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Research paper

New record of Indian Star Tortoise *Geochelone elegans* (Schoepff, 1795) from Ken river, Chhatarpur district, Madhya Pradesh (India), with systematic account, distribution, conservation status and threats

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Abstract: The present communication deals with the new record of *Geochelone elegans*, the Indian Star Tortoise from Chhatarpur district, Madhya Pradesh (India) with its systematic account, distribution, habitat, food and feeding, breeding, conservation status and threats.

Keywords: New record, *Geochelone elegans*, Chhatarpur district.

Introduction:

The reptile fauna of Madhya Pradesh has been studied by various workers (Agrawal, 1976, 1977, 1981; Das, 1988; Vyas and Pande, 1989; Kalaiarasan et al., 1991; Sanyal and Sur, 1995; Rao, 1998; Gajbe, 2003; Vyas and Singh, 2004; Chandra and Gajbe, 2005; Ramakrishna et al., 2006; Sur et al., 2007; Chandra et al., 2008; Chandra, 2009; Taigor and Rao, 2010; Ingle et al., 2011, 2012a-d, 2013, 2019; Mohapatra et al., 2012; Dubey and Khare, 2013; Manhas et al., 2015, 2018; Ingle, 2020) but have not recorded *Geochelone elegans*, the Indian Star Tortoise from its Chhatarpur district. Reports pertaining to crocodiles, lizards and snakes only have not been taken into account here. Presently a good specimen was found from river Ken in Chhatarpur district and recorded here as being the first find from the district.

Earlier, Viyas and Singh (2004) recorded it from Mandsaur district and Viyas (2010) from adjoining Ratlam district, both in extreme west of state and touching Rajasthan.

STUDY SITE: Ken river, Chhatarpur district, Madhya Pradesh

Physiography: Madhya Pradesh, the central state of India, is bounded on north-east by Uttar Pradesh, north-west by Rajasthan, south-east by Gujarat, south by Maharashtra and east by Chhattisgarh. Chhatarpur district is located at coordinates 24.63°N and 79.5°E, on north-east border with an average elevation of 305 m. It is bounded on north by Uttar Pradesh State, on east by Panna, on south by Damoh and on west by

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Tikamgarh, Ashoknagar and Sagar districts.

The Ken River originates near the village Ahirgawan (elevation 427 m) on the north-west slopes of Barner Range in Rithi tehsil of Katni district under Jabalpur Division and traverses a distance of 427 km (292 km in M.P., 51 km boundary common with both states and 84 km in U. P.), before entering Yamuna at Chilla village ghat (at about 95 m elevation) of Banda district in Uttar Pradesh. It is one of the major rivers in the Bundelkhand region of central India and traversing some districts in Madhya Pradesh state, forms common boundary between Chhatarpur and Panna districts and state boundary between M. P. and U. P. On way, it receives water from the tributaries (Kopra and Bearma on right bank; Bawas, Dewar, Kaith and Baink on left bank). Its total basin lies between latitudes 23°12' N and 25°54' N and longitudes 78°30' E and 80°36' E, covering both the states M. P. (Katni, Sagar, Damoh, Chhatarpur, Panna, Satna, Narasimhapur and Raisen districts) and U. P. (Hamirpur and Banda districts). It is rich in aquatic life.

Climate: Humid-subtropical with hot summer (maximum 47° C in June), cool winter (minimum may go down around 1° C in January) and monsoon rains with maximum fall during July-August.

Flora around: *Lannea coromandelica* (Anacardiaceae), *Carissa carandas* and *Holarrhena pubescens* (Apocynaceae), *Boswellia serrata* (Burseraceae), *Capparis deciduas* and *Maerua arenaria* (Capparaceae), *Anogeissus latifolia*, *A. pendula* and *Terminalia chebula* (Combretaceae), *Diospyros malabarica* and *D. montana* (Ebenaceae), *Euphorbia nivulia* (Euphorbiaceae), *Anisomeles indica*, *Hyptis suaveolens*, *Leonotis nepetifolia* and *Vitex negundo* (Lamiaceae), *Acacia catechu*, *A. farnesiana*, *A. leucophloea*, *Butea monosperma*, *Mimosa himalayana*, *Prosopis juliflora*, *Senna auriculata*, *S. stipulacea*, *S. tora* and *Tephrosia purpurea* (Leguminoseae), *Lagerstroemia parviflora* and *Woodfordia fruiticosa* (Lythraceae), *Helicteres isora* (Malvaceae), *Nyctanthes arbor-tristis* (Olacaceae), *Phyllanthus emblica* (Phyllanthavae), *Aristida hystrix*, *Heteropogon contortus*, *Iseilema laxum* and *Themeda quadrivalvis* (Poaceae), *Ziziphus oenopolia* and *Z. xylopyrus* (Rhamnaceae), *Ixora pavetta* (Rubiaceae), *Flacourtia indica* (Salicaceae), *Madhuca longifolia* (Sapotaceae), *Buddleja asiatica* (Scrophulariaceae), *Lantana camara* (Verbenaceae) etc.

SYSTEMATIC ACCOUNT, DISTRIBUTION, CONSERVATION STATUS AND THREATS

Geochelone elegans (Schoepff, 1795)

Synonymy:

Testudo elegans Schoepff, 1795. *Hist. Test.*: 111, pl. 25 (type-locality: India); Gunther, 1864. *Rept. Brit. India*: 4; Boulenger, 1889. *Cat. Chel. Brit. Mus.*: 161; Boulenger, 1890. *Faun. Brit. India*, Reptilia and Batrachia: 21-22, fig. 6; Haly, 1894. *J. Asiat. Soc. Ceylon*, 13: 128, fig.; Annandale, 1906. *Mem. Asiat. Soc. Bengal*, 1: 185; Deraniyagala, 1930. *Ceylon J. Sc*., Sect. B, 16: 58; Smith, 1931. *Faun. Brit. India*, Reptilia and Amphibia, Vol. 1 (Loricata, Testudines): 138-140; Jayakar and Spurway, 1966. *J. Bombay nat. Hist. Soc*., 63 (1): 83-114; Prakash, 1971. *J. Bombay nat. Hist. Soc*., 68: 273-274.

Testudo stellata Schweigger, 1814. *Prodromi monographiae Cheloniorum section prima*. Regiomontae: 56 (type-locality: India).

Testudo actinodes Bell, 1828. *Zool. Journ*., 3: 419, pl. 23 (type-locality: 'Africa' in error, corrected to India and Madagascar in *Monogr. Test*.: pls. 10, 11); Sowerby and Lear, 1872. *Tort., Terr.* and *Turtles*: pls. 11,12.

Testudo actinodes Gray, 1831. *Proc. Zool. Soc. London*, 1831: 106-107; Dumeril and Bibron, 1835. *Erpetologie generale ou histoire naturelle complete des reptiles*. 2 (Chelonians). Paris.
Testuso geometrica Hutton, 1837. *J. Asiat. Soc. Bengal*, 6: 689, pl. 38.
Peltastes stellatus actinoides Bell In: Gray, 1844. *Catalogue of the tortoises, crocodiles, and Amphisbaenians in the collection of the British Museum*. London.
Testudo megalopus Blyth, 1853. *J. Asiat. Soc. Bengal*, 22: 640 (type-locality: unknown).
Peltastes stellatus maura Gray, 1870. Notes on tortoises in the British Museum, with descriptions of some new species. *Proc. Zool. Soc. London*, 1870: 653-659 (type-locality: unknown).
Peltastes stellatus seba Gray, 1870. *Proc. Zool. Soc. London*, 1870: 653-659 (type-locality: unknown).
Geochelone elegans, Crumly, 1882. *J. Herpetol*., 16: 215-234; Crumly, 1884. *The evolution of land tortoises* (*Family-Testudinidae*). Doctoral dissertation, Ratgers University, Newwark: 426 pp.; Tikader and Sharma, 1985. *Handbook Indian Testudines*: 102-106, figs. 63, 64, pl. 27; Crumly, 1988. *Smithsonian Herpetol. Inf. Serv*., 75: 1-17; Ernst and Barbour, 1989. *Turtles of the World*: 314 pp; Moll, 1989. *Occasional Paper of the IUCN Species Survival Commission*, No. 5: 113-114; Alagar Rajan and Balasubramanian, 1991. *J. Bombay nat. His. Soc.*, 88: 290; Jayson, 1993. *J. Bombay nat. Hist. Soc*., 90: 112; Das, 1995. *Turtles and tortoises of India*: 176 pp; Sharma, 1998. *Faun. India, Reptilia*, Vol. 1 (Testudines and Crocodilians): 111-113, figs. 127, 128; Vyas and Parasharya, 2000. *Zoos' Print Journal*, 15: 239-242; Srinivasulu and Srinivasulu, 2002. *Hamadryad*, 27: 154-155; de Silva, 2003. *The biology and status of the star tortoise* (*Geochelone elegans, Schoepff, 1795*) *in Sri Lanka. Protected Area Management and Wildlife Conservation Project, Sri Lanka*: 100 pp; Ahamad et al., 2004. *Lyriocephalus*, 5: 135-139; Ekanayake et al., 2004. *Lyriocephalus*, 5: 65-72; Chandra and Gajbe, 2005. *Zoos' Print Journal*, 20: 181; Vyas, R., 2006. *Zoos' Print Journal*, 21 (4): 2220-2222; Fife, 2007. *Turtles of the World Series, Testidinidae*, No. 10; Sur et al., 2007. Reptilia. In: Fauna of Madhya Pradesh (including Chhattisgarh). *State Fauna Series*, 15 (1): 80, 86; Jayawickrama et al., 2010. *Lyriocephalus*, Special Issue, 7: 73-79; Vyas, 2010. *ENVIS Bulletin, Wildlife and Protected Areas*, 12: 9-104; Vyas, 2011. *Russian Journal of Herpetology*, 18: 47-50; Dasgupta et al., 2012. Reptilia. In: Fauna of Maharashtra. *State Fauna Series*, 20 (1): 190, 195; D'Cruze et al., 2016. The IUCN Red List of Threatened Species; de Silva and Vamberger, 2016. *Radiata*, 24: 23-24; de Silva et al., 2017. *Wildlanka*, 5: 31-35; D'Cruze et al., 2018. *Chelonian Research Monographs*, 5 (12): 106.1-13.

Common Names: Indian Star Tortoise and Star Tortoise.

Vernacular Names: *Khad-no-Kachba* (Gujarati), *Tara Kachhua* (Hindi), *Bali Kaichha* (Oriya), *Katu-amai*, *Kattupota-amai* (Tamil), *Meta-tabelu* (Telugu) and *Tariwala Kachhua* (Urdu).

Classification: Class Reptiles, order Testudines, suborder Cryptodira, superfamily Testudinoidea, family Testudinidae, genus *Geochelone* Fitzinger, 1835.

Sighting and Photograph: 1 example; Ken river, 51 km east of Chhatarpur city, Chhatarpur district, Madhya Pradesh (India); 5. iii.2022, by 2nd author (AKD).

Diagnosis: Tortoise with unique star-like patterns.

Description: Ernst and Barbour (1989), Moll (1989), Das (1995), de Silva (2003) and D'Cruze et al. (2018) provided detailed descriptions.

Head: Moderate with non-projecting snout a weakly hooked and may be with bi- or

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tricuspid upper jaw; edge of jaws denticulate; a large pre-frontal scale divided longitudinally and followed by single narrow fontal scale, other scales smaller.

Carapace: Oblong and domed in adult and almost roundish in juvenile; covered with bony shields; deep cervical indentation but without cervical scute; nuchal shield absent, vertebral shields 5 in number, usually broader than long, except first one which may be longer or as long as broad, fifth expanded; costals 4 in number, equal or less broader than vertebrals; marginals 22, 11 on each side and a single undivided and incurved supra-caudal schield which in male longer and more curved than in female, posterior ones serrated and may be upturned.

Plastron: Large, truncate or openly notched anteriorly , deeply notched posteriorly, made up of paired gular, humeral, axillary, pectoral, abdominal, inguinal, femoral and anal shields; gulars thickened, may not protrude anteriorly; suture between abdominals longest, shortest between pectorals or anals; axillary and inguinal shields small.

Formula: abd>hum>gul>fem>pect><an (D'Cruze et al., 2018).

Tail: Moderate, terminating into spur-like scute and usually without enlarged scales.

Limbs: Not webbed; fore limbs paddle-shaped, clawed and covered with large, imbricate, sharply pointed bony scales of varying size and shapes, heal with large, more or less spur-like scales, underside with conical and sub-conical scales; hind limbs typically short, strong, club-shaped, scaled, clawed and with conical scales on thighs.

Colouration: Shell dark brown or blackish; each vertebral and coastal shield with a yellow or tan vertebral and pleural areolae from which radiate outward about 6-12 yellow streaks (thick or thin, long or short) in starred pattern which continue over marginals and plastron; each marginal with 1-3 yellow streaks beginning from a yellow spot in lower posterior corner and extending upward to pleurals and vertebrals; plastron and bridge yellow with black radiations; head, tail and limbs yellow or tan with dark brown or blackish irregular spots.

Size: Length of shell 10 inches (Boulenger, 1890); length of shell 250, breadth 160 and depth 120 mm, males smaller (Smith, 1931); length of largest female up to 25 cm, males not more than 16 cm (Tikader and Sharma, 1985; Sharma, 1998); at least 15 cm carapace for male but typically reaching up to 26 cm (Moll, 1989; Fife, 2007); females larger than males with >25 cm, but typically reaching 32 cm (Frazier, 1987; Fife, 2007; D'Cruze et al., 2018); some females reaching up to 50.5 cm curved carapace in length (Matz et al., 1971; Vyas, 2011); 57.5 curved carapace length (de Silva et al., 2017); medium-sized with a straight carapace length of males up to 260 mm and females up to 505 mm (indiabiodiversity.org).

Sexual Dimorphism: Males smaller than females and with longer and thicker tails than in females; female with larger and broader shells; males typically have a supra-caudal shield/scute, longer and more curved than in females.

Distribution:

Chhatarpur district: Ken river, 51 km east of Chhatarpur city (new record).

Rest of Madhya Pradesh: Gandhisagar Reservoir, Mandsaur district (Viyas and Singh, 2004); Sailana Kharmaur Bird Sanctuary, Ratlam district (Viyas, 2010).

Rest of India: Andhra Pradesh (Anand et al., 2005), Chhattisgarh, Gujarat (Frazier, 1987; Rao and Choudhury, 1996; Vyas and Parasharya, 2000), Karnataka (Viyas, 2006; Vyas and Parasharya, 2000), Kerala (Jayson, 1993), Kurusadai / Karadura Island (Tikader and Sharma, 1985; Sharma, 1998), Odisha (Sethy et al., 2015), Peninsular India (Tikader and

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Sharma, 1985; Sharma, 1998), Rajasthan (Hutton, 1837; Smith, 1931; Prakash, 1971; Bhupathy et al., 1994), Rameswaram Island (Tikader and Sharma, 1985; Sharma, 1998), Tamil Nadu (Smith, 1931; Alagar and Balasubramanian, 1991; Das, 1991; Bhupathy et al., 1994; Sarath, 1997; Johnsingh, 2001; Anand et al., 2005) and Telangana (Moll, 1984; Srinivasulu and Srinivasulu, 2002; Srinivasulu, 2003).

Zoos / Zoological Parks of India: Sri Vekateswara Zoological Park / Tirupati Zoo, Tirupati; Indira Gandhi Zoo / Indira Gandhi Zoological Park, Visakhapatnam (Andhra Pradesh), Assam State Zoo cum Botanical Garden / Assam Zoo / Guwahati Zoo, Guwahati (Assam), Kamla Nehru Zoological Park, Kankaria / Kankaria Zoo and Mini Zoo / Sundarvan, Ahmedabad; Indroda Nature Park / Indroda Deer Park, Gandhinagar; Sakkar Baug Zoological Garden / Sakkar Baug Zoo / Junagarh Zoo, Junagarh; Pradyuman Zoological Park / Rajkot Municipal Zoo / Rajkot Zoo, Rajkot; Sayaji Baug Zoo, Vadodara (Gujarat); Bellary Zoo, Bellary; Bannerghatta National Park / Bannerghatta Zoo, Bannerghatta, Bengaluru; Chamarajendra Zoo, Mysore; Tyavarekoppa Tiger and Lion Safari, Shimoga (Karnataka); Gwalior Zoo / Gwalior Zoological Park, Gwalior (Madhya Pradesh), Mumbai Zoo / Jijamata Udyan / Byculla Zoo / Rani Baug Zoo / Victoria Garden / Veermata Jijabai Bhosale Udyan, Mumbai; Rajiv Gandhi Zoological Park, Pune; Mahatma Gandhi Zoo, Solapur; (Maharashtra); Nandankanan Zoological Park / Nandankanan Zoo, Bhubaneswar (Odisha); Udaipur Zoo, Udaipur (Rajasthan); Chennai Snake Park and Vandalur Zoo, Chennai; V.O. Chidambaranar Park and Zoo / V. O. C. Mini Zoo / V. O. C. Park Mini Zoo, Coimbatore / (Tamil Nadu); Nehru Park Zoo / Nehru Zoological Park, Hyderabad (Telangana); Alipur Zoological Park and Marble Palace Zoo, Kolkata (West Bengal) (Saxena, 1994; Vyas, 2006; names updated).

Elsewhere: Bangladesh (Jayakar and Spurway, 1966 which Moll, 1989 doubted for its natural occurrence), Madagascar (Bell, 1828, as *Testudo actinodes*), Pakistan (Gunther, 1869; Anderson and Minton, 1963; Tikader and Sharma, 1985; Moll, 1989; Sharma, 1998; Khan, 2006; D'Cruze, et al., 2016) and Sri Lanka (Tennent, 1861; Ferguson, 1877; Deraniyagala, 1930, 1939; Dattari and Vijayya, 1983; Dattari, 1984; Tikader and Sharma, 1985; Sharma, 1998; de Silva, A., 2003; Ahamad et al., 2004; Ekanayake et al., 2004; Jayawickrama et al., 2010; de Silva et al., 2000, 2017; de Silva and Vamberger, 2016).

Habitat: Rocky and grassy arid areas with plenty of vegetation.

Food and Feeding: Being largely herbivorous feeds on a variety of grasses, succulents, vegetation, flowers, fruits (oranges, tomatoes, water melons etc. and also animal matter (insects, centipedes, slugs, snails, small birds, carrion etc.).

Alagar and Balasubramanian (1991) listed some food plants (*Alysicarpus minilifer*, *A. vaginalis*, *Cyperus* sp., *Dactyloctenium aegyptium*, *Euphorbia lurida*, *Ipomoea pes-caprae* and *Pentatropis capensis*).

Breeding: Sexually mature at the age of 6-7 years; after courtship and copulation female lays usually 2-10 hard-shelled eggs in one or two clutches, rarely 3-4 eggs, measuring 45-46 x 35-37 mm, in self-dug pit in mud/sand, measuring 6 inches deep and 4 inches diameter / about 15 cm deep and 10 cm diameter, then covers with mud, during monsoon months; eggs may be laid frequently or at least three times in a year (Smith, 1931; Sharma, 1998). Rao and Choudhury (1996) studied prospects of its captive breeding.

Conservation Status: India: IUCN Red List- Vulnerable; Indian Wildlife (Protection) Act, 1972- Schedule IV; CITES- Appendix II (as Testudine spp.),

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upgraded to Appendix I in 2019; Pakistan: Sindh Wildlife Protection Ordinance, 1938- Schedule II; Sri Lanka: Sri Lanka Fauna and Flora Ordinance, 1993.

Threats: Habitat loss or degradation, road killings, poaching and illegal trade (WWF, 1994; Sekhar et al., 2004; Anand et al., 2005; Vyas, 2010; D'Cruze et al., 2015; de Silva et al., 2017; Choudhury et al., 2020). Conservation group TRAFFIC found 6,040 were seized globally that were intended to be sold in the pet trade (traffic.org).

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Figure 1. *Geochelone elegans*, the Indian Star Tortoise (dorsal side showing starred pattern)

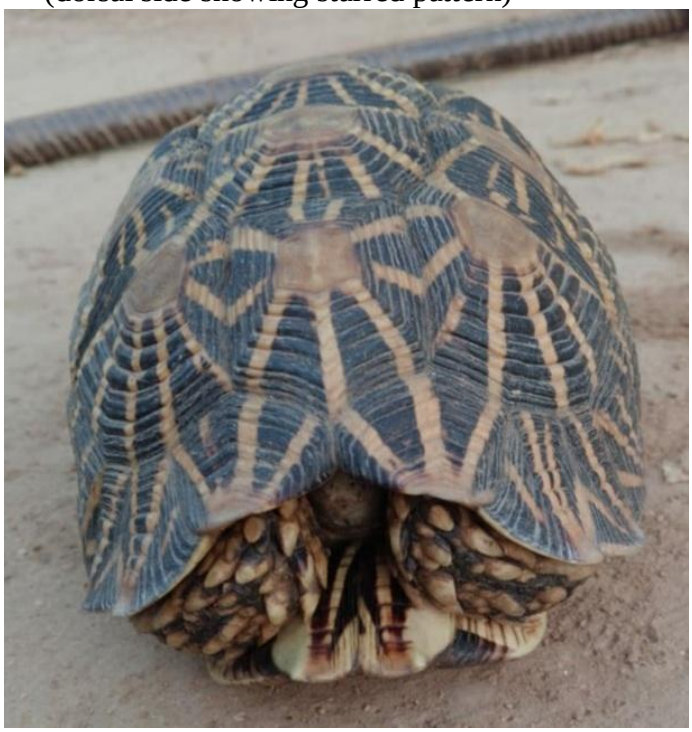

Figure 2. *Geochelone elegans*, the Indian Star Tortoise (posterior aspect)