

A NEW SPECIES OF *Eremias* (SAURIA: LACERTIDAE) FROM CHOLISTAN DESERT, PAKISTAN

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A new species of *Eremias* has been described from the Cholistan Desert of Pakistan. It constitutes the first record of the genus *Eremias* from the Oriental (Indian) region. The species has been named *Eremias cholistanica*, after the Cholistan Desert of Pakistan. This striped desert lacerta is not only different from all its congeners in several morphological characteristics but has been collected from an area distant from the previous known range of *Eremias*.

Keywords: Lacertidae, *Eremias*, *cholistanica*, new species, Pakistan, taxonomy.

INTRODUCTION

Lacertids (Reptilia: Sauria) are inhabitants of the Old World. They are found in Europe, Asia, and Africa but not in Madagascar or the Australian region. They are most abundant in Africa but rare in the Oriental region (Smith, 1935). Of the lacertids, the genus *Eremias* has not been reported from the Oriental (Indian) region thus far. Smith (1935) recognized about 45 species with numerous subspecies belonging to this genus. Later on, the genus *Eremias* was further subdivided into *Eremias* and *Mesalina* based on morphological characters and geographic distribution (Szczerbak, 1974). He gave a detailed account of lacertids and further subdivided *Eremias* into five distinct subgenera: *Eremias*, *Rhabderemias*, *Ommateremias*, *Scapteira*, and *Pareremias*. He gave detailed distributions and systematic accounts of the species belonging to *Eremias* but did not report even a single species from the Oriental region (Indian region). Rastegar-Pouyani and Nilson (1997) mentioned the existence of about 33 *Eremias* species distributed in China, Mongolia, Korea, Central and Southwest Asia to Southeast Europe.

Several authors have made significant contributions to our understanding of the lacertids fauna of different regions of the world: Russia (Terentjev and Chernov, 1949; Szczerbak, 1974), Iran (Anderson, 1963, 1974, 1999; Leviton and Anderson, 1970; Rastegar-Pouyani and Nilson, 1997; Rastegar-Pouyani and Rastegar-Pou-

yani, 2001; Moravec, 1974), Afghanistan (Anderson and Leviton, 1967; Böhme and Szczerbak, 1991) and Pakistan (Smith, 1935; Minton, 1966; Mertens, 1969 and Khan, 2004).

Smith (1935) showed the presence of *Eremias velox persica* (It has now been raised to species level), *E. acutirostris*, *E. aporosceles*, *E. fasciata*, and *E. scripta* in Pakistan. Subsequently, Mertens (1969) and Khan (2004) confirmed the presence of these species in Pakistan. Minton (1966), however, reported the presence of these species with the exception of *E. aporosceles* and *E. fasciata*. All the aforesaid studies restricted the distribution of *Eremias* in Pakistan to Baluchistan and North West Frontier Province of Pakistan, bordering Afghanistan and Iran.

Eremias (Eremias) cholistanica

Baig and Masroor sp. nov.

Figs. 1 – 4

Holotype. An adult male, PMNH 1685, collected from Baghdad-i-Jadeed Campus, Islamia University Bahawalpur, Bahawalpur, Punjab province, Pakistan (29°22'43" N 71°46'10" E), at an elevation of about 93 m, by Mr. Abdul Rahim on April 17, 2004.

Paratypes. Locality same as holotype; sex and other data with respective specimens is mentioned in Table 1.

Diagnosis. Dorsals 51 – 63; ventrals in 13 – 15 oblique longitudinal series; subocular touching mouth; frontal and supraciliaries separated from supraoculars by row(s) of granules; nasals three, lower in contact with three anterior supralabials; occipital absent; height of the

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first transverse row of pectoral scales is more than its breadth but not longer than the succeeding rows; 14 – 18 femoral pores on each side, separated by 2 – 4 scales; toes fringed, encircled by 3 scales and with 23 – 29 double series of uncarinate scales underneath; dorsum with 6 or 7 black longitudinal stripes without any sign of vermiculation.

Description of holotype. Head and body moderately depressed. Head length 2.0 times as its width, which is 1.1 times as that of its height; nasals swollen; snout longer than postocular part of head; head broader



Fig. 1. Holotype PMNH 1685, *Eremias cholistanica* sp. nov.

than neck. Hind limb does not reach the axilla of fore limbs; foot slightly longer than head; toes slender, compressed, with fringe on inner sides only. Tail 2.3 times as long as snout-vent length, cylindrical and depressed at base.

Anterior head shields smooth and convex, frontoparietals, interparietal and parietals slightly rugose; nasals in contact behind the rostral, the suture between them 1/2 the length of frontonasal, whose breadth is more than its length; prefrontals slightly longer than broad, forming median suture; frontal shorter than its distance from end of the snout, 2/3 times as broad as long, narrow behind; parietals rugose, as broad as long; interparietal rugose, almost equal to 1/2 of the length of frontoparietals; no occipital. Two large supraoculars, the anterior longer than the posterior, the space in front of supraoculars filled by small and few larger granules; an additional small, band-like supraocular also present posterior to larger ones; supraoculars separated from frontal by single series of granules and from supraciliaries by two series of granules; five supraciliaries, first longest. Rostral broader than high, narrower beneath than above. Three nasals, the lower in contact with three supralabials and not touching the rostral; anterior loreal slightly higher than long, shorter than the second that is longer than high; subocular smooth, bordering the mouth,



Fig. 2. Type specimens of *Eremias cholistanica* sp. nov.

wedged between sixth and seventh supralabials. Temporals smooth; auricular denticulation consists of six lobes on both sides. Lower eyelid translucent and covered with small scales.

Five pairs of chin shields; anterior two completely in contact, the third one 3/4 in contact on the midline, fourth and fifth touching infralabials. Twenty-one gular scales in a straight line between the symphysis of the chin shields and the collar. Gular fold distinct. Collar curved, free, serrated and composed of 11 plates.

Dorsal scales granular, smooth, 59 across middle of body. Ventral plates broader than long (except for outermost series), forming oblique longitudinal series of 14 plates, in 30 slightly angular transverse rows; first 4–5 rows of pectoral scales longer than broad, first one is twice as long as broad. Preanal region with an enlarged median plate, just above the vent.

Upper surface of arm with rhombic, smooth scales. Scales on upper surface of hind limbs similar to dorsals, varying in size; enlarged plates covering the lower surface of hind limbs; 16 femoral pores on each side, the two series separated by 3 scales. Subdigital lamellae unicarinate, in two rows of 28 scales under the 4th toe.

Upper caudal scales oblique, truncate, strongly and diagonally keeled, at the base smooth; 35 scales in the 9th annulus behind the postanal granules.

Color pale yellow in life with seven black stripes, the vertebral stripe bifurcate at neck and consequently 8 stripes appear on neck; lateral-most stripes widest, running along the entire length, starting from the nostril and reaching to tip of the tail; the next lateral stripes on both sides join each other on the anterior 1/3 of the tail; the paravertebral stripes join each other on the tail just posterior to the hind limbs; head gray without any markings or spots; labials white with black markings; limbs dark gray with yellow ocelli; belly creamy white; tail bluish gray.

Paratypes agree closely with the holotype with some differences as mentioned in Table 1. Besides sex, the specimens differ in the arrangement of supralabials, i.e., subocular wedged between 5th–6th and 6th–7th supralabials (PMNH 1160, 1686, 1688, however exhibit the wedge between 7th and 8th on one side of the head); postmentals have similar pattern as that of holotype except PMNH 1390, in which the third pair of postmentals are separated by a row of granules. The separation of supraoculars from supraciliaries is by one row of granules in PMNH 1167 and 1849 rather than two rows. The scale count pertaining to dorsals, ventrals, gulars, collars, caudals at 9th whorl and lamellae under 4th toe however, show a unique value for every specimen within a certain range. Regarding color the species also shows

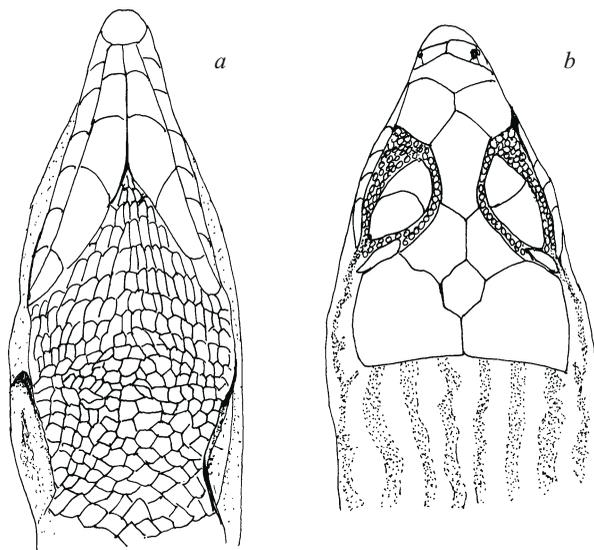


Fig. 3. Ventral (a) and dorsal (b) view of *Eremias cholistanica* sp. nov.

some variations. Most of the specimens show 7 black stripes on the dorsum, of which the central one bifurcates at neck forming 8 rows, whereas a few specimens show 6 black stripes on the body, which may not bifurcate at neck.

Discussion. The new species constitutes the first record of a species of *Eremias* from the Oriental (Indian) region. Besides some morphological characteristics and its unique distribution, *Eremias cholistanica* is totally different from other species of *Eremias*, i.e., *buechneri*, *quadrifrons*, *przewalskii*, *argus*, *brenchleyi*, *velox*, *persica*, *strauchi*, *regeli*, *nikolskii*, *arguta*, *intermedia*, *nigrocellata*, *aria*, *vermiculata*, *grammica*, *montanus*, and *nigrolateralis*, in being striped in color pattern and also from the species *fasciata*, *pleskei*, and *lineolata*, which retain the striped pattern throughout their life but differ in other characteristics.

It differs from all its congeners in morphological characteristics (Table 2) as well as zoogeographic distribution but we will individually compare the species found in Pakistan and adjoining areas.

It differs from *Eremias persica* for being smaller in size (max. 53 vs. 96 mm); supraocular separated from frontal (100 vs. 0%); larger eye as compared to ear diameter (100 vs. 0%); having less number of gulars (20–24 vs. 28–38) as well as femoral pores (14–18 vs. 17–24); presence of fringe (100 vs. 0%) and totally distinct color pattern.

It resembles *Eremias fasciata* in striped pattern but differs for having higher dorsals (51–63 vs. 46–53)

TABLE 1. Data Related to Type Specimens of *Eremias cholistanica* sp. nov.

Character	PMNH No.																										
	1390	1391	1685	1845	1846	1848	1849	1850	1851	1686	1687	1688	1689	1690	1691	1692	1163	1164	1165	1166	1167	1168	1169	1160	1161	1162	
Sex	♂	♀	♂	♂	♀	♂	♂	♂	♂	♂	♂	♂	♂	♂	♂	♀	♀	♂	♀	♀	♂	♂	♀	♂	♂	♂	♀
SVL	48	47	53	50	50	50	44	48	48	51	50	52	49	50	50	51	49	52	49	50	52	52	48	49	49	49	45
Tail length	broken	80	121	105	87	103	102	96	103	112	116	118	104	103	105	106	111	115	broken	113	111	broken	104	111	broken	111	broken
Head length	13	11.4	14	13	12	13	10.5	13.4	11	13.7	12.5	13.6	12	12.4	12.5	11.7	12	12.6	11.7	12.6	13.4	13.7	11.8	13.4	13	11	
Head width	6.6	5.7	7	7.2	6.4	6.8	6.4	7.4	6	7.5	5.8	7	6.4	7.3	6.8	7	6.4	7	6.4	7	6	6.2	6.2	7	6.1	5.5	
Head height	5.4	5	6.3	5.4	5.4	5.6	5.4	6	4.7	6.5	5	6	5.4	5.8	5.5	5.5	4.8	5	5.3	5.5	5.5	4.6	5.4	4.1	4.3		
Eye diameter	1.4	1	1.5	1.7	1.5	1.6	1	1.7	1.3	2.5	2	2	1.3	1.5	1.6	2	1.5	1.3	1.2	1.4	1.3	1.5	1.5	1	1.2	1.4	
Ear diameter	1	0.9	1.4	0.9	0.6	1.2	1	1.7	0.7	1	1	1.5	1.3	1.5	1	1.3	1.4	1.4	1	1	1.3	1	1.5	1.2	1	1	
Supralabials	5+3	6+4	6+3	6+2	6+2	6+2	5+3	6+3	5+3	6+3	6+3	6+3	6+3	6+4	6+3	6+3	6+3	6+3	6+3	6+2	6+2	6+2	6+3	6+2	6+3	5+3	
Infralabials	7	7	9	6,7	8	7	6	7	6	7	8	8	8	8	8	7	9	7	6,7	7	7	7	7,8	7	7	7	
Nasals	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
PM	5(2)	5(3)	5(3)	5(3)	5(3)	5(3)	5(3)	5(3)	5(3)	5(3)	5(3)	5(3)	5(3)	5(3)	5(3)	5(3)	5(3)	5(3)	5(3)	5(3)	5(3)	5(3)	5(3)	5(3)	5(3)	5(3)	
Dorsals	58	59	60	60	57	57	56	60	57	55	58	63	58	63	60	58	55	54	53	56	53	51	53	57	53	54	
Ventrals (L)	14	14	14	14	14	15	15	15	15	15	14	14	15	15	14	14	13	14	14	14	14	14	14	14	14	14	
Ventrals (T)	34	35	30	33	31	31	32	32	33	32	34	32	32	33	33	35	36	33	36	35	34	35	35	31	34	36	
Gulars	24	23	21	22	21	21	21	23	23	20	22	20	22	20	21	23	20	20	23	20	22	24	21	24	20	20	
Collar scales	12	9	11	10	8	8	9	9	8	8	8	9	9	9	9	8	9	6	7	9	8	8	8	9	8	9	
Caudals at 9 th ring	28	28	27	27	27	28	29	30	29	29	28	35	28	32	28	27	27	30	28	29	29	27	29	28	30	32	
Femoral pores	17	16	16	15	14	16	15	17	16	15	16	18	15	16	17	16	15	16	17	14	17	18	18	16	17	14	
FP separation	3	3	3	2	3	2	3	2	2	2	2	2	2	2	2	2	4	3	3	3	2	2	3	4	3	3	
SB touching mouth	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
Fringe at toes	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
Lm 4 th T No.	25	24	28	26	23	25	28	25	28	28	26	29	25	28	28	28	26	28	29	29	26	30	26	28	26	28	
Lm 4 th T rows	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
Supraoculars	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
SO separation from SC	2	2	2	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2	2	2	2	
Dorsal color, the number of black stripes on body	7	6	7	7	7	7	7	6	7	6	7	7	7	7	7	6	7	6	6	6	6	6	6	6	7	7	6
on neck	8	—	8	8	8	8	8	—	8	—	8	8	8	8	—	8	8	—	—	—	—	—	—	8	8	—	8
Ventral color	Cr.	Cr.	Cr.	Cr.	Cr.	Cr.	Cr.	Cr.	Cr.	Cr.	Cr.	Cr.	Cr.	Cr.	Cr.	Cr.	Cr.	Cr.	Cr.	Cr.	Cr.	Cr.	Cr.	Cr.	Cr.	Cr.	Cr.

Note. PM, postmentals; SVL, snout-vent length; L, longitudinal; T, transverse; FP, femoral pores; SO, supraoculars; SB, subocular; Lm 4th T, lamellae under 4th toe; SC, supraclariaries; Cr, creamy; +, yes/present; —, no/absent; 5(2), 5 PM, 2 united; 5(3), 5 PM, 3 united.

TABLE 2. Comparison of different species of *Eremias*

Species name	Character										Distribution
	Max. SVL	Dorsal scales	Ventrals (L)	Ventrals (T)	Gulars	Caudals at 9 th ring	Femoral pores	FP separation	SB touching mouth	Dorsal color pattern	
<i>E. acutirostris</i>	70	70–81	18–20	32–35	22–33	38–50	12–17	2–4	–	reticulate	Iran, Afghanistan, SW Pakistan
<i>E. aria</i>	61	55–59	12–14	28–29	23–25	28	17–18	2–3	–	striped	Afghanistan
<i>E. fasciata</i>	60	46–53	14–16	29–36	21–32	20–28	15–22	4	+	striped	Afghanistan, Iran, W Pakistan
<i>E. nigrolateralis</i>	84	64–69	14–17	31–32	41–42	29–30	19–20	2	+	ocellate	South Central Iran
<i>E. montanus</i>	57.2	63–68	13–14	27–28	23–24	27–28	18–19	3	+	striped	West Iran
<i>E. lineolata</i>	55	48–64	NA	26–35	18–30	12–17	9–17	NA	+	striped	E Iran, Turkmenistan, Afghanistan
<i>E. nigrocellata</i>	83	42–56	NA	27–34	23–33	19–31	10–15	NA	–	ocellate	NE Iran
<i>E. persica</i>	96	51–74	14–16	26–34	24–36	23–35	16–25	NA	+	striped and ocellate	Afghanistan, Iran, W Pakistan
<i>E. regeli</i>	70	43–61	NA	25–31	14–24	17–25	14–25	2–3	+	striped and ocellate	N Afghanistan, Uzbekistan, Tadjikistan
<i>E. scripta</i>	66	53–70	14	25–33	15–23	17–28	8–17	NA	+	striped	Afghanistan, Transcaspia, Iran, SW Pakistan
<i>E. velox</i>	77	44–66	NA	26–33	19–32	20–30	15–24	2–4	+	striped and ocellate	NW/NE Iran
<i>E. strauchii</i>	68	56–69	NA	28–33	23–33	24–35	17–23	2–5	+	ocellate	North, Eastern Iran
<i>E. multiocellata</i>	65	47–66	NA	28–35	22–38	23–33	9–18	8–12	–	ocellate	China, Russia
<i>E. nikolskii</i>	75	45–59	NA	28–32	20–28	23–31	12–20	4–6	+	striped and ocellate	China, Russia
<i>E. afghanistanica</i>	67	44–66	NA	37–38	25–28	NA	16–18	2	–	ocellate	Afghanistan
<i>E. pleskei</i>	58	48–63	NA	28–35	22–32	22–34	7–18	6–8	+	striped	North Western Iran
<i>E. arguta</i>	85	42–56	NA	29–35	23–32	21–29	5–12	6–11	–	ocellate	Northern Iran
<i>E. cholistanica</i> sp. nov.	53	51–63	13–15	30–36	20–24	27–35	14–18	2–4	+	striped	Cholistan Desert Pakistan

Note. FP, femoral pores; L, longitudinal; T, transverse; Max., maximum; NA, data not available; SB, subocular; SVL, snout-vent length; +, yes/present; –, no/absent.

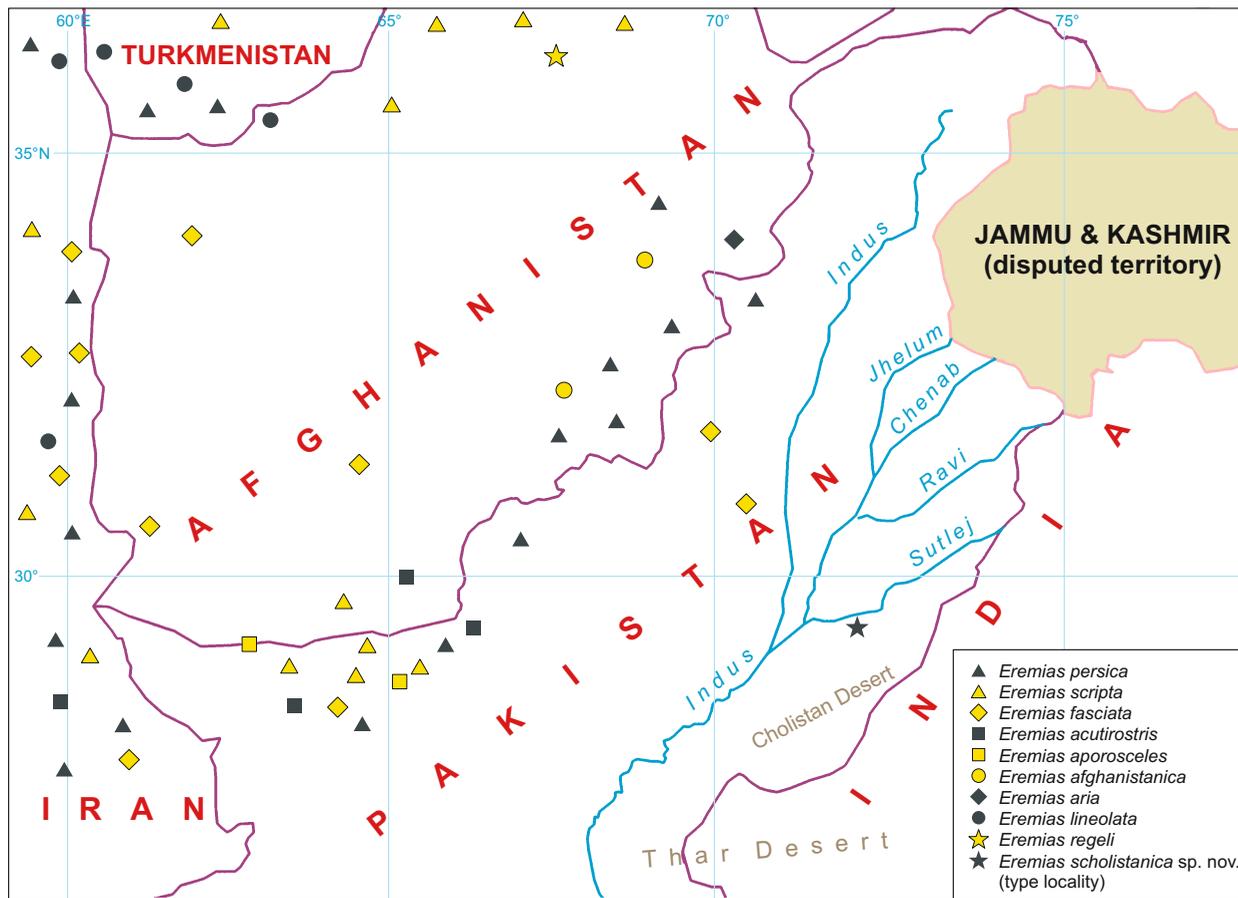


Fig. 4. Distribution of *Eremias* species in Pakistan and adjacent areas.

and caudal scale count at 9th whorl (27 – 35 vs. 20 – 28); lower gulars count (20 – 24 vs. 23 – 32) and presence of fringe at toes (100 vs. 0%).

It differs from *Eremias acutirostris* for being smaller in size (max. 53 vs. 70 mm); having lower count of dorsals (51 – 63 vs. 70 – 81), gulars (20 – 24 vs. 22 – 33) and distinct striped pattern as compared to reticulate pattern.

From *Eremias aporosceles* it differs for possessing series of 15 to 18 femoral pores on each side besides several other characteristics.

The new species differs from *Eremias scripta* in having higher number of caudal scales at 9th whorl (27 – 35 vs. 17 – 28); 3 scale rows around 4th toe compared to 4 in *scripta* and distinct striped pattern as compared to vermiculate pattern that is apparent even in the subadults and juveniles specimens of *scripta*. Moreover, *scripta* also possess a faint but consistent incomplete black stripe at the margins of the ventrals below the out-

most broad black lateral stripe and this stripe is completely lacking in the new species.

It differs from *Eremias afghanistanica* in being smaller in size (max. 53 vs. 67 mm); having higher dorsals count (51 – 63 vs. 44 – 46), lower number of ventrals (30 – 36 vs. 37 – 38) and gulars (20 – 24 vs. 25 – 28). It exhibits a striped pattern, which is totally different from *afghanistanica*.

It differs from *Eremias pleskei* in having fewer gulars (20 – 24 vs. 24 – 30), strongly keeled caudal scales rather than smooth ones as in *pleskei*, femoral pores narrowly separated (2 – 4 vs. 6 – 8 scales) and absence of faint but consistent incomplete black stripe at the margins of the ventrals below the outermost broad black lateral stripe.

Eremias lineolata differs from *E. cholistanica*. in having nasal in contact with rostral (100 vs. 0%); lower number of caudals in 9th annulus (10 – 15 vs. 27 – 35) and having spots on the head and faint but consistent incomplete black stripe at the margins of the ventrals.



Fig. 5. Habitat in type locality of *Eremias cholistanica* sp. nov.

Analysis of gut contents shows that the species is exclusively insectivorous, feeds on ant-lions, beetles, termites and spiders.

Type locality/Habitat. The type locality is a part of Cholistan Desert that is the northwestern limit of Thar Desert or Great Indian Desert. This is a plain of gently undulating sand hills. Elevations are generally below 150 m. Archeological evidence shows that the region was better watered, through the flow of historic Hakra River. The dry watercourse is still represented in the Cholistan Desert.

The species lives in the sandy area with sparse vegetation (Fig. 5), mainly consisting of *Calligonum polygonaoides*, *Haloxylon salicornicum*, *Aerva persica*, *Dipterygium glaucum*, *Aristida adscensionis*, *Crotalaria burhia*, *Lasiurus scindicus*, *Leptadenia pyrotechnica*, and *Cymbopogon jwarancusa*.

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