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DISTRIBUTION AND MORPHOLOGICAL VARIATION OF THE LIZARD *Mesalina brevirostris* IN SYRIA

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Abstract: A study of morphometrical and meristic characters of 82 museum specimens of *Mesalina brevirostris* from Syria, Jordan and Iraq revealed the existence of conspicuous morphological variation of this species in Syria. Discriminant analysis carried out in six pholidotic characters confirmed an assortment of the examined material into three forms: (1) "Lowland form" distributed mainly in lower altitudes (up to 500-600 m) of the "Desert" and "Desert-steppe" regions of central and eastern Syria and probably also in higher altitudes of the same climatic zone in south-western Syria. (2) "Western form", occurring at least in higher altitudes (600-800 m) of the western part of the country at the frontier between "Desert- steppe" and "West-Syrian steppe" climatic regions. (3) "J. Arab form"- most divergent morphotype inhabiting eastern slopes of the Jabal al Arab mountains (alt. ca. 1000 m) at south-western frontier of "Desert-steppe" climatic region. A possible effect of climatic factors on the distribution of the individual Syrian forms of *M. brevirostis* is discussed.

Key words: *Mesalina brevirostris*, morphology, systematics, zoogeography, Syria.

Resumen: Distribución y variación morfológica de la lagartija *Mesalina brevirostris* en Siria-. El estudio de los caracteres morfométricos y merísticos de 82 individuos de *Mesalina brevirostris* de colecciones de museo y procedentes de Siria, Jordania e Irak reveló la existencia de conspicuas variaciones morfológicas de dicha especie en Siria. El análisis discriminante llevado a cabo con seis caracteres de folidosis confirmó la agrupación del material examinado en tres formas: (1) Una forma distribuida principalmente a bajas altitudes (hasta 500-600 m) en las regiones desérticas y de desierto-estepa del centro y este de Siria y, probablemente, también presente a altitudes superiores de la misma zona climática del sudoeste de Siria. (2) Una forma occidental que, al menos, habita en altitudes superiores (600-800 m.) del oeste del país, en la frontera entre el desierto-estepa y la región climática de la estepa occidental de Siria (3) Una forma de J.Arab, el morfotipo más divergente, que habita las laderas orientales de las montañas Jabal al Arab (altitud aproximada de 1000 m.) en la frontera sudoeste de la región climática del desierto-estepa. Se discute el posible efecto de los factores climáticos en la distribución de las formas sirias de *M. brevirostris*.

Palabras clave: *Mesalina brevirostris*, morfología, sistemática, zoogeografía, Siria

Resum: Distribució i variació morfològica de la sargantana *Mesalina brevirostris* a Síria.-L'estudi dels caràcters morfomètrics i merístics de 82 individus de *Mesalina brevirostris* de col·leccions de

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museu i procedents de Síria, Jordània i Iraq va revelar l'existència de conspícues variacions morfològiques d'aquesta espècie a Síria. L'anàlisi discriminant realitzat amb sis caràcters de folidosi confirmà l'agrupació del material examinat en tres formes: (1) Una forma distribuïda principalment en altituds baixes (fins a 500-600 m) a les regions desèrtiques i de desert-estepa del centre i est de Síria i, probablement, també present en altituds superiors de la mateixa zona climàtica del sud-oest de Síria. (2) Una forma occidental que, almenys, habita en altituds superiores (600-800 m.) de l'oest del país, en la frontera entre el desert-estepa i la regió climàtica de l'estepa occidental de Síria (3) Una forma de J.Arab, el morfotipus més divergent, que habita els vessants orientals de les muntanyes de Jabal al Arab (altitud aproximada de 1000 m.) a la frontera sud-oest de la regió climàtica del desert-estepa. Es discuteix el possible efecte dels factors climàtics en la distribució de les formes síries de *M. brevirostris*.

Paraules clau: *Mesalina brevirostris*, morfologia, sistemàtica, zoogeografia, Síria.

INTRODUCTION

The lacertid lizard *Mesalina brevirostris* (BLANFORD, 1874) is a polytypic morphologically plastic species (or group of species) distributed in southern Sinai, Jordan, Syria, northern Lebanon, southern Turkey, Iraq, northern Saudi Arabia, Kuwait, Bahrain, Qatar, United Arab Emirates, Iran, Pakistan and northern India (Punjab) (ARNOLD, 1986; ANDERSON, 1999; IN DEN BOSCH, 2001; KUMLUTA *et al.*, 2002). Traditionally, two subspecies of *M. brevirostris* have been reported from Syria: nominotypical one from eastern and central part of the country (e.g. ANGEL, 1936; HAAS & WERNER, 1969; WERNER, 1971) and *M. b. microlepis* (ANGEL, 1936) from western Syria. The latter one had been based on a single specimen having higher number of dorsal scales and higher number of subdigital lamellae. However, the situation appears to be more complex and until now, the taxonomic status of the Syrian populations has not been solved sufficiently.

HAAS (1957) stated, that: "the proposal of a Syrian subspecies, *Eremias brevirostris microlepis* based upon specimens lifted out of a series of supposedly typical *E. brevirostris,* is certainly not adequately established." Nevertheless, WERNER (1971) found two specimens of *M. brevirostris* from northern Jordan to be in fairly well agreement with Angel's description of *microlepis*. This author also noticed an affinity of other individuals of *M. brevirostris* from central Jordan to *microlepis* and concluded, that *M. b. microlepis* is a valid taxon, which "occupies the centre (around Jebel ed Druz) of the western distributional frontier of the species, possibly intergrading with the typical form to the north, east and south." This trinomen was later used by some other authors for population of *M. brevirostris* from western Syria (e.g. BISCHOFF, 1991) and Jordan (e.g. DISI, 1991; 1996) (DISI & AMR, 1998) applied it, without explanation, even for the Arabian, Iraqi and Iranian populations). On the other hand, ANDERSON (1999) compared the available data from the whole area of the species and concluded that the

application of subspecific designations had no zoogeographic significance and the distinctions among populations require further study.

The aim of this study was to describe and analyse the morphological variation of *M. brevirostris* in Syria with respect to possible existence of geographically differentiated forms mentioned above.

MATERIAL AND METHODS

Material

In all, 82 museum specimens of *Mesalina brevirostris* (including type specimen of *Eremias brevirostris microlepis* Angel, 1936, MNHN 1935 285) were examined (see Appendix). For comparison, the material was divided into five geographically delimitated samples: (1) eastern and central Syria (area of lowland steppe and hamada, alt. up to ca. 500-600 m), 36 specimens; (2) western Syria (hamada, alt. 600-800 m), 16 specimens; (3) eastern slopes of Jabal al Arab (J. Duruz) (volcanic mountains in southern Syria, alt. ca. 1000 m), 5 specimens; (4) northern, north-eastern and central Jordan (alt. ca. 500-800 m), 18 specimens; (5) eastern and central Iraq (surroundings of Rutba, Baghdad, Basra, alt. ca. 5-600 m), 7 specimens.

The used museum abbreviations are as follows: HUJ-R - Zoological Museum, Hebrew University of Jerusalem, Herpetology, Jerusalem; MNHN - Museum National d'Histoire Naturelle, Paris; NMP6V - National Museum (Natural History), Prague, ZFMK - Zoologisches Forschungsinstitut und Museum A. Koenig, Bonn.

Mensural characters

The morphometric characters mesured were: SVL – snout-vent length; TL – tail length from cloaca to tip of tail (if original); HL – head length from tip of snout to anterior edge of ear; HW – head width (greatest width of head); SVL and TL were measured to the nearest mm and HL and HW to the nearest 0.1 mm. Except of SVL all characters are presented as % of SVL or % of HL.

Pholidotic characters

The Pholidotic characters mesured were: Supralabials – number of labials anterior to the centre of eye; Gulars – number of gular scales in a strait median series; Plates in collar – number of larger scales in collar; Dorsals – number of dorsal scales across midbody; Ventrals – number of transverse series of ventral scales counted in strait median series between collar and the row of scales separating the series of femoral pores; Preanals – number of preanal scales in strait median series between cloaca and the row of scales separating the series of femoral pores; Femoral pores – counted bilaterally; Subdigital lamellae – number of subdigital lamellae along underside of fourth toe (defined by their width, the one touching the claw included), counted bilaterally. Individual means of bilaterally counted characters were used for comparison.

Statistics

Two tailed t-test and multivariate discriminant function analysis were run on Statistica 5.1 '98 Edition. The populations (geographically delimitated samples taken as *a priori* groups) were tested for sexual dimorphism and interpopulational differences. Except of the counts of ventrals, preanals and femoral pores, in which significant sexual dimorphism was proved, other values of scalation characters of the both sexes were pooled for interpopulational comparison. Only pholidotic characters were used for discriminant analysis. All characters were range-standardized according to the equation: $x_{is} = (x_i.X)/SD$, where x_i is the value observed for an individual, x_{is} the range-standardized value of character i, X the grand mean for that character (mean of means obtained for *a priori* groups), and SD the standard deviation of that character in the pooled sample from the all groups. The characters (labials, preanals), values of which apparently did not fit to the normal distribution, were excluded from the analysis. The discriminant functions were computed only for specimens with complete character sets.

RESULTS

Standard discriminant analysis carried out in six pholidotic characters (gulars, plates in collar, dorsals, ventrals, femoral pores, subdigital lamellae) showed a distinct separation of the examined samples (Wilk's lambda = 0.1000, F=15.9, p<0.0001, n=52; Figure 1). Classification functions for the individual variables are given in Table 1. Approximately, 92 % of individuals were correctly classified to *a*

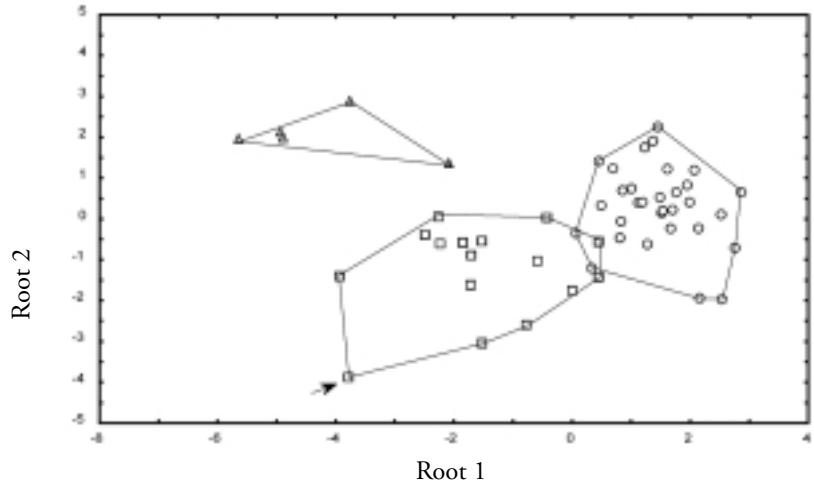

Figure 1. Discriminant analysis based on six pholidotic characters comparing the *Mesalina brevirostris* populations from central and eastern Syria (○), western Syria (□) and Jabal al Arab (Δ). Holotype of *Eremias brevirostris microlepis* indicated by the arrow

VARIABLE	CLASSIFICATION FUNCTIONS		
	Centr. and E Syria	W Syria	Jabal al Arab
Dorsals	-2.07125	0.60551	2.66798
Gulars	-2.04664	-0.85873	5.21996
Plates in collar	-1.26904	1.57351	0.73368
Ventrals	0.79195	0.79293	-1.06204
Femoral pores	-1.02754	1.25370	0. 98751
Subdigital lamellae	1.00553	1.29257	-2.72730
Constant	**-3.06674**	**-2.94856**	**-9.89107**

Table 1. Classification functions of the discriminant analysis of the Syrian populations of *Mesalina brevirostris* (only range-standardized characters were used for the analysis)

priori groups. The classification of the specimens from eastern and central Syria (group 1) was completely correct. Three specimens (18. 8 %) from western Syria (group 2) were erroneously placed into group 1 and one specimen (20.0%) from Jabal al Arab (group 3) was wrongly placed into group 2.

The mutual separation of the three given samples was evident also after extension of the analysis for the samples from Jordan (group 4) and Iraq (group 5) (Wilk's lambda = 0.1721, F=5.9, p<0.0001, n=72; Figure 2). Altogether, 75% of individuals were correctly assorted. Only one specimen (3.2%) from the group 1 and also one incorrectly determined individual from the group 2 were erroneously put/replaced into the Jordanian sample (group 4). On the other hand, the accuracy of classification of the specimens from Jabal al Arab was 100%. Opposite to this, only 21.4 % of the Jordanian individuals were classified correctly (64.3% was placed into the group 1). Similarly, the right assortment

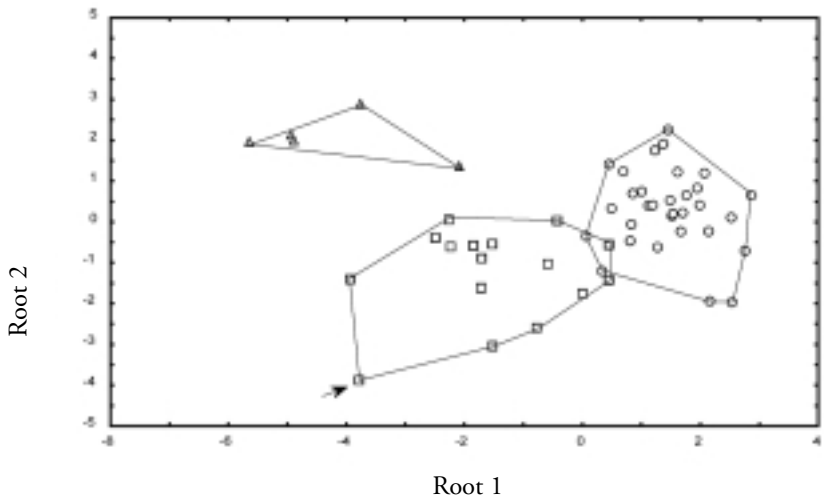

Figure 2. Discriminant analysis based on six pholidotic characters comparing the *Mesalina brevirostris* populations from central and eastern Syria (○), western Syria (□), Jabal al Arab (Δ), central and eastern Jordan (○) and eastern and central Iraq (◊). Holotype of Eremias brevirostris microlepis indicated by the arrow

of Iraqi specimens was low (50%) and two of them (33%) were put into group 1.

The obtained results (for descriptive statistics see Table 2) show that at least in Syria the geographically delimitated samples of *M. brevirostris* represent three more or less morphologically different forms (morphotypes): (1) "Lowland form" characterized by the small size, low number of gular, dorsal and preanal scales and by short head (rostrum) (Table 2, Figures 4, 5, 6). (2) "Western (intermediate?) form", which occupies higher elevations (600-800 m) of western Syria (Figure 3). It differs from the "lowland" form by its larger size, higher number of gular and dorsal scales, slightly higher number of subdigital lamellae and (at least in males) by higher count of femoral pores (Table 2, Figures 4, 5, 6). (3) "J. Arab form" inhabiting eastern slopes of the Jabal al Arab at the edge of the black lava desert (alt. ca. 1000 m.). It differs

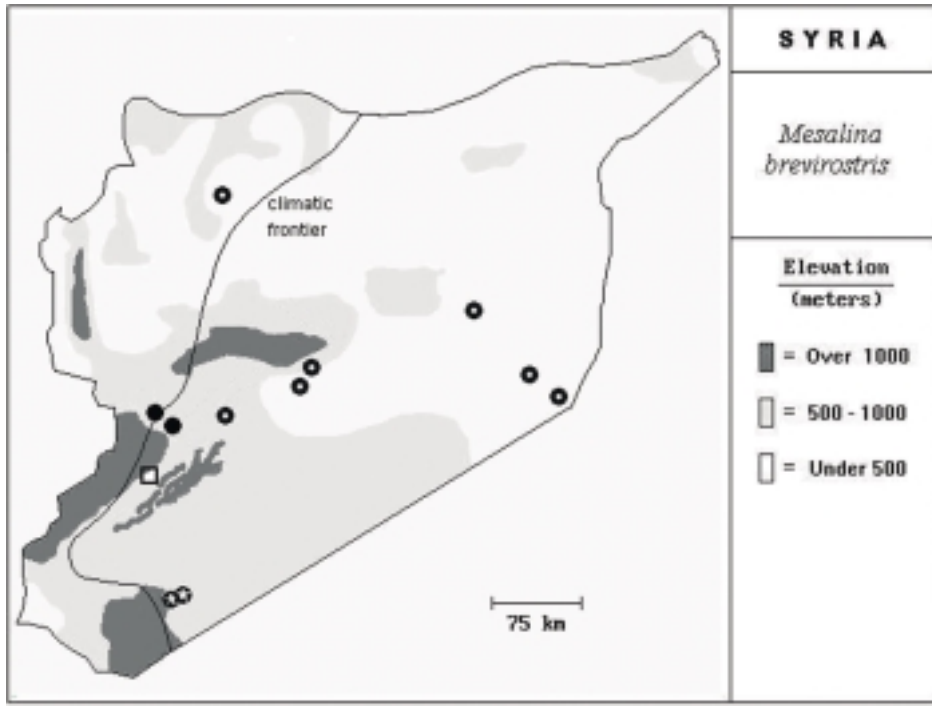

Figure 3. Distribution of the individual morphotypes of *Mesalina brevirostris* in Syria. Open circles = "lowland form", closed circles = "western form" (inexact locality of ZFMK 57930 not included), stars = "J. Arab form", square = Gadeau's series (Boulenger 1923), curve = frontier between "West Syrian steppe" and "Desert-steppe" climatic regions

Character	Centr. and E Syria	W Syria	Jabal al Arab	N, NE and Centr. Jordan	W, Centr. and S Iraq
SVL (m)	44.1±2.22, 40-48, (13)	50.2±2.53, 47-55, (10)	55.0±2.71, 51-57, (4)	49.1±3.76, 45-55, (8)	45.7±1.53, 44-47, (3)
(f)	45.8±3.16, 40-48, (10)	48.5±2.17, 46-52, (6)	54.0, (1)	52.0±6.38, 43-57, (4)	50.0±5.66, 46-54, (3)
TL%SVL (m)	187.7±11.23, 165.1-195.3, (10)	205.7±16.33, 188.5-236.2, (6)	197.3±1.28, 196.4-198.2, (2)	198.1±20.12, 171.1-217.6, (4)	187.2±18.95, 166.0-202.3, (3)
(f)	184.6±9.61, 170.8-195.4, (7)	183.6±6.71, 176.6-189.6, (4)	174.1, (1)	182.5±3.01, 180.4-184.6, (2)	-
HL%SVL (m)	21.8±1.12, 20.7-24.0, (9)	21.6±0.73, 20.6-22.8, (9)	23.3±1.11, 22.1-24.5, (4)	22.1±1.25, 20.4-23.6, (5)	21.4±0.55, 20.9-22.0, (3)
(f)	19.6±1.37, 17.7-21.7, (9)	19.2±0.99, 18.9-20.8, (6)	20.6, (1)	20.5±1.41, 19.5-21.5, (2)	19.1±0.24, 18.9-19.3, (2)
HW%HL (m)	78.8±3.17, 74.8-84.6, (9)	78.6±3.24, 73.3-84.16, (9)	74.6±3.06, 70.1-76.6, (4)	75.9±6.26, 69.5-83.0, (5)	78.4±0.35, 78.1-78.4, (2)
(f)	79.5±4.39, 74.3-85.7, (9)	80.8±5.22, 72.0-86.17, (6)	73.9, (1)	80.1±2.90, 78.0-82.1, (2)	82.4±3.71, 79.8-85.1, (2)
Supralabials	4.8±0.42, 3-5, (36)	4.9±0.50, 4-6, (16)	5.2±0.27, 5-6, (5)	4.7±0.49, 3-5, (18)	4.7±0.49, 4-5, (7)
Gulars	23.9±1.50, 20-27, (36)	25.9±2.08, 23-29, (16)	29.6, ±1.95, 27-32, (5)	25.2±2.43, 20-29, (18)	23.9±1.35, 22-26, (7)
Plates in collar	9.4±1.11, 8-11, (31)	10.9±0.96, 9-13, (16)	10.6±2.07, 8-13, (5)	10.1±1.70, 8-15, (18)	9.7±1.03, 8-11, (6)
Dorsals	46.1±3.27, 39-52, (36)	53.0±4.79, 46-61, (16)	60.4±3.51, 55-64, (5)	51.8±3.17, 48-59, (17)	45.0±3.44, 41-51, (7)
Ventrals (m)	31.6±1.56, 29-34, (13)	32.6±1.84, 30-36, (10)	33.5±1.29, 32-35, (4)	31.6±1.30, 30-33, (8)	29.0±0.00, 29-29, (3)
(f)	33.6±1.43, 31-36, (10)	34.2±1.33, 32-36, (6)	33.0, (1)	33.8±0.50, 33-34, (4)	32.3±1.15, 31-33, (3)
Preanals (m)	3.1±0.28, 3-4, (13)	3.9±0.32, 3-4, (10)	4.8±0.50, 4-5, (4)	3.8±0.46, 3-4, (8)	3.3±0.58, 3-4, (3)
(f)	3.1±0.57, 2-4, (10)	3.8±0.41, 3-4, (6)	5.0, (1)	3.5±0.58, 3-4, (4)	3.0±0.00, 3-3, (3)
Femoral pores (m)	14.0±0.89, 12-15 (13)	16.8±1.62, 14-20, (10)	14.6±0.95, 14-16, (4)	14.4±0.78, 13-15, (8)	13.2±0.76, 12-14, (3)
(f)	13.2±0.47, 12-14, (10)	14,3±2.14, 12-18, (6)	15.5, (1)	13.8±1.32, 12-16, (4)	14.5±0.50, 14-15, (3)
Subdigital lamelae	22.6±1.18, 21-27, (36)	23.5±1.66, 21-28, (16)	21.4±0.55, 20-22, (5)	22.6±1.16, 21-26, (18)	21.6±0.75, 21-23, (7)

Table 2. Comparison of descriptive statistics of 13 selected mensural and pholidotic characters of *Mesalina brevirostris* from five regions investigated

markedly from the "lowland form" and less obviously from the "western" form by their larger SVL, higher number of gular, dorsal and preanal scales, lower number of subdigital lamellae and by longer head (rostrum) (Table 2, Figures 4, 5, 6). The males possess also conspicuously swollen base of tail, which in a comparable extension occurs in the biggest males of the "western form" only. Further, the J. Arab population shows a distinct colour polymorphism with a high tendency to melanism (two specimens were completely and two others partly melanistic).

DISCUSSION

The discriminant analysis confirmed the assortment of the examined material into three forms in Syria. These morphotypes seem to be parapatric and their distribution is probably delimitated by horizontal and vertical differences in climatic conditions.

The "lowland form" is distributed in a wide area of "Desert" and "Desert-steppe" climatic regions (average annual precipitations 50-220 mm), which correspond to the "Syrian steppe" phytogeographical zone (sensu WIRTH, 1971). In north-western Syria it intrudes marginally also the region of "West-Syrian steppe" climate (precipitations ca. 220-400 mm), which roughly delimitates the "Syrian dry" phytogeographical zone. This "lowland form" agrees well to *M. b. brevirostris* sensu ANGEL (1936), HAAS & WERNER (1969) and WERNER (1971). The examined material originates from central and eastern Syria (alt. up to ca. 500-600 m) (Figure 3), but it is likely that this form occurs in the higher

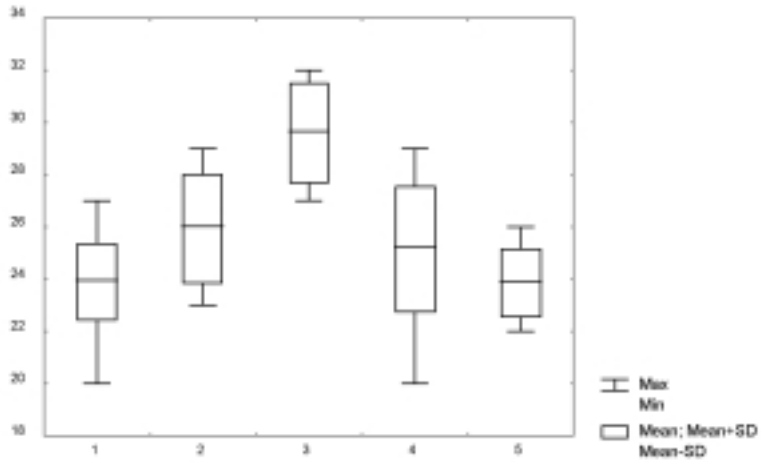

Figure 4. Comparison of the number of dorsal scales in the examined samples of *Mesalina brevirostris*. 1 = central and eastern Syria; 2 = western Syria; 3 = Jabal al Arab; 4 = northern, north-eastern and central Jordan; 5 = western, central and southern Iraq

altitudes of the south-western part of the country as well. Also most of the examined specimens from Jordan and Iraq correspond fairly well to this morphotype.

The "western form" is restricted to the area of the western frontier of the "Desert- steppe" region (Figure 3). However, the recent records from north-eastern Lebanon (IN DEN BOSCH, 2001) show that it reaches also more to the west into the zone of the "West-Syrian steppe" climatic region. It seems that also part of the Jordanian specimens agrees to this morphotype. This form should correspond to the subspecies *M. b. microlepis.* The examined sample involves the holotype of this taxon and 8 topotypes collected in 1999. However, in the case of the holotype the values of some characters (SVL = 55 mm, HW%HL= 73.3, supralabials 6/6, dorsals = 61 [60 according to Angel, 1936], ventrals = 36, femoral pores = 18/20) represent the lower or upper limits of their ranges found within the whole series. The extraordinal position of that specimen is visible also in Figures 1, 2.

Despite of the results of the discriminant analysis it is not easy to determine the individual forms of *M. brevirostris* in practice. Although the "lowland" and "J. Arab forms" can be readily distinguished owing to the obvious differences in number of gular, dorsal and preanal scales and in their general body habitus, the characters of the "western population" are more or less intermediate between those of the

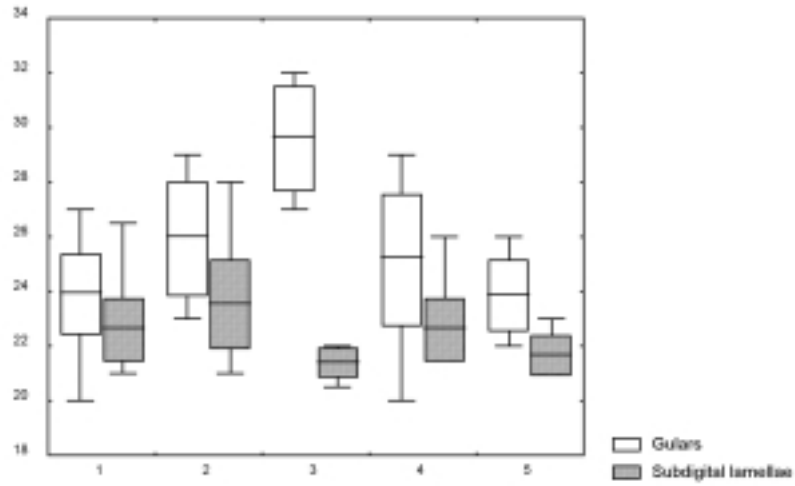

Figure 5. Comparison of the numbers of gular scales and subdigital lamellae in the examined samples of *Mesalina brevirostris.* Explanations as in Figure 4

former two morphotypes. According to ANGEL (1936) and WERNER (1971) this "western form" should agree to *M. b. microlepis*. It is truth that the only type specimen of this subspecies clearly differs from the "lowland form". On the other hand it turns aside also from the variation of the available sample of the "western form" (including the series of 8 specimens collected recently at the type locality of *microlepis*). Moreover, this type fits well neither the Lebanese population, scalation of which is in agreement to that of Syrian "western form" (see IN DEN BOSCH, 2001), nor the examined Jordanian sample.

Two hypothesis were suggested to explain this situation: (1) *M. b. microlepis* is a valid taxon endemic to the area of Jabal al Arab, which intergrades with the "lowland form" to the north, south and east (see WERNER, 1971). The relatively high degree of morphological similarity of the "western" and "lowland forms" as well as the today's extraordinal position of the holotype of *microlepis,* could be explained as a result of possible intergradation caused by the current process of aridisation of the area. The possible expansion of the "lowland form" to the higher elevations of western Syria could lead to assimilation of the original population, which the type belonged to. In the same light it could be also seen certain discrepancy in pholidosis between the recently collected series of 6 specimens from northern and north-eastern Jordan (48-53 /59/ dorsals and 20-25 /28/ gulars; parentheses indicate the exceptional values) and couple of individuals collected in the nearly same area of

northern Jordan in 1965 (60-62 dorsals, 28-29 gulars; see WERNER, 1971). The "J. Arab form" could perhaps correspond to the "typical" *microlepis*. The holotype of *microlepis* fit it by its size, index HW%HL, high number of dorsals and supralabials. On the other side, it differs by higher number of femoral pores (18/20) and subdigital lamellae (25/25). (2) The number of dorsals and the values of some of other characters are correlated with altitude and have no taxonomic value. Temperature correlated morphological clines have been reported for a number of reptiles (e.g. *Podarcis sicula*; see LANZA *et al.*, 1993). It really appears, that the number of dorsals, gulars and preanals could be positively correlated with altitude (Table 2, Figures 4, 5). However, the complex of factual climatic conditions at individual localities, will logically play a more important role. It is indicated by series of 11 specimens collected by Henri Gadeau (see BOULENGER, 1923) at relatively high altitude (ca. 700-800 m) around Jerud and "Khan Ayach" in south-western Syria in 1908 (Figure 3). The low number of dorsals (36-51, mean = 44.8) in this sample contrasts with its origin (higher altitudes in supposed range of the "western form"). The area of Jerud may be perhaps affected by the warmer and drier climate from the south. Similarly, the situation found in the case of the Jordanian sample, where the discriminant analysis placed more than 64% of examined animals into the rank of Syrian "lowland form", shows, that this morphotype extends far to the west in Jordan as well.

Figure 6. General habitus of the three Syrian forms of *Mesalina brevirostris* (males): "lowland form"- NMP6V 34774/1, Dayr az Zavr (left); "western form"- NMP6V 70440/2, Hawarin (middle); "J. Arab form" NMP6V 70211, 9 km NE of Rashiedeh (right)

As demonstrated by the following comparison, 6 specimens collected recently in northern and north-eastern part of this country (alt. 560-750 m) show the clear affinity to the "lowland form" and resemble those from Rutba (Iraq) (n=5): gulars 20-25 (28) versus 22-26; dorsals 48-53 (59) versus 41-51; preanals 3-(4) versus 3-(4); subdigital lamellae 21-23 (24) versus 21-22 (23).

Also the high number of dorsal (49-57) and preanal (5-6) scales in the recently discovered Turkish population occurring at relatively low altitude (550 m) at the northern frontier of the range of the Syrian "lowland form" (KUMLUTA *et al.*, 2002), could probably reflect lower temperatures at this northernmost locality of *M. brevirostris*.

The position of the "J. Arab form", which is represented by too small sample, remains open. On the one hand, this morphotype could represent a marginal population, which morphological characters reach the limits of their known ranges. On the other hand, the low number of subdigital lamellae, which does not fit the trend of clinal variation (Figure 5), the rather different head shape (longer rostrum) and the results of the discriminant analysis indicate a more separate position of this form.

In conclusion: (i) *M. brevirostris* forms three morphotypes in Syria, which need taxonomic revision; (ii) more numerous comparative material from Jabal al Arab and Jordan as well as application of non-morphological methods are necessary; (iii) a possible effect of climatic factors (including the process of aridisation of the Near East) on the morphology and distribution of the individual populations should not be overlooked.

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APPENDIX

The examined material of *Mesalina brevirostris.*

Central and eastern Syria:

NMP6V 34773/1-7: Tadmor (Palmyra); NMP6V 34774/1-5: Dayr az

Zawr (Deirezzor); NMP6V 34783/1-2: Abu Kamal; NMP6V 34876/1-5: Tadmor (Palmyra); NMP6V 34877: Al Salhyeh (Dura Europos); NMP6V 34878/1-2: Abu Kamal; NMP6V 34879/1-4: 4 km W of Abu Kamal; NMP6V 70305/1-4: 28 km N of Tadmor (Palmyra); NMP6V 70313: Abu Kamal; ZFMK 21010: Tadmor (Palmyra); ZFMK 27526: Al Salhyeh (Dura Europos); ZFMK 30528: Jabbul (Jabbul lake); ZFMK 57928-29: 59 km SW of Tadmor (Palmyra).

Western Syria:

MNHN 1935 285: Hawarin (Haouarine), holotype of *M. b. microlepis*; NMP6V 70439/1-6: Sadat; NMP6V 70440/1-8: Hawarin; ZFMK 57930: 80 km NE of Damascus.

Southern Syria (Jabal al Arab):

NMP6V 34880: 10 km NE of Rashiedeh; NMP6V 34881: 15 km NE of Rashiedeh; NMP6V 70211/1-3: 9 km NE of Rashiedeh.

Jordan:

HUJ-R 1225: N of Zerqa; HUJ-R 1226-27: Amman-Chissa; HUJ-R 1229: Amman-Chissa; HUJ-R 6181: 65 miles SSE of Amman; HUJ-R 6183: Amman-Chissa; NMP6V 70224/1-3 10 km SW of Azraq, NMP6V 70225: Shaumari; NMP6V 70629/1-3: S of Amman; NMP6V 71120: road Azraq – Al Jafr, 31° 01’ 04”N, 36° 38’ 28”E; NMP6V 71527: 32° 33’ 35.6”N, 38° 34’ 48.8”E; NMP6V 71529: 31° 51’ 25.6”N, 38° 34’ 48.8”E; ZFMK 44354: Shawbak; ZFMK 64683-4: Shaumari.

Iraq:

NMP6V33079/1-4: Rutba; NMP6V 33096: Rutba; NMP6V 71540: Baghdad; ZFMK 19410: Basrah. 1977.