Russian Journal of Herpetology Vol. 10, No. 1, 2003, pp. 11 – 24

LACERTAS OF SOUTH AND CENTRAL ZAGROS MOUNTAINS, IRAN, WITH DESCRIPTION OF TWO NEW TAXA

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Submitted ***??????????????***

During our long-term fieldwork on the Iranian plateau in 2000 and 2002, we collected and examined a series of lacertid lizards, belonging to the genus *Lacerta* from various parts of the Zagros Mountains of western and southwestern Iran, from a morphological point of view. Based on the collected material, two new taxa are described: *Lacerta yassujica* sp.n. and *Lacerta brandtii esfahanica* ssp.n. Based on all the available evidence, *L. yassujica* is closely related to *Lacerta* (*Apathya*) *cappadocica*. A short account on taxonomy and biogeography of the studied taxa is given.

Key words: Lacertidae, *Lacerta*, *L. yassujica*, *L. brandtii*, *L. cappadocica*, *L. zagrosica*, Iranian Plateau, Zagros Mountains, Taxonomy, New taxa.

INTRODUCTION

Comparatively little is known about the distribution and taxonomy of the small lacertids of Iran, Arnold's *Lacerta* Part II (Arnold, 1973). There have been rather few collecting trips made to the wide area of the Zagros Mountains, and comparatively few specimens of the concerned taxa are currently available in Museum collections. The Zagros Mountain chain is completely out of the range for Arnold's *Lacerta* Part II, as stated in his first comprehensive study in 1973 (Fig. 13, p. 355). Before 1968, when the Street Expedition extended the known distribution of *Lacerta brandtii* to Esfahan province, only *Lacerta* Part I (large green lacertas) where known to occur in central and southern Zagros (Anderson, 1999).

In northern Iran, and approaching the northern Zagros, *Lacerta raddei raddei*, *Lacerta raddei vanensis*, and *Lacerta defilippi* are distributed, together with *Lacerta brandtii*. In the humid habitats of northern Elburz and Talysh Mountains *Lacerta chlorogaster* and *Lacerta praticola praticola* are present. In 1976, Baloutch described *Lacerta mostoufii* from the dry desert of Lut in the southeast of Iran. The validity of this species is debated. According to Eiselt (1995), and Darevsky (cited in Arribas, 1999) it is a synonym of *L. chlorogaster*. According to in den Bosch (1999) a specimen of *Lacerta praticola praticola* has been listed in the type series (as paratype in Muséum nationale d'Histoire naturelle, Paris), a matter that is questioned by Ananjeva and Darevsky (2000), who claim all types of *mostoufii* to be *chlorogaster*.

Furthermore, *Lacerta valentini valentini* occurs in northwestern Iran (Anderson, 1999), and in 1995, Eiselt described *Lacerta steineri* from east Elburz. Most of these taxa belong to the saxicola complex, and are in recent literature referred to the genus *Darevskia* (Arribas, 1999). Exceptions are *brandtii*, which in many investigations is considered as a basic taxon in phylogenetic reconstructions (Boulenger, 1920; Arnold, 1989), and *cappadocica*, which is referred to subgenus (genus) *Apathya*. According to Arnold (1989) and Arribas (1999), the latter has some affinities with the Arabian *Omanosaura*, although this is not universally agreed upon (e.g., Mayer and Benyr, 1994; Mayer and Bischoff, 1996).

In recent years, a number of studies have focused on Archaeolacertas and other small Lacertas in north-

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1026-2296/2003/1001-0011

ern Iran and adjacent territories (e.g., Eiselt et al., 1992, 1993; Schmidtler et al., 1994; Eiselt, 1995; Anderson, 1999). Increased travel and studies in different parts of the Iranian Plateau clearly indicate a number of new populations and unresolved questions about the systematics and evolution of these lizards. In our current study on taxonomy and biogeography of the herpetofauna of Iran, we have collected additional material of lacertas. In 1998, we described *Lacerta zagrosica* (Rastegar-Pouyani and Nilson, 1998), and during our last expedition (in 2000) to the south central Zagros, we found another new species, as well as an additional population of *Lacerta brandtii*.

In this paper, we intend to clarify the taxonomy and relationships of these south central Zagros representatives of *Lacerta* Part II. We also discuss a hypothesis of the role of the Zagros as a spreading corridor.

MATERIAL

The examined material (fresh, as well as preserved specimens) originated from the following Museum collections:

— Göteborg Natural History Museum, Sweden (GNM);

— Razi University Zoological Collection, Kermanshah, Iran (RUZC);

— Iran National Natural History Museum, Iran (MMTT);

— Tehran University Zoological Museum, Iran (TUZM);

The collection numbers of the examined material are as follows:

Lacerta brandtii brandtii: GNM Re.ex. 2873 – 2874; RUZC/GNM field number 180 – 183; MMTT 1352 – 1354, 1392 – 1394.

L. brandtii esfahanica: GNM Re.ex. 5609 – 5611; KUZC: field number GN 562 – 563.

L. cappadocica urmiana: MMTT 1340 – 1341; TUZM 1 – 7, 137.

L. zagrosica: GNM Re.ex. 5149 – 5150, 5614 – 5617; RUZC: field numbers GN 539, 542, 544, 552, 554.

L. yassujica: GNM Re.ex. 5612 – 5613; RUZC: field number GN 586 – 587.

RESULTS

Taxonomic discussion. Most Iranian taxa of the Arnold *Lacerta* part II have, until now, been recorded from the northern mountains, and almost none, with a few exceptions, has been encountered from southern or west-central Iran. However, in our recent works, several taxa have been registered from the south-central regions of the Zagros (Table 1).

Lacerta brandtii is a ground-dwelling species while the remaining lacertas are all rock-dwellers. *Lacerta zagrosica* is a robust lacertid with fragmented scalation (high number of temporals, ventrals, etc.), but otherwise a typical rock lacertid. The two remaining species tare both characterized by having keeled subdigital lamellae and lower eyelid with transparent shields. The new species has a blue tail, and is otherwise unicolored except for a lateral

TABLE 1. Species of *Lacerta* Part II Occurring in Iran

Taxon	Author	Zagros	N. Iran
Lacerta valentini valentini	Boettger, 1892		×
Lacerta raddei raddei	Boettger, 1892		×
Lacerta raddei vanensis	Eiselt, Schmidtler, and Darevsky, 1993		×
Lacerta chlorogaster	Boulenger, 1909		×
Lacerta praticola praticola	Eversmann, 1834		×
Lacerta mostoufii	Baloutch 1976		×*
Lacerta steineri	Eiselt, 1995		×
Lacerta defilippi	(Camerano, 1877)	×	×
Lacerta cappadocica urmiana	(Lantz and Suchow, 1934)	×	×
Lacerta brandtii brandtii	De Filippi, 1863 n. comb.	×	×
Lacerta brandtii esfahanica	ssp. nov.	×	
Lacerta zagrosica	Rastegar-Pouyani and Nilson, 1998	×	
Lacerta yassujica	sp. nov.	×	

* Lut desert, but see text for more explanation.

black band with blue spots. *Lacerta cappadocica* has a marbled and longitudinally spotted pattern.

Lacerta brandtii has a discontinuous distribution. The main distribution is in northwestern Iran (East Azerbaijan Province) and in neighboring Azerbaidzhan Republic. The material collected by the Street expedition in 1968 from the vicinity of Kuh Rang in Esfahan Province and by us in 2000 at Fereydun Shahr in the same province represents the more southern occurrence. Anderson (1999) pointed out the necessity to compare populations from the two regions. He obviously suspected that different taxa could be involved. With our new material at hand, it is obvious to us that these two populations represent two taxa, albeit related.

The taxonomy of *Lacerta cappadocica* was studied by Eiselt (1979), including the Iranian subspecies *urmiana*. His study was focusing on Turkish populations, and Eiselt had only a small series from Iran. It seems obvious to us that a thorough study need to be done based on Iranian material. Our small material indicates unresolved taxonomic problems.

Lacerta defilippi was found in the Zanjan valley, in the Kûh-e Sendan Dag Mountains, which extends its distribution southwesterly, approaching the Zagros.

The single central Zagros species up to now are *Lacerta zagrosica* and *L. brandtii*, but in our recently collected material, another new species, related to *Lacerta cappadocica*, was discovered further south.

SPECIES ACCOUNT — ZAGROS *Lacerta* PART II

Lacerta cappadocica urmiana (Lantz and Suchow, 1934)

Morphology. For scalation characters, see Table 2. In the females, the dorsal scales are granular, juxtaposed and smooth but denser than in *Lacerta brandtii*. The caudal scales are elongated and distinctly keeled. The dorsal pattern in the W. Azerbaijan females is brownish with a broad vertebral band containing numerous bluish spots, which form a reticulated pattern. Dorsal ground color in the three Kermanshah females is olivish brown with less dark markings, the dorsolateral dark stripe narrower, and containing large blue ocelli. The ventral color pattern is uniformly bluish cream in the W. Azerbaijan females, and blue in the Kermanshah females. Lateral pattern consists of two wide dorsolateral stripes (bluish) from nape to proximal half of tail in the W. Azerbaijan females. In the Kermanshah females, the ventrolateral region is dark with bluish tinges and 1 – 2 outer rows of ventrals have dark markings. The throat is uniformly bluish cream in the W. Azerbaijan females. It is uniformly light blue in the Kermanshah females. The tail is light brown in the W. Azerbaijan females, greenish blue in the Kermanshah females.

In the males, which are all from the Kermanshah population, the dorsal scales are granular, juxtaposed, and smooth but denser than in *Lacerta brandtii*. The caudal scales are elongated and distinctly keeled. In

TABLE 2. Comparison of Scalation Characters in the Zagros Taxa of *Lacerta* part II

Characters	*brandtii* $N = 12$	*esfahanica* $N = 5$	*zagrosica* $N = 6$	*urmiana* $N = 10$	*yassujica* $N = 4$
Dorsal numbers	54.33 ± 2.5	53.6 ± 2.5	56.25 ± 1.3	70.1 ± 3.6	54.0 ± 1.2
Ventral plates rows	8.0 ± 0.0	9.2 ± 0.98	9.83 ± 0.4	8.00 ± 0.0	8.00 ± 0.0
Ventral plates series	29.00 ± 1.5	29.2 ± 1.6	28.8 ± 1.7	33.1 ± 0.5	29.75 ± 1.1
Submaxillary pairs	5.09 ± 0.3	5.6 ± 0.5	5.71 ± 0.5	5.00 ± 0.0	5.0 ± 0.0
Supralabials	9.00 ± 0.0	9.4 ± 0.5	9.0 ± 0.0	10.1 ± 0.5	9.0 ± 0.7
Infralabials	7.75 ± 1.4	7.4 ± 1.0	6.6 ± 0.8	7.0 ± 0.4	7.2 ± 0.4
Supraciliaries	6.67 ± 0.6	6.8 ± 0.8	6.5 ± 0.5	7.0 ± 0.5	7.75 ± 0.4
Supracilliary granulae	9.92 ± 0.9	9.60 ± 1.0	11.83 ± 1.2	14.7 ± 1.2	17.00 ± 3.5
Gulars	27.16 ± 2.5	28.2 ± 1.2	29.8 ± 1.1	33.44 ± 2.2	28.5 ± 0.5
Collar numbers	9.75 ± 0.4	11.4 ± 1.0	10.17 ± 0.7	10.5 ± 0.5	8.5 ± 0.9
Femoral pores	17.92 ± 1.7	17.00 ± 1.1	20.17 ± 1.1	22.8 ± 1.8	22 ± 0.7
Temporals	40.33 ± 5.7	63.2 ± 4.8	71.33 ± 15.1	142 ± 11.9	143.5 ± 14.8
Postnasals	2.0 ± 0.0	2.2 ± 0.4	1.17 ± 0.4	2.0 ± 0.0	2.0 ± 0.0
Subdigital lamellae	28.58 ± 1.9	27.6 ± 1.0	26.0 ± 0.8	25.9 ± 0.9	25.75 ± 0.8
Pre-preanal plates	6.83 ± 0.7	6.0 ± 0.6	6.5 ± 1.0	6.5 ± 0.5	6.75 ± 0.4

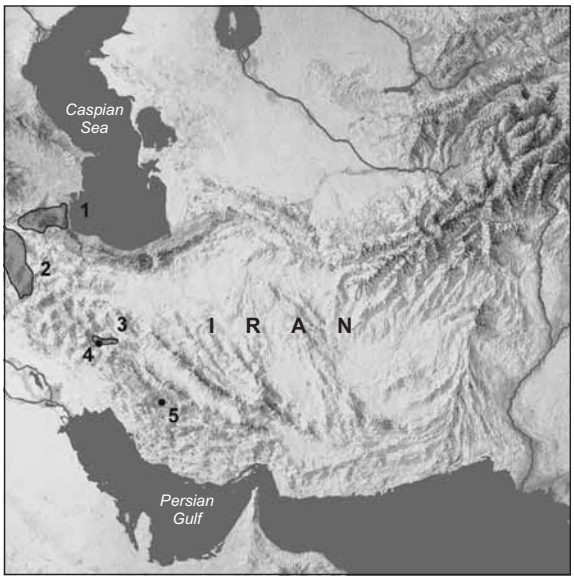

Fig. 1. Distribution of *Lacerta brandtii brandtii* (1), *L. cappadocica urmiana* (2), *L. brandtii esfahanica* (ssp. nov.) (3), *L. zagrosica* (4), and *L. yassujica* (sp. nov.) (5) in western Iran.

the dorsal pattern, the vertebral region is greenish blue, encompassing numerous dark markings located transversally and having tendency to form reticulations. In the dorsolateral region, there is a broad dark stripe that contains 1 – 2 rows of bluish ocelli. The upper surfaces of limbs are blackish with numerous bluish ocelli. The ventrolateral region is dark with bluish tinges and with the first to second outer rows of ventrals with dark markings. The ventral color pattern is uniformly blue. The throat is uniformly bluish cream. The tail is uniformly greenish blue.

Habitat. The West Azerbaijan specimens (MMTT 1340, 1341), which originated from a locality 15 km east of Urmia, were collected on "dirt tracks to waterfalls" [this is a misinterpretation by someone at MMTT of the field data. Anderson actually collected them on rocks, which were reached by a dirt track out of Urmia (Anderson, personal communication)] first of July, 1975. The Kermanshah specimens (TUZM 1 – 7, 137) were all on rocks, sympatric with *Laudakia caucasia*, north of the city of Paveh, Shahu Mountains, at about 2200 m elevation. They were collected in September 1997.

As well, one of us (N. Rastegar-Pouyani) recorded *L. cappadocica urmiana* from 45 km NE Kermanshah City on the Zagros Mountains at about 1600 m elevation (personal observation, dated August 1989) (Fig. 1).

Field notes. The species is a pronounced rock-dweller, and was observed a number of times on vertical rocks nearby Kermanshah.

Lacerta cappadocica urmiana specimens from two regions were studied. Eight specimens originated from Kermanshah Province, which is in the extreme southern range of *cappadocica* in Iran, and so far the southernmost known locality. Two females came from West Azerbaijan Province, which is at the northern edge of the species range in Iran, and close to the Turkish populations. The description of *urmiana* was based on specimens from this northern population (Lantz and Suchow (1934). These northern and southern subpopulations differ to some extent in morphology in our small series. Specimens of the southern fraction are somewhat bigger, have more dorsals, more supraciliary granulae, fewer gulars, more temporals and a fragmented preanal plate. This southern Azerbaijan population could be worth a closer look, based on more material.

Lacerta brandtii brandtii De Filippi, 1863 (n.comb.)

Morphology. For scalation characters, see Table 2. In the females, the dorsal scales are granular, juxtaposed and smooth, while the caudal scales are elongated and keeled. The dorsal pattern is olivish-brown with dark reticulations. The ventral color pattern is yellowish-cream, and brown at the margins. Lateral pattern is brownish with darker reticulations, while the lateroventral scales are dark-brown. The throat is yellowish cream. The tail is light brown dorsally, and yellowish ventrally.

In the males, the dorsal scales are granular, juxtaposed, and smooth, while the caudal scales are elongated and keeled. In the dorsal pattern, the vertebral region is uniformly brownish-olive-green, while the paravertebral and dorsolateral regions have dark-brown spots and blotches that tend to form reticulations. There is a large ocellated bluish spot on each side of the shoulder. The ventral color pattern is uniformly bluish-white. Lateral pattern is greenish with some dark spots, while the outer row of ventral scales has dark blotches. The throat is uniformly greenish-white. The tail is uniformly greenish dorsally, and greenish-cream ventrally.

Fig. 2. Male holotype of *Lacerta brandtii esfahanica* (ssp. nov.). (GNM Re.ex. 5609), at the type locality.

Habitat. Five specimens (MMTT 1352 – 1354, 1393 – 1394) originated from East Azerbaijan Province at Maragheh, Silvand Village, July 15, 1975. One additional specimen (MMTT 1392) came from region 4 km southeast of Chalivan, at 1800 m elevation in Maragheh Paleosite. It was collected July 3, 1975. Two specimens (GNM 2873 – 2874) originated from Ardabil, Ardabil Province. In addition, in our recent fieldwork in Iran in 2002, we collected four specimens of this taxon (field Nos. 02:180 – 02:183) from the region of south Sabalan Mountains, 25 km east of Sarab on the road to Ardabil (Fig. 1). In all pertinent characters, these specimens are representative of the nominal subspecies (*L. brandtii brandtii*).

Comments. There is a marked stepwise increase in number of temporals from north toward south: 29.46 ± 1.2 in the six specimens from around Ardabil (38°15′ N); 42.25 ± 1.5 in the four specimens from 25 km east of Sarab, south of Sabalan Mountains (38°05′ N); 43 ± 2.5 in the six Maragheh specimens (37°22′ N); and 63.2 ± 4.8 in the southern *esfahanica* sample (32°56′ N).

***Lacerta brandtii esfahanica* ssp. nov. (Fig. 2)**

Holotype. Adult male GNM Re.ex. 5609; (field No. GN 560) collected by the authors on the 11 of June 2000, in the main Zagros Mountain Range, at 3000 – 3200 m altitude, at Fereydun Shahr, W of Daran, (N 32°56′; E 50°05′). (Just a few kilometers north of terra typica for *Lacerta zagrosica*) (Fig. 3).

Paratypes. Adult female GNM Re.ex. 5610 (field No. GN 561) and GNM Re.ex. 5611 (field No. GN 564), one male and one female (KUZC: field Nos. GN 562, 563). Same data as holotype.

Diagnosis. A member of the *Lacerta brandtii* group, with smooth subdigital lamellae, and eyelid covered with several scales, not transparent. Color of tail of adults in life is light yellowish-brown in sunshine. Body is grayish-green, browner posteriorly, and head is green on dorsal side. Belly is yellowish-green to yellowish-brown posteriorly in both sexes. Throat is light blue.

It differs from *L. b. brandtii* by having masseteric shield small or absent and a higher number of temporal scales; more longitudinal ventral plate rows, more gular scales and a higher number of collar scales (Tables 2, 3).

Description of the holotype. Adult male (preserved in 80% ethyl alcohol), with depressed body

Fig. 3. Type locality for *Lacerta brandtii esfahanica* (ssp. nov.) in the main Zagros Mountain Range, 3000 – 3200 m altitude, at Fereydun Shahr, west of Daran, (N 32°56′; E 50°05′) (Just a few kilometers north of terra typica for *Lacerta zagrosica*).

and slender tail; head depressed, its length much less than twice its width (1.2), its depth slightly more than 80% of its width; head length about 13% of distance from snout to vent; snout pointed; tail (tip somewhat dried) 1.35 times as long as snout-vent length, round at base and tapering towards tip; frontal same size as its distance from tip of snout, 1.35 times as long as its maximum width, narrowed posteriorly and in contact with two prefrontals, two supraoculars on each side, and two frontoparietals; parietals each 1.75 times as long as its maximum width; occipital same width as interparietal but three times as long as interparietal length, and separated from it; four supraoculars, first and fourth small and of equal size, second and third large, first is not in contact with frontal, narrowly separated from it by a narrow contact between second supraocular and prefrontal, the second in contact with prefrontal and frontal, the third in contact with frontal and frontoparietal; supraciliary series 6/6, first the largest, and separated from second and third supraoculars by a complete row of 9/8 granules; lower eyelid with several scales that form a compact cover;

TABLE 3. Comparison of Morphological Characteristics in the Zagros Species of *Lacerta* Part II

Characters	*brandtii* $N = 12$	*esfahanica* $N = 5$	*zagrosica* $N = 6$	*urmiana* $N = 10$	*yassujica* $N = 4$
Snout-vent length, mm	52 – 67	50 – 68	54 – 70	53 – 76	48 – 50
Tail length, mm	83 – 135	78 – 106	97 – 124	63 – 125	98 – 105
Eye window	No	No	No	Yes	Yes
Masseteric shield	big (11), small (1)	big (1), small (1), absent (3)	small (2), absent (4)	absent (10)	absent (4)
Tympanic shield	big, small (1)	big (2), small (3)	big (1), small (7)	small (4)	small
Subdigital lamellae keeled	No	No	No (2), distally (1), weakly (3)	Yes	Yes
Dorsals keeled	No	No	No	No	No
Caudals keeled	Yes	Yes	Yes (obtusely)	Yes	Yes

nostril bordered by internasal, two postnasals and first supralabial, rostral separated from the naris by a very narrow rim; two loreals present, anterior loreal about half the size of the posterior, and in contact with first, second and third supralabials on right side, second and third supralabial on left side, posterior loreal in contact with third and fourth supralabials inferiorly on both sides, and with prefrontal and first supraocular superiorly; 6/5 supralabials anterior to suboculars; 2/2 minute ones posterior to it; subocular twice as long as high, borders mouth; three supratemporals decreasing in length posteriorly on right side, four on left, the first as long than the two/three posterior temporals taken together; temporal region covered by small scales of the same size as dorsals, and 63/60 in number; masseteric shield visible, measuring 1/3 of tympanum; tympanic shield half the size of the tympanum, well developed and elongated; lower labials 8/8, submaxillary shields 5/5, first three pairs in complete contact, the last two pairs completely separated, fourth pair the biggest; fourth submaxillary shields separated from each other by a series of four small scales in a row at shortest distance; 27 scales in a straight line between collar and symphysis of chin shields; developed gular fold present, collar serrated, made up of 12 scales; dorsal scales granular, non-imbricate (juxtaposed), smooth, round, 57 across widest part of dorsum, three rows of which correspond to each ventral plate; ventral plates almost rectangular with weak posterior imbrication, arranged in 27 transverse and 8 longitudinal rows, the first two from midline widest, the outermost rows smallest, about half of the ventrals are bordered laterally by a larger scale, giving an impression of ten longitudinal rows; preanal plate strongly developed, broader than long, bordered by a semicircle of six larger scales, the median one the largest; anal opening surrounded by very small scales; upper forelimb with series of strongly developed shields above and granular scales below; a series of well developed shields anteriorly on lower forelimb; lower hind limb with ventral series of strongly enlarged plates; dorsal surface of thigh with granular scales, its anterior and lateral surfaces covered by a single row of enlarged plates; ventral plates separated from the femoral pores by two to three rows of overlapping scales; 18/19 femoral pores, rows separated from each other and from the knees by a series of about three small scales; digits of forelimbs similar to hind limbs in subdigital scalation; all digits have a single smooth series of lamellae beneath, and one row above; all digits covered above with smooth plates, fourth digit the longest, third the second longest, followed by the fifth, second and first respectively; 28 subdigital lamellae under the fourth toe; caudal scales almost rectangular, much elongated and enlarged, forming distinct whorls, first two thirds of the scales of similar shape and size, the distal more pronouncedly keeled, each individual scale of the median whorls corresponds to around four dorsal granular scales in length; 28 scales in the fifth caudal whorl behind vent.

Measurements (in mm). Snout-vent length (SVL): 68, tail length (TL): 93, head length: 16.2, head width: 10.1, head depth 9.2, length of forelimb: 22.0, length of hind limb: 32.1, tip of snout to forelimb: 28.0.

Coloration (in life). Dorsal surface of head and body pale brown and gray, with unicolored longitudinal zone along the back, and surrounded by black and white small dots. Laterocaudal of front leg with two blue ocelli that are in some specimens followed by one or two white ocelli. Sides of body with numerous weakly developed white ocelli, occasionally very faded. Outer abdominal scales greenish with small black and blue dots, dorsolateral stripe whitish on anterior third of body, fragmented into small spots posteriorly.

Description of paratypes. Four paratypes, one male and three females, were collected. Measurements of all specimens are given in Tables 2 and 3. Males have their throats and undersides of head colored strongly blue. This secondary sexual characteristic disappears totally in preservation. The specimens have two to three blue ocelli on each side of body.

In all the paratypes, the masseteric shield is more or less totally fragmented and not identifiable.

Habitat. Alpine meadow at 3000 to 3200 m altitude (Fig. 3).

Field notes. At this high altitude locality, this population was sympatric but not syntopic with *Lacerta zagrosica*. *Lacerta brandtii esfahanica* occurred on horizontal stony-gravel substrate, while *Lacerta zagrosica* occurred on rocky slopes. Another sympatric species was *Trapelus lessonae* (*sensu* Rastegar-Pouyani, 2000).

Range. After examination, we consider the series of *brandtii* collected by the Street Expedition to Iran in 1968 in the vicinity of Kuh Rang in Esfahan Province to belong to this new subspecies. The locality is

Fig. 4. Female holotype of *Lacerta yassujica* (sp. nov.) (GNM Re.ex. 5612), at the type locality.

9.6 km NW Kuh Rang, at 2593 m altitude (FMNH 170956 – 62) (N 32°18′; E 50°13′). The two localities are situated rather close to each other in the northwestern parts of Esfahan Province, west-central Iran.

Lacerta yassujica sp. nov. (Figs. 4 – 6)

Holotype. Adult female GNM Re.ex. 5612; (field No. GN 584) collected by the senior author on the 16 of June 2000, in the main Zagros Mountain Range, at 2200 m altitude, 30 km SW Yassuj, Kohgiluye-va-Boyerahmad Province (N 30°28′; E 51°31′) (Fig. 1).

Paratypes. Adult female GNM Re.ex. 5613 (field No. GN 585); one adult male and one adult female (KUZC: field Nos. GN 586, 587). Same data as holotype.

Diagnosis and definition. A member of the *Apathya* lineage, with strongly keeled subdigital lamellae and eyelid with transparent window of several scales. Live color of tail of adults is blue in sunshine. Tail color fades in shadow, and becomes greenish. Body and head unicolored grayish beige on dorsal side. Head scales with dark sutures. Belly is mint green in both sexes. Throat is mint green in females but yellowish-orange in males. The yellowish color also covers the first ventrals. One lateral series of black small blotches is forming a longitudinal band on each side of body. Some of the black blotches include blue spots. The number of spots is four to six on each side in the two males and two in the two females. A weak third blue spot could be imagined in the latter. The black series of blotches start at the postocular plates and continue to the beginning of the tail. Scattered black dots present on hind limbs.

It differs from *Lacerta cappadocica urmiana* by its smaller size, fewer dorsal scales, fewer transverse ventral plate series, fewer gular scales, fewer collar scales, and by having smooth or obtusely keeled caudal scales (Tables 2 and 3). It also has a completely different color pattern.

Description of the holotype. Adult female (preserved in 80% ethyl alcohol), with depressed body and slender tail; head clearly depressed, its length much less than twice its width (1.3), its depth slightly more than 70% of its width; head length about 11% of distance from snout to vent; snout pointed; tail 11.67 times as long as snout-vent length, weakly depressed at base tapering towards tip; frontal slightly shorter than its distance from tip of snout, about 1.5 times as long as its maximum width, narrowed posteriorly and in contact with two prefrontals, two supraoculars on each side, and two frontoparietals;

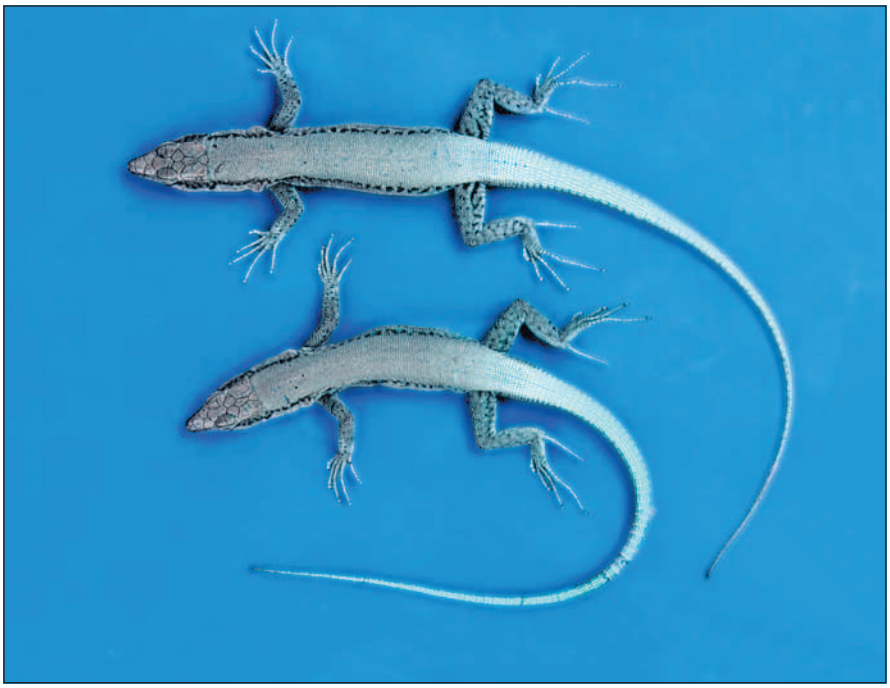

Fig. 5. Dorsal view of holotype [GNM Re.ex. 5612 (female)] and paratype [GNM Re.ex. 5613 (male)] of *Lacerta yassujica* (sp. nov.).

Fig. 6. Ventral view of holotype (GNM Re.ex. 5612 (female)] and paratype [GNM Re.ex. 5613 (male)] of *Lacerta yassujica* (sp. nov.).

parietals each about twice as long as its maximum width; occipital somewhat wider than interparietal and more than half as long as interparietal length, and in contact with it; four supraoculars, first and fourth small and of equal size, second and third large, first is not in contact with frontal, narrowly separated from it by a narrow contact between second supraocular and prefrontal, the second in contact with prefrontal and frontal, the third in contact with frontal and frontoparietal; supraciliary series 8/8, first the largest, and separated from second and third supraoculars by a complete row of 16/14 granules; lower eyelid with 5/5 large scales forming a translucent central disk; nostril bordered by internasal, two postnasals, first supralabial and rostral, the latter separated from the naris by a very narrow rim; two loreals present, anterior loreal about half the length of the posterior, and in contact with second and third supralabials on right side, second and upper divided third supralabial on left side, posterior loreal in contact with third and fourth supralabials inferiorly on right side, upper divided third, the fourth and fifth supralabials inferiorly on the left side, and with prefrontal and first supraocular superiorly; 5/5 supralabials anterior to suboculars (third on left side longitudinally divided into two plates), 3/3 posterior to it; subocular more than twice as long as high, borders mouth; three supratemporals decreasing in length posteriorly, the first longer than the two posterior temporals taken together, all supratemporals partly situated on parietal Table of skull; temporal region covered by small scales of the same size as dorsals, and 135/130 in number; masseteric shield not visible; tympanic shield weakly developed and elongated; lower labials 7/7, submaxillary shields 5/5, first three pairs in complete contact, the last two pairs completely separated, third and fourth pairs of equal size; fourth submaxillary shields separated from each other by a series of four small scales in a row; 29 scales in a straight line between collar and symphysis of chin shields; weakly developed gular fold present, collar not serrated, made up of 8 scales; dorsal scales granular, non-imbricate (juxtaposed), smooth, round, 53 across widest part of dorsum, three rows of which correspond to each ventral plate, two somewhat larger in direct contact with each ventral in most cases, a single in a few; ventral plates almost rectangular with weak posterior imbrication, arranged in 30 transverse and 8 longitudinal rows, the first two from midline widest, the outermost rows smallest; preanal plate strongly developed, broader than long, bordered by a semicircle of seven larger scales, the median one the largest (half size of preanal); anal opening surrounded by very small scales (about five rows); upper forelimb with series of strongly developed shields above and granular scales below; a series of well developed shields anteriorly and under lower forelimb; lower hind limb with lateral and ventral series of strongly enlarged plates, which are not separated from each other by small scales; dorsal surface of thigh with granular scales, its anterior and lateral surfaces covered by three series of enlarged plates; ventral plates separated from the femoral pores by three rows of overlapping scales; 22/22 femoral pores, rows separated from each other and from the knees by a series of about four small scales; digits of forelimbs similar to hind limbs in subdigital scalation; all digits have a single strongly keeled series of lamellae beneath, and one row above; all digits covered above with smooth plates, fourth digit the longest, third and fifth about equal, followed by the second and first respectively; 26 subdigital lamellae under the fourth toe; caudal scales almost rectangular, much elongated and enlarged, forming distinct whorls, first third of the scales of similar shape and size, the proximal scales more obtusely keeled, the distals more pronouncedly keeled, each individual scale of the median whorls corresponds to around four dorsal granular scales in length; 18 scales in the fifth caudal whorl behind vent; tail strongly compressed in distal one-third with more keeled scales.

Measurements (in mm). Snout-vent length (SVL): 58, tail length (TL): 100, head length: 14, head width: 9.1, head depth 6.3, length of forelimb: 21.9, length of hind limb: 28.0, tip of snout to forelimb: 22.1.

Coloration (in life). Dorsal surface of head and body grayish beige. From tip of snout, back to behind hind limbs laterally on each side of body a black fragmented band with two blue ocelli in its anterior section. Tail blue in sunshine, gleaming green in shadow, as the blue fades away. All of ventral surfaces unicolored mint-green.

Description of paratypes. Three paratypes, two males and one additional female, were collected. Measurements of all specimens are given in Table 2. Males have their throats and undersides of head colored strongly yellowish-orange (Fig. 5). This secondary sexual characteristic disappears totally in preservation. The males have five to six blue spots on each side of body; the female has four.

Fig. 7. Type locality for *Lacerta yassujica* (sp. nov.), in the main Zagros Mountain Range, at 2200 m altitude, 30 km SW Yassuj, Kohgiluye-va-Boyerahmad Province, (N 30°28′; E 51°31′).

Habitat. The habitat is rocky slopes, with vertical rock faces in open *Quercus* forest (*Quercus brandtii*, *Q. persica*) (Fig. 7). The new species only uses vertical rock sides, while on the open forest floor *Ophisops elegans* and *Mabuya aurata septemtaeniata* are occurring. In addition, *Laudakia microlepis* was found syntopic in the rocky section of the habitat.

Field notes. The population at the type locality seems to be in a low density. Besides the four specimens collected, all of us (four people) made only six more observations during two days of intensive search. The specimens were very alert and nervous, and disappeared at distances of 20 m when approached. The specimens observed were seen only on vertical rock faces, often rather high up from the ground. When undisturbed, they frequently waved with their blue tails up in the air in a slow fashion.

Etymology. *Lacerta yassujica* is so named as it is, apparently, restricted in distribution and collected for the first time from 30 km SW Yassuj, Kohgiluye-va-Boyerahmad Province, south-western Iran.

Lacerta zagrosica
Rastegar-Pouyani and Nilson, 1998 (Fig. 8)

Material. GNM Re.ex. 5149 (holotype), GNM Re.ex. 5150 (paratype), GNM Re.ex. 5614 – 5617; five additional specimens at KUZC: field Nos. GN 539, 542, 544, 552, 554). All topotypical specimens.

Type locality. At about 2450 m altitude at the main Zagros Range, 3 km northwest of Fereydun Shahr, about 140 km northwest of Esfahan city, Esfahan Province, west-central Iran, (N 32°58′; E 50°04′) (Fig. 1).

Diagnosis. *Lacerta zagrosica* differs from other Zagros small *Lacerta*s by having a single postnasal plate (two postnasals in other taxa). It also differs by having ten ventral plate rows (eight normal in the other species).

Morphology. For scalation characters, see Table 2. In the females, the dorsal scales are granular, juxtaposed and smooth, while the caudal scales are elongated and obtusely keeled. The dorsal pattern is green to olive brown with dark spots forming reticulations, encompassing light green spaces. The dark dots and spots much less numerous in the verte-

Fig. 8. Male specimen of *Lacerta zagrosica* at the type locality.

bral region. The ventral color pattern is dark blue, mixed with dark spots and dots. The black markings most numerous on the ventrolateral and gular regions. The tail is light green dorsally with numerous irregular dark spots and uniformly light turquoise blue ventrally. Upper surface of limbs is reticulated, with a pattern of dark oval and round ocelli encompassing light green spaces.

Habitat. Rocky and vertical slopes (Fig. 9).

Field notes. sympatric reptiles and amphibians were *Bufo viridis*, *Mabuya aurata*, *Laudakia caucasia*, *Ohisops elegans*, *Lacerta brandtii esfahanica*, and *Coluber ravergieri*.

DISCUSSION

The most thoroughly and comprehensive morphologically based study on the Lacertidae is that of Arnold (1989). In his study, Arnold analyzed relationships within the main genera of the Lacertidae and proposed a scenario on biogeography, distribution, and evolution of this family. According to the scenario suggested by Arnold, the genus *Lacerta* is paraphyletic. Furthermore, Arnold (1973) revised the genus *Lacerta* and separated four tropical and southern African species from *Lacerta* and raised the subgenera *Podarcis* and *Gallotia* to the generic level. In the same study, this author divided *Lacerta* (*sensu stricto*) into two groups: *Lacerta* part I and *Lacerta* part II. The former encompassing large and robust lacertas, usually occurring in the areas of dense, shrubby vegetation and the latter consists of smaller species, many of them occurring on or around the rocks. We consider *Lacerta yassujica* (sp. nov.) as belonging to Arnold's *Lacerta* part II since it has many characters in common with the other species of this group (e.g., small size, non-serrated collar, and special adaptations). The species of the *Lacerta* part II often have disjunct, fragmented ranges, which is indicative of a relict distribution and reduction of the area of total range (Arnold, 1973). This seems to be true for *Lacerta yassujica* (sp. nov.) as well, with its adaptations for living on the rocks. It is apparently restricted in distribution to the southern Zagros Mountains in southwestern parts of the Iranian Plateau.

The smaller lacertas of Iran (*Lacerta* part II, *sensu* Arnold) are currently considered to represent three evolutionary lineages: *Archaeolacerta*, *Apathya*, and *Lacerta brandtii*. In our material, *Lacerta brandtii esfahanica* (ssp. nov.) and *L. brandtii brand-*

Fig. 9. Type locality for *Lacerta zagrosica* at about 2450 m altitude in the main Zagros Range, 3 km northwest of Fereydun Shahr, about 140 km northwest of Esfahan city, Esfahan Province, west-central Iran (N 32°58′; E 50°04′).

tii represent all taxa of the *brandtii* group. *Lacerta yassujica*, together with *L. cappadocica*, make up the *Apathya* lineage, while the position of the remaining species, *L. zagrosica* is not clearly resolved.

The *Archaeolacerta*s (*Darevskia*, *sensu* Arribas 1999) are restricted to northern Iran (except *L. mostoufi*, which, however, might be synonymous with *L. chlorogaster*). Except *Lacerta defilippi* in the north (Kuh-e Sendan Dag), we could not find any representatives in the Zagros, or approaching the Zagros from the north.

According to Rastegar-Pouyani and Nilson (1998), *Lacerta zagrosica* is either (1) a relict of widely distributed lacertids, which invaded the region of the Zagros from the Mediterranean and northern Iran, or (2) it is one of the northernmost isolated and fragmented populations of an ancient group of lacertids that once were continuously distributed throughout southern parts of Iran. The occurrence of lacertas (*Omanosaura*) in the mountains of Oman could support this last pattern.

However, the picture of the relationship and the historical dispersal of the *Omanosaura* have been subject to speculations and hypotheses of various kinds in the literature. In a recent paper, Mayer and Bischoff (1996) summarized data concerning *Omanosaura* and considered it to be close to the Ethiopian and advanced Saharo-Eurasian clade (i.e., *Eremias*, *Ophisops*, *Mesalina*) (Arnold 1989, Mayer and Benyr 1994). However, Arnold (1989) also speculated in *Apathya* being close to *Omanosaura*, which was further supported by Arribas (1999).

Lacerta zagrosica could as well be close to the clades of *Apathya* and *Omanosaura* (*sensu* Arribas) and being well separated from the *danfordi* group and *Darevskia*. It could be possible that both the southern *Lacerta zagrosica* and *Lacerta* (*Apathya*) *yassujica* belong to closely related branches of lacertids, sharing a joint ancestral form together with *Omanosaura*. In addition, *Lacerta yassujica* and *Omanosaura cyanura* are very similar in color pattern. Thereby, the south and central Zagros lacertids fit in comparatively well with scenario 2 (*sensu* Rastegar-Pouyani and Nilson) above.

Oman and Iran were in contact across the Strait of Hormuz during the Quaternary (Kassler, 1973). The hypothesis that *Omanosaura* spread through the supposed bridge through the shallow Strait of Hor-

muz is to some extent supported by the above-mentioned morphological similarities between the *Omanosaura* species on the one hand and the new species, *Lacerta yassujica*, on the other. (This implies that separation at the generic level occurred as recently as the Quaternary.) This hypothesis is further supported by the vicariant pattern (e.g., *Assacus*, *Bunopus*, *Mabuya*, *Pseudocerastes persicus*, *Echis carinatus sochureki*) demonstrated to occur on both sides of the Persian Gulf (Arnold and Gallagher 1977).

In short, the present distributional patterns of the lacertids of the Zagros System (*Lacerta* part II) is the result of dispersal waves, along the Zagros as a distribution corridor, as well as vicariant events (e.g., mountain building phenomena) that occurred during the late Tertiary and Quaternary. This has led to fragmentation, isolation, and speciation in the ancestral lacertid(s). In other words, both dispersal and vicariance have been in effect in radiation, isolation, and subsequent evolution of the Zagros System small lacertas (*Lacerta brandtii*, *L. zagrosica*, *L. cappadocica*, and *L. yassujica*).

Acknowledgements. This work is a part of a larger study of Central Asian herpetofaunas, financed by the National Geographic Society to which we are very thankful. In addition, we thank the Razi and Sabzevar Universities, Iran for their generous support during fieldwork on the Iranian Plateau in 2000 and 2002.

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