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TURTLES : THEIR NATURAL HISTORY, ECONOMIC IMPORTANCE, AND CONSERVATION

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In his never ending quest for tapping hidden resources of food and commerce in nature, man has been relentlessly exploiting the seas and rivers which remain to be the vast media with inexhaustible plant and animal nutrients. The meat, soup, eggs of a turtle are a prized food throughout the world since time immemorial. So has the "tortoise shell" lured man's sense of art.

What is a Turtle ?

Turtles (chelonians) are reptiles like lizards, snakes and crocodiles which we do not look down upon with much aversion. Turtle is the only reptile that has a shell and because of this characteristic "dome" designed to act as a protective armour, nobody can mistake a turtle for anything else. The turtle shell is made up of a top arched part (carapace) and the flat lower part (plastron) which are joined at each side by a bony bridge. These domed reptiles have a lineage running back to 200 million years and yet this long process of evolution had no effect on the turtle or its shell. Here is a sheer case of conservation with vengeance. Thriving in arid waterless wastes, lakes, rivers and the high seas, about 250 kinds of turtles inhabit the earth today varying greatly in size and shape from the gigantic marine forms weighing over hundreds of pounds to small species less than a pound in weight. About fifty kinds of chelonians are found in our coasts, islands and inland waters. They are included in five families— Emydidae (Fresh-water Tortoises), Trionychidae (Mud Turtles), and Dermochelidae and Chelonidae (Marine Turtles). They can be easily recognised by the following key based upon the external characters :

1.	Limbs paddle-shaped ...	2
	Limbs not paddle-shaped ...	3
2.	Limbs clawless ; shell covered with smooth skin ...	Leather back Turtle

3.	Limbs clawed ; shell covered with horny shields	Sea Turtles
4.	Digits with four or five claws ; shell covered with horny shields	4
	Digits with three claws ; shell covered with smooth skin	Mud Turtles
5.	Limbs more or less flattened ; digits webbed	Fresh-water Tortoises
	Limbs more or less cylindrical ; digits not webbed	Land Tortoises

The varied usuage of the word "turtle" in English language has given rise to much confusion. In proper usuage "tortoise" is referred to the strictly land dwellers with elephant-like stubby feet, "turtle" for those found in seas and rivers with flippers and webbed toes and "terrapins" for the hard-shelled, edible freshwater tortoises.

Turtles are toothless but have a beak with horny sheaths provided with a cutting edge. They chew the food only to reduce it to fragments for easy swallowing. They feed on both plants and animals and like other reptiles can survive without eating for months or even years. Hearing is dull but the eye sight is fairly good. They are not very vocal creatures either except for making crying, barking and grunting sounds during mating. Though they are proverbially slow in movement, the marine turtles have developed an efficient surmming stroke. With their forefeet modified as "flippers" which are moved with an up-and-down beat similar to that of the wings of a bird in flight, sea turtles swim with a speed at 32 km an hour.

Contrary to popular belief, turtles do not live for ever but their maximum life span may be 100 years or more. One thing is certain that they live longer than any other back boned animal including man and in this respect the giant tortoises are record breakers. Atleast one tortoises in Mauritius lived from 1766 to 1918 when it was killed in an accident. Turtles can be made to learn slowly but on the whole to a casual observer they are stupid animals.

Marine Forms

Inhabiting the tropical and sub-tropical seas of the world, the present day sea turtles are of 5 kinds—the massive Loggerhead (*Caretta*), the edible Green turtle (*Chelonia*), the Hawksbill (*Eretmochelys*), the Ridley (*Lepidochelys*), and the leatherback (*Dermochelys*). Of these, the edible Green turtle (*Chelonia mydas*) and the Hawksbill turtle (*Eretmochelys imbricata*) have gained world wide recognition because of their immediate utility.

The Green turtle is the most valuable of all living reptiles of the world because of its edible meat, soup and eggs. Though the adult is of olive or brown colour, it derives its popular name 'Green turtle' from the hue of its fat which is greenish. This turtle, widely distributed around the world, has supplemented the diet of peoples of more different cultures than has any other wild vertebrate. In western countries, various kinds of edible concoctions like candy, pickled eggs and egg butter are made cut of this turtles' eggs which are claimed to be more nutritious than that of a hen.

Edible

The clear turtle soup called 'Calipee' is obtained from the cartilage of the lower shell of the turtle. It is said that a 300-pound green turtle yields about six pounds of calipee. The green turtle's soup is so much relished by Germans that they gave it another name, "Suppenchildkrote" (Soup turtle).

The home of the green turtle is the Mediterranean, Atlantic, Pacific and the Indian Oceans. It is abundant in and around the Krusadai Island, Palk Bay and Tuticorin. Also plentiful in the Andamans, Nicobars and Lakshadweep, it grows upto 4 feet and may weigh 800-900 pounds which indicates its heaviness and also its helplessness when once it is caught. Though the treatment meted out to it immediately after catch is cruel, it is a necessity that it has to be put on its back soon after the catch as otherwise the heavy carapace and other internal organs excert a fatal pressure on the animal's heart and lungs causing speedy death. Alternatively they are to be kept in capacious tanks of sea water which will not be easy to come by on the coasts. The green turtle has been known to swim 300 miles in 10 days and is capable of migrating to long distances. Green turtles marked after nesting on Ascension Islands have been found feeding 1400 miles away off the coast of Brazil.

Every Sunday live turtles and their products are sold at Tuticorin, Tamilnadu. Sea turtles majority of whom are of edible kind caught in the nearby reef islands fringing the coastal line from Tuticorin to Rameswaram will be brought for slaughter and every part of the turtle is sold for a price. The blood of the green turtle is also sold which is said to be effective in curing haemorrhoids. The shell, flippers, eggs, fat, and meat are sold out or the whole animal fetches a price of about Rs. 300 to Rs. 400 depending on the size.

Tortoise-Shell Turtle

The Hawksbill turtle, so called because its upper jaw resembles the bill of a bird, is another valuable chelonian. Although its flesh is not eaten, it is famous for its yields of the real "tortoise shell" (actually turtle shell) known as "carey" in trade. "Tortoise shell" is derived from the soft and flexible horny coverings of the carapace of this animal. It is said that the best tortoise shell comes from the species of the Indian Ocean. Each turtle may yield about 6 to 8 lb of this valuable product which is used in making jewellery and other objects d'art. The Japanese have been the best of all tortoise shell craftsmen. A small sized industry for the manufacture of ornamental articles like combs, buttons, small snuff boxes, cigar cases etc has developed around this turtle on the coasts of Tamilnadu, Kerala and Andhra but the tempo of the trade remains slow.

The Hawksbill, smaller than all the marine turtles, is generally found in Indian and Indo-Chinese waters.

Giant

The leatherback turtle or Luth is the King of the marine reptiles because of its size, weight and rare appearance on land except as a occasional straggler or as an egg-laying female visiting the coast. It reaches a length of 7ft and weighs up to 1500 lb. It is unique in yet another feature. Unlike other turtles, the shell is covered by black leathery skin resembling the blubber of a whale instead of the usual horny shields. With its large and powerful flippers, it can swim well and is said to cruise the open seas for weeks and months. This remarkably strong and rapid swimmer is widely distributed in tropics but is scarce everywhere. It is an accidental visitor on and off the coasts of Sri Lanka and Kerala. The flesh of this giant is not edible but oil is extracted from its fat and eggs are relished. The other sea going turtles of our coasts, Olive Ridleys and the Loggerheads are also not edible but their eggs are relished by fishermen in South India. Sea turtles are caught by nets or harpoons while they are in water. As they are fond of basking asleep on the coasts, they are sometimes stealthily approached in boats and then harpooned. Till recently they were caught by binding a line on to the tail of a sucker fish and getting it to stick fast to a turtle which is basking at the surface.

Breeding Habits

Turtles attain sexual maturity in a surprisingly shorttime. Available data prove that the big sea turtles start breeding when they are 3-8 years

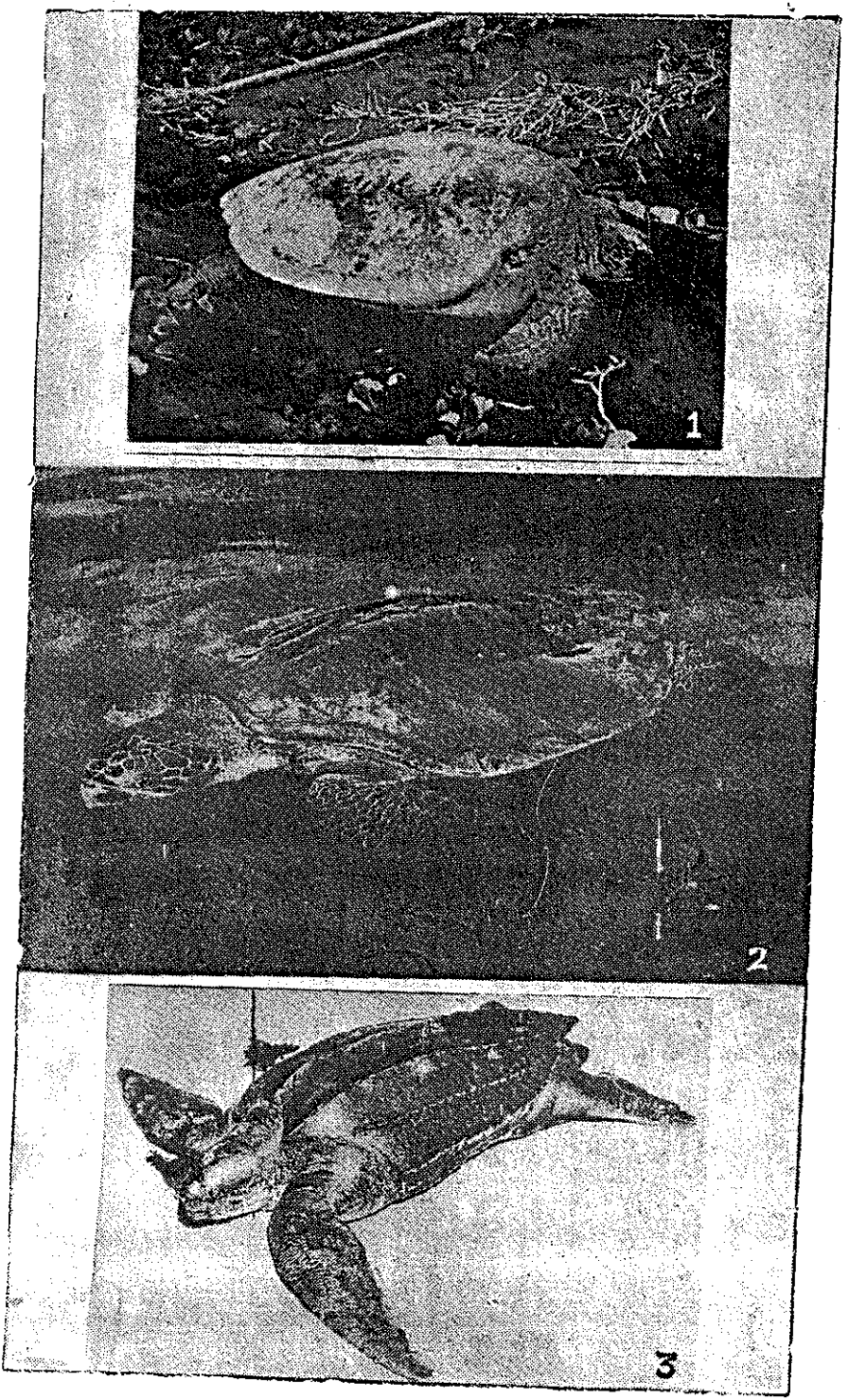

Fig. 1. The Green-turtle (*Chelonia mydas*)
Fig. 2 The Hawksbill turtle (*Eretmochelys imbricata*)
Fig 3. The Leatherback turtle (*Dermochelys coriacea*)

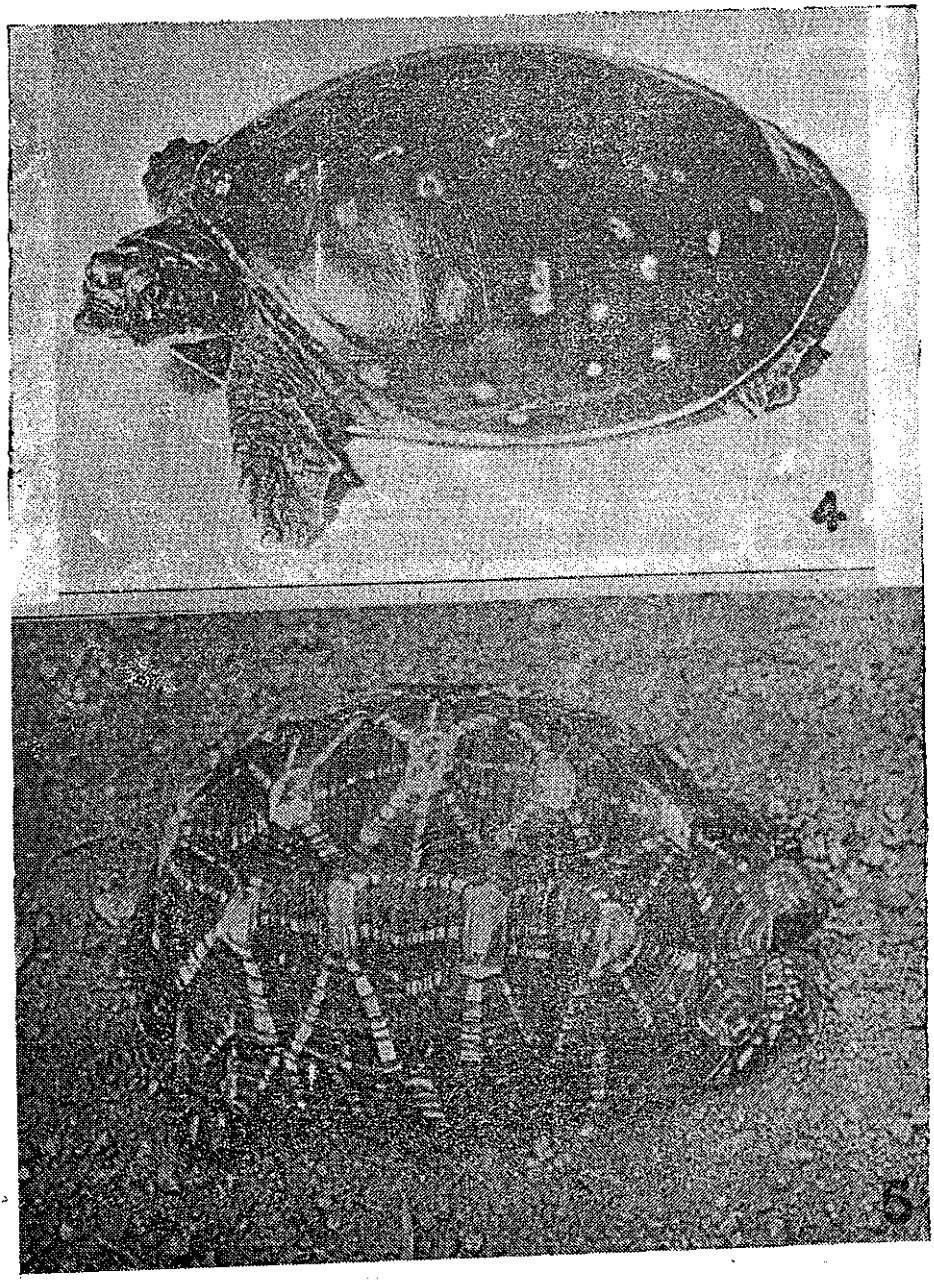

Fig. 4. Indian Flap-shell turtle (*Lissemys punctata*)
Fig. 5. Land Tortoise (*Testudo elegans*)

old. All turtles lay their eggs on land. Marine turtles lay many more eggs than the freshwater forms. The breeding of marine turtles makes interesting reading.

The most spectacular thing about the reproductive capacity of the turtles is that the female can store sperm cells to continue to lay fertilized eggs for several years after a single mating. The egg-laden female comes ashore at middle of night during spring and summer months to discharge its parental obligation making painful sighing noises made during the tiresome exercise of dragging its heavy weight up the high tide mark. Then it selects a sunny place and digs a hole depositing the ping-pong ball eggs in clutches, two at a time. A clutch may contain 200 eggs and the whole process of laying is over in a few hours. Thus it breeds several times a year at fortnightly intervals. The laying female takes no notice of her surroundings and goes on laying eggs like a machine set to motion. The presence of a human being or any other animal or even a blow on the shell of the turtle will have no effect. Taking advantage of this defenceless character of the female turtle, some inhabitants of tropical islands often sit at the nesting site and catch the eggs as they are extruded. However, the innocent female turtle fills the empty hole as carefully as though it contained all the eggs and then it lumbers back to the sea, stopping and emitting a great sigh on the way.

Young

Then the period of crisis in the life of a sea turtle and its progeny starts. The turtle going up the beach to lay eggs or making journey home towards the sea are "turned" and easily captured by poachers as the egg-laden females are especially valuable from the commercial point of view as the turtle as well as its eggs fetch the poacher a good remuneration. The pity is sometimes all the turtles turned over their backs may not be upto the market requirements of the greedy hunters. Thus several turtles either perish or become a ready prey to predators hovering about them.

The numbering of eggs laid by a female sea turtle gives some clue to the extent of the hazards faced by its young Particularly so when the mother turtle is least bothered about her nest or the tiny turtles that emerge later. The period of incubation which takes about seven to ten weeks in the warm beach sands and thereafter is a saga of terror and tragedy for the emerging young turtles called 'hatchlings'. They emerge out of the egg, scratch their way to the surface and head instinctively towards the sea probably guided by the light which is brighter over the sea. Enroute they

face a gauntlet of terror before they could reach their safe haven for they become the target of attack by sea birds, scuttling crabs, darting lizards, feral dogs, and of course the man, their arch enemy. After such a toll the fraction of the hatchlings that could thank themselves for having reached the sea fall a prey to fishes lurking in shallow waters. Yet sea turtles have persisted for millions of years. Unfortunately for them, the shell which is a most effective armour for the adult does not develop early enough to protect the hatchlings. Perhaps their potential for survival would have been quite different if turtles too, like sea snakes, delivered live young ones.

River Species

The meat and eggs of Indian river turtles are a staple diet in our country, notably in Assam, Bengal and certain parts of Bihar. Freshwater tortoises (Terrapins) like *Hardella, Kachuqa* and *Bataqur* found in the Ganges and Brahmapootra river systems are excellent eating and caught in large numbers for food. Of the mud turtles, mention should be made of the Indian softshell (*Trionyx*) the meat of which has an excellent flavour resembling that of beef. It is sold in large numbers in Calcutta markets.

The Star Tortoise of India (*Testudo elegans*) found commonly in South India and Sri Lanka is well known for its attractive colour pattern and gentle disposition which makes it a desirable pet. Live Indian tortoises are exported to USA where turtles are very popular pets.

Turtle Poison

Even the delicious meat of the greatly esteemed green sea turtle becomes a poison sometimes as the turtles often feed on poisonous algae and thus accumulates food poisoning substances in their flesh. Victims of turtle poison become violently ill and soon lapse into coma and there has been no invention of any satisfactory antidote to turtle poison so far. In a most recent outbreak (1961) of turtle poison reported from Quilon, Kerala, 18 of the victims among the 130 persons poisoned died. The best course is to avoid eating turtle meat, rotten and of a doubtful nature.

Export

India exports turtle meat, turtle shell, turtle skin and live turtles and our main buyers are U. K., U. S A., Germany, Switzerland, and Japan. The export figures of our edible chelonians and their products during the period 1971-74 are given in Table I.

Table I. Export figures of edible Chelonians and their products

Q : Quantity in kgs. of product wt.
V : Value in Rs. (F. O. B.)

	Products		1974	1973	1972	1971
I.	Turtle Meat					
	(a) Japan	Q :	...	100	...	...
		V :	...	6,550	...	...
	(b) E. Germany	Q :	811	...	...	...
		V :	30,331	...	...	...
	(c) Switzerland	Q :	...	63	...	...
		V :	...	3,300	...	...
	(d) U. K.	Q :	...	...	595	...
		V :	...	...	13,109	...
	(e) U. S. A	Q :	...	...	...	125
		V :	...	...	...	3,681
	(f) W. Germany	Q :	980	2,304	500	2,455
		V :	19,687	69,328	10,380	69,995
	Total	Q :	1,791	2,467	1,095	2,580
		V :	50,018	79,178	23,489	73,676
II	Turtle Shell : France	Q :	70	...	...	...
		V :	2,100	...	...	...
III	Turtles (Green Turtle) W. Germany	Q :	70	...	...	...
		V :	3,907	...	...	...
IV.	Tortoise Shell					
	(a) France	Q :	...	...	2	...
		V :	...	...	227	...
	(b) Hong Kong					
	(b) Hong Kong	Q :	...	N. A.	...	...
		V :	...	16,605	...	...
	(c) Italy			780	107	...
	(c) Italy	Q :	...	70,206	9,269	...
		V :	...	200	100	205
	(d) Japan	Q :	10	24,148	3,300	14,562
		V :	1,800	...	325	...
	(e) Netherlands	Q :	...	...	3,342	...
		V :	...	214	...	...
	(f) Singapore	Q :	...	3,010	...	...
		V :	...	...	202	...
	(g) Spain	Q :	...	...	1,974	...
		V :	...	20	40	78
	(h) W. Germany	Q :	53	1,567	1,154	4,655
		V :	9,376	1,214	776	283
	Total	Q :	63	1,15,536	19,266	19,217
		V :	11,176			

Products		1974	1973	1972	1971
V. Tortoise Meat					
W. Germany	Q :	...	800	400	1,432
	V :	...	18,776	9,710	30,817
VI. Living Tortoise					
(a) France	Q :	...	...	N.A.	...
	V :	...	...	1,620	...
(b) Italy	Q :	...	...	N.A.	N.A.
	V :	...	...	1,243	2,635
(c) Japan	Q :	...	...	N.A.	N.A.
	V :	...	...	2,068	1,350
(d) Netherlands	Q :	17	...	...	N.A.
	V :	600	...	...	570
(e) Switzerland	Q :	18	...	...	...
	V :	498	...	...	...
(f) U.S.A.	Q :	...	...	N.A	N.A.
	V :	...	...	231	795
(g) U.K.	Q :	...	...	...	N.A
	V :	...	...	...	650
(h) W. Germany	Q :	145	...	N.A.	N.A.
	V :	3,779	...	5,501	2,975
Total	Q :	180	...	N.A.	N.A.
	V :	4,877	...	10,713	8,975
VII. Tortoise Belly					
(a) Japan	Q :	...	...	100	...
	V :	...	...	3,420	...
(b) Singapore	Q :	...	...	...	25
	V :	...	...	...	740
Total	Q :	...	...	100	25
	V :	...	...	3,420	740
VIII. Tortoise skin	Q :	442	...	...	...
Singapore	V :	2,240	...	...	...

Notes : 1. N.A. —Not available
2. ..... —No exports
3. The figures are compiled from the daily list of exports issued by the various customshouses in India.

Turtle Farming

The main objectives of farming turtles are to raise wild. Stocks of breeding populations of the endangered turtles in specially constructed "pens" on the coasts where turtles abound and to provide employment to the locals at the spot. Possibly a cottage industry of the culture of green

and other valuable sea turtles may be attempted initially in the Andamans and Lakshadweep which offer excellent breeding beaches and other facilities for rearing the young turtles. Now we have to perfect ways of rearing and feeding the baby turtles since survival of hatchlings is the vital factor in turtle farming. Simultaneously small scale industries in tortoise shell, turtle oil etc. can be set up.

Thanks to the I. U. C. N. sea turtles are listed as species threatened with extinction and the government of India has made them protected species. Unless the breeding beaches are properly policed, the depradation of turtles and their eggs by the beasts and human alike continue unabated India with a coast line of over 4,000 miles and about 1,280 islands is actually aware of the need to draw maximum food yields and in this context turtle culture can offer a partial solution to the protein food shortage. We cannot afford to ignore turtles any more.