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A new species of *Eremias* (Squamata: Lacertidae) from the arid mountains of Pakistan

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Abstract

A new, morphologically distinctive lacertid lizard of the genus *Eremias* (*Rhabderemias*) is described from the arid mountains of northwestern Balochistan Province in Pakistan. *Eremias kakari* **sp. nov.** has an isolated distribution and can be easily distinguished from all other species of mainly desert subgenus *Rhabderemias* (*E. andersoni, E. cholistanica, E. fasciata, E. lineolata*, *E. pleskei, E. scripta, E. vermiculata*). Apart from other differences, *E. kakari* **sp. nov.** can be distinguished from geographically close members of the subgenus *Rhabderemias* (*E. cholistanica, E. fasciata,* and *E. scripta*) by having a single row of subdigital lamellae and a complete row of lateral scales and hence three scales around the penultimate phalanx of 4th toe. The new species is morphologically (dorsal pattern) very similar to *E. fasciata* but can be distinguished from this species for having 22–26 subdigital lamellae under 4th toe, 48–55 dorsal scales across midbody, ventrals in 11–14 oblique longitudinal series across the belly, 17–21 femoral pores and 17–21 scales in the 9th–10th annulus posterior to the postcloacal granules. The new species is currently known only from the type locality situated in the Toba Kakar Range, near to Tanishpa village. However, we expect that *Eremias kakari* **sp. nov.** would have a broader range in northwestern Pakistan and southeastern Afghanistan. An identification key for the Pakistani *Eremias*, together with other remarks to the new species, is presented.

Key words: Afghanistan, Balochistan, *Eremias fasciata*, endemism, Palearctic region, *Rhabderemias*, Torghar Mountains.

Introduction

The genus *Eremias* Fitzinger, 1834 belongs to the tribe Eremiadini (Arnold 1989; Pyron *et al.* 2013) and comprises 38 species that inhabit steppe, desert and mountain habitats in the Eurasian region from Korean Peninsula, through China, Mongolia, Central and South Asia, Middle East to eastern Europe (Sindaco & Jeremčenko 2008; Rastegar-Pouyani *et al.* 2010; Guo *et al.* 2011; Orlova *et al.* 2017; Uetz *et al.* 2020). Based on morphological characters and hemipenial features, five subgenera are presently classified within *Eremias*: *Eremias* Fitzinger, 1834; *Rhabderemias* Lantz, 1928; *Aspidorhinus* Eichwald, 1841; *Scapteira* Fitzinger, 1834; *Pareremias* Szczerbak, 1973 (Ananjeva *et al.* 1998; Arnold 1986; Barabanov 2009; Chirikova 2004; Guo *et al.* 2010; Orlova *et al.* 2017). Despite of ongoing efforts to the distribution, taxonomy, phylogeny, and phylogeography of these lizards (Bedriaga 1912; Boulenger 1918, 1921; Lantz 1928; Nikolsky 1915; Strauch 1876; Szczerbak 1971, 1974; Guo *et al.* 2011; Orlova *et al.* 2017), the species diversity and taxonomy within the genus still remain understudied. Nevertheless, several new species supported by integrative taxonomical approach have been recently described from Iran or Central Asia (Rastegar-Pouyani *et al.* 2016; Orlova *et al.* 2017).

In Pakistan, six species of *Eremias* have been reported (Smith 1935; Minton 1966; Mertens 1969; Khan 2006; Baig & Masroor 2006; Masroor 2012) that are distributed mainly in the desert and sub-mountain regions of south-western, central and northeastern parts of the country. The genus is here represented by subgenera *Aspidorhinus*,

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Rhabderemias and *Scapteira*, including the following species: *Eremias* (*Scapteira*) *acutirostris* (Boulenger, 1887), *E.* (*Scapteira*) *aporosceles* (Alcock and Finn, 1896) and *E.* (*Rhabderemias*) *scripta* Strauch, 1867 all known only from the sand dunes in Nushki and Chagai districts along the Pakistan-Afghan border; the endemic Pakistani species *E.* (*Rhabderemias*) *cholistanica* Baig and Masroor, 2006 from the sandy habitats of Cholistan desert; *E.* (*Rhabderemias*) *fasciata* Blanford, 1874 and *E.* (*Aspidorhinus*) *persica* Blanford, 1874 from open plains and gravelly alluvium of southwestern Balochistan. Although, Boulenger (1921) reported *E. fasciata* from southwestern Balochistan, subsequent authors did not report this species from Pakistan (Lantz 1928; Smith 1935; Minton 1966; Mertens 1969; Khan & Ahmed 1987).

The territory of Pakistan is less studied in terms of diversity of Lacertidae compared to surrounding countries (Rastegar-Pouyani *et al.* 2010; Agarwal & Ramakrishnan 2017; Agarwal *et al.* 2017), and new finds are highly expected after comprehensive explorations. For the same reason, the initial impulse of this study was to explore the diversity of lacertids in Balochistan. We collected seven specimens of *Eremias* from Tanishpa village in Torghar Mountains (Killa Saifulla district, Balochistan) in September 2018. All the specimens strictly exhibited the striped pattern and contained morphological features clearly different from other known species of *Eremias* (*Rhabderemias*) bearing the striped pattern. We examined six additional formalin-preserved specimens, collected by our late colleague from the Pakistan Museum of Natural History in Islamabad, Khalid Javed Baig (1956–2006) from the same locality in May 1997. Using identification keys (Minton 1966; Anderson 1999; Rastegar-Pouyani *et al.* 2016), our examination of the collected specimens revealed that this population belongs to the subgenus *Rhabderemias* with morphological characters not attributed to any known species of the subgenus.

Materials and methods

Apart from six specimens available at the herpetological collection of Pakistan Museum of Natural History, Islamabad, (PMNH), we further conducted fieldwork during September 2018 in Tanishpa village, Torghar Conservancy (Killa Saifulla District, Balochistan) and collected seven specimens, referable to *Eremias* sp. (Tab. 1, Fig. 1). We examined these specimens for 39 morphological characters by recording their mensural, meristic and qualitative data, following Boulenger (1921), Lantz (1928), Szczerbak (1974), Rastegar-Pouyani *et al.* (2016) and Orlova *et al.* (2017). All measurements were carried out to the nearest 0.01 mm by using a digital vernier caliper. The scales were counted with the use of a stereomicroscope. Measurements of arms, legs, and head as well as scale counts beneath the toes were principally taken on the right side of the animal.

We took data of the following characters: SVL (snout-vent length, from the tip of snout to the anterior edge of the cloaca); TL (tail length, from the posterior edge of cloaca to the tip of the tail); TrL (trunk length, the distance from axilla to groin measured from posterior edge of forelimb insertion to anterior edge of hindlimb insertion); HL (head length, distance between snout-tip and retroarticular process of jaw); Lpil (length of pileus, from rostrum to the posterior border of parietals); NL (head length from snout tip to the anterior edge of collar, measured from ventral side); HW (head width, measuring widest part of the head); HH (head height, from occiput to underside of jaws); FrL (length of frontal scale); FrW (maximum width of frontal scale); SNL (length of supranasal suture); FNL (length of frontonasal); PFL (length of prefrontal); PFW (width of prefrontal); NSD (nostril to snout distance); HLL (hindlimb length, from hindlimb insertion to the tip of the longest toe); FLL (forelimb length, from forelimb insertion to the tip of the longest finger); HRL (length of humerus and radius, from forelimb insertion to palm, excluding the digits); FL (femur length, from hindlimb insertion to knee); CL (Crus length or tibia length, from the base of the heel to knee); LFPR (length of femoral pore row); LFPS (width of space between femoral pore rows); SL (supralabials); SLAS (number of supralabials anterior to subocular); IL (infralabials); G (gulars, from chin shields to the collar); DS (number of scales on midbody); VL (maximum number of scales across mid-belly in a single row in the widest part); VT (number of ventral scales in a single row from posterior edge of collar to the vent); FP (number of femoral pores); FPS (number of scales separating femoral pore rows); SDLT 4th (subdigital lamellae under 4th toe); SA4th (number of scales around 4th toe at penultimate phalanx); SDLF 4th (Subdigital lamellae under 4th finger); NCWS (scales around ninth and tenth caudal whorl posterior to the vent); FMIL (contact of fifth maxillary/chin shield with infralabial; in contact (+)/ separated (-)); SOM (subocular in contact with mouth; present (+)/ absent (-)); FSO (contact of frontal and supraoculars; in contact (+)/ separated (-)), INTR (contact of infranasal with rostral; in contact (+)/ separated (-)).

For morphological comparisons with species from subgenera *Rhabderemias*, *Eremias*, *Aspidorhinus,* and *Scapteira*, we used morphological data from their original descriptions as well as other relevant publications (Bedriaga 1912; Nikolsky 1915; Lantz 1928; Minton 1966; Anderson & Leviton 1967; Szczerbak 1974; Darevsky & Szczerbak 1978; Bischoff & Böhme 1980; Böhme & Szczerbak 1991; Anderson 1999; Rastegar-Pouyani & Rastegar-Pouyani, 2001; Baig & Masroor 2006). The material examined in the present study is provided in Appendix I.

Results

Genus *Eremias* Fitzinger, 1834

Subgenus *Rhabderemias* Lantz, 1928

***Eremias kakari* sp. nov.**
Suggested vernacular name: Kakar's Racerunner
Pashto name: داکاکړ وسوسومار
(Figs. 2–5)

Holotype. PMNH 842, an adult male, collected from Tanishpa village, Torghar Mountains, Killa Saifulla district, Balochistan (31.1869º N, 68.4126º E; Fig. 1), elevation 2,506 m a.s.l., May 24, 1997, leg. Khalid Javed Baig (Fig. 2).

Paratypes. All paratypes were collected from the same locality as the holotype. PMNH 840, 844, 845 (males) and 843, 846 (females), leg. Khalid Javed Baig (PMNH 843–844, collected along with the holotype; PMNH 845–846, collected on May 25, 1997; PMNH 840, collected on May 26, 1997). PMNH 4092–4097 (subadults), collected on September 09, 2018, leg. Rafaqat Masroor. PMNH 4048, adult male, collected on September 01, 2018, leg. Muazzam Ali Khan (Figs. 3 & 4).

Generic and subgeneric placement. A member of the genus *Eremias*, based on the following combination of morphological characters: head shields normal, but occipital often vestigial or absent; nostril between three or four nasals, not touching labial; lower eyelid scaly; collar complete or nearly so; dorsal scales small or granular, subimbricate or juxtaposed; ventral plates subquadrangular, imbricate, smooth in converging longitudinal rows; digits with or without lateral fringes; tail cylindrical; femoral pores present (except in *E. aporosceles*, which is considered a synonym of *E. acutirostris* by Szczerbak (1974). Furthermore, *E. kakari* **sp. nov.** is assigned to the subgenus *Rhabderemias* based on the following combination of morphological characters sensu Lantz (1928: 37): subocular in contact with the edge of the mouth; striped dorsal pattern in young individuals is retained in adults.

Diagnosis. A medium-sized lacertid lizard, maximum snout-vent length (SVL) = 52.2 mm, tail being 1.9 to 2.2 times longer than body length (SVL), hindlimbs relatively long (HLL/SVL ratio 0.58–0.66); subocular scale reaching to the edge of the mouth, 5–7 (mainly 6) supralabials anterior to subocular; dorsals 48–55; ventrals in 11–14 oblique longitudinal series; frontal mostly separated from supraoculars or in few instances in contact with anterior large supraocular only; height of the first two to three transverse rows of ventral scales in pectoral region more than its breadth; 17–21 femoral pores on each side, separated medially by 4–5 scales, the space between the femoral pores about one–fourth or less than one–fourth length of each row; toes without fringe, encircled by three scales and with a single series of 22–26 unicarinate scales underneath. Hindlimbs reach to the base of collar in males and to the axilla of forelimbs in females. Color creamy beige in life with eight dark brown stripes on body dorsum (including the narrow stripes on flanks) and an additional short median stripe (nuchal) originating from the junction of parietals.

Etymology. The species is dedicated to the "Kakar" tribe of Pashtun people inhabiting the Torghar Mountains in the Toba Kakar Range where the holotype and paratypes were collected.

Description of holotype. SVL: 52.2, TL: 115.0, HL: 14.0, HW: 8.1, HH: 6.7, Trl: 23.1, HLL: 34.5, FLL: 19.0, FrL: 3.7, FrW: 1.7. An adult male preserved in formalin in a good state of preservation (Fig. 2); head and body moderately depressed; tail long, ca. 2.2 times longer than the body, cylindrical and depressed at the base. Head relatively long (HL/SVL ratio 0.27) (Fig. 2C), 1.7 times longer than wide (HW/HL ratio 0.57), head height slightly less than head width (HH/HW ratio 0.82). Limbs strong, hindlimbs slightly less than two times the length of forelimbs (FLL/HLL ratio 0.55), hindlimbs comprise more than half of the body length (HLL/ SVL ratio 0.66).

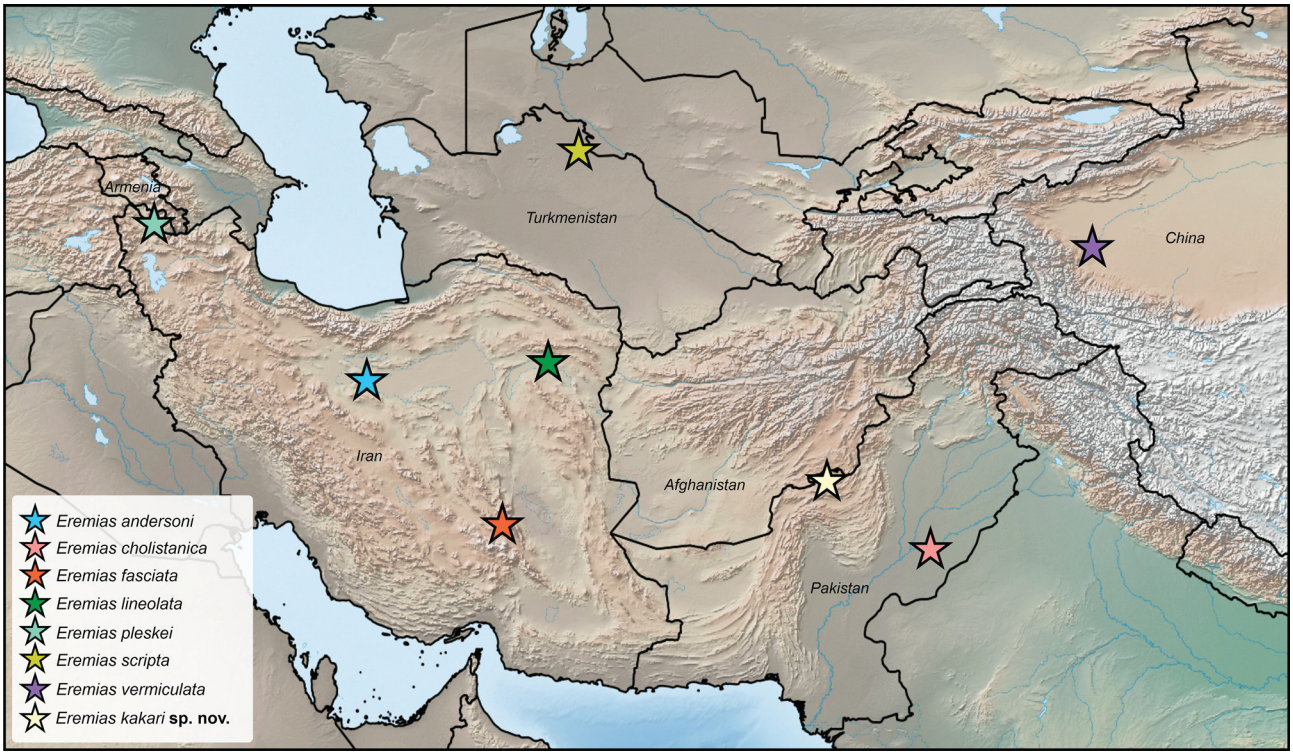

FIGURE 1. The type localities of the members of the subgenus *Rhabderemias* including the new species, *Eremias kakari* **sp. nov.**

Head broader than the neck. Anterior head shields including frontoparietals, interparietal and parietals smooth and convex. Nasals moderately swollen, three nasals, the lower in contact with three supralabials and separated from the rostral (Fig. 2D). Supranasals in contact slightly behind rostral, the suture between them is less than half the length of frontonasal, whose breadth is more than its length; prefrontals forming median suture, slightly longer than broad; length of frontal about equal to its distance from the tip of the snout, about two times as broad as long, narrow behind; parietals smooth, as broad as long; interparietal smooth, slightly more than half of the length of frontoparietals; no occipital. Two large supraoculars, about equal in size, the space anterior to supraoculars filled by several small and four larger granules; a third small, transverse, wide supraocular also present posterior to larger ones; anterior supraocular in contact with frontal while separated from supraciliaries by two series of granules, the second large supraocular separated from frontal by a scale (Fig. 2C); five supraciliaries, first longest, longer than its distance from the second loreal. Rostral pentagonal, broader than high, narrower beneath than above; anterior loreal slightly higher than wide, shorter than the second which is longer than high; supralabials 10; subocular keeled just below the eye, bordering the mouth, wedged between seventh and eighth supralabials on right side and between sixth and seventh on the left side (Fig. 2D). Temporals smooth, a large scale above ear; auricular denticulation indistinct or four small scales forming slight denticulation anteriorly. Lower eyelid covered with numerous small semi-transparent scales.

Six infralabials, gradually decreasing in size posteriorly. Five pairs of chin shields; anterior three completely in contact, the fourth one separated by four comparatively larger gulars, fifth not in contact with infralabials, separated by a single row of scales. Collar curved, free, serrated and composed of eight plates larger than adjacent gulars, the middle one quite enlarged than others. Gular fold distinct, 25 gular scales in a straight line between the symphysis of the chin shields and the collar (Fig. 2B).

Dorsal scales granular, smooth, 52 across the middle of the body. Ventral plates broader than long (except for outermost series), forming oblique longitudinal series of 12 plates across mid-belly and 32 transverse rows counted from behind collar to vent; first three rows of ventral scales in the pectoral region behind collar longer than broad, the first row is twice as long as broad. Precloacal region with an enlarged median plate just above the vent, surrounded by six large scales.

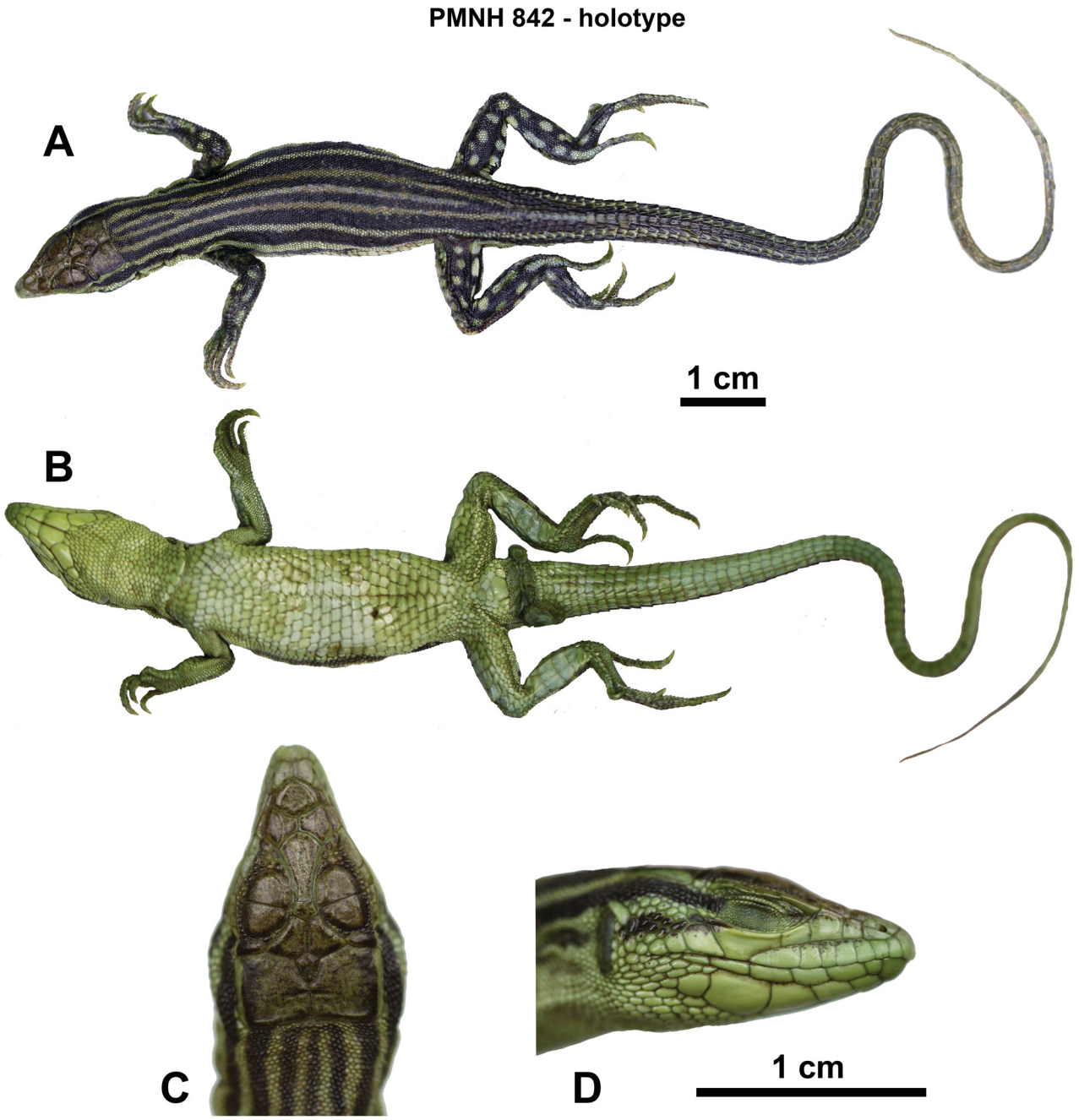

FIGURE 2. The holotype of *Eremias kakari* **sp. nov.** PMNH 842: A—dorsal view; B—ventral view; C—dorsal head view; D—lateral head view.

Foot longer than head, upper surface of the arm with rhombic, smooth scales. Scales on the upper surface of hindlimbs similar to dorsals, varying in size; enlarged plates covering the lower surface of hindlimbs, the lower surface of tibia with one row of very large and one comparatively smaller plates, hindlimb reaches the collar; 18 femoral pores on each side, the two series separated by four scales, the interfemoral space not greater than one–fourth length of each row. Toes slender, compressed, with no fringe. Subdigital lamellae unicarinate, in a single row of 22 scales under the 4th toe, a total of three scales around 4th toe. Upper caudal scales oblique, truncate, strongly and diagonally keeled, 18 scales in the 9th–10th annulus behind the postcloacal granules.

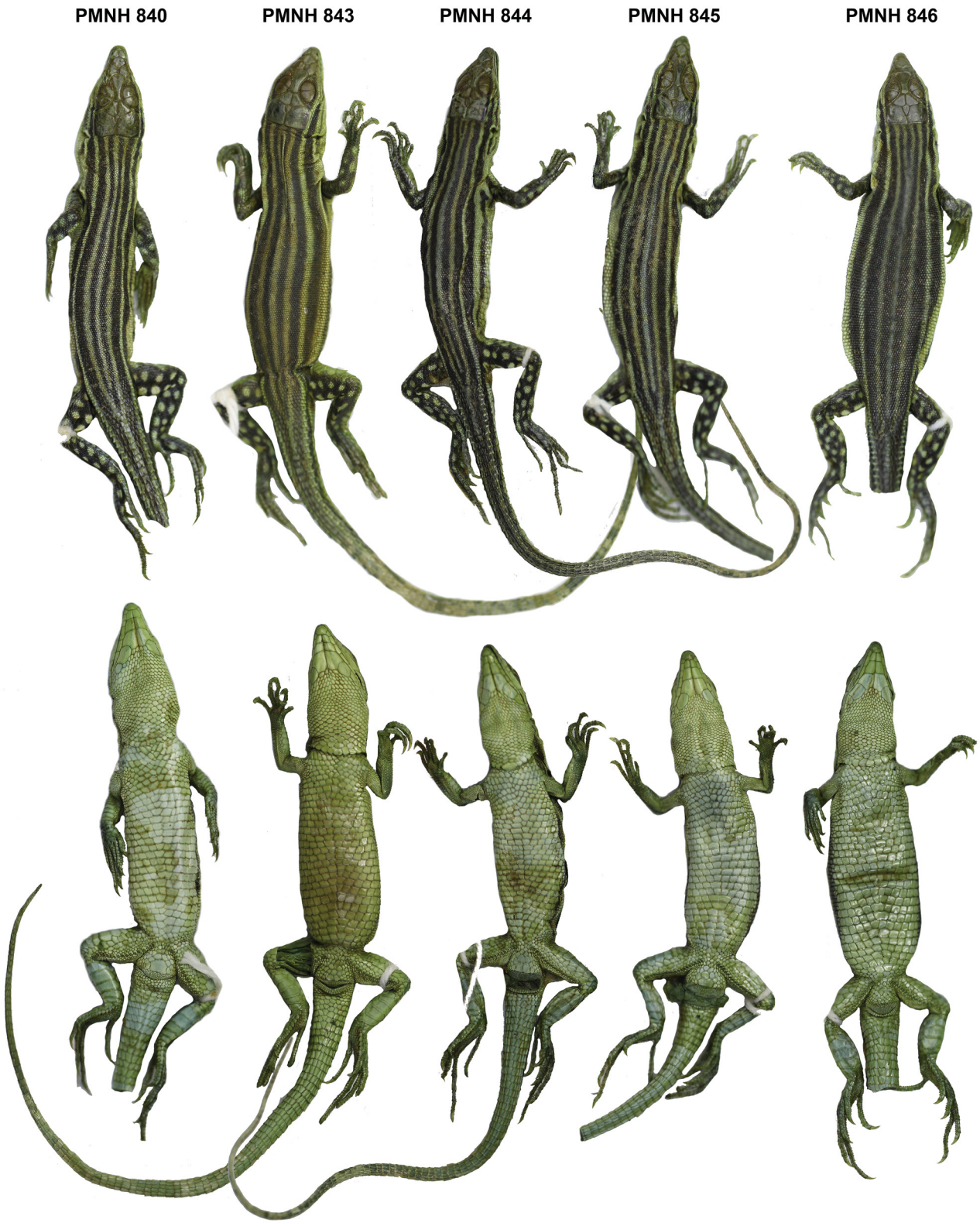

FIGURE 3. Paratypes of *Eremias kakari* **sp. nov.** PMNH 840, 843–846 dorsal (above) and ventral (below) view.

Coloration in life. Color creamy beige in life with eight dark brown longitudinal stripes on body dorsum (including the two narrow stripes on flanks) and an additional short median stripe (nuchal) originating from the junction of parietals; seven stripes appear on the neck, the nuchal stripe runs for a short distance on the neck and disappears on shoulders; the two lateral-most stripes (not of flanks) on each side of the body broader, the two

paravertebral stripes narrower; the first lateral-most broader stripe next to flank stripe originates from behind eyes and runs along with one-third of the tail, the other broader stripe originates from the outer edge of the parietal and continues onto tail slightly behind the vertebral stripes; the two paravertebral stripes join behind the base of tail; the stripe at flank on each side starts from behind the lower eye, runs through the ear and above forelimb to the insertion of hindlimb; head gray without any markings or spots; labials white without any markings except the lower edges of the supralabials which are dark brown; a faint dark brown line from nostril to the eye; limbs dark gray with white ocelli; belly creamy white; tail bluish gray.

FIGURE 4. Paratypes of *Eremias kakari* **sp. nov.** PMNH 4048, 4092–4097 dorsal (above) and ventral (below) view.

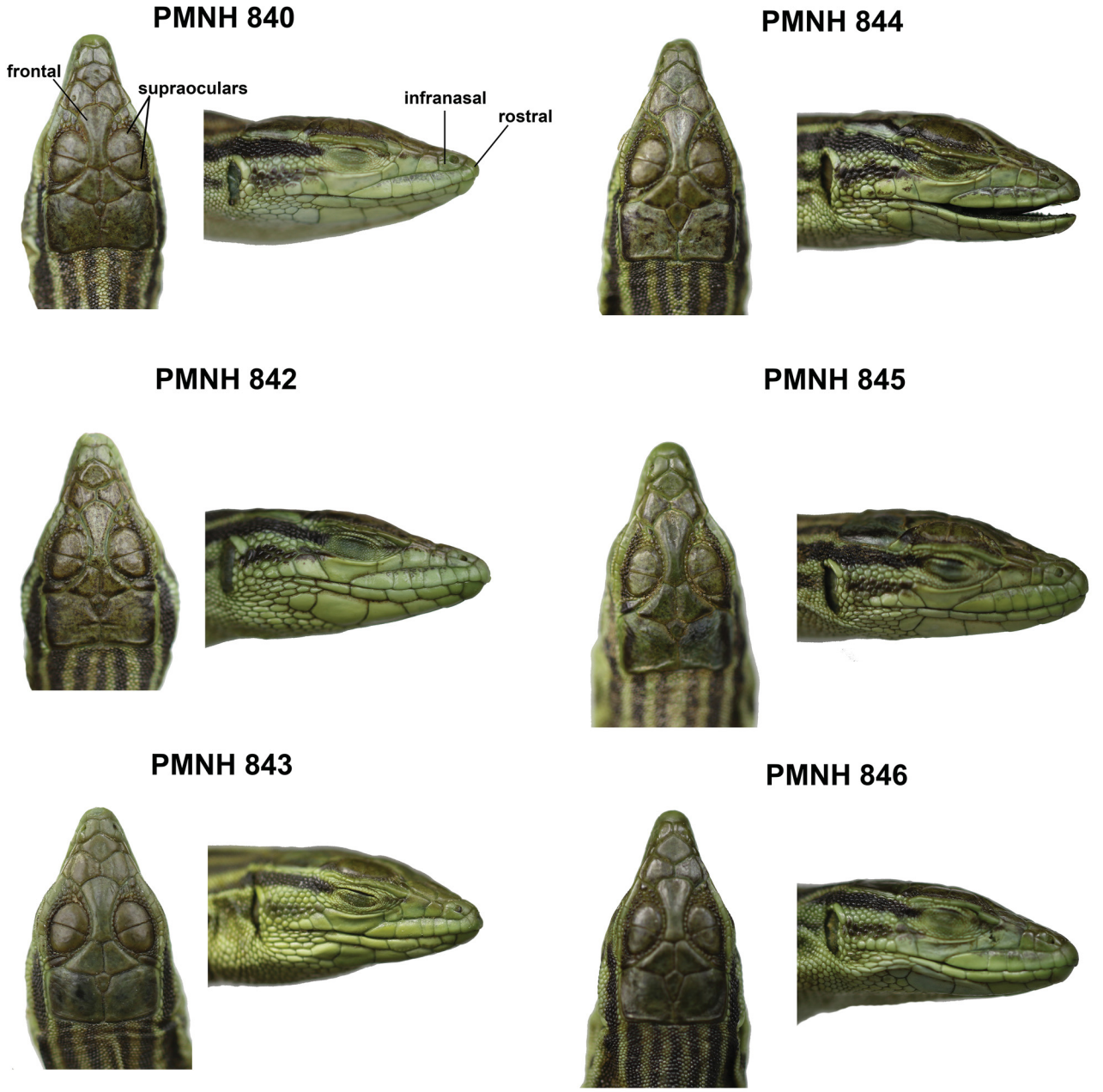

FIGURE 5. Paratypes of *Eremias kakari* **sp. nov.** PMNH 840, 842–846 showing the dorsal and lateral head view. Note the variations in arrangement of frontal, supraoculars, infranasal and rostal.

Variation. Paratypes agree with the holotype with some differences given in Table 1 (Figs. 3 & 4). Besides sex, the specimens differ in the arrangement of supralabials i.e. subocular wedged between 6th–7th in all the type series except PMNH 845 which exhibit the wedge between 7th–8th supralabials and PMNH 4095 bearing the wedge between 5th–6th supralabials; arrangement of postmentals have dissimilar pattern to that of holotype. In PMNH 843–46, 4048, 4092–94 and 4096–97, the fifth chin shield is in contact with the infralabials, the rest of the type series do not have such contact. In PMNH 843 and 846, the fifth postmental shield is in contact with 5th supralabial whereas in PMNH 840 and 844 the fifth chin shield is in narrow contact with 7th supralabial. In PMNH 845, however, the fifth postmental shield contacts the 6th supralabial. The scale count pertaining to dorsals, ventrals, gulars, collars, caudals at 9th–10th whorl and lamellae under 4th toe, however, show a unique value for every specimen within a certain range. The contact of infranasal with the rostral is also variable, for example there is contact of infranasal to rostral in PMNH 846, 4048, 4092–93 while the rest lacks such contact (Fig. 5). Whereas majority of the specimens

(PMNH 843, 846, 845, 4092–97) exhibit separation of supraoculars and frontal by a row of granules, the holotype PMNH 842 and paratypes PMNH 840, 844 and 4048 do not bear granules between the anterior supraocular and frontal so that the frontal meets the anterior supraocular only (Fig. 5). In paratypes PMNH 840, 845 and 4048, the median short nuchal stripe is not present.

Sexual and age dimorphism. Apparently, males attain larger sizes than females in *E. kakari* **sp. nov.**: male SVL to 52.2 mm, female SVL 47.5 mm. Moreover, males have generally longer hindlimbs and shorter trunk as compared to females. For a larger female having SVL of 47.5 mm (PMNH 846), the hindlimb is 27.8 mm against a smaller-sized male (PMNH 840, SVL 46.8 mm) which has a hindlimb length of 29.4 mm. Similarly, the trunk length of a smaller female (PMNH 846, SVL 47.5 mm) is 24.1 mm against a larger male (PMNH 842, SVL 52.1 mm) which has a trunk length of 23.1 mm. The dorsal body color and pattern are, however, similar in juveniles and adults of both genders (Fig. 6A, B).

FIGURE 6. Live individuals of *Eremias kakari* **sp. nov.** in type locality: A—paratype PMNH 4048, adult, male; B—paratype PMNH 4092, subadult.

Comparison. The new species *Eremias kakari* **sp. nov.** differs from morphologically closely related species in the subgenus *Rhabderemias* (*E. andersoni* Darevsky & Szczerbak 1978, *E. cholistanica*, *E. fasciata*, *E. lineolata* Nikolsky 1897, *E. pleskei* Nikolsky 1905, *E. scripta, E. vermiculata* Blanford 1875) whose members exhibit the striped dorsal pattern in juveniles as well as in adults. The new species is strikingly different from species exhibiting striped and ocellate pattern like *E. aria* Anderson & Leviton 1967, *E. regeli* Bedriaga 1905 and *E. montana* Rastegar-Pouyani & Rastegar-Pouyani 2001 (see published data in Lantz, 1928; Szczerbak 1974; Bischoff & Böhme 1980; Böhme & Scerbak 1991; Anderson 1999). A brief of morphological differences is provided (the material used for a first-hand comparison is listed in parentheses at each species; see also Tab. 2 and Supplementary Tab. 1).

From *E. fasciata*, that is very close in dorsal coloration and pattern, *E. kakari* **sp. nov.** differs in having a single row of subdigital lamellae and a complete row of pointed lateral scales and hence three scales around the penultimate phalanx of 4th toe (*versus* two complete rows of subdigital lamellae, a complete row of sharply pointed lateral scales and hence four scales). The collar in *E. kakari* **sp. nov.** is provided with 7–10 enlarged plates (*versus* 11–19 small scales or plates barely distinguishable from adjacent gulars), 22–26 subdigital lamellae under 4th toe (*versus* 28–30), 48–55 dorsal scales across midbody (*versus* 44–50), ventrals in 11–14 oblique longitudinal series across the belly (*versus* 14–16), 17–21 femoral pores (*versus* 16–19) and 17–21 scales in the 9th–10th annulus posterior to the postcloacal granules (*versus* 26–36). Moreover, the adpressed hindlimbs in *E. kakari* **sp. nov.** reach to the base of the collar in males and to the axilla of forelimbs in females. While in *E. fasciata* the hindlimbs reach to the ear in males, the shoulder, the collar, or between the collar and the ear in females.

FIGURE 7. The type locality and habitat of *Eremias kakari* **sp. nov.** near the Tanishpa village, Toba Kakar Range: A—cultivated orchards along the type locality; B—type locality of *E. kakari* **sp. nov.**

TABLE 1. Morphometric and meristic data of the type series of *Eremias kakari* **sp. nov.** including ratios of important characters. For abbreviation of characters, see material and methods (NA = data not available, + = in contact, - = separated).

PMNH	**842**	**840**	**843**	**844**	**845**	**846**	**4048**	**4092**	**4093**	**4094**	**4095**	**4096**	**4097**
Sex	**holotype male**	**paratype male**	**paratype female**	**paratype male**	**paratype male**	**paratype female**	**paratype male**	**paratype subadult**	**paratype subadult**	**paratype subadult**	**paratype subadult**	**paratype subadult**	**paratype subadult**
Metric data													
SVL	52.2	46.8	40.7	49.1	50.1	47.5	42.0	32.8	31.3	28.5	31.5	29.7	29.0
TL	115.0	NA	80.5	99.5	NA	NA	90.2	68.5	62.5	58.5	67.8	57.5	60.0
TL/SVL	2.2	NA	2.0	2.0	NA	NA	2.1	2.0	2.0	2.0	2.1	1.9	2.0
HL	14.0	13.0	11.1	13.5	13.2	11.3	11.1	8.4	8.3	8.1	8.0	8.5	7.7
HW	8.1	7.7	6.6	7.4	8.0	6.6	5.7	4.7	4.2	4.2	4.5	4.3	4.0
HL/HW	1.7	1.7	1.7	1.8	1.6	1.7	1.9	1.8	1.9	1.9	1.7	1.9	1.9
HH	6.7	5.4	5.1	5.7	6.2	4.9	4.4	3.4	3.0	2.8	3.2	3.0	3.1
HL/SVL	0.27	0.28	0.27	0.27	0.26	0.24	0.27	0.25	0.26	0.28	0.25	0.28	0.26
TrL	23.1	18.7	19.1	20.2	22.8	24.1	19.3	15.9	13.3	13.6	13.3	12.7	12.6
TrL/SVL	0.44	0.40	0.47	0.41	0.46	0.51	0.46	0.48	0.42	0.47	0.42	0.43	0.43
HLL	34.5	29.4	25.7	31.5	32.2	27.8	27.6	21.5	19.6	19.0	19.6	19.4	18.9
FL	10.0	7.6	7.0	8.2	9.2	7.3	7.4	6.0	5.3	5.1	5.8	5.3	4.9
CL	10.6	9.3	9.0	10.6	10.8	9.7	8.5	7.0	6.0	6.2	6.3	6.0	5.8
HLL/SVL	0.66	0.62	0.63	0.64	0.64	0.58	0.65	0.65	0.62	0.66	0.62	0.65	0.65
FLL	19.0	18.6	14.9	18.1	19.1	15.1	16.3	13.7	11.3	12.0	11.3	11.3	11.3
HRL	11.0	10.1	9.9	10.4	11.0	9.0	9.0	7.2	6.5	6.1	6.1	5.8	5.9
LFPR	9.5	8.1	7.5	9.4	9.6	8.0	7.3	5.8	4.8	4.5	5.6	5.2	5.2
LFPS	2.3	1.7	2.2	1.5	1.9	2.0	1.5	1.0	1.1	1.1	1.0	1.3	1.1
FrL	3.7	3.6	3.0	3.7	4.1	3.4	2.8	3.0	2.4	2.5	2.5	2.4	2.5
FrW	1.7	2.0	1.7	2.0	2.0	1.8	1.5	1.5	1.2	1.3	1.3	1.2	1.3
Lpil	12.1	11.5	9.6	12.0	12.1	10.4	9.8	8.2	7.5	7.7	7.8	7.5	7.7
NL	17.2	17.7	13.8	16.1	17.2	14.2	14.2	11.5	10.8	10.2	11.3	10.8	11.3
SNL	0.6	0.7	0.7	0.6	0.7	0.7	0.5	0.5	0.4	0.3	0.4	0.5	0.6
FNL	1.5	1.3	1.2	1.7	1.5	1.4	1.1	1.0	1.0	1.0	1.1	1.0	1.0
PFL	1.7	1.8	1.7	2.0	2.2	1.6	1.1	1.1	1.1	1.2	1.2	1.2	1.1
PFW	1.3	1.3	1.3	1.3	1.5	1.3	1.1	0.9	0.9	1.0	0.9	1.0	1.1

TABLE 1. (Continued)

PMNH	**842**	**840**	**843**	**844**	**845**	**846**	**4048**	**4092**	**4093**	**4094**	**4095**	**4096**	**4097**
Sex	**holotype male**	**paratype male**	**paratype female**	**paratype male**	**paratype male**	**paratype female**	**paratype male**	**paratype subadult**	**paratype subadult**	**paratype subadult**	**paratype subadult**	**paratype subadult**	**paratype subadult**
Meristic data													
SL	10	9	9	9	10	10	9	9	9	9	9	9	9
IL	6	8	5	7	7	5	7	7	7	7	7	8	7
DS	52	50	54	54	52	50	48	53	55	50	55	51	52
VL	12	14	13	14	12	12	11	13	13	13	13	12	12
VT	32	29	30	31	28	33	30	32	31	31	29	31	31
G	25	23	22	24	25	24	22	25	22	20	24	25	25
C	8	10	10	7	10	8	7	9	8	7	8	8	7
NCWS	18	18	20	20	20	20	18	18	17	18	20	17	21
SLAS	6	6	6	6	7	6	6	6	6	6	5	6	6
FP	18	17	17	18	20	18	17	18	18	17	19	18	21
FPS	4	5	5	4	4	5	5	5	4	5	4	3	4
SDLT 4th	22	25	24	24	26	24	22	23	23	22	23	23	25
SA 4th	3	3	3	3	3	3	3	3	3	3	3	3	3
SDLF 4th	17	16	18	16	17	17	16	16	15	15	15	16	14
Qualitative data													
FMIL	-	-	+	+	+	+	+	+	+	+	-	+	+
SOM	+	+	+	+	+	+	+	+	+	+	+	+	+
FSO	+	+	-	+	-	-	+	-	-	+	-	-	-
INTR	-	-	+	-	-	+	+	+	-	+	-	-	-

TABLE 2. Comparison of morphological characters between *Eremias kakari* **sp. nov.** and closely related species in the subgenus *Rhabderemias*. For abbreviation of characters, see material and methods (NA= data not available, + = in contact, - = separated).

Species name	Source	Number of specimens	Max. SVL in mm	DS	VL	**VT**	**G**	**NCWS**	**SAT 4th**
E. kakari **sp.nov.**	This study	13	52.2	48–55	11–14	28–32	21–25	17–21	3
E. andersoni	Darevsky & Szczerbak 1978	3	40.0	56–58	13–14	28–29	28–30	26–28	3
E. cholistanica	Baig & Masroor 2006	26	53.0	51–63	13–15	30–36	20–24	27–35	4
E. fasciata	Anderson 1999; Baig & Masroor 2006; Nikolsky 1915	NA	65.0	44–50	14–16	29–36	21–30	26–36	4
E. lineolata	Anderson 1999; Baig & Masroor 2006; ; Boulenger 1921; Lantz 1928	NA	55.0	54–62 (Boulenger 1921)	12–14	26–35	18–30; 21–26 (Lantz 1928)	12–17	3
E. scripta	This study	3	66.0	55–69	14–16	25–33	15–23	17–28	4
E. pleskei	Anderson 1999; Nikolsky 1915	NA	60.0	48–63	NA	28–35	25–31	20–32	NA
E. vermiculata	Bedriaga 1912; Boulenger 1921	NA	65.0	55–68; 59–71 (Bedriaga 1912)	18–20	36–38; 35–39 (Bedriaga 1912)	38–39; 31–43 (Bedriaga 1912)	42–46	3

continued.

Species name	**SDLT 4th**	**FP**	**FPS**	**SOM**	**Dorsal color pattern of adult**	**Distribution**
E. kakari **sp.nov.**	22–26	17–21	4–5	+	striped	NW Balochistan, Pakistan; only type locality
E. andersoni	32	15–16	NA	+	striped	NW Iran; only type locality
E. cholistanica	23–30	14–18	2–4	+	striped	NE Pakistan; only type locality
E. fasciata	28–30	16–19	4	+	striped	E Iran, SW Afghanistan, SW Pakistan?
E. lineolata	NA	9–17	NA	+	striped	Turkmenistan, Uzbekistan, Tajikistan, S Kazakhstan, NE Iran, NW Afghanistan
E. scripta	NA	12–13	NA	+	striped	S Kazakhstan, Turkmenistan, NE Iran, Afghanistan, SW Pakistan, SE Uzbekistan, SW Tajikistan, Kyrgyzstan
E. pleskei	NA	7–15	6–8	+	striped	NW Iran, Armenia, Azerbaijan, NE Turkey
E. vermiculata	24–26	20–23; 17–24 (Bedriaga 1912)	NA	+	Striped and vermiculate	Mongolia, NW China, SE Kazakhstan

Eremias kakari **sp. nov.** differs from *E. andersoni*, to which it is similar in having three scales around the penultimate phalanx of 4th toe, by having lower count of dorsal scales (48–55 *versus* 56–58), gular scales (20–25 *versus* 28–30), frontal separated from supraoculars by a row of granules or in few instances only in contact with anterior supraocular (*versus* both the supraoculars in contact with frontal) and dorsal coloration of eight uninterrupted dark longitudinal stripes on the body (*versus* nine dark longitudinal stripes, of which medial stripes breaks into wavy segments).

From *E. lineolata*, *E. kakari* **sp. nov.** differs in the following morphological characters: lateral scales of 4th toe not forming distinct fringe (*versus* lateral scales of 4th toe forming distinct fringe in *E. lineolata*), lower count of dorsals (48–55 *versus* 54–62), higher number of caudal scales in the 9th–10th annulus behind the postcloacal granules (17–21 *versus* 12–17) and femoral pores (17–21 *versus* 9–17) and has two stripes on the flanks (*versus* no stripes on flanks).

Eremias kakari **sp. nov.** differs from *E. scripta* in having three scales around the penultimate phalanx of 4th toe (*versus* four), lateral scales of 4th toe not forming fringe (*versus* lateral scales of 4th toe forming distinct fringe or comb in its entire length), rows of femoral pores reach to the knee (*versus* femoral pores well short of knee), lower number of dorsal scales (48–55 *versus* 55–69), ventrals across belly (11–14 *versus* 14–16) and the higher number of gulars (20–25 *versus* 15–23) and femoral pores (17–21 *versus* 12–13). Besides, the dorsal color pattern of *E. kakari* **sp. nov.** can be easily differentiated from *E. scripta* in having the striped dorsal pattern in juveniles as well as in adults compared to the reticulate pattern on dorsum in juveniles and adults in the latter species.

Eremias kakari **sp. nov.** can be distinguished from *E. pleskei* in having strongly keeled supracaudal scales (*versus* smooth), femoral pores narrowly separated by four to five scales (*versus* comparatively widely separated by six to eight scales), the space between the femoral pore rows about one-fourth or less (*versus* space at least one-third length of each row), lower number of gulars (20–25 *versus* 25–31), caudal scales in the 9th–10th annulus (17–21 *versus* 20–32) and the higher number of femoral pores (17–21 *versus* 7–15).

Apart from its peculiar distribution in the remote valley in Torghar Mountains, a part of the Palearctic region, *E. kakari* **sp. nov.** can be differentiated from *E. cholistanica* in the following set of characters: no fringe at toes (*versus* fringes at toes), three scales around the penultimate phalanx of 4th toe (*versus* four), generally lower number of ventrals across the belly (28–33 *versus* 30–36), caudal scales in the 9th–10th annulus (17–21 *versus* 27–35) and the higher number of femoral pores (17–21 *versus* 14–18).

From *E. vermiculata*, *E. kakari* **sp. nov.** differs in dorsal body pattern, having no fringes on the 4th toes (*versus* fringes), ventrals in 11–14 oblique longitudinal series across the belly and 28–32 transverse rows (*versus* 18–20 and 38–39, respectively), lower count of gulars (20–25 *versus* 31–43), dorsals (48–55 *versus* 55–68) and caudal scales in the 9th–10th annulus (17–21 *versus* 42–46).

From *E. regeli*, *E. kakari* **sp. nov.** differs in having a single row of subdigital lamellae and hence three scales around the penultimate phalanx of 4th toe (*versus* two rows of subdigital lamellae and hence four scales), higher count of gulars (20–25 *versus* 17–21), length of each femoral pore row about four times or more than four times the length of space between two rows (*versus* nine times), lower count of femoral pores (17–21 *versus* 21–24), supracaudals strongly keeled (*versus* moderately keeled) and striped dorsal body pattern (*versus* striped and ocellate pattern).

Besides distant distribution, body pattern and other decisive morphological characters, *E. kakari* **sp. nov.** can be distinguished from the geographically close species of other subgenera (*E.* (*Scapteira*) *acutirostris, E.* (*Eremias*) *aria, E.* (*Aspidorhinus*) *afghanistanica* Böhme & Scerbak 1991) by subocular scale bordering the mouth (Supplementary Tab. 1).

Type locality, habitat and ecological notes. The type locality, Tanishpa, is a small village situated in the Torghar Mountains (means "Black Mountains") in the Toba Kakar Range, a southern offshoot of the Himalayas, ca. 60 km from the border with Afghanistan (Fig. 1). The Torghar Mountains are very rugged semi-arid sandstone ridges with an average elevation of 2,400 m and is approximately 90 km long and vary from 15 to 30 km in width. This region is characterized by having dry temperate ecology, with sparse vegetation. The climate of the area is dry, with cold winters (an average mean temperature of 4°C) and warm summers (an average mean temperature 26 °C). Heavy snow often falls in winter and violent thunderstorms and dust storms occur in summer. The area receives very little precipitation with recorded annual precipitation between 180 mm and 270 mm (Superintendent of Government Printing, 1991). An occasional drought cycles are experienced which severely affect the flora and fauna of the region (Raja, 2000). Shrub-steppe plant communities dominate the semi-desert landscape of the Torghar Hills.

Bunchgrasses, forbs, *Ephedra* sp., *Artemisia* sp., and other shrubs occur on the upland slopes. *Cargana ambigua* and *Tamarix* sp. grow in low lying areas and streambeds where water is available. Although trees are scarce yet wild olive (*Olea europea cuspidata*), juniper (*Juniperus excelsa*), wild pistachio (*Pistacia khinjuk*), almond (*Prunus brahuica*) and ash (*Fraxinus xanthoxyloides*) are scattered across the lower slopes, and orchids are cultivated where water is sufficiently available (Woodford *et al.* 2004). Overgrazing of the valleys has led to the establishment of xerophytic scrub vegetation dominated by *Acacia, Artemisia, Haloxylon,* and *Rosa* species (Frisina *et al.*, 1998, 2002). The different mammals as *Capra falconeri megaceros*, *Ovis orientalis cycloceros, Canis lupus, Otocolobus manul, Felis silvestris ornate*, *Hyaena hyaena*, *Vulpes vulpes, Martes foina*, and number of small mammals, as *Ochotona rufescens* or *Ellobius fuscocapillus* and over 78 bird species have been reported from the area. The area is rich in reptiles, including the endemic species *Laudakia melanura nasiri* and *Cyrtopodion rhodocauda*. Other recorded species in the vicinity of the type locality were: *Testudo horsfieldii*, *Microgecko* sp., *Cyrtopodion watsoni*, *Hemidactylus persicus*, *Phrynocephalus scutellatus, Ablepharus pannonicus*, *Eremias* cf. *persica*, *Laudakia microlepis*, *Trapelus isolepis, Platyceps rhodorachis*, *Psammophis schokari, Ptyas* cf. *mucosa*, *Macrovipera lebetina obtusa*, *Pseudocerastes persicus*.

All the specimens were collected between 10:00 to 12:00 am. The specimens were quite active and were difficult to collect. Specimens were caught at the foothills in the barren area with man-made low walls, flanked by the cultivated orchards. Generally, the soil of the type locality is loamy, provided with herbaceous cover and occasionally shrubs and wild olive trees (Fig. 7).

Identification key to the Pakistani species of the genus *Eremias* (modified from Rastegar-Pouyani *et al.* (2016)

1.	Subocular bordering mouth	2
-	Subocular not bordering mouth	*E. acutirostris*
2.	A complete row of lateral scales of the 4th toe forming a distinct fringe or comb on its entire length	3
-	Lateral scales of 4th toe not forming distinct fringe	4
3.	Row of femoral pores reaches well short of knee; the median dark dorsal stripes interrupted and form reticulate pattern	*E. scripta*
-	Row of femoral pores reaches to knee; dorsal stripes without any sign of vermiculation	*E. cholistanica*
4.	Back with 5–11 dark stripes, broader than interspaces, none of the stripes containing light ocelli or spots; stripes persistent in adults, but sometimes indistinct so that back appears almost uniform sandy; usually only single median collar scale distinctly larger than adjacent gulars	5
-	Light ocelli or spots on upper flanks (rare exception), dark stripes of juvenile breaking up in adults to form spots or broken lines; usually several collar scales distinctly larger than adjacent gulars; Adults with more or less distinct rows of dark spots on dorsum between dorsolateral dark stripes, the latter usually with white spots in a single row within each stripe; distal portion of tail bluish in juveniles (in life)	*E. persica*
5.	4th toe with two complete rows of subdigital scales and a complete row of sharply pointed lateral scales, i.e., total of 4 scales counted around penultimate phalanx	*Eremias fasciata*
-	4th toe with one complete row of subdigital scales and a complete row of lateral scales, i.e., total of three scales counted around penultimate phalanx	*E. kakari* **sp. nov.**

Discussion

Boulenger (1921) examined three specimens of *E. fasciata* from Pakistani Balochistan: a single male specimen from Kohak and two female specimens from Kharan. All the specimens were unvouchered and probably lost. The subsequent authors relied on these records of *E. fasciata* for the purpose of making their checklists or identification keys of the reptiles of Pakistan (Minton 1966; Khan 2006). Lantz (1928) examined 22 specimens of *E. fasciata*, all originating from Iran. Smith (1935) mentioned the presence of five species of *Eremias* from the present-day Pakistan referring to Boulenger (1921): *E. fasciata* from Balochistan (Kharan and Kohak) and today's Khyber Pakhtunkhwa (Dera Ismail Khan and Wana); *E. scripta* from Balochistan (between Soru and Darband in Chagai District); *E. acutirostris* from Balochistan (Nushki and Chagai District); *E. aporosceles* from Balochistan (Koh Malik-do-Khand, Chagai District) and *E. persica* from Balochistan and Khyber Pakhtunkhwa (south Waziristan). Smith (1935), however, did not provide detail of the specimens he examined. Minton (1966) reported the presence of all preceding species from Pakistan except *E. fasciata* and *E. aporosceles*. Subsequent workers like Mertens (1969)

and Khan and Ahmed (1987) did not record any *E. fasciata* and *E. aporosceles* although they mentioned these species in their work. On the other hand, Boulenger (1890) mentioned a female specimen of *E. fasciata* (SVL 61 mm) from Helmand, Afghanistan that probably refers to BMNH 1886.9.21.87 (Wagner *et al.* 2016). However, it is known that *E. fasciata* is distributed in eastern Iran and southwestern Afghanistan (Šmíd *et al.* 2014, Wagner *et al.* 2016) with one record in central-southern Afghanistan (ZFMK 8553; Wagner *et al*. 2016). Besides specimens reported in Boulenger (1921), this species has never been recorded from Pakistan. Extensive surveys conducted by the team of Pakistan Museum of Natural History did not find a single specimen of *E. fasciata* from Kharan, Nushki and other districts of southwestern Pakistan. Given the fact that Boulenger's specimens originated from Kharan and Kohak, relatively near to the present find of *E. kakari* **sp. nov.** (ca. 375 km aerial distance), and exhibiting the dorsal striped pattern, we presume that all previous records of *E. fasciata* from Pakistan may belong to *E. kakari* **sp. nov.**

Currently, *E. kakari* **sp. nov.** is only known from the type locality and belongs to an arid high elevation species of *Rhabderemias* subgenus contrary to other members of the subgenus in Pakistan that inhabit sandy plains with bushes (Khan 2006) up to 1,000 m of elevation. For example, *E. cholistanica* is distributed in the sand dunes of Cholistan desert, Punjab around 100 m elevation. Similarly, *E. scripta* is found in the sand dunes tracts along Afghanistan-Pakistan border with the elevation between 800–1,000 m. *Eremias fasciata* from Iran is reported in the elevation between 450 to 1,700 m (Gholamifard & Rastegar-Pouyani 2015). The type locality of *E. kakari* **sp. nov.** is 2,506 m and represents probably the highest recorded elevation for the genus in Pakistan. However, as is mentioned, we expect a wider distribution of our newly described species in other parts of northwestern Pakistan or possibly southeastern Afghanistan.

Clark *et al.* (1969) reported an unusual *Eremias* (determined as *E. regeli*) from two localities of northeastern Afghanistan: 5 to 10 miles east north-east of Nimla, on old Kabul-Jalalabad road, and at about 10 miles southwest of the village of Balabagh (1,067 m). These authors were, however, not sure about the correct species determination of the specimens (CAS 96198, 96202–203, 96211). The photograph of putative *E. regeli* (Clark *et al.* 1969: 307; CAS 96211) closely resembles the dorsal pattern of *E. fasciata* or the presently described *E. kakari* **sp. nov.** Both *E. fasciata* and *E. kakari* **sp. nov.** have a striped pattern (see results) and elongated head. Furthermore, members of the subgenus *Rhabderemias* possess dorsal striped pattern in adults and thus these specimens from Afghanistan should be ranked under *Rhabderemias* subgenus, not *Aspidorhinus* to which *E. regeli* belongs. On the contrary, the adult *E. regeli* has vivid dorsal coloration of having striped and ocellate dorsal body (the lateral-most stripes have ocelli in them). Additionally, *E. regeli* has distant distribution (southern Uzbekistan and Tajikistan), north of the Hindukush range and its presence in the northeastern Afghanistan due to important biogeographic barrier is thus less possible. In conclusion, we have overall very limited knowledge on the biogeography of the subgenus with mostly unresolved phylogeny of the group (Guo *et al.* 2011). Further research, including morphological comparison and genetic analysis of the new species together with other members of the subgenus *Rhabderemias* is therefore needed.

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SUPPLEMENTARY TABLE 1. Comparison of morphological characters between *Eremias kakari* **sp. nov.** and species in subgenera *Aspidorhinus*, *Eremias* and *Scapteira*. For abbreviation of characters, see material and methods (NA= data not available, + = in contact, - = separated).

Species name	Source	**Number of specimens**	**Max. SVL in mm**	**DS**	**VL**	**VT**	**G**	**NCWS**	**SAT 4th**
E. (*Rhabderemias*) *kakari* **sp. nov.**	This study	13	52.2	48–55	11–14	28–32	21–25	17–21	3
E. (*Scapteira*) *acutirostris*	This study	6	70.0	68–84	20–23	32–38	25–33	44–54	2
E. (*Aspidorhinus*) *afghanistanica*	Böhme & Szczerbak 1991	2	67.0	44–46	NA	37–38	25–28	22–25	NA
E. (*Eremias*) *aria*	Anderson & Leviton 1967	2	61.0	55–59	12–14	28–29	23–25	28–29	3
E. (*Aspidorhinus*) *montana*	Rastegar-Pouyani & Rastegar-Pouyani 2001	3	57.2	63–68	13–14	27–31	23–24	27–28	4
E. (*Eremias*) *nigrocellata*	Anderson 1999; Baig & Masroor 2006	NA	83.0	42–56	17–20	27–34	23–33	19–31	NA
E. (*Aspidorhinus*) *nikolskii*	Anderson 1999; Böhme & Szczerbak 1991; Nikolsky 1915	NA	75.0	45–63	14	28–32	20–28	23–31	NA
E. (*Aspidorhinus*) *persica*	Rastegar-Pouyani & Rastegar-Pouyani 2001	47	96.0	51–74	14–16	26–34	28–38	23–35	4
E. (*Aspidorhinus*) *regeli*	Boulenger 1921; Böhme & Szczerbak 1991; Nikolsky 1915; Lantz 1928	NA	70.0	43–61; 46–56 (Lantz, 1928)	12–14 (Lantz, 1928)	25–31	14–24; 17–21 (Lantz, 1928)	17–25	4
E. (*Aspidorhinus*) *velox*	Rastegar-Pouyani & Rastegar-Pouyani 2001; Nikolsky 1915	NA	77.0	50–65	14–17	26–34	19–30	20–30	4
E. (*Aspidorhinus*) *strauchi*	Anderson 1999; Rastegar-Pouyani & Rastegar-Pouyani 2001	NA	68.0	56–68	NA	28–33	23–33	24–35	3

.....continued on the next page

SUPPLEMENTARY TABLE 1. (continued)

Species name	Source	**SDLT 4th**	**FP**	**FPS**	**SOM**	**Dorsal color pattern of adult**	**Distribution**
E. (*Rhabderemias*) *kakari* **sp. nov.**	This study	22–26	17–21	4–5	+	striped	NW Balochistan, Pakistan; only type locality
E. (*Scapteira*) *acutirostris*	This study	18–21	12-14	6–12	-	reticulate	SE Iran, S Afghanistan, SW Pakistan
E. (*Aspidorhinus*) *afghanistanica*	Böhme & Szczerbak 1991	NA	16–18	2	-	ocellate	Afghanistan; only type locality
E. (*Eremias*) *aria*	Anderson & Leviton 1967	25	17–18	1–3	-	striped & ocellate	Afghanistan; only type locality
E. (*Aspidorhinus*) *montana*	Rastegar-Pouyani & Rastegar-Pouyani 2001	18–25	18–19	3	+	striped & ocellate	W Iran
E. (*Eremias*) *nigrocellata*	Anderson 1999; Baig & Masroor 2006	NA	10–15	NA	-	ocellate	SE Turkmenistan, S Uzbekistan, SW Tajikistan, NE Iran, NE Afghanistan
E. (*Aspidorhinus*) *nikolskii*	Anderson 1999; Böhme & Szczerbak 1991; Nikolsky 1915	NA	12–20	4-6	+	striped & ocellate	Uzbekistan, N Tajikistan, Kyrgyzstan, SE Kazakhstan
E. (*Aspidorhinus*) *persica*	Rastegar-Pouyani & Rastegar-Pouyani 2001	NA	16–25	NA	+	striped & ocellate	Iran, Turkmenistan, S Afghanistan, SW Pakistan
E. (*Aspidorhinus*) *regeli*	Boulenger 1921; Böhme & Szczerbak 1991; Nikolsky 1915; Lantz 1928	NA	21–24 (Boulenger, 1921)	0-3	+	striped & ocellate	SE Turkmenistan, S Uzbekistan, SW Tajikistan, NE Afghanistan
E. (*Aspidorhinus*) *velox*	Rastegar-Pouyani & Rastegar-Pouyani 2001; Nikolsky 1915	NA	15–24	2–4	+	striped & ocellate	Iran, Kazakhstan, Russia, N Afghanistan, NW China
E. (*Aspidorhinus*) *strauchi*	Anderson 1999; Rastegar-Pouyani & Rastegar-Pouyani 2001	NA	17–23	2–5	+	ocellate	S Armenia, S Azerbaidzhan, NE Turkey, NE Iran

APPENDIX I. List of species examined in this study for morphological comparisons.

E. acutirostris: PMNH 3724, 3733–3737 (n=5) Khar, Nushki district, Balochistan.

E. cholistanica: PMNH 1160–1169 (n=10), PMNH 1390–1391 (n=2), 1685–1692 (n=8), 1845–1846 (n=2), PMNH 1848–1851 (n=4) Baghdad-i-Jadeed Campus, Islamia University, Bahawalpur, Bahawalpur, Punjab.

E. scripta: PMNH 914 Baghat Mal, Chagai district, Balochistan; PMNH 2199 Radzhab, Hamun-i-Mashkel, Chagai district, Balochistan; PMNH 3782 Mizal Darband, Nok Kundi, Chagai district, Balochistan.

E. persica: PMNH 839, 855, 861–862 (n=2) Ashewat checkpost, Zhob district, Balochistan; PMNH 838, 856–860 (n=5) Tanishpa village, Killa Saifulla district, Balochistan; PMNH 648–649 (n=2) Jafferabad, Loralai, Balochistan; PMNH 697–698 (n=2) Khanozai, Pishin, Balochistan; PMNH 841 Khaisore, Killa Saifulla, Balochistan; PMNH 652 Bencha, Kalat district, Balochistan; PMNH 3613–3616 (n=4) Kunder, Torgher, Killa Saifulla, Balochistan; PMNH 3619, 3621–3624 (n=4) Zeba Nala, Tanishpa, Killa Saifulla, Balochistan.

E. kakari **sp. nov.**: PMNH 840, 842–846, 4048, 4092–4097 (n=6) Tanishpa village, Torghar Mountains, Killa Saifulla district, Balochistan.