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Studies on certain chelonians of Sidhi district (M.P.)

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Abstract
Members of the Reptilia possess dry and horny skin with scales or scutes. Limbs are usually four, each with 5 clawed toes, reduced or absent in some. Reptiles are terrestrial, fresh water or marine. They are found in tropics and warm temperate regions.
Tortoises and lizards are also associated with Hindu Gods and Goddesses. It shows that the ancient people had a greater knowledge about the biology of reptiles which were quite common in the hoary past in all the ecological zones of India.
The chelonians are broad bodied encased in a firm shell or founded dorsal carapace and flat ventral plastron united at the sides. Body is covered with polygonal scutes or leathery skin. Jaws are with horny sheaths but no teeth. Eggs are laid in holes in their habitat.

Keywords: fresh water, chelonians, Sidhi district

1. Introduction
Critical survey of herpetological literature reveals that Chelonians are important biological material for conservation study and research. They are major vertebrates in biomass and excellent indicators of aquatic and semi aquatic environment. The depletion of their stock due to industrialization and urbanization has contributed to a considerably increased pollution in our water bodies. Madhya Pradesh has the major riverine system with 12000 kms long run of water within the state. In addition to this, 350 million hectare water spread area is also available which includes 200 major and medium reservoirs, thousands of ponds and many seasonal water impoundments, pools, dry and wet bands which are considered direct or indirect source of energy conservation. All these water bodies had different species of turtles in abundance as important and integral component of ecosystem. Now as their number is decreasing, there is urgent need of recording the present status of turtle population at least in the major rivers of M.P. so that steps can be taken to rehabilitate these chelonians in their natural environment.
There is a big past history of Chelonians and they represent an early reptilian offshoot in the animal phylogeny being originated from the primitive cotylosaurs. While Dionasaurs, their contemporaries have become extinct, the turtles have flourished and have adapted themselves for life in present day aquatic habitats through many ecological and morphological specializations.
Turtles offer a good study base for biological problems specially physiological and ecological due to being archaic on one side and fully adapted to the modern environment on the other. The studies in population structure, species composition, species domination in fresh water bodies and food habits of turtles will help us to understand their level of coexistence and their phenomenal adaption trend towards the everchanging environment. Age composition will help us to know the reproductive span. There is an apparent high mortality of eggs and hatchlings. Once the turtle reaches maturity its chances for survival are high. But present trends in killing of turtles and their death due to other factors exhort us to undertake studies on status, biology and conservation of turtles in Distt. Sidhi (M.P.).
Turtle meat is of very high protein content and its substantial biomass offer a great scope to alleviate malnutrition problem in our country. The possibility of raising economically important turtle species of the State of M.P. have also to be explored.
In Sidhi Distt. (M.P.), turtle population has declined drastically during last few decades as a result of direct and indirect human interventions. Illegal trade, export and overexploitation have caused an alarming decline of turtle in the State rivers and other water bodies. It is proposed to study the dimension of these problems to ensure that turtle "Biomass" of Sidhi Distt. does not further decline.
Almost all investigatiors have suggested further study of ecology and biology of turtles found in Madhya Pradesh. Among the pioneer and most recent workers who have undertaken study of Indian Chelonians specially of Madhya Pradesh can be referred to are Tikadar and Sharma (1985) [1], Moll and Vijaya (1986) [2], Rao and Singh (1987) [3] and Vyas and Patel (1990) [4]. Tikadar and Sharma (1985) [1] in their exhaustive book have reviewed the work of previous investigators. In their books, they have shown the presence of *Lissemys punctata granosa* Schoepff in a map on p. 132 in the whole of Madhya Pradesh.
However, description, details of species and actual sites of their presence have not been shown. *Lissemys punctata granosa* is endangered but as yet nothing is known about its biology and breeding habit except that it lays 12 eggs in a clutch. Its habit has been described as ponds, tanks with muddy bottoms and embankments. Its Status and ecology still not known. *Trionyx leithi* is also endangered. It is only reported from Ganga but not from any river in M.P. Many

from Gangetic system are supposed to be present in Madhya Pradesh but localities are still to be identified. In all, eight species of fresh water turtles are present in M.P. according to Tikadar and Sharma (1985) [1].

2. Material and Methods

Sidhi is the Distt. Of old Vindhya Pradesh. Presently it is one of the very important Distt. Of Madhya Pradesh. Sidhi is situated on the North-East border of the state. The geographical location is $23^0$15'N - $24^0$15'N latitude and longitude $81^0$45'E- $82^0$45'E. The town is located on a plateau and is situated 65.7 meters above the mean sea level. The Son, Gopad, Son and Mahan rivers surround the town from almost three sites and mark it's Northern, Southern and Western boundaries. Hills mark the Eastern boundary.

Turtles were collected from rivers, barrage, tanks, ponds, dams and lakes of Sidhi Distt. Help of fishermen was also taken to collect eggs, hatchlings, juveniles and adults. One is direct collecting by hand or nets and requires feeling by hand before capture. Indirect capture requires baited hoop nets (Legler, 1960) [5]. Nests were observed and eggs were brought to laboratory and successfully incubated. Egg number, temperature, clutch size and time needed for hatching was noted. Aquatic fauna and flora inside the water body and its neighbourhood was observed to have some idea about species food and feeding habits.

The river systems of Bellan, Son, Tons, Bichhia, Bihar, Satna and Mandakini were also surveyed for comparison. However, it was difficult to catch specimens from main river systems. Information was collected on the habitat, biology, natural history, water pollution, myths and belief etc. from local fishermen and tribal people of this region. It is interesting to note that during survey work of this group 3 land tortoises and one crocodile was found in some river, Sidhi (M.P.).

Chelonian fauna of Sidhi Distt. comprised of 3 families namely (I) Emydidae Gray, 1825, (II) Testudinidae Gray, 1825 and (III) Trionychidae Bell, 1828. The genus and species of the above families are given as below :

a) The Family: Emydidae Gray, 1825.
Genus : *Batagur* (Gray, 1855)
Species 1 *B. baska* (Gray, 1831)

b) The Family: Testudinidae, Gray, 1825.
Genus : *Geochelone* (Fitzinger, 1835)
Species 9 *G. elegans* (Schvepff, 1795)

c) The Family: Trionychidae, Bell, 1931.
Genus : *Lissemys* (Smith, 1931)
Species 10 *L. punctata* (Lacepede, 1788)

Aquatic habitats were sampled with trammel nets and hoop traps baited with fish or chicken entrails. This worked well in lakes and ponds. Turtles were also collected from local fish markets. One very important feature of the present study has been the availability of turtles for study from ponds, lakes, canals and small reservoirs rather than from main rivers. Information gathered from fishermen and local residents showed that due to many factors turtles were forced to leave main stream of rivers and migrate to tributaries and from there to smaller ponds, tanks, canals or reservoirs in the neighborhood.

3. Observation

a) Family: Emydidae Gray, 1825

This family comprises the largest number of living fresh water and terrestrial Tortoises or Terrapins, whose neck is completely retractile within the I shell. The shell is covered with the epidermal scutes; carapace is oval, arched or flattened; nuchal shield is devoid of properly developed costiform process. Plastron is composed of nine bones and is in contact with the marginal shields of carapace. Top of the head is covered anteriorly with smooth undivided skin, on the posterior portion of the top of head the skin is divided into many moderate to large shields. Eggs are oval or elongate.

These are the hard-shelled, amphibious, herbivorous, or carnivorous and omnivorous Chelonians, relatively or small size, inhabiting the various fresh water bodies. They are devoid of mesoplastron infralabials and gular shields. They are closely related to the land tortoises, but can be differentiated by not having elephantine hind feet and are more adapted to fresh water life than to a terrestrial one. The family Emydiade is well represented in Sidhi.

Genus : *Batagur* GRAY, 1855
Batagur river TERRAPIN
Batagur baska GRAY, 1831

The *Batagur* is a moderately large, web-footed, aquatic species of terrapin. The head is comparatively small with an upturned, pointed and strongly projecting snout. The skin of the posterior portion of head is divided into small shield. The skull is characterised by having a bony temporal arch, quadrato-jugal in contact with the jugal and post-orbital, bony choanae on lavel with the posterior part of the orbits, alveolar surface of jaws very broad with two strong, denticulate ridges placed in the middle of both the upper and lower jaws. Upper jaw is provided with a notch at the middle. The carapace is smooth, shining, subtruncated anteriorly, rounded posteriorly, heavy and moderately depressed.

The plastron consists of paired gular, humeral, axillary, pectoral, abdominal, inguinal, femoral and anal shields. The plastron is much smaller than the shell opening, laterally angulated in the young and rounded in the adult, truncated anteriorly and notched posteriorly. Limbs are with narrow transversely enlarged scales, digits fully webbed and are provided with four claws. Tail is extremely short in comparison with the body. Its shell is uniformly brown or greenish; the head and the under surface of the neck are brown. In the breeding season, the male assumes a brilliant colouration. Ganga, basin Godavari and Mahanadi river systems and son and its tributaries in Sidhi.

The *Batagur* is found in fresh, brackish or even salt waters. It occurs in fresh water lakes, canals or other water bodies. But its most favorite habitat is the shallow, muddy, tidal regions at the wide river mouths, lined with mangrove or other vegetation. At this place the river is quite shallow with sandy gravel bottom. It is an omnivorous terrapin but generally prefers a vegetation diet consisting of stems, leaves and fruits of river-side plants. It also feeds on molluscs, crustaceans and fish. Mating takes place between September and November. During this period the malesassume brillant breeding colours.

The *Batagur* prefers to nest on large sandy banks.

***Batagur baska* GRAY, 1831**

Family : Emydidae gray, 1855
Genus : *Batagur*
Species : *B. baska*

Nose tip-tilted and pointed, saw jawed. Carapace rather flat and digits well webbed. Only 4 claws on each forelimb unlike the other members of its family which have 5. Length over 24 in. (610 mm.) Colour brown or gray with a greenish or bluish cast in the female which has brown iris. During the breeding season head neck and shell limbs of the male turns black while the iris changes from yellow cream to white.

Habitat: Rivers (Ganga in India) freshwater lakes and canals. Tributaries of Son river in Sidhi Distt. (M.P.)

Food: Fruits aquatic vegetation, molluscs, crustaceans and fishes.

Nesting: January to early March of the year.

b) Family: Testudinidae Gray, 1825

The family comprises the true land tortoises, whose neck is completely rerractile within the solid shell. The carapace is covered with horny epidermal shields, frequently with distinct growth ringes and is generally dome shaped. The marginal shields of the carapace are connected to the somewhat flat or slightly concave plastron by a broad bridge. Nuchal shield of the carapace is without suitably developed costiform processes. The plastron is usually flat in females and concave in males, composed of bones. The digits are short and completely devoid of webs, with not more than two phalanges, metacarpals not or but slightly longer than broad, the hind feet are club-footed, the skin of the anterior side of the fore-limb is covered with strong horny scales. The skin on the top of the head is divided into shields. The tail is relatively short. Eggs are spherical in shape.

The member of this family existed and flourished in India the Pliocene Period in the Siwalik Hills. At present the family is widely distributed in tropical, subtropical and temperate zone of the world except Australia, In M.P. only one species has been reported namely, Geochelone elegans (Tikader and Sharma, 1985).

***Geochelone elegans* SCHOEPFF, 1795**

Family : Testudinidae
Genus : *Geochelone*
Species : *G. elegans*

It is a small tortoise in which the length of the largest female measures up to 25 cm. males never exceed more than 16 cm. in length. The head is of moderate size, its anterior portion is bulged and somewhat convex. The skin at top of head is divided into small irregular shields. Carapace elongated, highly domed the vertebral and costal shields from well marked conical humps. Plastron is large, turncate or openly notched anteriorly, deeply notched posteriorly and is made up of paired gular, humeral, axillary, pectoral, inguinal, femoral and shields: the suture between the abdominal shields is the largest and the shortest suture is between forelimbs are with five claws: outer side of the arm of forelimb and heel are provided with large imbricate, sharply pointed, bony scales, a patch of such comparatively more larger scales are present on the back of the thigh. Tail is moderately long and terminating into a spur-like scute. Shell is black above, each vertebral and costal shield is with a yellow areols from which radiate as many as eight streaks, ultimately producing a radiated pattern which is continuous over the marginal to the plastron. Head and limbs are yellow, more or less spotted with dark brown or black. Juveniles are almost entirely yellow or orange, with dark marks along the sutures.

Habits and habitat: The species inhabits rocky, grassy arid areas with plenty of other vegetation. The star tortoise is quite active during the morning and evening hours of the day and feeds on grass, flowers, vegetables, fruits and all other available vegetable material. Courtship and copulation takes place throughout the rainy season. Some of the same clutch are almost spherical. The eggs are laid at least three times in a year and are deposited in a self-dug nest pit roughly about 15 cm. deep and 10 cm. in diameter. Before starting the digging operation, the egg laying female moistens the soil of the nest site by using her urine for this purpose. The mother tortoise employs her hind limbs for scraping and digging the soil. After the egg deposition is over the nest is covered with the same urin-soaked muddy soil and the whole area is compacted by the female. The complete operation of egg laying is completed within four hours.

c) Family: Trionychidae

The group comprising the modern, flattened, soft-shelled, carnivorous, aquatic turtles and showing typical divergence. Head and neck are completely retracted within the shell. Carapace covered with a leathery skin.

Trionychidae turtles are represented in Madhya Pradesh by three well established genera, namely *Lissemys*, *Chitra* and *Trionyx* inhabiting fresh water habitats like marshes, pools, lakes and rivers. Genus *Trionyx* is widely distributed in this region and is represented by three species, namely *Trionyx gangeticus*, *Trionyx hurum* and *Trionyx leithi* respectively. *T. gangeticus* is available in Ganga and Mahanadi river systems. *T. leithi* is available in the Ganga, Mahanadi, Godavari river systems. The species *L. punctata* includes three quite distinct subspecies. *Lissemys punctata* and *Lissemys punctata granosa*. Genus *Chitra* is represented by a single species *Chitra indica* inhabiting the river systems of Madhya Pradesh.

North Indian Flap-Shelled Turtle

***Lssemys punctata punctata* LACEPEDE, 1788**

This is a small, flat turtle whose length hardly exceeds more than 23 cm. The head is moderately large, the snout is short and broad, its length is less than the length of the mouth opening. The carapace and plastron covered by a continuous sheet of soft skin and their collasities are finely granulated. Skin of the dorsal disc of juveniles longitudinally plaited. The lateral and the hinder portions of the carapace is most flexible. Nural bones are two in number and rest between the first pair of costal plates. First marginal bone in the adult is very large,

much longer than the other marginal bones. Plastron is with soft, semicircular flaps, which accommodate the retracted hind feet to be totally concealed; front portion of the anterior shell opening quite effectively. Plastron is with seven callosites in the adult, yellow spots on head never present. Limbs are fully webbed, with only three claws on each foot. Tail is very short. Carapace is grey-green, with numerous black-bordered yellow spots, irregularly arranged and with a light yellow marginal rim. Carapace is low and oval. Colour of the upper shell highly variable depending on the locality.

Habits and habitat: The species prefers to live in shallow, muddy ditches, lakes and marshes. It is a carnivorous turtle and feeds mainly on small frogs, tadpoles, earth worms, fishes and snails. Sometimes it has been found in lakes. Once they were abundant in Narmada at Hoshangabad they served as great scavengers. Large scale export to Bengal on hish price has resulted in total elimination of their species from many regions of Narmada. It lays 12 eggs in single clutch. Nests close to water. Nesting season is after rains from September to November. The eggs are 3-8 in number.

Status: Suspected to be threatened on account of ruthless killing and overexploitation of adults and their eggs for protein-rich food. Habitat destruction is the another principal factor of threat to the species. The nests of these turtles are frequently raided by predators like man, jackals and dogs. The construction of hydro-electric dams and barrages has greatly checked the movements of the turtles to its breeding grounds. The species is now on Endangered list.

Conservation: Nominally protected by legislation and export of adults and their products is prohibited. This subspecies is already in the Appendix I of IUCN. Exact data on the population are not available but it has been drastically reduced. A detailed study on the status and ecology will lead us to formulate suitable management plans to conserve this endangered subspecies. Its rehabilitation is possible only through large scale farming.

Distribution: Rivers of Gangetic system, ponds and lakes.

Lssemys punctata PUNCTATA

Family : Trionychidae
Genus : *Lissemys*
Species : *L. punctata punctata*

Carapace low and ovel. Flaps of plastron present under which the hindlimb may be retracted. The anterior lobs is hinged and capable of some movement. Colour of uppershell highly variable depending on the locality may be uniform olive-brown or strikingly patterned sometime with numerous pale green spots on a dark green background. Head greenish with three oblique parallel black streaks in the young the markings sometime presient in the adult.

Habitat: Mostly Ponds, reservirs or slow water rarely in fast waters. Narmada, Tapti and Son rivers of M.P. lakes and ponds near Rewa, Bilaspur and Son river. Moll (1987) reports that this species is very common in rivers and ponds of Gujrat.

Food: Food of this species are small fishes, insects, tadpoles, earthworms and carrio. Capative specimens are know to feed on mosquito larvae, stagnant water. Exploited for its flesh. Indian wild life (Protection) act schedule I.

Nesting: Nesting seasons: After the rains from September to Nomber Nest is a shallow pit, 10 cm. deep Egg: 3-8 diameter 25.5-27.5 mm. Incubation period: 9 months.

4. Discussion & Conclusion

India boasts one of Asia's most diverse assemblages of chelonians. At least 5 families, 23 genera and 31 species occur within the boundaries of the country. Generally the distribution and the biology of these species are poorly known. Much of our knowledge of this assemblage came from the investigations of the British Naturalists of the nineteenth and early twentieth century. For the most part these herpetologysts were concerned only with taxonomy. Their locality data were seldom precise (e.g. North India, Peninsular India) and natural history data were rarely provided. To further complicate matters much of the describing and classifying was done by museum curators such as John Edward Gray, Albert Geunther and George Albert Boulenger who had never been to India and who often relied on second hand information, drawings and dried specimens to prepare their accounts. Considerable confusion and lengthy synonomies have resulted. Malcolm Smith's 1931 treatise on chelonians in the fauna of British India series did much to summarize the available information and to reduce confusion. Nevertheless the distributions given were still sketchy and little natural history information was provided.

Tortoises are commonly found in ponds, rivers, lakes, tanks and on land, and are well adapted for aquatic and terrestrial mode of life as the case may be. Freshwater forms belong to the families Emydae and Trionychidae, Whereas land-forms belong to the family Testudinidae. Both inhabit in the rivers of Sidhi Distt. (M.P.) and are of great economic value. *Hardella thurgi* (Gray) is exclusively aquaic in habit frequenting slow-running and stagnant waters. It is also present in Chambal river and other river basins of Madhya Pradesh.

Batagur baska (Gray) is caught in large numbers by basket-traps. Its flesh is eaten, and its carapace is of some special value to salt-boilers. It is also exported from M.P.

Mud-Turtles of the genera *Lissemys* and *Trionyx* of Madhya Pradesh are valued for their flesh, which is used as food. They are carnivorous, largely feeding upon fish, molluscs, frogs, etc. and are easily tamed. *L. punctata* refer from Son, Tons, Ken, Betwa, chambal and Sindh. *L.P. granosa* refer (Schoepff), from the Mahanadi and Godavari rivers, are common in all rivers of M.P. and have great export value.

The chemical analysis of the meat of *L. punctata* was made and it is found to have the following composition:

a) Moisture, 79.4%
b) Protein, 16.05%
c) Fat, 1.5%
d) Carbohydrates, 1.5%
e) Mineral matter, 1.1 %
f) Calcium, 7 mg.
g) Phosphorus, 162 mg./100 g.

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