

One Strange Night on

MY FEET LEFT DEEP TRACKS on the warm, soft sand of that remote Pacific beach, but incoming rollers quickly erased them. Offshore the surf heaved somberly. In the east the purplish tiara of dawn was growing.

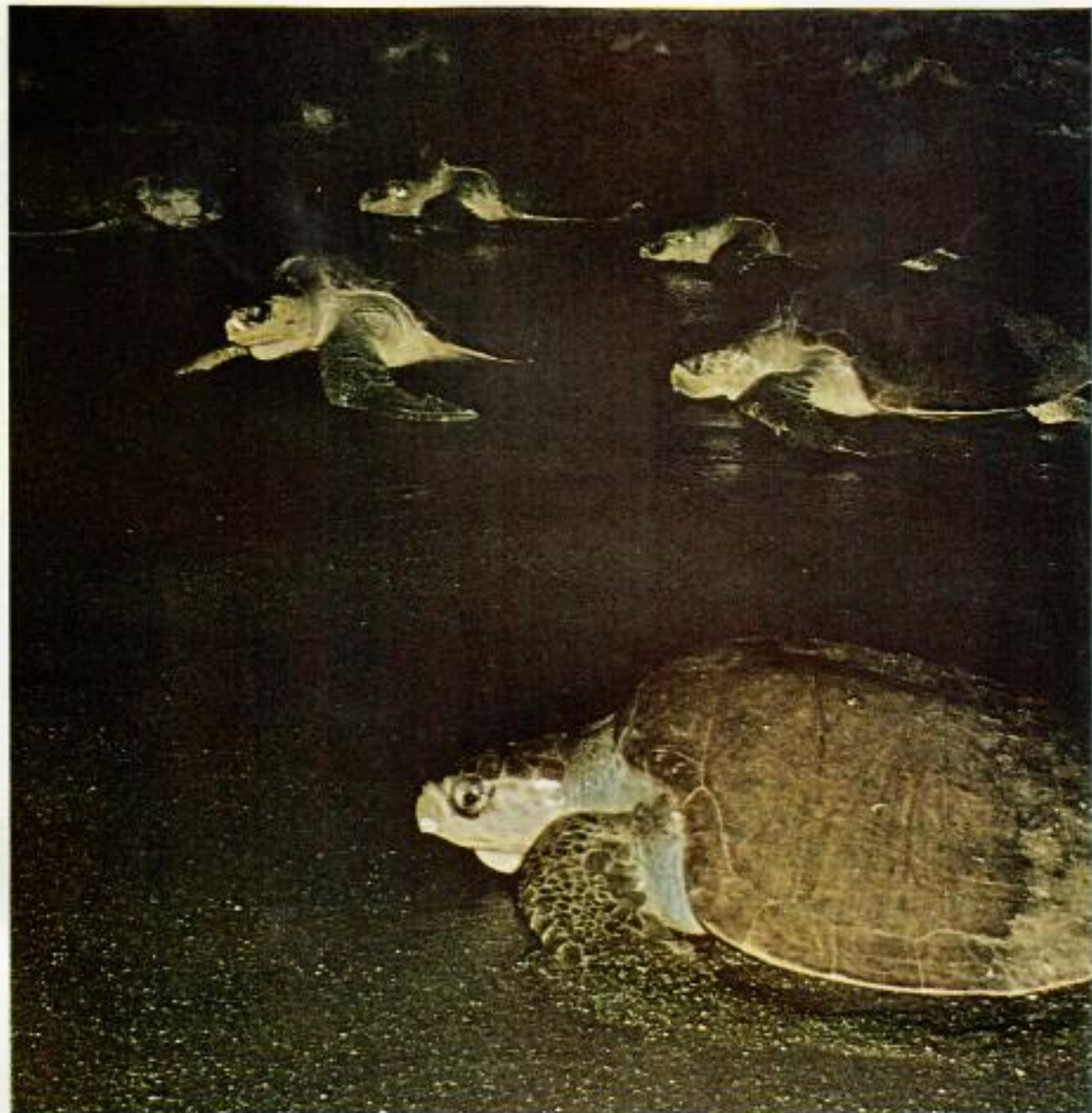
Ahead, several dozen black vultures suddenly erupted from the beach where they had huddled as if awaiting daybreak. Like evil omens they circled in silence, then plummeted

down and in winged fury sparred and fought for something on the sand.

When I sprinted to the spot, the vultures again took to the air. Now I could see their prey: leathery slate-gray bits scarcely bigger than silver dollars—newly hatched Pacific ridley turtles. I counted eight dead. Four were still alive, churning the sand with their untaught flippers in a desperate effort to gain the cover of the sea. I picked up one of the

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Vanguard of an incredible annual invasion, Pacific ridley turtles come ashore on Costa Rica's Ostional Beach. In a few



Turtle Beach

lifeless infants, decapitated cleanly as though by a 16th-century headsman. The seven others had been just as neatly beheaded by scissors-sharp beaks.

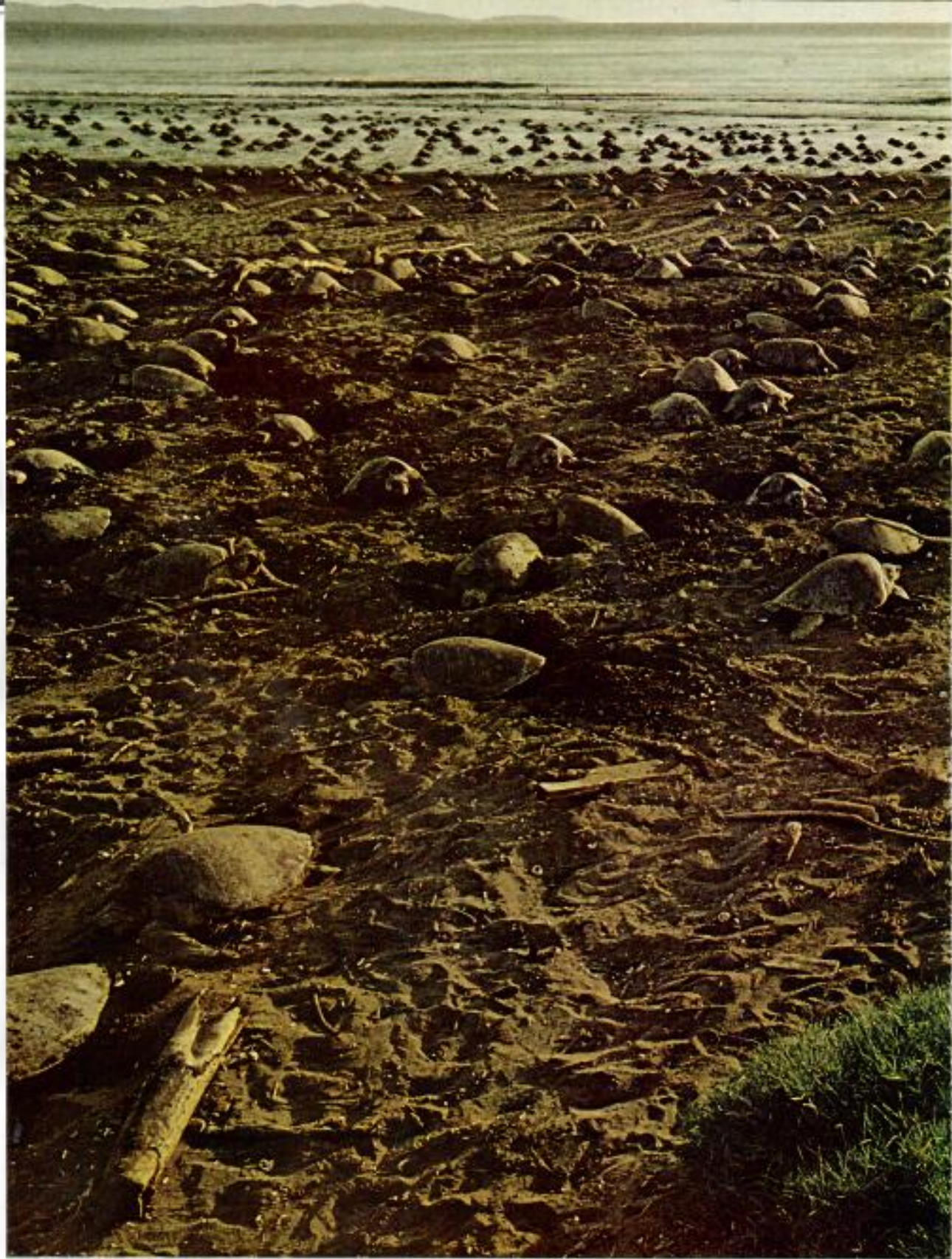
"Not more than one in a hundred makes it to the water," commented Dan McDuffie, who was also combing the beach. His hands held half a dozen live hatchlings. Tossing them into the surf, he added grimly: "At least the vultures won't get these."

Early every morning Dan and his wife, Joan, hiked this half-mile stretch of sand, recording the number of tracks left by female turtles that might have come ashore under cover of darkness to deposit their eggs. Dan and Joan are Peace Corps Volunteers assigned to aid in the University of Costa Rica's study of the Pacific ridley turtle (*Lepidochelys olivacea*), a species quite distinct from such other—and better-known—sea turtles as the

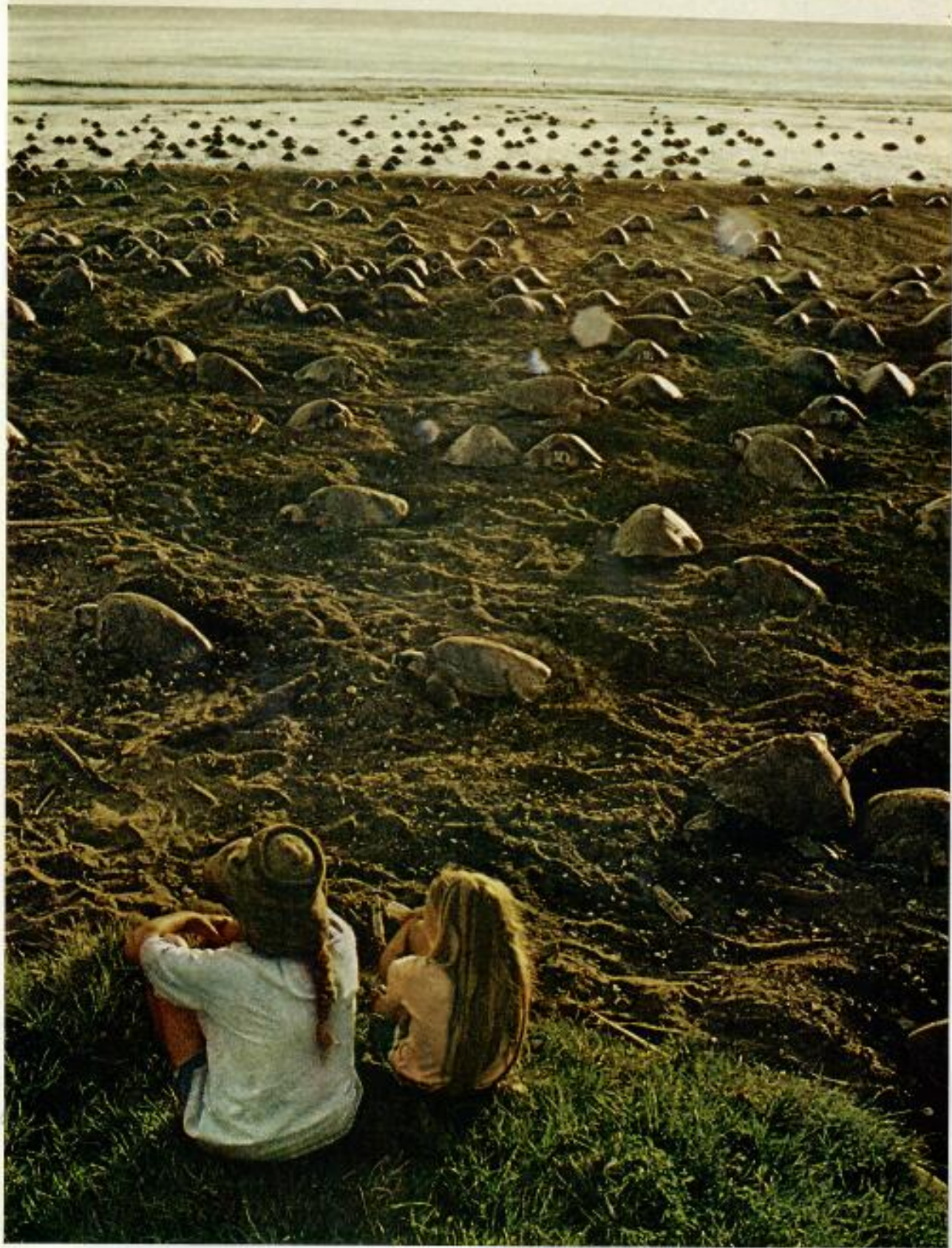
days tens of thousands will emerge from the sea, march beyond the surf's reach, and lay their eggs. The *arribada*—"arrival"—is one of nature's most spectacular phenomena.

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Like water-worn boulders, female ridleys swarm over Nancite Beach, Costa Rica, in a rare daylight appearance. Intent on their egg-laying mission, they ignore human spectators. No one knows why such



DAVID A. HUGHES

awesome throngs blanket only a few of the world's most isolated beaches. Even the name ridley is a puzzle. "Ridley" or "ridler" was first applied to a related Atlantic species by Gulf Coast shrimp fishermen.

hawksbill, loggerhead, leatherback, and green.

Among these great turtles of the sea, the handsome olive-green Pacific ridley remains a mystery. It may be a migratory species, but no one is sure where it comes from—or goes. It is native to widely separated reaches of the Pacific, Indian, and Atlantic Oceans.

A mature specimen, with a shell measuring as much as 30 inches in length, may weigh 100 pounds. We can only guess at its life-span—perhaps as long as a man's. Little is known of its mating or other habits. And, curiously, no one has yet reported finding a young Pacific ridley after it has hatched and slipped into the sea.

But the most dramatic riddle of the ridley is its custom of visiting a few traditional beaches en masse during the latter half of the year to nest. Relatively few humans along the coast, from Chile to lower California, have ever witnessed this awesome spectacle: wave after wave of big, gravid female turtles emerging from the surf—ten, twenty, even thirty thousand in a night.

It was this phenomenon, called an *arribada*, or "arrival," that I had come to Costa Rica's Ostional Beach to see (map, opposite).

On the bulletin board at the turtle-watchers'

camp I read the daily log. Between October 8 and 12, no turtles had come ashore. On the 12th, eight sets of tracks appeared where females had plodded up to the soft, deep sand above the high-water mark, dug their nesting holes, and released their loads of as many as 120 eggs each. Mating had occurred at sea; the males rarely if ever accompany the females ashore. Each morning the number of tracks grew: On the 13th of October, 26 were found; on the 15th, 116.

Waiting's Easy on Ostional

"I guess we can expect an *arribada* any day," said Dr. Douglas Robinson, associate professor of biology at the University of Costa Rica, in charge of the turtle study.

Doug told me that the last *arribada* on this beach had occurred in late September. The next? One could only guess. Moon, tide, weather, a built-in urge, a biological clock—any and all may be factors triggering the mass landing. "Who knows?" Doug teased me. "You may have to sit on this beach for another month or two!"

I didn't mind that prospect at all. The camp quarters overlooked the sandy beach—and spectacular Pacific sunsets. There were

Topsy-turvy ridleys lie helpless on Ostional Beach the morning after the melee of an *arribada*. Upended by tumbling over a timber and unable to right themselves, these adults await the coming of high tide or a friendly passerby—with luck, before the sun gets too hot.



cots and hammocks, and Joan McDuffie knew how to cook rice and beans in the best Costa Rican style. One night she served up savory iguana steak. Gaudy parrots and hoarse-voiced howler monkeys enlivened the shoreline jungle. All of us, including two student aides, spent each balmy day in shorts, and quickly forgot the meaning of shoes. The prospect of waiting was hardly depressing.

Darwin would have savored this place, I thought more than once as the days slipped by. Here occurs a struggle for survival that is seldom matched anywhere else. First there is the competition for egg space; then the embryos must survive an incubation period of some 65 days beneath the sand. The hatchlings must then escape waiting predators on the perilous trek from nest to surf. Once the sea is attained, they must elude sharks, groupers, snappers, and barracuda.

The survival odds from egg to adult are perhaps less than one in a thousand. But that seems to be enough, for adults reappear each year in undiminished numbers.

The grayish lava sand of Ostional Beach slopes gently into a sea wild one hour with crashing breakers, placid the next. Inland rises a swampy jungle—cover for hundreds

of rapacious vultures, and also for egrets, spoonbills, and herons. At the high-water line lie untidy heaps of logs and other flotsam. Yet the distinctive debris of this beach is not paper plates or pop bottles, but thousands of small white leathery fragments—the broken husks of turtle eggs that have fallen prey to vultures, raccoons, crabs, and even domestic pigs and dogs.

Pigs and Poultry Relish Ridley Eggs

One morning on the beach I followed a farmer from a nearby village. With his son, his dogs, and a cart, he was clearly bent on egg collecting. Once in the egg-laying arena, he shoveled away a little surface sand, then his hands took over. "*Huevos de tortuga*," the man said with a grin, displaying a handful of white eggs the size of Ping-Pong balls. He tossed them into the cart.

Even though there had been no recent arribada, he unearthed at least 500 eggs within an hour—some from the previous night, others weeks old. Finally the cart was full, and the boy strained to pull it off the beach, past a cemetery where simple wooden crosses leaned, then down a picturesque lane.

I followed the party to a little farm, where sounds in the wallow seemed to anticipate breakfast. Pigs, hens, ducks, and turkeys joined in a noisy welcome as the boy began tossing turtle eggs into the muddy yard. Within minutes pigs and poultry finished off the feast, leaving only shredded husks.

The sight was in a way appalling, but I knew that it was part of the local economy. Never once did I see a native harm an adult turtle, for he knows that the big ones provide nutritious eggs for his livestock. By contrast, it is said that in times past on some beaches of Mexico's Pacific and Gulf Coasts multitudes of ridleys were butchered for their meat, leather, and oil.

Next morning the man and his son were back on the beach, along with a dozen or so other teams. This time each led a sow. Powerful snouts emitted eager grunts as the pigs uncovered and did away with hundreds of eggs. Village dogs competed for those overlooked by the pigs; vultures and crabs snatched and snipped whenever possible.

Willy Navarro, a student from the University of Costa Rica, showed me another hazard ridley pre-hatchlings must withstand. "Long before the vultures, pigs, or dogs get their chance, fungi and bacteria make inroads,

Pacific shores of Mexico and Costa Rica harbor the massive arribadas of the ridleys. The species also nests in tropical regions of the Pacific, Atlantic, and Indian Oceans.





Ensuring a new generation, a ridley drops leathery-shelled eggs (left), each roughly $1\frac{1}{2}$ inches across, into a pit dug with her hind flippers. She deposits about 120 eggs, fills the nest with sand, then tamps and camouflages it. Leaving her brood in nature's care, she returns to the sea an hour after touching shore.

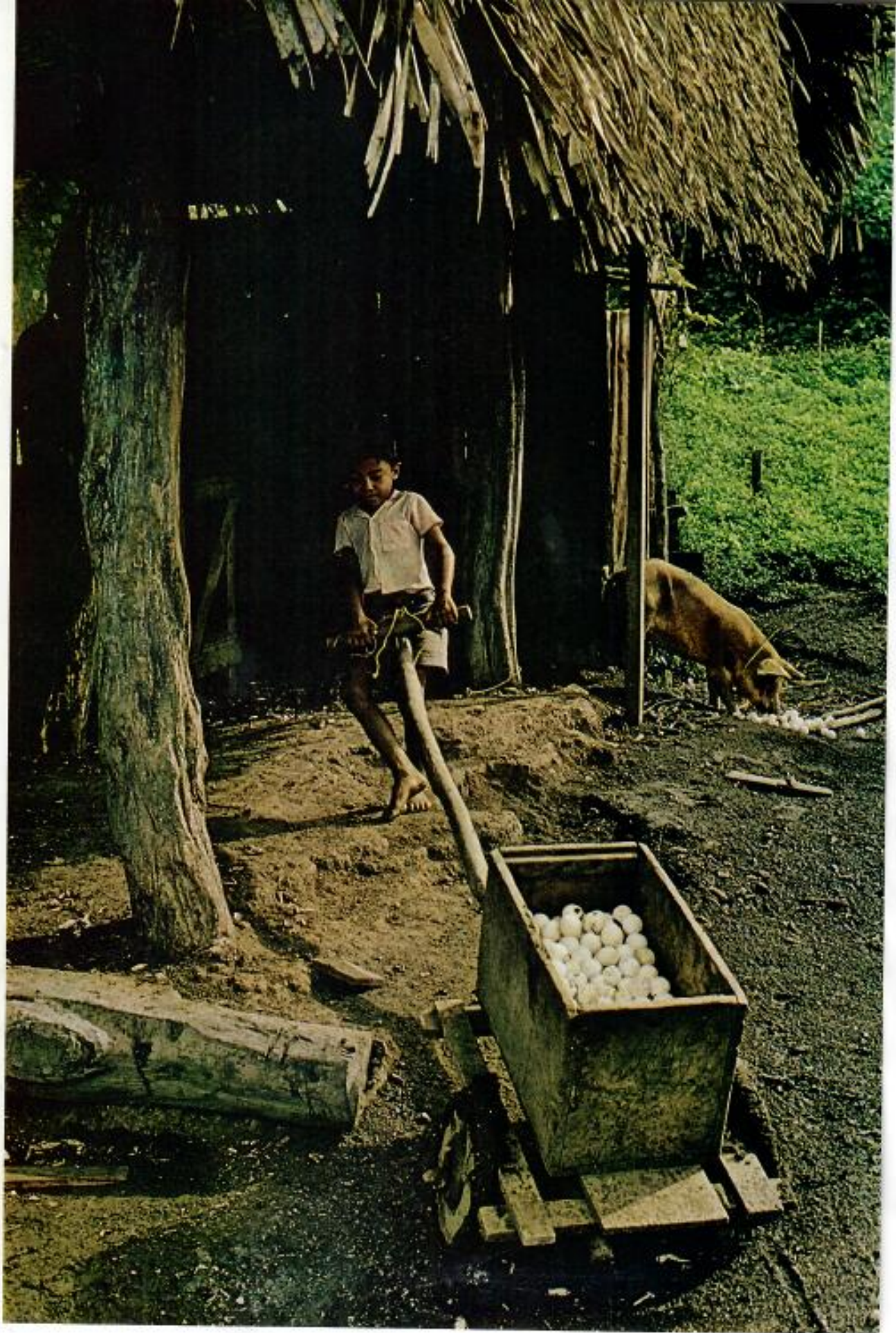
But the female's gifts to the future face many enemies. Lethal microbes and yolk-damaging salt water may invade the permeable shells. Other turtles, seeking havens for their own eggs, accidentally



excavate those laid previously. Hungry pigs and dogs root up the eggs for food.

Men also hunt the caches, locating them by pushing a slim stick into the sand until it comes up yellow (above), then mine them as a source of much-needed protein for livestock (right). Beach residents never harm adult turtles and rarely eat the eggs; commercial exploitation is outlawed. But poaching occurs, for numerous Costa Rican cantinas serve turtle eggs, considered an aphrodisiac by many Latin Americans.

Eggs left uncovered by men, pigs, and dogs may feed some two thousand black vultures (left) that patrol Ostional.



especially if the sand is either too wet or too dry," he said. He scissored open an egg, revealing a dead embryo. Ugly blue-green streaks showed that its tissues had been attacked by insidious microorganisms. Willy collected a number of infected eggs for analysis in the university laboratory.

We still had not witnessed an arribada, but a few turtles came ashore each night, keeping the biologists busy. Undergraduate Bill Stewart had been assigned to aid the Peace Corps people. In the dark he and his associate Oliver Daniren stalked the beach with scales and oversize calipers. Object: to measure the precise length, breadth, and weight of the egg-laying turtles. They also recorded the sizes and numbers of eggs the turtles deposited.

"That's only one of our procedures," Doug said. "We want to learn more about ridley movements too, so we've started tagging."

Turtle tagging also takes place about 50 miles up the coast at Nancite, another site of the phenomenal ridley arribadas. In 1971 Dr. David A. Hughes, working there under a

research grant from the National Geographic Society, wrote: "I estimate, I think conservatively, that no fewer than 120,000 nested over a four-day period. The experience of being among such a horde of clumsy, heaving, panting, digging creatures on a dark night is almost indescribable. Vast arrays of them nest shoulder-to-shoulder in the crush, and are continually crawling over each other."

Later one night on Ostional Beach I watched Dan McDuffie tag a big ridley on her nest. With one knee firmly planted on the broad, rock-hard carapace, he clamped a conspicuous metal tag onto a front flipper with heavy pliers (bottom).

She lay stonily indifferent, as if in a trance. I swept my flashlight beam over her head, from which mournful eyes gazed transfixed, then rearward. Her tail sloped into a foot-deep hole she had dug with her two back flippers, acting almost like hands.

As I watched, her neck tautened and she began to strain. Her mouth gaped as if to shriek, but there was no sound except that of dropping eggs and perhaps the suggestion

Turtle-man of Ostional, biologist Dr. Douglas Robinson (below) rights a female he found upside down. Assistant Bill Stewart (right) weighs eggs to correlate their size with that of the mother. Peace Corps Volunteer Dan McDuffie (lower right) fixes a metal tag to a front flipper. Tagging may help answer such questions as where ridleys go after egg laying and how often they nest.



of a sigh to punctuate the fulfillment of the creative process. There was more straining, more apparent agonizing, more eggs released, then again the easeful lull. All this while tears streamed from those great eyes, but they had nothing whatever to do with pain or sentiment. Lacrimal glands enable the sea turtle to rid itself of excess body salts.

Spasmodically the large female forced out eggs, one, three, or even five between pauses. The entire event lasted for a good half-hour, leaving more than a hundred eggs at the bottom of the hole.

Finally, after a brief rest, the matriarch stirred as if waking from a deep sleep. Rear flippers began to slash, raking sand over the nest and its cache. When the hole was filled, the turtle raised herself high on all four flippers and suddenly allowed the full mass of her hundred pounds to drop, the plastron, or lower shell, acting as a platterlike pile driver. Again and again she stretched upward and dropped heavily, until the nest site was firmly packed and essentially invisible.

With not so much as a farewell glance at her bassinet, the ponderous turtle turned and plodded implacably seaward, leaving tracks on the sand somewhat like those of a tank.

Within a few minutes the creature was awash in the rollers and swallowed up by the sea. Neither eggs nor hatchlings would ever experience the concern or protection of maternal care.

Action Begins at Midnight

There were perhaps 50 egg-laying turtles on the beach that night. What a feeble demonstration compared to a week later!

About midnight I was awakened by excited voices and activities outside. Dan McDuffie, who had been patrolling the beach, was yelling, "Arribada . . . arribada!"

I leaped up, groped for my flashlight, and raced with my friends down the dark trail to the shore. In the pitch blackness my dim light failed to warn me of frontline turtles moving up on the sands. Crash! I slammed into them, heels flying wildly over my head, and my right shoulder crunched hard against one of the lumbering tanks. Unaware of my fall, my friends kept running.

I lay on the sand gasping, the wind knocked out of me. Survival suddenly seemed an issue as my feeble torch revealed a grim face and ominous armor inexorably plowing toward me, a couple of feet away.

Obviously the big turtle was not going to change her course. I rolled aside and regained my feet, dancing a jig to avoid a dozen others coming on immediately behind her.

Rubbing my bruised shoulder, I pushed on through the blackness where crawling colossuses were so numerous that I had to jump over, zigzag between, plunge through them. No flashlight could begin to reveal the vastness of the onslaught.

Beachhead Secured, Invaders Dig In

Finally I caught up with Doug. He was panting, too. "Thousands here already," he gasped, "... hundreds more coming out of the sea every minute!"

On and on they came, pushing aside driftwood near the high-water mark. There the thrust slowed, as one after another selected nesting spots in the sand.

We were wildly busy. The McDuffies raced from one turtle to the next, searching for tags affixed during an earlier arribada. Doug was counting turtles in a preselected area so that he might calculate the total magnitude of the foray; he estimated the horde at 7,400. Bill and Oliver were collecting eggs for measurement and weighing. And I was trying to make photographs.

Then a downpour began, pelting, splashing, drenching us, in best tropical style. I have a vivid memory of thousands of glistening carapaces each time my electronic flash went off. Finally my lighting gear, totally soaked, shorted out.

Six soggy turtle-watchers made for an abandoned thatched hut somewhat higher on the beach, where we huddled while the rain continued to pound. There was little talk. We felt tremors as one oncoming turtle after another careened against the little hut. I stepped outside for a second, sweeping the beam of my flashlight back and forth, and saw an army of ponderous shapes everywhere, one almost blocking the hut's entrance.

By dawn the rain had stopped, and I was again on the beach. Talk about Dunkirk or D-Day! The beach was a shambles. The invaders had vanished, but every square inch of sand was laced with their tracks. Unseen under the surface lay a new generation of ridley turtles, oblivious of the hostile world waiting above.

Actually, not quite all the turtles were gone. A scattered few lay flat on their backs, helpless, having been overturned during the



night's melee. They lay there vainly stretching necks and flippers, unable to right themselves until the next high tide (page 574). I recalled stories of sailing-ship mariners capturing giant turtles and placing them upside down in the hold, where they would stay alive for months, a ready source of fresh meat. We righted those we found, and they lumbered back into the sea.

By the time the sun was up, the picture had reverted, for there again were those bands of brooding vultures, and a little later the human egg gatherers with their pigs, dogs, groping hands, and carts (pages 576-7).



Racing for their lives, newly hatched Pacific ridleys churn toward the sea on a course fraught with danger. They risk ambush by ghost crabs and aerial attack by vultures. Emerging from the sand (top) after about ten weeks of incubation, the youngsters measure barely two inches in length. Instinctively they turn and begin their frantic drive for the water. If they make it, they flipper away into the ocean's vastness, only to face sharks, groupers, and other hunters of the sea. But at least one predator—man—will not see the turtles again for perhaps five to seven years. Then mature females, having overcome incalculable odds, will mate at sea and mysteriously find their way back to land.

My friends at camp were busy recording observations and figures: the date and magnitude of the invasion; conditions of tide, moon, and weather; the number of tags sighted and affixed. By the fourth and concluding day, some 50,000 turtles had come ashore, I learned later; only two were found that had been previously tagged.

The study at Ostional Beach had begun two months earlier and would continue for another ten, perhaps longer—and even then mysteries would persist.

Where do the turtles come from—and where do they go? What forces draw them

in such vast numbers? How and when do they mate? How many times does a single female come ashore during the egg-laying period? What is the exact survival ratio between eggs and adults? Is the Pacific ridley turtle an endangered species? Only time and further study would provide the answers to such intriguing questions.

As for me, my wait was over. Within a few days I was back in San José, of whose quarter-million inhabitants perhaps only a score have ever seen, or even heard of, one of their country's great natural happenings—an arribada. □

