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Studies on Pakistan Lizards: *Cyrtopodion baturense* (Khan and Baig 1992) and *Cyrtopodion walli* (Ingoldby 1922) (Sauria: Gekkonidae)

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Abstract

The taxonomy of Eurasian angular or thin-toed geckos has undergone a great deal of revision over the last 30 years. However, it is clear that a desirable level of taxonomic resolution has not yet been attained as their taxonomic assignments are somewhat arbitrary. In this paper, we discuss two lesser-known gecko species, *Cyrtopodion baturense* (Khan and Baig 1992) and *C. walli* (Ingoldby 1922). One adult specimen of *Cyrtopodion baturense* (the only known specimen other than the type series) and a series of 53 *C. walli* collected by Walter Auffenberg and the Zoological Survey Department of Pakistan (ZSD) and subsequently deposited in the University of Florida Herpetology collection were compared to the type specimens. Specimens were examined for 46 morphological characters and measurements. *Cyrtopodion baturense* and *C. walli* are diagnosable and confirmed to be distinct species. *Cyrtopodion baturense* is known only from the holotype locality of Pasu and the nearby village of Dih, Hunza District, in the Gilgit Agency, Federally Administered Northern Areas (FANA), Pakistan, at 2,438–3,078 m elevations. *Cyrtopodion walli* is known from Ayun, Chitral, Bamburet Valley, Bermoghluscht, Drosh Tehsil, and 7.0 km N Drosh, in the Chitral District, Northwest Frontier, Pakistan, at 1,970–2,120 m elevations. We also conclude that the likely paratype (BMNH 1922.5.22.1) of *Gymnodactylus walli* is not conspecific with the holotype (BMNH 1910.7.12.1) and is most morphologically similar to *Cyrtopodion tibetanus* (Boulenger 1905). We concur with Khan (1992), based on our own examination of the syntype of *Gymnodactylus chitralensis* Smith, 1935, that *G. chitralensis* is a junior synonym of *Gymnodactylus walli* Ingoldby, 1922. Furthermore, the tail associated with the holotype of *G. walli* does not belong to that individual.

Key words: Gekkonidae, gecko, lizard, taxonomy, *Gymnodactylus*, *Mediodactylus*, *Tenuidactylus*, *Altigekko*

Introduction

The gecko fauna of Pakistan remains poorly understood despite a number of recent advances (Auffenberg *et al*. 2004; Khan 1993 a, b, 2003a, b). The taxonomy of Eurasian angular or thin-toed geckos, variously assigned to *Cyrtodactylus*, *Cyrtopodion*, *Gymnodactylus*, *Tenuidactylus*, etc., has undergone a great deal of revision over the last 30 years (*see* Anderson 1999 for brief review). Szczerbak & Golubev (1986, 1996) produced the most comprehensive recent treatment of these geckos, but their taxonomic scheme is not based on characters that are irrefutably synapomorphic. Recently, Khan (2003b) described three new genera for species occurring in Pakistan and adjacent areas. Khan's generic assignments for Pakistan species may have merit with additional research, but we believe their use at this point is premature. It is clear that a desirable level of taxonomic resolution has not yet been attained although recent increased understanding of a few taxa is encouraging (Macey *et al.* 2000; Červenka *et al.* 2008)

The taxonomic assignment of angular-toed geckos in southern and central Asia remains somewhat arbitrary. This is particularly true in Pakistan with its large (21 recognized species) and morphologically

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diverse angular-toed gecko fauna (Krysko *et al.* 2007; Khan 2006; Masroor 2008, 2009). Our use of *Cyrtopodion* Fitzinger, 1843 herein follows the simplified arrangement presented by Anderson (1999), with acknowledgement that taxonomic reassignments are likely to occur in the future.

Until recently, larger, well-localized series of most species were not available for study leaving morphological variation within these species virtually unknown. In the 1980s and early 1990s, Walter Auffenberg and the Zoological Survey Department of Pakistan (ZSD) conducted herpetological surveys throughout Pakistan. Much of this material was deposited in the Florida Museum of Natural History (FLMNH), University of Florida collection (UF), and forms the basis for a continuing series of contributions documenting the herpetofauna of Pakistan. Other specimens collected during these surveys were deposited in the ZSD collections in Karachi. In this paper, we discuss two lesser-known gecko species, *Cyrtopodion baturense* (Khan & Baig 1992) and *C. walli* (Ingoldby 1922).

Material and methods

One adult specimen of *Cyrtopodion baturense* and a series of 53 *C. walli* ranging from neonates to adults were collected by Walter Auffenberg and the Zoological Survey Department of Pakistan and subsequently deposited in the UF Herpetology collection (*see* accounts below). These specimens were examined and compared with appropriate type material on loan from The Natural History Museum, London (BMNH), the California Academy of Sciences, San Francisco (CAS), and the United States National Museum of Natural History, Washington, D.C. (USNM).

Specimens were examined for 46 morphological characters and measurements (Table 1). Although most of these counts and measurements are standard, clarification on certain characters are provided. Only original (i.e., non-regenerated) tails were measured. The left side is given first for counts taken on both sides of the specimen. Character seven was obtained by counting the scales surrounding five randomly selected enlarged dorsal tubercles. Character 13 lists color bands in the following order: occipital, nape, body (from forelimbs to sacrum), and tail regions. Character 14 lists the left side only for the number of scales between the eye and ear. The numbers of longitudinal rows of enlarged dorsal tubercles (Character 15) and transverse rows of ventral scales (Character 16) were taken at mid-body. Limb lengths were determined for four adult specimens by pressing the straightened limb to a steel ruler; manus, pes, and digits were not included. Redescriptions of *Cyrtopodion baturense* and *C. walli* are provided below. These are based on the examination of type specimens and material collected during the Pakistan surveys.

TABLE 1. Morphological characters and measurements used for geckos from Pakistan. See text for certain character descriptions.

No.	Character description
1	Gender (F = female; M =male)
2	Number of post-nasals
3	Number of medial scales between post-nasals
4	Number of supralabials
5	Number of infralabials
6	Number of interorbitals
7	Number of scales surrounding dorsal tubercle (randomly counted 5 tubercles)
8	Number of scales between postmentals and cloaca
9	Number subdigital lamellae on fourth toe
10	Number of postmentals
11	Number of whorls on anterior one-third of tail

continued next page

TABLE 1. (continued)

No.	Character description
12	Number of large, lateral tubercles on each tail whorl
13	Number of color bands on head, nape, body, and tail
14	Number of scales between eye and ear (left side only)
15	Number of longitudinal rows of tubercles
16	Number of transverse rows of ventral scales at midbody
17	Number of subdigital lamellae on first toe
18	Presence (+) and number of cloacal spines
19	Number of scale rows per tail whorl (max. 8 whorls counted)
20	Number of subdigital lamallae on fourth finger
21	First pair of postmentals in contact (+) or not in contact (-)
22	Scales on top of head relatively homogeneous in size (+) or not homogeneous in size (-)
23	Dorsal tubercles present (+) or absent (-)
24	Mental triangular (+) or not triangular (-)
25	Tail whorls distinct (+) or indistinct (-)
26	Presence (+) and number of precloacal pores
27	Color pattern of dorsum banded (+) or not banded (-)
28	Color band from nostril through eye to nape present (+) or absent (-)
29	Femoral spines present (+) or absent (-)
30	Presence (+) and number of femoral pores
31	Enlarged tubercles on limbs present (+) or absent (-)
32	Roundish dorsal tubercles present (+) or absent (-)
33	Dorsal tubercle sculpture rounded (+) or not rounded (-)
34	Medial subcaudals greatly enlarged (+) or not greatly enlarged (-)
35	Distal scale row of tail whorl enlarged (+) or not enlarged (-)
36	Tail dorso-ventrally compressed (+) or not compressed (-)
37	Presence (+) and number of enlarged femoral scales
38	Snout-vent length (SVL) (mm)
39	Tail length (TL) (mm)
40	Head length (HL) (mm)
41	Head width (HW) (mm)
42	Head height (HH) (mm)
43	Eye-nostril distance (EYN) (mm)
44	Eye-ear distance (EYEA) (mm)
45	Eye diameter (EYD) (mm)
46	Ear diameter (EAD) (mm)

Results

Cyrtopodion baturense was confirmed to be a distinct species restricted to extreme northcentral Pakistan. Although Szczerbak & Golubev (1996:200, footnote) stated that *C. baturense* is "very close to (if not the same as) *C. stoliczkai* (Steindachner 1867), *C. baturense* is immediately separable from *C. stoliczkai* by a number of characters, i.e. character 12 = number of large, lateral tubercles on each tail whorl, character 19 = number of

scale rows per tail whorl, character 34 = medial subcaudals, character 35 = distal scale row of tail whorl (Table 2).

Comparison of the large (*n* = 53) UF series of geckos from lower Chitral District along with type material of both *Gymnodactylus walli* Ingoldby 1922 and *G. chitralensis* Smith 1935 (Table 2), leads us to concur with Khan's (1992) view that *Cyrtopodion walli* is distinct from *C. stoliczkai* (as redescribed by Auffenberg *et al.* 2004) and that *G. chitralensis* is a junior synonym of *C. walli*. We also agree with Khan (1992) that the detached tail associated with the holotype of *C. walli* (BMNH 1910.7.12.1) does not belong to that specimen (*see* Discussion).

Cyrtopodion stoliczkai was confirmed to be a distinct species restricted to extreme northeastern Pakistan and adjacent Ladakh region (Auffenberg *et al.* 2004), and is immediately separable from *C. walli* by a number of characters, i.e. character 8 = number of scales between the postmentals and cloaca, character 11 = number of whorls on anterior one-third of tail, character 22 = scales on top of head (Table 2). We also conclude that the likely paratype (BMNH 1922.5.22.1) of *Gymnodactylus walli* is not conspecific with the holotype (BMNH 1910.7.12.1) and is most morphologically similar to *Cyrtopodion tibetanus* (Boulenger 1905).

***Cyrtopodion baturense* (Khan & Baig 1992)**
Figures 1–3

Tenuidactylus baturensis Khan & Baig 1992, Pakistan Journal of Zoology 24:273. Type locality: Pasu, Gilgit Agency Pakistan, 3620'N, 7450'E, 2,446 m.
Cyrtodactylus baturensis (*lapsus calami*) Khan 1999, Pakistan Journal of Zoology 31:278.
Mesodactylus baturensis Khan 1999, Pakistan Journal of Zoology 31:278.
Altigekko baturensis Khan 2003, Journal of Natural History and Wildlife 2:2.

Specimens examined. Gilgit Agency, Federally Administered Northern Areas (FANA), Pakistan: Pasu (often spelled Passu), BMNH 1990.3 (holotype; Fig. 1), paratypes CAS 170529 and USNM 284136 (Fig. 2) from holotype locality; Dih, Hunza District, UF 79147 (Fig. 3).

Description of holotype. Female. Snout-vent length (SVL) = 50.9 mm; tail regenerated; head length [HL]/SVL = 0.265; head width [HW]/HL = 0.637; head height [HH]/HW = 0.616; eye diameter [EYD]/eye–nostril [EYN] = 0.697; ear diameter [EAD]/EYD = 0.233; three post-nasals; one medial scale between post-nasals; nine supralabials; seven infralabials; 14 interorbitals; nine scales surrounding roundish dorsal tubercles; 141 scales between post-mentals and cloaca; 26 subdigital lamellae on fourth toe; three pairs of post-mentals; four large, lateral tubercles on each tail whorl; dark color bands: one on head, one on nape, and five on body; 15 scales between eye and ear; 10 longitudinal rows of tubercles; 27 transverse rows of ventrals at mid-body; 12–13 subdigital lamellae on first toe; two cloacal spines; 20 subdigital lamellae on fourth finger; first pair of post-mentals in contact; head scales homogenous in size; mental triangular; tail whorls distinct; pre-cloacal pores absent; dark color bar from nostril through eye; femoral spines and pores absent; enlarged tubercles on limbs (Fig. 1).

Variation. Medium-sized geckos (SVL of largest adult = 58.5 mm), tail longer than body; limbs moderate, hind limb extends to just beyond axilla, forelimb to nostril; body and head moderately dorso-ventrally compressed. Head moderate (HL/SVL, mean = 0.268 $\pm$ 0.008, HW/HL, mean = 0.630 $\pm$ 0.010, HH/HW, mean = 0.591 $\pm$ 0.026), snout slightly longer than distance between eye and ear. Eye large (EYD/EYN, mean = 0.735 $\pm$ 0.057; ear opening ovate to roundish, prominent, EAD/EYD, mean = 0.253 $\pm$ 0.027. Nostril bordered by rostral, first supralabial, and three postnasals, medial postnasal largest, others subequal in size; one medial scale between postnasals. Dorsal head scales homogeneous in shape, slightly larger on snout; scattered flattened tubercles in occipital region; 14–19 interorbital scales; loreals with small projections on posterior half of eye; 15–16 scales between eye and ear opening; rostral partially cleft; nine to 10 supralabials, seven to eight infralabials. Mental triangular, longer than broad. Three pairs of postmentals, decreasing in size posteriorly, first pair in contact, with a broad suture. Dorsum of body and limbs with small roundish, beaded to flat scales intermixed with larger, roundish tubercles; tubercles surrounded by rosettes of eight - nine small

scales; tubercles two–three times larger than granular scales, smooth, flat to rounded, often conical laterally; arranged in ten longitudinal rows at midbody, lateral rows indistinct; limbs with scattered enlarged dorsal tubercles. Lateral fold indistinct, often absent. Venter with roundish, slightly imbricate scales, 27–30 across middle of belly; 141–150 from postmentals to cloaca; gulars small. Pre-cloacal pores absent. Femoral pores and spines absent. Subfemoral scales large, in five series, imbricate, slightly larger than ventrals. Cloacal spines present, two per side. Digits moderate, subdigital lamellae well-developed, smooth, nearly as broad as digit, 20–21 on fourth finger, 20–22 on first toe, 24–26 on fourth toe. Tail dorso-ventrally compressed in anterior two-thirds, round posterior one-third; anterior half with dorsal medial groove; anterior half distinctly segmented, tapering to point; seven to nine whorls in anterior third of tail; each segment in anterior half with two enlarged dorso-lateral tubercles (medial tubercle smallest, keeled, other bluntly acuminate) and two much larger, acuminate, lateral tubercles per side; tubercles reduced in size and number distally, indistinct or absent on posterior one-third; eight–ten rows of scales per whorl, terminal row not enlarged, comprised of a series of small squarish scales (Fig. 2); base of tail with numerous small scales below, transverse series of five to six larger scales, slightly larger than adjacent scales at third whorl; regenerated tail of holotype swollen and lobed, whereas paratype (USNM 284136) (broken at third whorl), not swollen nor lobed; dorsum of regenerated tail uniformly covered with small, flat to bluntly conical scales; regenerated subcaudals much larger than dorsal scales with transverse series of three or four scales largest.

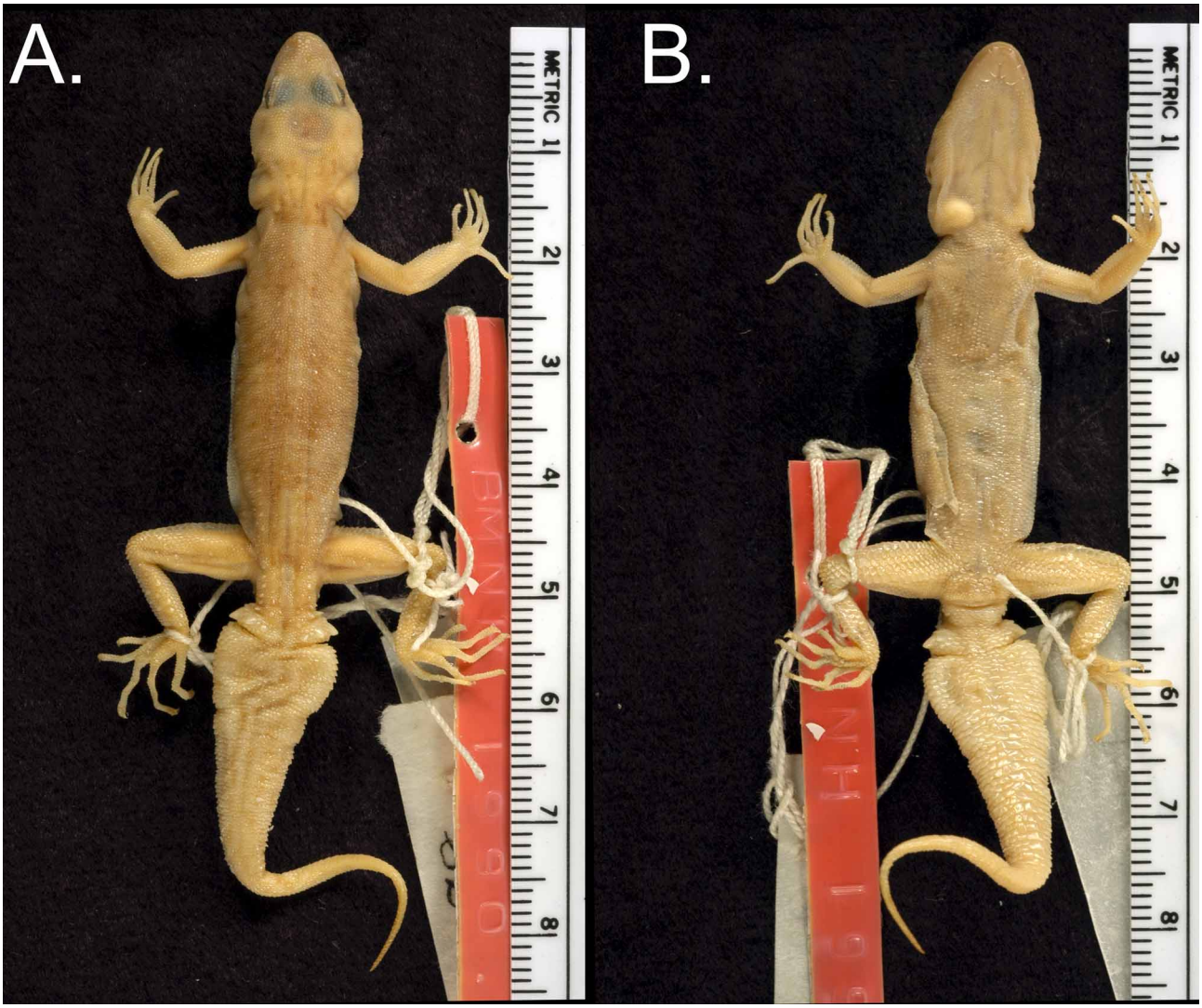

FIGURE 1. Holotype (BMNH 1990.3) of *Cyrtopodion baturense* (Khan & Baig 1992). A. dorsal and B. ventral views.

Dorsal ground color light to medium gray with seven to eight irregular transverse darker brown bands, with even darker posterior margins, one in occipital area, one at nape, and five to six on body; nine to 15 dark

bars on tail, regenerated tail with elongated brown speckles; limbs with short brown bars; grayish-brown bar from nostril through eye; top of head irregularly mottled; labials with dark blotches and specks; venter whitish.

FIGURE 2. Paratype (USNM 284136) of *Cyrtopodion baturense* (Khan & Baig 1992) illustrating three non-generated whorls at tail base.

FIGURE 3. *Cyrtopodion baturense* (Khan & Baig 1992) from Dih, Hunza District, UF 79147. A. dorsal and B. ventral views.

Distribution. Known only from the holotype locality and nearby village of Dih, Hunza District (Fig. 4).

Habitat. Found on side of stone wall and under stones on hillsides from 2,438–3,078 m elevation.

Reproduction. All previously known specimens are female. UF 79147 collected 12 July 1990 is also a female, with one vitellogenic follicle in each ovary. Khan & Baig (1992:276) do not mention if their specimens were gravid. Khan & Baig (1992) speculate that males of high altitude gecko species are rare or absent based on the small number of males encountered by Gruber (1981) (~ 14%, 2 males out of 14 specimens) and by the absence of males in the few specimens of *C. baturense* so far collected.

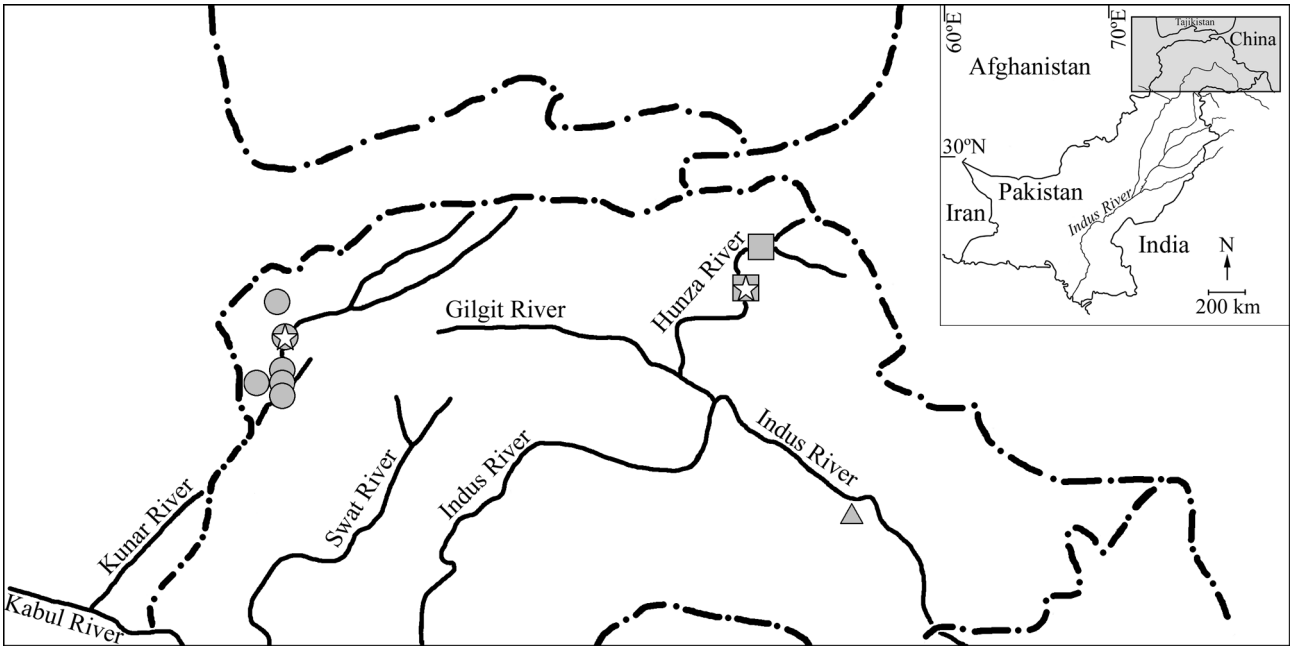

FIGURE 4. Distribution of *Cyrtopodion baturense* (squares), *C. walli* (circles), and *C. stoliczkai* (triangle). Star within symbol indicates holotype locality for respective taxon. Note that additional records for *C. stoliczkai*, including the type locality, occur in northern Kashmir, about 300 km southeast of locality above (see Auffenberg *et al.*, 2004).

***Cyrtopodion walli* (Ingoldby 1922)**

Figures 5–7

Gymnodactylus walli Ingoldby 1922, Journal of the Journal of the Bombay Natural History Society 28:1051. Type locality: Chitral, Northwest Frontier Province, Pakistan.

Gymnodactylus stoliczkai (*in partim*) Smith 1935:57, Fauna of British India, Reptilia and Amphibia vol. 2, Sauria.

Gymnodactylus (*Cyrtodactylus*) *stoliczkai* (*in partim*) Mertens 1969, Stuttgarter Beiträge zur Naturkunde 197:25.

Cyrtodactylus stoliczkai (*in partim*) Minton 1988:160, Reptiles of the Pakistan Deserts.

Tenuidactylus stoliczkai (*in partim*) Szczerbak & Golubev 1984:55, Vestnik Zoologii.

Cyrtopodion stoliczkai Welch *et al.* 1990:17, Lizards of the Orient A Checklist.

Gonydactylus stoliczkai (*in partim*) Kluge 1991, Smithsonian Herpetological Information Service 85:13.

Gymnodactylus walli Khan 1992, Herpetological Journal 2:106.

Gymnodactylus chitralensis Smith 1935:46, Fauna of British India, Reptilia and Amphibia, vol. 2, Sauria, pl. I, fig. E. Type locality: Karakal, Bumhoet Valley, Northwest Frontier Province, Pakistan. Khan 1992, Herpetological Journal 2:106.

Cyrtodactylus walli Kluge 1993:9, Gekkonoid Lizard Taxonomy.

Tenuidactylus walli Khan 1997:384, Biodiversity of Pakistan.

Mesodactylus walli Khan 1999, Pakistan Journal of Zoology 31:278.

Mediodactylus walli Khan 2003, Journal of Natural History and Wildlife 2:5.

Specimens examined. Chitral District, Northwest Frontier, Pakistan; Chitral: BMNH 1910.7.12.1 (holotype; Fig. 5), BMNH 1946.5.23.19 (recataloged, previously BMNH 1933.7.8.2, syntype of *Gymnodactylus*

chitralensis Smith 1935, but see discussion below; Fig. 6), UF 82302–12, 88003–20 (UF 88011 illustrated in Fig. 7); 7.0 km N Drosh: UF 82366–67; Ayun, ca. 20.0 km S Chitral: UF 82368–75; Bamburet Valley: UF 88022–23; Bermoghluscht: UF 88024–25; Drosh Tehsil: UF 88027–36.

Description of holotype (neonate, gender unknown). SVL = 26.0 mm; TL = unknown, associated tail does not match holotype; HL/SVL = 0.300; HW/HL = 0.628; HH/HW = 0.714; EYD/EYN = 0.800; EAD/EYD = 0.062; two post-nasals; four medial scales between post-nasals; 10–11 supralabials; eight to nine infralabials; 20 interorbitals; nine scales surrounding roundish dorsal tubercles; 165 scales between post-mentals and cloaca; 23 subdigital lamellae on fourth toe; three pairs of post-mentals; dark color bands: one on head, one on nape, five on body; 15 scales between eye and ear; 10 longitudinal rows of enlarged, dorsal tubercles; 24 transverse rows of ventrals at mid-body; 12 subdigital lamellae on first toe; three cloacal spines; 20–21 subdigital lamellae on fourth finger; first pair of post-mentals in contact; head scales not homogenous in size; mental triangular; pre-cloacal pores absent; dark color band from nostril through eye; femoral spines and pores absent.

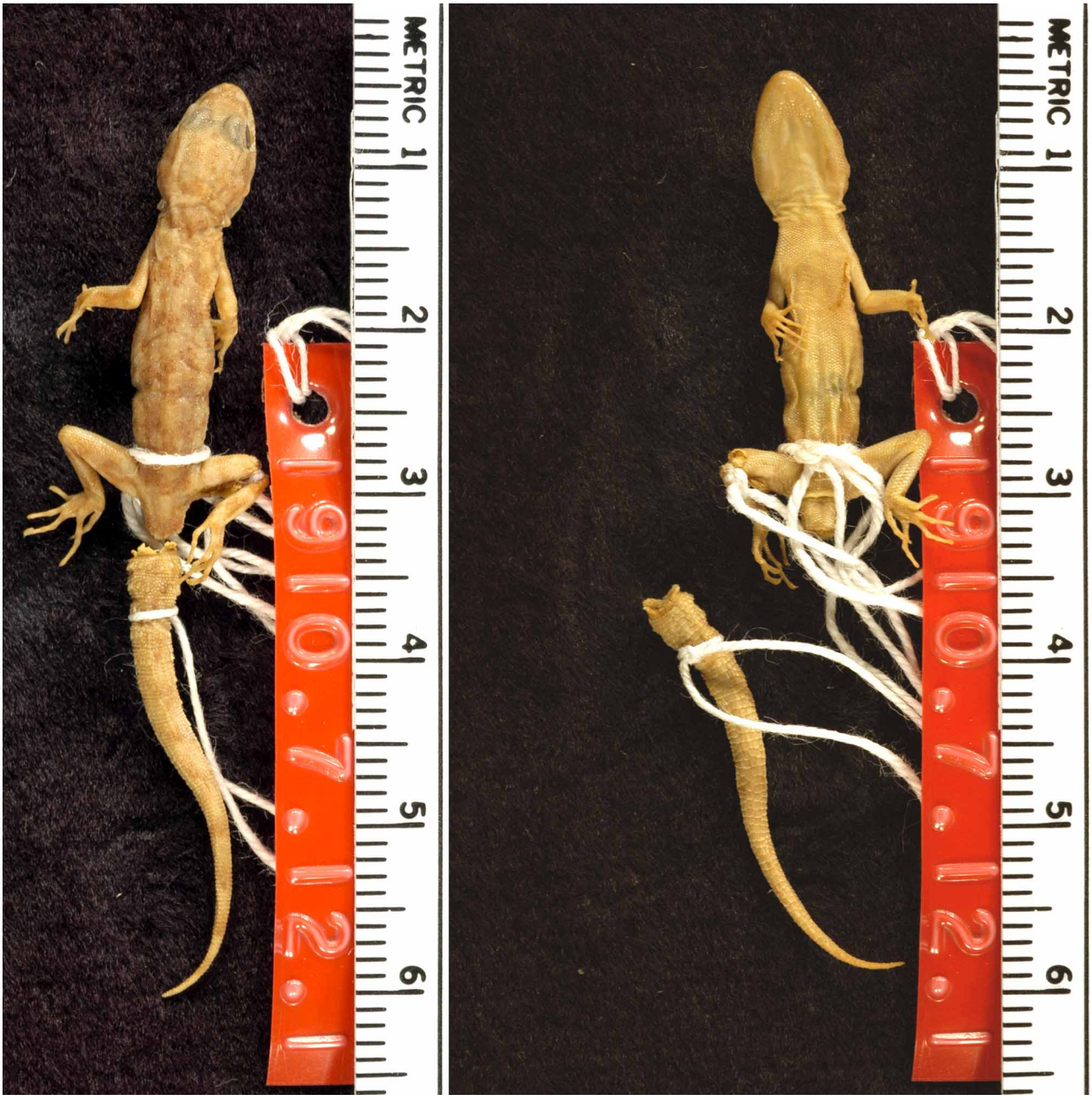

FIGURE 5. Holotype (BMNH 1910.7.12.1) of *Cyrtopodion walli* (Ingoldby 1922). A. dorsal and B. ventral views.

FIGURE 6. Syntype (BMNH 1946.5.23.19) of *Cyrtopodion chitralensis* (Smith 1935). A. dorsal and B. ventral views.

Variation. Medium-sized geckos (SVL of largest adult = 61.8 mm), tail longer than body (longest TL = 82.5 mm), SVL/TL, mean = 0.745 ± 0.072 (*n* = 22); limbs moderate, hind limb extends to axilla, forelimb to nostril; body and head moderately dorso-ventrally compressed. Head moderate (HL/SVL, mean = 0.254 ± 0.014, HW/HL , mean = 0.733 ± 0.035, HH/HW , mean = 0.510 ± 0.041, snout slightly longer than distance between eye and ear. Eye large, EYD/EYN, mean = 0.719 ± 0.071; ear opening ovate, small, EAD/EYD, mean = 0.285 ± 0.064. Nostril bordered by rostral, first supralabial, and three postnasals; middle postnasal largest, others subequal in size; zero to four medial scales between postnasals, usually one or two. Dorsal head scales heterogeneous in size, slightly larger on snout, scattered enlarged tubercles in occipital region; 16–22 interorbital scales; loreals with small projections on posterior half of eye; 14–19 scales between eye and ear opening; rostral partially cleft; nine to 11 supralabials, seven to 10 infralabials; mental triangular, about as long as broad; three pairs of postmentals, decreasing in size posteriorly, first pair in contact, with a broad suture; third pair often variable in size, may be substantially larger on one side, sometimes separated from infralabials by a series of smaller scales. Dorsum of body and limbs with small roundish, beaded to flat scales intermixed with larger, roundish to ovate tubercles. Tubercles surrounded by rosettes of eight to 12 small scales; tubercles four to five times larger than granular scales, smooth, flat to rounded, sometimes indistinctly keeled, often conical laterally; arranged in 10–12 longitudinal rows. Paravertebral rows separated by three to four granular scales. Limbs with scattered enlarged flat to conical dorsal tubercles. Lateral fold indistinct,

FIGURE 7. *Cyrtopodion walli* (Ingoldby 1922) (UF 88011). A. dorsal and B. ventral views.

often absent; venter with hexagonal to roundish, slightly imbricate scales, 27–36 across middle of belly; 143–182 from postmentals to cloaca; gulars small, granular; a chevron-shaped series of four enlarged pre-cloacal scales, often broken into two pairs separated by one or two much smaller scales; four pre-cloacal pores present in males; larger females with indentations in each of four enlarged scales. Femoral pores and spines absent; subfemoral scales uniform in size, about three-fourths as large as ventrals. Cloacal spines usually present, zero to four per side. Digits moderate, clawed, subdigital lamellae well-developed, smooth, nearly as broad as digit, 16–22 on fourth finger, 11–14 on first toe, 22–28 on fourth toe. Tail dorso-ventrally compressed in anterior two-thirds, round posterior one-third, base swollen in males, anterior two-thirds with shallow dorsal medial groove, anterior half distinctly segmented, tapering to point, seven to nine whorls in anterior third of tail, each segment in anterior half with one enlarged, rounded to weakly keeled dorso-lateral tubercle and two

to three enlarged, bluntly conical lateral tubercles per side, medial tubercle largest; tubercles reduced in size and number (two) distally, indistinct or absent on posterior one-third; six to 10 rows of scales per whorl, two terminal rows (distal to enlarged tubercles) comprised of transverse series of rectangular scales. Ventral tail base with numerous small scales, gradually becoming larger with central transverse series of two scales largest; dorsal four-fifths with single series of transversely enlarged scales, usually with two smaller scales ventral to enlarged tubercles; shallow medial groove in anterior half to two-thirds of tail; dorsum of regenerated tail with uniformly-sized, flattened scales, tubercles lacking, a single series of transversely enlarged scales below.

Dorsal ground color light- to medium-gray with seven to nine irregular transverse darker gray to brown bars, with even darker posterior margins, one in occipital area, one at nape, and five to seven on body; nine to 15 dark bars on tail; limbs with short grayish-brown bands; grayish-brown bar from nostril through eye; top of head sparsely mottled; labials with dark speckles; venter whitish.

Distribution. All known records occur north of the Lowari Pass (3,209 m elevation) in the lower Chitral District of northwestern Pakistan from Drosh northward as far as Birmogh Lasht, a village a few kilometers north of the town of Chitral (Fig. 4). These localities lie along the highway that generally follows the Kunar River. It has also been collected in the Bumboret River valley, a large tributary of the Kunar River within the Kafir Kalash Tribal Area (also see Smith 1935 for *Gymnodactylus chitralensis*). These localities range from 1,970–2,120 m elevation.

We are unaware of any records from other tributaries of the Kunar River in the Kalash region (Rumbur and Birir rivers), as well as the Shishi River drainage to the east, and upper Chitral District (north of Birmogh Lasht), albeit these areas of Pakistan are very poorly surveyed. Additionally, its distribution southwest of Drosh in the Kunar River valley is unknown. The species may occur in the Nuristan region of the borderlands of Pakistan and Afghanistan.

Habitat. The lower elevations of the mountains in Chitral District are denuded of much of their original conifer forests. River valleys have been mostly converted to agriculture although they are often forested with various broadleaf species.

Wall (1911:132) states that the species (as *Gymnodactylus stoliczkai*) is common around Drosh Fort, being found in packing crates and rubbish piles during the day and in the open at night. Individuals were encountered active at night most often on human habitations, including wooden and earthen structures during our surveys. Others were collected at night on tree trunks in a reforestation project site.

Reproduction. Two neonates (UF 82370 collected 7 July 1991 and UF 88004 collected 16 June 1993, SVL = 31.6 mm and 30.8 mm, respectively) indicate that hatching takes place in spring to early summer.

Discussion

Cyrtopodion baturense (species epithet emended from original to correspond with the neuter gender of generic name *Cyrtopodion*) is known from extreme northern Pakistan based on five specimens collected from Pasu (often spelled Passu), Gilgit Agency, N36 20', E74 50' (type locality, *n* = 3) and Khaiber (often spelled Khaibar), Gilgit Agency, N36 35', E74 47' (*n* = 2), about 17 km NW of Passu. Both these localities are approximately >2,400 m elevation. We have examined the holotype (BMNH 1990.3), two paratypes (CAS 170529 and USNM 284136) and one specimen (UF 79147) collected near Dih, Gilgit Agency, N36 53', E75 00', about 25 km NNE of Khaibar at 3,078 m. These localities lie along the Karakoram Highway between Karimabad and Khunjerab Pass.

Szczerbak & Golubev (1996:200, footnote) stated that *Cyrtopodion baturense* (Khan & Baig 1992) is very similar to or conspecific with *C. stoliczkai* (Steindachner 1867). Although similar in gross external morphology, *C. baturense* is distinct (*see* Table 2).

Gymnodactylus walli Ingoldby 1922 was described on the basis of five specimens: one adult male, two adult females, and one "halfgrown" specimen all from Jutogh (cantonment near Simla), Himachal Pradesh, India, and a neonate specimen from Chitral, Northwest Frontier Province (now Pakistan). Ingoldby (1922)

designated the neonate from Chitral as the holotype (BMNH 1910.7.12.1) and named the species in honor of its collector, Major F. Wall. Only one of the four paratypes was located at the British Museum (BMNH 1922.5.22.1), the others were perhaps transferred to the Indian Museum, Calcutta. However, these were not located in a recent survey of that collection (Das *et al.* 1998).

The postnasals and the medial scales between them are aberrant on the holotype of *Gymnodactylus walli*. The holotype has two postnasal scales in contact with each nostril and four medial scales. No other specimens in our UF series match the condition of the holotype precisely. The typical condition for this species based on our large series is three postnasals in contact with each nostril with 0 (n = 1), one (n = 26), two (n = 24), or three (n = 2) medial scales between them. However, all other characters of the holotype are well within the range of variation seen in our series, including two neonates only slightly larger than the holotype.

The paratype of *Gymnodactylus walli* (BMNH 1922.5.22.1) we examined is probably a specimen of *Cyrtopodion tibetanus*. Although this specimen remains a paratype of *G. walli* Ingoldby 1922, it is excluded from further discussion herein. Ingoldby's (1922) intention of designating the neonate (BMNH 1910.7.12.1) as a holotype is clear, his error in the identification of the examined paratype notwithstanding. The proper assignment of the other paratypes, if extant, remains unknown.

Smith (1935:57) placed *Gymnodactylus walli* Ingoldby 1922 into the synonymy of *Cyrtopodion stoliczkai* (Steindachner 1867) without comment. Smith (1935:46–47, plate 1, Fig. E) also described *Gymnodactylus chitralensis* based on two specimens collected during the Chitral Survey from Karakal, Bumhoet (now Krakal, Bumburet) Valley, Chitral District. Until recently, subsequent authors (Mertens 1969; Minton 1966; Kluge 1991; Wermuth 1965) followed Smith's opinion. Khan (1992) resurrected *Gymnodactylus walli* Ingoldby 1922 based on comparison of the holotype of *G. walli* with two specimens collected at Gharuet, a village near Drosh Fort in lower Chitral. In the same study, Khan (1992) examined a syntype of *G. chitralensis* Smith 1935 (BMNH 1946.5.23.19, several times erroneously stated as BMNH 1946.5.23.1 in Khan's report), and concluded that Smith's name should be considered a junior synonym of *G. walli*.

Cyrtopodion stoliczkai was later redefined (Khan 2000; Khan & Rösler 1999), and Auffenberg *et al.* (2004) provided a morphometric analysis of a larger series from Skardu. All of these studies were congruent and found *C. stoliczkai* to be a distinct species confined to the upper Indus River area of extreme northeastern Pakistan and northwestern India.

We concur with Khan (1992), based on our own examination of the syntype of *Gymnodactylus chitralensis* Smith 1935 (Fig. 6; BMNH 1946.5.23.19), that *G. chitralensis* is a junior synonym of *Gymnodactylus walli* Ingoldby 1922. The tail associated with the holotype of *G. walli* does not belong to that individual (also noted by Khan 1992:108). The detached tail, tied to the holotype with string, is about 29 mm in length. The proximal end of the detached tail is about 1 mm broader than the tail stump of the holotype. The tail scalation does not match other Chitrali specimens we have examined. Most importantly, Ingoldby (1922) stated that "It [the holotype] is a very young specimen minus the tail. We do not know how and when this tail became associated with the holotype of *G. walli*, but it is our opinion that an error has occurred and the tail should be omitted from future discussions of the holotype.

The specimens illustrated as *Tenuidactylus chitralensis* by Szczerbak & Golubev (1986; Fig. 90) are not that species. These identifications are corrected in the translation of their original work (Szczerbak & Golubev 1996:197, footnote).

Khan (2003b) presented a revised taxonomic arrangement for the Pakistani angular-toed geckos of Pakistan, introducing three new genera, *Altigekko*, *Siwaligekko*, and *Indogekko*. The genus *Altigekko* (Khan 2003b:2) (type species = *Tenuidactylus baturensis* Khan & Baig 1992) is comprised of those gecko species formerly assigned to the *stoliczkai* group (Khan 2001 and others). In addition to *A. baturensis*, the group includes *A. stoliczkai* (Steindachner 1867), *A. boehmei* (Szczerbak 1991) (synonymized with *A. stoliczkai* [Auffenberg *et al.* 2004]), and *A. yarkandensis* (Anderson 1872) (validity questioned by Blanford 1878, resurrected by Khan 1994, but *see* Auffenberg *et al.* 2004 for synopsis). Khan (2003b:2–3) inadvertently included the species epithet *lawderanus* Stoliczka 1871 in the content of both *Altigekko* and *Siwaligekko*. The latter genus is the correct assignment (M.S. Khan, pers. comm., 2004).

TABLE 2. Morphological characters, measurements and ratios for *Cyrtopodion baturense* (holotype = BMNH 1990.3), *C. stoliczkai* (holotype = NMW 16756, not personally examined in this study) and *C. walli* (holotype = BMNH 1910.7.12.1), respectively, from Pakistan. See text and Table 1 for character descriptions. Note that BMNH 1946.5.23.19 listed under *C. walli* is a syntype of *C. chitralensis*.

Specimen	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
baturense																						
BMNH 1990.3	F	3/3	1	9/9	7/7	14	9	141	26/26	3/3	NA	4	1/1/5/NA	15	10	27	12/13	+/2/2	NA	20/20	+	+
USNM 284136	F	3/3	1	9/10	8/7	16	9	149	27/27	3/3	NA	4	1/1/5/NA	16	10	27	13/13	+/2/2	9-10	20/NA	+	+
UF 79147	F	3/3	1	9/9	7/7	14	9	141	26	3/3	NA	4	1/1/4/NA	15	10	27	11/11	+/2/2	NA	20	+	+
CAS 170529	F	2/2	1	8/8	8/8	17	7-9	137	25/24	3/3	NA	3	1/1/5/NA	19	10	24	13/11	+/2/2	NA	18/18	+	+
stoliczkai																						
UF 81327	N/A	3/3	1	10/9	7/8	19	7-8	135	23/22	3/3	NA	2	1/1/5/10	17	8	29	10/10	+/2/2	6-7	19/19	+	+
UF 81328	F	3/3	1	10/10	7/7	20	7-9	125	22/23	3/3	5	2	1/1/5/12	17	8	30	11/11	+/2/2	6	18/17	+	+
UF 81329	N/A	3/3	0	10/10	7/7	17	7-8	117	23/23	3/3	NA	2	1/1/5/10	17	8	29	10/11	+/2/2	6-7	19/19	+	+
UF 81330	F	3/3	2	11/10	9/9	18	7-8	113	22/23	2/3	NA	2	1/1/5/NA	17	10	31	10/10	+/2/2	NA	18/18	+	+
UF 81331	N/A	4/3	1	10/10	8/8	20	7-8	127	23/23	3/3	NA	2	1/1/5/13	16	10	31	11/11	+/2/2	6-7	18/18	+	+
UF 81332	N/A	3/3	2	10/10	8/8	18	7-8	116	26/26	3/3	5	2	1/1/5/NA	16	10	27	12/12	+/2/2	6-7	18/18	+	+
UF 81333	F	3/3	2	10/10	8/9	19	7-8	122	23/21	3/3	5	2	1/1/6/15	17	10	27	10/10	+/2/2	6-7	16/17	+	+
UF 81334	N/A	3/3	1	10/10	7/7	18	7-8	119	22/23	3/3	5	2	1/1/6/11	16	8	28	10/10	+/2/2	6-7	19/19	+	+
UF 81335	M	3/3	1	9/9	8/8	18	7-8	113	22/21	3/3	5	2	1/1/6/NA	17	12	28	10/10	+/2/2	6-7	19/18	+	+
UF 81336	F	3/3	1	11/11	8/7	20	7-9	126	22/22	2/2	NA	2	1/1/6/NA	16	10	28	10/10	+/2/2	6-7	19/18	+	+
UF 81337	N/A	3/3	2	10/10	8/7	20	8	126	23/22	3/3	5	2	1/1/6/15	17	8	25	11/11	+/2/2	6	18/18	+	+
UF 81338	N/A	3/3	1	11/10	7/7	20	7-8	132	23/24	3/3	NA	2	1/1/6/NA	17	10	28	10/10	+/2/2	6-7	18/17	+	+
UF 81339	N/A	3/3	1	10/10	7/8	20	7-8	118	20/20	3/3	NA	2	1/1/5/NA	17	8	26	10/10	+/1/1	6-7	18/19	+	+
UF 81340	N/A	3/3	1	10/10	7/7	19	7-9	117	19/19	2/3	5	2	1/1/6/14	17	10	27	10/10	+/2/2	6	19/19	+	+
UF 81341	F	3/3	2	11/11	8/8	20	8	124	22/20	3/3	5	2	1/1/5/NA	16	8	26	10/10	+/1/1	6	18/18	+	+
UF 81342	N/A	2/2	2	10/11	8/8	17	7-8	116	22/23	3/3	NA	NA	1/1/6/NA	16	8	26	11/10	+/2/2	NA	18/18	+	+
UF 81343	M	3/3	2	10/11	8/7	17	7-8	115	23/22	3/3	5	2	1/1/5/13	16	10	30	10/10	+/2/2	6-7	18/18	+	+
UF 81344	F	2/2	1	10/10	7/7	18	7-9	129	23/22	3/3	5	2	1/1/6/NA	15	10	26	11/11	+/1/1	6-7	17/17	+	+
UF 81345	F	3/3	2	10/10	9/9	17	7-8	119	24/26	3/3	5	2	1/1/6/13	16	8	28	10/11	+/2/2	6-7	18/19	+	+
UF 81346	F	3/3	2	11/10	9/8	18	8-9	129	25/27	3/3	5	2	1/1/6/12	16	8	29	11/11	+/2/2	6	18/20	+	+
UF 81347	N/A	3/3	1	10/10	8/8	18	7-8	115	-/24	3/3	NA	2	1/1/6/NA	17	8	27	NA/10	+/2/2	6-7	18/18	+	+

continued next page

TABLE 2. (continued)

Specimen	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
UF 81348	F	3/3	1	9/9	8/8	20	7-9	114	23/23	3/3	NA	2	1/1/5/NA	16	8	25	11/11	+/2/2	6	18/18	+	+
UF 81349	F	3/3	2	10/10	9/9	19	7-8	122	25/24	3/3	5	2	1/1/8/13	17	8	25	11/11	+/2/2	6-7	20/20	+	+
UF 81350	M	3/3	1	10/10	7/7	18	7-9	130	26/24	3/3	NA	NA	1/1/7/NA	16	8	28	11/11	+/1/1	NA	20/19	+	+
UF 81351	N/A	3/3	1	11/12	9/9	19	7-8	122	22/23	3/3	5	2	1/1/6/NA	16	8	29	11/11	+/2/2	6-7	18/18	+	+
ZFMK 38773	N/A	3/3	1	9/9	6/7	20	8	NA	NA	3/3	NA	2	1/1/5/12	NA	NA	NA	NA	NA	NA	NA	+	+
walli																						
BMNH 1910.7.12.1	N/A	2/2	4	11/10	9/8	20	9	165	23/23	3/3	6	3	1/1/5/11	15	10	37	12/12	+/3/3	6-8	21/20	+	-
BMNH 1946.5.23.19	N/A	3/3	1	11/10	9/8	20	8-9	166	28/28	3/3	10	2	1/1/7/13	17	12	31	13/13	+/2/2	8	23/23	+	-
UF 82302	F	3/3	1	9/9	7/8	17	9-10	165	24/23	3/3	8	3	1/1/5/11	15	12	33	12/12	+/2/2	8	18/19	+	-
UF 82303	F	3/3	2	9/9	8/8	21	9-10	166	26/26	3/3	NA	3	1/1/6/NA	15	12	30	12/13	+/2/2	NA	20/18	+	-
UF 82304	F	3/3	2	10/11	8/8	22	8-10	162	23/23	3/3	NA	3	1/1/6/NA	14	12	32	12/13	+/2/1	8	22/20	+	-
UF 82305	M	3/3	3	9/11	8/8	20	9-10	174	25/26	3/3	NA	3	1/1/6/NA	15	12	31	13/12	+/2/3	8	17/19	+	-
UF 82306	N/A	3/3	1	9/10	8/9	18	9-10	171	23/23	3/3	9	3	1/1/6/12	14	10	30	12/12	+/2/2	8-9	20/22	+	-
UF 82307	F	3/3	1	10/10	8/8	17	8-10	163	26/27	3/3	9	3	1/1/6/15	14	12	32	12/11	+/4/3	6-8	20/21	+	-
UF 82311	F	3/3	2	10/10	8/9	19	8-10	165	25/26	3/3	8	3	1/1/6/12	14	12	34	13/13	+/2/2	6-8	20/15	+	-
UF 82308	M	3/3	2	9/9	8/8	20	8-9	174	26/26	3/3	8	3	1/1/5/NA	14	10	29	13/12	+/2/2	6-7	21/21	+	-
UF 82309	F	3/3	1	9/9	8/8	21	9-10	159	26/27	3/3	8	3	1/1/6/NA	15	12	34	12/12	+/2/2	7-8	20/20	+	-
UF 82310	F	3/3	2	10/9	7/8	17	8-10	171	26/26	3/3	NA	NA	1/1/6/NA	15	12	32	12/12	+/2/2	NA	20/20	+	-
UF 82311	F	3/3	2	10/10	8/9	19	8-10	165	25/26	3/3	8	3	1/1/6/12	14	12	34	13/13	+/2/2	6-8	20/15	+	-
UF 82312	N/A	3/3	2	10/10	8/8	19	8-10	156	25/24	3/3	NA	3	1/1/6/NA	14	12	32	13/12	+/3/2	7-10	NA/19	+	-
UF 82366	F	3/3	2	10/9	8/7	18	9-10	158	22/23	3/3	NA	3	1/1/6/NA	17	10	34	13/12	+/2/2	7-8	16/17	+	-
UF 82367	M	3/3	2	10/10	9/8	20	8-10	164	26/25	3/3	NA	3	1/1/6/NA	19	12	33	13/12	+/2/2	NA	21/21	+	-
UF 82368	F	3/3	2	10/9	8/8	19	8-9	159	25/24	3/3	8	3	1/1/6/12	16	12	35	12/13	+/2/2	7-8	18/NA	+	-
UF 82369	M	3/3	2	10/10	8/9	21	9-10	174	28/28	3/3	NA	3	1/1/6/NA	14	12	31	12/12	+/2/2	NA	21/21	+	-
UF 82370	N/A	3/3	2	10/9	7/8	20	8-10	167	23/24	3/3	NA	NA	1/1/6/NA	14	10	33	13/13	+/2/2	NA	20/20	+	-
UF 82371	M	3/3	2	10/10	8/8	20	8-9	143	24/24	3/3	8	3	1/1/6/11	16	12	32	12/12	+/2/1	8	20/20	+	-
UF 82372	N/A	3/3	1	11/11	8/8	21	9	159	28/28	3/3	8	3	1/1/6/13	15	12	31	12/13	+/2/2	8	22/22	+	-
UF 82373	M	3/3	1	10/11	8/8	22	8-9	166	26/26	3/3	8	3	1/1/5/11	16	10	27	13/13	+/2/2	7-8	20/19	+	-
UF 82374	N/A	3/3	1	10/10	9/9	21	8-10	162	25/26	3/3	8	3	1/1/6/12	15	10	33	12/12	+/3/3	8	20/20	+	-

continued next page

TABLE 2. (continued)

Specimen	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
UF 82375	M	3/3	1	10/9	8/9	16	8-9	153	23/23	3/3	8	3	1/1/6/12	15	10	27	12/12	+/2/2	8	18/18	+	-
UF 88003	N/A	3/3	2	10/11	8/8	17	9-11	162	27/26	3/3	8	2	1/1/6/12	16	12	30	11/11	+/2/2	6-7	20/19	+	-
UF 88004	N/A	3/3	2	9/11	8/8	20	9-11	164	26/27	3/3	8	2	1/1/6/12	18	12	32	12/11	+/2/2	8	21/21	+	-
UF 88005	F	3/3	1	10/9	7/7	17	9-10	153	27/27	3/3	NA	2	1/1/6/NA	17	12	32	11/12	+/2/1	8-9	21/22	+	-
UF 88006	F	3/3	2	11/10	9/8	18	8-11	169	26/26	3/3	NA	2	1/1/6/NA	17	12	34	12/12	+/2/2	8	22/22	+	-
UF 88007	F	3/3	1	11/10	8/8	20	10-11	164	24/25	3/3	8	3	1/1/6/12	18	12	33	12/11	+/2/2	6-8	21/22	+	-
UF 88008	M	3/3	0	11/11	8/8	16	9-11	153	24/25	3/3	NA	3	1/1/6/NA	19	12	32	12/12	+/3/3	6-7	20/20	+	-
UF 88009	M	3/3	1	10/11	7/7	20	10-11	164	25/25	3/3	8	2	1/1/7/14	16	12	32	12/12	+/2/2	7-8	20/21	+	-
UF 88010	N/A	3/3	1	10/10	9/7	22	9-10	167	26/26	3/3	NA	2	1/1/6/NA	18	10	32	12/11	+/2/2	6-7	19/20	+	-
UF 88011	M	3/3	2	10/10	9/9	20	9-10	182	26/26	3/3	8	2	1/1/6/NA	16	12	34	12/12	+/0/3	7-9	20/21	+	-
UF 88012	M	3/3	2	9/9	9/8	19	9-11	163	23/24	3/3	7	2	1/1/6/11	17	12	32	12/12	+/2/2	7	20/20	+	-
UF 88013	M	3/3	1	10/10	8/8	20	9-10	165	27/27	3/3	NA	2	1/1/5/NA	15	12	36	13/13	+/2/2	7	21/21	+	-
UF 88014	F	3/3	1	10/11	9/8	18	9-10	182	27/27	3/3	NA	2	1/1/5/NA	15	12	36	12/12	+/2/2	7-8	20/21	+	-
UF 88015	F	3/3	1	10/10	9/9	21	9-11	167	27/28	3/3	7	2	1/1/6/NA	18	12	36	13/13	+/3/3	7-8	21/22	+	-
UF 88016	N/A	3/3	2	9/9	8/8	18	9-10	165	27/26	3/3	9	2	1/1/7/12	17	10	33	12/11	+/2/3	7	21/21	+	-
UF 88017	F	3/3	1	11/9	8/8	16	9-11	152	25/26	3/3	NA	3	1/1/7/NA	18	12	35	13/12	+/2/2	7-8	21/22	+	-
UF 88018	F	3/3	1	10/10	9/8	20	9-10	175	26/26	3/3	NA	3	1/1/6/NA	16	12	36	12/12	+/2/2	7-8	22/22	+	-
UF 88019	F	3/3	1	9/9	8/8	20	9-11	154	24/24	3/3	8	3	1/1/5/9	16	12	32	11/11	+/3/3	7-8	20/21	+	-
UF 88020	F	3/3	1	10/10	9/9	22	9-11	169	23/22	3/3	NA	3	1/1/6/NA	15	12	35	12/12	+/3/3	7	21/22	+	-
UF 88022	F	3/3	2	10/10	9/8	20	9-11	156	26/25	3/3	9	3	1/1/6/12	16	12	32	12/13	+/2/2	7-8	20/20	+	-
UF 88023	M	3/3	1	10/9	9/10	18	9-10	158	26/25	3/3	NA	3	1/1/5/NA	14	10	27	12/12	+/3/1	7-9	20/21	+	-
UF 88024	F	3/3	1	10/9	8/9	22	9-12	174	26/27	3/3	7	3	1/1/7/NA	14	12	31	13/13	+/3/2	8-9	20/20	+	-
UF 88025	F	3/3	2	11/11	8/8	22	10-11	171	25/24	3/3	NA	NA	1/1/6/NA	17	12	33	13/14	+/2/2	NA	20/22	+	-
UF 88027	F	3/3	2	9/10	7/8	19	8-10	150	23/23	3/3	8	3	1/1/7/13	16	12	35	13/13	+/2/3	7-8	21/21	+	-
UF 88028	F	3/3	1	10/10	7/7	21	9-11	149	24/25	3/3	NA	3	1/1/6/NA	17	12	31	12/12	+/1/2	7-8	20/21	+	-
UF 88029	F	3/3	2	9/10	9/8	20	9-10	162	26/24	3/3	NA	NA	1/1/7/NA	17	12	36	12/12	+/3/2	NA	22/21	+	-
UF 88030	F	3/3	3	9/11	8/7	20	9-10	167	23/23	3/3	NA	3	1/1/6/NA	16	10	31	12/12	+/2/1	7	20/20	+	-
UF 88031	M	3/3	2	9/11	8/8	19	9-10	153	26/25	3/3	NA	3	1/1/6/NA	15	12	36	12/12	+/2/2	7-8	22/22	+	-
UF 88032	F	3/3	1	9/10	8/8	18	9-10	149	25/25	3/3	NA	3	1/1/5/NA	14	10	30	12/12	+/2/2	7-9	22/22	+	-
UF 88033	N/A	3/3	1	9/9	7/7	19	9-10	160	24/24	3/3	9	2	1/1/7/12	15	12	34	12/12	+/1/1	7-8	20/20	+	-
UF 88034	M	3/3	1	10/9	8/8	17	9-10	151	26/25	3/3	NA	2	1/1/6/NA	14	12	32	12/12	+/3/2	7-8	21/21	+	-
UF 88035	N/A	3/3	2	9/9	8/8	21	9-10	165	25/24	3/3	7	2	1/1/6/12	15	10	32	12/12	+/2/0	7-9	20/21	+	-
UF 88036	F	3/3	1	10/10	8/8	19	9-10	164	23/24	3/3	NA	NA	1/1/6/NA	15	10	35	12/12	+/3/3	NA	21/21	+	-

continued next page

TABLE 2. (continued)

Specimen	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46
baturense																								
BMNH 1990.3	+	+	+	-	+	+	-	-	+	+	+	NA	NA	NA	-	50.9	NA	13.5	8.6	5.3	4.3	4.1	3.0	0.7
USNM 284136	+	+	+	-	+	+	-	-	+	+	+	-	+	+	-	58.5	NA	14.7	8.8	4.5	4.2	4.3	3.8	0.7
UF 79147	+	+	+	-	+	+	-	-	+	+	+	NA	NA	NA	-	50.9	NA	13.5	8.6	5.3	4.3	4.1	3.0	0.9
CAS 170529	+	+	NA	-	+	+	-	-	+	+	+	NA	NA	+	-	42.0	NA	12.2	7.9	4.9	4.2	4.0	2.7	0.8
stoliczkai																								
UF 81327	+	+	-	-	+	+	-	-	+	+	+	+	-	+	-	23.7	25.0	6.8	4.6	2.6	1.9	1.9	1.4	0.1
UF 81328	+	+	+	-	+	+	-	-	+	+	+	+	-	+	-	45.1	52.5	13.7	8.3	5.1	3.4	3.4	2.4	0.2
UF 81329	+	+	-	-	+	+	-	-	+	+	+	+	-	+	-	20.1	17.5	7.5	4.4	2.7	1.6	1.6	1.3	0.1
UF 81330	+	+	NA	-	+	+	-	-	+	+	+	+	-	+	-	43.6	NA	11.0	7.9	4.8	3.3	3.3	2.2	0.3
UF 81331	+	+	-	-	+	+	-	-	+	+	+	+	-	+	-	34.0	41.0	9.2	6.1	3.6	2.7	2.4	1.8	0.2
UF 81332	+	+	+	-	+	+	-	-	+	+	+	+	-	+	-	36.7	NA	9.5	6.9	4.2	3.0	3.0	2.1	0.3
UF 81333	+	+	+	-	+	+	-	-	+	+	+	+	-	+	-	41.9	47.5	10.7	7.6	4.2	3.4	3.4	2.4	0.5
UF 81334	+	+	+	-	+	+	-	-	+	+	+	+	-	+	-	33.4	41.5	8.5	6.0	3.3	2.5	2.5	1.7	0.3
UF 81335	+	+	+	-	+	+	-	-	+	+	+	+	-	+	-	41.1	NA	10.6	7.6	4.5	3.3	3.3	2.2	0.3
UF 81336	+	+	+	-	+	+	-	-	+	+	+	+	-	+	-	44.0	NA	11.3	8.1	4.8	3.4	3.0	2.5	0.4
UF 81337	+	+	+	-	+	+	-	-	+	+	+	+	-	+	-	38.7	46.6	9.7	7.0	4.0	2.6	2.6	2.0	0.5
UF 81338	+	+	+	-	+	+	-	-	+	+	+	+	-	+	-	37.9	NA	10.1	6.9	3.8	3.1	3.1	2.2	0.4
UF 81339	+	+	+	-	+	+	-	-	+	+	+	+	-	+	-	22.0	NA	6.5	4.3	2.7	1.5	1.5	1.4	0.1
UF 81340	+	+	+	-	+	+	-	-	+	+	+	+	-	+	-	36.3	46.3	9.8	6.6	5.2	2.9	2.5	2.0	0.3
UF 81341	+	+	+	-	+	+	-	-	+	+	+	+	-	+	-	45.0	NA	11.3	8.0	4.8	3.6	3.6	2.6	0.3
UF 81342	+	+	NA	-	+	+	-	-	+	+	+	+	-	+	-	34.1	NA	9.5	7.0	4.0	2.9	2.9	1.9	0.3
UF 81343	+	+	+	-	+	+	-	-	+	+	+	+	-	+	-	41.5	48.8	10.9	7.6	5.4	3.6	3.6	2.4	0.4
UF 81344	+	+	+	-	+	+	-	-	+	+	+	+	-	+	-	46.5	NA	11.3	8.2	4.6	3.5	3.5	2.2	0.4
UF 81345	+	+	+	-	+	+	-	-	+	+	+	+	-	+	-	43.4	51.0	10.8	7.8	4.3	3.2	3.2	2.2	0.4
UF 81346	+	+	+	-	+	+	-	-	+	+	+	+	-	+	-	43.5	48.1	11.1	8.1	4.6	3.5	3.5	2.3	0.4
UF 81347	+	+	+	-	+	+	-	-	+	+	+	+	-	+	-	37.2	NA	9.4	6.3	3.8	2.8	2.8	2.0	0.2
UF 81348	+	+	+	-	+	+	-	-	+	+	+	+	-	+	-	43.9	NA	11.1	7.8	4.2	3.5	3.5	2.2	0.4

continued next page

TABLE 2. (continued)

Specimen	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46
UF 81349	+	+	+	-	+	+	-	-	+	+	+	+	-	+	-	45.1	53.4	11.5	8.3	4.6	3.7	3.7	2.5	0.5
UF 81350	+	+	NA	-	+	+	-	-	+	+	+	+	-	+	-	40.0	NA	10.5	7.3	4.1	3.0	3.0	2.3	0.4
UF 81351	+	+	+	-	+	+	-	-	+	+	+	+	-	+	-	34.0	NA	9.1	6.5	3.7	2.8	2.8	1.7	0.2
ZFMK 38773	+	+	-	-	+	+	NA	NA	NA	NA	NA	NA	NA	NA	-	34.6	35.7	NA	7.2	4.4	NA	NA	1.5	0.5
walli																								
BMNH 1910.7.12.1	+	+	+	-	+	+	-	-	+	+	+	+	-	-	-	26.0	29.0	7.8	4.9	3.5	2.0	2.1	1.6	0.1
BMNH 1946.5.23.19	+	+	+	-	+	+	-	-	+	+	-	+	-	-	-	52.4	74.5	13.3	9.3	5.3	4.5	3.9	2.9	0.7
UF 82302	+	+	-	-	+	+	-	-	+	+	+	+	-	+	-	54.9	74.0	13.4	10.0	4.6	3.6	3.6	2.9	1.1
UF 82303	+	+	+	-	+	+	-	-	+	+	+	+	NA	+	-	45.3	NA	11.9	8.5	4.1	3.6	3.5	2.6	0.7
UF 82304	+	+	+	-	+	+	-	-	+	+	+	+	-	+	-	50.8	NA	12.9	9.2	4.7	3.8	3.8	2.6	0.9
UF 82305	+	+	+	+/2/2	+	+	-	-	+	+	+	+	-	+	-	52.7	NA	12.9	9.7	5.2	4.3	4.0	3.1	1.0
UF 82306	+	+	+	-	+	+	-	-	+	+	+	+	-	+	-	36.2	46.7	9.7	6.9	3.5	2.9	2.9	2.1	0.7
UF 82307	+	+	+	-	+	+	-	-	+	+	+	+	-	+	-	56.6	79.3	14.4	10.2	5.1	4.7	4.5	3.4	1.1
UF 82308	+	+	+	+/2/2	+	+	-	-	+	+	+	+	-	+	-	53.6	NA	13.4	9.7	5.2	4.2	4.0	3.2	1.1
UF 82309	+	+	+	-	+	+	-	-	+	+	+	+	-	+	-	56.5	NA	13.9	10.2	5.2	4.2	4.2	3.1	1.0
UF 82310	+	+	+	-	+	+	-	-	+	+	+	NA	NA	+	-	50.7	NA	13.0	9.3	4.7	4.0	4.2	2.7	0.7
UF 82311	+	+	+	-	+	+	-	-	+	+	+	+	-	+	-	55.5	76.3	12.7	10.3	4.8	4.4	3.9	2.8	1.0
UF 82312	+	+	+	-	+	+	-	-	+	+	+	+	-	+	-	38.6	NA	10.0	6.9	3.8	3.2	3.2	2.4	0.5
UF 82366	+	+	+	-	+	+	-	-	+	+	+	+	-	+	-	49.0	NA	11.3	8.5	3.9	3.4	3.6	2.5	0.8
UF 82367	+	+	+	+/2/2	+	+	-	-	+	+	+	NA	NA	+	-	48.2	NA	12.4	9.0	3.9	3.6	3.9	2.6	1.0
UF 82368	+	+	+	-	+	+	-	-	+	+	+	+	-	+	-	43.8	65.4	11.4	8.0	4.1	3.7	3.6	3.0	0.7
UF 82369	+	+	+	+/2/2	+	+	-	-	+	+	+	NA	NA	+	-	52.7	NA	13.6	9.8	4.6	4.4	3.9	3.4	1.0
UF 82370	+	+	+	-	+	+	-	-	+	+	+	NA	NA	+	-	31.6	NA	8.5	6.1	3.0	2.6	2.7	2.3	0.4
UF 82371	+	+	+	+/2/2	+	+	-	-	+	+	+	+	-	+	-	44.4	65.9	11.0	7.8	3.9	3.6	3.1	2.7	1.0
UF 82372	+	+	+	-	+	+	-	-	+	+	+	+	-	+	-	38.2	51.4	9.5	7.1	3.7	3.1	3.1	2.5	0.6
UF 82373	+	+	+	+/2/2	+	+	-	-	+	+	+	+	-	+	-	51.5	76.9	13.3	9.3	5.2	4.2	4.2	3.2	1.0
UF 82374	+	+	+	+/1/1	+	+	-	-	+	+	+	+	-	+	-	40.7	71.9	10.5	7.1	3.9	3.1	3.1	2.2	0.6

continued next page

TABLE 2. (continued)

Specimen	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46
UF 82375	+	+	+	+/2/2	+	+	-	-	+	+	+	+	-	+	-	46.9	65.7	11.7	9.0	4.4	3.6	3.6	2.6	1.0
UF 88003	+	+	+	+/2/2	+	+	-	-	+	+	+	+	-	+	-	43.7	59.9	12.1	8.4	4.2	3.9	3.6	3.3	0.6
UF 88004	+	+	+	-	+	+	-	-	+	+	+	+	-	+	-	30.8	38.1	8.6	6.1	3.5	2.6	2.8	2.2	0.6
UF 88005	+	+	+	-	+	+	-	-	+	+	+	+	-	+	-	59.3	NA	13.2	11.0	5.2	5.0	4.7	3.4	0.8
UF 88006	+	+	+	-	+	+	-	-	+	+	+	+	-	+	-	49.6	NA	12.4	9.4	4.4	4.3	4.0	2.2	0.7
UF 88007	+	+	+	-	+	+	-	-	+	+	+	+	-	+	-	51.7	67.0	12.4	9.3	4.9	4.8	4.1	2.8	0.7
UF 88008	+	+	+	+/2/2	+	+	-	-	+	+	+	+	-	+	-	58.1	NA	14.7	10.9	5.1	4.6	5.3	3.5	0.9
UF 88009	+	+	+	+/2/2	+	+	-	-	+	+	+	+	-	+	-	51.4	72.6	13.0	9.5	5.0	4.5	4.0	3.0	0.7
UF 88010	+	+	+	+/2/2	+	+	-	-	+	+	+	+	-	+	-	28.5	NA	7.8	5.8	2.4	2.7	2.4	2.2	0.5
UF 88011	+	+	+	+/2/2	+	+	-	-	+	+	+	+	-	+	-	49.4	NA	12.5	9.7	4.9	4.6	3.9	2.9	0.8
UF 88012	+	+	+	+/2/2	+	+	-	-	+	+	+	+	-	+	-	56.5	82.5	14.9	10.6	5.7	5.0	4.7	3.4	1.3
UF 88013	+	+	+	-	+	+	-	-	+	+	+	+	-	+	-	47.6	NA	11.9	9.0	4.6	4.2	4.0	2.6	0.7
UF 88014	+	+	+	-	+	+	-	-	+	+	+	+	-	+	-	54.9	NA	13.5	9.8	5.0	4.8	4.1	3.3	0.8
UF 88015	+	+	+	-	+	+	-	-	+	+	+	+	-	+	-	58.1	NA	13.7	9.8	4.9	4.9	4.5	3.2	1.0
UF 88016	+	+	+	-	+	+	-	-	+	+	+	+	-	+	-	36.0	44.4	10.1	6.9	3.6	3.0	2.9	2.5	0.5
UF 88017	+	+	+	-	+	+	-	-	+	+	+	+	-	+	-	49.5	NA	12.7	9.4	4.5	4.0	3.8	3.1	0.8
UF 88018	+	+	+	-	+	+	-	-	+	+	+	+	-	+	-	56.0	NA	13.7	10.2	5.1	4.9	4.5	3.5	1.0
UF 88019	+	+	+	-	+	+	-	-	+	+	+	+	-	+	-	53.7	68.5	13.3	9.9	5.1	4.9	4.5	3.2	0.9
UF 88020	+	+	+	-	+	+	-	-	+	+	+	+	-	+	-	61.8	NA	15.2	11.4	6.1	5.1	4.7	3.8	1.0
UF 88022	+	+	+	-	+	+	-	-	+	+	+	+	-	+	-	51.0	69.8	12.7	9.5	5.2	4.5	4.1	2.9	0.9
UF 88023	+	+	+	+/2/2	+	+	-	-	+	+	+	+	-	+	-	50.2	NA	12.9	9.3	5.1	4.3	4.3	3.1	1.0
UF 88024	+	+	+	-	+	+	-	-	+	+	+	+	-	+	-	61.1	NA	14.5	11.2	5.6	5.2	4.4	3.5	1.1
UF 88025	+	+	+	-	+	+	-	-	+	+	+	+	-	+	-	53.9	NA	12.9	9.3	4.9	4.3	4.1	3.2	0.7
UF 88027	+	+	+	-	+	+	-	-	+	+	+	+	-	+	-	51.8	61.9	12.7	9.4	4.7	4.3	4.4	3.2	0.7
UF 88028	+	+	+	-	+	+	-	-	+	+	+	+	-	+	-	49.4	NA	11.7	9.4	4.8	4.3	4.3	2.8	0.7
UF 88029	+	+	+	-	+	+	-	-	+	+	+	+	-	+	-	51.1	NA	12.3	9.3	4.6	4.2	4.2	2.8	1.1
UF 88030	+	+	+	-	+	+	-	-	+	+	+	+	-	+	-	54.6	NA	13.5	10.1	5.1	4.5	4.5	3.2	1.1
UF 88031	+	+	+	+/2/2	+	+	-	-	+	+	+	+	-	+	-	52.2	NA	12.7	10.0	5.2	4.4	4.4	2.7	0.8
UF 88032	+	+	+	-	+	+	-	-	+	+	+	+	-	+	-	49.9	NA	12.6	9.0	4.6	4.7	4.0	3.0	1.0
UF 88033	+	+	+	-	+	+	-	-	+	+	+	+	-	+	-	40.1	48.1	10.7	8.0	4.0	3.5	3.4	2.7	0.6
UF 88034	+	+	+	+/2/2	+	+	-	-	+	+	+	+	-	+	-	47.5	NA	12.3	8.9	4.5	3.8	4.0	2.8	1.0
UF 88035	+	+	+	-	+	+	-	-	+	+	+	+	-	+	-	37.1	46.1	10.1	7.8	4.0	3.7	3.6	2.6	0.6
UF 88036	+	+	+	-	+	+	-	-	+	+	+	+	-	+	-	48.0	NA	13.0	8.8	4.8	4.1	4.1	2.9	1.0

Khan (2003b:5) includes *Cyrtopodion walli* (Ingoldby 1922) in the Mediterranean and Central Asian group, *Mediodactylus* Szczerbak & Golubev 1977, along with the Iranian *C. kirmanense* (Nikolsky 1900).

These generic assignments (Khan 2003b) may have merit, but we consider their usage premature. Variation within these and other recognized groups of geckos in southern Asia should be examined and their limits rigorously tested before this arrangement can be generally applied.

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