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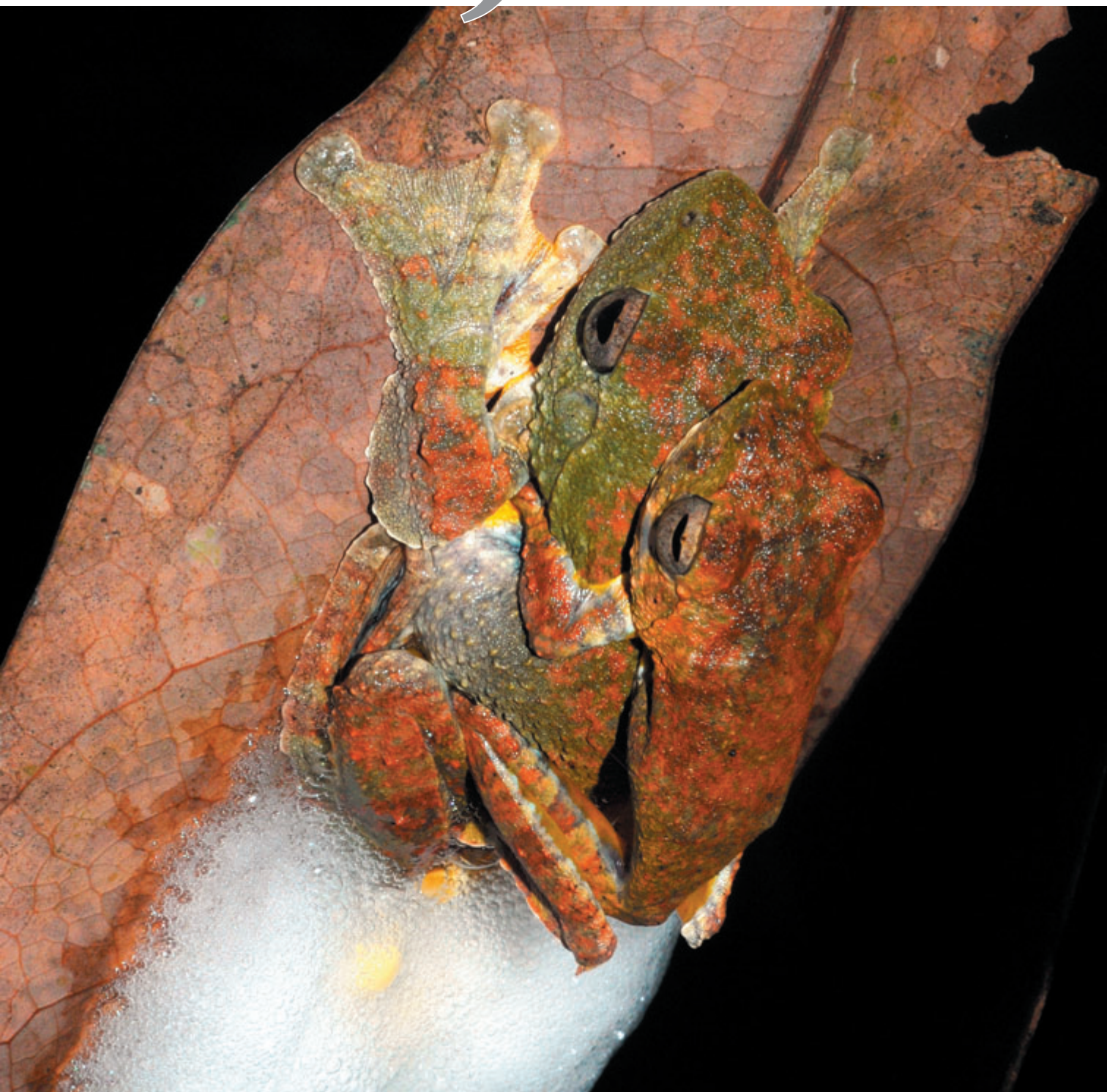

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# BIOLOGY AND DISTRIBUTION OF GECKOS OF GENUS *Indogekko* KHAN, 2003 (SAURIA: GEKKONIDAE)

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*Submitted December 1, 2005.*

Notes on morphology, ecology and distribution of geckos of genus *Indogekko* Khan, 2003 are provided, with comments on their distribution in upper Indus Valley and circum Hindukush Region (northwestern Pakistan, southwestern Afghanistan, northeastern Iran and southern Turkmenistan.

**Keywords:** Sandstone geckos; Morphology; Biology; Distribution.

## INTRODUCTION

Sandstone rocks are widely scattered in the sub-Himalayas of Pakistan, marking ancient river beds. Khan (1988) discovered that the sandstone rocks are a natural habitat for a series of peculiar long-legged angular-toed geckos from Pakistan (Khan, 1988, 1993; Khan and Tasnim, 1990; Baig, 1998). When first discovered the sandstone geckos were placed in genus *Tenuidactylus* Szczerbak and Golubev, 1984. Later, as the peculiarities of their morphology was realized, they were found to be distinct from *Tenuidactylus* and *Cyrtopodion*, the other angular-toed geckos of the area. Khan (2003) erected a new genus, *Indogekko*, to accommodate them. A similar group of "long-legged" geckos had already been described from the sandstone rocks in western Afghanistan, eastern Iran and southern Turkmenistan: *Gymnodactylus longipes* Nikolsky (1896) *G. microlepis* (Lantz, 1918), and *Cyrtodactylus voraginosus* (Leviton and Anderson, 1984). Khan (2003) also included these long-legged geckos in the new genus *Indogekko*.

The present report presents notes on the morphology, ecology and distribution of geckos of genus *Indogekko* in Pakistan and the Palearctic Region. Morphology of the long-legged is reviewed, relationship between Palearctic and Pakistani species are established, moreover, most of the information about these geckos was published in journals not available to most readers in the west

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## *Indogekko* PROFILE (Table 1)

Long-legged thin bodied geckos with body and tail moderately depressed and robust (*rohtasfortai*, *rhodocaudus*) to much depressed and thin (*indusoani*, *fortmunroi*); tail much longer than body; naris posterolateral, lined by rostral, postrostral, a pair of nasals and first supralabial; the postrostrals are as broad as half the width of rostral scale, separated mesially by one (*indusoani*) or three (*rohtasfortai*) and *longipes* species and subspecies 1–3 granular scales; head covered with heterogeneous, hexagonal, slightly tubercular, and juxtaposed scales, largest on snout, interorbital and preorbital regions; temporal and occipital granular scales interspersed with few larger round tubercles; interorbital scales 12–16; supralabials 9–13; mental scale large, triangular, first pair of three postmentals narrowly in contact with each other behind the tip of mental scale; infralabials 7–10; gular scales granular, pentagonal, juxtaposed, those on throat broader than long arranged in transverse series; scales on chest broad, triangular, imbricate, arranged obliquely; scales at midabdomen, between ventrolateral scales, 14–18 (*rhodocaudus*), 21–24 (*indusoani*), 24–33 (*rohtasfortai*), 21–28 (*fortmunroi*), 30–40 (*longipes* species and subspecies), are longer than broad, imbricate, largest present anterior to the precloacal pores; midventral scales lowest 92–106 (*rhodocaudus*), highest 160–163 (*fortmunroi*), 129–132 (*indusoani*), 92–106 (*rhodocaudus*), 140–153 (*longipes* subspecies) from the suture between first pair of submentals to anterior of vent.

Dorsals granular, juxtaposed, slightly tubercular arranged in transverse rows, are interspersed with 12 rows of flat, keelless large round to oval scales (tubercles). Tubercles are four to five times larger than dorsal granular scales, is surrounded by 4–5 granular scales. Tail longer than body, segmented, fragile at any point along the length. There are three rows of trihedral tubercular scales running along its latero-dorsal sides, progressively decreasing in size distally, so that by the mid-tail they have considerably diminished in size. A single series of broad subcaudals, one pair to a segment. Tails of most of the collected specimens of all species are regenerated, specimens with entire tails are rare.

Limbs long, claws of the addressed fore limbs reach naris or beyond, that of hind limb extending beyond axilla. Upper and fore-arm are with large flat, imbricate scales on their undersides. Fingers are long, thin, subdigital lamellae under basal part of digits are broad, not extending across to the base, while the distal, compressed lamellae are narrow, extending across the digit extending on its lateral sides. Lamellae under 4th finger 17–23 and under 4th toe 22–28. Thigh and shank are covered with rows of large flat, slightly tubercular scales, dorsal thigh scales are separated by granular scales, while those of shank mostly touch each other. Foot is covered with large flat scales, granular scales are confined to the sides.

**Color and dorsal pattern.** Dorsum (in life) gray (*indusoani*), light gray (*rohtasfortai*), light brown (*fortmunroi*), dark brown (*rhodocaudus*), with a median series of 7 light dark spots or transverse bands extending from nape to the level of vent, tail is with 10–14 light dark or pink cross bands. Light-brown head is with dark-brown mottling which extends on supra and infralabials. A thin dark stripe extends from snout through eye, joining first transverse band on nape. Lateral dorsal tubercles are light in color, forming a mosaic lateral pattern of light brown. Limbs are dark mottled, digits barred.

**Ecology.** The long-legged geckos are characteristically associated with sandstones, where they live in holes and crevices among rock plates and blocks. The long thin body of the gecko enables it to retreat into narrow crevices among the masonry of buildings, bridges, huts, houses etc. The sandstone rock is usually over grown with grasses, this microhabitat is rich in different types of insects. *Indogekko fortmunroi* is the house gecko in Fort Munro town, at the Punjab–Balochistan border. However, in small settlements of thatched huts which are scattered among mountains in the area, *Cyrtopodion scabrum* is the common house gecko (Khan, 1993). The Soan valley gecko, *I. indusoani* has only been collected from sandstone blocks lying along the banks of the rivers Soan and Indus, not from buildings in the area. The salt-range gecko, *Cyrtopodion montium-salsorum*, which is common in the Soan Valley, lives in holes and crevices in surrounding mudflats and seldom invades sandstone habitat, however, it extends into buildings in the area (Khan, 1988). In the Jhelum River Valley (central Punjab), the Rohtas Fort gecko *rohtas-*

**TABLE 1.** Pholidosis and morphometrics of geckos of genus *Indogekko* Khan, 2003

| Characters | *I. fortmunroi* | *I. indusoani* | *I. longipes* | | | | *I. rhodocaudus* | *I. rohtasfortai* |
|---|---|---|---|---|---|---|---|---|
| | | | overall | *l. longipes* | *l. microlepis* | *l. voraginosus* | | |
| Length, mm: | | | | | | | | |
| snout-vent | 41–50 | 45–51 | 60–66 | | 60.2 | 60 | 45–64 | 46–54 |
| caudal | 41–67 | 68–76 | | | 78.6 | 85 | 57–74 | 78–82 |
| Supralabials | 9–13 | 8–9 | 11–16 | | 12–13 | 17 | 8–10 | 8–10 |
| Infralabials | 8–10 | 7–8 | 7–11 | | 9 | 11 | 7–9 | 9–10 |
| Interorbitals | 12–15 | 13–15 | 12–19 | 13–17 | 12–16 | 16–19 | 15 | 14–16 |
| Nasals | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Submentals | 3 | 3 | 2–3 | | 3 | 1–2 | 3 | 2–3 |
| Mid belly scales | 21–28 | 21–24 | 30–40 | 30–36 | 30–40 | 34–39 | 14–18 | 24–33 |
| Midventrals | 160–163 | 129–132 | 119–169 | 135–158 | 119–150 | 156–169 | 92–106 | 109–135 |
| Post femoral tubercles | | 5/4 | | | | | | 13–18 |
| Pores: | | | | | | | | |
| precloacal | 4–6 | ♂ 4–5 | | | | | ♀ 5–9 | ♀ 8–11 |
| precloacal-femoral | — | — | 31–44 | 32–38 | 32–39 | 35–44 | ♂ 20–23 | ♂ 18–27 |
| Subdigital lamellae | 18–28 | 18–25 | 20–30 | | 23 | 25 | 17–24 | 17–25 |

Data from: *I. fortmunroi*, Khan, 1993; *I. indusoani*, Khan, 1988; *I. longipes*, *I. l. longipes*, *I. l. microlepis*, *I. l. voraginosus*, Szczerbak and Golubev, 1996; *I. rhodocaudus*, Baig, 1998; *I. fortmunroi*, Khan, 1993).

*fortai* is mostly collected from the masonry of the fort rather than from worn out surrounding sandstone rocks which are heavily overgrown with vegetation, where the gecko is rare. In this area *Cyrtopodion scabrum* lives in crevices and holes among solid rock blocks and natural crevices and holes in the ground. Other sympatric geckos collected from different parts of the dilapidated fort buildings (Fig. 1) are: *Hemidactylus flaviviridis*, *H. persicus*, *H. brookii*, *Cyrtopodion montiumsalsorum*. *H. flaviviridis* was dominant inside the buildings, while the rest of the species were scattered, solitary, and confined mostly to the outer walls of structures (Khan and Tasnim, 1993).

The Palearctic long-legged geckos were mostly collected from sandstone rock with vegetation around, they were found to be rare on bare limestone, ridges and stony cliffs, and they have been said to be active during day and to bask (Szczerbak and Golubev, 1996: 154).

**Food.** Activity period varied in different species of long-legged geckos. The Soan valley gecko *I. indusoani* is active during most of the day, runs about among sandstone rocks in broad daylight. The activity starts two hours after dawn when they begin moving about, catching insects, mostly small moths, that fly about the vegetation around the sandstone rocks. So are rest of the long-legged geckos, except *I. fortmunroi* which feeds on photophilic insects during night and is house gecko in Fort Munro town.

**Fig. 1.** The dilapidated Rohtas Fort buildings, Jhelum River valley, Punjab, Pakistan. *Hemidactylus flaviviridis* are collected from roofed parts, while from exposed parts of the buildings *H. persicus*, *H. brookii*, *Cyrtopodion montiumsalsorum*, and rarely *C. scabrum* were picked up.

A recently caught gecko may regurgitate one or two caterpillars, indicating a primary larvae eating habit of geckos of genus *Indogekko*. A study of the stomach contents indicates a wide variety of dietary items including moths, butterflies, damselflies, grasshoppers, crickets, mayflies, spiders, and cockroaches. Occasionally small beetles, isopods, stoneflies, and termites are included (Table 2). A similar dietary pattern is reflected in the Palearctic geckos from Afghanistan, Iran and Turkmenistan (Szczerbak and Golubev, 1996: 155, Table 6).

**TABLE 2.** Stomach content analysis of Pakistani species of genus *Indogekko*

| | *I. fortmunroi* | *I. indusoani* | *I. rohtasfortai* |
|---|---|---|---|
| Blattaria | + | – | +++ |
| Coleoptera | – | + | + |
| Collembola | ++ | ++ | ++ |
| Dermaptera | – | – | – |
| Diplura | – | – | – |
| Diptera | ++++ | ++ | +++ |
| Ephemeroptera | ++ | + | ++ |
| Hemiptera | – | – | ++ |
| Hemenoptera | – | – | – |
| Isoptera (winged) | + | ++ | ++ |
| Lepidoptera (moths) | ++++++ | +++++ | +++++ |
| Mantoidea | – | – | + |
| Odonata | + | + | ++ |
| Orthoptera (grasshoppers, Crickets | +++ | ++ | +++ |
| Trichoptera | + | – | + |
| Caterpillars | +++ | ++ | +++++ |
| Number of stomachs studied | 5 | 10 | 15 |
| Empty | – | 2 | 4 |

Khan's unpublished data; no data available for *I. Rhodocaudus*
% of occurrence: +, 10; ++, 20; +++, 30; ++++, 50; +++++, 100.

**Breeding habits.** Gender in many geckos is indicated by the presence of precloacal and femoral pores in males and their absence in females. However, the genus *Indogekko* is an exception to this rule: only male *I. indusoani* have precloacal pores, while in male *rohtasfortai* precloacal and femoral pores form a series, which is absent in females similarly male *I. rhodocaudus* have precloacal and femoral pores in a series, while females have 5–9 precloacal pores. On the other hand, in *I. fortmunroi* femoral pores are absent, males have 5–6 and females 4–6 precloacal pores (Table 1). In *I. longipes* a mesially interrupted series of 32–39 femoral pores is present in males (Szczerbak and Golubev, 1996: 152–153).

Sex ratio calculated for Pakistani species from collected specimens varies 1:1 (*indusoani*, 23 specimens) to 1:3 female (*fortmunroi*, *rohtasfortai*, 18, 7 specimens), however, it is 1:1 (Szczerbak and Golubev, 1996: 155) for Palearctic species. Sexual maturity is reached at snout-vent lengths of 35–40 and 40–45 mm in males and females, respectively. Mating occurs just after hibernation (April), continues to June, during which 2–3 clutches of one or usually two eggs are laid in a protected communal sites, where at the base there has been an accumulation of debris of pieces of broken eggs laid in past. Older pieces were blackened by fungal growth. Freshly laid eggs have pliable sticky shells and are glued to the sides of the site. The shell soon hardens, and is difficult to dislodge without breaking. The egg shell is thicker when compared to other angular-toed geckos, the scattered egg-shell debris indicate year after year use of the same site for egg laying by several geckos. The incubation period extends from 30 to 40 days, depending on environmental conditions. The juveniles have been observed moving about by mid-May to late August, while the geckos invading buildings mostly use spaces between loose cement plastering, for egg laying in dark parts of the building.

## KEY FOR IDENTIFICATION OF GECKOS OF GENUS *Indogekko*

| | | |
|---|---|---|
| 1. | Only precloacal pores present in male | 2 |
| | Both precloacal and femoral pores present in male | 3 |
| 2. | Flat dorsal tubercles strongly keeled | *Indogekko indusoani* |
| | Dorsal tubercles feebly keeled or keel less | *Indogekko fortmunroi* |
| 3. | 16–18 scales across mid-abdomen | 4 |
| | 30–40 scales across mid-abdomen* | *longipes* taxa |
| 4. | 92–106 midventral scales | *Indogekko rhodocaudus* |
| | 102–132 midventral scales | *Indogekko rohtasfortai* |

* Data from Szczerbak and Golubev, 1996.

## DESCRIPTION OF SPECIES

### *Indogekko indusoani* (Khan)

1988. *Cyrtodactylus indusoani* Khan, *J. Herpetol.*, **22**(2), 241–243.

**Type locality.** Pirpeahai, Iskindarabad, District Mianwali, northwestern Punjab, Pakistan.

**Diagnosis.** 9–10 supralabials, 7–8 infralabials; 13–15 interorbitals; dorsal tubercles in 10–11 irregular longitudinal rows, in 24–26 para vertebral series; 21–24 scales across midbelly; 129–132 midventral scales; 4–5 precloacal pores in male, no femoral pores; 24–25 subdigital lamellae under 4$^{th}$ toe; snout-vent length 48–51, tail length 72–76 mm.

**Range.** From sandstone blocks along the Soan River, Mianwali District, 33° N 71° E; northwestern Punjab, Pakistan, at 237 m above sea level (a.s.l.).

### *Indogekko rohtasfortai* (Khan et Tasnim)

1990. *Tenuidactylus rohtasfortai* Khan and Tasnim, *Herpetologica*, **46**, 142–148.

**Type locality.** Ahmadiyyah Mosque, Goi Madan, District Kotli, Azad Kashmir, Pakistan.

**Diagnosis.** 12–14 tubercles across mid-dorsum, 21–25 scales across midbelly; 102–132 midventral scales; 5–7 precloacal pores in male, 6–10 femoral pores in a continuous series; 22–25 subdigital lamellae under 4$^{th}$ toe; snout-vent length 48–53, tail length 78–82 mm.

**Range.** It is most widely distributed Pakistani sandstone gecko, distributed from 33° N 73° E to 35° N 75° E, at elevation from 650 m in central Punjab, Pakistan, to 1600 m in southwestern Azad Kashmir.

### *Indogekko fortmunroi* (Khan)

1993. *Tenuidactylus fortmunroi* Khan, *Pakistan J. Zool.*, **25**, 217–221.

**Type locality.** Khar Gardens, Fort Munro, District Dera Ghazi Khan, western Punjab, Pakistan.

**Diagnosis.** Body much depressed, habitus thin and flattish. Dorsal granular scales tubercular, juxtaposed, interspersed with 12 longitudinal rows of flat, keel less, 3–4 times larger round tubercles. Tail longer than body, segmented, with three rows of trihedral caudal tubercles on sides, subcaudals in a midventral transversally enlarged median series. Snout-vent length 48–50, tail 65–68 mm.

**Range.** Known from type locality Fort Munro and Khar village 31°53′ N 70°23′ E, northwestern, Dera Ghazi Khan District, Punjab, Pakistan, at elevation 1800 m.

***Indogekko longipes* (Nikolsky)**

1896. *Gymnodactylus longipes* Nikolsky, *Ann. Zool. Mus. Imp. Acad. Sci.*, **I**(4), 369.

**Diagnosis.** More than 30 femoral pores; midventral and lateventral scales are more than 130; 30 to 40 scales across midbelly; 12–19 interorbital scales.

**Distribution** (Fig. 2). A widely distributed Palearctic species distributed widely in the Caspian drainage system, from Turkmenistan, eastern Iran, Afghanistan to western part of the Badghaz Plateau, southward through the Kayen Mountains to Pelenghan Ridge and eastward through the southern foothills of Hindukush to Kandhar (Szczerbak and Golubev, 1996).

**Taxonomic note.** *Gymnodactylus microlepis* Lantz, 1918; *G. longipes* Nikolsky, 1896, and *Cyrtodactylus voraginosus* Leviton and Anderson, 1984 are now been recognized as three morphologically close subspecies of *Tenuidactylus longipes* (Nikolsky, 1896) by Szczerbak and Golubev (1986, 1996), which are distributed widely in the foothills of different parts of the Hindukush Range. The basis of division into subspecies are on following pholidosic variations:

| | Mid-ventral scales | Interorbital scales | Across midbelly |
|---|---|---|---|
| *longipes* | 135–158 | 13–17 | 30–36 |
| *voraginosus* | 156–169 | 17–19 | 34–39 |
| *microlepis* | 119–150 | 12–16 | 30–40 |

***Indogekko longipes longipes* (Nikolsky)**

1974. *Gymnodactylus longipes longipes*, Gorelov, Darevsky, and Szczerbak, *Vestn. Zool. Kiev* [in Russian], No. 4, 35.

**Distribution.** Eastern Iran, Kayen Mountains and Pelenghan Ridge in southwestern Afghanistan

***Indogekko longipes microlepis* (Lantz)**

1918. *Gymnodactylus microlepis* Lantz, *Proc. Zool. Soc. London*, **1918**(7), 11 – 13.

**Distribution.** Western Badghyz Plateau, probably adjoining parts of Iran and Afghanistan.

***Indogekko longipes voraginosus* (Leviton et Anderson)**

1984. *Cyrtodactylus voraginosus* Leviton et Anderson, *J. Herpetol.*, **18**(3), 270.

**Distribution.** Southwestern foothills of Hindukush in Afghanistan.


**Fig. 2.** Distribution of geckos of genus *Indogekko*. **1. Turkmenistan:** *I. longipes microlepis*; **2. Iran:** *I. l. longipes*; **3. Afghanistan:** *I. l. voraginosus* (Szczerbak et Golubev, 1996); **Pakistan: 4.** *I. rhodocaudus* (Baig, 1998); **5.** *I. fortmunroi* (Khan, 1993); **6.** *I. indusoani* (Khan, 1988); **7.** *I. rohtasfortai* (Khan et Tasnim, 1990).

***Indogekko rhodocaudus* (Baig)**

1998. *Tenuidactylus rhodocaudus* Baig, *Hamadryad*, **23**(2), 127–132.

**Type locality.** Tanishpa, District Kila Saifullah, Balochistan, Pakistan.

**Diagnosis.** Supralabials 10–11, 8–9 infralabials; dorsal tubercles round weekly keeled in 12–14 rows across middorsum; 16–18 scales across midbelly; 92–106 number of midventral scales; 5–9 precloacal pores and 7/7 femoral pores in male; 22–24 subdigital lamellae under 4$^{th}$ toe; snout-vent length 30–64, tail length 31–74 mm.

**Range.** Known from the type locality, Tanishpa 31°12′ N 68°28′ E, District Kila Saifullah, northwestern Balochistan, Toba Kakar Range, Pakistan, elevation 2320 m.

## CONCLUDING REMARKS

The long-legged angular-toed geckos are wide ranging in the foothills of Pakistani part of the sub Himalayas and the foothills of the Hindukush Range in the west, between 31° N 59° E and 34° N 74° E. They are the only geckonids collected from the sandstone rocks which mark the ancient river beds in their wide distribution range. The sub Himalayas and the upper Indus Valley lies in the bed of the northwest-flowing ancient Siwalik River, that flowed west parallel to the Himalayas in the Tertiary times (Pascoe, 1919; Pilgrim, 1919; Khan, 1988). At places the sandstone bed rock is exposed due to erosion of the covering soil and is overgrown with

vegetation. It is cut into deep ravines in the sub Himalayas through which tributaries of Indus River flow. The cracks and crevices in the exposed sandstone provide retreats for the long-legged geckos, who because of their long thin body and legs are able to utilize narrow crevices among sandstone plates and blocks (Khan, 1988).

In the west the Hindukush Range overlooks the southeastern flood plains of Helmand, Khash, and Farah rivers from Afghanistan, they drain into Zabol depression lying in the southwestern Afghanistan and northeastern Iran. While the lowland areas in the south and west include the Turkestan Plains, the Herat-Ferah Lowlands of the extreme northwest, and the Sistan Basin and Helmand River valley in the south. Sandstone bluffs surround chain of lakes in the Hazarajat region in central Afghanistan. In the northwest Hari Rud and Murgab rivers from Hindukush Range drain into Turkmenistan. The Caspian Lowland lies on the northern and eastern shores of the Caspian Sea at elevations between –28 to 100 m a.s.l. Four rivers traverse the region on their way to the Caspian Sea: the Volga, Ural, and Emba from the north, and the Atrek from the southeast (Fig. 2).

The *I. longipes* taxa are widely distributed in sandstone rocks scattered in the foothills of the Hindukush Range from Turkmenistan, eastern Iran, Afghanistan to the western part of the Badghaz Plateau, southward through the Kayen Mountains to Pelenghan Ridge and eastward through southern foothills of Hindukush to Kandhar (Szczerbak and Golubev, 1996). Only one Pakistani species, *Indogekko rhodocaudus* from Qila Saifullah, at 2320 m elevation in Tobba Kakar Range, northwestern Balochistan, comes close to the range of *I. longipes* (Kandhar across Afghanistan border in the west), rest of the Pakistani species are distributed in relatively low lying localities in the sub Himalayas.

The ground angular-toed geckos of genus *Cyrtopodion* (*montiumsalsorum*, *kohsulaimanai*, *scabrum*, *watsoni*, and *kachhense*) mostly occur sympatrically with *Indogekko* in most of their range, but they are not syntopic with *Indogekko*. *Cyrtopodion* mostly are confined to the mudflats while *Indogekko* are confined to the sandstone rocks (Khan, 2003). While the high altitude Himalayan geckos of genera *Altigekko* and *Siwaligekko* do not extend into the range of sandstone geckos (Khan, 2004, 2005).

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# INSTRUCTIONS TO CONTRIBUTORS (http://rjh.folium.ru/instructions.htm)

## MANUSCRIPT

Manuscripts that are too descriptive or containing reports of work which appears to contravene accepted principles of conservation or ethical standards may be rejected without external review. Manuscripts should be written in US English and submitted by e-mail or printed to the following Editors, according to the field:

**Dr. Natalia B. Ananjeva** (general aspects of herpetology and reptiles), **E-mail: azemiops@zin.ru**;

**Dr. Igor G. Danilov** (evolutionary morphology, paleoherpetology and turtles), **E-mail: turtle@zin.ru**;

**Dr. Spartak N. Litvinchuk** (amphibians, cytology and genetics), **E-mail: slitvinchuk@yahoo.com**.

**Post address (for all Editors):** Zoological Institute of the Russian Academy of Sciences, Universitetskaya nab. 1, St. Petersburg, 199034, Russia.

Articles accepted for publication are usually published in order of submission. Exceptions are made for papers of particular scientific significance, and for manuscripts which fully comply with editorial requirements given in the instruction for authors and require only minor changes. **Printed manuscript** must be sent as two double-spaced copies (including figure captions and tables on separate pages) printed on laser or matrix printer should be of near letter quality (NLQ) with typesetting marks entered. Submit file on a diskette or by E-mail (**azemiops@zin.ru**) if possible. **Manuscripts and all the materials included are not normally returned to the author.**

Arrange the parts of the article in the following order:

- Title of the article
- Running header (short title of the article)
- Author(s) of the article
- Full address of the author(s)
- Sending (submitting) date
- Abstract
- Key words
- Main text
- References
- Figure captions
- Tables

## ABSTRACT

An abstract not exceeding 200 words should be informative rather than indicative and given on a separate page. All relevant key words should be included in the abstract.

Number all hierarchical headings decimally (e.g., 1. First level heading, 1.1. Second level heading, 1.1.1. Third level heading).

## TABLES

Tables should be comprehensible without reference to the text. Avoid long column headings, complicated structure and vertical lines. Plan your tables for column or page width, 40 and 80 letter spaces, respectively.

## ILLUSTRATIONS

Illustrations should be numbered consecutively as **Figures** or **Maps**. Line drawings should be made clearly in deep-black ink and submitted as original drawings or photographic prints. Photographs should be submitted as sharp, high contrast prints trimmed at right angles. Half tone and color drawings must be the originals. If dimensions are important a measuring line should be given on the photograph. Parts within composite illustrations should be identified with letters, not numbers. Plan your figures for column (79 mm width) or page (164 × 215 mm) size when printed, but reserve space for the legend.

## REFERENCES

References should be listed in alphabetical order under the first author's name and should refer only to publications cited in the text. The followiing are examples of the format to be used for articles from journals, books, and non-serial collective publications, respectively.

**Parker E. D., Trueb L., and Cloutier R.** (1979), "Phenotypic consequences of *C. tesselatus* to its sexual parental species," *Evolution*, **33**(4), 1167 – 1179.

**Deuchar E. M.** (1975), *Xenopus*: *the South African Clawed Frog*, Wiley, New York.

**Trueb L. and Cloutier R.** (1991) "A phylogenetic investigation of the inter- and intrarelationships of the Lissamphibia (Amphibia: Temnospondyli)," in: Schultze H.-P. and Trueb L. (eds.), *Origins of the Higher Groups of Tetrapods: Controversy and Consensus*, Cornell Univ. Press, New York, pp. 175 – 193.

**International Code of Zoological Nomenclature** (1985), 3rd Edition, Int. Trust Zool. Nomencl., London.

For abbreviations see *Biological Abstracts*.

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In the case of non-observance of any of the above-mentioned instructions the article can be returned for reworking.

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