

# Nature Watch

## A Tale of Two Turtles

*V Deepak*

**Turtles are one of the oldest groups of reptiles in the world and India has a large and diverse assemblage of extant turtles. While the North and Northeast parts of India are higher in turtle diversity, peninsular India has all the three endemic turtles. The Cane turtle and the Travancore tortoise are two endemic forest dwelling turtles. Until recently, very little was known about the ecology of these two turtles. I spent five years during my PhD studying their behaviour and ecology in the Western Ghats. In this article, I share general information on evolution of turtles and some of my findings on the behaviour and ecology of these two endemic turtles of India.**

### Introduction

Turtles have existed on Earth since the rise of Dinosaurs. The oldest known turtle fossil with a complete shell is of the *Proganochelys* species dating from the late Triassic (220 Ma). The shell of a turtle is a unique and successful body plan which has enabled them to survive over 200 million years despite fluctuating climates and diverse forms of vertebrate predators. Many living tortoises<sup>1</sup> are slow growing and attain sexual maturity quite late. This makes them vulnerable to extinction because they take a long time to recover from depletion, especially when large numbers of their populations are hunted or killed. Currently, 460 taxa (species & subspecies) of turtles are found throughout the tropical and temperate regions of the world. They consist of 14 different families which are broadly classified into two groups, the Pleurodires or the side-necked turtles and the Cryptodires or the hidden-necked turtles. Members of these two families split from each other approximately 200 million years ago. Three of the fourteen families belong to the Pleurodires which are found in South America, Africa, Madagascar and Australia. The



V Deepak is a postdoctoral fellow at the Centre for Ecological Sciences, IISc. He is interested in ecology, systematics and biogeography of amphibians and reptiles in India. His current research focuses on systematics and phylogeography of fan-throated lizards (*Sitana*) in the Indian subcontinent. He uses morphological and molecular data to understand evolutionary relationships and distribution patterns of different groups of reptiles.

<sup>1</sup> Tortoises and turtles belong to the same order Testudines, but different families. All tortoises are classified under the family Testudinidae.

### Keywords

Ecology, endemic, India, turtles, tortoises, Western Ghats.



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Cryptodires can further be classified into marine (two families), terrestrial (one family) and freshwater turtles. They are a widely distributed family with some members found even in cold regions such as Canada and some in dry and arid zones in Australia. There is a long standing debate about the closest living relative of turtles as a group. Based on morphological similarity, some scientists have suggested that they are most closely related to lizards, while others have even suggested mammals, but a recent molecular study indicates that they are more closely related to crocodiles than to lizards or mammals.

The Ganges and the Brahmaputra river basins of India and Bangladesh are identified as world turtle hotspots with 19 species of freshwater turtles and tortoises. While Northeast India is particularly rich in turtle diversity, peninsular India is also home to three endemic turtles. Of these, one is an aquatic turtle found in major rivers of peninsular India, while the other two are terrestrial and endemic to the Western Ghats. The mountains located in the Southwestern part of India are home to some evolutionarily distinct life forms. One such enigmatic creature is the forest cane turtle (also called the Cochin forest cane turtle) (*Vijayachelys silvatica*) a monotypic genus found only in the Southern and Central Western Ghats. These small terrestrial turtles grow up to 170 mm length (straight carapace length) and, to an untrained eye, their shell looks just like a leaf on the forest floor (*Figure 1*).



**Figure 1.** It is often difficult to spot the cane turtle by an untrained eye. They are just like a leaf on the forest floor.



Their closest relative is an aquatic turtle found in lakes and ponds throughout India, Sri Lanka and Myanmar. The other chelonian endemic to Peninsular India is the Travancore tortoise (*Indotestudo travancorica*), a medium sized (330 mm SCL) terrestrial tortoise found in the moist forests of the Western Ghats. These tortoises are pale yellow with black markings on the shell and are difficult to spot in their habitat. Their closest relatives are the *I. elongata* and the *I. forstenii*. The *I. elongata* is found in the Sal (*Shorea robusta*) forests of India, NE India, Myanmar, Thailand and Vietnam while the *I. forstenii* is found only on the Sulawesi Island in Southeast Asia. Phylogenetic and paleontological studies estimate that the diversification of the ancestors of these two turtles occurred in the early Tertiary and late Cretaceous (50–80 million years ago).

Most of the recent information on the biology and ecology of the forest cane turtle and the Travancore tortoise originated from a project in which I was involved, titled ‘Ecology of the two endemic turtles in the Western Ghats’. The two main aims of the project were to estimate the population size and assess the status of the species in the wild, and to determine home-range movement patterns and diet of the species. It took my field guide and me six months to locate the first cane turtle and three months to find the first Travancore tortoise. Over four and half years, we searched most moist forests in the mid-elevations (400–900 masl) of the Anamalai landscape looking for turtles. We carried out systematic searches in different habitat types, and subsequently identified a potential sampling area for radio-tracking turtles. We attached transmitters on six cane turtles and five Travancore tortoises and eventually managed to track some of them for two and a half years.

### **The Saga of the Cane Turtle (*Vijayachelys silvatica*)**

In 1912, John Robert Henderson, a British zoologist from the Government Museum, Madras first collected specimens of the cane turtle with the help of the local Kadar tribe. It was named *Geomyda silvatica*, and subsequently, *Hoesemys silvatica*. Until 1982, the cane turtle was believed to be extinct in the wild, since

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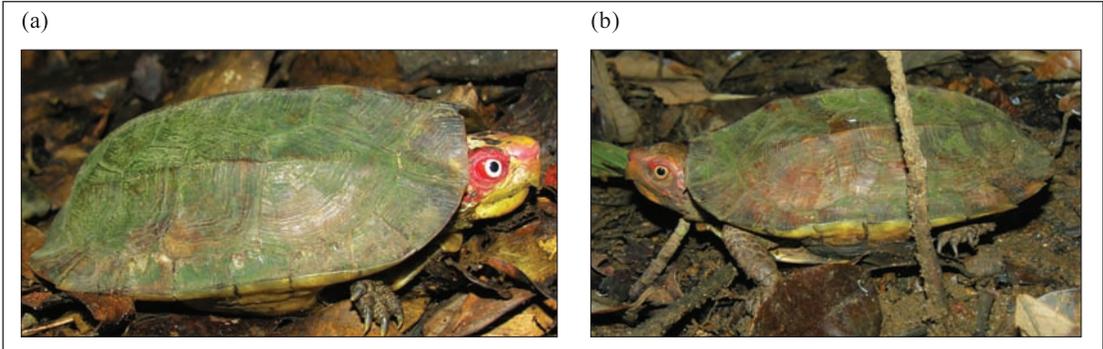
no one had found this species after its description. It was rediscovered in 1982 by J Vijaya, after a few months of surveys in the southern Western Ghats. Vijaya added significant natural history information on the species. The generic name *Vijayachelys* was assigned to this species in 2006 in honour of her contribution to the knowledge of this species.

Cane turtles are omnivores; they relish eating the red-coloured snails (*Indrella ampula*) in spite of the fact that the snails produce a sticky substance to deter them. They also feed on five other kinds of snails occurring in the Anamalai hills. Small fruits, berries, earthworms, beetles and other invertebrates also form a part of their diet. While handling, some of the cane turtles squirt out a pungent smelling fluid. The release of such a fluid is well known in sea turtles and is reported from a few freshwater turtles as well. The fluid is produced from the Rathke's gland, which is located above the thigh. Although cane turtles are well-camouflaged, they can be easily detected by predators that locate their prey by olfaction (smell). It is suspected that the turtles' behavior of squirting a strong smelling substance is most probably to deter predators. Most cane turtles readily defecate when picked up which is also a kind of defense. The third form of defence, which is recorded only in male cane turtles, is much more interesting. The males fight among themselves aggressively, ramming against one another and biting until one of them gives up. During the fight, they tend to bite on the shell and cause damage. The losing male usually retracts its head inside and uses its shell like a shield. In some of the males we found, the small scute (scale) right above their head, which is called the nuchal scale, was either missing or damaged. The damage was observed only in males above 115 mm in carapace length which suggests that this probably takes place when the males become sexually mature and get involved (or participate) in aggressive fights.

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Cane turtles also climb slanting trees up to a meter high or other elevated places (like termite mounds or logs) to scan the terrain around them for food. When approached, they can dive in the leaf litter and bury themselves. Cane turtles are sexually dichromatic;





the males are brightly coloured with red, yellow, jet black and pink and have different individual colour markings on the head, while the females are drab coloured (*Figure 2*). Cane turtles breed during the monsoon months, and lay a clutch of 2 eggs in small depressions in the ground.

Cane turtles have very specific thermal and spatial requirements; a higher proportion of their activity is during rainy months as compared to the dry season. Reptiles, in general, have to regulate their body temperature with that of the environment. Given this adaptation, very dry and arid regions can be inhospitable for reptiles. But it is equally tough for species living in rainforests (*Figure 3*). The conditions are so adverse that one of the cane turtles that we tracked did not perform any activity for almost 100 days during the dry season.

**Figure 2.**

- (a) A brightly coloured male cane turtle from Topslip, Anamalai Tiger Reserve.  
 (b) A female cane turtle from Anaikundhi, Anamalai Tiger Reserve.



**Figure 3.** Evergreen forests with dense canopy are preferred habitats of cane turtles.



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Cane turtles were thought to be a rare species. As it turns out, they are not. Like many other reptiles in the Western Ghats, they are locally abundant. Our radio telemetry study suggests that they occur at high densities with approximately one individual in every 2 ha. Their well-camouflaged shell, elusive behavior and crepuscular activity make it difficult to locate them. However, they are found only in the western slopes of the Western Ghats, only below 1000 m elevation and only below 16°N latitude. In spite of being locally abundant in a few places, they have a very small range, which is why they are listed as Critically Endangered in the IUCN Red List.

### **The Tale of the Travancore Tortoise (*Indotestudo travancorica*)**

The *Indotestudo travancorica* was described by Boulenger in 1907, based on specimens collected by Ferguson, from the Travancore hills of Kerala. They have a long history of classification. Based on their morphological similarity, it was thought that the species found in Sulawesi (*I. forstenii*) was introduced in the island from India. Taxonomists synonymized these two species as the same until a genetic study in 2000 revealed the differences between the two.

Travancore tortoises are reported from evergreen, semi-evergreen, moist deciduous, bamboo forests and in rubber and teak plantations. Within these habitats, they are known to frequent grass marshes and rocky outcrops (Figure 4). They are omnivores which feed on grass, herbs, crabs, mushrooms, fallen fruits and dead carcass of other vertebrates. These large bodied tortoises are sometimes attacked by carnivores (tigers & leopards).

Our radio telemetry study suggests that they occur in very low densities with approximately one individual in every 15 ha. Radio-tagged Travancore tortoises moved a minimum distance of 0.8 m and a maximum of 485 m in a day. They are crepuscular and, like the cane turtle, showed higher activity during the monsoon months. When they are not active they use leaf litter, ground level tree holes, rocks,





fallen logs and pangolin burrows for shelter.

Male Travancore tortoises are known to develop bright pink colouration around the eye and nostril (*Figure 5*). They also participate in combat with other males which involves shell ramming and biting but, unlike the cane turtle, their shell is hard to break off. There are reports of these tortoises, which frequent marshes, getting trampled by elephants and gaur. Surprisingly, they survive even with badly damaged shells which heal. This extraordinary ability to heal has prompted the locals to think that they have medicinal properties. Therefore, apart from meat, Travancore tortoises are hunted for their shell.

**Figure 4.** Vayals/grass marshes are important feeding grounds of the Travancore tortoise.



**Figure 5.** Breeding male Travancore tortoise on a rocky outcrop in the Anamalai Tiger Reserve.



## Threats to the Turtles

Currently, there are 192 reptiles in the Western Ghats of which 68 % are endemic to this region. Ethnic communities and other settlers in the Southern Western Ghats hunt Travancore tortoises and cane turtles for meat. This is considered as one of the major threats to these endemic turtles. Along with other endemic species, they also face serious threats from habitat fragmentation and modification. Many of the west-flowing rivers in the Anamalai region have been diverted to the east and large tracts of mid and low elevation evergreen forests have got submerged in reservoirs. In the Anamalai hills alone, there are 10 dams (approximately an area of 1500 km<sup>2</sup>), which were part of a mega project following India's independence. These dams were indeed a boon for farmers on the dry eastern parts of the mountain and agriculture flourished in the adjoining plains. However, these dams do not appear to have solved the problem. The never ending need for hydroelectric power and water supply for irrigation threatens to submerge even more forests, which include some of the last remaining habitats for the two endemic turtles and other unique life forms in this region.

### Suggested Reading

- [1] V Deepak, P Praschag, and K Vasudevan, *Vijayachelys silvatica* (Henderson 1912) – Cochin Forest Cane turtle. *In Conservation Biology of Freshwater Turtles and Tortoises: A compilation project of the IUCN/SSC Tortoise and Freshwater Turtle Specialist Group*, (Eds) A G J Rhodin, P C H Pritchard, P P van Dijk, R A Saumure, Buhlmann and J B Iversion, *Chelonian Research Monographs*, No.5. 0.78.1–0.78.7, 2014.
- [2] V Deepak and K Vasudevan, Factors influencing the occurrence and vulnerability of the Travancore tortoise *Indotestudo travancorica* in protected areas in south India, *Oryx*, Vol.48, No.3, pp.1–8, 2014.
- [3] V Deepak, M Ramesh, S Bhupathy and K Vasudevan, *Indotestudo travancorica* (Boulenger 1907) – Travancore Tortoise. *In Conservation Biology of Freshwater Turtles and Tortoises: A compilation project of the IUCN/SSC Tortoise and Freshwater Turtle Specialist Group*, (Eds) A G J Rhodin, P C H Pritchard, P P van Dijk, R A Saumure, Buhlmann and J B Iversion, *Chelonian Research Monographs*, No.5, pp.0.54.1–0.54.6, 2011.
- [4] N Whitaker and J Vijaya, Biology of the forest cane turtle, *Vijayachelys silvatica*, in South India. *Chelonian Conservation and Biology*, Vol.8, No.2, pp.109–115, 2009.

Address for Correspondence

V Deepak

Postdoctoral Research

Associate

Centre for Ecological

Sciences

Indian Institute of Science

Bangalore 560012, India.

Email:

deepaksalea@gmail.com

