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A NEW SPECIES OF THIN-TOED GECKOS *Cyrtopodion* SENSU LATO (SQUAMATA: SAURIA: GEKKONIDAE) FROM BALOCHISTAN PROVINCE, SOUTH PAKISTAN

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A new species of the geckonid genus *Cyrtopodion s. l.* — *C. belaense* is described from Las Bela District, Balochistan Province, Pakistan. It is distinguished from other *Cyrtopodion s. l.* by the combination of the following characters: (1) small body size, maximal SVL 40.5 mm, (2) 12 – 13 longitudinal rows large strongly keeled trihedral dorsum tubercles, (3) ventral scales in 22 rows between ventrolateral skin folds, (4) nine preanal pores and lacking femoral pores, (5) enlarged median subcaudals, (6) head sufficiently short and high with very big eyes and short rostral part, (7) limbs very thin and elongate, (9) 6 – 7 dark width bands on tail, interspaces between them noticeable bigger than the width of stripes. These bands also visible on the sucaudal surface of tail.

Keywords: a new species; thin-toed gecko; Gekkonidae; *Cyrtopodion*; taxonomy; South Pakistan.

INTRODUCTION

Territory of modern Pakistan is intriguing for zoological survey because of inhabiting by the members of Palearctic and Oriental faunas. Especially high biodiversity can be expected in poorly studied remote mountain systems. Pakistan seems to be an area of maximal diversity of geckos of *Cyrtopodion* sensu lato, but we still do not have sufficient information and collections as material for clarifying of disputable taxonomic problems.

While working with MVZ collection senior author examined several specimens different from all known species. We herein describe another new species of *Cyrtopodion* based on this material.

MATERIAL AND METHODS

We studied 4 specimens (1 male and 3 females) collected by Theodore Papenfuss in South Pakistan, Balochistan Province in October 2003 as the material for the present study. Collections of Zoological Museum of Moscow State University (ZMMU), Zoological Institute of St. Petersburg, Russian Academy of Sciences (ZISP), California Academy of Sciences, San Francisco (CAS), Museum of Vertebrate Zoology (MVZ) of Berkeley University and Field Museum of Florida University (UF) were used for comparative analysis.

For morphological analysis the following characters were used: snout-vent length (SVL, from snout to vent), tail length (Lcd, from vent to the tip of the tail), head length (HeadL, from rostrum to occipital sinus), head width (HeadW, maximum width), head height (HeadH, maximum height), snout to eye distance (SnEye; distance between anterior most point of eye and tip of snout), orbital diameter (OrbD; greatest diameter of orbit), ear

Fig. 1. Adult male holotype (MVZ 248428) of *Cyrtopodion belaense* from Pakistan. Dorsal view.

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length (EarL; longest dimension of ear), eye to ear distance (EyeEar; distance from anterior edge of ear opening to posterior corner of eye), trunk length (TrunkL distance from axilla to groin measured from posterior edge of forelimb insertion to anterior edge of hindlimb insertion), shoulder length (LS); forearm length (ForeaL, from base of palm to elbow); femur length (FemurL); crus length (CrusL, from base of heel to knee); fourth finger length (LD4A), fourth toe length (LD4P).

The following characters of pholidosis were examined: number of scales across middle of belly (SAB), number of midventral scales along belly (SLB, between mental and vent), number of subdigital lamellae on fourth finger (SDL 4A), number of subdigital lamellae on fourth toe (SDL 4P), number of preanal pores (PP), number of supralabials (SL), number of infralabials (IL), number of longitudinal rows of enlarged tubercles in the middle of dorsum between ventrolateral folds (TubL); number of transversal rows of enlarged tubercles between occiput sinus and middle of sacrum along the middle of dorsum (TubW); number of scales along middle of head, between occiput sinus and supranasales (SLH), number of scales across head, between top of ears opening (SAH).

Cyrtopodion belaense sp. nov.

Holotype. MVZ 248428 — Pakistan, Balochistan Province, 8.5 km W (by Turbat road), Bela, Las Bela District, 26°11.23′ N 66°12.24′ E; h = 130 m, 14 October 2003, coll. Theodore J. Papenfuss (Fig. 1).

Paratype. MVZ 248427; MVZ 248429; MVZ 248430 with the same data as holotype (Fig. 2).

Measurements of holotype and type series are presented in Table 1.

Description of holotype. Adult male. Snout-vent length 40 mm. Head relatively long (HeadL/SVL ratio 0.3), wide (HeadW/HeadL ratio 0.65), not markedly depressed (HeadH/HeadL ratio 0.41), distinct from slender neck. Snout not elongate (SnEye/HeadL ratio 0.36), roundish, longer than eye diameter (OrbD/SnEye ratio 0.7); scales on snout rounded and homogeneous; the border of a frontal bone is marked by visibly enlarged conical scales (Fig. 3). Occipital region covered of small homogeneous scales, with large conical tubercles among them.

Eye large (OrbD/HeadL ratio 0.25); pupil vertical with crenellated margins; supraciliaries short, bearing tiny conical spines posteriorly. External ear opening small (EarL/HeadL ratio 0.08) oval, vertical; eye to ear distance approximately equal of eye diameter (EyeEar/OrbD ratio 0.97). Width of rostral scale (1.8 mm) is more than its height (1.0 mm), it is divided to the two third by longitudinal groove; two supranasals are divided by two granular scales; rostral in contact with first supralabial, two supranasals and scales between it; nostrils round, each surrounded by supranasal, rostral, first supralabial, and two enlarged postnasals, about the same size as supranasals.

Fig. 2. Type series (holotype and paratypes) of *Cyrtopodion belaense* from Pakistan. Dorsal view.

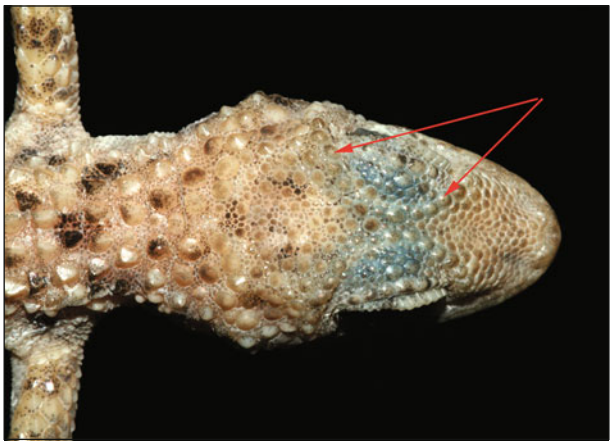

Fig. 3. Enlarged conical scales on the head. Holotype (MVZ 248428) of *Cyrtopodion belaense*.

Fig. 4. Mental scalation on the ventral side of the head. Holotype (MVZ 248428) of *Cyrtopodion belaense*.

TABLE 1. Measurement and Pholidosis of Type Series of *C. belaense* sp. nov.

Character	Holotype	Paratypes		
	MVZ 248428	MVZ 248427	MVZ 248429	MVZ 248430
Sex	m	f	f	f
SVL	40	39.3	40.5	40
Lcd	0	52	54*	54
HeadL	12.2	11.7	12.1	12
HeadW	7.9	7.6	7.5	7.4
HeadH	5	4.9	5	4.6
SnEye	4.4	4.2	4.4	4.3
OrbD	3.1	2.6	2.8	2.7
EarL	1	0.9	1	1
EyeEar	3	2.7	3	2.6
TrunkL	17.8	17.3	18.2	17.7
LS	7.8	7.2	7.4	7.4
ForeaL	7.4	6.8	7.2	7
FemurL	10.5	11.6	10.3	10
CrusL	8.2	7.9	8.6	8.2
LD4A	3.8	4.3	3.8	3.7
LD4P	5.3	6.5	5.3	5.5
SAB	22	22	22	22
SLB	100	103	98	99
SDL 4A	20	22	20	20
SDL 4P	24	24	25	24
PP	9	0	0	0
SL	7	9	8	8
IL	10	13	11	12
TubL	12	12	12	12
TubW	26	24	24	22
SLH	40	39	43	39
SAH	30	32	29	35

* Regenerated tail.

Mental triangular, height (2.0 mm) and width (2.0 mm) are equal; three pairs of enlarged postmentals, first pair in broad contact (Fig. 4); supralabials 10, infralabials 7.

Body is slightly flattened and not elongated (Trunk/SVL ratio 0.44) with weakly developed ventrolateral folds. Dorsal surface is covered of regularly rows of large trihedral tubercles, among which small granular scales (10 – 12 times less than tubercles) are situated. Twelve rows of trihedral tubercles pass from occipital and temporal region on to back and tail base. Lateral edges of these keeled tubercles are bent.

Ventral scales much larger than dorsal, smooth, subimbricate, with rounded free margins. Scales in precloacal region have almost the same size as surrounding scales. Twenty two scales across middle of belly, 100 midventral scales along belly, from mental to cloaca.. Gular region with relatively homogeneous, smooth scales.

Nine precloacal pores located in a broken row, each pore is situated within a scale of size equal with surrounding scales; no femoral pores, enlarged femoral scales are present (Fig. 5).

Fore and hind limbs moderately long, slender (LRU/SVL ratio 0.18; LT/SVL ratio 0.2); digits are long and thin; 20 subdigital lamellae on IV finger; 24 subdigital lamellae on IV toe.

Unfortunately, only collected male of a new species has damaged tail. However we have designated just this specimen as a holotype because the number of preanal pores in males is an important diagnostic character in this group.

Diagnosis. Small size geckos, snout-vent SVL 39.3 – 40.5 mm, tail length Lcd 52 – 54 mm; large strongly keeled trihedral dorsum tubercles forming 12 –

Fig. 5. Preanal region with 9 preanal pores and enlarged femoral scales of the holotype (MVZ 248428) of *Cyrtopodion belaense.*

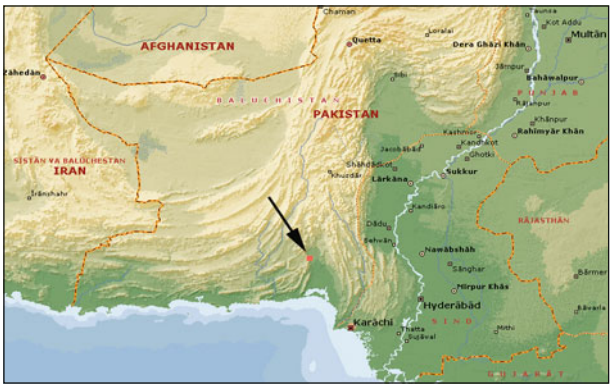

Fig. 6. Type locality of *Cyrtopodion belaense* in Balochistan Province, Pakistan.

13 longitudinal rows at midbody, 22 – 26 tubercles from occiput to the middle of sacrum; tail with pronounced segments, that were formed by semi-rings of large greatly keeled oblong tubercles, subcaudal plates in single median series, which wider than its height, on the tip of non-regenerated tail the subcaudal scales are bifid; 22 abdominal scales across middle of belly, 98 – 103 midventral scales along trunk. Males have 9 highly pronounced preanal pores, situated within the scales of the same size as surrounding. Preanal pores formed row with obtuse angle. 8 – 9 infralabial scales, 10 – 12 supralabial. Mental plate large; 3 – 4 pairs postmentals scales, first pair in broad contact.

Coloration in alcohol. Color pattern of the back bears a great resemblance to those in *C. scabrum* (Heyden, 1827) and *C. kachhense* (Stoliczka, 1872).

The lower trunk surface is white, distal sucaudal surface of tail with 5 – 6 dark wide bands; there are 5 – 6 transverse dark bands on the dorsum, consisting in separate oblong spots. There are 6 – 7 dark width bands on tail, interspaces between them noticeable bigger than the width of stripes.

Color pattern of dorsal surface of the head in preserved specimens is almost not visible except small dark spots of irregular shape in nuchal area. Dark nuchal band passing from posterior edge of eye above the ear and along nuchal area is indistinct and often disintegrates into separate fragments. It can be supposed that this band is well developed in juvenile individuals and becomes less visible when they grow up.

Etymology. This species is named after very famous place where geckos were collected from, near Bela town (this name was introduced by Kurt Auffenberg).

Distribution (Fig. 6). New species is known only from type locality: Pakistan, Balochistan Province, 8.5 km W (by Turbat road), Bela, Las Bela District, 26°11.23′ N; 66°12.24′ E; *h* = 130 m.

Habitat and Natural History (Fig. 7). *C. belaense* inhabits very dry low sandstone rocks with poor shrubby vegetation typical for southern part of Pakistan and Iran. Activity predominantly twilight and night, although sometimes geckos can be found in shaded areas or in the crevices of rocks.

These lizards have the special type of locomotion, they move not fast raising body above the substrate, while *C. scaber* on the contrary, moves much swiftly, pressing oneself close to the substrate. No more natural history information is currently available for this species.

Comparison. New species differs from all other geckos inhabiting this region by specific color pattern of the tail with very broad black bands interspaces between them noticeable bigger than the width of bands (Fig. 8). These bands on the lower tail surface also visible, especially on the distal part of tail.

C. belaense differs from *C. agamuroides* (Nikolsky, 1900), *C. kachhense* (Stoliczka, 1872) and *C. persepolense* Nazarov et al. 2009 by single row of enlarged subcaudal plates and bigger triangle tubercles; from *C. scabrum* (Heyden, 1827) by smaller body size (maximal SVL known for *scabrum* — 53 mm and Lcd — 62 mm vs. SVL 40 mm and Lcd 54 mm for new species), high number of preanal pores (9 vs. 4 – 7[4] for *scabrum*), patterns of the original tail with broad dark bands interspaces between them noticeable bigger than the width of bands. These bands on the subcaudal surface also visible and contrast especially on the distal part of the tail vs. sabrum which have white subcaudal surface. Head is sufficiently short and high with very big eyes and short rostral part (Fig. 9), limbs are very thin and elon-

[4] 4 – 7 pores for Pakistanian *scabrum* (in Khan, 2003); in Szczerbak N. N. and Golubev M. L. authors give 4 – 9 pores.

Fig. 7. Habitat of *Cyrtopodion belaense* in Balochistan Province, Pakistan.

gate, index SVL/forelimbs and SVL/hindlimbs for adult *scabrum* = 2.33 and 1.77 (n = 25) and for new species 2.16 and 1.62 (n = 4); from *C. watsoni* (Murray, 1892), *C. sistanense* Nazarov et al. 2007, and *C. potoharense* (Khan, 2001) by smaller body size, large ventral scales (see Table 2), relatively longer limbs; from *C. montiosalsorum* (Annandale, 1913) and *C. kohsulaimanai* (Khan, 1991) by lacking of femoral pores; from *C. golubevi* Nazarov et al. 2009 and *C. gastrophole* (Werner, 1917) by smaller body size, large triangle tubercles and high number of preanal pores (9 vs. 4).

All details of comparison of species of thin-toed geckos of this region are shown in Table 2.

DISCUSSION

In recent years there have been several attempts to revise the complicated group of Palearctic thin-toed geckos of genus *Cyrtopodion sensu lato* and in particular those from Pakistan (Khan, 1993, 2001, 2003; Ĉervenka et al., 2008, 2010; Sindaco and Jeremčenko, 2008). However, up to now none of the proposed scheme does not allow to decide principal taxonomic problems.

Based on morphological analysis we suppose that *Cyrtopodion belaense* probably occupies an intermediate position between "scabrum" group and "*agamuroides – gastrophole*" group because it has some common characters of these both groups. On the one hand the new species has a very large trihedral tubercles on the dorsal surface of the body, a fairly large number of preanal pores (9) and color pattern similar with those of those of the typical members of "*scabrum*" group (*C. kachhense*, *C. scabrum*, *C. watsoni*, *C. sistanense*).

However, such characters as: long, slender limbs, thin and long tail, relatively large eyes, high head with a short rostral part are more common in species of "*agamuroides – gastrophole*" group.

TABLE 2. Comparison of Morphological Characters of Palaearctic Thin-Toed Geckos from Iran and Neighboring Countries

	Species	1	2	3	4	5	6	7	8
Cyrtopodion s. s.	*montiosalsorum*	47/57	20 – 23/103 – 115	26 – 32	12 – 13	S	2	2C	5 – 6/13 – 14
	kohsulaimanai	58/80	27 – 30/120 – 138	30 – 40	13 – 14	S	2	2 – 3C	6 – 7/11 – 12
	watsoni (Murray, 1892)	53/63	30 – 40/140 – 170	5 – 9	12 – 13	S	2	2 – 3C	5 – 8/10 – 12
	kachhense (Stoliczka, 1872)	46/45	28 – 35/100 – 128	4 – 8	12 – 14	D	3	3C	4 – 5/7 – 10
	k. ingoldbyi (Khan, 1997)	53/65	32 – 40/149 – 156	4 – 6	14 – 16	D	3	3C	4 – 6/7 – 10
	scabrum (Heyden, 1827)	53/62	16 – 23/85 – 120	4 – 7	12 – 13	S	2	2 – 3C	5 – 8/7 – 10
	sistanense Nazarov et. al 2007	57/78	31 – 44/120 – 156	6	14 – 15	S	2	3 – 4C	5 – 8/11 – 12
	potoharense (Khan, 2001)	52/64	25 – 35/121 – 145	5 – 12	12 – 15	S	2 (?)	(?)	5 – 8/10 – 12
	belaense sp. nov.	40/54	22/98 – 103	9	12	S	2	3C	4 – 5/5 – 7
agamuroides – gastrophole	*agamuroides* (Nikolsky, 1900)	40/50	28 – 30/120	2	10 – 12	M	3	2C	7/13
	golubevi Nazarov et al. 2009	52/73	23 – 28/115 – 126	4	10	S	2	2 – 3C	5 – 7/7 – 8
	gastrophole (Werner, 1917)	50/55	14 – 18/84 – 94	4	10	S	2	3D	6 – 8/10 – 13
	persepolense Nazarov et al. 2009	51/58	26 – 35/114 – 132	4	10 – 12	D	2+2	3D	6 – 8/10 – 13
Mediodactylus	*brevipes* (Blanford, 1874)	44/	20 – 22/(?)	4	10	S	2 (?)	(?)	8/12
	sagittifer (Nikolsky, 1899)	32/40	19 – 24/83 – 98	4	10 – 12	D	4	1 – 2C	5 – 6/(?)
	russowii zarudnyi (Nikolsky, 1900)	34/45	25/102	2	10 – 12		2	2D	6 – 8/10 – 12
	dehakroense Mansoor, 2009	36/48	21 – 25/92 – 102	4	10 – 12	D	4	3C	6 – 8/10 – 14
	baigii Mansoor, 2008	46/58	30 – 31/120 – 132	2	10 – 12	D-M	3	3C	6 – 8/9 – 10
	kirmanense (Nikolsky, 1900)	51/40	26 – 30/120 – 132	4	8 – 10	D-M	3	3 – 4C	8/10
	brachikolon Krysco 2007	51/62	30 – 34/137 – 158	4	10	S	2	2 – 3C	5 – 6/10 – 12

Note. 1, Maximal snout-vent length/maximal tail length, mm; 2, Scales across belly/midventrals; 3, Preanal pores; 4, Number of longitudinal rows of dorsal tubercles; 5, Subcaudal (M, small homogenous scales; S, single row of transversally enlarged subcaudals plate; D, double row of enlarged subcaudals); 6, Number of subcaudal per segment; 7, Postmentals (C, first pair in contact; D, first pair divided); 8, Number of transversal stripes on trunk and tail.

Such a situation with morphological characters does not allow us with certainty refer this new form to neither one nor the other group. Additional molecular studies are needed to test this hypothesis.

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