

Notes on morphology, habits, ecology and distribution of short-tailed ground agama *Brachysaura minor* (Hardwicke and Gray 1827).

Muhammad Sharif Khan^{1*} and Manoj Kumar²

¹ Herpetological Laboratory, 306 N. Morton, Ave., Morton, PA 19070, USA.

² Research Associate, Gujarat Institute of Desert Ecology, P.O. Box 83, Mundra Road, Bhuj (Kachchh) - 370 001, Gujarat, India.

Abstract: Peculiar morphology of *Brachysaura minor* makes it a lizard of zoological interest. It has been reported from some localities falling in barren, stony and scrubby arid fields in subtropical temperate, Indo-Gangetic landscape across the plains of India and Pakistan. The biotope houses several other sympatric species of agamids, whip-tail sand-lizards, geckos and snakes. Present report sums up data gleaned from earlier reports and adding fresh observations on morphology, habits, ecology and distribution of *B. minor*.

Keywords: *Brachysaura minor*, natural history, ecology, zoogeography

INTRODUCTION

Hardwicke deposited a collection of 366 coloured sketches drawn by himself and other Indian artists of Indian vertebrates and invertebrates, in the Library of British Museum of Natural History. Hardwicke and Gray (1827) took sketch number 82 to describe a new lizard *Agama minor*. The lizard was allegedly caught from Chittagong (now in Bangladesh), since no second report exists from that locality, apparently an erroneous record of locality. Blyth (1856) described a similar lizard from Saugor (central Indian state Madhya Pradesh) as *Brachysaura ornata*, putting *Agama minor* in its synonymy. For long time the lizard remained illusive in nature Günther (1864: 205) placed the lizard in Genus *Calotes*, because of lack of its detailed morphological data. However, Stoliczka (1872) reported five specimens from the western Indian state of Kachchh, followed by Cockburn (1882) who collected several of them from Banda in Bundelkhand region, Uttar Pradesh. He reported some details of lizard's morphology and habits.

Almost all recent publications reporting on lizards of India, mention the presence and distribution of *B. minor*, not dealing with details of its morphology (Das, 2002; Mertens 1974; Manthey and Schuster 1999; Murthy 2010; Sherma, 2000, 2002; Vyas 2000, 2002; Tikader and Sherma 1992; Vyas and Singh 1996; Chakraborty and Gupta 2009). IUCN has placed *B. minor* in the list of Data Deficient Species list.

Khan (1972) and Khan and Mirza (1977) reported a specimen from the lawns of Talimul Islam College, Rabwah, District Jhang (north-western, Punjab, Pakistan (31° 45' 10" N 72° 55' 20" E), Mertens (1974), (Senckenberg Museum, Frankfurt, Germany) authenticated the identification. There are two

lizards from Pakistan referring to this taxon in Walter Auffenberg's collection (housed in Florida Museum of Natural History, University of Florida, USA): one from Rani Kot, District Dadu, Sindh; the other from Mastung, Kalat, Balochistan (29° 48' 0" N 66° 51' 0" E), which extends range of *B. minor* to SW Pakistan.

MATERIALS AND METHODS

Brachysaura minor population around Bhuj (Kachchh) was observed in its natural habitat for its behaviour and reaction to each other and human presence. Some specimen were caught and released after study of their morphometrics, in view not to harm natural population of this already rare agama. Morphometric values conformed with minor differences in counts reported in morphology section, so are not reported separately.

RESULTS AND DISCUSSIONS

One of us (Manoj Kumar) observed and photographed *Brachysaura minor* in its natural habitat in Bhuj (Kachchh). Following description of *B. minor* is based on Rabwah specimen supplemented by Cockburn's (1882) remarks.

Brachysaura minor (Hardwicke and Gray, 1827)

Brachysaura minor Khan 2006. Amphibians and reptiles of Pakistan: 88-89.

Agama minor Hardwicke and Gray, 1827. *Zool. Jour.* 3:218.

Brachysaura ornata Blyth 1856. *J. Asiat. Soc. Bengal* 25: 448-449.

Acanthosaura minor Boulenger 1890. *The Fauna of British India*: 127.

*Corresponding author: typhlops99@hotmail.com
Copyright 2010: Pakistan Wildlife Foundation

Agama minor Smith 1935: *The fauna of British India: II. Sauria*: 225-227.

Brachysaura minor Manthey and Schuster: 1999: 26.

Type locality: Chittagong, Bangladesh

Morphology

Brachysaura minor is a small (snout-vent length 45-90 mm) stocky and pot-belly lizard with short (43-88 mm) tail. The head is large, elongated, flat above, sloping towards snout, covered with heterogeneous, irregular, obtusely ridged scales, arranged in a whorl at its top. Canthal and supraciliary ridges are sharp; round naris is in a circular nasal tubercle, lying below canthus, between 3rd and 4th supralabials, visible from above. Eye large, more than half the diameter of the tympanum, pupil round, eyelids thick, eyeball yellow. Tympanum large, round, shallow; a supraotic and another occipital tuft of 3-5 spines, on each side, which are not well developed in juvenile and female. Orbito-otic space with large tri-to quadrihedral tubercles; 4-6 rows of elongated scales between orbit and supralabials. Supra and infralabials 10-15. Gulars smooth, broader than high, slightly keeled, arranged in transverse rows. Neck with small triangular slightly keeled scales. A feeble, short, oblique, black shoulder fold.

Body slightly depressed, laterally bulging; dorsal scales homogeneous, broad, strongly keeled, imbricate, mucronate, arranged in vertical rows on sides of the body, keels form oblique postero-dorsally directed rows; 48-60 scales around midbody, 104-125 scales when counted from posterior most nuchal spine to the tail tip. In adult male vertebral scales elevated in a ridge, distinct at nuchal region, feebly marked in female and juveniles. Ventral scales smaller than dorsals, slightly keeled. No preanal pores and callous scales.

Tail short, cylindrical, not annulated, with gradual taper, covered with strongly keeled homogeneous scales to the tip, in adult male distinctly swollen at base, with hemipenial protuberances underneath.

Limbs rather long, weak, not compressed; covered to the tip of digits with strongly keeled scales. Fingers and toes short, weak, fifth shorter than first, claws weak. Anterior limb when laid backwards reaches to the



Fig. 1. *Brachysaura minor*: adult male

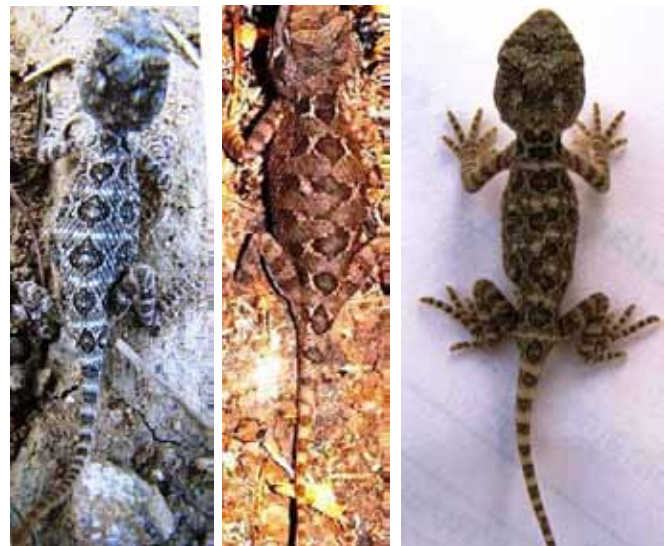


Fig. 2a

Fig. 2b

Fig. 2c

Fig. 2. *Brachysaura minor*: variations in dorsal pattern: 2a, 2b, 2c.

inguinal region, while posterior extends to the angle of the mouth or a little beyond. Snout-vent length: male 50-85 mm with the tail 38-75 mm; female 53-90 mm with the tail 45-86 mm.

Color pattern: Dorsum olive brown to brownish dark with yellow tinge (Fig. 2a, 2b; 2c). Head with inter-nasal, frontal and inter-orbital light brown cross-bars; white streak at nape, another from eye to the angle of the mouth, a dark line extends across eye from canthus to temporal. Dorsum with a pattern of three rows of rhomboidal to circular blotches: blotches of median row edged with white, are medially confluent with each other; median row extends to tail tip; lateral rows consist of six smaller cuboid blotches, separated from the median row by irregular white spots (Fig. 2a, 2b, 2c). Throat yellow spotted with gray; belly yellowish; limbs and digits cross-banded. Reproductively, active female colored crimson and yellow. A well marked deep black short shoulder fold in adult.

The color pattern of the lizard blends it with its stony dark gray soil. In juveniles, light-dark blotched pattern is more



Fig. 3. *Brachysaura minor*: adult female



Fig. 4. *Brachysaura minor*: in natural habitat

compact, blotches of middorsal row are separated by narrow white transverse bars (Fig. 2a) or are confluent with each other (Fig. 2b, 2c), and are laterally edged with white.

Comparison with sympatric agamid lizards: Several species of terrestrial agamids, whip-tail sand-lizards, and snakes occur sympatric with *Brachysaura minor*, agamids recorded belong to six genera: *Brachysaura*, *Bufoinceps*, *Phrynocephalus*, *Sitana*, *Trapelus* (four species) and *Saara* (*Uromastyx*), (Daniel 1983; Khan 2006).

Short tail, docile sluggish habits; homogenous vertically arranged broad, strongly mucronate, keeled scales; distinct round tympanum; sharp canthus; long weak limbs and small weak claws; and three-row blotched dorsal pattern, make *B. minor* distinct from its sympatric agamids. Granular body scales and spiny tail separate *Saara hardwickii* from sympatric lizard. However, following combination of characters, key out *Brachysaura minor*:

- | | |
|---|--|
| 1. Body slightly depressed..... | 2 |
| Body laterally compressed..... | <i>Sitana ponticerina</i> |
| 2. Tympanum large, round | 3 |
| Tympanum small indistinct, slit..... | |
| | <i>Bufoinceps laungwalansis</i> |
| 3. Tail equal or shorter than body..... | |
| | <i>Brachysaura minor</i> |
| Tail much longer than body..... | |
| | <i>Trapelus agilis</i> , <i>Trapelus megalonyx</i> |

Sexual dimorphism and reproduction: *Brachysaura minor* female is larger than male, has prominent pendulous abdomen; becomes bright crimson during breeding season (July-August), with dusky olive to light brown back, and a deep black shoulder fold (Fig. 3). Sexually excited female seeks attention of male by her body movements. Cockburn (1882) observed a receptive female "taking decided advances on an unconcerned male, by siding up to him in a most insinuating way by crouching wriggling motion of her body, and ceasing him by its nuchal crest." 4-6 eggs



Fig. 5. *Brachysaura minor*: in resting posture

with hard white shell are laid in burrows in the roots of vegetation. Male is comparatively smaller with narrower shorter belly, longer tail, swollen at the base with distinct hemipenial protuberances. Uniform dusky dorsum with smaller blotches (Fig. 1).

Habits: *Brachysaura minor* is crepuscular, diurnal (though some authors regard it nocturnal, a habit unusual for an insectivore agamid). It is seen picking insects around at mid-day. The lizard is stupidly docile, when approached it freezes, staring in the eyes of the trespasser, moves sluggishly away, is easily get caught, emits a short squeak, lunges with wide opened mouth; its bite is a slight pinch, maxillary teeth being small and tricuspid. It does not excavate its burrow, mostly retreats under stones etc., or creeps into unused burrows of sympatric lizards like *Saara hardwickii* and rodents. During monsoons (July-August) it comes out in great numbers to feed and mate. Brightly colored females are actively involved in mating rituals as compare to male. Cockburn (1882) reports *B. minor* and *Sitana ponticerina* of having common habits of hanging upside down from branches of low bushes of *Calotropis* and *Zizyphus*, similar habit has been noted in *Calotes versicolor* while in Karachi, Pakistan.

Food: The lizard feeds on different kinds of arthropods, beetles, termites, centipedes, scorpions, spiders, caterpillar, grubs, termites, ants, grasshoppers, and butterflies etc., however, Chakraborty and Gupta (2009) reported seeds in its diet.

Habitat: Gujarat state is one of the most diversified states in India with respect to ecology and biodiversity. Different types of habitats from dry desert to moist deciduous forests, and seashore along coastal islands with mangrove forests and mud flats are available. Kachchh district covers an area of 45652 km² which is about 24% of the total area of Gujarat State. The district falls in the arid tract of Gujarat. The district has a tropical monsoon climate and the annual average precipitation is 340 mm. The average rainfall ranges between 266-417 mm, being very erratic (Babbar *et al.*, 1994).

Environment of this region is conducive for several groups of animals, particularly reptiles, which are well

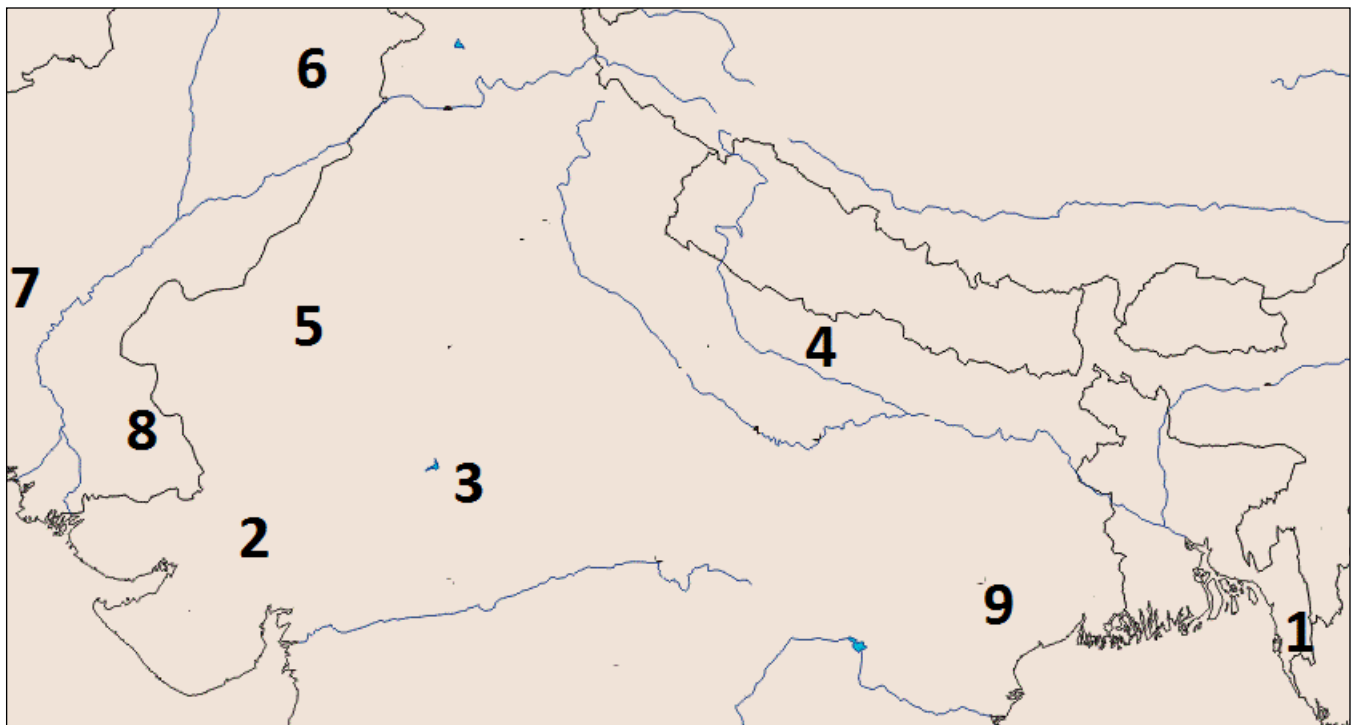


Fig. 6. *Brachysaura minor*: Distribution range

1. Chittagong, Type locality (Smith, 1935)
2. Gujrat state: Kachchh District (Boulenger 1890, Narayan Sarovar Sanctuary (Vyas 2002); Kathiawar (Smith 1935)
3. Madhya Pradesh (Tikader & Sherma 1992; Sharma 2000, 2002; Das 2002)
4. Banda, Saugor, Ratlam, Allahabad, Uttar Pradesh; , India (Cockburn, 1882; Smith, 1935)
5. Baran, Eastern Rajasthan (Vyas 1998)
6. Rabwah, District Chiniot, Punjab, Pakistan (Khan 1972, 2006; Khan & Mirza 1977)
7. Mastung, Kalat, Balochistan, W. Auffenberg Collection (Florida Natural History Museum (Zoological Survey Dept. collection, 1990)
8. Ranikot, District Dadu, Sindh, Pakistan (W. Auffenberg Collection (Florida Natural History Museum (Zoological Survey Dept. collection, 1990)
9. Satkosia Sanctuary, Orissa (Chakraborty & Gupta 2009)

documented in literature (Stoliczka 1872; Bhaskar 1978; Auffenberg *et al.*, 1990; Akhtar and Tiwari 1991; Vyas 1998). *B. minor* is recorded from diverse habitats: rocky with scrubby vegetation; sand mixed rocky areas with stunted tufts of grasses; dark lava soil with scrub; stony sandy soil with stunted scrub vegetation, thorn fields in subtropical temperate environs, with extremes weather conditions in the Indo-Gangetic plains (Fig. 4).

Status: Though Chittagong (south eastern Bangladesh) is believed to be the type locality of *B. minor*, which is very unlikely because of environment and no subsequent specimen has been recorded from the area. However, the lizard is reported from several other localities throughout the Indo-Gangetic plains (Fig. 6), pushing this species among most wide ranging lizards in the subcontinent. It is significant to note that single or few specimens have been recorded from each locality, perhaps because of secretive habits of this lizard. However, Cockburn (1882) found it abounding in Banda, and Vyas (2000, 2002) in Narayan Sarovar sanctuary, Gujrat, India. It is stated to be rare in southern Rajasthan (Vyas and Singh, 1998). Chakraborty and Gupta (2009) reported one road killed and observed three live specimens in Satkosia wildlife sanctuary, Orissa. This report widens range of *B. minor* to south-eastern India (20° 09' N 85° 30' E).

Docile sluggish disposition of *Brachysaura minor* makes it vulnerable to the increasing anthropogenic activity around its natural habitat, especially when it is considered poisonous by general public and is killed at sight (Minton, 1966: 89). In nature its docility makes it highly vulnerable and easy prey to a battery of local diverse carnivores: dogs, cats, mongooses, foxes, jackals, falcons, monitor lizards, and snakes etc., so common and hungry in desert habitat. Incidentally its breeding season coincides with sowing season of major crops in the region, when it is unscrupulously killed in large numbers.

REFERENCES

- Akhtar, A. S., and Tiwari, J. K. 1991. Extension of range of the Black Cobra *Naja naja oxiana*. *J. Bombay Nat. Hist. Soc.*, **88**(1): 123.
- Auffenberg, W., H. Rehman, F. Iffat and Z. Perveen (1990). Notes. *J. Bombay Nat. Hist. Soc.*, **40**: 425-427.
- Babbar, V; Pathak, B; Chopra, P. K.; Kaushik, Vinod; Tembe, S. K and Dave, J. M. 1994. Current Ecological Status of Kachchh: A Report Prepared for Gujarat Ecology Commission, GERI Campus, Race Course Road, Vadodara - 390 007. India.

- Blyth, E. 1856. Proceedings of the Society. Report of the Curator. *J. Asiat. Soc. Bengal*, **25**: 448-449
- Bhaskar, S. 1978. Notes from the Gulf of Kutch. *Hamadryad*, **4**(1): 3-6.
- Boulenger, G. A. 1890. *The Fauna of British India, Including Ceylon and Burma. Reptilia and Batrachia*. Taylor & Francis, London, xviii, 541 pp.
- Chakraborty, R., and Gupta, G. D. 2009. 7 New records of *Brachysaura minor* (Hardwicke and Gray) an agamid lizard from Orissa, India. *Mic. Notes. J. Bombay Nat. Hist. Soc.*, **106** (2): 323.
- Cockburn, J. 1882. On the habits of little known lizard, *Brachysaura ornate*. *J. Asiat. Soc. Bengal*, 1882: 50-54.
- Daniel, J. C. 1983. *The book of Indian reptiles*. Bombay Nat. Hist. Soc. 141 pp.
- Das, I. 2002. Snakes and other reptiles of India. Pp. 1-144. New Holland Publishers, Ltd., UK.
- Günther, A. 1864. *The Reptiles of British India*. London (Taylor & Francis). 550 pp.
- Hardwicke, T. and Gray, J. E. 1827. A synopsis of the species of saurian reptiles, collected in India by Major-General Hardwicke. *Zool. J. London*, **3**: 214-229
- Khan, M. S. 1972. Checklist and key to the lizards of Jhang District, West Pakistan. *Herpetologica*, **28**:94-98.
- Khan, M. S. 2006. *Amphibians and reptiles of Pakistan*. Kreiger Publishing Company, Malabar, Florida, 311 pp.
- Khan, M. S. and Mirza, M. R. 1977. An annotated checklist and key to the reptiles of Pakistan. Part II: Sauria (Lacertalia), *Biologia (Lahore)*, **23**:35-58.
- Manthey, U. and Schuster, N. 1999. *Agamen*, 2. Aufl. Natur und Tier Verlag (Münster), 120 pp.
- Mertens, R. 1974. Die Amphibien und Reptilien West-Pakistans. *Senckenb. Biol.* **55**(1-3):35-38.
- Murthy, T.S.N. 2010. *The reptile fauna of India*. B.R. Publishing, New Delhi, 332 pp.
- Sharma, R. C. 2000. Reptilia. In Alfred, J. R. B. *Fauna of Gujrat (Part I) Vertebrates*. pp. 243-297. Zoological Survey India, Calcutta.
- Sharma, R. C. 2002. *The Fauna of India and the adjacent countries*. Reptilia (Sauria): Vol II. Director Zool. Survey India Kolkata: 240-241.
- Smith, M.A. 1935. *The fauna of British India, including Ceylon and Burma. Reptiles and Amphibia*, Vol. II. Sauria. Taylor and Francis, London, 440 pp.
- Stoliczka, F. 1872. Notes on the reptilian and amphibians fauna of Kachh. *Proc. Asiat. Soc. Bengal.*, 71-85.
- Tikader, B.K. and R. C. Sherma. 1992. *Handbook of Indian lizards*. Zoological Survey, India, Kolkata: 111.
- Vyas, R. 1998. The reptiles of Gujarat State: updated distribution. *Tiger Paper* **25**(1): 8-14.
- Vyas, R. 2000. A review of reptile studies in Gujarat State. *Zoo P. Journal.* **15**(12) 386-390.
- Vyas, R. 2002. Preliminary survey of Herpetofauna of Narayan Sarovar sanctuary, Gujrat. *Zoo Print*, **17**(6): 812-814.
- Vyas, R. and Singh, H. 1998. Short tail agama in southeast Rajasthan. *J. Bombay Nat. Hist. Soc.* **95**(2): 348-349.