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## Notes on circum Indus geckos of genus *Cyrtopodion* (Squamata: Gekkonidae)

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### Summary

Morphology of *Cyrtopodion* geckos from Indus Valley is described; their evolution in circum Indus region is discussed. Natural history, reproduction, and distribution of various taxa are discussed.

### Zusammenfassung

Die Morphologie von Geckos aus dem Indus Tal wird beschrieben. Besprochen wird ferner ihre Entwicklung, Biologie, Reproduktion und Verbreitung in der Zirkum-Indus Region.

### Introduction

Geckos from considerable bulk of my herpetological collections that were made over the years from different parts of Pakistan: Balochistan (KHAN 1987, KHAN & AHMED 1987), northern Punjab (KHAN 1972, 1988, 1989), northwestern Punjab (KHAN 1980, 1986, KHAN & BAIG 1988, KHAN & TASNIM 1990), southern Punjab (KHAN 1985, 1993b) and North West Frontier Province (KHAN 1993a, 1997, KHAN & BAIG 1992). Several new species have been described, discovered, and old doubtful records are confirmed, from the material (KHAN 1980, 1988, 1989, 1991, 1992, 1993a, b, 1997, 2001).

Present paper presents details of laboratory study of *Cyrtopodion* geckos collected from circum Indus region. Several interesting morphological features have been gleaned from the study for the first time, which may provide extra help in identification of the geckos and may possibly throw light on their evolution in the circum-Indus region.

### Materials and Methods

The geckos for present study were collected by grabbing them with bare hand, as they emerged from their daytime hideouts. Their emergence time usually coincides with the call for dusk-time prayer from mosques around.

Concentrated formalin (40 %) is injected at midbelly of the gecko, which instantly kills and preserves the animal. Then the body of the gecko is arranged on a piece of muslin cloth, by straightening limbs and digits properly to facilitate morphological study. The specimens are sprayed with formalin and left for 10-20 hours for hardening, and stored in 10 % formalin.

Following data on the body of geckos is recorded: Snout-vent length = from tip of snout to anterior border of vent; Tail length = from posterior border of vent to tail tip; Snout length = anterior border of eye to snout tip; Head length = anterior border of ear to snout tip; Head breadth = greatest distance between ear openings; Number of midabdominal scales = number of scales (larger than laterals) counted in straight line across mid-belly; Number of midventral scales = number of scales between first pair of postmentals to the anterior cloacal border counted in a straight line.

The geckos used in present study bear author's personal acronym MSK, are now housed in Natural History Museum, Government College, Lahore, Punjab, Pakistan.

### ***Cyrtopodion* profile**

The kinked digitated *Cyrtopodion* geckos are defined to have a more or less distinct frontal concavity; not more than 25 interorbital scales; typical trihedral tubercles on body, arranged in regular longitudinal rows; 2-3 pairs of postmental shields, first broadly in contact with each other; 4-9 preanal pores in male, in some species both preanal and femoral pores form a continuous series; tail segmented, strongly fragile, caudal tubercles flat, keeled, mucronate, overlapping, arranged in three lateral rows; digits with three or more rows of small lateral scales, terminal segment weakly compressed; undivided subdigital lamellae in a single series (SZCZERBAK & GOLUBEV 1996).

The circum-Indus *Cyrtopodion* are a group of small geckos (total length 98-138 mm); scales on snout are large, flat, slightly tuberculated, and pentagonal; frontal concavity is rather indistinct, a distinct postnasal pit lined with small scales (Fig. 1, P); rostral scale incompletely divided, is more than twice broad than high; nostril is lined by a large supranasal (postrostral), two postnasals (one in MSK 508.82), and first supralabial, 1-3 internasals may usually be present; large, pentagonal scales on the frontorostral part of head.

Granular body scales are flat, smooth or keeled, imbricate, more or less transversally arranged, are interspersed with large trihedral tubercles arranged in 12-15 longitudinal rows across middorsum. Tubercles of median 6-8 rows are separated by 2-3 granular scales or are almost in contact with each other, two median rows extends on the tail as dorsal row of caudal tubercles. Neck and temporals with triangular tubercles. An additional neural row of smaller tubercles is present, or represented by 2-5 separate tubercles or is absent.

Belly scales broader than long or in some species longer than broad, 16 to 40 at midbody, midventrals 85-156. Male with 6 to 8 preanal pores, in some species both preanal and femoral pores form a series. Subdigital lamellae are smooth, mostly squarish, those at the angles of digits are thickened, few may be divided, 18-27 under fourth toe.

Caudal tubercles flat, strongly keeled, mucronate, arranged in three dorsolateral rows, form terminal ring of caudal segment, their sides overlap.

Colour and dorsal pattern: Dorsum light grey to light brown or light blue, with fine dark-brown suffusion. Five to seven light to dark-brown transverse rows of round, squarish spots, dashes, or blotches, often arranged in M-shaped bands or

crests (Fig. 4). In some, dark and light tubercles may alternate to form variegated pattern.

Labials and frontal may be spotted, a dark band from nasals, through eye and ear, converges at temporals meeting at back of head. Tail barred with 10-12 dark cross bars, legs and fingers barred. Ventrums white to dirty white, sometimes with suffusion of fine dark dots.

**Habitat and ecology:** The *Cyrtopodion* geckos are ecosympatric, are peculiar of arid bad land habitat with sparse grasses and stunted bushes. The sub-mountain strip running along north, northwest of Punjab and west of Sindh, best qualifies as typical habitat for these geckos. The substrate which mainly consists of mudflats, at places, is stone-mixed gravel or sandy, gets heavily eroded and cut in deep gullies by rain, the crevices and holes provide retreat to the geckos. They rarely venture in nearby rock; rather they prefer anthropogenic edifices wherever accessible. The geckos are unsocial, strongly territorial attached to a particular crevice (KHAN 1989).

**Feeding habits:** The geckos emerge at dusk from their retreats and roam about foraging in surrounding vegetation. Diet mostly includes dipterous insects and their larvae. The geckos are specially attracted under light-posts, where they stay in the peripheral darker area, picking occasional stray insect, well away from the territory of common house-gecko *Hemidactylus flaviviridis*, as *Cyrtopodion* comes in its range it disappears away, often the intruder flees for life by autotomizing its tail, which is devoured by the pursuing hemidactylid.

**Reproduction:** Geckos feed vigorously after emerging from hibernation. By May males are seen chasing females. The chosen female is followed by vigorously coughing male with swollen neck. Ultimately she stops in some relatively darker, calm corner and turns towards pursuing male, to and fro lashes her tail. Male responds by gentle lashing of his tail as he nears, suddenly it gets a bite at the side of her neck, while she struggles and scrambles, she soon calms down. Male mounts, immediately bending his cloacal region around her body reaching under that of her's. A gentle shivering of the couple indicates successful intromission. The couple remains 5-10 minutes in this position. Suddenly breaking apart, female sprints away for a distance, bends to lick its cloaca, similarly male licks its hemipenes in. The female who has copulated once, shuns the presence of males, mostly by running away, until she has ovulated.

A pair of rounded, hard-shelled white eggs is laid and left in some remote protected relatively humid recess. Juveniles are hatched within about 30-40 days, frequently encountered by mid July onward. Juveniles mostly fall prey to adults of their kind or of sympatric geckos, few reaching adult age.

## Descriptions

Similar morphology and overlapping scutellation leave little for herpetologists to work with circum-Indus *Cyrtopodion* geckos (Table 1). However, in following descriptions traditional as well as new distinguishing characters, gleaned from detailed morphological study of the *cyrtopodion* material, have been used. New characters are explained by line drawings (Fig. 1-7).

Table 1. Interspecific variations in scutellation and measurements of circum-Indus species of genus *Cyrtopodion* (numbers in parenthesis = number of specimens studied). A = *C. k. kachhense*; B = *C. k. ingoldbyi*; C = *C. kohsulaimanai*; D = *C. montiumsalsorum*; E = *C. potoharensis*; F = *C. scabrum*; G = *C. watsoni*; 1 = Snout-vent length; 2 = Tail length; 3 = Supralabials; 4 = Infralabials; 5 = Interorbitals; 6 = Scales across midbelly; 7 = Midventral scales; 8 = Subdigital lamellae under 4<sup>th</sup> toe; 9 = Postfemoral tubercles; 10 = Preanal pores; 11 = Femoral pores; 12 = Head length; 13 = Head breadth; 14 = Snout length; 15 = Oculo-orbital space; 16 = Eye diameter; 17 = Ear diameter. \* = only in male, **vr** = very rare. All measurements in mm.

	A (11)	B (11)	C (12)	D (33)	E (30)	F (77)	G (60)
1	35-46	50-55	34-58	32-47	40-52	26-57	28-53
2	38-55	57-60	64-80	42-47	43-67	31-71	49-71
3	10-12	11-12	10-11	9-11	9-13	9-13	10-13
4	8-10	8-9	7-8	7-10	7-10	7-10	5-10
5	13-17	14-17	11-13	11-13	10-17	10-16	11-15
6	28-35	32-40	27-30	20-24	24-33	16-28	30-43
7	140-158	124-156	120-138	111-115	114-170	91-106	125-225
8	18-23	19-23	23-25	21-23	19-26	18-25	21-26
9	0-8	3-5	6-8	2-4	1-12	1-12	2-15
10*	4-8	5-7	6-10	5-7	5-8	4-7	5-8
11*	0	0	11-15	10-13	0	<b>vr</b> 1-2	<b>vr</b> 1-1
12	10,0-12,0	11,0-12,5	15,4-16,0	11,0-12,0	11,0-12,0	11,0-12,0	10,0-11,0
13	9,0-10,0	9,0-10,5	12,0-15,0	9,0-9,4	9,0-10,0	9,0-10,0	9,0-10,5
14	5,0-5,2	5,0-5,2	7,0-7,4	5,0-5,2	4,7-5,0	4,2-4,5	5,2-5,4
15	2,3	2,4	4,8-5,0	3,0-4,0	2,6-3,0	2,4-3,0	2,5-3,2
16	3,0-3,5	3,0-3,9	4,0-4,2	3,0-3,5	3,0-3,6	2,9-3,7	2,8-3,2
17	1,0	1,0-1,3	2,3-2,6	1,4-1,8	1,4	1,0-1,7	1,0-1,5

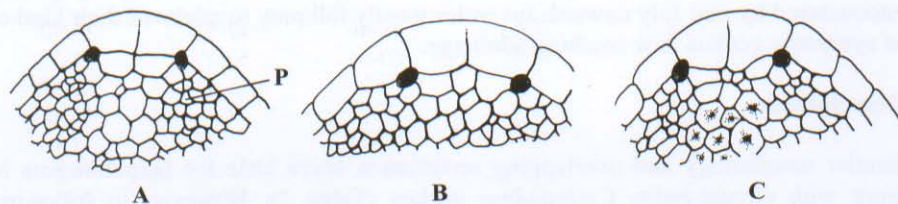


Fig. 1. *Cyrtopodion* geckos, variations in postrostral region: A, B, C; P = postnarial pit. Original drawing by H. RÖSLER on a sketch by M. S. KHAN.

*Cyrtopodion kachhense kachhense* (STOLICZKA)

(Kachh spotted ground-gecko: Kachh chapkali)

1872 *Gymnodactylus kachhensis* STOLICZKA, Proc. Asiat. Soc. Bengal, Calcutta, 1872 (1): 79.

Type locality: Kachh Province, southwest India.

Material examined: Eleven specimens from Karachi and Las Bela, Pakistan.

Diagnosis: Snout short, 5.0-5.2 mm abruptly slopes. Number of scales across midbelly 28-35. Number of scales along midventrum of body 100-128. Pore bearing scales similar to surrounding ones. Subcaudals longer than broad, in two series. Subfemorals squarish in more or less regular series.

Small geckos total length 80-101 mm.

Remarks: Table 2 quantifies variations in my collection. My pholidotic counts differ from SZCZERBAK & GOLUBEV (1996: 181-183, in parenthesis): Interorbitals 12-13 (13-16, not GVA, midventral scales), scales across midabdomen 28-29 (28-35); midventrals 140-158 (100-128); lamellae under 4<sup>th</sup> toe 21-22 (18-23); neural row of small tubercles present ("no additional dorsal tubercles", though shown in Fig. 81e, Page 182).

The differences, referred above may be apparently due to the fact that SZCZERBAK & GOLUBEV data pertains to material from whole range of taxon *kachhense* including that of *ingoldbyi*, which is now recognized as a subspecies (KHAN 1997).

Habits: MINTON (1966: 78) picked *kachhense* from under rock and Euphorbia bushes during day, and states it to be rare in human inhabitations. However, I picked several *kachhense* from walls of uninhabited huts in the suburbs of Karachi, where this species is known to remain active round the year, unlike its congeners which hibernate in winter (KHAN, 1997).

Distribution: Kachh gecko is reported from south-western India, through Indus Delta up to Las Bela in south-eastern Balochistan. Reports from Lalian and Rabwah (KHAN 1972) and Attock (MERTENS 1969) are misidentifications, we collected only *Cyrtopodion scabrum* around Attock during herpetological survey of Potowar Plateau, (KHAN & BAIG 1988).

Table 2. Intraspecific variations in scutellation and measurements: *Cyrtopodion kachhense kachhense*: A = Karachi; B = Las Bela; and *Cyrtopodion kachhense ingoldbyi*: C = Ladha (Waziristan); D = Khar Gardens (Fort Munro); E = Maal Pattan (Mianwalli); rest as Table 1.

	A (6)	B (4)	C (3)	D (2)	E (6)
1	32-42	34-46	48-49	47-51	37-50
2	38-45	45-55	60-64	52-59	49-65
3	10-12	10-12	11	11-12	10-12
4	7-10	9-10	9	8-9	9-10
5	13	16-17	13-14	13-16	13-16
6	28-29	29-35	34-36	32-35	32-35
7	140-159	132-135	124-155	130-135	120-156
8	18-22	21-23	19-21	21-23	21-23
9	0-8	6-9	3	3-4	3-5
10*	4-5	4-8	6	4	6
11*	0	0	0	0	0

***Cyrtopodion kachhense ingoldbyi* (PROCTOR) new combination**  
(Westem rock gecko: Chattani chapkali)

1923 *Gymnodactylus ingoldbyi* PROCTOR, J. Bombay Nat. Hist. Soc., **29**: 121.  
1997 *Cyrtopodion kachhensis ingoldbyi* KHAN, Russian J. Herptol., **4**: 83-88.

**Type locality:** Ladha, Dera Ismael Khan, south-eastern North Western Frontier Province, Pakistan.

**Material examined:** 11 specimens from Sulaiman Range, south-western Punjab and Dera Ismael Khan, North Westem Frontier Province, Pakistan.

**Diagnosis:** Snout short, 5.0-5.2 mm, abruptly slopes. Number of scales across midbelly 32-40. Number of scales along midventral 124-156. Subcaudals longer than broad, in two rows. Dorsal tubercles laterally pinched-in, with a distinct sharp dorsal keel. A ventro-lateral fourth row of caudal tubercles. Subfemorals squarish, more or less in regular series.

Small geckos of total body-tail length 86-116 mm.

**Colour:** Body light to dark brown with darker spots arranged in 4-6 transverse bands. Tail barred with 9-11 darker bands.

**Variations:** Table 2 quantifies variations in my collection. Geckos from Khar Gardens are longer in snout-vent length (47-51 mm), while those from Maal Pattan have longer tail (49-65 mm) and more midventral scales.

MERTENS (1969) placed *Cyrtopodion ingoldbyi* (PROCTOR, 1923) in synonymy of *Cyrtopodion watsoni*.

**Range:** Sulaiman Range, south-western Punjab and Dera Ismael Khan, southern North Western Frontier Province, Pakistan.

***Cyrtopodion kohsulaimanai* (KHAN)**  
(Sulaiman Range gecko: Koh-Sulaimani chapkali)

1991 *Tenuidactylus kohsulaimanai* KHAN, J. Herpetol., **25**: 199-204.

**Type locality:** Sakhi Sarwar, Dera Ghazi Khan, Punjab, Pakistan.

**Material examined:** 12 specimen from Sakhi Sarwar, at the foot of Sulaiman Range, Dera Ghazi Khan, northwest Punjab, Pakistan.

**Diagnosis:** Snout distinctly long, 7.0-7.4 mm, with gradual slope. Number of scales across midbelly 20-23. Number of scales along midventrum of body 112-115. Subcaudals broader than long, in a single median row. Preanal and femoral pores in a continuous series, in male. Dorsal tubercles not in contact with each other. Subfemorals rectangular, in regular series.

Large geckos total length 102-138 mm.

**Variations:** Table 1 quantifies variations, snout-vent length 34-58 mm, tail 64-80 mm; preanal pores 6-10, femorals 11-15; midabdominals 27-30, midventrals 120-138.

**Habitat and habits:** The stone mixed gravel substratum at the foothills of Sulaiman Range, receives meagre rainfall, natural vegetation consists of stunted sparse grasses and bushes (KHAN 1980, 1991).

Geckos were rarely found on rocks; they were mostly picked from crevices under road bridges and caves. Nocturnal, stays in relatively lighted area of caves during day, when disturbed flees in darker part of the cave, into its crevice.

Distribution: Known only from around the foothills of the Sulaiman Range, Dera Ghazi Khan, Punjab, Pakistan.

Table 3. *Cyrtopodion montiumsalsorum*: Intraspecific variations in scutellation and measurements: A = Dandot; B = Rohtas Fort; C = Pir peahai; E = Iskinderabad; D = Goalpur; br = broken; rest as Table 1.

	A (1)	B (8)	C (15)	D (4)	E (5)
1	48,5	42,0-45,5	42,0-47,3	45,0-46,5	32,0-44,2
2	br	42,0-47,2	42,0-47,0	42,0-46,4	42,0-45,0
3	9	9-11	9-10	9-11	9-11
4	8	9-10	8-9	7-9	8-9
5	12	11-13	12	10-12	12
6	23	22-23	21-24	20-22	21-23
7	113	112-115	111-115	110-118	112-113
8	22	21-23	20-22	22-23	22-23
9	4/4	3/4	2/2	3/3	2/3
10*	7	5-6	3-7	7	6-7
11*	10-12	12-13	12-13	11-13	10-12

***Cyrtopodion montiumsalsorum* (ANNANDALE)**  
(Salt Range ground-gecko: Koh-namak chapkali)

1913 *Gymnodactylus montiumsalsorum* ANNANDALE, Rec. Ind. Mus. Calcutta, 9 (5): 313.

Type locality: Salt Range, Punjab, Pakistan.

Material examined: 33 specimens from different localities (Table 3).

Diagnosis: KHAN (1989) redescribed this long lost species. Snout short, 5.0–5.2 mm abruptly slopes. Scales across midbelly 27–30. Scales along midventrum of body 120-138. Subcaudals broader than long, in a single median row. Preanal and femoral pores in a continuous series, in male. Tubercles in median dorsal rows almost in contact with each other. Subfemorals mostly rectangular, in regular series. Medium size geckos, total length 71–103 mm.

Variations: Table 3 quantifies variations in my collection of this species. Geckos are fairly consistent and homogenous in scutellation and measurements, however those from Rohtas Fort are longer.

Habitat and habits: In nature the gecko inhabits subterranean crevices and holes in mudflats, desolate, dry bad land with sparse grasses and rare stunted bushes. It was also picked from walls of anthropogenic edifices like under loose plastering of walls of Rohtas Fort, however, few from crevices in surroundings loose sandstone rocks (KHAN 1986). Habitat around Rohtas Fort is humid and greener with lush growths of grasses and bushes, as it is in proximity of Jhelum River. The terrain is mostly sandy, composed of deteriorating sandstone.

Several geckos were observed in crevices among sandstone blocks used in the construction of Rohtas Fort. It does not extend in the covered area, which is overwhelmingly occupied by common house gecko *Hemidactylus flaviviridis*.

**Reproduction:** Breeds during May-July. At this time preanal and femoral pores of male are filled with secretions, however, during post breeding period (September-March) femoral pores are reduced to pinholes, while preanal pores remain large and filled throughout the year (KHAN 1989).

**Distribution:** The gecko has wide range in the southern Salt Range extending to Rohtas Fort, Jhelum, Punjab, Pakistan (KHAN & BAIG 1988).

Table 4. *Cyrtopodion potoharensis*: Intraspecific variations in scale counts and measurements: A = Chinji village and Rest House; B = Nazampur; C = Jhangit Dahri; D = Jaffer City; E = Soan Sakesar; F = Malal; G = Lawrence Pur; rest as Table 1.

	A (7)	B (3)	C (2)	D (2)	E (7)	F (3)	G (6)
1	44-50	44-50	45-52	46-50	40-50	47-51	44-51
2	60-67	47-53	45-48	47-55	49-64	43-51	50-51
3	9-11	11-12	11-12	11-13	9-13	10-12	10-12
4	7-9	8-9	8-9	8-9	9-9	9-8	9-10
5	13-15	13-17	12-13	13-14	12-15	10-15	12-15
6	25-30	26-32	26-33	28-32	24-32	27-29	29-31
7	120-130	126-170	114-124	121	121-124	123-145	121-122
8	22-24	20-22	20-22	21-23	21-24	21-22	19-26
9	6-10	5-10	1-8	6-7	5-8	7-9	7-12
10*	5-7	6-7	6	7-8	5	6-7	5-6
11*	0	0		0	0	0	0

***Cyrtopodion potoharensis* KHAN**  
(Potohar gecko: Potohari chapkali)

2001 *Cyrtopodion potoharensis* KHAN, Pakistan J. Zool., 33 (1): 15-16.

**Type locality:** Lawrancepur, Potwar Plateau, Punjab, Pakistan.

**Material examined:** About 30 specimens from different localities in the Salt Range (Table 4).

**Diagnosis:** Snout short, 4.7-5.0 mm, abruptly slopes. Abdominals more or less squarish, 25-35 across midbelly. Midventrals 120-170. Subfemorals squarish, regular. Preanal pores mostly arranged angularly, the pore bearing scales large.

Medium size geckos, total body-tail length 100-118 mm.

**Colour:** Dorsum light bluish with 3-4 squarish dark spots of different sizes, arranged in 5-8 transverse series from nape to the level of vent, tail barred with 10-12 dark bands. Limbs and digits heavily barred with black.

**Variations:** Table 4 quantifies variations in this species. Geckos from Jhangir Dahri are largest in snout-vent length (45-52 mm), while those from Chinji village have longer tails (60-67 mm); those from Nazampur have highest number of midventrals.

Distribution: Collected from different localities (32-33°34' N, 72-73° E) in central Potowar Plateau, Pakistan.

*Cyrtopodion scabrum* (HEYDEN)

(Common tuberculate ground-gecko: Toorani chapkali)

1827 *Stenodactylus scaber* HEYDEN in RÜPPELL, Atl. Reise nördl. Afr. Rept.: 15.

Type locality: In the vicinity of Tor mountains, Sinai.

Material examined: About 77 specimens from different localities in Punjab (Table 5).

Diagnosis: Snout short, 4.2-4.5 mm, abruptly slopes. Abdominal scales broader than long, 16-23 across midabdomen. 95-110 scales along mid-ventrum. Subcaudals in a single series of broad scales. Subfemorals rectangular, arranged in regular series. Preanal-pore bearing scales of the size of surrounding scales.

Medium size geckos, total body-tail length 88-126 mm.

Variations: Table 5 quantifies variations in my collection, differing little from SZCZERBAK & GOLUBEV (1996), except that my geckos are smaller in length than those collected from Middle East.

MSK 450.92 and MSK 550.97, two males from Rabwah (Table 5), have both preanal and femoral pores in a continuous series, however, differ from *montiumsalsorum* in having more scales at midbelly and along mid-ventrum. Moreover, are larger in the series collected from Rabwah. They were probably collected from mudflats close to rocky outcrop in the east of Rabwah City, with several gecko now put in *scabrum*.

The midabdominal and midventral counts are lowest in geckos from southern Punjab: Uchh Sharif, Dera Nawab, and Sadiq Abad (Table 5), the numbers increase toward north (20-25 in Rabwah), maximum (23-28) is reached in material from Khazrina, Balochistan. However, presence of postfemoral tubercles is infrequent, not recorded in Bakkhar, Makerwal, Sadiq Abad, and Uchh Sharif, while highest 1-17 are recorded in Rabwah population.

Habitat and habits: The gecko has been picked from holes and crevices in rocky hill slopes with grass cover (MINTON 1966), and from mudflats at foothills of low hills in Balochistan and Punjab (KHAN 1972, 1986, 1987, 1993, KHAN & AHMED 1987). It is frequently picked from loose stonewalls demarcating fields in hilly regions. In proximity of human inhabitations it readily invades crevices in outer compound walls, not venturing inside where common house gecko *Hemidactylus flaviviridis* is territorially dominant. However, *scabrum* is said to be common house gecko in villages in the foothills of Khuzestan, Iran, it is rarely seen away from human inhabitations (ANDERSON 1999).

Distribution: It ranges from African coast to the Red Sea, throughout Arabian Peninsula and Southwest Asia (including) Syria, southern Turkey, Iraq, Iran, and Afghanistan. In Pakistan it is widely distributed in Sindh Valley, reaches the western border of Thar Desert into Rajasthan (BISWAS & SANYAL 1977).

Extends northward in plains and sub mountains of Punjab and Waziristan, NWFP, usually confining to low altitudes. Widely distributed along Iran-Balochistan-Afghanistan border and Makran coastal strip.

Table 5. *Cyrtopodion scabrum*: Intraspecific variations in scale counts and measurements A = Bakkhar, B = Makerwall, C = Sadiq Abad, D = Dera Nawab, E = Uchh Sharif, F = Rabwah, G = Khazrina, H = Naushki, I = Akhora Khatak, br = broken, rest as Table 1.

	A (4)	B (5)	C (3)	D (8)	E (4)	F (32)	MSK 450	MSK 550	G (9)	H (9)	I (1)
1	42-43	45-47	51-56	33-51	42-46	45-46	46,1	45	26-51	49-55	47
2	56-57	51-52	54-56	46-65	49-51	55-56	58	br	31-63	55-71	br
3	9-11	10-12	10-11	10-12	10-13	11-12	11	11/12	9-11	9-13	11/12
4	9-10	8-10	9-10	8-10	8-9	8-9	8-9	9	8-9	7-10	8/9
5	12-13	10-11	10-14	13-14	12-14	12-13	16	14	13-15	10-14	12
6	20-21	20-21	20-21	19-21	16-19	20-25	25	25	23-28	19-23	21
7	95-109	103-110	94-102	96-100	99-102	108-110	122	120	91-120	89-109	105
8	22-23	18-19	20-21	20	24-25	22-24	18	23	21-24	20-23	21
9	0	0	0	3/3	0	1/7	3/4	12/11	4-6	6-7	3/3
10*	4-5	4-6	4-5	5-6	5-6	4-6	7	6	5-7	4-5	0
11*	0	0	0	0	0	0	12	12/11	0	0	0

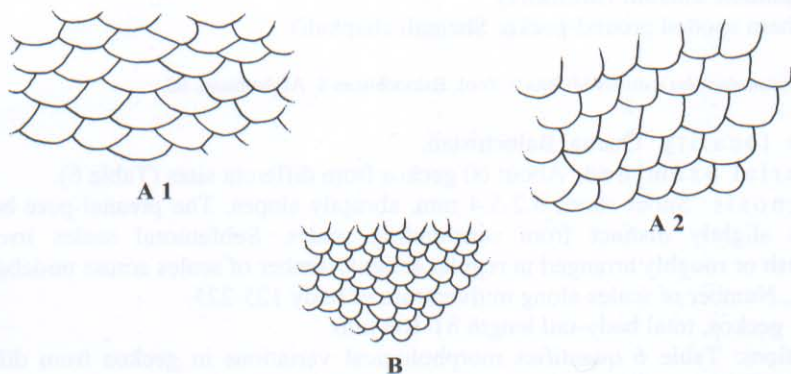


Fig. 2. Midabdominal scales: A. 1+2. *C. scabrum*; B. *C. watsoni*. Original drawing by H. RÖSLER on a sketch by M. S. KHAN.

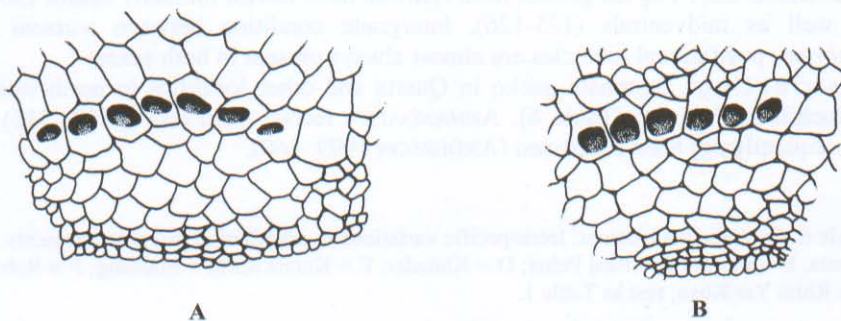


Fig. 3. Preanal region: A. *C. scabrum*; B. *C. watsoni*. Original drawing by H. RÖSLER on a sketch by M. S. KHAN.

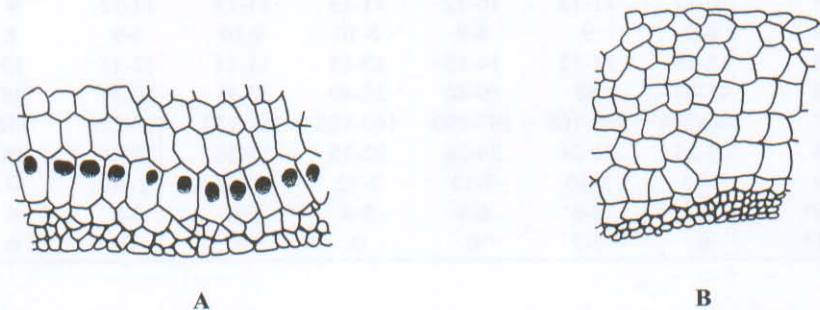


Fig. 4. Subfemoral scales: A. *C. montiumsalsorum* and *C. kohsuilaimanai*, B. *C. scabrum* and *C. watsoni*. Original drawing by H. RÖSLER on a sketch by M. S. KHAN.

*Cyrtopodion watsoni* (MURRAY)

(Northern spotted ground-gecko: Shamali chapkali)

1892 *Gymnodactylus watsoni* MURRAY, Zool. Baloochistan S. Afghanistan: 68.

Type locality: Quetta, Balochistan.

Material examined: About 60 geckos from different sites (Table 6).

Diagnosis: Snout short, 5.2-5.4 mm, abruptly slopes. The preanal-pore bearing scales slightly distinct from surrounding scales. Subfemoral scales irregular, squarish or roughly arranged in regular series. Number of scales across midabdomen 32-42. Number of scales along midventrum of body 125-225.

Small geckos, total body-tail length 81-103 mm.

Variations: Table 6 quantifies morphological variations in geckos from different sites in Pakistan. Those from Khuzdar are longest (106-116 mm), while Quetta specimens have higher midabdominal scales (41-43), two specimens from Khuzdar, MSK 508.87 a male, and MSK 595.87 a female, both have 32 midabdominals; 152-170 midventrals, however, a female MSK 611.86 has maximum number of midventrals 225. The six geckos from Rabwah have lowest midbelly counts (30-37) as well as midventrals (125-126), intergrade condition between *watsoni* and *scabrum*; postfemoral tubercles are almost always present in both sexes.

Distribution: Dominate gecko in Quetta and other localities in north-western Balochistan, Pakistan (Table 6). ANNANDALE's record from Iran (1913: 315) has subsequently not been confirmed (ANDERSON 1999: 160).

Table 6. *Cyrtopodion watsoni*: Intraspecific variations in scutellation and measurements: A = Quetta; B = Peshin; C = Panj Pehai; D = Khuzdar; E = Karaiz north + Mastung; F = Rabwah; G = Rhim Yar Khan; rest as Table 1.

	A (5)	B (3)	C (5)	D (6)	E (7)	F (33)	G (1)
1	45-51	48-50	43-51	45-53	28-52	47-51	38,9
2	54-65	60-65	58-71	61-63	49-63	51-65	br
3	10-12	11-13	10-12	11-13	11-13	11-12	9
4	8-9	9	8-9	8-10	9-10	5-9	8
5	12-15	11-12	14-15	13-15	11-14	12-15	13
6	41-43	40	40-42	32-40	32-41	30-37	45
7	140-225	150-168	187-190	140-155	161-172	125-126	138
8	23-25	21-24	24-26	22-25	25-26	22-24	26
9	8-15	5-10	7-13	7-12	9-10	2-10	0
10*	5-7	5-6	6-8	5-6	6-8	6-8	6
11*	0	1-1	0	0	0	0	0

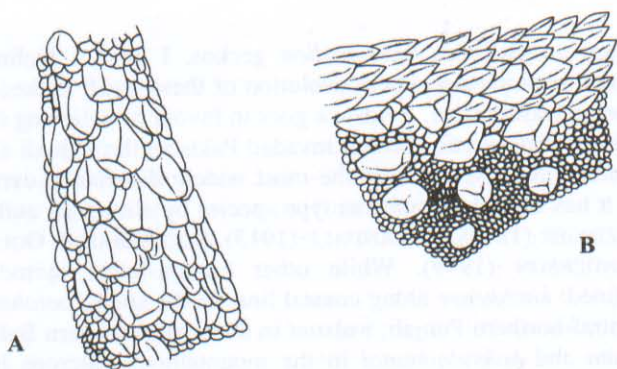


Fig. 5. *C. scabrum*: scutellation: A. Shank; B. Thy. Original drawing by H. RÖSLER on a sketch by M. S. KHAN.

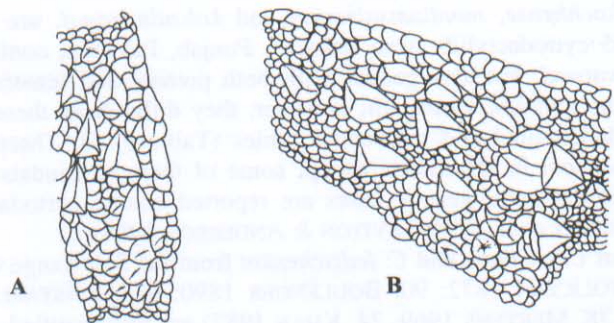


Fig. 6. *C. watsoni*: scutellation: A. Shank; B. Thy. Original drawing by H. RÖSLER on a sketch by M. S. KHAN.

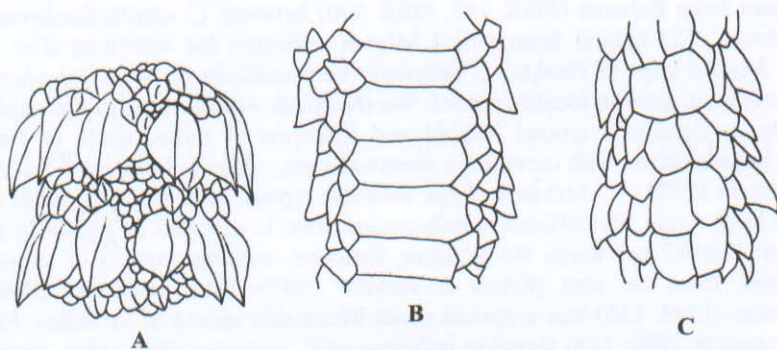


Fig. 7. Caudal region: A. *C. scabrum*, tail dorsum showing caudal tubercles. Subcaudals: B. *C. scabrum*, C. *C. kachhense*. Original drawing by H. RÖSLER on a sketch by M. S. KHAN.

## Discussion

While reviewing circum-Indus *Cyrtopodion* geckos, I have a feeling that I am looking at a large amphitheatre where evolution of these small kinked-toed geckos had or is still being taking place. Evidence goes in favour of believing that *scabrum*, a widely distributed Palaearctic species, invaded Pakistan through all along western Iran-Afghan border. Now *scabrum* is the most widely distributed cyrtodactylid of the region and it has been designated as type species by almost all authors working on geckos: FITZINGER (1843), ANNANDALE (1913), SZCZERBAK & GOLUBEV (1986, 1996) and ANDERSON (1999). While other circum-Indus cyrtodactylids are regionally confined: *kachhense* along coastal line, in the south, *potoharensis* in the Salt Range, central-northern Punjab; *watsoni* in the central western Balochistan and *montiumsalsorum* and *kohsulaimanai* in the mountainous outcrops in the north-western Punjab. Common ancestry of these taxa from a *scabrum*-like ancestor is strongly indicated by their similar morphology, overlapping scutellation, heterogeneity among cyrtodactylids collected from a locality. Suggesting that inbreeding freely occurs in the areas of sympatry. The genomes, which are relatively more isolated, like *kachhense*, *montiumsalsorum* and *kohsulaimanai*, are less heterogeneity. The 65 cyrtodactylids from Rabwah, Punjab, Pakistan, contain not only *scabrum* and *watsoni*, but also geckos with both preanal and femoral pores like *montiumsalsorum* and *kohsulaimanai*; however, they differ from these taxa in the number of midabdominal and midventral scales (Table 5, 6). There are geckos *scabrum* and *watsoni* in all criteria except some of their subcaudals are divided (*kachhense*). Similar heterogenetic cases are reported among cyrtodactylids from elsewhere (GORELOV et al. 1974, LEVITON & ANDERSON 1984).

Earlier reports of *C. caspium* and *C. fedtschenkoii* from the Salt Range or elsewhere in Pakistan (STOLICZKA 1872: 90, BOULENGER 1890: 62, CONSTABLE 1949: 82, MINTON 1966: 78, MERTENS 1969: 24, KHAN 1987) are misidentified as *C. montiumsalsorum* (KHAN 1989, 1991), since Pakistan does not fall in the range of these species. The tailless male (S.A.M. 691, personal collection of MINTON: 23 preanofemoral pores, supralabials 10, lower 9, 10 rows of dorsal tubercles, scales across midbelly 23) may be another example of transitional condition observed in two specimens from Rabwah (MSK 450, MSK 550) between *C. montiumsalsorum* and *C. scabrum*. The habitat from which Minton collected his specimen (flat, sandy desert, 2 miles west of Nushki) is definitely very unlikely for a *Cyrtopodion*, perhaps there is an error in locality record. We (KHAN & AHMED 1987) found *scabrum*, the only cyrtodactylid around Nushki and Khazrina (7 miles, south of Nushki), always in association with crevices in stonewalls etc., close to human inhabitations. BLANFORD's (1874) *C. brevipes* (Type locality: Aptan, near Bampur, 3000 ft, Jaz Murian Depression, Balochistan, south-eastern Iran) is reported by MURRAY (1892: 68) from Nushki and Kirta, Balochistan, Pakistan, without support of subsequent collections from the area (KHAN & AHMED 1987). Like MERTENS (1969: 7), ANDERSON (1999: 155) was sceptical about MURRAY's record of localities. Fig. 71, (in ANDERSON 1999: 155) showing holotype of *C. brevipes* (ZSI 3465), except for its dorsal pattern which is stated to be streaked (not shown), otherwise strongly resembles *C. scabrum* in scale morphology of subfemoral, preanal and subcaudal

regions. However, SZCZERBAK & GOLUBEV (1996: 181, footnote) regard *C. brevipes* closer to *kachhense* because of its smaller dorsal tubercles and fewer preanal pores. *C. brevipes* may present another example of intergrade between two circum-Indus taxa *scabrum* and *kachhense*.

Rabwah is a small town (approximate population 100,000) situated on the western bank of Chenab River, Punjab, Pakistan. The town is situated at a high platform of barren, stony gravel, which slopes westward to get salted and dusty (MINTON 2001: 135), where it is fringed with fertile flood plain of Chenab River, is heavily cultivated. An outcrop of low metamorphosed Precambrian rocks runs along northeast of the town. The rocky area is heavily modified recently; some rocks are levelled due to heavy activity of stone crushing industry.

I collected the heterogeneous *Cyrtopodion* geckos from gullied gravel strip bordering the rocks from holes and crevices in ground and stonewall of huts, and mudflats along nearby roads and railway tract, close to the agricultural area. Though cyrtopodions were dominant geckos in the area, few *Hemidactylus flaviviridis* were also picked from stonewalls and *H. brookii* from the mud flats.

The geckos were collected between 1972-1999; unfortunately no record of the niche (stone-walls or mudflats) from where they were collected was kept.

### Literature Cited

- ANDERSON, S. C. (1999): The lizards of Iran. – Contrib. to Herpetol., Vol. **15**, I-VII, 1-441.
- ANNANDALE, N. (1913): The Indian geckos of the genus *Gymnodactylus*. – Rec. Indian Mus., **9**: 309-326.
- BISWAS, S. & D. P. SANYAL (1977): Fauna of Rajasthan, India, Part: Reptilia. - Rec. Zool. Survey India, **73**: 247-269.
- BLANFORD, W. T. (1874): Description of lizards from Persia and Baluchistan. – Ann. Mag. nat. Hist., London, (4) **13**: 453-455.
- BOULENGER, G. A. (1890): Fauna of British India, including Ceylon and Burma. Reptilia and Batrachia. - London.
- CONSTABLE, D. (1949): Reptiles from the Indian Peninsula in the Museum on Comparative Zoölogy. – Bull. Mus. comp. Zoöl. Cambridge Mass., **103**: 59-160.
- FITZINGER, L. I. (1843): Systema reptilium. Amblyglossae. – Vindobonae (Braumüller & Seidel), 106 S.
- GORELOV, Y. K., I. S. DAREVSKY, N. N. SZCZERBAK(1974): Dwa nowych dlja fauny SSSR wida jastscheriz is semejstwa gekkonow. – Verstn. Zool., **1974** (1): 33-39.
- KHAN, M. S. (1972): Checklist and key to the lizards of Jhangh District, western Pakistan. – Herpetologica, Lawrence, **28** (2): 94-98.
- KHAN, M. S. (1980): A new species of gecko from northern Pakistan. – Pakistan J. Zool., **12**: 11-16.

- KHAN, M. S. (1985): An interesting collection of amphibians and reptiles from Cholistan Desert, Punjab, Pakistan. - J. Bombay Nat. Hist. Soc., **82**: 144-148.
- KHAN, M. S. (1986): A noteworthy collection of amphibians and reptiles from northwestern Punjab, Pakistan. - The Snake, **18**: 118-125.
- KHAN, M. S. (1987): Checklist, distribution and zoogeographical affinities of herpetofauna of Balochistan. - Proceedings of 7th Pakistan Zoological Congress, **7**: 105-112.
- KHAN, M. S. (1988): A new cyrtodactylid gecko from northwestern Punjab, Pakistan. - J. Herpetol., Athens, **22** (2): 241-243.
- KHAN, M. S. (1989): Rediscovery and redescription of the highland ground gecko, *Tenuidactylus montiumsalsorum* (ANNANDALE, 1913). - Herpetologica, Lawrence, **45** (1): 46-54.
- KHAN, M. S. (1991): A new *Tenuidactylus* gecko from the Sulaiman Range, Punjab, Pakistan. - J. Herpetol., Athens, **25** (2): 199-204.
- KHAN, M. S. (1992): Validity of the mountain gecko *Gymnodactylus walli* INGOLDBY, 1922. - Herpetol. J., London, **2** (4): 106-109.
- KHAN, M. S. (1993a): A new angular-toed gecko from Pakistan, with remarks on the taxonomy and a key to the species belonging to genus *Cyrtodactylus* (Reptilia: Sauria: Gekkonidae). - Pakistan J. Zool., **25** (1): 67-73.
- KHAN, M. S. (1993b): A new sandstone gecko from Fort Munro, Dera Ghazi Khan District, Punjab, Pakistan. - Pakistan J. Zool., **25** (3): 217-221.
- KHAN, M. S. (1997): Validity, generic redesignation, and taxonomy of western rock gecko *Gymnodactylus ingoldbyi* PROCTER, 1923. - Russ. J. Herpetol., **4** (2): 83-88.
- KHAN, M. S. (2001): Taxonomic notes on angular-toed Gekkota of Pakistan, with description of a new species of genus *Cyrtodactylus*. - Pakistan J. Zool., **33** (1): 13-24.
- KHAN, M. S. & N. AHMED (1987): On a collection of amphibians and reptiles from Baluchistan, Pakistan. - Pakistan J. Zool., **19**: 361-370.
- KHAN, M. S. & K. J. BAIG (1988): Checklist of the amphibians and reptiles of District Jhelum, Punjab, Pakistan. - The Snake, **20**: 156-161.
- KHAN, M. S. & K. J. BAIG (1992): A new *Tenuidactylus* gecko from northeastern Gilgit Agency, north Pakistan. - Pakistan J. Zool., **24** (4): 273-277.
- KHAN, M. S. & R. TASNIM (1990): A new gecko of the genus *Tenuidactylus* from northeastern Punjab, Pakistan, and southwestern Azad Kashmir. - Herpetologica, Lawrence, **46** (2): 142-148.
- LEVITON, A. E. & S. C. ANDERSON (1984): Description of a new species of *Cyrtodactylus* from Afghanistan with remarks on the status of *Gymnodactylus longipes* and *Cyrtodactylus fedtschenkoi*. - J. Herpetol., Athens, **18** (3): 270-276.

- MERTENS, R. (1969): Die Amphibien und Reptilien West-Pakistans. – Stuttg. Beitr. Nat., **197**: 1-96.
- MINTON, S. A. (1966): A contribution to the herpetology of West Pakistan. – Bull. Amer. Mus. Nat. Hist., **134** (2): 29-184.
- MINTON, S. A. (2001). Life, love and reptiles: an autobiography. – Malabar (Krieger Publishing Company).
- MURRAY, J. A. (1892): The zoology of Baloochistan and southern Afghanistan. – Education Soc., Bombay, 83 pp.
- PROCTOR, J. B. (1923): Notes on a collection of reptilia from Waziristan and the adjoining portion of the N. W. Frontier Provinces. In: INGOLDBY, C. M., and J. B. PROCTOR. – J. Bombay Nat. Hist. Soci., **29**: 117-135.
- STOLICZKA, F. (1872): Notes on some new species of reptilia and amphibia, collected by Dr. W. Waagen in north-western Panjab. – Proc. Asiat. Soc. Bengal, **1872**: 124-131.
- SZCZERBAK, N. N. & M. L. GOLUBEV (1986): Gekkony fauny SSSR i sopredelnykh stran. – Kiew (Naukowa Dumka), 231 S.
- SZCZERBAK, N. N. & M. L. GOLUBEV (1996): Gecko fauna of the USSR and contiguous regions. – Contrib. to Herpetol., Vol. **13**, I-IX, 1-233.

#### APPENDIX 1

*Cyrtodactylus battalensis* — MSK 0763.89; *Cyrtodactylus collegalensis* — BMNE 82.4.14.28-29; *Cyrtodactylus dattanensis* — MSK 0056.78; *Cyrtodactylus fasciolatus* — BMNE 1913.11.11.2; *Cyrtodactylus nebulosus* — BMNH 82.4.14.32-33; *Cyrtodactylus oldhami* — BMNH 1916.6.22.4; *Cyrtodactylus pulchellus* — BMNH 1916.3.27.1-2; *Cyrtodactylus triedruss* — BMNH 68.3.17.11-12; *Cyrtodactylus yarkandensis* — BMNH 72.3.22.4; *Cyrtopodion chitralensis* — BMNH 1946.8.23.19, Chitral; *Cyrtopodion montiumsalsorum* — BMNH 1904.11.19.1; *Gymnodactylus chitralensis* — BMNH 1946.8.23.19; *Gymnodactylus stoliczkai* (photograph) — NMW 16756; *Gymnodactylus walli* — BMNH 1910.7.12.1, Chitral; *Tenuidactylus baturensis* — BMNH 1990.3; *Tenuidactylus baturensis* — MSK 0771.87; *Tenuidactylus caspium* — SR 2546:16713-14; *Tenuidactylus fedtschenkoi* — SR 1078:8837-8, Afghanistan, Mazari Sharif; *Tenuidactylus fortmunroi* — BMNH 1990.4 (MSK 0626.90); *Tenuidactylus indusoani* — MSK 0467.86; *Tenuidactylus longipes* — CAS 115944, SR 307:3267-68; *Tenuidactylus longipes voraginosus* — CAS 130323, Afghanistan, Kandhar; *Tenuidactylus montiumsalsorum* — BMNH 1904.11.19.1 and MSK 014.86; *Tenuidactylus rohtasfortai* — USNM 284133; *Tenuidactylus turcmenicum* — SR 961:8016-17.

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