

## ***Cyrtodactylus ayeyarwadyensis* BAUER, 2003 (Squamata: Gekkonidae) in Bangladesh with habitat details of new collection localities and a discussion of morphological variation**

STEPHEN MAHONY, MUSHFIQ AHMED, M. KAMAL HOSSAIN,  
M. MOFIZUL KABIR & M. KAMRUL HASAN

**Abstract.** The genus *Cyrtodactylus* has previously been represented on checklists of Bangladesh herpetofauna by only one species, *Cyrtodactylus khasiensis*. Herein we propose that previous citations of this species were likely based on misidentifications of *C. ayeyarwadyensis*, a species that was considered endemic to southwestern Myanmar. We provide a northern range extension of ca. 430 km to the Chittagong Hill Tracts of southeastern Bangladesh and an expanded discussion of morphological variation within the species. Details of habitat and observations in the wild are given for the first time.

**Key words.** *Cyrtodactylus khasiensis*, Myanmar, Chittagong Hill Tracts, range extension.

The genus *Cyrtodactylus* GRAY of mainland south Asia, west of the Indo-Myanmar mountain range of the southeastern Himalayas, is currently comprised of seven species: *C. fasciolatus* (BLYTH), *C. gubernatoris* (ANNANDALE), *C. khasiensis* (JERDON), *C. malcomsmithi* (CONSTABLE), *C. marcuscombaii* (DAREVSKY, HELFENBERGER, ORLOV & SHAH), *C. martinostolli* (DAREVSKY, HELFENBERGER, ORLOV & SHAH) and *C. nepalensis* (SCHLEICH & KÄSTLE). *Cyrtodactylus marcuscombaii*, *C. martinostolli* and *C. nepalensis* were originally placed in the genus *Gonydactylus* based on an apparent misconception of the nomenclatural priority of this genus over *Cyrtodactylus* (DAREVSKY et al. 1997, SCHLEICH & KÄSTLE 1998). These species were later placed in the genus *Cyrtopodion* along with *C. fasciolatus* by RÖSLER (2000). SM has recently had the opportunity to observe living individuals of *C. martinostolli* and *C. fasciolatus* in the wild which appear typical of the genus *Cyrtodactylus* and so are included above in this genus pending a molecular phylogenetic resolution to *Cyrtodactylus* systematics. *Cyrtodactylus khasiensis* is considered to be the most widely ranging species

here and has been reported from the mountainous areas of north-eastern India, Xizang (Tibet), Myanmar and Bangladesh (SMITH 1935, 1940, LI 2007, AHSAN 1998, KHAN 2008). The presence of this species in Myanmar has recently been reviewed and it was found that the Myanmar sample is not representative of *C. khasiensis* (MAHONY, in press). The authors could find no reference of the Bangladesh populations of *C. khasiensis* whereby actual specimens were identified for verification of their identification (AHSAN 1998, KHAN 2008). KHAN (2008) however provided a photograph of a live individual which he considers representative of *C. khasiensis* with a brief morphological description that may correspond to that species.

MAHONY & ALI REZA (2007) and MAHONY et al. (in press) have reported on collections of a *Cyrtodactylus* species allied to *C. ayeyarwadyensis* from the districts of Bandarban and Rangamati in the Chittagong Hill Tracts of south eastern Bangladesh. A detailed re-examination of specimens from the latter confirms that they correspond in all described morphological characteristics to the type series of *C. ayeyarwadyensis* based

on the original description by BAUER (2003). Herein we provide a discussion of the morphological variation expressed in the Bangladesh populations based on 12 specimens in the collection of the Jahangirnagar University Herpetological Group (JUHG) along with information on the collection habitat and updated distribution of this little known species. Other collection abbreviations used in the comparative materials section are, ZSI (Zoological Survey of India, Kolkata) and BMNH (British Museum of Natural History, London). Morphometric and meristic abbreviations used in Table 1 are as follows: SVL (snout to vent length), TTL (total tail length, R = regenerated), TW (maximum tail width), TD (maximum tail depth), A-G (axilla to groin), FAL (fore-arm length), TbL (tibia length), HW (maximum head width), JawW (jaw width at the posterior axis of upper and lower mandible), HL (head length), HD (maximum head depth), OrbD (horizontal orbit diameter), IO (interorbital, minimum width of frontal), OrbSn (orbit to snout distance), OrbEar (orbit to ear distance), EarL (maximum ear length), Toe4L (total length

of fourth digit of pes, excluding claw), Fin4L (total length of fourth digit of manus, excluding claw), Pores (total precloacal/precloacal-femoral pores), SL (number of supralabials, left/right), IL (number of infralabials), MBTR (mid-body tubercle rows), MVSR (mid-ventral scale rows), Toe4Lam (complete lamellae on digit IV of pes, basal/terminal) and Fin4Lam (complete lamellae on digit IV of manus, basal/terminal).

Variation of morphometrics within the Bangladesh series can be seen in Table 1. Meristic variation is as follows: supralabials 9-13 (12 & 11 in holotype), infralabials 8-11 (10 in holotype), longitudinal tubercle rows at mid body 18-23 (22-24 in type series), males with 15-30 (10-28 in type series) precloacal or precloacal-femoral pores in a continuous series, or with intervening single non pore-bearing scales, pores absent in females, pore bearing scales not enlarged relative to anteriorly bordering scale rows, post cloacal tubercles vary in both size and number from two large tubercles on each side of a male (JUHG 0126), three barely visible on a female (JUHG 0061) or four of intermediate size on other



Fig. 1. Dorsal view of a live adult female *Cyrtodactylus ayeyarwadyensis* (JUHG 0196) from Milonchari, Bandarban District, Bangladesh, with dull colouration and vivid white punctuations.



Fig. 2. Dorsal view of a live adult male *Cyrtodactylus ayeyarwadyensis* (JUHG 0126) from Kaptai Village, Rangamati District, Bangladesh, with light colouration and dorsal white punctuations indistinct.

males (JUHG 0059, 0161, 0162). Midventral scale rows of this sample appear to show some geographical variation in this series, 34-37 on specimens ( $n = 6$ ) from Kaptai and 38-42 on specimens ( $n = 5$ ) from Bandarban (32-37 in paratype series), number of lamellae on the basal-most digital inflection of the fourth digit, 5-7 on pes (6 on holotype) and 5-6 on manus, number of complete lamellae from the basal-most digital inflection to the claw sheath of the fourth digit, 10-12 on pes (10 on holotype) and 9-11 on manus.

Variation in colouration and pattern as follows: 10-12 (11 on holotype) light bands on complete original tails ( $n = 7$ ), 7-10 (9-11 in type series) dark brown blotches in a paravertebral line from the nuchal region to the sacrum, forming pairs in most specimens, or partly phase shifted between the left and right sides in others. Some of these blotches may be fused to the preceding blotch resulting in the lower numbers seen on some specimens (Fig. 1; also Fig. 6 in BAUER 2003). The nuchal pair may or may not be fused. White punctuations may be present or absent posterior to the brown blotches (Figs. 1 and 2) and the dorsolateral row of longitudinal brown spots are fused on several individuals into an almost continuous stripe. Background colouration ranges from pale pinkish beige to medi-

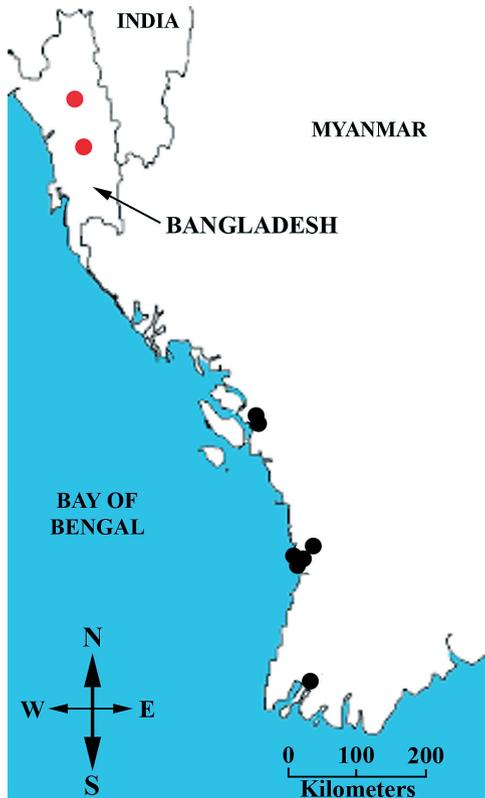


Fig. 3. Map of current distribution of *Cyrtodactylus ayeyarwadyensis* with previously reported localities in black and new locality records in red.

um brown, in dull individuals dark mottling of the head is barely visible. White spots are present along the lips and ventrolateral folds. The variation in colouration discussed here was evident in populations from both localities during the time of collection. Individuals of this species appear to have the ability to slightly lighten and darken their primary background shade but not to the extremes shown in Figs. 1 and 2.

In Bangladesh, this species is currently known from two localities within the Chittagong Hill Tracts of south-eastern Bangla-

desh, Milonchari (22°10' N, 92°13' E, 120-150 m above sea level), Bandarban District and Kaptai (22°28'-22°30' N, 92°12'-92°13' E, 30-60 m above sea level), Rangamati District, a range extension of ca. 430 km north-west from its nearest known population, Taung Gok Township, Rhakine State, Myanmar (BAUER 2003). Based on the present distribution pattern (Fig. 3) it is likely to be more widespread in suitable habitat between these localities, however no habitat information is available for the Myanmar series. The habitat at Milonchari originally consisted of a lush

Tab. 1. Morphometric and meristic data for the four largest specimens from the Kaptai and Milonchari series. Abbreviations as described above.

	Kaptai				Milonchari			
	JUHG 0010 male	JUHG 0060 female	JUHG 0061 male	JUHG 0125 female	JUHG 0161 male	JUHG 0162 male	JUHG 0195 male	JUHG 0196 female
SVL	59.2	55.1	54.9	65.5	55.0	55.1	56.9	57.9
TTL	64.6	64.3	(R)	53.6	60.7	44.7(R)	58.1(R)	67.6
TW	4.9	4.4	4.9	5.1	4.9	4.1	4.6	5.1
TD	3.9	3.4	4.3	4.3	4.4	4.4	4.0	4.7
A-G	27.4	25.9	24.7	30.0	25.7	25.7	26.3	26.4
FAL	8.5	7.9	8.3	8.8	7.7	7.4	7.7	8.3
TbL	9.3	8.5	9.3	10.7	9.3	8.6	9.0	9.4
HW	9.6	9.2	9.9	11.4	10.0	10.3	10.0	10.7
JawW	8.9	9.1	9.5	10.6	8.8	8.9	8.9	9.4
HL	15.4	15.8	15.8	18.0	15.4	15.1	15.8	15.6
HD	6.4	6.1	5.9	7.3	6.2	6.1	6.0	6.6
OrbD	4.5	4.4	4.3	5.7	4.6	4.8	4.9	4.8
IO	2.4	2.1	2.1	2.5	2.4	2.3	2.2	2.6
OrbSn	6.5	6.3	6.0	6.8	5.7	5.7	5.8	6.2
OrbEar	4.5	4.3	4.5	5.0	4.2	3.8	4.2	5.8
EarL	1.4	1.3	1.5	1.6	1.5	1.5	1.4	1.5
Toe4L	5.8	5.9	6.1	5.5	4.9	5.1	5.1	5.9
Fin4L	4.8	4.4	4.3	4.6	3.6	3.8	4.6	4.5
Pores	30	0	15	0	21	26	26	0
SL	10	11	10	10	12/13	9	10/11	10
IL	9	10	9	9	11	9	9	9
MBTR	22	21	22	21	22	23	21	22
MVSR	35	34	34	37	41	40	38	40
Toe4Lam	7/11	7/10	6/11	5/11	5/11	7/12	6/10	6/11
Fin4Lam	6/11	5/9	5/9	5/11	6/9	5/9	5/10	5/11

mixed evergreen rain forest, but in recent years the majority of this habitat has been cleared for jhum farming (traditional slash and burn farming) or replaced with teak plantation. Due to the difficult terrain of this hill range there are still small patches of relatively intact forest vegetation bordering steep sloped hill streams and other inaccessible areas. The second locality Kaptai, is situated within the Kaptai National Park, an area of 5464 ha. There is a relatively large permanent human population living within this National Park which puts considerable pressure on the natural habitat. Additionally, large expanses of the forest have been harvested and replaced with plantation secondary forest by the forestry department. Despite this, there are still areas of the park such as Kaptaimukh Beat, a primary forest with heavily restricted access by the military due to its proximity to the hydroelectric dam of the Kaptai reservoir. This primary forest patch is one of the few remainants of the once extensive mixed evergreen and semi-evergreen forest belt which once extended the length of the Chittagong Hill Tracts.

At both Milonchari and Kaptai Village specimens were collected primarily within or nearby patches of heavily disturbed original forest patches or regenerating natural secondary forest growth. Though most specimens were collected from the banks of narrow hill streams, a few were collected some distance from streams in exposed areas neighbouring dense undergrowth. All specimens were collected after dusk, between 18:30-23:30 h and no individuals were observed during daylight hours. Most were observed resting on leaves and thin stems of low vegetation < 50 cm above ground level, and others directly on the clay of sheer stream banks. Where found this species appears to be relatively abundant, often individually spaced several meters apart.

Specimens referable to *C. khasiensis* examined here are all from localities at mid elevation. The hills of Meghalaya do not cross the border with northern Bangladesh. The

altitudinal range of *C. khasiensis* however is still unconfirmed, thus further herpetological collections along border areas in the north of Bangladesh are required to establish whether *C. khasiensis* is also present in these low-lying plains. Based on the results presented here and under the consideration that there appears to be no *Cyrtodactylus khasiensis* specimens from Bangladesh currently known in recognised specimen repositories, we propose that *C. khasiensis* be removed from the checklist of Bangladesh herpetofauna until specimens of confirmed identification are found.

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### Comparative material examined

*Cyrtodactylus ayeyarwadyensis*: JUHG 0010, Kaptaimukh Beat (22°28' N, 92°13' E), Kaptai, Rangamati District, Chittagong Division, Bangladesh; JUHG 0059-0061, 125-127, Kaptai Village (22°30' N, 92°12' E), Kaptai, Rangamati District, Chittagong Division, Bangladesh; JUHG 0161, 0162, 0195-0197, Milonchari (22°10' N, 92°13' E), Bandarban District, Chittagong Division, Bangladesh.

*Cyrtodactylus gubernatoris*: ZSI 17275 (holotype), Darjeeling, West Bengal, India.

*Cyrtodactylus khasiensis*: BMNH 1906.8.10.4 (former ZSI 6198), "Khasi Hills"; BMNH (18)74.4.17.134, "northeast Bengal"; ZSI 5828 and ZSI 5831-5832, Cherrapunji, Khasi Hills, Meghalaya, India.

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Authors' addresses: STEPHEN MAHONY, Madras Crocodile Bank Trust, Post Bag 4, Mamallapuram, Tamil Nadu - 603 104, India, E-Mail: stephenmahony2@gmail.com; MUSHFIQ AHMED, M. KAMAL HOSSAIN, M. MOFIZUL KABIR, M. KAMRUL HASAN, Jahangirnagar University Herpetology Group, Department of Zoology, Jahangirnagar University, Savar - 1342, Dhaka, Bangladesh, E-Mail: mushfiq.ahmed@yahoo.com.