

## NOTES ON A GROUND GECKO *Geckoella* cf. *collegalensis* BEDDOME, 1870 (SQUAMATA, SAURIA, GEKKONIDAE) FROM INDIA

**Zeeshan A. Mirza,<sup>1</sup> Saunak Pal,<sup>2</sup> and Rajesh V. Sanap<sup>3</sup>**

*Submitted February 4, 2009.*

Specimens of *Geckoella* cf. *collegalensis* observed at Goregaon (Aarey Milk Colony, Mumbai, Maharashtra) from November 2007 to January 2009; provide new insights into the natural history and habitat of this poorly known gecko. Earlier regarded as a rare species restricted to low elevation area of south India, in fact appear to be widespread and terrestrial after a through review of museum specimens, published literature and our own observations.

**Keywords:** *Geckoella* cf. *collegalensis*, Aarey Milk Colony, BNHS collection, distribution, natural history, habitat.

The genus *Geckoella*, which is endemic to India and Sri Lanka is represented in India by five species namely *G. deccanensis*, *G. albofasciata*, *G. nebulosus*, *G. jeyporensis*, and *G. collegalensis*. Geckos of this genus are terrestrial, nocturnal, forest dwelling and secretive and are one of the least well known of Indian geckos. The alpha systematic status of the genus is fairly stable and recently Bauer and Giri (2004) provided proofs of the validity of *G. albofasciata*. *Geckoella* cf. *collegalensis* (Beddome, 1870) a medium sized terrestrial gecko attaining an average SVL of about 52 mm (Vyas, 2000; Tikader and Sharma, 1992) remains poorly known in terms of natural history, distribution and variation of all Indian geckos.

Beddome (1870) described this species as *Gymnodactylus collegalensis* based on a single specimen collected from Balarangams (in the old Kollegal state, Biligiri Rangan Hills, 11°54' N; 77°14' E), Yelondur; Chamrajnagar district, Karnataka state. This species and others of the genus *Gymnodactylus* were transferred to the genus *Cyrtodactylus* and several other genera after Underwood's classification (fide Russell and Bauer, 2002) and this argument was followed by subsequent

authors [e.g., Prasanna (1993), Saker (1994), and Tikader and Sharma (1992)] until; Kluge (1993) allocated the species to the genus *Geckoella*. Smith (1935) stated that all specimens examined by him were from south of lat. 13° and that the species occurs in the hills of South India and Sri Lanka (Ceylon); Sekar (1994) reported the occurrence of this species in the Sanjay Gandhi National park, Mumbai, Maharashtra extending its range to 19° N. The species was reported from Anaikatty (Anaikatti), Tamil Nadu state by Gupta (1998) and from Gir forest, Gujarat by Vyas (1998). Later, Vyas (2000) gave the distribution as Gir, Vansada/Vansda (Gujarat), Sanjay Gandhi National Park, Borivali (Mumbai, Maharashtra), Balarangams (Karnataka), Nilambur (Kerala) and Manar, Anaikatty, Madurai (Tamil Nadu)). Prasanna (1993) and Chandra and Gajbe (2005) included it in the herpetofauna of Madhya Pradesh.

Recently, specimens of *Geckoella* cf. *collegalensis* were collected from Aarey Milk Colony, Mumbai Maharashtra and deposited in the collection of the Bombay Natural History Society (BNHS). An additional thirty specimens, twenty at Aarey Milk Colony, seven specimens at Conservation Education Centre (CEC), Film City, one near Vihar Lake Mumbai and two specimens at Boradpada village, near Badlapur, Thane district, Maharashtra were observed in their natural habitat. The BNHS collection also houses seven older specimens of this species: BNHS 1171, 1172, and 1173 were collected from Chadkunnu, Nilambur forest, Malabar, Kerala; BNHS 1427 from Sanjay Gandhi National Park (Mum-

<sup>1</sup> Zoology Department, Bhavans College, Andheri (W), Mumbai, 400058 Maharashtra, India; E-mail: snakeszeeshan@gmail.com

<sup>2</sup> Nisarg Trust, Hrishikesh, Jadhav Colony, Belvali, Badlapur (West), Thane District, 421503 Maharashtra, India; E-mail: nisargtrust@gmail.com

<sup>3</sup> D-5/2, Marol Police Camp, M. M. Road, Andheri (East), Mumbai, 400059 Maharashtra, India; E-mail: rajeshvsapan@gmail.com



Fig. 1. Adult *Geckoella* cf. *collegalensis* morph 'collegalensis' from Aarey Milk Colony, Maharashtra, India. Photo by Amod Zambre.

bai, Maharashtra); BNHS 1392 from Calicut University Campus, Kerala; BNHS 1434 Gir Forest, Gujarat and BNHS 1675 from Kalakad — Mundanthurai Tiger Reserve, Tamil Nadu. This species is listed as Data deficient (Molur and Walker, 1998) and the information about the habitat, natural history and morphological variation is meagre, thus in the present communication we take the opportunity to add some data from the newly acquired as well as observed specimens and the older museum material in Mumbai. The paper also presents a review of its distribution based on specimens examined, literature reports and reliable photographic evidence and also provides information on the natural history and habitat preference of this poorly known gecko. Earlier publications pertaining to this species have been restricted in providing new locality records and a single one on its ecology (example Vyas, 2000; Gupta, 1998; Saker, 1994; Prasanna, 1993). The two color morphs were relegated to a subspecific level which were later considered as synonyms (Smith, 1935); but yet there has been no considerable work done on the color morphs and the possibility of further taxonomic revision into consider-

ation, the authors restrict themselves in referring this species complex as *Geckoella* cf. *collegalensis*.

## MATERIAL AND METHODS

Three specimens of *Geckoella* cf. *collegalensis* were collected by hand from Aarey Milk Colony and briefly kept for observation and photography. Subsequently they were euthanized, preserved in 10% formalin, later transferred to 70% alcohol, and deposited in the collection of the Bombay Natural History Society (BNHS 1848, 1849, and 1929). Tissue samples were taken by preserving tail tips in 95% ethanol before fixation in formalin. The specimens were examined using a stereo microscope and measurements taken with a Mitutoyo™ dial caliper (to the nearest 0.1 mm). Other individuals were observed in the field without disturbing them.

During surveys, edges of forest pathways were checked with the aid of a flashlight and this survey yielded a total of thirty specimens while documenting the herpetofauna of Aarey Milk Colony, Film City, and Powai (Mirza and Patil, in press).



Fig. 2. Adult *Geckoella* cf. *collegalensis* from Toranmal, Dhule district, Maharashtra, India. Photo by Vivek Gour Broome.



Fig. 3. Adult *Geckoella* cf. *collegalensis* from Chandrapur, Chandrapur district, Maharashtra, India. Photo by Vivek Gour Broome.

## RESULTS AND DISCUSSION

**Locality and habitat.** Specimens of *Geckoella* cf. *collegalensis* were collected from near New Zealand hostel (Fig. 1), Aarey Milk Colony, Mumbai, Maharashtra (19°7'31" N 72°52'76" E). This species have been recorded from Maharashtra by Sekar (1994), thus the Aarey specimens constitute the second record of the occurrence of this species in Mumbai. A dead specimens (flattened, road kill) was found on the side of a tar village road about 10 km from Mandwa Jetty, Mandwa — Alibaug main road, Alibaug, Maharashtra (Ashok Captain, personal communication). Another two specimens were observed at Boradpada village, near Badlapur, Thane district, Maharashtra (19°10' N 17°21'37" E). Additional provisional localities for this species are Leghapani (Toranmal) Maharashtra, Chandrapur district, eastern Maharashtra based on visual identifications made on high resolution photographs (Figs. 2 and 3) and from Bandipur Tiger Reserve, Karnataka (Fig. 4). We consider these to be provisional until specimens from the areas are examined.

The habitat at New Zealand Hostel, Aarey Milk Colony (Fig. 6) is dominated by boulders scattered in an open deciduous scrub land with patches of exotic trees like *Gliricidia sepium*, *Delonix regia*, and *Eucalyptus melliodora*. Specimens from Boradpada village were found in an area with Teak plantation. Specimen from Chandrapur was found under a decaying log in a dry deciduous habitat and the specimen from Toranmal was found among a pile of stones in a similar habitat. Our observation and those of others confirm that the species prefers open dry deciduous patches/scrubland (Vyas, 2000; Prasanna, 1993; Vijayakumar et al., 2006; Gupta, 1998).

Surveys conducted at Aarey Milk Colony from March 19, 2008, to December 18, 2008, yielded a total of twenty specimens. Another seven juveniles (probably hatchlings) were observed in a span of 2 days, 16<sup>th</sup> and 17<sup>th</sup> November 2007 at Film City. A single specimen was found near Vihar Lake in May, 2008 at 02:30. Most of the specimens were observed to be active between 18:00 to 20:30. The species prefers to move along forest pathways foraging among the leaf litter and hides among the curled leaves at the slightest disturbance. One of the specimens from Boradpada village was observed feeding on termites. A specimen was observed emerging from a crab burrow at Aarey just after heavy rains in the month of July, 2008, and another one was found under a stone on the 18<sup>th</sup> December 2008. The habitat is shared with sympatric species like *Hemidactylus* cf. *brookii*, *Hemidactylus* sp., *Hemidactylus frenatus*, *Lygosoma lineata*, *Eutropis* (= *Mabuya*) sp., *Lycodon aulicus*, and *Ophisops beddomei*. Other sympatric species observed included predatory arthropods namely *Chilobrachyus fimbriatus*; *Heterometrus* cf. *hipsoni*, *Lychas* sp., *Plesiophrictus* sp., and giant scolopendrans at Aarey Milk Colony and Film City. Five female specimens were observed with two well developed eggs in the body cavity between March and May, 2008. Once captured or cornered the gecko adopts a distinctive posture raising the body off the ground and curling the tail up high (some specimens were observed slowly wriggling the tail). A juvenile was collected from Film City on 17 November 2007 measuring ca. 15mm (SVL) and retained in captivity for brief observations till 26 May 2008 (later deposited in the BNHS collection as BNHS 1849). The juvenile was kept in an acrylic tank with loose soil as the substrate. It was fed with termites for about three months and later was provided with a variety of insects like cockroaches, grasshoppers, mantis nymphs, crickets,



Fig. 4. *Geckoella* cf. *collegalensis* morph 'specious' from Bandipur Tiger Reserve, Karnataka. Photo by Rohit Naniwadekar.

mealworms and spiders. On certain occasions the gecko would devour 25 to 30 termites at a time. Six more specimens were collected from Aarey Milk Colony between March and May 2008 and kept together in a wooden box and were provided with the same diet which was readily accepted by all specimens. No sign of aggression was observed among the geckos. The geckos would actively forage and pursue its prey. Water was offered every alternate day and was accepted. The geckos would hide under a bark piece provided for shelter during the day and would be active at dusk as observed in the wild. One of the captive geckos laid two eggs in the month of May (eggs did not hatch, probably infertile) and was gravid in another two weeks as the developing eggs were evident in the body cavity. This proves that this species might lay more than one clutch in a single season. All the captive geckos were released after photography and observations at the collection site. Our observations of this species being strictly terrestrial are at odds with that of Tikader and Sharma (1992) who regard this species to be arboreal.

**Morphological features.** The description provided by Smith (1935) and Vyas (2000) matches with that of all the specimens and mensural and meristic data are presented in Table 1. Smith (1935) stated that this species has 10–12 supralabials and the same number of infralabials, whereas data from the examined specimens suggest that the supralabial range is 8–10 and the infralabial range is 7–9.

Beddome (1870) described *Gymnodactylus specious* which has been treated as a synonym of *G. collegalensis* (fide Smith, 1935). Smith (1935) recognized two color morphs namely 'specious' (based on Beddome's *G. specious*) and 'collegalensis' which could be distinguished by their distinctive pattern but also mentioned that these two morphs are completely connected to one another by intermediate ones. Several color morphs of *Geckoella* cf. *collegalensis* (Figs. 1–4) have been recognized.

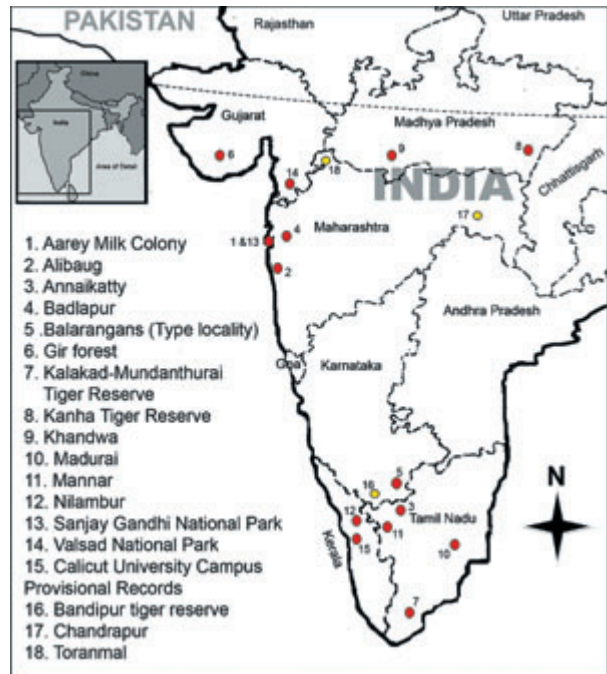


Fig. 5. Distribution of *Geckoella* cf. *collegalensis* based on specimens examined and literature records (red spots) and provisional records based on photographic evidence (yellow spots).

Smith (1935), Tikader and Sharma (1992), and Taylor (1953) stated that this species occurs in Ceylon (Sri Lanka), whereas, Wickramasinghe and Somaweera (2002) considered its status to be doubtful there (fide Ziesmann et al., 2007) In support of this, Das and

**TABLE 1.** Mensural and Meristic Data for *Geckoella* cf. *collegalensis* from New Zealand Hostel, Aarey Milk Colony (Mumbai, Maharashtra)

Character	BNHS 1848*	BNHS 1849*
Snout-vent length	48.3	43.3
Tail length	3.3	2.2
Axilla to groin length	22.2	18.3
Body width	8.3	8.3
Head length	16.1	15
Head width	9.4	7.2
Eye to nostril distance	3.3	3.3
Eye to ear distance	3.3	3.3
Eye to snout distance	6.0	5
Eye diameter	3.3	3.3
Supralabials left/right	10/10	10/10
Infralabials left/right	7/8	7/8
Length of forelimb	7.2	6.1
Length of hindlimb	10.4	8.3

**Note.** All mensural data in mm. Tail incomplete in both specimens.



**Fig. 6.** View of habitat of *Geckoella cf. collegalensis* from Aarey Milk Colony, Mumbai, Maharashtra, India. Photo by Zeeshan Mirza and Rajesh Sanap.

De Silva (2005) did not include it in their checklist. Likewise Bauer and De Silva (2007) could not locate this gecko at Taylor's Sri Lankan collecting locality. Further work is needed to assign the Sri Lankan population of geckos earlier referred to *Geckoella collegalensis* (= *Gymnodactylus collegalensis*) by Taylor (1953), as this population was considered distinct from the *Geckoella collegalensis* (Indian population) and *Geckoella yakhuna* by Bauer and De Silva (2007). Considering these points, it can be concluded that *G. cf. collegalensis* is endemic to India. Considered to be a forest dwelling species found under bark of dead trees (Smith, 1935); most of the specimens were observed in a highly disturbed and degraded habitat close to human settlement. Certain specimens were found on the edge of road at New Zealand hostel and some were also observed in undisturbed areas of the Sanjay Gandhi National park (Borivali, Mumbai).

The habitat at New Zealand hostel (Aarey Milk Colony) is close to a small village and is under pressure of habitat destruction as the scattered boulders have been moved and utilized for construction purposes. An-

other major loss is due to forest fire. As this species is terrestrial and prefers to take refuge under boulders, it is under threat at least at Aarey Milk Colony where not a single specimen was found after a forest fire for about a month in the month of January 2009. In their preliminary survey Mirza et al. (in press) documented a total of 47 species of reptiles and 12 species of amphibians indicating the high herpetofaunal diversity of this area and thus some measures need to be taken to provide protection to the area in order to conserve these species.

## CONCLUSION

*Geckoella cf. collegalensis* has been considered a rare species (Vyas, 2004) of indeterminate status (Tikader and Sharma, 1992) due to its restricted range; however, a review of distribution records reveals its occurrence in at least six Indian states. The species might be more widespread than collection records otherwise indicate. Confirmed records in Madhya Pradesh and Maharashtra further hint at its occurrence in Chhattisgarh,

Andhra Pradesh and/or Orissa and it may possibly be distributed in whole of the central and southern peninsular India. In addition to its wide distribution (Fig. 5), *Geckoella* cf. *collegalensis* also appears to be abundant at individual sites. This is attested by our own observations at Aarey Milk Colony and Film City as well as those of previous authors (e.g., Mukherjee et al., 2005; Prasanna, 1993). It thus appears that the apparent rarity of *Geckoella* cf. *collegalensis* is an artifact. Despite its distinctive coloration/pattern and high local density, the species has escaped the notice of herpetologists and has remained poorly known. This situation parallels that of the golden gecko, *Calodactylodes aureus*, a large, brightly colored and highly vocal gecko of the Eastern Ghats; giant forest gecko *Hemidactylus giganteus*, another large, widespread gecko in Andhra Pradesh, Karnataka and Maharashtra and prashad's gecko *Hemidactylus prashadii*, yet another large, conspicuous, widespread gecko in Karnataka, Goa, and Maharashtra; slender gecko *Hemidactylus gracilis* a medium sized terrestrial gecko occurring in Gujarat, Maharashtra, Madhya Pradesh and Andhra Pradesh. Despite their conspicuousness and occurrence near human settlements, these species were until recently considered as among the rarest of Indian geckos (Bauer and Das, 2001; Giri et al., 2003; Bauer et al., 2005; Giri and Bauer, 2006). *Geckoella* cf. *collegalensis* was thought to be a species restricted to the forested areas and hills of South India at low elevation (Smith, 1935; Tikader and Sharma, 1992), but our observations suggest that this species can be met with in secondary degraded forest as well. Vyas (2000) reported female laying eggs on 25<sup>th</sup> of August 1998 and the one of the egg hatched 43 days after laying. We observed gravid females from March to June and most of the juveniles were found in October and November. We also confirm that this species lays more than one clutch in a single season as was pointed by Vyas (2000). Considering all these points, it can be concluded that this species breeds during the summer and monsoon season and hatchlings can be encountered from September to December. Adults are active throughout the year. The typical color morph appears to be much wide spread than 'specious' which has been reported only from Southern Karnataka (Fig. 4) and Tamil Nadu (BNHS 1675). The color morphs now considered to be conspecific might in fact be distinct species altogether. However, these data are preliminary and it is hoped that more data will be collected on its natural history, distribution from throughout the range of this endemic gecko and also it is hoped that molecular studies will resolve the taxonomic status of to the various color morphs of *Geckoella* cf. *collegalensis*.

**Acknowledgments.** We would like to thank Vivek Gour Broome, Rohit Naniwadekar, and Amod Zambre for providing photographs of *Geckoella* cf. *collegalensis*. Special thanks to Kunal K. Ullalkar for assisting ZM in the field and in collecting morphometric data. Thanks are also due to Aaron M. Bauer, Ashok Captain, Raju Vyas, and Varad Giri for their help, comments and encouragement. Aaron M. Bauer provided impossible to find literature and provided valuable suggestions. ZM is grateful to Sunny Patil for sharing his knowledge of the habitat preference of this species and assistance during field work. We also would like to thank Vishvanath Rathod, Shardul Bhajikar, Sachin Rai, Shashank Dalvi, and Viral Mistry. We would like to acknowledge Amod Zambre for providing help with literature and helpful comments. Last but not the least; we would like to thank Kshamata Gaikwad and Vithoba Hegde for their help.

## REFERENCES

- Bauer A. M. and Das I.** (2001), "Review of the gekkonid genus *Calodactylodes* (Reptilia: Squamata) from India and Sri Lanka," *J. S. Asian Nat. Hist.*, **5**(1), 25 – 35.
- Bauer A. M. and Giri V.** (2004), "On the systematic status of *Geckoella deccanensis* (Günther, 1864) and *G. albofasciata* (Boulenger, 1885) (Squamata: Gekkonidae)," *Hamadryad*, **28**(1–2), 51 – 58.
- Bauer A. M., Giri V., Kehimkar S., and Agarwal I.** (2005), "Notes on *Hemidactylus gracilis* Blanford 1870, a poorly known Indian gecko," *Gekko*, **4**(2), 2 – 7.
- Bauer A. M. and De Silva A.** (2007), "Return to Nilaveli: Edward Harrison Taylor's Sri Lankan herpetofaunal hotspot revisited," *Herpetol. Bull.*, No. 102, 5 – 11.
- Beddome R. H.** (1870), "Description of new reptiles from Madras presidency," *Madras Monthly J. Med. Sci.*, **2**, 169 – 176. Reprint: *J. Soc. Bibliogr. Nat. Sci., London* (1940), **1**(10), 327 – 334.
- Chandra K. and Gajbe P. U.** (2005), "An inventory of herpetofauna of Madhya Pradesh and Chhattisgarh," *Zoo's Print J.*, **20**(3), 1812 – 1819.
- Das I. and De Silva A.** (2005), *A Photographic Guide to Snakes and other Reptiles of Sri Lanka*, New Holland, London.
- Giri V., Bauer A. M., and Chaturvedi N.** (2003), "Notes on the distribution, natural history and variation of *Hemidactylus giganteus* Stoliczka, 1871," *Hamadryad*, **27**, 217 – 221.
- Giri V. and Bauer A. M.** (2006), "Notes on the distribution, natural history and variation of *Hemidactylus prashadii* Smith, 1935," *Hamadryad*, **30**(1), 54 – 59.
- Gupta B. K.** (1998), "Note on the occurrence and growth of *Geckoella collegalensis* (Beddome, 1870)," *Hamadryad*, **23**(1), 77.
- Kluge A. G.** (1993), *Gekkonid Lizard Taxonomy*, International Gecko Society, San Diego.

- Mirza and Patil** (in press), *A Preliminary Survey of the Reptiles and Amphibians of Powai Lake, Aarey Milk Colony and Film City*.
- Molur S. and Walker S.** (Eds.) (1998), "Report on the 'Conservation Assessment and Management Plan for Reptiles of India' (BCPP Endangered Species Project)," Zoo's Outreach Organisation, Conservation Breeding Specialist Group, Coimbatore, India.
- Mukherjee D., Bhupathy S., and Nixon A. M. A.** (2005), "A new species of day gecko (Squamata, Gekkonidae, *Cnemaspis*) from the Anaikatti Hills, Western Ghats, Tamil Nadu, India," *Curr. Sci.*, **89**(8), 1326 – 1328.
- Prasanna G.** (1993), "Leopard gecko *Cyrtodactylus collegalensis*," *Dactylus*, **1**(4), 33
- Russell A. P. and Bauer, A. M.** (2002), "Underwood's classification of geckos: a 21<sup>st</sup> century appreciation," *Bull. Nat. Hist. Mus. Lond. Zool.*, **68**(2), 113 – 121
- Sekar A. G.** (1994), "Range extension of the spotted forest gecko *Cyrtodactylus collegalensis* (Beddome, 1870)," *J. Bombay Nat. Hist. Soc.*, **91**(3), 323 – 324.
- Smith M. A.** (1935), *The fauna of British India, including Ceylon and Burma. Reptilia and Amphibia. Vol. II. Sauria*, Taylor and Francis, London. Reprint: (1970) Ralph Curtis Books, Hollywood, Florida; (1980) Today and Tomorrow's Publishers, Dehradun.
- Taylor E. H.** (1953), "A review of the lizards of Ceylon," *Univ. Kansas Sci. Bull.*, **35**, 1525 – 1585
- Tikader B. K. and Sharma R. C.** (1992), *Handbook Indian Lizards*, Zoological Survey of India, Calcutta.
- Vijayakumar S. P., Ragavendran A., and Choudhury B. C.** (2006), "Herpetofaunal assemblage in a tropical dry forest mosaic of Western Ghats, India: Preliminary analysis of species composition and abundance during the dry season," *Hamadryad*, **30**(1 – 2), 41 – 54.
- Vyas R.** (1998), "First record of the spotted forest gecko *Geckoella collegalensis* (Beddome, 1870) from Gir forest, Gujarat state, India," *J. Bombay Nat. Hist. Soc.*, **95**(1), 123 – 124.
- Vyas R.** (2000), "Note on the breeding ecology of *Geckoella collegalensis* (Beddome, 1870)," *Hamadryad*, **25**(1), 45 – 46.
- Vyas R.** (2004), "Fauna of protected area. 9. Herpetofauna of Vansda National park, Gujarat," *Zoo's Print J.*, **19**(6), 1512 – 1514.
- Wickramasinghe M. and Somaweera R.** (2002), "Distribution and current status of endemic geckos of Sri Lanka," *Gekko*, **3**(1), 2 – 13.
- Ziesmann S., Janzen P., and Klaas P.** (2007), "Die Vielfalt der Geckos (Sri Lankas)," *Draco*, **7**(30), 38 – 44.