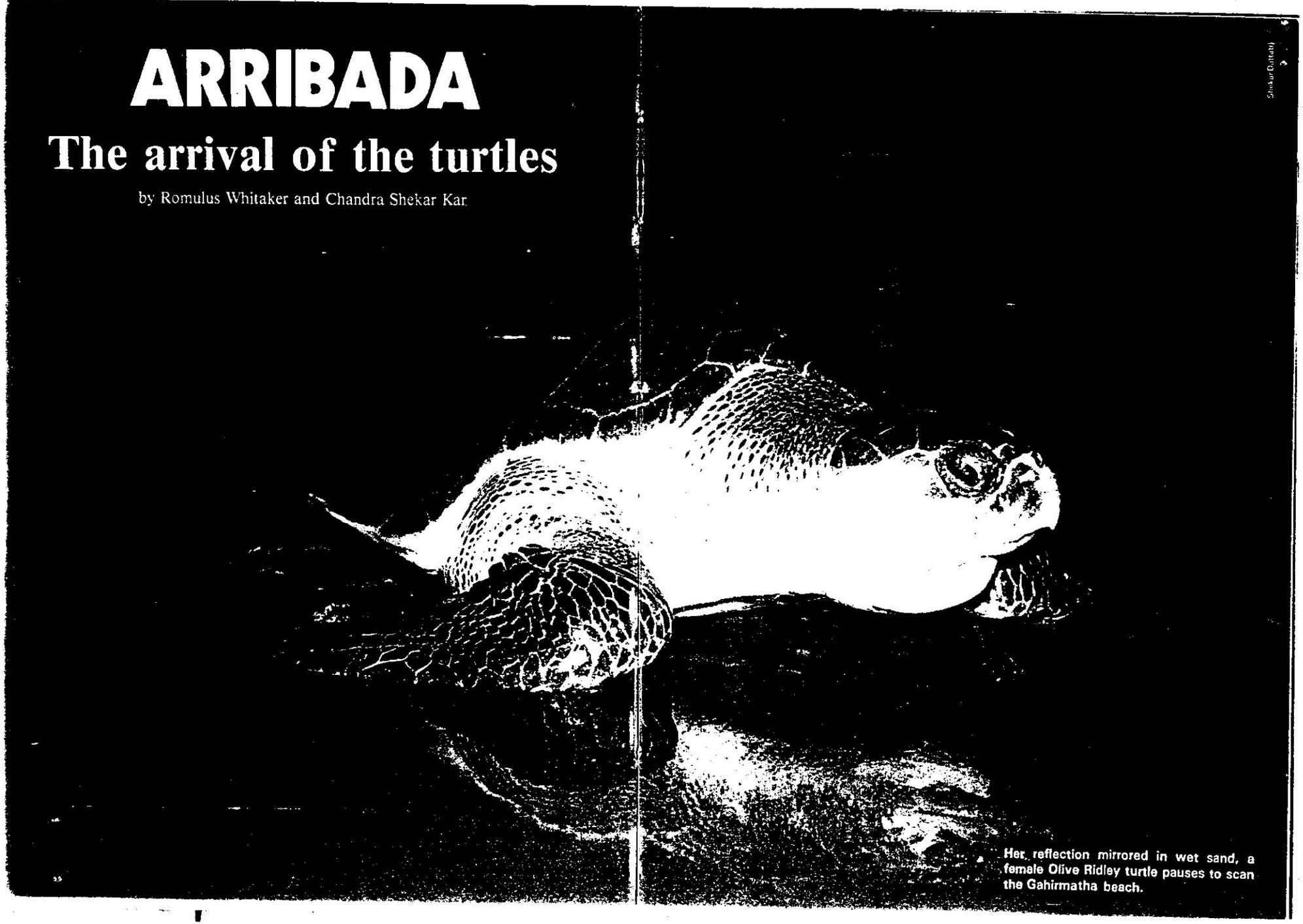
ARRIBADA

The arrival of the turtles

by Romulus Whitaker and Chandra Shekar Kar



Her reflection mirrored in wet sand, a female Olive Ridley turtle pauses to scan the Gahirmatha beach.

Soon there was no room to stand. The air was full of the leathery squeak of turtle skin against hard turtle shell and soft beach sand. This was punctuated by the blowing of air by the gravity bound female turtles as they forged up to the nesting grounds.

A female turtle shuffles forward up the sloped beach, stops, digs her snout into the soft sand, almost like a dog on a new scent, and continues until the nesting ground is reached. Once she has covered the 100 to 150 metres from the surf to the second plateau of the beach, after blundering into other females returning to the sea after nesting, she starts the mysterious and fascinating final act in the art of procreation.

We were on Gahirmatha Beach in the Bhitarkanika Sanctuary in Orissa, witnessing a phenomenon that was comparable to the hordes of game on the African plains, schools of tuna and whales and other such astounding congregations in nature. This was one of the planet's ultimate extravaganzas: the mass nesting of the Olive Ridley sea turtle.

The olive-brown and yellow *Lepidochelys olivacea* (or gadha kacchua in Hindi), was earlier believed to have emerged singly to nest rather than form their nesting aggregations as is now proved. This nesting is a nocturnal process and the fact that the Ridley is seldom out of the water for more than 45 minutes, and is unpredictable in its choice of time, makes the location of an "arribada" (Spanish for arrival), extremely difficult.

Certain preferences of the Olive Ridley, however, have been observed such as the apparent correlation of nesting to the phases of the moon (usually during the third quarter of the lunar cycle) and to the time when strong winds blow off the sea. A curious habit of the Ridley is the covering of its nest with nearby vegetation, a habit first noted and recorded in India by a fourth century A.D. Indian poetess. She identified the plant as *Udumbu kodi* the local name for Ground Glory, a very common creeper on sandy beaches.

The method employed by sea turtles to dig their nests is fascinating as the mechanics employed by each of the five genera is virtually identical. The whole process of nest digging is an unvarying series of the reciprocating actions of the hind feet which work alternatively. A foot is brought in beneath the hind edge of the shell to scoop up a small amount of sand, then lifted and swung laterally and the sand falls. Instantly the other hind foot, which until then has rested on the sand by the rim of the egg cavity, snaps sharply forward throwing sand from beside the hole to the front and side. This sequence is then precisely repeated in reverse until the flask-shaped nest grows to a depth equal to the reach of the hind leg.

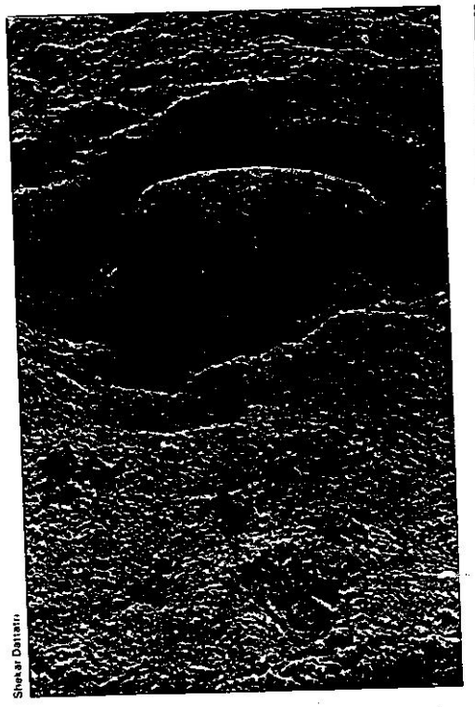
Chandra Shekar has been watching this annual phenomenon of nesting since 1977 and yet none of the awe of this spectacular event has been lost. After the first spurt of taking pictures we just stood and stared open-mouthed at what was happening around us, until another oncoming turtle made us jump aside. We watched a group of females in various stages of nesting, two of them obviously digging into the nest chambers of previous nesters, flinging whole and broken eggs through the air along with the sand they were excavating. Thwack! One of us gets it in the face from a flying egg and the fresh yolk dripping down makes a sticky mess. Kneeling down for a closer look, clots of egg mixed with sand stick to one's trousers. As the evening's steady nesting progressed into early morning the sand became squelchy with yolk and albumin which would harden to a crust in the next day's sun. The hours went by quickly as the flow of turtles seemed to ebb and swell with its own dynamic tide. Over 20,000 turtles emerged on this little five kilometre stretch of beach that night, a tiny fraction of the over 3,00,000 which had nested the week before. We were watching a small arribada but this knowledge did not detract from the excitement as we pondered the mechanisms and senses that caused the turtles to travel in huge flotillas which coast guard officers once described as 'islands of turtles migrating northward'. Crouched between several nesters we scooped aside a bit of sand to enable us to see the glittering, ping-pong ball-like eggs drop from the wrinkled snout-like cloaca into the hold. Each female lays an average of 110 of these eggs once or twice every season (clutch sizes vary from 40 to as much as 200). This means over two million eggs were laid that night, and over 40 million in the season, a super abundance provided by Nature to assure the continuance of the species.

Just as it is virtually impossible to count the number of turtles that come up from the sea, it is even more difficult to try to predict how many hatchlings make it back to the sea after their 50-60 day incubation under the sand. Wild boar, hyenas, jackals, lizards, cats, crabs, fish and birds predate on the eggs. Beach erosion, successive waves of nesters and the natural mortality rate further deplete the viable stock. Eventually, it is roughly estimated, after a year, less than one per cent of the total number of eggs laid actually hatch. Even at this stage the hatchlings are highly vulnerable in a sea full of predators and it is unlikely that more than one per cent of the survivors will attain maturity eight or ten years hence. Of course, it will be several years before we know the real figures. Meanwhile, the Orissa government's investment of time and money to protect and study the Gahirmatha Ridley population gives further generations of reptiles a greater chance for survival.

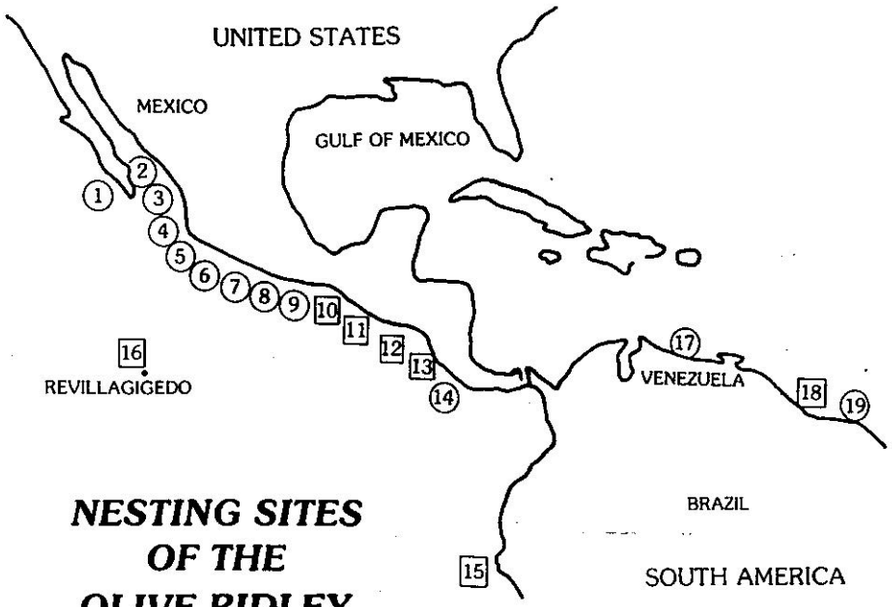
Great though the toll might be by way of natural predators, man, as usual, constituted the major threat for marine turtles. In 1974, J.C. Daniel, and S.A. Hussain of the Bombay Natural History Society reported a large concentration of nesting sea turtles near the mouths of the Brahmani, Baitrani and Mahanadi rivers adjacent to the mangrove swamp known as Bhitarkanika. No one really knew just how big the rookery was, but several million sea turtle eggs found their way to the Calcutta markets every year in January and February. (The ex-jamindar of Kanika Raj and, later, the Orissa Forest Department used to charge a small royalty of Rs. 15/- per boat load of around 35,000 to 1,00,000 eggs.) However, according to Dr. Robert Bustard, a FAO/UNDP expert who visited the area in 1974, over 1,50,000 females used the Gahirmatha beach for nesting. Each year, at this rookery, there are one or two big arribadas with numbers building up and tapering off before and after. In the 1982-83 season the nesting schedule showed only one arrival in the month of December, over 2,00,000 in February, 1,455 in March and 18,500 in April.

From 1976 onwards the Orissa Forest Department banned the lifting of eggs at Gahirmatha beach. With technical advice from the FAO of the United Nations and financial assistance from the Government of India, a crocodile and sea turtle project was started. The importance of the huge turtle rookery was finally realised. Chandra Shekar was appointed to study sea turtle biology, manage the conservation programmes and set up what has now become the *Gahirmatha Marine Turtle Research and Conservation Centre*. In 1981 Chandra Shekar discovered another mass nesting beach of Ridleys about 100 km. south of Gahirmatha where perhaps 1,00,000 females nest on three or four kilometres of sand each year. The only other large concentration of Olive Ridleys is known on the Pacific coast of Mexico and Costa Rica. They are also found in the South Atlantic oceans. Combining the two populations of Orissa, there are perhaps 5,00,000 females and assuming (though with no evidence) that the sex-ratio is 1:1 there are perhaps one million turtles in this one population. However, this, one of the largest Olive Ridley breeding populations in the world is still in the process of being depleted by the thousands off the coast of Orissa—for meat.

Just two years ago, working on the Gahirmatha shores, Chandra Shekar had to endure the frustration of watching turtle poachers just offshore, hauling turtles into their boats—turtles which had just laid their eggs and just been carefully tagged with a special metal marker inscribed, "Reward, Return Chief Wildlife Warden, Bhubaneshwar, Orissa, India". The illegal catch would be taken in these



Obeying a genetically programmed instinct, the Olive Ridleys come ashore on carefully chosen sandy beaches only to deposit their eggs. Having scooped out a flask-shaped chamber (left) a female may lay a hundred or more eggs, most of which will be predated upon by crabs, birds, lizards and even wild-boar, jackals and hyenas. Man, of course, is the most vicious predator of all. All over the world his markets are stocked with turtle eggs stolen from nests on beaches. Even after hatching (above left) the turtles' perils are far from over. As they scramble seawards, the young fall easy prey to a host of predators. On reaching the sea, hatchlings are likely to be eaten by fish and other marine predators. Tell-tale tracks, sighted even before the turtle reaches the water (above right) record the finale to the Ridleys' marathon migration saga.



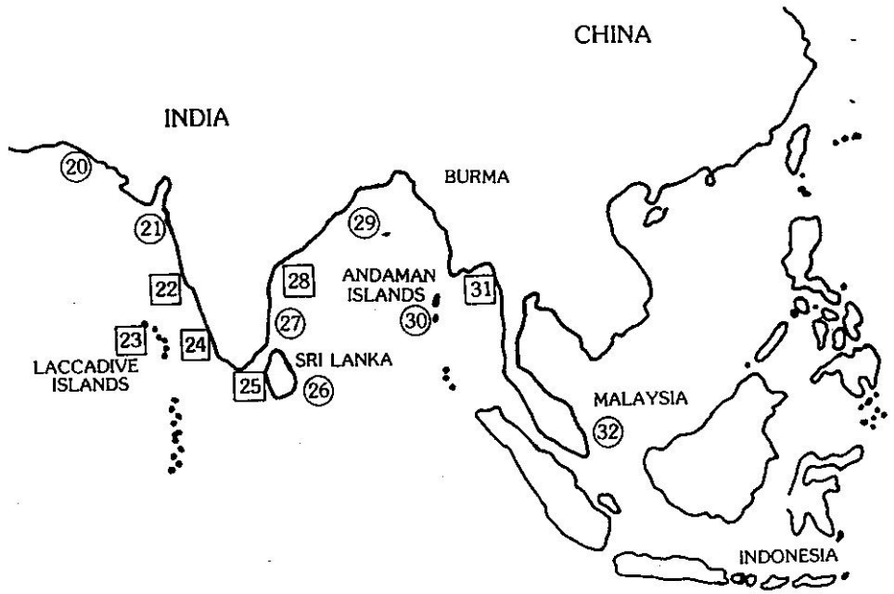
NESTING SITES OF THE OLIVE RIDLEY SEA TURTLE

Source: Sea Turtle Rescue Fund, Centre for Environmental Education, Washington.

1. Mexico—Baja California (1,000-10,000) (major)
2. Mexico—Sinaloa—El Quelite—El Marmol, Chametla and Teacapan (10,000-1,00,000) (major)
3. Mexico—Nayarit—Chacala—Plantanitos and Isla Marias (1,000-10,000) (major)
4. Mexico—Jalisco—El Playon de Mismaoloya and La Gloria (20,000-50,000) (major)
5. Mexico—Colima—Cuyutlan—Playa Campos (1,000-10,000) (major)
6. Mexico—Mexico—Michoacan—Colola, Mexiquillo—Nexpa, Play Azul—Chucutitan (1,000-10,000) (major)
7. Mexico— Guerrero—Petacalo and Playa Potosi (1,000-10,000) (major)
8. Mexico—Oaxaca—ElMaro Ayuta, Playa Larga and Chacahua (20,000-50,000) (major)
9. Mexico — Oaxaca — La Escobilla (50,000-1,00,000) (major)
10. Mexico—Chiapas—Puerto Arista (minor)
11. Guatemala—southern coast (minor)
12. Honduras—Isla Ratones (minor)

country craft to trawlers waiting slightly offshore and then to Digha, from where they would be sent in lorries to Howrah in Calcutta. (At Puri, fishermen sell turtles to middlemen at Rs. 20/-to Rs. 25/- each. These in turn are sold to wholesalers at Calcutta for Rs. 57/- to Rs. 60/-each. Retailers sell the turtle meat at Rs. 5/-to Rs. 6/- per kg. in Calcutta.)

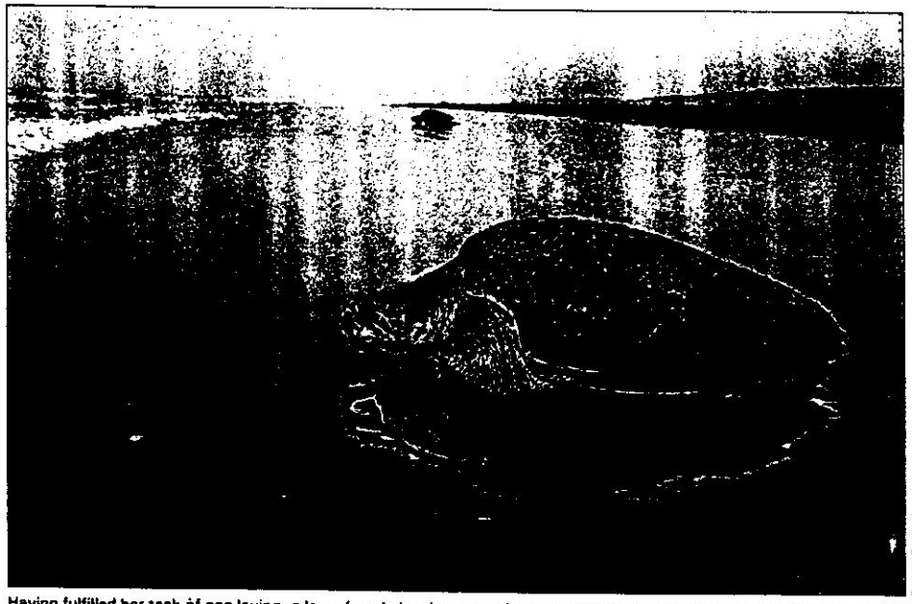
In March 1982, some photographs and information provided by J.J. Vijaya, a Madras Snake Park officer, resulted in the article "Massacre at Digha", which was published by *India Today*. The resultant furore and publicity about the slaughter of these reptiles which were supposed to be protected under Schedule I of the Indian Wildlife (Protection) Act, 1972, prompted several hundred letters from conservationists from all over the world to the Prime Minister. Fortunately the response was swift and decisive: the turtle market quickly became clandestine and



13. Nicaragua—between Masachapa and La Boguita (minor)
14. Costa Rica—Playa Naranjo, Ostional and Nancite (major)
15. Peru—northern section—Punta Malpelo (minor)
16. Mexico—Islas Revillagigedo (minor)
17. Venezuela (major)
18. Guyana—Shell Beach (minor)
19. Suriname—Galibi area, Eilanti and Baboensanti and Krofajapasi (1,100) (major)
20. Pakistan—Hawks Bay and Sandpit (1,000) (major)
21. India—Maharashtra—Gorai, Kihim, Manori and Versova (Major)
22. India—Goa (minor)
23. Laccadives—Suheli Valiakare, Suheli Cheriakara, Tinnakara, Bangaram, Pitti and Parali II (minor)
24. India—Kerala—Calicut and Karad (minor)
25. Gulf of Manner—Krusadai Island (minor)
26. Sri Lanka—especially south-west (major)
27. India—south of Madras and Point Calimere (1,000-5,000) (major)
28. India—Andhra Pradesh (minor)
29. India—Gahirmatha Beach (1,30,000) (major)
30. Andaman Islands—middle Andaman and Rutland (major)
31. Burma—Diamond Island (minor)
32. Malaysia—east coast—southern Kelantan to Pahang (1,70,000 eggs/yr) (major)

declined and perhaps most important of all, the Orissa Forest Department secured the help of the Navy and coast guards to start effective protection patrols. The poachers never knew what hit them as helicopters, fixed-wing aircraft and fast patrol boats began to intercept them at sea. On land the West Bengal Forest Department stepped up their vigilance and several lorry loads of turtles were seized between Digha and Calcutta. Thus, one more major step towards the conservation of the Ridleys had been successfully taken.

Another major threat to the adult turtles that copulate offshore just before making for land to nest, is the "incidental" catch of turtles in trawlers and fishnets. The stench of rotting turtles reached a peak last year when over 3,000 carcasses littered the 10 km. beach. This year a control on trawlers brought the number down to 500 but it still continues to be a serious problem. The Orissa Chief Minister,



Shekar Dattatri

Having fulfilled her task of egg-laying, a large female heads seawards to continue the migration saga that her species has undertaken for millions of years.

Shekar Dattatri

Powerful flippers, normally used to propel the reptile through water, spray sand over a clutch of eggs to obliterate any sign of a nest. This is the only protection a female will offer her progeny. Soon after egg-laying she departs and will never see her hatchlings.

Chandra Shekar Kar

Even more numerous than the gulls flying overhead, thousands of turtles can be seen the morning after they arrive at Gahirmatha.

Shekar Dattatri

Chandra Shekar tags a nesting turtle. The number will identify her and will help marine biologists to monitor one of Nature's most fascinating dramas—the migration of marine turtles.

Shekar Dattatri

Surrounded by the hundreds of eggs they have inadvertently dug up, some Ridley females proceed to lay their own eggs in nests barely a metre apart.

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Mr. J.B. Patnaik, and Mrs. Jayanti Patnaik (MP), visited the Gahirmatha rookery and spent a night there to witness this fascinating event of nesting. Mr. Patnaik later announced, over the radio, that there would be a ban on fishing from September to April in an area extending 10 km. offshore on the 35 km. of main nesting beaches.

We are fortunate, to have what looks like one of the most enlightened turtle protection policies in the world. To ensure still better protection to the Ridleys, however, our suggestion to upgrade the status of Bhitarkanika to the level of a National Park, by extending its limit of a buffer zone further offshore, has received due attention at the National Sea Turtle Workshop at Madras.

As we stand here the sun is just rising on a quiet glassy sea. Some stragglers are still shuffling to the water, a few are still laying their eggs and there are even one or two crawling up out of the surf to unload their heavy cargo of eggs. Large, dark heads pop up from the sea just beyond the surf—it seems like there are hundreds of turtles wanting to come up to lay their eggs, but are possibly too wary of the daylight. Later a strong wind will smoothen the beach sand, erasing the thousands of tracks before us and making the whole experience even more unearthly and dreamlike. We wonder what the future of this large breeding population of sea turtles will be. Can a number be safely culled for the Calcutta market, with no negative consequences to the population? If so, how do we arrive at the figures and how do we evolve a fool-proof system to ensure that no over-exploitation takes place?

In late March and early April the beach is again dark with moving shapes. Millions of tiny hatchlings crawl laboriously past a deadly gauntlet of crabs and birds. Only 17 gm., compared to their 40 kg. mothers, the little ones instinctively head towards the sea, getting there as quickly as possible aided by their remarkable sea-finding ability. They then swim away from the shore as fast as their tiny flippers can take them. Perhaps some will return within ten years, as adults, to lay their own eggs and perpetuate the fantastic "arribada" tradition. □