance with those for *Malpolon monspessulanus insignitus*, which has a distribution range in southern Europe, northern Africa, Turkey and Cyprus according to Baran (1976), Başoğlu and Baran (1980), Osenegg (1989) and Atatür and Göçmen (2001).

We accept it as an endangered subspecies in NC, because we could not find a live specimen during our field studies and it was rarely reported in previous works.

Telescopus fallax (Fleischmann, 1831)

Material. n = 6, (4 ♀♀, 2 ♂♂). ZDEU 115/1960, ♀ jüv., 1, Gönyeli-Nicosia, [14], Leg. Ö. Kaya Gülen, 12.09.1960, ZDEU 19/1996, ♀, ♀ jüv., 1-2, Gönyeli-Nicosia, [14], Leg. B. Göçmen, 25.04.1996, ZDEU 5/2002, ♂, ♂ jüv., 1-2, Gönyeli-Nicosia, [14], Leg. B. Göçmen, 19.03.2002, 35/2003, ♀, 1, Dörtyol-Famagusta, [18], Leg. H. Bahar-B. Göçmen, 27.07.2003.

General aspect and pholidosis. In our six specimens the head was triangular and dorso-ventrally depressed. Tip of the rostrum was obtuse and slightly visible from above. A thin neck was evident. Pupil was vertical. The body was laterally depressed. There were 1/1 frenals which were in contact with the anterior edges of the eyes. Supralabials were 8/8 in four specimens, 8/9 in one, 8/7 in another; while sublabials were 11/11 in three specimens, 11/12 in one and 10/11 in two. Configuration of temporals was 3/3 in three specimens, 2/2 in two, 3/4 in one and that of posttemporals was 4/4 in five specimens, and 3/3 in one. Temporal plates formed a notch between the sixth and seventh supralabials. Anal plate was divided. No sexual dimorphism was evident from the viewpoints of ventral and subcaudal counts.

Body measurements and ratios. The ratio of HTL/TL was 5.04; that of RW/RH 1.63, of PL/PW 1.74., and of FL/FW 1.26. Body measurements and pholidotic characteristics of our specimens are given in tables 1 and 3.

Pattern and coloration. The specimen from Dörtyol-Famagusta had a light brown-gray dorsum with dark brown maculations (Figure 8). In six specimens, number of these maculations changed between 39 and 48 and continued to the tip of the tail. The maculations on the flanks were generally in contact with dorsal maculations. The venter was yellowish white with small black spots. These spots increased towards the tail tip.

Biological and ecological observations. The specimen from Dörtyol-Famagusta was caught under a bush early in the morning in July. Nearby, a mostly dried up creek was present. The sparsely vegetated region, which was not far from human habitation, also inhabited lizards such as *Ophisops elegans* and *Laudakia stellio*. The five specimens from Gönyeli were collected from the cracks and crevices of the stratified rocks in the surroundings of the small Gönyeli Lake at 08.00-10.00 hours in March, April and September. The vegetation was scarce.

Taxonomical evaluation. *Telescopus fallax* is represented by *T. f. fallax*, *T. f. iberus* and *T. f. syriacus* in Turkey and other countries surrounding Cyprus (Baran, 1976), while in Cyprus, the endemic *T. f. cyprianus* is found (Baran, 1976; Osenegg, 1989; Atatür and Göçmen, 2001). Differing from *fallax*, *iberus* and *syriacus*; *cyprianus* has 21 rows

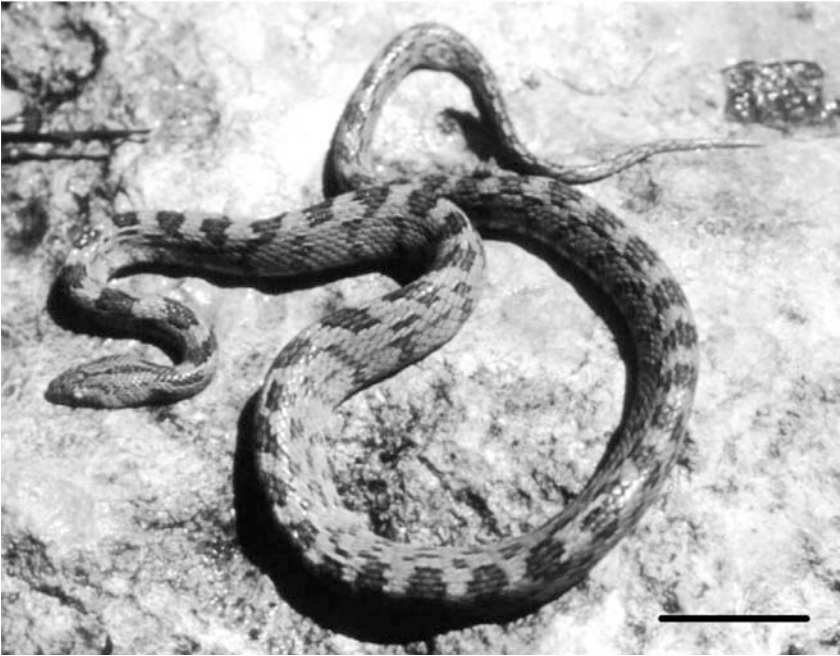


Figure 8. Dorsolateral pattern and general aspect of *Telescopus fallax cyprianus* (ZDEU 19/1996, ♀, Gönyeli-Nicosia. Photo: B. Göçmen, Bar 24 mm).

of dorsal scales at mid-trunk (Oseneegg, 1989). Baran's (1976) data on 14 specimens gave 194–209 ventrals and 55–73 subcaudals, while a work conducted at SC gave 202–212 ventrals and 65–68 subcaudals in five specimens (Oseneegg, 1989).

In our six specimens, ventrals were found to change between 196 and 205 and subcaudals between 62 and 65. So, from the viewpoints of pholidotical characteristics and pattern and coloration features, our material from NC are in accordance with those given for *T. f. cyprianus*, which is found only in Cyprus according to Baran (1976), Başoğlu and Baran (1980), Schätti (1985), Oseneegg (1989) and Atatür and Göçmen (2001).

Natrix natrix (Linnaeus, 1758)

Material. n = 1. ZDEU 117/1960, ♂, 1, Gönyeli-Lefkoşa, [14], Leg. Ö. Kaya Gülen, 12.09.1960.

General aspect and pholidosis. Head and neck regions of the specimen were distinct, from above tip of the rostrum was rounded. There were 1/1 frenals. Anal plate was divided.

Body measurements and ratios. The ratio of HTL/TL was 4.0, that of RW/RH 1.37, PL/PW 2.33 and FL/FW 1.34. Body measurements and pholidotic characteristics of the specimen are given in tables 1 and 3.

Biological and ecological observations. No data is available.

Pattern and coloration. Dorsum of the museum material was blackish brown with black maculations. The maculations on the flanks were partly in touch with ventral plates. Two rows of whitish lines started in the neck region and extended towards the tail. These were partly faded. Just behind the head, two whitish half-moons were present. Top of the head was black; underneath, the head was grayish white and immaculate. The venter exhibited black maculations from 13th ventral to backwards, these gradually joined to each other towards the mid-trunk, the central parts black with whitish sides (the given coloration accompanying the pattern is that of an alcohol preserved specimen).

Taxonomical evaluation. The first records on the presence of *Natrix natrix* in Cyprus belong to Unger and Kotschy (1985 in Osenegg, 1989). Schätti and Sigg (1989) gave male counts as 167-173 ventrals and 66 subcaudals, in four specimens from SC. Specimens from Turkey exhibited 162-184 ventrals and 50-80 subcaudals (Başoğlu and Baran, 1980).

Since nineteen sixties, several authors thought that the species was extinct in Cyprus, and then a breeding population was discovered in a pond near Troodos Mountains in SC (Wiedl and Böhme, 1992). In 13 specimens, the dorsal white lines were absent, so it was reported that the form could be taken as a new subspecies: *Natrix natrix cypriaca* (Böhme and Wiedl, 1994). However, this characteristic was observed also in some specimens from Turkey (Baran, 1976; Başoğlu and Baran, 1980; Göçmen et al., 1996).

The museum specimen from NC had 180 ventrals and 68 subcaudals. From the viewpoints of pattern and coloration and pholidotic characteristics, the specimen is quite similar to *Natrix natrix persa*, which is also known from Turkey (Baran, 1976; Başoğlu and Baran, 1980; Tok, 1993; Göçmen et al., 1996).

The facts that our specimen was an old dated museum material, and no second specimen was found during our or previous field studies make us think that the species may be extinct in NC.

Natrix tessellata (Laurenti, 1768)

Material. n = 2 (1 ♀, 1 ♂). ZDEU 114/1960, ♂ S.ad., ♀ S.ad., 1-2, Gönyeli-Nicosia, [14], Leg. Ö. Kaya Gülen, 12.09.1960.

General aspect and pholidosis. Distinct head and neck regions were evident. Dorsal scales were strongly keeled.

Body measurements and ratios. HTL/TL was 3.95, RW/RH was 1.57, PL/PW was 2.61, FL/FW was 1.51. Body measurements and pholidotic characteristics are given in tables 1 and 3.

Pattern and coloration. The dorsum was dark brown-blackish in the ethanol preserved specimens. Top of the head was black, the chin white and immaculate.

The venter exhibited two rows of black maculations, starting from the 12th ventral plate. These maculations came together towards the tail and the tail venter was black (fig. 9).

Biological and ecological observations. No data is available.

Taxonomical evaluation. The first records on the occurrence of *Natrix tessellata* in Cyprus belong to Unger and Kotschy (1865) and Cecconi (1989) (cited in Osenegg, 1989). Boulenger's (1910) checklist for Cyprus does not include *Natrix tessellata*. A live specimen was found by G. P. Oxtoby in Larnaca in 1986, and photographed (Schätti and Sigg, 1989). But Osenegg (1989) reported that the photographed specimen was probably mistaken with a young *Dolicophis jugularis*.

Various herpetofaunistic works on Cyprus doubt the presence of *Natrix tessellata* on the island. Böhme and Wiedl (1994) shared the opinion that the only specimen in Torino Museum (MCSNT 18024) might be brought to the island by someone. That specimen had 166 ventrals and 70 subcaudals (Schätti and Sigg, 1989). The second record on the occurrence of *Natrix tessellata* was given by Göçmen and Böhme (2002). In Turkish specimens; ventrals of males were 165–185, those of females 158–179, subcaudals of males 56–78 and those of females 53–68.

Our specimens share the same descriptive values given for *Natrix tessellata* by Baran (1976), Başoğlu and Baran (1980), Göçmen and Böhme (2002), from the viewpoints of pattern and coloration and pholidotic characteristics. The fact that

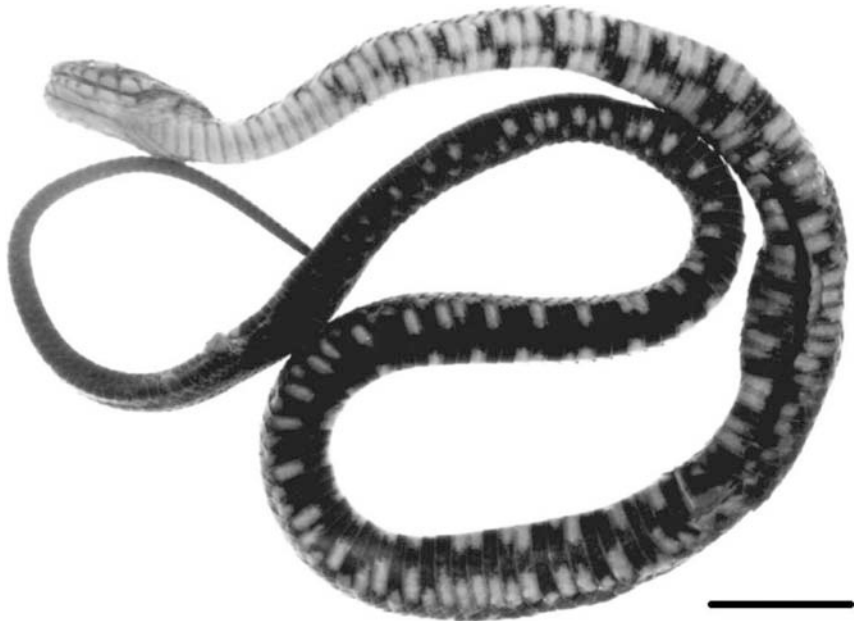


Figure 9. Ventral pattern of *Natrix tessellata* (ZDEU 114/1960-♂, Gönyeli-Nicosia, photo by B. Göçmen, bar = 12 mm).

no other *Natrix tessellata* specimens were found in Cyprus since 1960, despite the presence of suitable biotopes, makes us think that the species became extinct on the island.

Viperidae

Macrovipera lebetina (Linnaeus, 1758)

Material. n = 3 (3 ♂♂) ZDEU 187/1984, ♂ juv., 1, Famagusta, [19], Leg. B. Göçmen, 15.09.1984, ZDEU 123/1992, ♂, 1, Koruçam-Kyrenia, [9], Leg. M. Kofalı-H. Baflı, 10.05.1992, ZDEU 38/1995, ♂, 1, Geçitköy-Kyrenia, [10], Leg. B. Göçmen, 06.05.1995.

General aspect and pholidosis. A large and stout species. Top of the rostrum was obtuse; head and neck regions distinct. Top of the head was covered with small, keeled scales. Tail was very short with respect to the trunk. Supraoculars were divided, 3/3 in two specimens and 4/4 in one. In a mature specimen, the front two supraoculars were partly joined, forming a small ridge. There were 3/3 canthals and 2 apicals. Number of scales present between the supraoculars was 9, and two rows of scales were present between the supralabials. Number of scales in the peripheral eye ring was 13/13 in one specimen, 13/14 and 17/17 in two others. Supralabial count was 10/- in one specimen (right side deformed), 10/11 and 10/10 in the other two; sublabials were 13/- in one (right side deformed), 14/14 in two other specimens. There were 25 rows of keeled dorsal scales at mid-trunk. Anal plate was single; 151-155 ventrals and 43 subcaudals (in one specimen tail was deformed) were counted.

Body measurements and ratios. In three specimens, total lengths were 215.8-(687.26)-969 mm (SD: 410.88, SE: 237.22). RW/RH was 1.12; HTL/TL 8.51. Some other bodily measurements and pholidotic characteristics of our specimens, together with those of some other authors, are given in table 5.

Pattern and coloration. In ethanol preserved material and observed live specimens (Figure 10), the dorsum was grayish brown with black maculations, which joined together in some places. The maculations on the flanks were in touch with ventral plates. In the juvenile specimen, which exhibited the juvenile pattern, four rows of black maculations were evident on the dorsum, the middle two rows were partly joined together.

The dorsal maculations of the three specimens continued to the tip of the tail. The distinct maculations of the juvenile were a little faded in the adults. Top of the head was immaculate and gray-brown. The venter was yellowish white with blackish small spots. These were less dense under the tail.

Biological and ecological observations. During the July excursion, a mature specimen was seen in a watermelon field in Tepebaşı-Kyrenia, probably killed two weeks ago. Dorsal maculations had largely faded, the dried up specimen was not included in our evaluations. The two adult specimens with more distinct dorsal maculations were

Table 5.

Some bodily measurements and pholidotic characteristics of *Macrovipera lebetina lebetina*, according to various authors

Author	n	ToL (max.)	VP	SCa	DS
Werner (1936)	1	850	163	42	25
Mertens (1952)	-	-	147-163	39-44	-
Joger (1984)	-	-	126-163	-	-
Billing and Schätti (1984)	9	-	152-156	-	-
Brodmann (1987)	-	1500	152-156	-	25
Nilson et al. (1988)	9	-	150	-	-
Nilson & Andrén (1988)	8 ♂	-	147-154	-	25
	3 ♀	-	146-153	-	25
Osenegg (1989)	7	1095	149-157	39-44	25
Present work	3 ♂	969	151-155	43	25

caught in a rocky biotope covered with *Cupressus* (cypress) trees in September, at Dikmen (Kyrenia Mountain Range).

Taxonomical evaluation. The name *Macrovipera* Reuss, 1927 was resurrected to accommodate a species of the *Vipera lebetina* group and then, the name *Vipera* Laurenti,



Figure 10. Dorsolateral pattern and general aspect of *Macrovipera lebetina lebetina* (Lapithos-Kyrenia, photo by B. Göçmen, bar = 45 mm).

1768 was accepted as a synonym (Schwarz, 1936). Various herpetologists later accepted this nomenclature (Sindaco et al., 2000; Tok et al., 2002).

Differing from other *Vipera* species, *Macrovipera* has finely divided supraocular plates. It has a subspecies endemic to Cyprus: *Macrovipera lebetina lebetina* (Arıkan et al., 2005; Göçmen et al., 2006). According to Baran (1976) and Başoğlu and Baran (1980), on the nearest mainland, Anatolia, lives *Macrovipera lebetina obtusa*. It differs from the nominate race, in the number of dorsal scale rows at mid-trunk, which is 25–27 (25 in *lebetina*). Also, *obtusa* has higher ventral and subcaudal counts with respect to the nominate race. For *obtusa*, these counts are 156–172 ventrals and 41–49 subcaudals according to Baran (1976) and David et al. (1999). Vertical distribution of the species is found up to 1200 m in SC (Osenegg, 1989); while in the northern part of the island, the highest record is 900 m in Dikmen (Kyrenia Mountain Range).

Böhme and Wiedl (1994) had reported a small “horn” above the supraocular plates on the right side of a specimen from SC. We did not find a similar process in our specimens from NC. A slight ridge formed by the partly joined anterior two supraoculars was seen in a mature specimen (ZDEU 123/1992), but it did not form a horn-like structure.

From the points of view of pattern and coloration and pholidotical characteristics, our specimens are identical with *Macrovipera lebetina lebetina*, an endemic race to Cyprus according to Baran (1976), Başoğlu and Baran (1980), Osenegg (1989) and Atatür and Göçmen (2001).

Discussion and conclusion

The geological history of the eastern Mediterranean region which has undergone a series of prominent geological movements, together with the world wide sea level fluctuations accompanying the continental glaciations have caused of connection and separation of Cyprus and Anatolia (Zinner, 1972; Kempler, 1998, Robertson, 1998). There is no consensus on the paleogeographical data regarding Cyprus; Schmidt (1960) considers Cyprus as a broken piece of the mainland, but in the light of modern hypotheses on plate tectonics, Gass (1987) stated that Mt. Troodos is a Mesozoic volcano of submarine origin which originally formed an oceanic island which arose at late Cretaceous or early Palaeocene. While Kyrenia Mts (which include Pentadactylos Mt.) originated in Eocene probably as a second island or as a part of the southern Taurus range which later moved southwards (Kempler, 1998; Cavazza and Wezel, 2003). These two islands or the Troodos island and the southern Tauruian-Kyrenian peninsula came into contact only during the Mediterranean salinity crisis just before the Miocene, in Messinian (Cavazza and Wezel, 2003). The paleogeographic dynamic of this region may have provided some of the terrestrial organisms with opportunities for dispersal across land connections and subsequent isolation. Cyprus is considered to have been isolated from surrounding Anatolian mainland for around 5 Mya BP cal. (Zinner, 1972; Kempler, 1998, Robertson, 1998; Hadjisterkotis et al., 2000). This isolation had a crucial role in forming present day snake fauna of Cyprus and may be the major

factor for endemic snake races. *Telescopus fallax cyprianus*, *Natrix natrix cypriaca* and *Macrovipera lebetina lebetina*, and these lineages are peripherally isolated from their mainland ancestors as long as 5 Mya. Because no anthropogenic arrival of these races to Cyprus is evident, and before conducting a detailed phylogenetic analysis of present surrounding mainland and island lineages of these fauna, we tentatively propose that these Cypriot lineages could be taken as separate species. On the other hand, the two- island origin of Cyprus may help to explain the presence of the only endemic species, *Hierophis cypriensis*, in only SC (i.e., Troodos island) while *Platycephalus najadum* (Göçmen et al., 1996) and *Natrix tessellata* (Göçmen and Böhme, 2002) is found only in NC (i.e., Kyrenia island) and also on the mainland.

The presence of *Typhlops vermicularis*, *Dolichophis jugularis*, *Hemorrhois nummifer*, *Telescopus fallax*, *Malpolon monspessulanus* and *Macrovipera lebetina* in NC is established, as a result of several excursions to the region. In spite of the rarity of springs in NC, some authors had reported the presence of *Natrix natrix* and *N. tessellata*, but no specimen was observed since nineteen sixties, so, we think that these species became extinct since then.

According to Göçmen et al. (1996), since the second record of *Platycephalus najadum*, a museum material, no other specimen have been seen in several recent field works, so the species might be very rare on the island, and should be investigated again under suitable seasonal conditions. There are single specimens of *Eryx jaculus* and *Zamenis situla* from NC in ZDEU collections, but no other records have been given in several herpetofaunistic works up to present on Cyprus. Probably those two specimens have been included into the snake species of NC as a result of faulty labeling.

The fact that there were no undoubted earlier records of the Dice Snake from Cyprus does not argue against its continuous but cryptic existence on the island. *N. natrix* was also not found for many decades and was consequently believed to be extinct. It must also be borne in mind that the only undoubted endemic species on Cyprus (*Hierophis cypriensis*), though not so rare, was not recognized until it was discovered by Schätti (1985). *Platycephalus najadum*, which was not known from Cyprus until its discovery by Göçmen et al. (1996; at Lapithos, Kyrenia, NC), is a similar case.

It is clear from the data discussed above that Cyprus is still under-explored faunistically and that further discoveries can be expected when searches are intensified. Another problem concerns autochthony vs. allochthony of the Cypriot fauna. The geological history still tells that the last connection between Cyprus and the mainland dates back to the Miocene or Messinian salinity crisis (5.96 ± 0.02 mya) (Kempner, 1988; Cavazza, and Wezel, 2003), which would lead us to expect many more endemics than we actually know. But the earlier rich endemic fauna (including pygmy hippos and pygmy elephants) become extinct at the end of the Pleistocene (Bailon, 1999). On the other hand, human settlements are known from 10,000 years before present, so that many modern species of the Cypriot fauna may be anthropogenic arrivals on the island. This does not in the least affect their claims to be protected.

Nearly all of our specimens were found in the vicinities of springs or creeks within urban areas during our field works in NC, where summer months are quite warm (noontime means: 30–40 °C; Tarkan, 1971). From the viewpoints of caught specimen

counts and species density, the poorest region is Karpas, where springs and vegetation are very rare. Kyrenia, Güzelyurt and Nicosia regions are relatively richer because they possess more springs and thick woods.

During our excursions the most frequently seen snake was *Dolicophis jugularis*. This species feeds on rodents some of which are agricultural pests, so it is not killed frequently by local people. On the other hand, *Hemorrhois nummifer* usually gets killed because of its resemblance to *Macrovipera lebetina*, so it may be relatively rare in NC.

During our study period, which extended from March to September (see material and methods), we found six *Telescopus fallax* and two *Malpolon monspessulanus* specimens. In our previous study (Göçmen et al., 1996) number of specimens was also low (only one *Telescopus fallax*), which points to the fact that these species are in the danger of facing extinction within the study area.

The recent increase in unplanned urbanization in NC, also to some degree in SC, gradually destroys the habitats of the snake species. A serious decrease in springs and creeks is evident within the region, which has rather arid summers. In addition to these factors, the frequent killing of snake species, which are thought to be venomous by local people, make them susceptible to extinction, except *Dolicophis jugularis* and *Typhlops vermicularis*.

The herpetological data we have obtained have clarified the taxonomical states of the snake species of Cyprus.

We urge the Environmental Protection Office of NC to increase regulations and take legal steps towards the protection of flora and fauna of Cyprus (please refer to “European Union habitat and species directive (1992)”, Annexes II and IV). Furthermore, we need to inform and educate the people of Cyprus in their responsibility to protect the unique habitat of Cyprus for many generations to come.

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