

The impressed tortoise (*Manouria impressa*) in India - extended range and natural history notes

ANUJA MITAL^{1*}, LISHI GUNIA², BAMANG TACHUNG³ & ABHIJIT DAS⁴

¹Freshwater Turtles and Tortoises Foundation, Thane 400610, Maharashtra, India

²Potin, Lower Subansiri 791119, Arunachal Pradesh, India

³Bumchi Bumte, Papum Pare 791121, Arunachal Pradesh, India

⁴Wildlife Institute of India, Dehradun 248001, Uttarakhand, India

*Corresponding author e-mail: anujamital@gmail.com

The state of Arunachal Pradesh in north-east India lies within the Indo-Burma and Himalayan biodiversity hotspot and 'Turtle Priority Area' (Mittermeier et al., 2011; Buhlmann et al., 2009). Nevertheless, the chelonians of the region are still relatively poorly known (Ahmed & Das, 2010) as exemplified by the discovery in 2019 of a large land-dwelling species, the impressed tortoise *Manouria impressa* (Günther, 1882), in Arunachal Pradesh; an addition to India's chelonian checklist (Mital et al., 2019).

Land tortoises of the genus *Manouria* are considered primitive (Le et al., 2006) and are represented by the two species *Manouria emys* and *Manouria impressa*. The more familiar *M. emys* is distributed across south-east Asia, southern China, Bangladesh and north-east India (Das & Das, 2017). All the records of *M. emys* come from south of the Brahmaputra River which is considered as a significant biogeographic barrier in the region (Pawar et al., 2007). *Manouria impressa* is distributed across Cambodia, southern

China, Laos, peninsular Malaysia, Myanmar, Thailand, Vietnam (Htun & Platt, 2016), and north-east India. The Indian records of *M. impressa* come from two adult specimens from Lower Subansiri district of Arunachal Pradesh, north of the Brahmaputra River (Fig.1). A third living specimen of *M. impressa*, a sub-adult male, was rescued from the adjoining Papum Pare district, and subsequently transferred to captivity in Itanagar Zoological park, where all the three live individuals are currently housed. The nearest known population of *M. impressa* is found ca. 244 km away to the east in Myanmar, in the Hukaung Valley Wildlife Sanctuary and eastern Rakhine Hills (Htun & Platt, 2016).

In this note we report on a record of a living specimen recently found in Papum Pare district and summarise all known records of *M. impressa* in Arunachal Pradesh, with additional findings of shells from specimens that had been consumed and notes on natural history. Since the initial discovery of *M. impressa* in Arunachal Pradesh, we

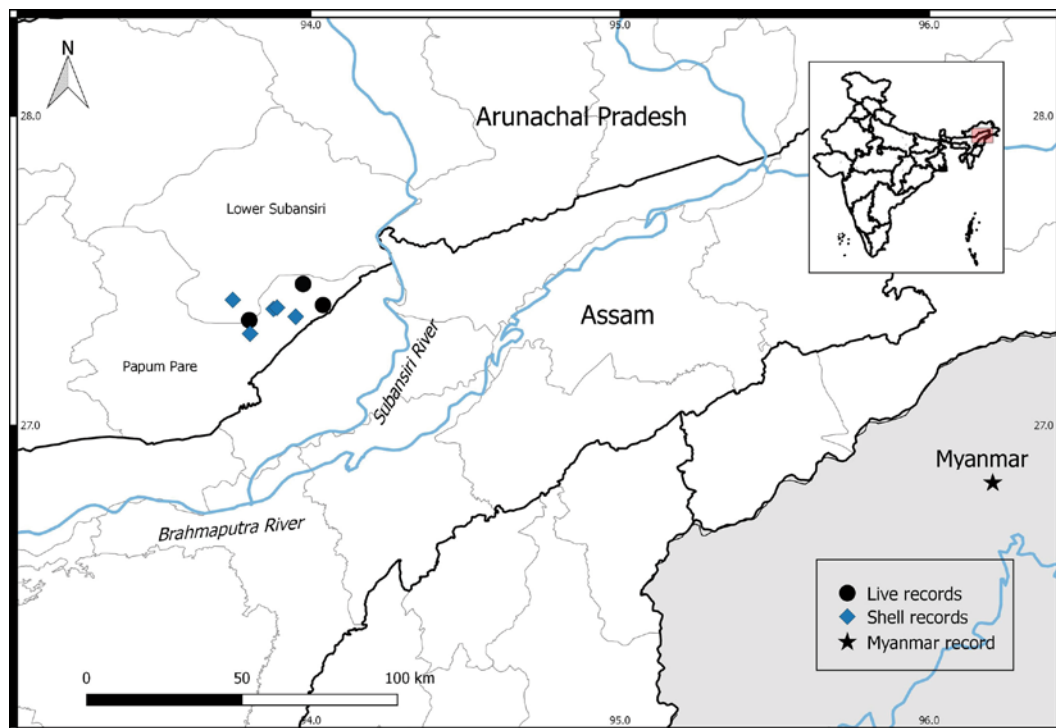


Figure 1. Map of Arunachal Pradesh showing locations where *M. impressa* is found in Lower Subansiri and Papum Pare districts, and locations of shell specimen encountered. Closest known record in Myanmar is also shown.

made two field visits to document additional records and to collect further information from researchers and local communities. The first indication of *M. impressa* in India was from the observation in 2012 of a shell in Cher village, Papum Pare district (Anwaruddin Choudhury, pers.comm.), but the occurrence of this species remained unreported until 2019 (Fig. 2). During field visits in September-October 2019 and June-July 2020, informal questionnaire surveys were completed with members of the local community (Nyishi tribe) who frequent the forests of Lower Subansiri and Papum Pare districts. During these interactions, four shells of *M. impressa* that had been consumed were recovered from local houses. These were photographed (Fig. 3) and measured on the spot (Table 1). The tortoises were sexed based on the concave nature of the plastron observed in adult males. The sex could not be assessed for two shells as their plastrons were missing.

On 26 June 2020 at 10:30 h an active adult female *M. impressa* (Fig. 4) was found in the forests of Papum Pare district in a swampy patch of grassland (locally known as phumdi). The area where the tortoise was found lies in the

Panior forest about 4 km from Bumchi Bumte village (for co-ordinates see Table 1) on the left bank of Panior River. The head of the female was creamish-yellow with a pink snout. On 3 July 2020, this tortoise laid two spherical leathery eggs that were translucent white in colour. One of the eggs was destroyed by the female's movements and the second egg although damaged was sufficiently intact that it could be measured; it had a diameter of 38 mm. The two eggs may represent only part of the actual clutch as this species is known to lay 10-21 eggs (Brock, 2009). In the presence of local people, the tortoise was released back into the habitat from which it had been collected. Photographic vouchers of this tortoise have been deposited in the Lee Kong Chian Natural History Museum, National University of Singapore (ZRC[IMG] 2.543a-g).

Table 1. Summary of all *M. impressa* and shell specimen records known from Lower Subansiri and Papum Pare districts, Arunachal Pradesh

	Date	Nearest location	Condition	Carapace length (mm) ^a	Age class / sex
1	26/06/19	Potin, Lower Subansiri (27° 19' N, 93° 48' E)	Live	238	Adult / male
2	26/06/19	Potin, Lower Subansiri (27° 19' N, 93° 48' E)	Live	292	Adult / female
3	23/08/19	Kakoi, Papum Pare (27° 23' N, 94° 02' E)	Live	- ^b	Sub-adult / male
4	26/06/20	Bumchi Bumte, Papum Pare (27° 26' N, 93° 58' E)	Live	305	Adult / female
5	22/12/12	Cher, Papum Pare (27° 21' N, 93° 57' E)	Shell	359	Adult ^c
6	29/06/19	Yazali, Lower Subansiri (27° 24' N, 93° 44' E)	Shell	265	Adult / female
7	18/10/19	Lichi, Papum Pare (27° 22' N, 93° 52' E)	Shell	290	Adult / male
8	3/07/20	Lichi, Papum Pare (27° 22' N, 93° 52' E)	Shell	293	Adult / male
9	14/07/20	Yabi, Papum Pare (27° 17' N, 93° 48' E)	Shell	296	Adult ^c

^aMeasured as straight carapace length ^bMeasurement of individual not available, ^cSexing of shell specimen was not possible



Figure 2. Shell specimen of *M. impressa* tortoise that had been consumed, found in December 2012 in Cher village, Papum Pare district, Arunachal Pradesh



Figure 3. Shells of *M. impressa* tortoises that had been consumed, found during informal interviews in Lower Subansiri and Papum Pare district of Arunachal Pradesh



Figure 4. Carapace and plastron of the *M. impressa* adult female from Papum Pare district, Arunachal Pradesh

To date we have reported on four live *M. impressa* and the remains of five shells. These observations from Lower Subansiri and Papum Pare districts in Arunachal Pradesh represent the northern-most and western-most occurrences of *M. impressa* across its range. The natural vegetation in the area comprises tropical semi-evergreen and sub-tropical evergreen forests (2B/C1b, 8B/C1) (Champion & Seth, 1968) at altitudes of 45 m to 1200 m. The average annual rainfall is around 3200 mm with the peak monsoon period reported from April to September. All living specimens of *M. impressa* documented in 2019 and 2020 were found in the monsoon months which is consistent with previous observations of increased activity at the onset of heavy monsoon rains in Myanmar (Htun & Platt, 2016).

Our interview respondents revealed traditional folk knowledge of *M. impressa*, known locally as 'Chimin Rakhap'. They stated that the species is restricted to intact evergreen forests with closed canopies, the wild banana patches that intersperse forested hill slopes, and occasionally in large cardamom (Zingiberaceae) plantations. They are mainly encountered by local villagers during the monsoon months of June to August and are found during land and bamboo patch clearance, or while taking local cattle (*Bos frontalis*) to graze in the forest. They also opportunistically collect the keeled box turtle (*Cuora mouhotii*) from similar habitats, which due to its small size is often kept as a pet.

A characteristic of tortoises is that they have long lives and have a reproductive maturity proportional to their lifespan (Shine & Iverson, 1995). In the case of *M. emys*, sexual maturity has been reported to be as late as 10 to 15 years (Stanford et al., 2015) and this may similarly apply to *M. impressa*. *Manouria impressa* is currently classified as a vulnerable species by IUCN (2008), is known to be rare in the wild, and has low breeding and survival rates in captivity (Wanchai et al., 2012). In this situation, hunting of this

apparently localised population of *M. impressa* could result in its extirpation from the forests of Arunachal Pradesh. A comprehensive study on the collection and hunting practices of *M. impressa* is vital to understand the actual scale of the threat. Currently, the four live records of *M. impressa* come from only a ~24.5 km² area across Papum Pare and Lower Subansiri districts. To develop conservation management strategies for this species in Arunachal Pradesh, further surveys in suitable habitats are needed to know the area that it occupies, the population size and genetic diversity, and its ecology and habitats. In India, tortoises are protected under the Schedule IV of the Indian Wildlife (Protection) Act, 1972, making it illegal to collect or kill them. Consequently, the State Forest Department, in collaboration with the local Nyishi community, should be encouraged to initiate awareness campaigns for the protection of this rare species.

ACKNOWLEDGEMENTS

We are grateful to Dr Anwaruddin Choudhury for his valuable inputs and the photograph of the first shell specimen (Fig. 2). We thank Bitupan Boruah for information and the photograph of a shell specimen, Director WII for his support, and the Desert Tortoise Council for funding assistance.

REFERENCES

- Ahmed, M.F. & Das, A. (2010). Tortoises and Turtles of Northeast India: Saving them from Extinction! Survey, Assessment of Present Status and Conservation of Tortoises and Freshwater Turtles in Northeast India. Technical Report, Aaranyak, Guwahati, India, 86 pp.
- Brock, J. (2009). Keeping and breeding impressed tortoises (*Manouria impressa*). *IRCF Reptiles & Amphibians* 16: 99–101.

- Buhlmann, K.A., Akre, T.S.B., Iverson, J.B., Karapatakis, D., Mittermeier, R.A., Georges, A., Rhodin, A.G.J., van Dijk, P.P. & Gibbons, J.W. (2009). A global analysis of tortoise and freshwater turtle distributions with identification of priority conservation areas. *Chelonian Conservation and Biology* 8: 116–149.
- Champion, G.H. & Seth, S.K. (1968). A revised survey of the forest types of India. Govt. of India, New Delhi, 404 pp.
- Das, I. & Das, A. (2017). *A Naturalist's Guide to the Reptiles of India, Bangladesh, Bhutan, Nepal, Pakistan and Sri Lanka*. John Beaufoy Publishing Ltd., Oxford, 176 pp.
- Htun, S. & Platt, S.G. (2016). A field observation and significant range extension of *Manouria impressa* in Myanmar. *Asian Herpetological Research* 7: 295–297.
- Le M., Raxworthy, C.J., McCord, W.P. & Mertz, L. (2006). A molecular phylogeny of tortoises (Testudines: Testudinidae) based on mitochondrial and nuclear genes. *Molecular Phylogenetics and Evolution* 40: 517–531.
- Mital, A., Tao, B. & Das, A. (2019). *MANOURIA IMPRESSA* (Impressed Tortoise). *Herpetological Review* 50: 523.
- Mittermeier, R.A., Turner, W.R., Larsen, F.W., Brooks, T.M. & Gascon, C. (2011). Global biodiversity conservation: the critical role of hotspots F.E. Zachos, J.C. Habel (Eds.), *Biodiversity Hotspots*, Springer Publishers, London 3–22 pp.
- Pawar, S., Birand A., Ahmed F., Sengupta, S. & Shankar Raman, T. R. (2007). Conservation biogeography in north-east India: Hierarchical analysis of cross-taxon distributional congruence. *Diversity and Distributions* 13: 53–65.
- Shine, R. & Iverson, J.B. (1995). Patterns of survival, growth and maturation in turtles. *Oikos* 72: 343–348.
- Stanford, C.B., Wanchai, P., Schaffer, C., Schaffer, R. & Thirakhupt, K. (2015). *Manouria emys* (Schlegel and Müller 1840) – Asian Giant Tortoise, Giant Asian Forest Tortoise. In: Rhodin, A.G.J., Pritchard, P.C.H., van Dijk, P.P., Saumure, R.A., Buhlmann, K.A., Iverson, J.B. & Mittermeier, R.A. (Eds.). *Conservation Biology of Freshwater Turtles and Tortoises: A Compilation Project of the IUCN/SSC Tortoise and Freshwater Turtle Specialist Group. Chelonian Research Monographs* 5: 086.1–9, doi:10.3854/crm.5.086.emys. v1.2015, <http://www.iucn-tftsg.org/cbftt/>.
- Wanchai, P., Stanford, C.B., Thirakhupt, K. & Thanhikorn, S. (2012). Home Range of the Impressed Tortoise, *Manouria impressa* (Günther, 1882) at Phu Luang Wildlife Sanctuary, Loei Province, Thailand. *Tropical Natural History* 12: 165–174.

Accepted: 20 July 2020