

Where birds soar and turtles nest

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An expedition to Aves Island

Story by Jean Thurston / with photographs by William E. Rainey

PERHAPS A SPARKLE, definitely a glow, that tiny speck of sand, a soft golden glow across turbulent deep blue water in the pale August morning light: our first sight of Aves Island, craning our necks from *Allanora's* rigging. "You'll see it slightly to port," the skipper had told us at dawn. Sure enough, at last we see the distant bright spot of sand, to be our home for a month while we study the diminishing population of Atlantic green sea turtles, *Chelonia mydas*, which nest there from July to November each year.

A mere five hundred yards long and shaped roughly like a footprint, the Venezuelan island of Aves lies 180 miles south of St. Thomas, U.S. Virgin Islands, and 120 miles west of Dominica, West Indies, in the heart of the eastern Caribbean. Island of birds, named for its dense colonies of noddy and sooty terns, this remote sandspit is the main eastern Caribbean nesting site of the giant greens. Long ago island lore rumored its beaches were crawling with turtles, thousands upon thousands each season, tempting men with small native schooners to match navigational skill against storms and currents to reach the elusive islet, visible only within two miles, and capture vulnerable turtles by the hundreds as they emerged to nest. Many boats did reach the island; many returned again and again to plunder, and in exchange for cargoes of delectable meat, eggs, and calipee, their skippers walked away rich men.

In recent years, Venezuelan conservationists have become increasingly alarmed by these continuing illegal predations, which threaten to completely obliterate the Aves turtle population within the next few years. Our present expedition, in cooperation with the Venezuelan government and supported by the Explorers Club, the Dave Hokin Foundation, and the Island Resources Foundation of St. Thomas, has these goals: to tag as many greens as possible for migrational tracking; to study nesting behavior; to obtain data on individuals including size, weight, and coloration; to collect blood samples for studies of ge-

netic variation; and to estimate the size of the present remaining population. We will conduct our studies with as little disruption to the tiny island ecosystem as possible.

The trip to Aves aboard the Hokin Foundation's 72-foot ketch takes only 28 hours from Virgin Gorda, British West Indies, where we spend an impatient four days at anchor waiting for rough weather to clear sufficiently to make a landing on the island possible. We finally arrive on August 13, in the heart of the hurricane season, height of the nesting season for greens. Should a hurricane hit, the entire island could disappear beneath crashing seas. But no hurricane has struck here in 120 years; we consider the risk small.

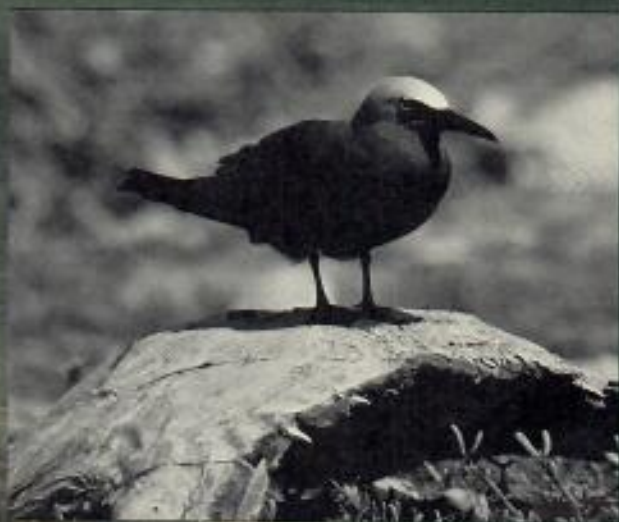
Allanora is anchored well out to lee of the island. The weather has cleared but a heavy swell rolls from the south. The beach is steep; unloading our mountain of precious gear by dinghy, wading through the surge on shore, takes a long time. With the poor anchorage, our skipper is anxious to be off. By four o'clock the ketch departs; we are alone on the beach at Aves. Our group is small: Bill Rainey, biologist and turtle specialist of the Island Resources Foundation, who headed two brief reconnaissance expeditions to Aves in July and November of 1971; his wife Suzan, technician; Jim Williams, marine biochemist; Carl Pechman, a marine biology student at Cornell; Jean Thurston, journalist. All of us will share in the work with the turtles.

Despite a steady wind, the afternoon sun is excruciating. We perch on a pile of tents and tarps, break out a can of fruit juice, and take stock of our new surroundings. From where we sit at the mid-section, a narrow neck of sand, almost all of the island is visible. All is sand: to the north, the main tern colony, an area of compacted sand and guano; just south of this, a large vivid green patch of so-called "survival weed," *Sesuvium portulacastrum*, a hardy beach succulent capping the sand; to the south, more sand, a smaller tern colony, a smaller patch of survival weed. To the east, or

weather side, the surf is broken by "beach rock" into an area of tide pools bordering the beach. Before us, to the west, lie the calmer waters of the lee side, a pale-blue arc of the warm, transparent Caribbean. Half a mile out the island shelf ends, and the dark smoky blue of deep sea stretches to the horizon in every direction. All about us the luxuriant white sand is pitted and pocked like craters of the moon with nest pits. Everywhere are the unmistakable tracks, churning up and down the beach like the tread-marks of some strange and awesome tractor. We exchange knowing grins. No doubt about it: the turtles are here.

Our shadows grow long; we hasten to make camp. Bill directs us to the large area of survival weed to the north, on the edge of the bird colony. This is the highest part of the island and the least accessible to storm-driven waves. Last November when he was here, the entire center section of Aves was washed over. There is no fresh water; we have brought four barrels and a hope for rain.

As we pitch our tents, the birds return to Aves from their day of fishing at sea. By the thousands they blanket the colony, bobbing and fluttering. The air resounds with their elated calls. Suddenly more terns arrive—and zero in on us. With outraged screeches they swoop down, thrashing their wings just above our heads, circling and diving in an attempt to frighten us off. Our campsite, unfortunately, is the territory of a group of noddy terns, now justly furious at the intrusion. Gradually, as evening approaches, some of the birds settle with disgruntled squawks on the fringes of the camp. Others continue to whirl through it at top speed, emitting a weird portentous buzzing noise like the ominous roar of a bomber squadron; we hastily protect our heads with hats and scarves. It has been an exhausting day; fatigue swirls in my head like the screeching phantoms still circling, invisible now in the darkness. But the excitement of the night's activities ahead keeps me alert: it is time to go look for turtles.



(ABOVE, LEFT)
NODDY TERN WITH
EGG. WHITE BITS
OF CORAL AND
SHELL MARK THE
NEST IN THE
SURVIVAL WEED.
(ABOVE, RIGHT) A
NODDY TERN RESTS
ON THE SUN-
BLEACHED REMAINS
OF A TURTLE'S
CARAPACE.
(BELOW) THE MAIN
TERN COLONY OF
AVES ISLAND, WITH
SOOTY TERNS IN
FLIGHT.

ATLANTIC GREEN
SEA TURTLE,
CHELONIA MYDAS,
ASHORE ON AVES
ISLAND.



"We think a turtle always returns to mate and nest at the beach from which she emerged years before as a hatchling."

Using no lights, we cautiously proceed down the dim beach. It is impossible to avoid stumbling into old nest pits as we move along just above the high-tide mark, straining to see fresh tracks or the dark hump of an emerging turtle, listening for the sounds of nest-making. As we approach the tern colony, startled birds fly up screeching, confused and alarmed in the darkness. The moon rises, a pale but welcome arc of light, vaguely illuminating the nest pits and shore. The Aves greens, Bill tells us quietly, seem to be more skittish than those which nest at some other localities, and they are markedly larger than the turtles of the Tortuguero, Costa Rica, aggregation. We think a turtle always returns to mate and nest at the beach from which she emerged years before as a hatchling. Thus, the population of each nesting area is distinct, and genetic differences may have resulted from this isolation. Where the hatchlings go when they leave Aves, where the mature turtles come from to reach Aves, and where they go when they leave after nesting no one knows. Our current study, particularly the tags and blood samples, should give us some clues.

The work with each turtle will be time-consuming, and to spend an hour on an individual now might mean missing several others farther down the beach. Tonight we will flip the turtles on their backs, returning to them in the early morning. Out of water, gravity weighs heavily on the animal, whose muscles are adapted for swimming, not for moving her body weight on land. Turned over, she is immobilized; the night out of water in the cool moist air will not harm her.

Bill stops abruptly and conversation ceases. He points far down the beach, where a barely discernible dark shape is emerging from the surf, moonlight glinting on the wet carapace: our first turtle. We crouch in the sand, motionless, as she slowly pulls herself up the beach. Approaching her now could easily frighten her back to sea, Bill whispers. Better to wait until she begins to lay; we can return to her later. Farther along, at the south tip of the island, a turtle has just finished laying. With her paddle-shaped rear flippers she carefully seals the egg chamber with moist sand, tamping and filling with a side-to-side motion. She conceals the nest with great sprays of sand from her fore flippers, gouging the beach before her and hurling it back. She pauses to rest, and her body trembles

with a gasping sigh. Her great eyes blink, half-blinded by the streams of glittering mucus which keep them moist and carry away salt and sand. As she heaves herself out of the nest pit, we quickly approach. Too exhausted to move rapidly, she is still extremely strong. Jim takes her right flipper and holds it firmly over her head to prevent its dangerous slashing. The rest of us grab the right edge of her shell. "Now, heave!" Bill grunts, and over she goes, waving her flippers helplessly, lashing the air. Sorry, old girl. As if the strain of nesting were not enough. With another great shuddering sigh, she relaxes. She will live, to swim again, and nest again—hopefully, for many years. Her ancestors nested here, or on similar beaches, when ours still swung in trees. Did the species persist so long only to die out now, smoked condiment on a rich man's table, a gourmet soup? Turning our faces to the cool night wind, we move on. By midnight, fifteen turtles are turned. Exhausted but elated, we return to camp.

Sorting the jumble of cameras and equipment in the tents will be tomorrow's task. For now, Carl, Jim, and I stretch sleeping bags on the cool, springy survival weed while Bill, muttering something about "ticks," heads with Suzan for a cluttered tent. At dawn a brief rain stirs me and I waken to the chorus of the birds. All about me are the noddies, preening moist feathers. As I begin to move they fly up with squawks, settling again beyond camp. Bill was right about the ticks: soft ticks, brought here by birds—the bedding is full of them, my arms and legs covered with small, very itchy welts. Suddenly a mound of damp sand and weed nearby shudders and rises, and Carl emerges, shaking sand from bedding and hair. "You won't believe this, but last night a turtle tried to crawl in my sleeping bag!" A green, it turned out, had blundered into camp in the night and chose to nest beside a small hill. She had begun gouging into the sand—but beat a hasty retreat when the "hill" awoke and began to yelp!

Already, Jim and Bill are setting up the radio equipment, and the morning's activities begin, as they will from now on, with the whirring throb of the generator and Bill's voice, "This is Aves Island, do you read me, over?" The Venezuelans have allowed us two radio contacts a day with St. Croix, morning and afternoon, for emergency communication and weather reports. Before

breakfast, we attend to the turtles. The weighing is accomplished by means of a tripod of heavy galvanized pipe erected over the turned turtle. A sturdy webbing is stretched beneath the animal and buckled to a central ring over her plastron, or ventral side of the shell. Hoisted by block and tackle, she is then lowered onto a tension scale. After weighing, her plastron and carapace, or dorsal side of the shell, are measured, her condition and coloration noted, and her right flipper then tagged with a numbered, corrosion-free monel tag of the type generally used as cattle ear tags. The tags were provided by Dr. Archie Carr of the University of Florida, who has successfully used them for nearly twenty years to track the migratory movements of the Tortuguero population. Each tag is printed with return-reward information; a five-dollar reward provides some inducement to fishermen to return the data.

Initially, Bill attempts blood sampling by heart puncture, a harmless but difficult process with a 400-pound animal. But the precious blood preservative en route from California did not reach us before departure from St. Thomas, and the few samples he is able to obtain spoil in the fickle freezing unit of our tiny kerosene refrigerator. With dubious storage, the blood sampling program is temporarily abandoned; an airdrop of preservative may be possible later in the month. Tagged and tallied, the turtle is turned back onto her belly and sloshed with salt water; she returns to the sea.

Turtle studies over for the morning, we return to camp to enjoy a hearty breakfast and watch our neighbors, the birds. The colony is a constant source of fascination. Terns comprise the majority of the population. The sooty terns, small vivacious birds beautifully patterned in brilliant black and white, occupy the largest area of compacted sand north of camp, a barren, wind-swept flat studded with twisted brown gorgonian stalks and sun-bleached coral "rocks" worn to a shiny polish by the constant prodding of generations of webbed feet. Fringing the sooties and intermingling peaceably are the lovely and comical noddy terns, plump charcoal-colored birds with white foreheads, named for their frequent curious ritual of bowing to each other. The noddies prefer the rough coral rock jumbles on the weather side of the island and the areas of survival weed. In the center of the main colony, overlooking the other

birds like presiding royalty on a mound of coral rocks, is a small community of frigate birds. Late mornings, the terns fly off to sea and the crowded rookery is quiet and bare except for a few turnstones and the occasional sandpiper, picking and scurrying among the drifts of feathers and bones.

A captive audience by choice, we delight in following the daily activities of the island's inhabitants: our associates and, frequently, our roommates as well. A surprising number of crabs dwell on Aves. Least shy, the land hermit crabs, *Coenobita clypeatus*, are the first to take advantage of us. Whether from previous territorial association or not, camp becomes their headquarters. By day they disappear into the damp recesses beneath the edges of tents, under cases of canned goods, and in the folds of tarps. But evening's coolness—or perhaps the aromas of supper cooking?—rousts them forth by the hundreds, clanking shells and jostling one another as they congregate en masse beneath our picnic table, where they pick curiously at our toes and voraciously gobble up any morsels which happen to fall. After supper they march as one to the cook tent, there to scour the dishes, pots, and campstove to a fine shine, penalizing us on the evenings of little scavenge by munching the tops off spice tins and chewing gummed labels from bottles. Appetites abated, they occupy the rest of the night with the crab equivalent of a community social in and about the cook tent amid a din of scuffling and rattling audible from afar. Anyone intrepid enough to enter the tent for a midnight snack is obliged to shuffle feet to avoid being impaled upon scurrying shells. Less congenial but equally curious are the small red-and-purple land crabs, *Gecarcinus lateralis*, which delight in burrowing into sleeping bags, shoes, swim fins, etc., defending the chosen homesite with formidable claws. Ghost crabs, *Ocypode quadrata*, abound on the upper shore, dashing into their holes at our approach. At night, attracted to the lantern light, they edge into camp, or rush headlong into the bright campfire, darting out confused and unharmed in a cloud of ashes and coals.

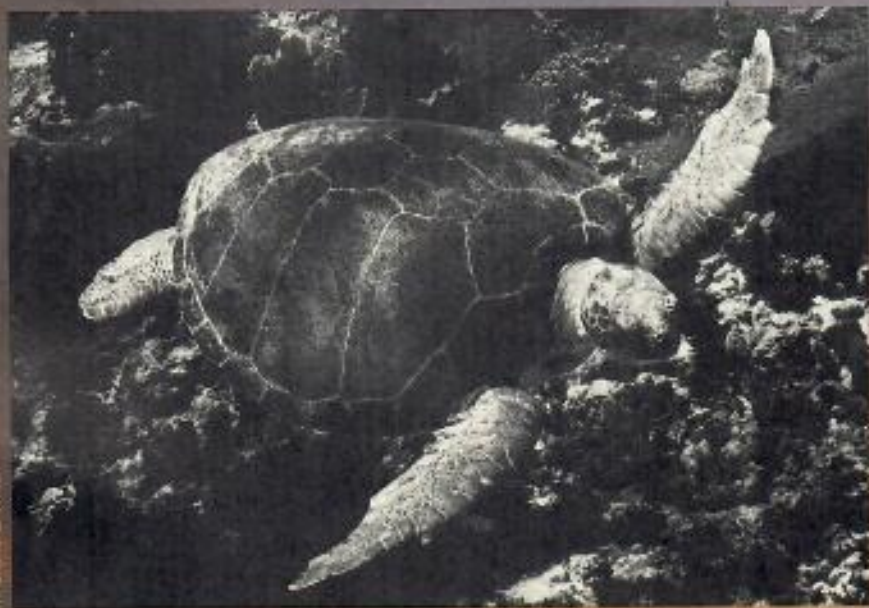
In the devastating midday heat, the sea provides entertainment and respite. To windward in the shallow tide pools dwells a school of about thirty gregarious palometas, *Trachinotus goodei*, which within days become so tame that they rush to greet us as we fling ourselves into

the cool seawater. In and out of our legs they swim, feather-light touches of sleek silvery bodies tickling against our flesh. Greedily they inspect our hands for the daily offerings of crumbs and leftovers. Beyond the tide pools, rows of breakers rush and foam, a constant background of exhilarating sound. Seldom is it calm enough to venture out to windward through the sweeping current and rip. For snorkeling, we choose the calmer arc of water to lee where the sandy bottom is interspersed with beach rock and coral clumps, bright sponges and lacy waving gorgonians. Among rocky ledges, grouper, snapper, and rock hind abound in water ten to thirty feet deep. Everywhere are the bulbous-cheeked black durgons, *Melichthys niger*, most common fish at Aves. Curiously, deepwater fishes are here: porpoise-nosed black jacks, *Caranx lugubris*, swim up to us in fifteen feet of water, and the plump ocean triggerfish, *Canthidermis sufflamen*, paddle lazily among the smaller reef fishes. Each venture into the water brings an encounter with great barracudas. At times, up to twenty are visible at once, ranging from two to five feet in length. They are quite curious—uncomfortably so. Frequently, with a twinge of paranoia, I turn in the water to find one suspended a foot or two over my head or following just behind my fins. Disconcerted, I wave my arms at him but he hangs there staring balefully, mouth agape with dazzling rows of needle-sharp teeth. Barracudas very seldom attack people, I keep reminding myself, but somehow these guys always look ominously hungry. When they begin to snoop too close, I clear out.

With the cool breeze of later afternoon we return to camp to relax and compare the day's discoveries: an exotic piece of driftwood, an unusual shell or insect. Gradually daylight fades into dusk; the island, a miniscule blotter of vastness, soaks color from a crimson sky and sea, turning white to gold, then rose. Now flamboyant, now austere, each sunset brings its own unique mood, variation on a timeless theme of clouds and colors. With the last shafts of sunlight, the birds return to the island. In twos and threes the sooties come from every direction, swooping low, then off again, far to the east. A thousand specks of pepper, they gather in a spiral, a great whirling column of birds in the darkening lavender sky. Then back they come, diving, climbing, peeling off in split formation, banking low

over the island, calling out above the beat of wings, infecting any stragglers on land with a sudden urge to join in the wild free-wheeling sport of evening. As darkness falls they settle onto the colony, chattering and shaking feathers, each bird in its place. Last to return are the noddies, gliding in low over the waves, dipping to catch a last fish.

Each evening we prepare to go turtling. The watch is split up to ease the nightly routine: three to go out shortly after dark until perhaps eleven o'clock; two then to go until about two A.M. or whenever the nesting dwindles. As the nights pass, we begin to learn more about the Aves turtles. Most of the turtles emerge to nest between eight o'clock and midnight. They frequently nest in pairs, the two congenial females coming up together and excavating side by side. The nesting procedure takes anywhere from forty minutes to an hour and a half. After excavating a large pit perhaps three feet deep with her strong front flippers, she scoops out the egg chamber with the short rear flippers, gently gouging and shaping a vertical cavity about one and a half feet deep below the body pit. Should she encounter rocks, should the site be too moist or too dry, she moves to another spot, usually a few yards farther down the beach, or she may go back into the surf and come ashore elsewhere. Sometimes, confused and disoriented by unsuccessful attempts or sheer exhaustion, a turtle may wander across the island and back, her travels revealed by an arduous pattern of weaving tracks. A sudden chorus of outraged cries tells that a turtle has had the misfortune to wander into the bird colony, to flail fruitlessly in the hard-packed crusty sand and rock and, eventually, move on. Should she encounter too many discouragements, or should we happen to disturb her too soon, a turtle often goes back to sea, warily to return many hours later or perhaps to wait for another night, depending on the urgency of her need to lay. Egg production does not cease; soon she must repeat the pattern: return to the beach to lay, go back to sea, return to lay again . . . and again . . . perhaps as many as eight clutches of eggs, spaced at intervals of about ten days. Then, for several years she goes elsewhere, roaming the seas to graze in shallow marine grass pastures. We know of no turtle grass at Aves; during the season of nesting, the turtles here probably do not feed. This year, she will return to sea bearing a small tag—who



Jesse Truitt



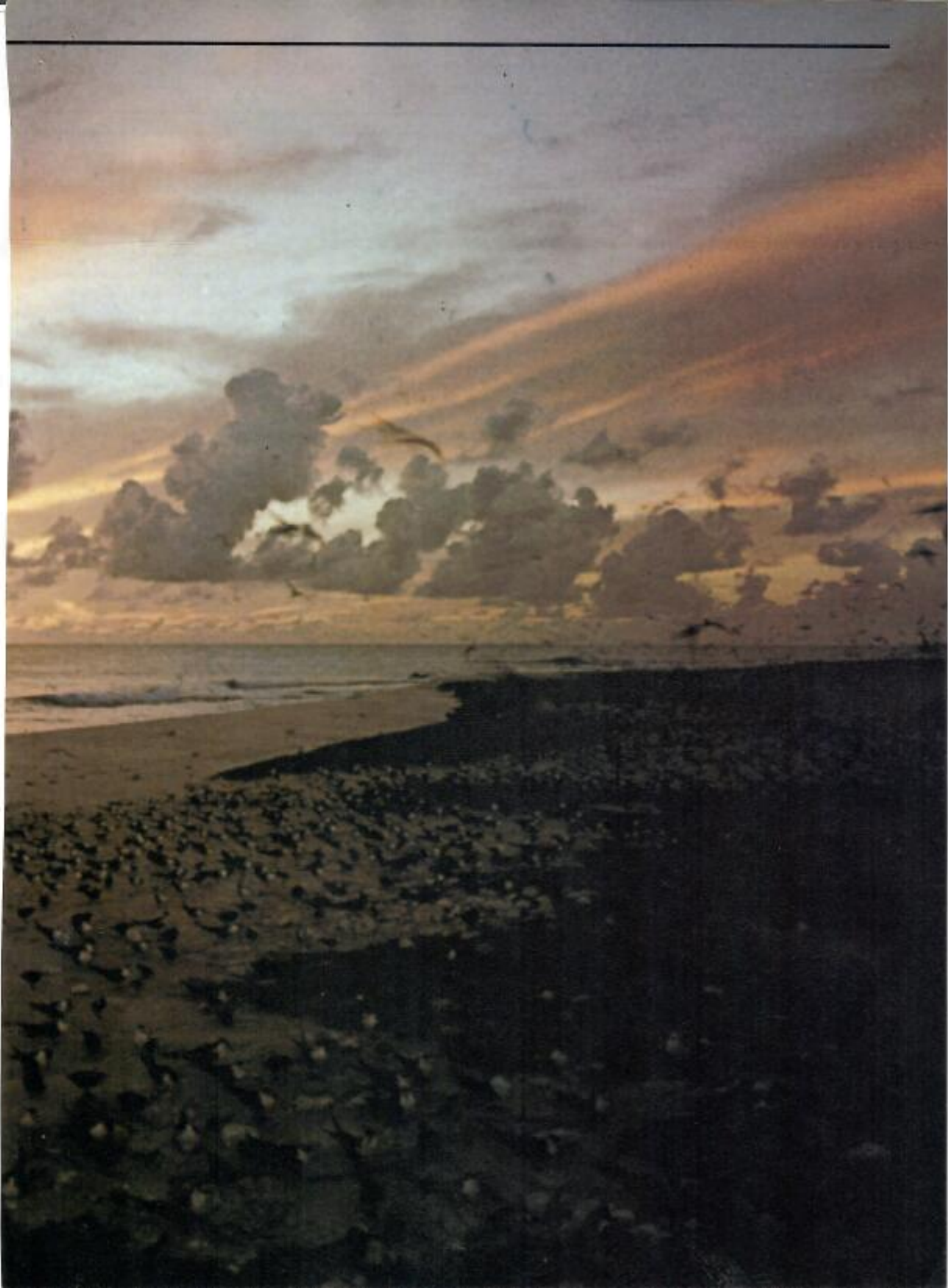
(ABOVE) ADULT FEMALE GREEN TURTLE, PHOTOGRAPHED IN ABOUT 70 FEET OF WATER TO WINDWARD OF AVES. DURING THE DAY THE TURTLES SEEM TO STAY CLOSE TO THE ISLAND, BUT AT SOME DISTANCE FROM SHORE. (BELOW, LEFT) SUZAN RAINEY INSPECTS AN EGG CAST OUT OF THE

SAND. DISTURBANCE TO THE EMBRYO AT THIS STAGE IS CRITICAL —THE EGG WILL NOT HATCH. THIS TURTLE IS DIGGING HER BODY PIT IN A NEST HOLE MADE BY AN EARLIER OCCUPANT. (BELOW, RIGHT) IN THE FINAL STAGE OF NESTING, A GREEN TURTLE FLINGS SAND BEHIND HER TO COVER THE NEST. THE TAG

NUMBER WAS SPRAYED ON HER CARAPACE EARLIER IN THE EVENING TO AID IN IDENTIFICATION WITHOUT DISTURBING THE ANIMAL A SECOND TIME. A NIGHT PHOTOGRAPH.

SUNSET OVER THE NORTHWEST BIRD COLONY; SOOTY TERNS SETTling FOR THE NIGHT.





“... A peaceful pattern of labor and rest, wake and sleep, togetherness and solitude.”

will read it, and where? Or will she be a lucky one, shunning the nets and harpoons of man, the jaws of sharks, to return unerringly to Aves in perhaps three years to nest, and nest again?

Tonight I have the early watch with Suzan and Bill. I dress lightly for the warm night and strenuous activity ahead, but wear sturdy high-topped shoes to protect my feet from rocks, sharp gorgonian stalks, and flipper cuts. We wait about an hour after dark to give the first turtles a chance to begin nesting undisturbed. Then, armed with penlights and data sheets, we set off across the powdery sand amid a flurry of birds and crabs. It is a dark, overcast night. Near camp, at the edge of the survival weed, a sudden geyser of sand betrays a turtle just beginning her nest. She continues, engrossed, as we creep silently past. At the south end of the island two turtles are emerging from the surf but the beach is unoccupied; we return to the turtle near camp. Now all is silent; she has begun to lay. On hands and knees Bill crawls up behind her. With his penlight he checks the egg chamber, probing gently between her rear flippers, lying on his stomach to avoid caving in the nest. Shiny-moist, pale pink in the dim light, the first eggs fall softly to the bottom of the chamber. Putting out the light, Bill reaches beneath her, intercepting the eggs as they emerge then releasing them into the pit, counting. Twenty minutes later, the egg chamber is full. He lifts out a few and I take them, soft-shelled leathery rounds, still warm, smelling strangely of leaf mold, damp roots. Bill sits up, brushing sand from his shirt. There are 154 eggs: a large clutch. Suzan wraps the sample of eggs carefully to take back to camp; these she will weigh and measure. Brief handling does not injure the eggs at this stage. After the weighing, they will be placed in a simulated nest.

In roughly fifty days the eggs will hatch into a dark, moist, sandy world, two to four feet below light. During these first days the hatchling is supplied by a bulging yolk sac on its belly and needs no food. As a group the hatchlings gradually begin their struggle upward. As they approach the surface, the daytime warmth of sun-heated sand slows them but night's coolness or rain stimulates them to activity; most hatchlings emerge at night. By now, yolk sacs are gone and the soft spot is healing on each belly. Sudden movement of sand—a group of hatchlings lying quiescent all day only inches below the

surface suddenly burst into the night. Instinct guides them, swift and unerring, toward the sea, the brightest horizon: down the beach, away from the greedy beaks of frigate birds whose sharp eyes may find them even in the protective darkness. Into the surf they go, many to be gobbled by waiting fishes before they get far, furiously paddling their tiny flippers along the water surface, straight out to sea. Do they drift among clumps of sargassum weed and flotsam, feeding on minute shrimps, jellyfish, and other soft-bodied organisms? This is supposed, but no one really knows. Very few will survive the hatchling stage; fewer still will mature. Of them all, perhaps one will live to grow old. Behind them, buried in the sand of the nest pit, are the remains of infertile eggs and those never to emerge: some too weak to struggle upward, some crushed or trapped in tightly compacted sand, others that simply hatched too late to join in the mass emergence. No waste here—now the burrowing insects can move in for their share. Some hatchlings develop, then die in the shell, and we find one, seasons later, cast high on the beach and dried by sun and wind, a perfect tiny case of minute rattling bones.

As the days pass, life on the island gradually slips into a peaceful pattern of labor and rest, wake and sleep, togetherness and solitude. We strive to make our camp and our activities the least disruptive possible to our island environment. Strange, clumsy beings in a fragile natural setting, we bend to it; we adapt. We become impervious to sun with no shade, to the constant salt wind. We grow used to the endless cacophony of the birds, the strong odor of the colony, and even to the ticks. We adjust to the nocturnal schedule of the turtles, catching odd naps by day, tramping the beaches by night. We grow strong from the exertion of turning turtles and heaving the tackle for weighing. We accept, and enjoy, life on a simple basis, away from the beguilements of modern society. Here, relevancies are different, more fundamental. Our values change. Entertainment is watching the antics of a crab; luxury is rain. Home is a tent. Back from the turtling, I lie on my blankets, too tired to sleep. Overhead the canvas flutters, casting flickering shadows in the candlelight. Frangible yet pliant, it moves with the wind; unresisting, it endures. For how many millennia have men dwelt in tents? The form has changed little. By night,

on the island, ancestors seem to loom close.

After five days on the island, time means little. Dawn and sunset punctuate the days, one on another—has it been two days, or ten?—I must glance in my journal to know. But what does it matter? We are filled with the exhilaration of living close to nature; Aves has become “our” island. Even the irate noddies have accepted us, staking out new territories on water barrels and fuel cans, perching precariously atop the tents. On the sixth morning, I waken at dawn to the growl of diesel engines. A large, gray military vessel backs and churns as she tightens up on her anchor. By prearrangement, this Venezuelan navy ship has come to Aves bringing a party of scientists to discuss turtle conservation and work with us. They are friendly and inquisitive visitors, greatly interested in our studies. The island, they tell us, is soon to be declared a preserve; when this happens, Venezuelan gunboats will patrol regularly and poaching, we hope, will cease. The scientists camp and go turtling with us for three nights. Before leaving, they give us a welcome barrel of water. I watch them depart with mixed feelings. Aves is a small community to withstand the influx of so many human beings. Fewer turtles nested during their stay, shying from voices and lights. This time, we were the observed ones—at once, I empathized with our subjects, the turtles.

Four days later, a small seaplane from St. Croix comes to pick up Carl, who must register at Cornell, and to bring the blood preservative and a few much-needed supplies. The flight from St. Croix takes two hours; the plane is due at 10:00 A.M. Landing, even in the lee of the island, may be difficult. Bill and Jim affix a large wind sock to the radio tower, per the pilot's request, and Carl builds a fire on the beach, smoke billowing downwind. At 9:50 we hear a distant hum, then a roar. The terns go wild and rise up in a screeching cloud. The little plane circles once then lands, bouncing in geysers of spray across the swells. The pilot drops anchor just beyond the surf. Quickly Carl and his bags are exchanged for the box of supplies. The pilot is alone; the two rear seats of the plane are filled with cans of gasoline for the flight back.

Landing at Aves was rough; takeoff is something else again. In alternating growls and sputters the plane bounces on the swells, unable to gain speed without porpoising. The pilot is forced in

"We are filled with the exhilaration of living close to nature: Aves has become 'our' island."

close to lee where the swells ease along the curving beach. He taxis out, turns, guns it—no good. Again and again. On the fourth all-or-bust try, he cuts in right along the beach and guns it just beyond the surf in a curve to the south, passing inches above the coral, narrowly missing the rocks off the point with the body of the plane, tipping up the left wing to clear. "He's up!" "Whew!" "Aarrgh." Our tension resolves into weak croaks and sighs. The plane circles several times to photograph the island, then disappears to the north. The terns settle with disgruntled squawks. We are alone again—four, now—on our island. Bill opens the box of supplies; inside are medical stores, spray-paint for temporarily numbering the turtles, and—to our delight!—more tags, small chicken-wing tags this time (the larger ones were not available), but the blood preservative still did not arrive.

With Carl gone, the pattern of our nightly routine alters. By now over a hundred turtles are tagged and most of them weighed. The long nightly treks in all weather, the effort of turning massive, wildly-lashing animals weighing 300 to 500 pounds each, the morning routine of heaving dead weight on block and tackle, have taken their toll. (I think of one incident among many: Jim and I decide to turn an unusually large turtle, four feet in length. It takes us six tries to topple her; we are exhausted, our arms scraped, knuckles cut, hair and eyes full of sand. We weigh her in the morning: 495 pounds.) By now each of us is suffering from the effects of constant rigorous activity: muscle strains, backache, sore feet, cuts, bruises. We have worked hard and it's time to ease the schedule. From now on, only unusually large or small turtles will be weighed, the rest measured and tagged while they lay.

Overnight the weather changes. The morning after Carl leaves, sunrise is obscured by a pall of clouds; the air is warm and heavy with moisture. Mid-morning the rain begins in earnest: big, slow drops, then faster, pouring down, cool torrents streaming over our salty bodies, the first good rainstorm. Out comes the soap, out comes all the dirty clothes, and we hoot and cackle and scrub in that wondrous downpour; along with the salt all the tensions and weariness wash away too. It keeps on raining. The water comes in sheets and the wind turns chill. The awnings and tarps sag from the weight of it; we set out buckets

and pitchers, the spare rubber dinghy, anything to catch water. In less than an hour, one and a half barrels are filled. Wind lashes the sodden tents; Suzan and I add extra lines and then huddle in the cook tent, watching it pour. Sundown, it still rains. With darkness, Bill and Jim go turtling in the rain, curious to see how the weather affects the nesting activities. In two hours, they find nineteen turtles, a record! The rain continues all night.

The following morning the sky is still overcast. Camp is a sodden confusion of windblown gear. Should another storm hit, we will be better prepared; with logs and bamboo from the beach and a heavy tarp, Jim and Bill construct a sturdy lean-to for the equipment, while Suzan and I patch and reinforce the tents and dry their contents. Overnight the island has changed shape, remolded by gouging seas: stretches of bright sand where before there were only rocks, wide beaches stripped to narrow cliffs and rubble. The shore is littered with algae and sponges, wrenched from their rocks and crannies, flung up by churning gray-green waves opaque with silt. Washed-out turtle nests spill their sodden contents to pale morning light: broken shells and half-developed eggs, bluish-gray in death.

In the storm two boats come to Aves. They anchor in the rolling swells to lee but no one comes ashore, perhaps because of our camp. For several days they fish the surrounding shelf with pots, then depart. Had we not been here, would they have come ashore by night to turn turtles, lucrative additions to a cargo of fish? Quite likely. Before our coming to Aves, notice of our expedition under the auspices of the Venezuelan government was passed along to the fisheries officers of eastern Caribbean islands, in hopes that the word would go out and the chances of undesirable encounters with poachers might be lessened.

The storm clears, but the weather remains unsettled for over a week with gusty winds, sporadic showers, roaring seas to weather, and huge swells to lee. But the turtles keep on coming, crashing over rocks, pounded on the corals, their golden-green plastrons and flippers gashed and torn. Nightly, we tramp the beaches, armed with tagging and measuring gear and spray cans of paint. The turtles are up nesting for the second and third time since our arrival, and I recognize many of them even before my fingers gently probe the right flipper for the tag

and I read a familiar number: one with a deformed flipper, another with a gaping scar on her carapace where Jim removed a huge perforating barnacle, another with gashes from a shark attack. Once tagged, each turtle is spray-painted with her tag number so that, should she move about or go back to sea before nesting and return later, we can note her actions from a distance without disturbing her. The moon is full now, occasionally bathing the beaches with almost startling light through parting clouds. We have grown accustomed to the dark and cloudy nights; even starlight seems a rare and brilliant treat.

The rough seas temporarily preclude the pleasures of snorkeling and diving. Instead, we spend hours combing the beaches, strewn anew each morning with an array of curious flotsam and shells. One day Suzan and I find hundreds of tiny shells swept clean of their hosts by the surf. Another day, small inch-long shrimp molts litter the beach in drifts which dry and blow about like shreds of crumpled cellophane. I find a Japanese glass float covered with barnacles, a heavy piece of fragrant wood wrenched from a distant forest, a tin of English cocoa, a turtle bone or two. Always there are coconuts, some sweet and edible, others already sprouted with sodden tattered leaves and broken roots. And always, there is the refuse of man: insecticide spray cans, plastic bottles with sun-bleached labels in French/Spanish/English, aluminum fragments, indomitable plastic shoes, dismembered dolls.

A surprising variety of organic matter washes up: seeds and pods of flamboyant, cocoa, mangrove, sea grape, cashew; fruits such as breadfruit, banana, grapefruit, orange, custard apple. Bamboo stalks are everywhere. Small uprooted plants drift ashore intact: *Sansevieria*, cactus, rhizomes of banana and ginger, some even bearing land snails. The seeds and plants, their long journey at an end, will find no welcome soil here in which to sprout and grow. Each night the voracious land crabs scour the beaches, feasting on seeds and pods, stripping the succulent leaves and roots, boring into cracked coconuts to scoop out the meat. Even sprouted coconut trees stand little chances at Aves. If the constant erosion and remolding of the island by the sea do not uproot them, the gouging flippers of several hundred nesting turtles will

(To be concluded)

Authors

Inga Behr, author of "Gray Angelfish," is an associate professor of chemistry at Pasadena City College. Her hobbies are diving, underwater photography, and shell collecting. Her pictures have won a number of awards.

Robin Burton, author of "Winners and Losers," is a writer and broadcaster specializing in matters relating to the sea. A free-lancer for the last 18 years, he also writes on conservation, ecology, and for specialist fishery publications such as *Fishing News International*. His article on the Tall Ships Race appeared in *Oceans*, No. 1, 1973.

Mr. Burton spent over five years at sea on merchant ships, yachts, fishing vessels, and longshore boats and has experience of many kinds of fishing. Having traveled to North and South America, the Near East, Africa, and most of western Europe, he now lives in Suffolk, England.

Charles T. Feazel, coauthor of "Fringing Reefs," is a doctoral candidate in the Department of Earth and Planetary Sciences at Johns Hopkins University after spending three years as Assistant Chief of the Oceanography Branch at Coast Guard headquarters. During his Coast Guard tour, Mr. Feazel made several Arctic research cruises (see "Where Greenland's Glaciers Meet the Sea," *Oceans*, No. 2, 1973) and participated in the shipboard training of cadets from the Coast Guard Academy. He holds a B.A. from Ohio Wesleyan University and an M.A. from Johns Hopkins. He recently spent five months in the Virgin Islands while doing field work on his thesis on coral reef sediments.

Alice Grant, author of "Tropical Trio," is a free-lance writer based in Michigan. At present she is employed by the University of Michigan's Population Planning Department. In the past she has edited a small city daily and a farm monthly, but primarily she has worked as writer/editor/photographer of several small town monthlies. As a free-lancer she has had a number of stories published in national magazines. Her article for *Oceans* is the result of a year spent in the Caymans. Mrs. Grant also wrote a story on the islands' old-time shipbuilding industry which appeared in *Boating*.

Ira Kahn, photographer in *Oceans' Salon*, was born in Palo Alto, California, in 1950 and has lived in Northern California most of his life. This region, particularly the coastline, has been a strong influence on much of his work. He is an alumnus of Stanford University.

His professional life bridges still photography and film. By commission he has generated a broad range of visual statements, documenting subjects from cancer treatment to regional folk dance. His work has been widely exhibited.

Robert F. Marx, author of "Pedro Serrano," is an explorer-archeologist specializing in marine archeology and naval and maritime history, particularly the Spanish colonial period in the Caribbean. Until 1971, he was director of research for the Real Eight Company, the Florida salvage firm which has recovered over six million dollars in treasure during the past twelve years. He is currently the vice-president of Seafinders, Inc., a new com-

pany which locates and salvages deepwater wrecks, and which may also be making underwater movies.

Mr. Marx directed the excavation of the sunken city of Port Royal, the Jamaican pirate stronghold destroyed by an earthquake in 1692, and has also participated in re-creations of historic voyages. He has written a number of books about his many excavations and voyages, including books for children.

While serving in the Marine Corps, Mr. Marx was in charge of salvage operations on the East Coast and also directed the Corps' diving school in Puerto Rico. (Other of Mr. Marx's articles which have appeared in *Oceans* are on Port Royal, June 1969; the history of diving, Vol. 4, No. 4 and 5; and Florida treasure diving, Vol. 5, No. 4.)

Douglas Myles, author of "Sharks—The Oldest Living Predators," is a Marine Corps veteran of World War II and served as an Army intelligence officer during the postwar occupation of Germany. He was born in New York City in 1924 but has lived much of his life in California. A history major, he holds a degree from the University of California, and has also done graduate work at that institution.

He first became interested in oceanography when as a youth he used to skin dive off the breakwater at Long Beach. Later, using scuba

equipment, he pursued his hobby throughout the length of the Southern California coast, and, in recent years, off the Channel Islands and the coasts of tropical Mexico, particularly in the Gulf of California with diving operations centered on Guaymas.

His interest in sharks dates from childhood when as a wide-eyed ten-year-old he saw a large hammerhead brought in to the pier at Redondo Beach. In the years since then he's had numerous experiences with sharks of many species, and as a diver has met such killers as hammerheads, great blues, and tiger sharks in their own element.

Today he's a free-lance writer, primarily of novels, one of which, *Seek Me in The Morning*, is soon to be published by a major New York house.

William E. Rainey, photographer and leader of the 1972 Aves Island Expedition ("Where Birds Soar and Turtles Nest"), is currently a graduate student in zoology at the University of California at Berkeley. Not surprisingly, his research focuses on the biology of sea turtles. While in the Caribbean, serving as wildlife biologist for the Island Resources Foundation, St. Thomas, Virgin Islands, he traveled widely, working on biological and conservation-related problems—including park planning projects and marine resource inventories.



Burton



Feazel



Grant



Kahn



Marx



Myles



Rainey



Roessler



Sefton



Schuessler

Thurston

Robinson

Waterman



He has written (slowly and painfully) several scientific papers, and has "a long-standing commitment for a truly gargantuan production from the Aves material."

Alan H. Robinson, coauthor of "Fringing Reefs," is a career research biologist with the National Park Service. Over a four-year period (1970-1974) in the Virgin Islands National Park on St. John his work involved studies of visitor impact on coral reefs, sandy beach dynamics, and watershed disruption. With local and regional conservation interests he has successfully worked for the establishment of marine and coastal parks in several Caribbean nations. Earlier research interests in fisheries biology and plankton led him to rivers and lakes in West and East Africa and the Great Lakes in the United States, following receipt of an M.S. in biological oceanography in 1966. He currently is assigned to the National Park Service Science Center in Mississippi, working on resource management problems in the barrier island national seashores.

Carl Roessler, the author of "Goodbye, Luymes," is now vice-president of the See & Sea travel agency in San Francisco, a job which enables him to escort diving groups all over the world. In 1969 he resigned from his position as Director of Computation at Yale University to take his family to Curaçao and pursue a career in underwater photography and free-lance writing. Since then, Mr. Roessler's photographs have won major awards at international film festivals in the United States and Europe. In addition, several of his articles have appeared in national magazines (see his story on the Galápagos in *Oceans*, Number 2, 1974).

Raymond Schuessler, author of "Panama," is a former baseball player who gave up professional sports to become a full-time free-lance writer. Once a student of journalism at the University of Buffalo, he has written a novel and numerous articles which have been published both in the United States and abroad. (See Mr. Schuessler's article on the Atlantic cable in *Oceans*, No. 2, 1973.)

Nancy Sefton, author of "Now They're Farming Turtles," is a free-lance writer/photographer for publications dealing with sport diving and the marine environment. She lives on Grand Cayman Island in the Caribbean, not far from the sea turtle farm described in her article. Mr. and Mrs. Sefton own and manage a skin diver's resort, Spanish Bay Reef, affording them frequent sojourns underwater where she pursues her favorite hobby, underwater photography.

Her diving career began in 1960, and her exposure to the sub-sea world has fostered an interest in conservation. Mrs. Sefton presently heads the Cayman Islands Conservation Group, and authors a weekly column in the island newspaper, dedicated to the preservation of Cayman's famous coral reefs.

A graduate of the University of Washington, Mrs. Sefton taught English at the college level for several years before she and her husband Ron moved to the Cayman Islands to take up diving in earnest. Together they have published over a dozen articles about diving and the marine environment for *Skin Diver*, *Dive*, and *Oceans* magazines.

Aside from her free-lance and conservation projects, Mrs. Sefton teaches journalism and radio broadcasting at the new International College of the Cayman Islands, and hopes to broaden her understanding of marine ecology

Letters



On the shore of the sundown sea

In reference to T. H. Watkins' "The Longest Hour," Volume 7, No. 1, (Jan.-Feb. 1974).

My house is too warm. Early summer days spent lying in bed, catering to a spine gone mad, are made all the less rewarding by reliving the youth of one T. H. Watkins. T. H. is junior to me in time, yet full journeyman in recollection. I walked the sand flats of Alamitos Bay when they were as crystal, I learned almost to breathe salt water when Laguna became sea bottom, and I happily sloshed through the lowtide mud within Rainbow Pier. The cults were young and the barbells few.

I, too, heard dire tales of tides and tummies, though they were as rote, not care. The ocean gave me parole and embraced me. Since those days long gone, I have learned of forest and lake, stream and mountain. These, all, would be as nothing but for the happy apprenticeship served in solitude, thrill, and terror, so well recalled by my never-met comrade.

I thank you and commend you for your free minds and sensitivity.

JERRY WHITMAN
Palo Alto, California

In boldface above is the title of Tom Watkins' book which yielded us the treasure of "The Longest Hour." The other chapters are equally rewarding. On the Shore of the Sundown Sea was published in San Francisco by Sierra Club Books, 1973.—Ed.

LOS mind-boggle

I am greatly concerned about pollution of the oceans and the necessity for world agreement

by participating in the programs of the college's proposed marine laboratory.

Jean Thurston, author of "Where Birds Soar and Turtles Nest," is a free-lance writer currently living near Cabo Rojo on the western coast of Puerto Rico. A native of California, she has spent most of her life on the ocean.

In her second year of college at the University of California at Berkeley, Jean took up sailing, a hobby which quickly became a way of life. In 1966, after wandering up and down the coasts of Mexico, she signed on as cook aboard a vessel bound for Tahiti. From there she worked her way westward around the world on a variety of sailing boats, finally reaching the West Indies in 1968.

Following another year of college in California, Jean returned to boats and the sea, crewing south along the eastern seaboard, and eventually ended up in the Caribbean once more. On St. John and later St. Thomas, Virgin Islands, she assisted with a series of local marine research projects while working as secretary and technician for the Virgin Islands Ecological Research Station, 1970-72.

The third expedition to Aves Island (to

on managing and protecting them. The complexity of the problems facing the Law of the Sea Conference and the implications if they are not solved boggle the mind. Thank you for including as much as you do on this subject in *Oceans* magazine.

Mrs. A. V. EMMOTT
Houston Sportsmen's Club
Houston, Texas

Oceans' new column, "Oceanic Society Waves" (page 2) refers to coming events related to, and future Oceans coverage of, the UN/LOS conference held this summer in Caracas.—Ed.

Man-watcher

Just happened on to your article, "Soaring Spirit of the Sea," in the January-February 1973 issue of *Oceans* Magazine. Very good. I was on board the U.S.S. *Bayonne*—P.F. 31—on weather station duty 1,200 miles out of Yokosuka, Japan, on January 5, 1951, when I was washed overboard in sixty- to seventy-foot seas, with no lifejacket. If it hadn't been for the albatross following the ship I never would have been found. The bird kept flying over me till the ship was able to turn around and come back.

R. J. WASHINGTON, U.S.N. (RET.)
Rohnert Park, California

The only good jellyfish . . . ?

The "age-old . . . jellyfish nuisance" and attempts to "solve" this problem ("Solving the Jellyfish Puzzle," *Oceans*, March-April 1974) reminds me of the old white American (originally European, of course) proverb "The only good Indian is a dead Indian," which in fact is the vindication for total extermination of obstacles.

This type of hard, perfect, and total solving of problems, based on a mechanistic view of how to master the challenges of life in a simple way, will eventually lead to a situation in which man stands lonely in between the ruins of what formerly was his living environment. (The "mechanistic" method of seeing and treating things oversimplifies the nature of things by using mere symbols instead of facts. This may help to build a machine, but it fails to interpret the cosmos.)

DR. STEFAN WELLERSHAUS
Institut für Meeresforschung
Bremerhaven, Germany

which her story relates) took place in 1972. In August and September of 1973 a fourth expedition, in which Jean also participated, went to Aves. This time, a party of seven scientists and technicians set sail on the trimaran *Release* for what was to be a three-week stay on the island. After ten days, however, the group was suddenly evacuated by a U.S. Coast Guard helicopter when approaching Hurricane Cristine threatened tiny Aves. A week later, after the weather had settled, they sailed again to the island and remained for an additional 22 days.

More recently, Jean has been working on a nesting survey of the hawksbill turtle, *Eretmochelys imbricata*, on Mona Island and the western coast of Puerto Rico.

Stanton Waterman, author of "Cruising and Diving the Western Caribbean," is a world-famous underwater photographer, film-maker, lecturer, and traveler. With Peter Gimbel he was the co-producer of the famous film on the great white shark, *Blue Water, White Death*. He received Man Sea '72's Poseidon Award and was Jacques Cousteau's "Diver of the Year."