

ON THE SYSTEMATIC STATUS OF *GECKOELLA*
DECCANENSIS (GÜNTHER, 1864) AND *G. ALBOFASCIATA*
(BOULENGER, 1885) (SQUAMATA: GEKKONIDAE)

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(with eight text-figures)

ABSTRACT.— Two nominal species of Indian geckos, *Geckoella deccanensis* and *G. albofasciata*, are similar in general appearance and have been regarded as conspecific by some recent authors. Although there are no obvious morphometric differences between the two forms, they differ consistently in dorsal scalation and in juvenile colour pattern. *Geckoella deccanensis* is characterized by large, flattened, juxtaposed dorsal scales and a series of yellow cross-bands on the body, whereas *G. albofasciata* has smaller, heterogeneous, conical dorsal scales and juveniles possess a series of white dorsal trunk bands and a single, yellow nape band. The rapid loss of life colours in preservative have contributed to the confusion over the systematic status of the two species.

KEYWORDS.— *Geckoella deccanensis*, *Geckoella albofasciata*, systematic status, colouration, distribution.

INTRODUCTION

The genus (or subgenus within *Cyrtodactylus*, fide Rösler, 2000) *Geckoella* consists of a number of distinctive terrestrial geckos with short toes that are endemic to peninsular India and Sri Lanka. Recently, a superficially similar species has been described from Myanmar (Bauer, 2002), although its affinities to *Geckoella* sensu stricto remain unclear. Little is known of the biology of the group or its relationships, and although its monophyly has not been explicitly demonstrated nor rigorously tested, the overall similarity in body form as well as geographic restriction of the group has served as the basis for the recognition of genus as a distinctive lineage of padless gekkonine geckos (Ulber and Gericke, 1988; Kluge, 1993, 2001).

Although the alpha systematic status of *Geckoella* is fairly stable, the status of two Indian species, *G. deccanensis* and *G. albofasciata*, has remained problematic. Both forms are brownish in colour and bear a series of light cross bands

across the nape, body and tail. They are nocturnal forest dwellers that are terrestrial and insectivorous and are uncommonly encountered due to their secretive habits (Tikader and Sharma, 1992).

Günther (1864) described *Gymnodactylus deccanensis* on the basis of a single specimen collected “in the Deccan”. Boulenger (1885) in describing *Gymnodactylus albofasciatus* distinguished it from the former species by its possession of the following suite of characters: dorsal pholidosis heterogeneous (vs. uniform large tubercles), small scales of limbs and dorsal aspect of tail intermixed with larger keeled tubercles (vs. homogeneous), one pair or enlarged postmental scales (vs. additional pairs of enlarged chin shields posterior to first postmentals), tubercular lamellae under basal phalanx enlarged (vs. barely larger than adjacent tubercles), ventral scales enlarged, weakly keeled (vs. smaller, smooth), and base colour chestnut brown (vs. reddish-brown). Boulenger’s type

TABLE 1: Morphometric data for *Geckoella deccanensis* (* indicates regenerated tail). Coordinates provided to the nearest minute are approximate only.

BNHS Reg. No.	LOCALITY (in Maharashtra unless otherwise indicated)	SVL	TL	AG	HL	HW	HD	ED	EE	ES	ScB	ITB	IITB	SB
60	Vihar Lake, Sanjay Gandhi National Park 19° 16' 11"N; 72° 57' 35"E	77.00	66.00	33.70	23.50	15.50	9.70	4.90	7.50	8.60	2.10	3.00	3.15	3.20
61	Matheran 19° 00'N; 73° 17'E	77.60	—	31.10	24.70	15.30	8.50	5.20	7.60	9.00	2.20	3.00	3.05	3.00
62	Khandala 18° 48'N; 73° 24'E	53.40	—	24.50	17.20	11.60	6.60	3.35	5.70	6.60	1.80	2.05	2.10	—
63	Tungreshwar 19° 36'N; 73° 00'E	59.20	36.10	21.00	19.40	12.50	7.30	4.70	6.00	7.60	1.60	1.90	2.00	2.45
63-1	Tungreshwar	72.00	—	32.80	22.00	9.50	8.50	4.60	6.40	8.60	1.90	2.10	1.90	2.20
64	Khandala	54.40	54.40	21.70	17.00	11.20	6.90	4.10	5.80	7.20	1.70	1.90	2.00	2.10
65	Koyna Wildlife Sanctuary 17° 40'N; 73° 40'E	64.20	—	22.10	20.40	13.00	7.40	5.00	5.90	7.50	1.40	1.80	1.90	2.05
1188	Matheran	59.80	—	23.50	18.90	12.80	7.50	4.40	6.00	7.30	1.30	1.60	2.00	2.00
1443	Sanjay Gandhi Natl. Park 19° 16' 11"N; 72° 57' 35"E	64.70	32.50*	29.40	20.30	13.30	7.60	4.70	6.10	7.90	1.80	2.00	2.20	2.40
1547	Koyna Wildlife Sanctuary	53.30	47.30	21.50	16.00	10.30	5.40	4.00	4.60	6.70	1.50	1.30	1.20	1.50
1560	Koyna Wildlife Sanctuary	67.30	53.10	28.20	19.30	13.40	7.60	4.50	6.80	8.00	1.80	2.00	2.10	2.20
1583	Phansad Wildl. Sanctuary 18° 06' 14"N; 73° 06' 28"E	43.30	34.40	19.00	13.50	9.10	4.40	3.10	4.30	5.50	1.00	1.20	1.00	1.10

material originated from "South Canara" and his comparative material of *G. deccanensis* included the holotype plus a specimen from Matheran.

Annandale (1913) in his review of Indian "*Gymnodactylus*" confirmed these differences, but Hora (1926) called the distinctness of the two forms into question. He examined six additional specimens from North Canara (Castle Rock and Karmal), ostensibly referable to *G. albofasciatus*, and indicated that the chin shield and ventral scale characters were more similar to *G. deccanensis* while the dorsal tubercles and subdigital characters were as stated by Boulenger, and the ground colour was variable. On the basis of this he concluded that it was probable that additional material would prove the two forms to be conspecific, with *albofasciatus* perhaps representing a "local race". However, he did note that the two forms could be distinguished on the basis of their banding: with *G. deccanensis* having broader white bands with well-defined black margins. Hora (1926) also provided measurements for two specimens from Castle Rock.

Many subsequent authors, whether allocating the species to *Gymnodactylus*, *Cyrtodactylus* or *Geckoella*, have recognized the two forms as distinct (Smith, 1935; Wermuth, 1965; Murthy, 1985a, 1985b, 1990; Tikader

TABLE 2: Morphometric data of *Geckoella albofasciata* (* indicates regenerated tail). Coordinates provided to the nearest minute are approximate only.

BNHS Reg.No.	LOCALITY	SVL	TL	AG	HL	HW	HD	ED	EE	ES	S&B	ITB	IITB	SB
66	Castle Rock, Karnataka 15° 25'N; 74° 19'E	51.00	—	20.30	16.40	10.20	5.60	4.00	5.00	7.30	0.90	1.15	1.20	1.30
67	Castle Rock, Karnataka	53.90	—	24.10	16.80	11.70	6.40	4.50	5.60	7.20	1.30	1.50	1.45	1.55
67/1	Castle Rock, Karnataka	52.10	—	25.20	17.20	11.00	6.90	3.40	5.60	6.90	1.20	1.30	1.25	1.20
1447	Amboli, Maharashtra 15° 57' 37"N; 73° 59' 58"E	73.50	61.80*	30.70	22.50	15.00	8.70	5.50	7.00	9.30	1.60	1.55	1.20	1.20
1448	Amboli, Maharashtra	54.50	42.10	21.50	17.40	11.40	7.00	4.10	5.60	7.10	1.00	1.00	0.80	0.95
1480	Amboli, Maharashtra	76.10	—	30.00	22.10	15.30	8.90	5.10	8.10	9.10	1.60	1.50	1.60	1.80
1481	Amboli, Maharashtra	65.10	63.00	26.00	20.60	13.50	8.10	5.30	5.90	8.80	1.00	1.10	1.00	1.10
1482	Amboli, Maharashtra	75.80	—	30.10	23.10	15.10	8.90	5.50	6.70	9.50	1.50	1.50	1.60	2.00
1483	Amboli, Maharashtra	38.10	35.40	16.40	12.10	8.00	5.20	3.10	3.00	5.50	0.70	0.70	0.60	0.80
1484	Amboli, Maharashtra	38.30	—	16.30	12.10	8.00	5.00	3.30	3.20	5.10	0.70	0.80	0.60	0.50
1543	Amboli, Maharashtra	56.50	—	22.50	18.70	11.60	6.80	4.20	5.20	7.40	0.90	1.00	1.00	0.80
1544	Amboli, Maharashtra	55.30	52.20	21.40	17.30	11.50	6.80	4.30	5.70	6.70	1.20	1.10	1.20	1.10
1578	Amboli, Maharashtra	52.30	28.60*	22.10	15.50	11.10	6.90	4.20	4.30	6.80	1.10	1.20	1.00	1.00

and Sharma, 1992; Sharma, 2002). Smith (1935) used the criteria of broader subdigital lamellae and yellow (rather than white) bands to distinguish *albofasciata* (note that agreement in gender necessitates the use of the feminine form of the specific epithet when used in combination with *Geckoella*, as in the remainder of this paper). In addition, Smith (1935) appears to have introduced the spelling *dekkanensis*, incorrectly crediting it to Günther (1864). This spelling has subsequently been employed by many later authors (e.g., Daniel, 1983, 2002; Murthy, 1985b, 1990; Tikader and Sharma, 1992; Das, 1994, 1996, 1997, 2001, 2002; Das and Andrews, 1997; Sharma, 2002).

Cornelissen (1971) noted that he found both heterogeneous dorsal scales (an *albofasciata* character) and broad *deccanensis*-like bands in specimens supposedly from Bombay. On this basis, he favoured the synonymizing of the two forms, although the paper was not a taxonomic one and no formal action was taken. More recently Kluge (1991, 1993, 2001) explicitly included *albofasciata* in the synonymy of *deccanensis*, whereas this was implicit in the works of Das (1994, 1996, 1997, 2001), Das and Andrews (1997), and Rösler (2000).

Because no consensus exists among herpetologists as to the validity of *Geckoella albofasciata* as a species distinct from *G. deccanensis*, we take this opportunity to present some new data on these geckos and to present evidence bearing on their taxonomic status.

METHODS

Twelve specimens of *Geckoella deccanensis* and 13 specimens of *G. albofasciata* in the collection of the Bombay Natural History Society (BNHS) were examined (Tables 1-2). The following measurements were taken to the nearest 0.05 mm with a Mitutoyo dial caliper: snout-vent length (SVL), tail length (TL),

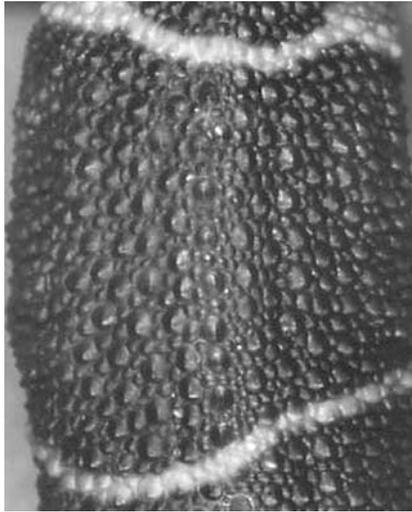


FIGURE 1: Close up of the dorsal trunk of *Geckoella albofasciata* (BNHS 1481), showing the heterogeneous scalation. Photo by A. Captain.

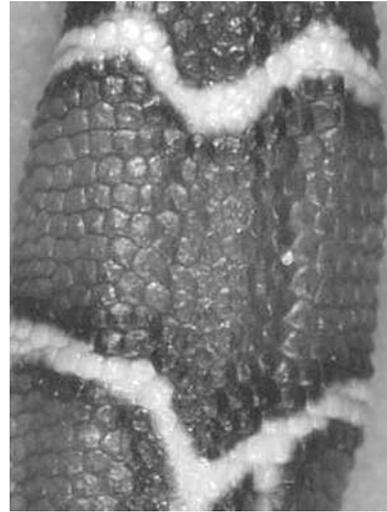


FIGURE 2: Close up of the dorsal trunk of *Geckoella deccanensis* (BNHS 1547), showing the flattened, juxtapsed scalation. Photo by A. Captain.

axilla-groin length (AG), head length (HL), head width (HW), head depth (HD), diameter of the eye (ED), distance between anterior border of eye and tip of snout (ES), and distance between posterior border of eye and anterior margin of ear opening (EE). In addition, the width of each of the four dorsal body bands was recorded: scapular band (ScB), anterior (ITB) and posterior trunk (IITB) bands, and sacral band (SB). General body scalation was also noted.

Life colouration was assessed on the basis of field observations by the junior author and on a series of photographs of live specimens of known locality.

RESULTS AND DISCUSSION

The traditional character of dorsal scale form (flattened and homogeneous in *G. deccanensis* vs. conical and heterogeneous in *G. albofasciata*) does appear to be a stable and reliable diagnostic trait. Although the degree of heterogeneity in *G. albofasciata* is variable, specimens of this species are always characterized by larger conical to keeled tubercles with much smaller interstitial scales (Fig. 1). In comparison. Those of *G. deccanensis* are always conspicuously flattened and juxtapsed (Fig. 2).

Morphometric data for specimens of *Geckoella deccanensis* and *G. albofasciata* are

presented in Tables 1 and 2, respectively. The two forms have very similar body proportions and cannot be discriminated on the basis of any mensural data. This result is typical of closely related geckos in general. However, there were differences in the relative width of the body bands of the two species (Fig. 3). The body bands in our sample of *G. albofasciata* are consistently narrower than those in *G. deccanensis*, usually being one scale row in width (vs. two scale rows in *G. deccanensis*). This difference is statistically significant for all bands, both absolutely and when corrected for body size ($P < 0.0001$; Student's t-test), thus confirming Annandale's (1913) observations on band width (although relatively broad-banded *G. albofasciata* do occur, as at Amboli).

Prior to India's independence, it appears that the only author to have actually observed either species in life was Beddome (1870), who reported "*Gymnodactylus Deccanensis*" "in South Canara at Hospet (nearly sea level), and at the top of the Codachy Parwat (5,000 feet)" with "brilliant yellow" bands. That yellow bands were present in either species was unknown to museum workers due to the rapid loss of colour in preservative. Smith (1935), based on Beddome's (1870) localities, interpreted his comments to apply to *G. albofasciata*. Thus, both Smith (1935)

and subsequently Tikader and Sharma (1992) and Sharma (2002) reported that yellow bands characterised this more southern species.

In fact, the characterisations made by some of these authors are incorrect. The dorsum of *Geckoella deccanensis* is reddish-brown in life with five yellow bands on the back and six to seven bands on the tail, all of which have dark brown edges (Fig. 4). These edges are especially conspicuous in light-coloured specimens. The portion of the dorsum between scapular band and anterior trunk band, just behind the forelimbs, is often lighter than the rest of the body and the lateral aspect of the same region may even be whitish. A pair of yellow spots is present on the dorsum of the thighs, close to the tail base. The nape band is also yellow (not black as described by Tikader and Sharma, 1992). In some specimens from Phansad Wildlife Sanctuary and Sanjay Gandhi National Park, the limbs are lighter in colour than the dorsum. In addition to the dorsal bands, the supralabial scales may be yellowish and this colouration may continue posteriorly as a line, reaching about the level of the ear. The venter is whitish. The pupil is vertical with a golden iris. Juveniles of this species may display paler posterior bands, and those on the tail may be cream-coloured (Fig. 5).

The body colouration of adult *Geckoella albofasciata* is similar to that of *Geckoella deccanensis*, with yellowish bands on the trunk and tail (Fig. 6). However, these bands are often somewhat paler in *G. albofasciata* and the yellow markings on the supralabials and stripe on the side of the head are typically lacking or these markings may be whitish. Juveniles of this species, however, have white bands on the trunk and tail and only the nape band is yellow (Fig. 7). Specimens from Amboli are lighter than those from Castle Rock, but both share a yellow nape band.

The consistent scalation differences between *Geckoella deccanensis* and *G. albofasciata* and their differing juvenile colouration support their continued recognition as distinct, albeit closely related species. Although colour variation alone might well be expected to vary geographically across a widespread species, the significant dif-

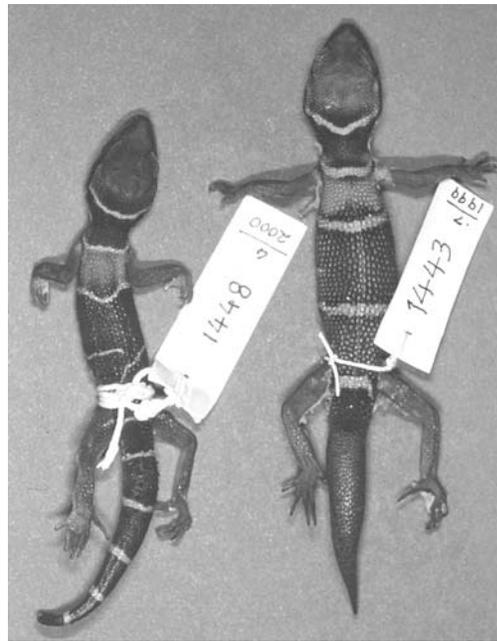


FIGURE 3: Preserved specimens of *Geckoella albofasciata* BNHS 1448 (left) and *G. deccanensis* BNHS 1443 (right) illustrating the typical difference in width of pale dorsal cross bands. Photo by A. Captain.

ferences in scalation, particularly that of the body dorsum are more typical of specifically distinct congeners.

The specimens reported by Cornelissen (1971) with “mixed” characteristics “should” be *G. deccanensis* if they originated from near Mumbai as the author claimed. Indeed the specimens in his photograph have the broad yellow bands with dark edges that are typical of this form. However, the specimens appear to have conical scales, rather than flattened, and are thus similar to *G. albofasciata*. Given that we are aware of no cases of conical scales in true *G. deccanensis*, we suggested that Cornelissen’s specimens are referable to a broad-banded population of *G. albofasciata* and that they originated from a location in extreme southern Maharashtra. As they were commercially obtained, the locality “Bombay” probably reflects the point of the animals shipment, rather than their capture.

Based on our material, as well as previously published locality data, *G. deccanensis* is a more



FIGURE 4: Adult specimen of *Geckoella deccanensis* in life, showing the typical yellow banding and head markings of this species. Near Rajmachi fort, near Lonavla, Maharashtra, India. Photo by A. Captain, J. Kadapatti and M. Deshpande.



FIGURE 5: Juvenile specimen of *Geckoella deccanensis* in life, showing the typical yellow banding, tending to cream on the tail. Koyna, Maharashtra. Photo by V. Giri and S. Kehimkar.



FIGURE 6: Adult specimen of *Geckoella albofasciata* in life, showing the typical yellow banding of this species. Note the absence of yellow pigmentation on the supralabial scales. The yellow trunk bands of this specimen are unusually wide for this species. Amboli, Maharashtra. Photo by V. Giri, S. Kehimkar and I. Agarwal.



FIGURE 7: Juvenile specimen of *Geckoella albofasciata* in life, showing the white banding of the trunk and tail. Only the nape band is yellow. Castle Rock, northern Karnataka, India. Photo by A. Captain.

northerly distributed species that is apparently endemic to western Maharashtra, occurring from at least Tungareshwar in the north to Koyna in the south (Fig. 8). In addition to those localities represented by material reported in Table 1, we are aware of the occurrence of this species at Bhimashankar Wildlife Sanctuary (19° 07' 56"N; 73° 33' 17"E), Karnala Wildlife Sanctuary (18° 53' 10"N; 73° 09' 40"E), and Panchgani (17° 54' N 73° 48' E). It is possible that *G. deccanensis* extends north of the Maharashtra border into extreme southern Gujarat at the northern extent of the Western Ghats, but it has not yet been recorded from this state (Gayen 1999; Sharma 2000; Vyas 2000). *Geckoella albofasciata* extends from at least as far north as Amboli, Maharashtra (this paper) and Godachi, Karnataka (Beddome, 1870), both near 16° north latitude. Southwards it continues through Goa

(e.g., Bhagwan Mahavir Sanctuary, 15° 19' 48"N; 74° 00' 00"E; Mollem, 15° 21' 35"N; 74° 16' 48"E) and into northern Karnataka as far south as at least Karwar (14° 48' N; 74° 08' E) and as far inland as Hospet (15° 16' N; 76° 24' E) (Beddome, 1870; Sharma, 2002) (Fig. 8). The two forms are not known to occur in sympatry but it is likely that the ranges of the two taxa do approach one another (perhaps in the Kolhapur district) and that they are sister species formed as a result of allopatric speciation. Sharma (2002) provided a shaded map showing the basic distribution of the two species which indicated that the boundary between them is roughly coincident with the Maharashtra-Goa border, corresponding well with the localities we identified. He illustrated the southern boundary of *G. albofasciata* as occurring in southern Karnataka. While this may be the case, we did not examine any specimens or locate any literature records from south of Karwar. Although many reptile

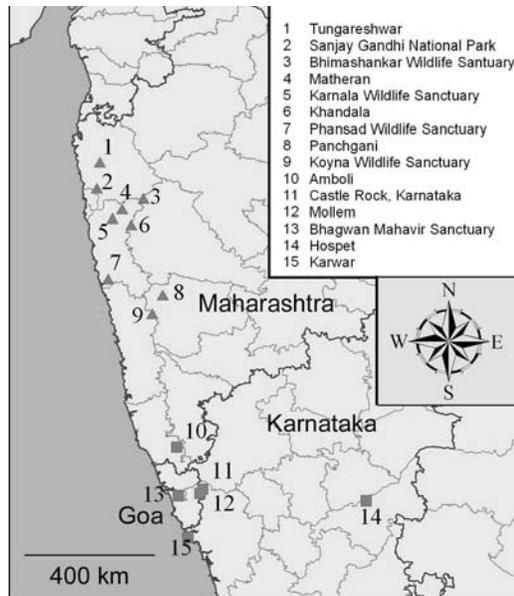


FIGURE 8: Distribution of *Geckoella deccanensis* (triangles) and *G. albofasciata* (squares) based on specimens examined and literature records.

taxa are endemic to the Western Ghats (Das, 1996) none are known to have distributions strictly coincident with the *G. deccanensis/albofasciata* species pair. This, however, may be an artifact of limited collecting of these cryptic, nocturnal species. Additional field work will be necessary to ascertain the actual northern and southern limits of distribution of both species and to verify if a zone of sympatry or parapatry exists in southern Maharashtra and if the range of *G. albofasciata* actually does extend into southern Karnataka. Molecular studies may also suggest the approximate age of the cladogenetic event that resulted in the separation of these two gecko species.

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