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Additional information on *Vipera albizona* (Reptilia, Serpentes, Viperidae)

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Data from 10 specimens of *Vipera albizona* are being compared with the holotype, the paratype and 3 other specimens. Distinction from other representatives of the *Vipera xanthina* complex and particularly *Vipera wagneri* is discussed. It is concluded that the characters of the, on the basis of two specimens, newly described species can be largely confirmed for the greater part by this study and that distinction on the basis of colour and pattern is not as difficult as sometimes is thought.

Aanvullende informatie over de bergadder Vipera albizona - Gegevens van 10 exemplaren van *Vipera albizona* worden vergeleken met het holotype, het paratype en 3 andere exemplaren. Het onderscheid met andere vertegenwoordigers van het *Vipera xanthina* complex en *Vipera wagneri* in het bijzonder wordt besproken. Geconcludeerd wordt dat de kenmerken van de, op basis van twee individuen, recentelijk beschreven soort door deze studie grotendeels bevestigd kunnen worden en dat onderscheid op kleur en tekening niet zo moeilijk is als soms gedacht wordt.

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INTRODUCTION

Vipera albizona is a mountain viper, recently described by Nilson et al. (1990) on the basis of two specimens from Turkey. After that, a few specimens were caught by at least seven people (Teynié, 1991; Bettex, 1993; others unpublished, pers. inf.) in three or more populations. During two trips in Turkey in 1992 and 1993 I observed 13 specimens from yet another locality in the same area in Central-Turkey (Fig.1). Detailed location data are not given in order to avoid collecting by commercially interested snake catchers. I also had the opportunity to see several other individuals of this species (live specimens in private collections and colour pictures), as well as many specimens of other representatives of the *V. xanthina* complex (field observations, live specimens in private collections and picture material). This paper concerns the description of the specimens found by me, compared with the holotype, the only paratype and three specimens caught by Bettex (1993 and *in litt.*).

There are two main streams in the taxonomy of this group of mountain vipers. Nilson and Andrén (University of Götheborg, Sweden) described a series of new species within this group during the last years (*V. wagneri* in 1984; *V. bulgardaghica* in 1985; *V. albizona*, Nilson et al. in 1990). The opponents, formed by Schätti (Muséum d'Histoire Naturelle, Genève, Switzerland), Baran (Dokuz Eylül Üniversitesi, Buca-Izmir, Turkey) and Sigg (Birkenbeul, Germany) consider these taxa to be conspecific and belonging to the polymorphic species *V. xanthina*. The issue has been argued in several papers: Bettex (1993), Nilson & Andrén (1992), Schätti & Baran (1988) and Schätti et al. (1992). The disagreement is mainly based on different views on

the species concept and is fed by the insufficient information on the intraspecific variation and distribution. Both groups do not put the same weight on some scale characters, colour patterns and other parameters.

The main aim of this paper is to get a better insight in the intraspecific variation of vipers of the *V. xanthina* complex, irrespective of the status of *V. albizona*: a valid species (Nilson et al., 1990) or included within the polymorphic species *V. xanthina* (*sensu* Schätti et al., 1991).

MATERIAL AND METHODS

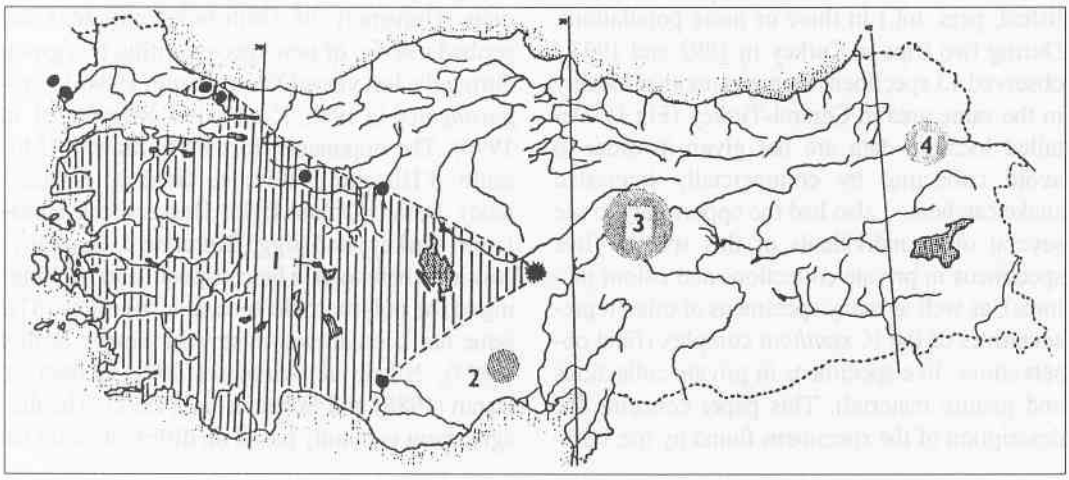
The locality where the animals used in this study were caught, differs from the Terra typica or the other sites where *V. albizona* were found. This can therefore be responsible for some disagreement in characters, but without doubt the studied population fits in the range of *V. albizona*, *viz.* the province of Sivas, Turkey (Fig.1). The habitat is a sun-exposed stony slope of a mountain ridge, partly overgrown by thorny bushes. The altitude is about 1600 m. Seven males were caught in May 1992, five of them were taken home alive. During artificial hibernation that winter in a refrigerator at about 7°C one of the five snakes died. This specimen (nr. 2 in Table 1 and depicted in Fig. 2)) was preserved and is deposited in the collection of the Natuurmuseum Rotterdam (NMR 9994-00213/JM0012). In May and June 1993 one female and five males were captured at the same site. One male was released shortly after it, the rest taken home alive. All specimens were measured and checked on their characters in 1993, while they were still alive (except for the one which died in winter). Scalation characters of the three released specimens are not available. The characters of the two type specimens were taken from the description of the species by Nilson et al. (1990). Characters of the specimens of Bettex were taken from his paper (1993) and additional data (Bettex *in litt.*). Data of 11- 21 specimens or pictures of specimens are available, depending on the kind of character. Scalation characters are available from five females and eleven males.

COLOUR RELATED CHARACTERS

dorsal pattern

Distinction between *V. albizona* and *V. wagneri* based on the dorsal pattern is very difficult according to Bettex (1993). But, after examining a total of 21 specimens of *V. albizona* on dorsal coloration and pattern, I can recognize the taxon as being clearly different from *V. wagneri* (the species which it resembles the most) and from the other representatives of the *V. xanthina* complex. In spite of the facts that Schätti et al. (1991) reckon the colour pattern as insignificant, and that intraspecific variation in some populations and/or species can be rather large, I note that there are sound differences between the colour patterns of *V. albizona*, *V. wagneri* and other

Figure 1 Species ranges of the *Vipera xanthina*-complex in Turkey; **1** (shaded) = *V. xanthina*, **2** = *V. bulgardaghica*, **3** = *V. albizona*, **4** = *V. wagneri*, *= Erciyes Dagi; black dots = outermost finding locations of *V. xanthina*



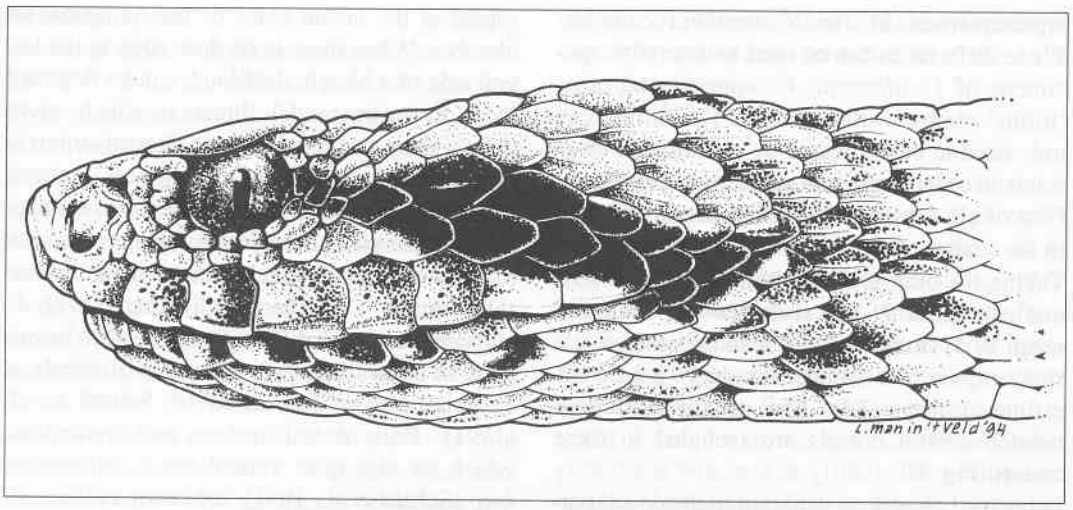
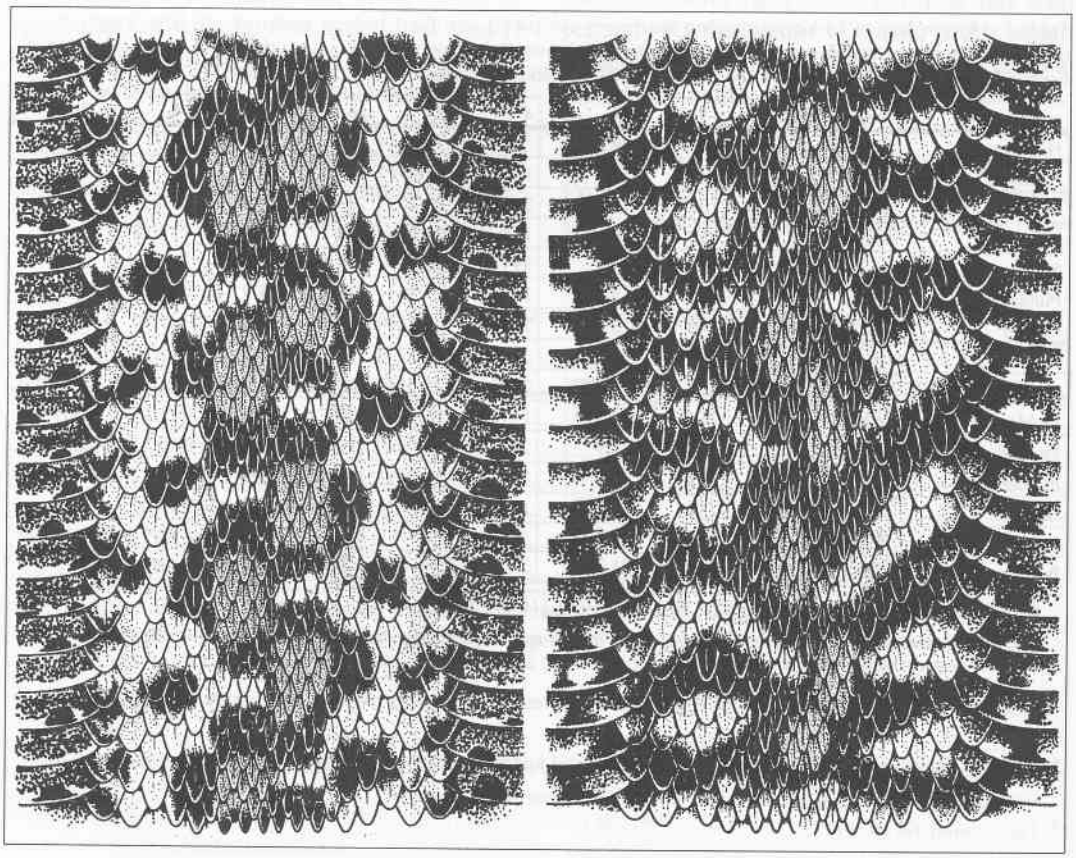


Figure 2 Head of *Vipera albizona* (collection NMR 9994-00213/JM0012); (Leo Man in 't Veld)

Figure 3 Dorsal and lateral pattern of males of *Vipera albizona* (left) and *V. wagneri* (right) at mid-body (Leo Man in 't Veld)



representatives of the *V. xanthina* complex. These differences can be used to determine specimens of *V. albizona*, *V. wagneri* and other 'forms' almost without doubt. The differences only need to be expressed by quantifiable characters in order to prevent subjective opinions.

First of all, a remarkable difference can be seen in the transverse wideness of the dorsal pattern. Taking the orange-brown blotches at midbody, one can count 9 - 12 scales (N=21, estimated mean 10.5) from the one side to the other, while in *V. wagneri* this number is only 4 - 8.5 (N=32, estimated mean 7.5). The usually dark pigmented central dorsals are included in these counts (Fig. 3).

I observed almost no variation in the dorsal pattern of 21 specimens of *V. albizona* from four or five populations (sites). It is a well pronounced wide dorsal pattern from head to tail which consists of round orange-brown blotches, whose left and right halves are often shifted with respect to each other. They are edged by a dark rim which is very pronounced at the rostral and caudal sides of the blotches and sometimes even interrupted at the lateral sides of the orangebrown blotches. When there is no dark edge at the lateral side of a blotch, the blotch can be flattened there in rostro-caudal direction which gives them a more rectangular shape. Dorsal colour is greyish and females show slightly less contrast. This consistent pattern of a wide, clear orange-brown inner part of the dorsal zigzag from neck to tail in both sexes is quite unique in the *V. xanthina* group. This character is shared with *V. wagneri* only and differs from the few brown parts in the anterior part of some individuals of *V. bulgardaghica* as noted by Schätti et al. (1991). Both dorsal pattern and coloration, which are also quite variable in *V. bulgardaghica* (Schätti et al., 1991), are in my opinion always clearly different from that of *V. albizona*.

The character from which the name of the species is derived, the whitish spots in the dorsal pattern, is in my opinion not well chosen. The whitish spots do occur, particularly in males, but this character is shared with many males of related species and cannot be regarded as a discriminating character.

Table 1 Morphology of 13 *Vipera albizona* specimens compared with the two type specimens. **1**. total length in mm; **2**. tail length in mm; **3**. relative tail length in %; **4**. preventrals + ventrals ; **5**. subcaudals (r/l); **6**. dorsals (at mid body); **7**. supralabials (r/l); **8**. inner circumoculars (r/l); **9**. apicals. [parameters 4 - 9 are counts]

specimen	sex	1	2	3	4	5	6	7	8	9
Holotype	female	266	23	8.6[1]	2+151	26/26+1	23	10/9	11/11	3
Paratype	male	-	-	-	152	28/29+1	-	9/9	11/10	3
Mulder 1[2]	female	521	39	7.5	2+150	24/23+1	23	9/9	11/11	2
Mulder 2[4]	male	658	53	8.1	155	28/28+1	23	8/9	12/13	2
Mulder 3[2]	male	779	65	8.3	3+149	28/28+1	23	7/8[5]	12/11	3
Mulder 4[2]	male	605	53	8.8	1+152	29/28+1	23	9/9	13/12	2(3)
Mulder 5[2]	male	566	46	8.1	2+155	26/26+1	23	8/8	11/10	2(3)
Mulder 6[2]	male	575	48	8.3	2+155	27/27+1	23	8/9	11/10	2
Mulder 7[2,3]	male	696	54	7.8	2+150	25/25+1	23	9/9	11/11	3
Mulder 8[2,3]	male	706	56	7.9	1+151	28/28+1	23	9/9	11/11	2(3)
Mulder 9[2,3]	male	601	46	7.7	2+152	24/25+1	23	9/9	10/11	2
Mulder 10[2,3]	male	643	51	7.9	2+153	27/27+1	23	9/9	10/12	3
Bettex 1[6]	male	720	55	7.6	153	30	23	9/9	9/10	2
Bettex 2[6]	female	600	45	7.5	154	24	-	9/9	12/9	2
Bettex 3[6]	female	-	-	-	-	-	-	9/9	13/10	3

[1] 8.5 (erroneous) in original description by Nilson et al.,(1990)

[2] Specimen measured alive. Especially snout-vent length and thus relative tail length can be different (larger and smaller respectively) from measuring dead (preserved) specimens.

[3] Specimen in captivity for one year. Length and length related characters may not be entirely representative for nature.

[4] Specimen from collection Natuurmuseum Rotterdam: NMR 9994-00213/JM 0012.

[5] Irregularity in supralabial pattern: sixth supralabials abnormally long.

[6] Pers. comm. (*in litt.* 1993)

occipital spots

A second aspect worth mentioning is that I never saw a *V. albizona* with the two dark occipital spots in contact with the dorsal pattern (N=15), while this can be seen regularly in other mountain vipers, e.g. *V. wagneri* (9 out of 23, data partly (N=4) from Joger et al., 1988; others pers. obs.), *V. bulgardaghica* (6 out of 14, depicted by Schätti et al., 1991 and Bettex, 1993), *V. raddei raddei* (5 out of 13, pers. obs.), *V. raddei kurdistanica* (13 out of 21, pers. obs.), and southern *V. xanthina* (passes over 50%, Nilson & Andrén, 1992). Bettex (1993) shows a hatch from which one juvenile has the head and body pattern connected. However, this is a captive-bred specimen in which also the dorsal colour and pattern is not quite regular, a feature which is often seen in captive-bred vipers (Mulder, in prep.). Characters of the above mentioned clutch are not used in the present study.

Instead of the character indicated above, a considerable amount of individuals checked by me (6 out of 12) has one or both of the large occipital spots in contact with the end of the band coming from the eye to the corner of the mouth (5 specimens) or with the first lateral dark spot (1 specimen); see Figure 3. One of the five specimens is a snake from a population found by Teynié. This phenomenon is rarely seen in other representatives of the *V. xanthina* group, although there is little information about it, e.g. *V. wagneri* (0 out of 17, pers. obs.), *V. xanthina* (4 out of 60, pers. obs.) and *V. bulgardaghica* (0 out of 21, data partly from Schätti et al., 1991 and Bettex, 1993).

lateral pattern

A third, less pronounced, distinctive character is that the lateral pattern of the males generally consists of small blackish spots, while in *V. wagneri* this pattern tends to consist of wide black transverse blotches or bands going from the dorsal blotches to the ventrals (not mentioned anywhere, but recorded by me in many specimens in the field and in private collections). Examples of this can be seen in Gruber (1989) and Nilson et al. (1988). Thus, compared with its congeners and taking into account many specimens, *V. albizona* shows few dark pigmented markings on the lateral sides (Fig. 3).

MORPHOLOGICAL CHARACTERS

total length

It is sometimes assumed that *V. albizona* is a small mountain viper. I can not deny this with certainty but the capture of a male with a length of nearly 78 cm (male Nr. 3, Table 1) is quite remarkable in this respect.

tail length

Confirmation of the fact that *V. albizona* is a short tailed viper when compared with *V. xan-*

Table 2 Morphological differences between *Vipera albizona* ,*Vipera wagneri* and *Vipera bulgardaghica*. Data (counts) given as mean value and/or range.

species	sex	N	ventrals	subcaudals	inner circumoculars
V.albizona	males	11	152.5 (149-155)	28.5 (24-30)	11.0 (9-13)
	females	3	151.7 (150-154)	24.5 (23-26)	11.0 (9-13)
V.wagneri	males	1	(163-170)2	(28-31)[3]	(12-15)4
	females	1	(161-166)5	(23-29)[5]	(12-15)[4]
V.bulgardaghica[6]	males	8	150.8 (147-156)	28.3 (25-33)	10.8 (9-13)
	females	3	145.0 (145-145)	26.0 (24-28)	10.5 (10-12)

Due to the not always uniformly presented data by the different authors the following remarks are added:

[1] data from Schätti et al. (1991) which are partly from Joger et al. (1988) and Nilson et al. (1990), number and mean values not exactly known.

[2] N = 5 - 7

[3] N = 6 - 8

[4] data from males and females together, N=40 sides of the head (this is most probably not a sex-related character).

[5] N = 3 - 5

[6] data from type series (Nilson & Andrén, 1985) and Schätti et al. (1991).

thina is given in Table 1. This fact was already mentioned in the original description of Nilson et al. (1990). Relative tail length varies around 8% (7.5-8.8%) in *V. albizona,* while mean values in *V. xanthina* are well above 9% (9.2-9.8%, depending on sex and population, Nilson & Andrén, 1986).

scalation characters

All data known to me on scalation characters of *V. albizona* used in this study are given in Table 1. The number of ventrals seems to be low in this species, 149-155 in males (mean 152,5 N=11) and 151-150 in females (mean 151.7 N=3). Number of subcaudals is 24-30 in males (mean 28.5 N=22, each side counted separately) and 23-26 in females (mean 24.5, N=6). Nine supralabials must be considered to be the usual number, although sometimes eight, once seven and rarely ten supralabials occur (mean 8.7 N=30, each side counted separately). Data on the number of apicals presented here show that three (both holotype and paratype) is not the standard but that both two and three are about as common. The number of scales in the inner circumocular ring is 9-13 (9 and 13 rare, mean 11.0 N=30, each side counted separately). The number of dorsals at midbody seems to be very constant with 23 scales in all specimens checked (N=15). None of the specimens show elongated upper preoculars in the degree *V. bulgardaghica* tends to show (Nilson & Andrén, 1985), and there is always a normal scale in between the upper preocular and the nasal. All *V. albizona*-specimens also show a full outer circumocular ring viz. there are always two subocular rows.

COMPARISONS *

Vipera wagneri

The number of ventrals (161-170) is much higher than in *V. albizona* (149-155). The number of subcaudals is only slightly higher. Most remarkable of the subcaudals is the lower end of the range in males (28 compared with 24 in *V. albizona*). The number of circumoculars of the inner ring (12-15, N=40 sides of the head) is much higher than in *V. albizona* (9-13, mean 11.0, N=30 sides of the head). Apicals in contact with the rostral, and dorsals at midbody show same values as in *V. albizona* (2-3 and 23 respectively, Schätti et al., 1991).

Vipera bulgardaghica

Scalation characters of *V. bulgardaghica* do not seem to be very different from those of *V. albizona*. Ventral count is slightly lower in the males (147-156, mean 150.8, N=8) compared with *V. albizona* (149-155, mean 152.5, N=11) and considerably less in females, although there were only few female specimens to compare with (*V. bulgardaghica*: 145-145, mean 145, N=3; *V. albizona:* 150-154, mean 151.7, N=3). The numbers of subcaudals, supralabials, apicals and scales in the inner circumocular ring of *V. bulgardaghica* have almost the same ranges as in *V. albizona* (see Tables 1 & 2 and Schätti et al., 1991). The amount of dorsals is very variable (21-25, mean 22.8, N=12, data from Nilson & Andrén, 1985 and Schätti et al., 1991) compared with the constant 23 (N=15) of *V. albizona*.

Vipera xanthina

V. xanthina, from which the easternmost known population of Erciyes Dagi (province of Kayseri) is almost parapatric with *V. albizona*, shows a longer tail, a higher number of ventral and subcaudal scales, two (instead of two or three) apicals in contact with rostral, ten (instead of the normal nine) supralabials and a totally different colour and colour pattern (Nilson & Andrén, 1986; Nilson et al., 1990).

CONCLUSIONS AND DISCUSSION

Despite the scarce data on (especially) its intraspecific variation, Nilson et al. (1990) considered *V. albizona* a valid species. This view was later criticized by others (Schätti et al., 1991). The additional data from the present study correspond for the greater part with those from Nilson et al. (1990) and support the validity of the species. Possible future records from the gap between the ranges of *albizona* and *wagneri* (some 500 km; Fig. 1) can give more clarity about their relationship. The two taxa

* Data without references can be found in Table 2

might be on both ends of a cline of a polymorphic species.

Present data on characters such as the number of ventral scales and the number of scales in the inner circumocular ring give a clear distinction with *V. wagneri,* as was already mentioned by Nilson et al.(1990) (Table 2).

New criteria concerning the colour pattern (the transverse wideness of the orange-brown dorsal blotches and the coloration of head and body) help to visually discriminate *V. wagneri* and *V. albizona*. Differences in colour and pattern between *V. albizona* and the other mountain vipers are quite clear.

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