MARINE TURTLES/land turtles-
newspaper articles: 1973 1972

1972-1979 G.H. BALAZS FILES

MARINE TURTLES/land turtles- 1972-1973
exerpts, advertisements, news, etc.

MARINE TURTLES/land turtles- 1974
exerpts, advertisements, news, etc.

MARINE TURTLES/land turtles-
newspaper articles: 1974

MARINE TURTLES/land turtles-
newspaper articles: 1977

MARINE TURTLES/land turtles- 1979

MARINE TURTLES- no dates
articles, items, news, advertisement

National Fisherman
54(6): 19-A.
Oct. 1973.

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EGGS TRANSPLANTED

Hopes Fading For Second Coming Of Ridley Turtles On Padre Island

By Jack Baughman

NORTH PADRE ISLAND, TEX. — Dearl Adams has abandoned his turtle project for this year. However, next year, the Ridley turtles may come back to Padre Island to lay their eggs.

"We've left our camp on the island," he said, "but there are still some people out there making occasional checks for us, just in case the turtles do show up." But it looks like his dream of rising turtles on Padre once again has gone up in smoke. The island he says, has changed so much since the turtles once laid there years ago that he does not have much confidence that the chelonians will ever return.

There is now too much traffic, especially on weekends. "We haven't given up yet, but we've become awfully discouraged. My personal opinion now is that it's not going to work. The traffic on the beach is much worse than it was six years ago."

That's when Adams planted eggs from the Mexican coast on the shores of Padre, hoping that if they hatched, the little turtles, when adults, would return to lay their eggs where they were hatched.

"I didn't know how fast the island was going to grow," he said. "It's just grown by leaps and bounds. But I still want to keep looking until I'm sure they're not coming back."

Adams has been waiting for the return of the turtles hatched from the eggs he obtained six years ago, and he believed this might be the year they would return as adults to establish a colony of the endangered turtles here.

The Adams family first came to the beach in 1963, the first year that Dearl and others attempted to transplant Ridley turtles from a declining colony near Tampico, Mexico. Despite laborious efforts to protect them, no eggs hatched in 1963, and only a small number of Ridleys survived successive transplant efforts in 1964, 65 and 66.

But in 1967, 1,102 turtles hatched from 2,000 eggs and scuttled across the beach into the surf.

"Nobody knows for sure how old they have to be before they return to lay eggs," Adams said. "Estimates have been from five to eight years. I personally believe from six to eight years."

Adams made camp this year on April 28 with his wife and son. Each morning, he drove his son to school and then went to work himself, leaving his wife, Ethel, to watch. He and the boy would return a little after 4 p.m.

ABANDONED CAMP

However, after nearly two months on the beach, they finally abandoned their camp, but during the time they were there Adams or his wife, sometimes accompanied by others, patrolled a 29-mile stretch of beach looking for turtle tracks.

In theory, the Ridleys will return to where they were hatched, although no one is certain of that. Nobody knows much about them, Adams said.

Some research has been carried out at colonies along the Caribbean coast of Mexico, although the nearest colony — about 50 miles north of Tampico — is down to about 400 to 500 adults.

It has been learned that male Ridleys never return to land, but spend their lives at sea. The females return only to lay eggs.

Once females mature, they may lay eggs as often as three times during a season, which extends from May through August. "Most should arrive in a bunch in May," Adams said, "and the others would be scattered thereafter."

He said it has also been learned that some adults lay every year; others, only every two years. Each turtle lays about 100 eggs at a time.

None of the adults — which may weigh as much as 90 lbs. have been sighted by the Adams family — although several years back, biologists working for the Texas Parks and Wildlife Dept. caught a few in shrimp trawls. None of these were Adams' turtles.

However, the Adams family saw true Ridleys twice this year. A man named Don Peatch, who has helped the Adams look for Ridleys, found a yearling tangled up in a piece of rope. About "the size of a dinner plate," the Ridley was taken care of by Mrs. Ila Loethcer, an inslander with a long-standing interest in the project.

MYSTERY TURTLE

The source of that turtle is a mystery. Adams said it was remotely possible that one of the pre-1967 transplant survivors came to the beach last year, and this was one of her young. The youngster apparently became entangled in the rope at sea, and was washed ashore. Another Ridley, this one four years old, was caught by a fisherman.

As for Adams plans, he said he will return the next two summers, but after that, he'll probably have to give up.

Asked what was keeping him going, Adams said, "We have got something started, and we just don't want to turn it loose. We want to see it through to the bitter end, or happy end, whichever it is."

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the structure and function of respiratory pigments.

Research projects: Currently focused on the Dungeness crab, chitons and sea cucumbers.

UNIVERSITY OF RHODE ISLAND

Facilities: The institution has a department of fisheries and marine technology, which conducts a two-year vocational program in commercial fisheries. Those who complete the course receive an associate degree and are prepared for eventual command of fishing vessels and for employment in other phases of the marine industry.

Graduate marine degree programs include the master's and doctoral programs in biological, physical, chemical and geological oceanography awarded by the URI Graduate School of Oceanography on URI's 165-acre Narragansett Bay Campus; the Master of Science and Doctor of Philosophy programs in ocean engineering; the Ph.D in economics, marine resource option; and the Master of Marine Affairs Program.

The University's oceanographic vessel is a 180-foot, 840-ton former Army maintenance and supply ship coverted into a rearch vessel in 1962. URI also has a 47-foot motor cruiser, *Gail Ann*, used extensively for commercial fisheries training. The Graduate School of Oceanography also charters a 40-foot dragger, *Billie II*, for year-round work on Narragansett Bay and Rhode Island Sound. The department of fisheries and marine technology charters a 21-foot workboat.

The URI Marine Experiment Station has, on loan, a 54-foot steel boat, *La Nina*, for research on fish gear and electronic equipment. The experiment station, which is administered by the school of oceanography, has a laboratory building with a salt-water system, a shop building, outdoor holding tanks for marine animals and a dock for small boats. It is expected that a new nutrition physiology center for vertebrates and invertebrates will be in operation this year.

The National Marine Water Quality Laboratory also maintains a floating laboratory and dock at the experiment station. The experiment station is the University's base of operation for research in aquaculture, fishing gear and fish population dynamics.

Other research vessels include the *Islander* and *Crowsnest VI*, two ocean engineering vessels, and *Blue Jacket*, a 26-foot bass boat used for diving, survey and utility work. Another dozen skiffs and outboards are available for use by researchers in various departments.

Research facilities also include standard and specialized apparatus for studies in various phases of marine science and engineering, an electron microscope, a scanning electron microscope, the University's Computer Center, the state's Nuclear Science Center and the Pell Marine Science Library.

Activities: A research aquarium is being built that will include a large tank room, small isolation laboratories, freezing rooms, controlled temperature rooms and an acoustically isolated room. Studies of fish sound, research on animal behavior, shellfish rearing and pollution and physiological experiments will be carried out at the new facility by biological oceanographers, zoologists and botanists.

As a Sea Grant College, URI also has a public service function, including commercial fisheries extension, which is handled through the Marine Advisory Service for R. I. and regionally by the New England Marine Resources Information Program.

Research projects: Much of the research effort pertinent to commercial fisheries is done in connection with the University's Sea Grant program. Projects include systems ecology studies of Narragansett Bay; hydrodynamics of fishing gear; towing power of bottom trawls; gear development; fisheries populated dynamics; the impact of international trade legislation on the commercial fishing industry; the labor force at certain New England ports; fisheries occupational culture and a management system for clam resources in New England.

Also, evaluation of the October 1970 amendments to the Merchant Marine Act; management of salmonids in a closed circulating controlled environment system; commercial aquaculture of the American lobster, *Homarus americanus;* chemistry and bacteriology of biological filters for aquaculture; marine pathology; economic analysis of salmonid aquaculture; aquaculture of green sea turtles; utiliaztion of industrial fishery products by poultry; preservation and evaluation of marine foods; process development for industrial fishery products; and marine fish pigments.

Please turn to page 70

Late reports from universities, Senators, Congressmen and fisheries spokesmen will be published in the April edition of the FISH BOAT.

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THE TRAWL

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NORTHEAST FISHERIES – A group of fishermen known tentatively as the Atlantic Offshore Fisheries Association, P.O. Box 730, Narragansett, R.I. 02882, have banded together to promote the seafood industry from Maine to North Carolina . . . Federal officers impounded a Japanese fish boat in Jersey City, N.J., after the Prelude Corp., Westport, Mass., complained that it had destroyed or damaged $50,000 worth of lobster pots 30 miles south of the Nantucket Shoals.

A University of Rhode Island, Kingston, marine ecologist has discovered many abnormalities in hardshell clams from Providence River waters. Dr. H. Perry Jeffries, following six years of research, reported that hydrocarbons, petroleum waste products and sewage were to blame . . . 5/72 Also at the University, researchers have been successful in raising green sea turtles in a project aimed at reproducing the species for commercial use.

The National Marine Fisheries Service has established a Regional Extension Division in Gloucester, Mass. Dr. J. Perry Lane has been named division coordinator . . . Certain areas of Georges Bank and Browns Bank off Gloucester have been closed to

The Fish Boat May 1972

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SAIL
NOV 72

Living off the Florida Land

by Janet Groene

photographs by Gordon H. Groene

Fish will be your most common, costless meal while cruising in Florida. This 65-pound jewfish will make superb eating; was speared by SCUBA diver off Key West.

Surefire lure is clear shampoo tube, cut into narrow strips. Long leader goes through neck; one or two hooks are concealed within fluttering strips. Reel attached to stanchion in cockpit. Line is 80 lb. test.

and canals on Florida's east coast, they have a muddy flavor and are not recommended.

King mackerel — as a "fat" fish this has an unearned poor reputation among fishermen who usually have catch smoked if they keep it at all. We cut the king into steaks for pan, charcoal or oven broiling and pronounce it superb.

Spanish mackerel — another fish that is not considered "prime" eating because it is fat and slightly bloody. We serve ours poached in milk, seasoned with salt, pepper and thyme and find it has a firm, chicken-like texture and delicious, delicate flavor when served fresh from the sea.

Dolphin — the king of the catch, producing a firm, white, chicken-like meat. Should be filleted and skinned. Can be fried, baked, broiled, or cut into fingers, batter dipped and deep fried.

Grouper — another of the most popular Florida fish but better fresh than bought frozen in markets. Can be speared or caught on hook and line, using bits of conch as bait. Very popular in all fish recipes, including chowder.

Also from the water: Famous Florida **crawfish** must be picked up by (gloved, if you're smart) hand, can be speared in the Bahamas. Rules are strict and fines severe to protect this delicious but abused species. Tail is customarily eaten but you'll find meat in feelers too . . . **Coon oysters** can be found at low tide clinging to roots of mangrove trees. Fry them in clumps (they are tiny) or make stew . . . **Turtle meat** is sold in Key West grocery stores. Meat should be browned in oil, braised with tomatoes and green pepper. Catching and butchering is a messy, cruel job and is not recommended except in survival situations . . . **Shrimp** are sold fresh from shrimp boat holds in Marathon and Key West . . . **Conch** are still common in the Bahamas but Florida's rich harvest has been pirated badly in past years by shell collectors. Can still be found by snorkeling and frozen in supermarkets and makes fine chowder. Natives can demonstrate meat removal using tiny hole that does not ruin shell. Pound to tenderize.

Anything that comes in a shell is probably edible. Make a special search for **coquina** on the Gulf Coast. This clam-like shell makes delicious broth . . . **Pen shells** yield up a scallop-type nugget of firm white meat . . . **Top shells** harvested from rocky shores should be two inches and larger or meat is too minuscule. Boil to slip from shell; serve with garlic butter.

Florida's cities all offer well stocked and familiar chain supermarkets such as A&P, Grand Union, Food Fair-Pantry Pride and Publix. In more remote areas and in the Keys, small stores have slim selections so leave larger ports with well-stocked larders.

The Florida food scene is one of sunny, year-round seasons, lush tropical plenty and tremendous variety in familiar as well as fun new tropic tastes. The following books and pamphlets will help expand your eating-off-the-land skills:

Wild Plants for Survival in South Florida, by Julia F. Morton; $3.95 plus

38 Commercial wharf
Boston, MASS.
02110

Mango — growing season short, usually ripe in early summer. Prices high compared to peaches. Fruits are greenish red, yield to gentle touch when ripe, taste like stringy peaches but extremely juicy and refreshing. Handle briefly at first, peel before eating. Some people are strongly allergic to skin, sap, pollen.

Plantains — big, coarse-looking bananas found in most south Florida groceries and especially in Spanish areas. Fry peeled chunks in deep fat until brown and tender. (Does not get mushy.) Luscious light banana flavor; serve hot with main dish.

Key limes — a very small, yellow, juice-heavy lime sometimes found in supermarkets and more commonly in roadside stands. Key lime pie sold in restaurants is probably not authentic if green in color. Use in gin and tonic, rum drinks, pies. Like no other limes, have slight vanilla perfume.

Sea grapes — when dark purple this fruit is exotically sweet and grapey for eating raw. Bushes sometimes grow to tree size; fruit may be had free for the asking from property owners. Large round leaves make sturdy paper plates for beach picnics and can be pinned or tied together for jury-rig sun hats if you're caught ashore unprepared for broiling Florida sun.

Also fun to try: **Sour oranges,** found wild and identified by greenish-orange lumpy skins and familiar but heavily seeded orange interior. Use in drinks, for cooking fish and as a tenderizing marinade for conch . . . **Hot peppers** are grown in many Florida yards for their brilliant white, purple and red beauty. Experiment sparingly with this bitey, pungent spice. Grate and dry for future use. Approach with caution; some people have skin reaction . . . **Yucca** flowers bloom plentifully in Florida gardens. Crisp white flower petals can be used in salads . . . **Coco Plum** trees grow wild near the water. Fruit is yellow blushed with red, or is dark purple. Familiar plum-like pit. Eat somewhat pithy fruit raw or make jam.

Prickly pear cactus is found in the wild; produces sweet red fruits which can be speared from a distance by using sharp stick. Slice off ends, slice through skin and eat out sweet pulp . . . **Guava,** a very popular fruit n West Indian and Cuban cooking and baking, is sometimes found wild n Florida and Keys. Soft, pulpy green or yellow fruit is eaten skin, seeds and all or made into jam. Smell is extremely pungent and sometimes objectionable when stored in a small boat. Well worth trying for high vitamin C content.

Our sport is sailing, not fishing. And if you don't enjoy fishing as a sport it simply isn't economical to invest in all the "proper" equipment, buy bait and expensive lures, and spend fuel for trolling or for nosing out faraway fishing areas.

We fish only for food, and only along our sailing course, by trailing a homemade lure on an 80-pound test line. In shallow water along offshore reefs you'll catch your fill of mackerel this way. In blue water you'll reel in dolphin (do not confuse with porpoise) and tuna.

Jumble bean shrub-tree produces edible green seed pods which are boiled until tender. Bitter, strong taste put them in the survival-only category for us. Dried beans said to be usable as coffee substitute when roasted and ground.

Barracuda often take a trolling line and thousands of people eat them, but we prefer not to take a chance.

When water is warm and clear we prefer to snorkel, spearing grouper or snapper. (SCUBA fishing is legal in Florida; forbidden in the Bahamas.) We've also had luck in catching grunt, small snapper and other pan fish at anchor on a cheap rod and reel by baiting tiny hooks with old pancakes, stale bread or chicken scraps. Among the hundreds of Florida fish you'll want to try are:

Mullet — this is an abundant, willing fish, pouncing into Florida pans at the rate of 35 million pounds a year. It can be smoked, salted, broiled, poached, pan fried, oven fried or baked. One trimaran family told us they literally lived on it during one money-shy winter in Sarasota. Do stick to Gulf mullet, though. Although they are caught in rivers

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You'll want to spend eternity on Seabrook. But if you wait too long, you may not get to spend even an hour there.

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The first of Seabrook's championship golf courses is open for play, as are four of the dozen fast-dry granule tennis courts. Islanders swim off the white-sand ocean beaches, and soon will be enjoying the large freshwater pool and the Beach and Cabana Club, currently under construction. Plans for the Equestrian complex are maturing fast, and Islanders' boats of all sizes will one day be safely moored in Seabrook's sheltered deep-water marina, just off the inland waterway.

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If you've been considering an investment in the exclusive elegance of Seabrook, do act soon. Activity on the lots offered for purchase has been brisk, and the supply is diminishing rapidly.

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Progressive Farmer Company
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Southern Living
July 1973

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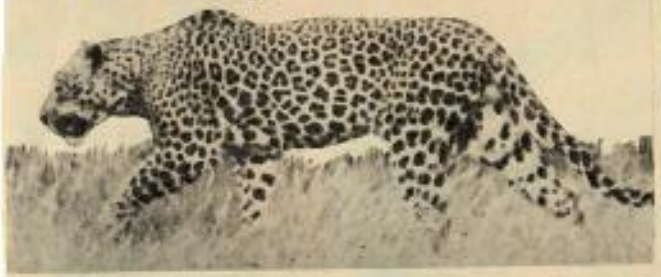

Ceylon

Republic of Sri Lanka

NIGHT OF THE TURTLE

From previous page

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ordinarily would be timid on land, was absorbed in its procreative role. Leaning forward, she scooped out one side of the chamber so that the damaged flipper could not undo the work.

The chamber at least was as deep as the good flipper could reach — a sign to the turtle, working by touch, that all was ready. It proceeded to lay 154 eggs, slightly larger than pingpong balls.

To say that the islands girl had an immediate change of heart about turtle eggs in the family diet would be a comfortable and neat rounding-off of this part of the story; but she took home a heavy basketful, weighing about 15lb., while the great turtle pushed the sand carefully back and lumbered into the sea.

(Dr. Bustard's culinary note, for historical purposes only: "The eggs, rich in fat and protein, have a watery white which does not coagulate when cooked, and a fishy flavor. However, if the eggs are left in the sun for a day or so or soaked in salt water then the whites coagulate as in hen's eggs.")

The eggs were duly eaten, and the nest was a success. Kay counted 166 eggs as they fell into the chamber, and she took none away. Her imagination had been touched; she was proud, by this time, to have had a useful part in events, and hoped to be present when the eggs hatched.

Kay was now constantly on the beach, and getting to recognise other laying turtles, and giving them pet names. She says they even let her swim near as they grazed on turtle-grass in the shallows.

Dr. Bustard is convinced, from her account, that she helped in every one of that season's nestings by the crippled turtle — Ruth, as she called it. She was photographed with the turtles, and

Now signs of activity spread through the buried mass of turtlets.

They each weigh well under an ounce, but already are seized by a marvellous stubborn instinct for meeting all the trials and dangers ahead. Even though the sand in the egg-chamber is only lightly packed, a single turtlet's chance of escaping from that depth would be remote; but working together, it is no problem for the brood.

"The uppermost turtlets dig into the roof over the eggs and as this caves in it is trampled down by the multitude below. In this way the whole brood slowly moves upward rather like an elevator slowly making its

Turtle farm

the babies moved down the beach. And seagulls appeared from nowhere in the night and large ghost crabs came out of their burrows. The surviving turtlets rushed on, and in the moist sand at the sea's edge their flippers changed to a swimming motion.

Kay estimated that over 900 hatchlings emerged from Ruth's nests that summer. She could not count the casualties in the march to the water; and as they swam out to sea she heard the plopping sound of fish lunging at them.

In the ocean beyond the reef, the survivors would be harder to notice camouflaged from above by their dark shell, from below by their white belly. Probably (little is known of their first year at sea) they would eat plankton, the minute life near the surface. And, if male, they might exist to a great age without even touching dry land again. If female they must at some time return to lay their eggs on beaches ever more unsafe for most living things.

NIGHT OF THE TURTLE

An islands girl makes friends

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By PETER HARDING

MANY millions of years ago, in the age of reptiles, certain kinds of tortoise turned to the sea for their food and eventually forsook the land, except to breed.

They thrived through the ages. But today few beaches are safe for their eggs; most of the seven species of sea turtle are rapidly dwindling in numbers, and unless more is done for them they will vanish as they have lived, a vast silent mystery.

If the green turtle, one of the species in northern Australian waters, survives, some of the credit will belong to a girl of the Torres Strait islands who has been studying them under the guidance of Scots-born Dr. Robert Bustard, of the Australian National University. He writes about her in his book, "Kay's Turtles." *

The girl, Kay, is the daughter of an islands schoolteacher, but her interest in turtles at first was strictly alimentary – she dug up their eggs for eating.

Then she befriended a turtle that was having trouble making its nest in the sand.

It was right at the start of a laying season. Turtles much prefer the ocean to the dangers and discomforts of land; male turtles in fact very rarely leave the ocean, and the females spend several years at sea between sessions of egg-production.

On this occasion, Kay was roaming a beach after sundown, carrying a pandanus-leaf basket. A massive shaped loomed out of the sea, to disappear in the line of vegetation.

Kay heard sounds of digging and the swish of flung sand. She waited three-quarters of an hour, then approached.

Green turtles don't dig any simple hole to lay their eggs in. They start with a wide pit for the body, and with the rear flippers proceed to dig a narrow chamber in the harder sand. Kay found that her turtle was making little progress, because a crippled rear flipper kept knocking sand into the chamber while the other scooped.

So that the turtle could start laying, Kay decided to help with the digging. She had been able to come near because the turtle, which

Continued overleaf

* "Kay's Turtles," by Robert Bustard, published by Collins (recommended price, $4.95).

Kay with some of the turtlets she is rearing.

taught to keep a note of everything she saw. She reported a total of 1220 eggs in the season's eight layings by Ruth.

The turtle disappeared back in the mysterious ocean.

In that slow-paced island life, it was not too difficult for the girl to be present at the hatchings. She knew that incubation takes about six weeks, and a small depression usually forms in the sand a day or so before the hatchlings emerge.

The turtlets, using a temporary tooth on the snout — an egg-tooth — break their eggs three days before emerging. During this time they absorb what is left in the yolk-sac (thus for the first four or five days of life at sea they do not need to find food).

way up a lift-shaft," Dr. Bustard writes.

Baby turtles emerge in the first hours of night.

"Several times Kay had noticed one or two heads or flippers poking out of egg-chamber depressions as she walked along the beach at sunset. She did not know that these were the forerunners of a brood waiting for cooler temperatures to activate them . . . One evening when she saw this she bent down and gently pulled out two baby turtles.

". . . The effect was like removing a champagne cork. The sand heaved, baby turtles bubbled out of it, and under a minute more than one hundred had fought their way out of the ground."

Like strange little machines, flippers scrabbling,

Kay took home four of Ruth's offspring, to rear in seawater on oysters, fish, and turtle-grass. At six weeks they weighed seven times their birth weight — she kept records like a Plunkett nurse.

Obviously, she would be the right person to run one of the experimental turtle farms which Dr. Bustard was thinking about.

For the last eight or nine years he has been studying the life cycle of turtles on the Great Barrier Reef, and the Office of Aboriginal Affairs in Canberra decided to provide funds for him to start turtle research farms in the Torres Strait. The aim is to ensure the survival of turtle populations in the area, and offer employment for islanders.

The commercial demand for turtles, Dr. Bustard explains, is considerable, for soup, steaks, skins, and oil.

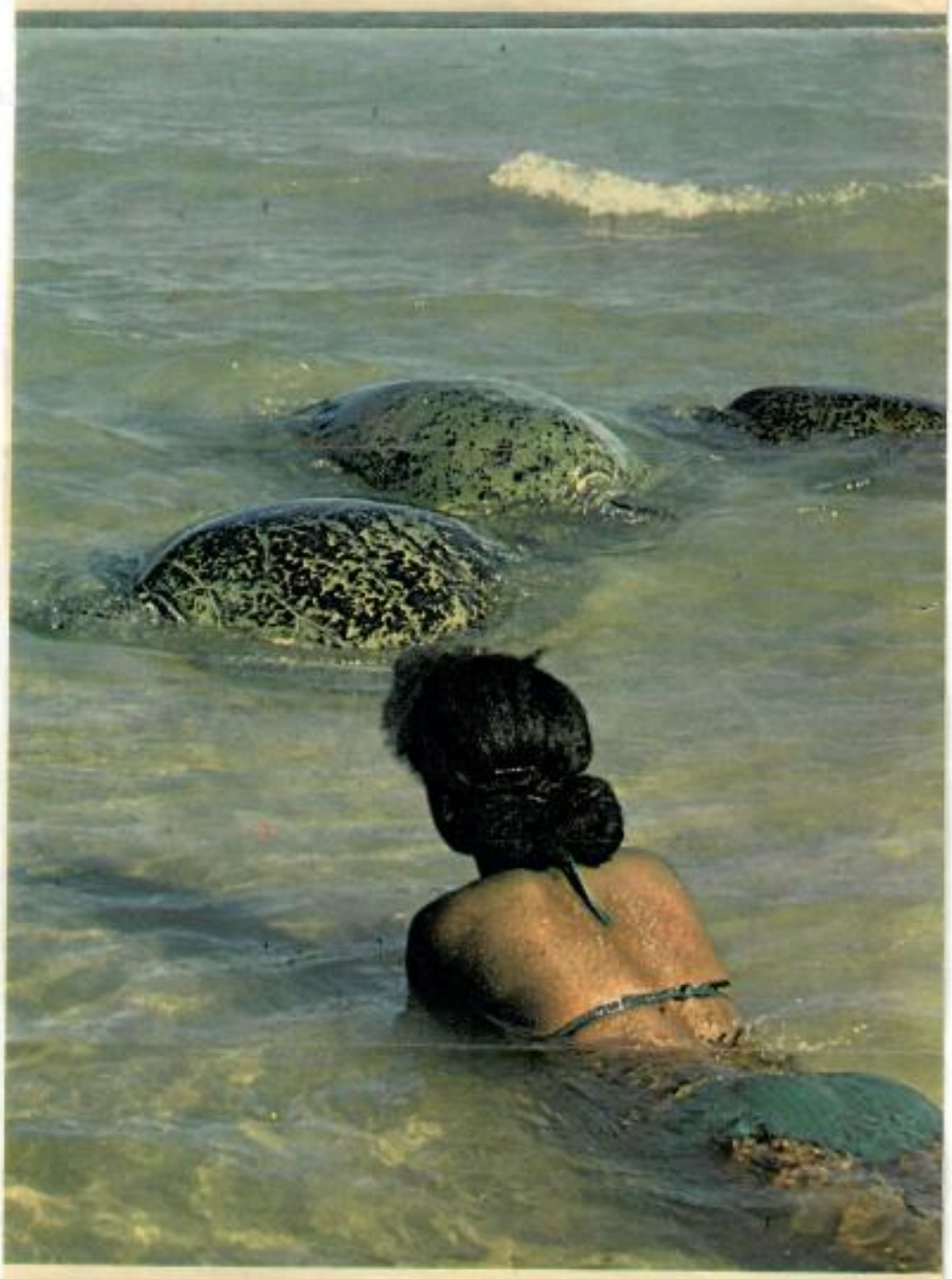
So Kay is running one of those farms. She was given a six months' study course at the ANU, then put to rearing newly hatched green turtles in batches up to 250.

"By keeping them in confinement for one year and liberating them on the reefs, scientists have considered that their survival chances may be increased between fifty and one hundred-fold over babies leaving the natural nest," Dr. Bustard writes.

"The turtle farming scheme . . . will also fully investigate battery-rearing techniques to grow turtles to a commercial size.

"Kay is extremely happy in her job."

Kay, the girl who "turned turtle," and one of the female green turtles she has studied on Torres Strait island beaches. Below, she basks with them in the shallows. The ocean's big turtles are normally very shy and timid.



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THE AMERICAN FISH FARMER & WORLD AQUACULTURE NEWS

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Box 1346
Kaneohe, HI 96744
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The Brotherhood of the Green Turtle

Story Begins on Page 4

THE AMERICAN FISH FARMER & WORLD AQUACULTURE NEWS

October, 1973

Graphic Communications Co., Inc. • Little Rock, Arkansas • 1971

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Don Kincaid inspects a green sea turtle near Sand Key Reef. Peg Robinson describes the efforts of the Caribbean Conservation Corporation to save this species from extinction in an article beginning on page 4.

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THE AMERICAN FISH FARMER is published monthly at Little Rock, Ark. Subscription rates: 1 year $7; 2 years $12; 3 years $16. Add $1 per year outside United States and its territories. Single copy price: 75 cents. Mail all editorial, subscription and advertising correspondence to P.O. Box 1900, Little Rock, Ark. 72203. Street address: 1908 W. 11th Street, Little Rock, Ark. Phone (501) 374-2342. Second-class postage paid at Little Rock, Arkansas.
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The Brotherhood of the Green Turtle

An American Concept Rings the Globe

By Peg Robinson

Two young men collecting small objects from the sand attracted natives by their strange actions. The scene is the 5-mile Tortuguero Beach in Costa Rica in midsummer; the spectators, mixed-blood Spanish Indians and Creoles, moving closer, found the white strangers were picking up inch-long baby turtles.

In wonder, one observer exclaimed, "Mon, fo' why dem gemmen cotch de baby turkle? Him no got meat, him too bitsy fo' soup; w'at you t'ink, Mon?"

The small anecdote of puzzlement is part of a 4-column article in the **TICE TIMES** of San Jose, Costa Rica, by Rex H. Benson, July 10, 1959, which began:

"Among the sun-drenched sands of Tortuguero Beach in northwestern Costa Rica, two American college students, Larry Ogren and Harry Hirth, are the cause of much speculating and head-scratching . . ."

The article brought out the planning by Dr. Archie Carr, graduate research professor, Dept. of Zoology, University of Florida, and Joshua B. Powers, prominent publishers' representative, the previous formation of the Brotherhood of the Green Turtle. Headlined: "Can Sea Turtle Species Be Saved From Extinction?" here, in short, was an early forecast of the success of the Caribbean Conservation Corporation, which exists to answer YES!

Headquartered in Tallahassee, Florida, this non-profit group has won full and enthusiastic support from peoples of the Caribbean area. It is to assuage hunger that CCC performs the difficult task of preserving the sparse green turtle for the immense protein value that originally nourished the settlers around the Caribbean littoral.

The earnest little CCC has won the aid of the International Union of Conservation of Nature and Natural Resources (I.U.C.N.) and of the World Wildlife fund. It is operated by volunteer unpaid workers. Although membership includes other nationalities, the movement was started by Americans and its membership is mostly American.

Measuring a big green turtle the morning after nesting. Harold Hirth with caliper; Dr. Carr with pad; Larry Ogren at right.

Book Starts Movement

It was Archie Carr's book **The Windward Road** that sparked it all. Powers sent copies to 20 friends. Then came the Brotherhood, the CCC, annual pledges — and action.

The group took over five miles of a 24-mile black sand beach — since become a national refuge — and when turtles lay their eggs there, Carr and two graduate assistants are ready. They scoop up the eggs, hatch them at their own hatchery, then fly them to turtle-depleted islands throughout the Caribbean, where local fisheries' officers place them gently into the surf or keep them for a year to grow larger.

As early as 1960 there were 27,000 eggs in the CCC hatchery. That summer they saw thirteen 300-pound mamas along the protected beach, belly-up, waiting to be tagged.

The gentle lumbering sea species got the spotlight in Dr. Archie Carr's conscience-calling book, **The Windward Road.** Carr tells of his search into the habits and migrations of the beast along miles of remote tropical beaches. The tale unfolds like a mystery, of people and places and animals — of jaguars, mangroves, and the forest — the keynote adventure: "a state of mind," Carr calls it.

He takes the reader back to 1503 and Columbus' discovery of two low islands separated by a channel where great numbers of turtles dotted the shore and cluttered the seaway "like little rocks." Of course, he named them Las Tortugas. We now know them as the Cayman Islands, thanks to Ponce de Leon, who didn't know where he was either.

Then for 300 years these vast flotas — fleets of breeding green turtles — were a prime factor in the growth of the Caribbean. Turtle schools came from hundreds of leagues around — from Hispanola and the Lucayas, from the Yucatan Channel and the shores of the Main, to mate in the Cayman Sea and lay their eggs on the sand.

At the hunger of growing settlements, ships of a half dozen flags — 40 sloops at once — converged from Jamaica, taking all the turtles that their holds and decks could carry.

Dr. Archie Carr

The turtle flotas looked to them, wrongly, as infinite as herring schools. No other source from which to restock ship's stores compared to the turtle for quality, abundance and certainty. It was the one edible creature that could be captured and kept alive so long.

Turtle was a specific for scurvy. The shipwrecked survived on it for years. It fed the seaboard poor when salted or dried. A staple, it was a slave ration. A luxury in soups and curries, it was served proudly in the spacious plantation homes. Declares Carr: "More than any other dietary factor, the green turtle supported the opening up of the Caribbean."

The CCC, outgrowth of the Brotherhood, is the response to this moving book.

Force For Survival

The aims, purposes and results of the CCC have become more than favorably known to governments all over the world. The CCC has been the strongest force in activating the general awakening of concern for the survival status of sea turtles everywhere.

In a dozen years more than 175,000 turtle hatchlings have been manually added to the sea waters of the world and more than 8,000 eggs distributed for local hatching. The U.S. Government sanctioned the services of Navy planes for seven consecutive years (until the service had to be curtailed because of the Vietnam War) in the seeding, thus nourishing Western Hemispheric goodwill to a degree.

Navy and helicopter flights delivered hatchlings, eggs or both to Costa Rica, Nicaragua, Anguilla, Puerto Rico, Florida, Barbados, Ascension, Mexico, Bahamas, St. Vincent, Grenada, Cayman Islands, Texas, St. Kitts, Surinam, Venezuela, Guiana, Jamaica, Virgin Islands, British Honduras, Bimini, Colombia, Panama, French Guiana, Bermuda and St. Lucia.

The CCC supplies hatching beaches at Avis Island and Bermuda as well as Tortuguero.

The long-range aim is not only to halt the decimation of the gentle *Chelonis mydas mydas,* but also to handle the situation so that humanity could see the light — by following the CCC's example we would be working for our own preservation.

In his report a few years ago, the technical director, Carr, said that 600 turtles were tagged on Tortuguero, and "a great deal of new information on reproductive cycles, growth and site tenacity was derived from tag recoveries."

Joshua B. Powers

Five men handled the beach work. Dr. and Mrs. Carr were in residence at the station throughout, with a series of visiting scientists and others, both local and foreign. Does what man has here done for the turtle foreshadow the day when again the turtle will do for mankind?

Best of all, since the human population upsurge is completely dependent on a continued and reliable source of nutritious food, the CCC is already playing a vital role by ensuring one source of valuable protein for the generations ahead. This is the product of a non-profit group of men and women who know the meaning of **work.**

John H. (Ben) Phipps

Life Cycle

The marine reptile they conserve is a tiny hatchling, carnivorous its first year. The animal is gathered in great numbers on Tortuguero, fed, protected and cared for instead of risking its tender new life to predators in a dangerous run to the sea. Plainly visible in shallow waters, the inchlings make tasty morsels for raccoons, birds and fish, providing they survive earlier raccoon raids on the unhatched eggs. ched eggs.

By the time the youngsters are a year old and the size of a 10-inch dinner plate, their foster parents place them gently into the sea where the now herbivorous creatures help to control the abounding "turtle grass." grass."

Their migratory powers can take them 1,400 miles in an arrow-straight line to Brazil for grazing, and bring them back the same way for mating and laying. A female lays around 200 eggs and may do so for two or three consecutive seasons, her eggs being fertile from a single mating. Turtle courtship is quite impressive, and they can even make sounds in their impassioned state.

Commercial Projects Dim?

Carr is outspoken in his views on commercial turtle farming. He said: "I have yet to see or hear of a work plan for any reptile ranch that shows in realistic detail how it expects to achieve a volume of production so great that it will do anything other than increase both demand and prices.

"If the enterprise is a commercial one, it will obviously do everything possible to create new markets. Just as obviously, it will not be able to satisfy

Continued on page 6

Florida children view a large nesting turtle as part of their learning about wildlife and its meaning.

Turtles,

Continued from page 6

these, and so will exacerbate, rather than relieve, the predicament of the natural populations."

Before we proceed to other turtle-conservation work in Florida, here is a run-down of the three CCC leaders:

John H. (Ben) Phipps, president, a conservationist and owner of broadcasting stations, handles administration.

Joshua B. Powers, influential publishers' agent, boosts organization, incentive and growth.

Dr. Archie Carr, CCC technology director, an expert in ecology, is probably the world's foremost authority on turtles. With lengthy honors listed in Who's Who, he now is Honorary Consultant for the World Wildlife Fund.

The scene changes. Frank Lund, 23, observes and tags marine turtles on a 13-mile eastern beach at Jupiter Island, Florida,. the fifth summer for the Jupiter native. With three college

Continued on page 7

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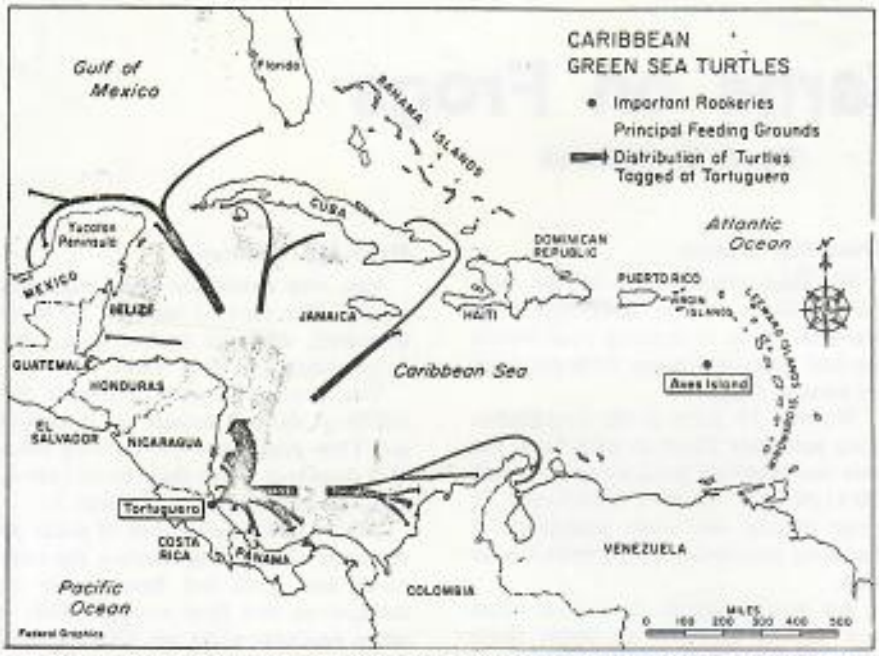


Reporting the status of the green turtle as one of the world's endangered species, Dr. Carr illustrated his report in National Parks and Conservation Magazine (April 1970) with this map showing locations where tagged turtles had been recovered.

Hatchlings for seeding are collected from protective fence around nesting site. At height of nesting season as many as 300 sites protect young turtles from predators. Larry Ogren is doing the collecting on Tortuguero Beach.

student assistants, he is employed by the town not only to research, but also move turtle nests from dangerous areas, with financing from local foundations and individuals.

With a freshly-earned degree in wildlife ecology, Lund has been a devotee of the sea turtle since childhood. He said that much research is still needed. While amassing pictures and notes, Lund keeps an eye on poachers, ("more than ever this year"); blasts commercial fishing interests for "butchering" the 1969 Florida law he helped write, closing the season on turtles during nesting, and has set a goal of pinpointing the exact status of Florida's turtle population plus finding means to protect the turtles.

The new law is not easily enforced, according to Ron Purdom, Florida Marine Patrol supervisor for the Palm Beach County area, whose 12 men are responsible for the coast throughout the counties of Palm Beach, Martin, St. Lucie and Okeechobee.

Lund's equipment includes, besides tags from Archie Carr, a secretary, tee shirts emblazoned with **Turtle Research,** printed research cards and five vehicles. Sunbleached, horny-handed and direct of eye, Lund is successfully serving his lifetime home.

Out of the Stuart (Florida) Field Laboratory, the Florida Department of Natural Resources has worked for several years, rearing for one year, then tagging and releasing green turtles.

A tagged yearling released April 13, 1972, near Delray Beach, was caught 1,300 miles away, May 6, 1973, at Avis Island, Venezuela. Meanwhile it had nearly doubled its length and more than tripled its weight. This is not unusual.

Ed Joyce, chief of the Bureau of Marine Science and Technology, cites such examples as proof of the need and value of recent legislation requesting a conference of Caribbean countries to discuss the protection and management of marine turtles.

Ross Witham of the FDNR, who has worked since 1956 to enhance the survival chances of turtles, said: "I hope some day soon we'll have all our captive-breeding turtles in one facility. We're working with Florida Power & Light Company toward this end and anticipate provision of such facilities at their nuclear plant on Hutchison Island between Stuart and Ft. Pierce."

To a question about turtle food, he answered: "One aspect of my work has been seeking economical food sources. In Florida, large quantities of crab wastes are available, and these could be one economic source of food. In cooperation with Miami Seaquarium, I have shown that young turtles can live on nothing more than jellyfish. One species of jellyfish is very common in the Florida Keys, and preliminary work suggests that it might be possible to cultivate this animal in captivity. For their herbivorous diet after age one, there are a number of terrestrial plants that are suitable for food."

All aboard for the deep. Tender is carrying cases of hatchlings to the Navy plane. On the dock, styrene containers are filled with turtle eggs packed in beach sand.

LIBRARY OF
GEORGE PEABODY

lowing of the developed countries by the tropical world holding about 90% of the world biota and ecological balance of the world. Thus the book inspite of its heavy deficiencies, will be found inspiring to scientists of all shade and environmental planners everywhere but especially to tropical countries.

R. MISRA

R. PAPE. (Ed.) : *New Horizons : Forestry in Papua New Guina.* Brochure of 70 pages with 49 coloured plates and 6 maps in colour.

Besides the introduction written by the Director of the Department of Forests the brochure describes the environment, the forest resource, selected timbers, present and potential market, forest activity and policies. It is said that despite the centuries of subsistence economy and exploitation over 70% of the land surface is still covered with forests varying in type from the swamp and lowland of the coastal plain to alpine vegetation and mors forests. Colonisation by the Europeans in the 19th century did not disturb initially the life style *vis-a-vis* forest economy of the people. However, world war II and its aftermath accelerated timber export but it is claimed that the forest industry is helping in the maintenance of the resource. Obviously ecological research is urgent to demonstrate the limits of growth and development.

R. MISRA

C. A. BACKER : *Atlas of 220 weeds of Sugarcane Fields in Java.* 1973. (Ed. Prof. C. G. G. J. Van Steenis) p. 240. 26.5 × 18 cm. Ysel Press, Deventer.

This is a publication of the excellent line drawings of vol. 7 of Backer's Weed Flora of the Javanese sugar cane fields which appeared earlier in Dutch. The numberings of the diagrams correspond with those of the original text. The editor gives three reasons to justify separate publication of the sympetalous plant families. Firstly it has been much needed for the Sugar Experiment Station at Pasuruan. Secondly the general interest in tropical weeds has gone up and thirdly because there are very few atlases of tropical weeds. It is pleasure to handle the resultant publication which is so elegant, accurate and uptodate. It is bound to give a boost to tropical botany which has been the life long mission of its experienced editor.

R. MISRA

The Turtle People. Producer-Editor, James Ward; Anthropologist-Photographer, Brian Weiss. B and C Films, 10451 Silkirk Lane, Los Angeles, Calif. 90024. Color, sound, 16 mm, 26 minutes. Purchase price $310 (US); rental $25.

The subsistence of the Miskito Indians on the Caribbean coast of Nicaragua was based aboriginally on the meat of the sea turtle and manioc grown by shifting cultivation. It required about 10 turtles per week to feed the village featured in this film, and the meat was distributed according to rules of kinship. The culture

was in balance with the environment; everyone was well fed and life was made secure by the pattern of mutual aid that assured labor when needed for group activities, such as house construction, garden clearing and planting, and turtle fishing.

The Miskito entered the money economy a few decades ago during a banana boom. By the time disease and hurricanes had destroyed this crop, the Indians had become accustomed to many of the products of the outside world, among them clothing, tools, and foods such as rice, beans, coffee, and wheat flour, all available only by purchase. After weathering a period of scarcity, they experienced another period of prosperity when a timber concern flourished in the area briefly. With the depletion of commercial-grade timber, the only remaining resource was the green sea turtle, which began to find a place in the world market.

The presentation is low key, but the message (delivered sometimes by a narrator and sometimes by members of the community, whose Caribbean accent may make their English difficult for some listeners to understand) is clear. The men go to offshore islands for a week at a time to set and monitor nets used for catching turtles. If they are lucky, they will catch 50-75, most of which they sell. Those brought back to the village are no longer distributed among kinsmen, but sold by the pound, and often there is not enough to satisfy the needs, even of those who can afford to pay. Since the men spend more time fishing, they plant smaller gardens. More money is consequently required for purchase of goods that might otherwise be grown. To get more money, it is necessary to catch more turtles. As this process intensifies, the situation gets steadily worse. If the turtle supply continues to decline at the present rate, it will soon provide neither food nor cash. The people do not foresee the danger and the commercial interests are concerned only with immediate profits.

The Miskito situation has a relevance beyond the local time and place; it presents a simple and clear view of what is happening in many "underdeveloped" areas. Perhaps circulation of films such as this will help awaken both the profiteers and the victims to the dangers of overexploitation of those resources that we have too long viewed as inexhaustible and force an attempt to rectify the ecological imbalances before it is too late.

BETTY J. MEGGERS

Mind Reading

A collaboration between American medical hardware and British ingenuity has resulted in a new X-ray machine that reduces the risk and the expense of examining the brain. Developed by the British firm EMI, the $350,000 device scans the brain area of a fully conscious patient with X rays that penetrate only to the desired depth. The output is a Polaroid photograph of the exact cross section the doctors want to see, in full detail, in less than thirty minutes. Conventional brain X rays require hours of work by teams of specialists, with the patient often under anesthesia. Even so, the bone encasing the brain obscures most of the detail and the resulting image reveals only gross abnormalities.

Making a Connection

After a century and a half of second thoughts, France and Britain have agreed to proceed with Napoleon's dream of a tunnel under the English Channel, linking the two countries. Planned for completion in 1980, the $2 billion project will include two parallel cast-iron or concrete tubes, each carrying a single railroad track, with a third service tube between them. The trains will carry automobiles, freight, and passengers between Paris and London in three hours and forty minutes, compared with today's six-hour schedule, which includes an often choppy channel crossing by ferry. By tunnel the thirty-two-mile underwater portion of the trip will take only thirty-five minutes.

Emerging European economic unity has soothed many Britishers' traditional fears that a trans-channel tunnel would be an inviting entrance for invading armies from the Continent. Still, critics continue to disparage the subterranean passage, claiming that it is technologically outmoded, financially unsound, and environmentally ruinous to the Kent countryside, where the English terminal will be located. However, the British government anticipates that by 1990 the tunnel will be carrying 30 million paying passengers a year, plus 10 million tons of freight at a saving of from two to five dollars a ton over the present rate.

Filet of Turtle

While horsemeat and various concoctions of soybeans are being touted as alternative protein sources to beat the high cost of beef, a group of English entrepreneurs on Grand Cayman Island in the Caribbean are working on an even more exotic beef substitute: the meat of the giant green sea turtle. According to *aficionados*, the meat under the creature's hard shell is not only tender and tasty but also low in fat and cholesterol. Turtle meat contains only 102 calories per pound, compared with 247 in beef.

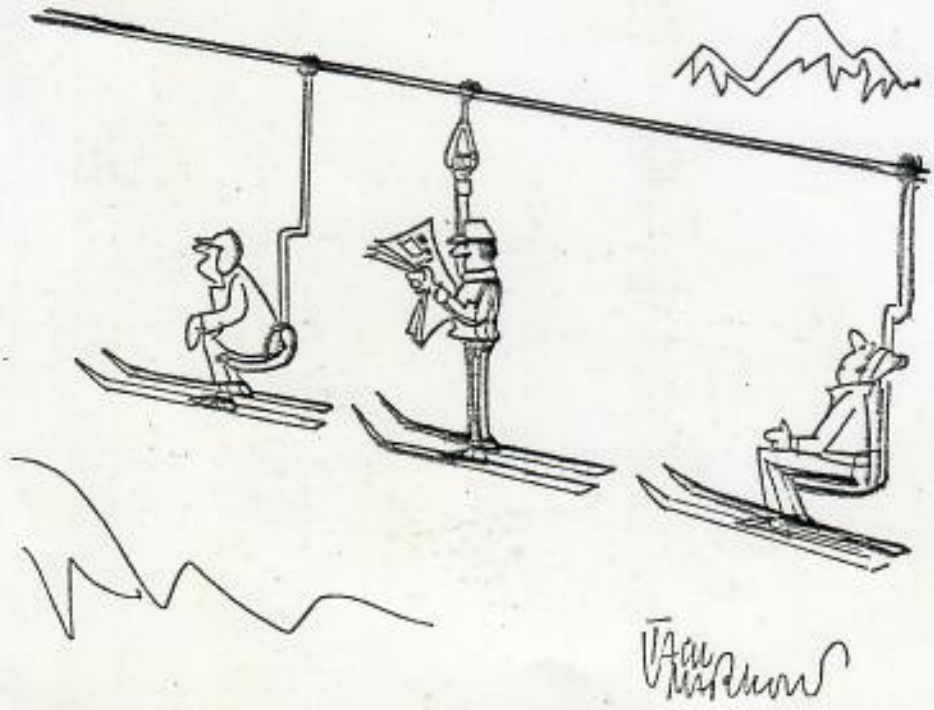
Sea-turtle meat is hardly a newcomer to the menus of the world. Seafarers in centuries past commonly maintained the docile, easily captured creatures on the decks of their ships as a source of fresh meat during long voyages. And the turtle's leathery eggs, deposited in nests on Caribbean beaches, were such a favorite delicacy that as early as 1711 they had to be protected by law. Even so, a hundred years later the green sea turtle had been poached nearly to extinction in the Cayman Islands, and the species is still listed as endangered in the United States.

But the turtle enthusiasts on Grand Cayman Island, incorporated as Mariculture, pose no threat to the object of their affection. Quite the contrary: They propose to replenish the wild population, while stocking the world's larders with filet of turtle. They built up their initial inventory by rescuing eggs from nests that were too vulnerable to waves and marauding birds. Of green-turtle hatchlings left alone, say Mariculture's biologists, only 1 percent survive, while the rate rises to 85 percent for turtles nurtured in captivity. A minimum of 1 percent of the Mariculture hatchlings is set free.

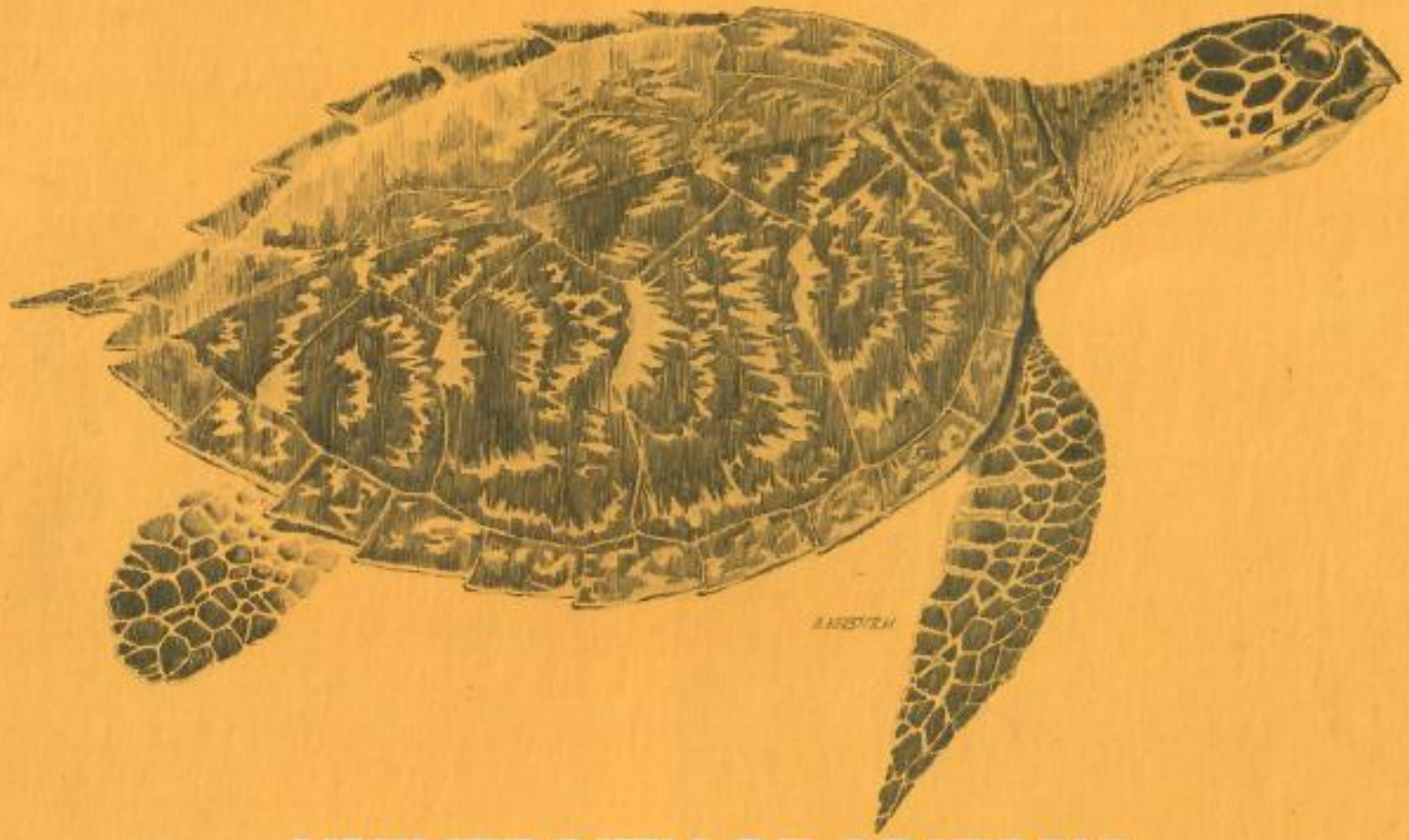
Last April, after three years of patient effort, Mariculture succeeded in breeding its sea turtles in captivity, and in establishing its own supply of eggs for the future. Two wild male turtles were introduced into the company of several dozen mature, captive females in the company's pool. The result, some 4000 fertilized eggs, was described by Mariculture's consultant on reproduction as "a landmark in the conservation of the species." The first hatching of the eggs fertilized in captivity took place in September.

The hatchlings not lucky enough to be released in the sea will join 78,000 other turtles, ranging from a few ounces to 800 pounds, in Mariculture's inventory. After about three years of pampered growth, at about 125 pounds, they will become part of the 1.5 million pounds of turtle meat that Mariculture markets annually.

ANTHONY WOLFF



AQUATIC SCIENCES



UNIVERSITY OF ARIZONA

Department of Biological Sciences 1972-73

GENERAL INFORMATION

The Department of Biological Sciences has developed broad teaching and research programs in marine and freshwater biology based upon the nearby Gulf of California and the great diversity of freshwater environments in Arizona. An interdepartmental Marine Sciences Committee coordinates interdisciplinary marine projects, and the Arizona Cooperative Fishery Unit (Fish and Wildlife Service) conducts applied research and training programs in freshwater fishery biology and limnology. The Department of Biological Sciences offers the B.S., M.S. and Ph.D. degrees in Biology with areas of specialization within the aquatic sciences (marine ecology, limnology, ichthyology, etc.). In addition the B.S., M.S. and Ph.D. degrees are offered with a major in Fishery Biology. Summer field courses in marine biology are offered at the Puerto Peñasco Marine Research Station, Sonora, Mexico and at other locales in the Gulf of California.

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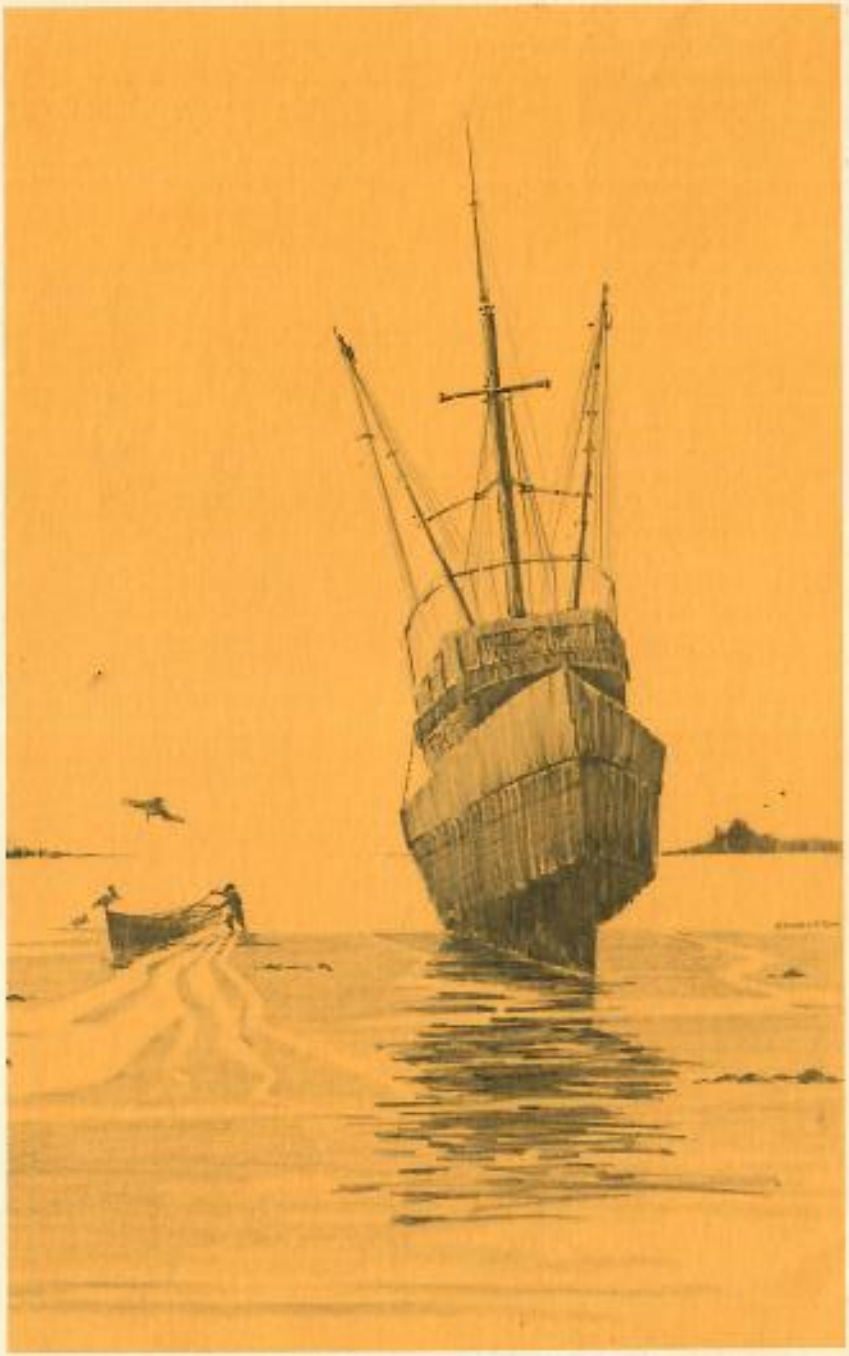
Aerial view of the Puerto Peñasco region (1969) showing location of Marine Science facilities and boundaries of preserves.



FACILITIES

The Puerto Peñasco Marine Station is jointly supported and used by the Universidad de Sonora (Hermosillo, Sonora, Mexico) and the University of Arizona. It consists of two laboratory buildings, various outdoor pools, and a nearby dwelling serving as a classroom/dormitory; all are located along the beach front a short distance outside the town of Puerto Peñasco (see photo). The laboratory buildings are within a compound shared with the Environmental Research Laboratory of the University of Arizona Department of Atmospheric Physics, which also has a cooperative program with the Universidad de Sonora. The station is equipped with a seawater system, wet and dry benches, reference collections of local flora and fauna, basic laboratory and collecting equipment, a modest weather station and small boats powered by outboard motors. Commercial fishing vessels from the nearby port are utilized for work far from shore, when the fishing season permits charters. The Universidad de Sonora is in the process of obtaining a 46-foot diesel powered vessel for research in the Northern Gulf.

The beach and the intertidal limestone reef extending in front of the station to the classroom/dormitory (400m) are set aside as a preserve where the biota may be observed but not collected. Collecting is permitted outside the preserve area. Transportation to the station and field sites along the Sonoran coast is available by vehicles kept on the Tucson campus. Information on living and classroom facilities for visiting investigators and students is available upon request. A fee is charged.

Considerable marine research is carried out on the Tucson campus, using artificial sea water systems. Also, sizable collections of Gulf fishes, invertebrates and algae are curated by the Department of Biological Sciences. A listing of current research in progress is available on request.

FINANCIAL AID, ADMISSIONS

Graduate teaching assistantships carrying stipends from $2850 to $3450 for the academic year are available. A limited number of research and curatorial assistantships are available through individual faculty members. Application for admission to Graduate School and for teaching assistantships may be obtained by writing to:

Coordinator of Graduate Admissions
Department of Biological Sciences
West Building — Room 310
University of Arizona
Tucson, Arizona 85721

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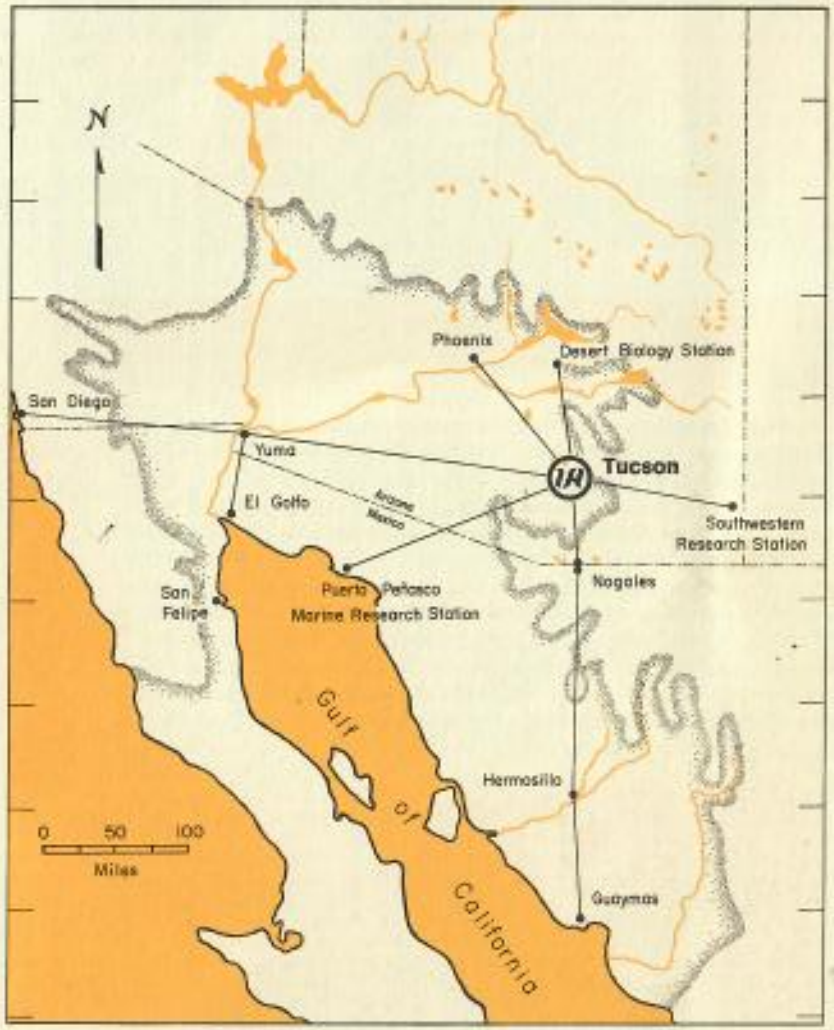
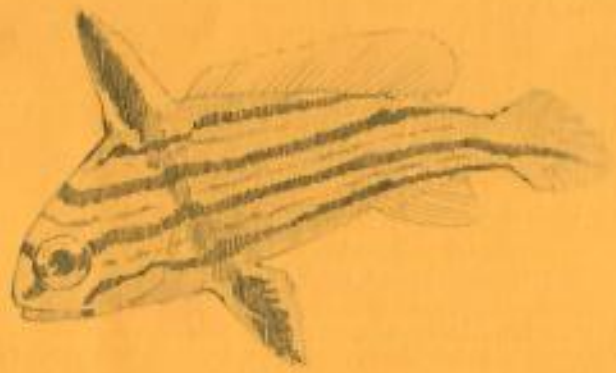


For further information on the Marine Sciences Program write to:

Dr. John R. Hendrickson
Department of Biological Sciences
The University of Arizona
Tucson, Arizona 85721
Phone (602) 884-1889

The Gulf of California offers the biologist an exciting array of environments populated by a highly diversified subtropical fauna and flora. Spring tides greater than 30 ft. expose miles of clam beds at the Colorado River Delta and swimming pool-sized tide-pools at Puerto Peñasco. Whales, porpoises, sea lions, turtles and fish of all kinds abound in the tranquil waters of the Gulf. Jumbo shrimp support a rich fishery and the giant totoaba and the beach-spawning grunion make breeding migrations toward the muddy Colorado Delta each spring. The many shallow reefs and sandy estuaries harbor a biota rich in species and numbers. The hot, arid desert climate enveloping the Gulf imposes environmental extremes on the intertidal marine life generating a host of problems challenging the marine scientist.



MARINE BIOLOGY

MARINE ICHTHYOLOGY

More than 650 species of fish have been recorded from the Gulf and a large research collection is curated on campus. Current investigations include population ecology of intertidal fishes, behavioral ecology of the Gulf grunion, effects of hypersalinity on fish eggs and larvae, habitat selection of larval fishes, species diversity and trophic ecology of rocky shore fishes and behavior and systematics of gobioid fishes.

INVERTEBRATE ZOOLOGY

The vast intertidal zone of the Northern Gulf provides ready accessibility to a diverse invertebrate fauna. Studies in progress include ecology of polychaete worms, migration of blue crabs, comparative morphology of gastropods and neurophysiology of sea anemones.

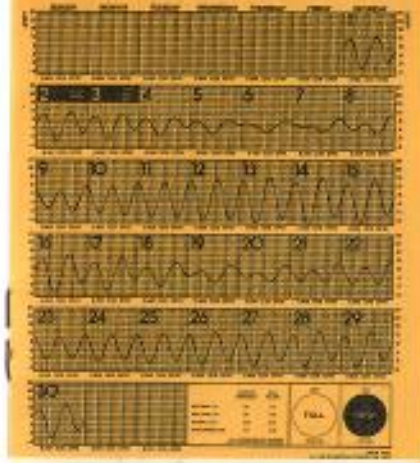
MARINE BOTANY

Puerto Peñasco is a favorite collecting area for marine phycologists each spring as nearly 200 species of algae can be found growing on the exposed rocky reefs at low tide. Studies on the distribution and ecology of Gulf of California algae are in progress and a substantial reference collection is curated on campus.

MARINE FISHERIES AND MARICULTURE

Investigations are in progress on the totoaba and the sea turtle with the ultimate objective of developing mariculture techniques for these species. Cooperative programs with Mexican institutions on the food resources of the Gulf are underway with studies on the biology of the commercial shrimp — bottom fish community and the totoaba having highest priority.

APRIL 1972



The Department of Biological Sciences publishes an annual Tide Calendar of the Northern Gulf of California which may be obtained from the Bureau of Multilithing and Mimeographing for a small fee. The University of Arizona Press is publishing a series of identification manuals on the biota of the Gulf of California. This handbook series will include manuals on intertidal invertebrates, shore plants, fishes, and algae.

FRESHWATER BIOLOGY

The fresh waters of Arizona are highly diverse with regard to fauna, flora, chemistry and morphometry. Streams range in character from the Colorado River to unique intermittent habitats in the mountains at the edge of the deserts. Within the past 70 years Arizona has been changed from an almost lakeless state to one having over 70 man-made impoundments between 20 and 200,000 acres in area plus many times this number of smaller ponds. Reservation Lake at 9000′ in the White Mountains remains frozen for five months each year while Lake Martinez near Yuma remains warmer than 70° for most of the year. Lakes on the Mogollon Rim with their very soft water stand in contrast to desert lakes having high dissolved solid content. There are 27 native species of fish and 41 introduced species present in Arizona lakes and streams. These are as taxonomically diverse as the pupfish, northern pike and tilapia.

FRESHWATER ALGAE

Laboratory studies are in progress involving algal cultures grown and manipulated in controlled environments with emphasis on the investigation of the morphology, cytology, and physiology of filamentous species. Field studies have involved the distribution of selected species in southern Arizona waters.

LIMNOLOGY

Opportunities for studies include ecological investigations of aquatic habitats within the Sonoran Desert, determination of factors regulating distributions of organisms in intermittent streams in the Catalina Mountains, analysis of relationships between composition of plankton communities and energy flow, and the effects of climatic variables and lake basins on nutrient characteristics and productivity of lakes.

FRESHWATER FISHES

The native freshwater fishes of Arizona are restricted in distribution, limited in abundance and threatened by introduced species. Current studies include thermal physiology and behavior of desert pupfish, native minnows, and mosquito fishes in hot springs.

ARIZONA COOPERATIVE FISHERY UNIT

Graduate studies in freshwater fishery biology and aquatic ecology are offered through the Fishery Unit. Although topics are very diverse, emphasis is placed on zooplankton productivity, fish behavior, fishery water quality relationships, general fishery ecology, and management.

Two choices of undergraduate curricula are available. One, fishery biology, designed to prepare students for basic research or advanced training in graduate programs and two, fisheries management, which gives a broader background for applied or managerial positions. With these different curricula available, students are able to select the training best suited for their individual needs.

On campus and off campus laboratory facilities are available for special projects for both undergraduates and graduates.

Field training for graduates can be in many locations ranging from high mountain lakes and streams to warm water impoundments. A variety of fish species inhabit these waters. Research equipment, boats and motors and vehicles are available. Research assistantships with stipends of $3400 for M.S. candidates and $3900 for Ph.D. candidates are offered on a competitive basis.

For further information write to:

Dr. Jerry C. Tash
Leader
Arizona Cooperative Fishery Unit
Department of Biological Sciences
West Building, Room 210
University of Arizona
Tucson, Arizona 85721
Phone (602) 884-1959

COURSES IN AQUATIC SCIENCES

BIOLOGICAL SCIENCES DEPARTMENT

240. Oceanography (2) II ..... Thomson
240L. Oceanography Laboratory (2) II ..... Staff
241. Limnology (4) I ..... Stull
242. Marine Ecology (5) I and Summer Session ..... Thomson-Staff
245. Aquatic Resource Biology (2) II ..... Tash, Hendrickson, Ziebell
245L. Aquatic Resource Biology Laboratory (2) II ..... Staff
249. Current Problems in Fisheries Biology (2) I, II ..... Staff
275. Freshwater Algae (4) I ..... Hoshaw
276. Marine Algae (4) II ..... Hoshaw
280. Invertebrate Zoology (4) II ..... Miller
282. Ichthyology (4) I and Summer Session ..... Thomson
290. Animal Behavior (2) I ..... Pulliam
299b. Problems in Applied Marine Biology (2) I ..... Hendrickson
299j. Fisheries — Water Quality Relationships (2) II ..... Ziebell
299k. Special Problems in Desert Limnology (2) II ..... Stull
299. Aquatic Productivity (2) I ..... Stull
340. Advanced Studies in Marine Biology (2) I ..... Thomson

RELATED COURSES OFFERED IN OTHER DEPARTMENTS

Geosciences 214. Sedimentary Environments (3) II ..... Schreiber
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Agricultural Chemistry and Soils 265. Hydrochemistry (3) II ..... Dutt
Watershed Management 25. Fisheries Conservation (2) I ..... Staff

AQUATIC SCIENCES FACULTY
IN THE DEPARTMENT OF BIOLOGICAL SCIENCES

Howard A. Baldwin. M.S. 1951, Ohio State University
Research Associate. Biotelemetry: Sensory nerve coding

J. Laurens Barnard. Ph.D. 1953, University of Southern California
Visiting Scholar from Smithsonian Institution. Taxonomy of smaller marine arthropods of tropical waters

John R. Hendrickson. Ph.D. 1951, Univ. of California (Berkeley)
Professor. Tropical ecology: Biology of marine turtles and mariculture

Robert W. Hoshaw. Ph.D. 1950, Purdue University
Professor. Phycology: Morphology and cytology of algae

Albert R. Mead. Ph.D. 1942, Cornell University
Professor. Malacology: Speciation and taxonomy of gastropods

Walter B. Miller. Ph.D. 1967, University of Arizona
Assistant Professor and Curator of Invertebrates
Malacology: Neuroendocrinology of mollusks

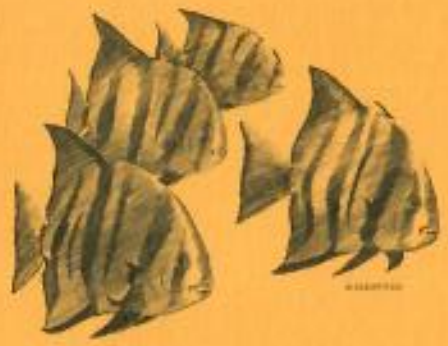
Peter E. Pickens. Ph.D. 1961, University of California (Los Angeles)
Associate Professor. Comparative Physiology: Neurophysiology and behavior of marine invertebrates

Elizabeth Stull. Ph.D. 1972, University of California (Davis)
Assistant Professor. Limnology-Oceanography: Ecology and dynamics of plankton; primary productivity and eutrophication

Jerry C. Tash. Ph.D. 1964, University of Kansas
Associate Professor and Leader, Arizona Cooperative Fishery Unit. Fishery Biology-Limnology: Primary productivity and fisheries

Donald A. Thomson. Ph.D. 1963, University of Hawaii
Associate Professor and Curator of Fishes.
Ichthyology: Behavioral ecology of marine fishes

Charles D. Ziebell. M.S. 1954, Oregon State University
Lecturer and Assistant Leader, Arizona Cooperative Fishery Unit. Fishery Biology: Water quality and fisheries management



MARINE SCIENCES COMMITTEE

Howard A. Baldwin (Sensory Systems Lab.: Marine Biotelemetry, Sensory Nerve (Coding)
J. Laurens Barnard (Biol. Sci.: Systematics and Biology of Amphipods)
Gen. Samuel R. Browning (Atmospheric Physics: Systems Engineering, Tidal Studies)
William A. Calder (Biol. Sci.: Comparative Physiology)
Rocco A. Fazzolare (Nuclear Engineering)
John R. Hendrickson (Chm., Biol. Sci.: Environmental Science, Marine Biology, Herpetology)
Simon Ince (Civil Engineering: Hydrology)
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Carl N. Hodges (Environmental Research Lab.: Desalination, Environmental Control)
Robert W. Hoshaw (Biol. Sci.: Phycology)
Fred Libby (Ocean Engineer: Marine Geology)
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Stephen M. Russell (Biol. Sci.: Ornithology, Ethology)
Joseph F. Schreiber (Geosciences: Coastal-Shallow Water Geology)
William D. Sellers (Atmospheric Physics: Climatology)
Norval A. Sinclair (Microbiology: General Microbiology)
Elizabeth A. Stull (Biol. Sci.: Phytoplankton, Primary Productivity)
Jerry C. Tash (Biol. Sci.: Zooplankton, Fisheries Biology)
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Department of Biological Sciences
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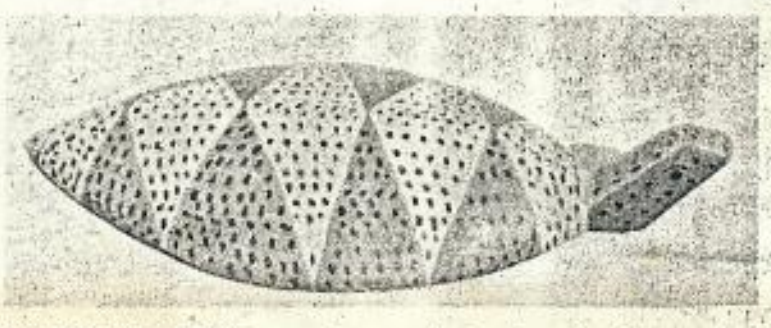
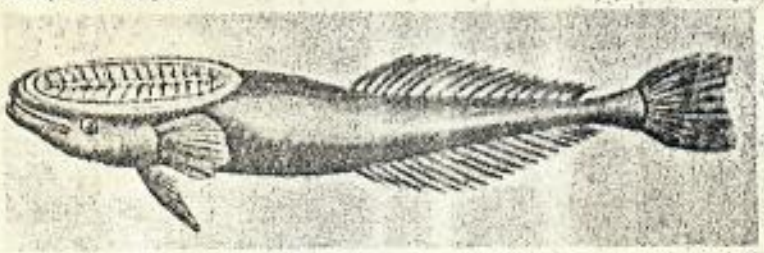


THIS TURTLE DECOY was made recently for the author by a native of British Honduras, from a piece of driftwood picked up on one of the isles of the great reef that runs from Yucatan southward. Approximately 2' long and about 4" high at the center of the back, its triangles are green with black spots; three of the diamonds are yellow, also with black spots; and the back of the head is yellow also, while the center diamond and the two triangles at either end of the body are a sort of dull pink.

GREEN TURTLES have long been a favorite food of man, so much so that the giant chelonians are verging on extinction. But in the early days of this country they were much used for food, and the old Spanish natural historian Oviedo says in his book, written in 1526: "I say that in the island of Cuba large turtles are found, sometimes so large that ten or fifteen men are necessary to pull one of them from the water." There turtles were taken in the manner shown in this old print, when they were laying their eggs. They were turned over on their backs by bars and, since the turtle could not right itself on land, "in this way many are caught."



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Satellites May Help Green Turtles; Odd Catching Methods Once Used

By Jack Baughman

CORPUS CHRISTI, TEX.—The great green turtles once so common along the Texas coast, and now surviving in the Caribbean, may soon be wearing transistorized tracking radios and be spied on by one of the NASA satellites.

Today, the turtles are a threatened species and efforts are being made to increase the number of the big soup turtles by learning more about them. Scientists have already tried fitting the turtles with radios to make a long-range study of their habits and migrations. But these studies have been hampered by the earth's curvature, which limits the range of radio transmission.

Now, Dr. Archie Carr, in a recent issue of "National Geographic Magazine," says NASA has suggested that use of a satellite might become available for tracking the great reptiles as they go about their business in remote areas of the sea. Signals from the turtles could be picked up by an orbiting satellite and relayed to a ground station, where they could be plotted on a map.

Carr, a University of Florida zoologist, has long been interested in the green turtles and is one of the leaders in the fight to save the big reptiles from extinction. (See "The Sea Turtle," NF, P. 23, May

scoops a pit in the sand and lays about 100 golf-ball-sized eggs. After incubating about 60 days, the baby turtles hatch, wriggle up through the sand in which the eggs were buried and make a frantic dash for the sea.

Clumsy on shore, green turtles swim nearly as fast as a man can run, surfacing to breathe every few minutes, and they rarely dive deeper than 70'.

Males never come ashore, and all those taken on the beach are females. However, in parts of the Caribbean, they are caught in great nets to which painted wooden turtle decoys are affixed. In British Honduras, native fishermen make these decoys from carved driftwood, and decorate them with bright and fanciful patterns of paint. These are then used as floats for large meshed nets, usually from 100' to 200' long and 20' to 40' deep. The decoys, presenting a turtle silhouette from below are approached by amorous turtles which become entangled in the webbing.

But far and away the most colorful method by which men catch turtles is that which employs the remora or shark sucker. Comparable to falconry in its appeal to the imagination, this ancient custom was apparently pre-

Aransas Pass. In the bays around those towns were great undersea pastures of eel grass on which the green turtle fed. And on these grounds the fishermen took "bull turtles, cow turtles and turtle calves" using nets in the same manner as described above except that decoys were not utilized.

CAUGHT IN PASTURE

The turtle fishermen knew the hours at which the herds of turtles sought these pastures. They strung their nets in convenient places about the underwater pastures, stretching them to cover as much space as possible. Turtles going to or coming from the undersea feeding grounds would become entangled in the large-mesh nets.

Today the eel grass and turtles are practically extinct on the Texas coast and far southward, until the Caribbean Sea is reached. Fishermen along the coasts from Yucatan southward to Central America still catch them.

GREAT TRAVELERS

Carr and his colleagues have been interested in the rapidly vanishing species for many years, and have marked more than 4000 nesting turtles at Tortuguero. His work has revealed that the turtles travel immense distances — one turned up at the island of Trinidad, more than 1500 miles

1962.)

Sponsors of Operation Green Turtle, aimed at preserving the great chelonians, are Florida University, the National Science Foundation, the non-profit Caribbean Conservation Corp. and the Costa Rican government.

NAVY INTERESTED

The U. S. Navy, interested in the green turtle's phenomenal ability to navigate, helps by airlifting baby turtles to former nesting sites in Central and South America, Mexico, the West Indies, Bahamas, Florida and even Texas.

"The only flaw in the green turtle resource," says Carr, "is the fact that the females have to come shore to lay their eggs. They leave the safety of the sea — where their size makes them almost immune to danger — and expose themselves and their offspring to the hazards of the land."

Most of the green turtles left today nest on a 25-mile strip of Costa Rica's eastern shore called Tortguero Beach. The female valent among the Carin Indians who inhabited the sea named after them, and it still persists among some of their descendants as well as among various peoples in the Pacific and Indian oceans. Columbus observed this exotic method on his second voyage.

A ring was put around the tail of the sharksucker or remora, to which a line was attached. The remoras were carried in live wells in the Indian canoes, and when placed in the sea sought to escape by swimming in all directions. Eventually one would spy the turtle asleep on the surface and attach itself to the chelonian by the sucking disc on its head. The fishermen, as soon as they perceived this, were able to land the turtle by means of the cord fastened to the fish's tail.

There used to be a considerable fishery for green turtles on the Texas coast and in the early 1890s a correspondent for one of the St. Louis newspapers wrote about the fishery around Rockport and from Tortuguero.

But they almost always return to the beaches where they were hatched. Females rarely change their nesting places.

It is against Costa Rican law to dig up the eggs or disturb the turtles on land, but predators like coyotes and human poachers take a heavy toll of the eggs and nests. Unfortunately, the great reptiles return only to secluded beaches, well known to the nest robbers, but not easily protected by the law officers and game wardens.

Carr says that "our tagging studies have shown that the green turtle has a strong homing urge and great navigational ability. So far the process by which they hold courses and make pin-point landings at the end of long journeys is not known. The most likely explanation is that smells of certain localities are carried by ocean currents, and that a sun-compass sense is used to point the way to homing turtles."

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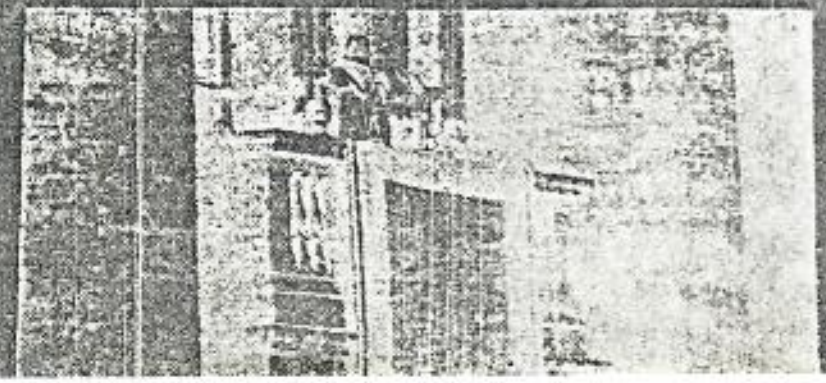
4/12 1953

—Walter M. Ringer of Minne-
nation team sent to Denmark.
lain elephant as a gift from
first American to receive the

UNLOOKED-FOR CATCH — Trawling for mullet in the Gulf Stream off Morehead City, N. C., Captain Jim Beebe (right) got the surprise of his life when he hauled in this 400-pound loggerhead turtle. He was fishing with his son and mate, Jim Beebe Jr. (left), in his boat the Adele, when he made the catch in waters where sportsmen try for record fish. According to Dr. W. E. Fahy of the University of North Carolina Institute of Fisheries, Beebe got himself a record turtle. He said it is the largest male loggerhead turtle on record.



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Eisenhower's pilot. He

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Ocean Science News 6

including
oceanology
The Weekly of Ocean Technology

E. W. SEABROOK HULL
Vol. 13, No. 40
October 1, 1971
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THE WHITE HOUSE IS "VERY CLOSE" to announcing appointments to the National Advisory Committee on the Oceans & Atmosphere (NACOA). All 25 appointees have been contacted, the White House says, and the announcement will be made early in October.

* * * * * * *

NOAA WOULD UNDERTAKE TWO NEW RESPONSIBILITIES under a resolution passed by the House, and a bill approved by the Senate. H. Res. 615 would require reporting of weather modification activities to the Secretary of Commerce, or more specifically, NOAA. The resolution would not affect state laws governing weather modification activities (29 states have some form of legislation, with Maryland banning the activity). Reports on weather modification activities were required to be filed with the National Science Foundation from 1958-1968, when Congress reassessed the role of NSF. The Administration supports the resolution.

The Senate-passed bill would give NOAA and the Smithsonian Institution joint administrative authority over the Crown of Thorns starfish study and control program. This amends a bill passed prior to the creation of NOAA which gave the responsibility to Interior Dept. and the Smithsonian.

* * * * * * *

GREEN TURTLE CUTLETS IN YOUR LOCAL SUPERMARKET THIS WINTER? Well, if you're in the United Kingdom it just could be if Mariculture, Ltd's., luck holds out. Established in 1968 and with an investment to date of $2.5 million (by roughly 70 stockholders) and a loan from the Commonwealth Development Finance Corp. in the U.K., the British West Indian company has been developing green sea turtle (Chalonia mydias) farming technology on Grand Cayman Island south of Cuba and northwest of Jamaica for just three years now. Founded by York, Pa., businessman Irvin Naylor (Lok-Box and Cor-Box container corporations and Roundtop), other participants include Dr. R. E. Schroeder (whose techniques for raising green sea turtles in captivity inspired the whole thing), formerly a marine biologist with University of Miami Institute of Marine Sciences and now Mariculture Technical Director, U.K. chicken magnate A.A.G. Fisher and his son Marc, and Henry Hamlin, Rochester, N.Y. (who developed a sea grass harvester now used to collect fodder for the turtles).

Mariculture presently has some 50,000 green sea turtles in its ponds and tanks. They range in size from four pounds at about six months to around 100 pounds at 36 months. The hope is to begin marketing in December-'71 - March-'72, initially in Grand Cayman, the U.K. and Western Europe and, perhaps, in the U.S. as a gourmet food in mid-to-late '72. Each turtle yields about 20% of its gross weight in turtle steaks -- 30 pounds for a 150-lb. turtle. The whole turtle is saleable, however -- shell for jewelry and ornamentation, bones and calipee for green turtle soup, skin for turtle leather goods, and low-iodine, oxidization-resistant oil for cosmetics. The target production level from the Grand Cayman farm is 1.5 million pounds of turtle meat a year from some 60,000 turtles. The optimum harvest size is 150-to-180 pounds. Initially, the price of turtle steak will be in the beefsteak range; right now it brings $2 a pound in Grand Cayman. Eventually, however, the hope is to get prices down to those comparable for chicken. Meanwhile, other sites both within and outside the Caribbean are being surveyed for their potential as turtle farms. Among the locations being examined are those in colder climates where thermo-electric power plants provide heated effluents. Significantly, the low dissolved oxygen content of these discharges is of no matter to the turtles, which are air breathers.

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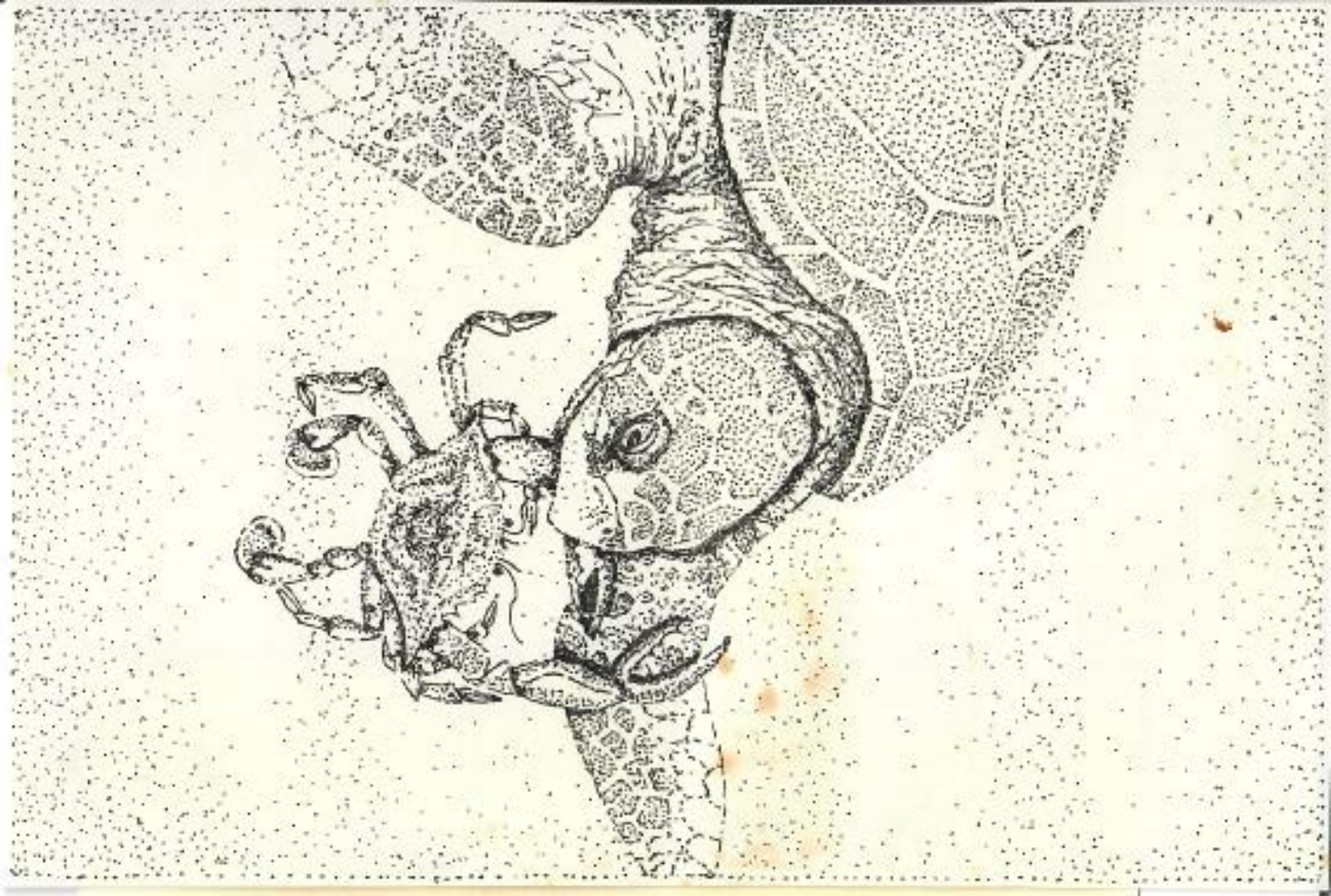
Right now Mariculture harvests its eggs from sites where they have been laid by wild turtles. This is done on Grand Cayman and other locations, some well outside the Caribbean. A number of agreements have been negotiated which assure (a) Mariculture of a continuing supply and (b) the protection of wild stocks. Grand Cayman and other governments, largely as a result of Mariculture's activities, have made the unregulated harvesting of green sea turtle eggs illegal and are taking steps to enforce the law. The collected eggs are placed in an incubator room, where a hatching success of 90-to-95% is reported. Next the hatchling turtles are placed in 4'x3'x1' wooden tanks where they are fed a specially formulated high-protein pellet, substituting for the diet of plankton on which they normally live for the first 6-to-8 months in the wild. Their growth rate, as measured, is about 7.5% compounded per month. When they reach a certain minimum size they are transferred to circular tanks (cinder or concrete block covered with stucco) ranging from 18 to 50 feet in diameter and eight feet deep. There they are fed a mixture of freshly harvested sea grass and pellets. At the age of one year, 1% of the original egg harvest is returned and released to the waters just offshore of the location where they were originally laid. It is estimated that in this way a considerably greater number of turtles from each hatching survive in the wild than would occur without this intervention. In their natural state all but a very few newly hatched turtles are consumed by gulls, foxes and other animals before they ever reach the surf zone. There predation continues by fish.

Mariculture hopes before long to have developed its own breeding stock. Towards this end it has a number of mature turtles (up to 400 pounds) in a specially constructed "natural" pond 300 feet long, 150 feet wide, 25 feet deep on one side and sloping gently up to a broad sandy beach. Just recently several pairs have mated and laid eggs. An Archimedes pump provides some 12,000 gallons per minute of fresh seawater to the farm complex. Excess food and droppings from the turtle tanks are pumped into the large breeding pond, where the hardier oldsters make short shrift of the surplus food and where the droppings support a luxurious growth of algae, which the breeding stock also consumes. Much of the waste, of course, is flushed out in the circulatory system. Meanwhile, the people of Grand Cayman -- a fairly wealthy, full-employment island -- view the turtle farming operation with considerable enthusiasm, some of it generated, no doubt, by prospects of a virtually unlimited supply of one of their favorite foods. A number of Caymanians are included in the Mariculture payroll of about 40. If the turtle venture turns out as well as expected, the company is prepared to take a crack at farming clams, oysters, shrimp and other marine species. Incidentally, when we asked Mariculture entrepreneur Naylor about the danger from hurricanes, he cited a high protective seawall, as well as the fact that no hurricanes have hit the island in its recorded history -- which makes it a pretty lucky place, since reference to plots of major hurricane tracks shows it to be right on the throughway for hurricanes originating in both the western and eastern tropical Atlantic.

* * * * * * *

GENEVA REPORT -- the first comprehensive public briefing by participants and observers at the recent Geneva meeting of the U.N. Seabeds Committee (OSN, 27,20,13,6Aug) -- is being sponsored by the Marine Technology Society on 18Oct at the Army-Navy Club, 17th & Eye Sts., NW, beginning at 9:30 a.m. This promises to be an interesting and informative session, with MTS bringing together voices from the Federal government, minerals and fisheries industries, and academia. Here's the schedule. Morning session is chaired by Dr. Tom Clingan, professor of law, U. of Miami, and includes: John R. Stevenson, legal advisor, State Dept. (general summary); Howard Pollock, deputy administrator, NOAA (fisheries and scientific research); Jared Carter, deputy director, office of ocean affairs, DoD (territorial sea, navigation through straits and on high seas); Dave Stang, assistant to the undersecretary, Interior Dept. (limits of national jurisdiction and seabed regime for mineral resource development).

Afternoon session (which follows a 12:15 p.m. lunch) will be a panel moderated by Dr. Lewis Alexander, URI. Panel includes: Cecil Olmstead, VP of Texaco (petroleum and mineral development); Jacob Dykstra, Point Judith Fisherman's Co-operative (coastal fisheries); August J. Felando, general manager, American Tuna Boat Assn. (distant water fisheries);



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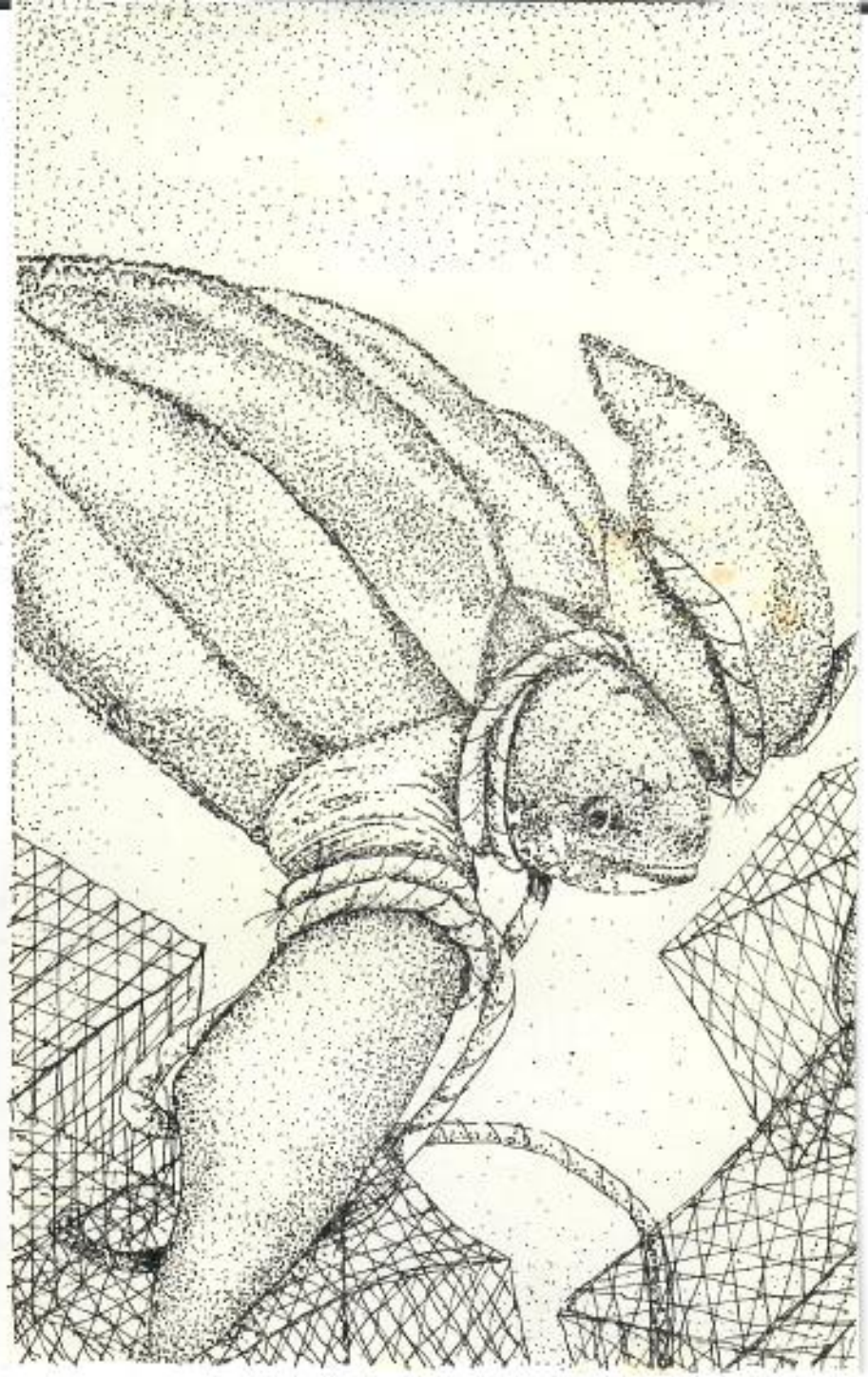

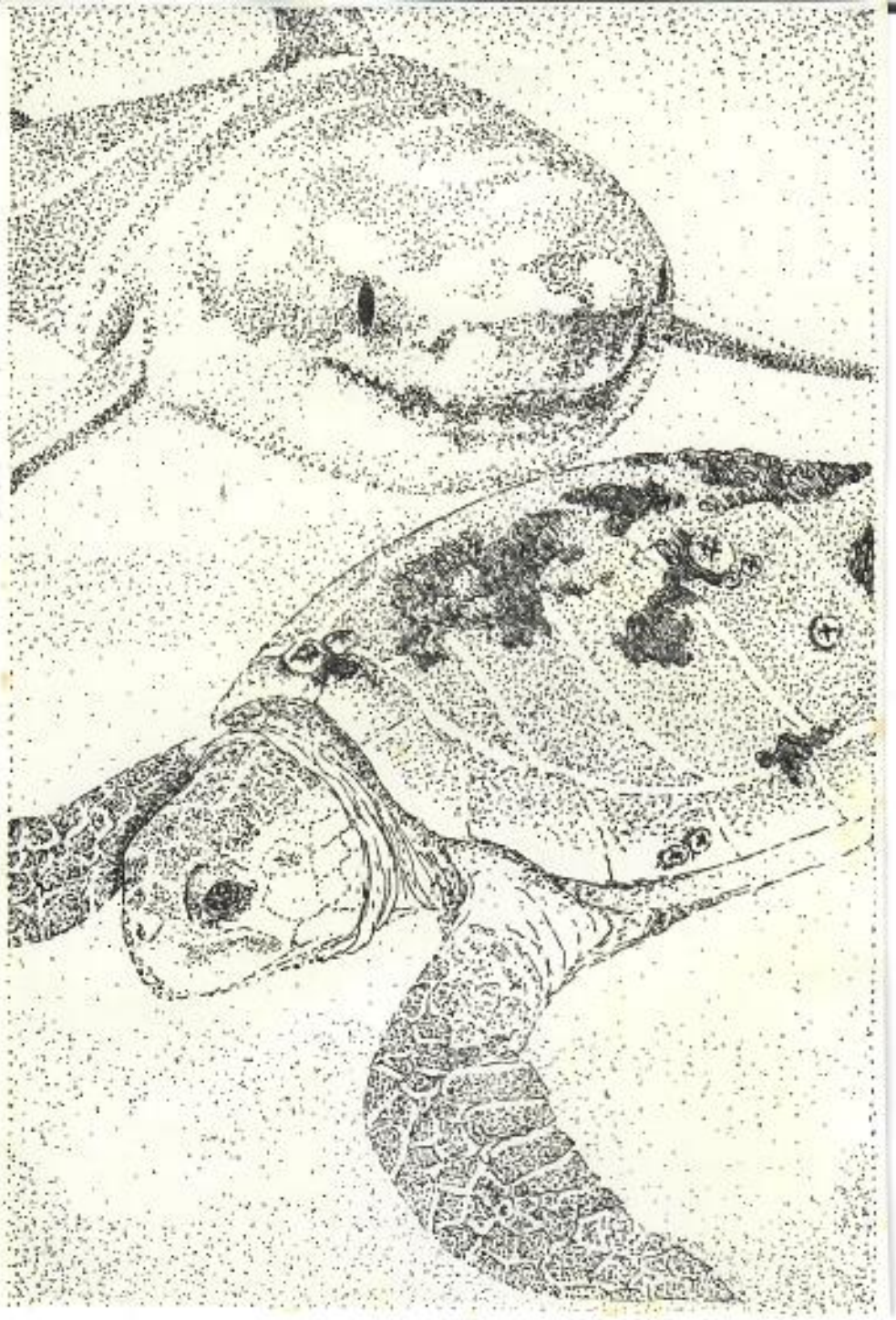

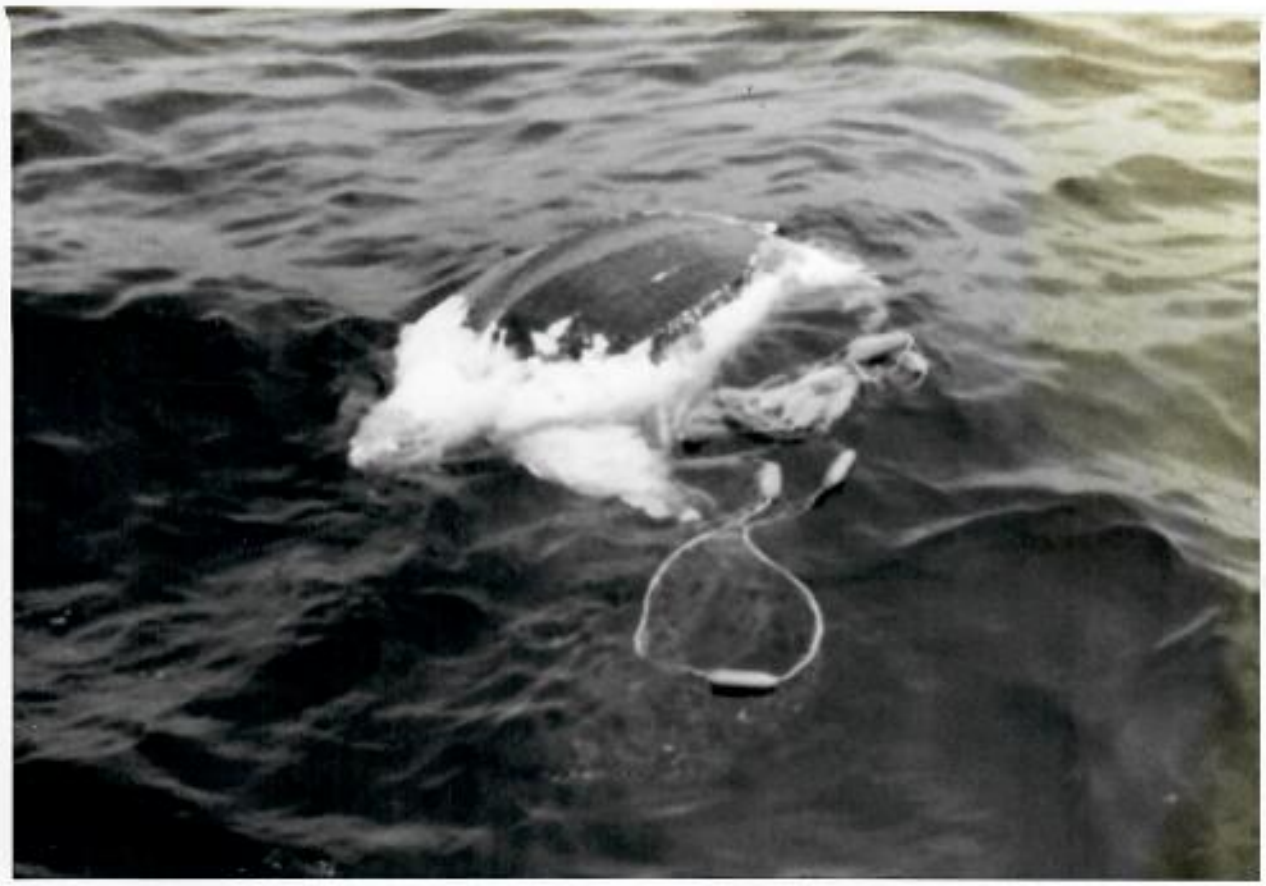

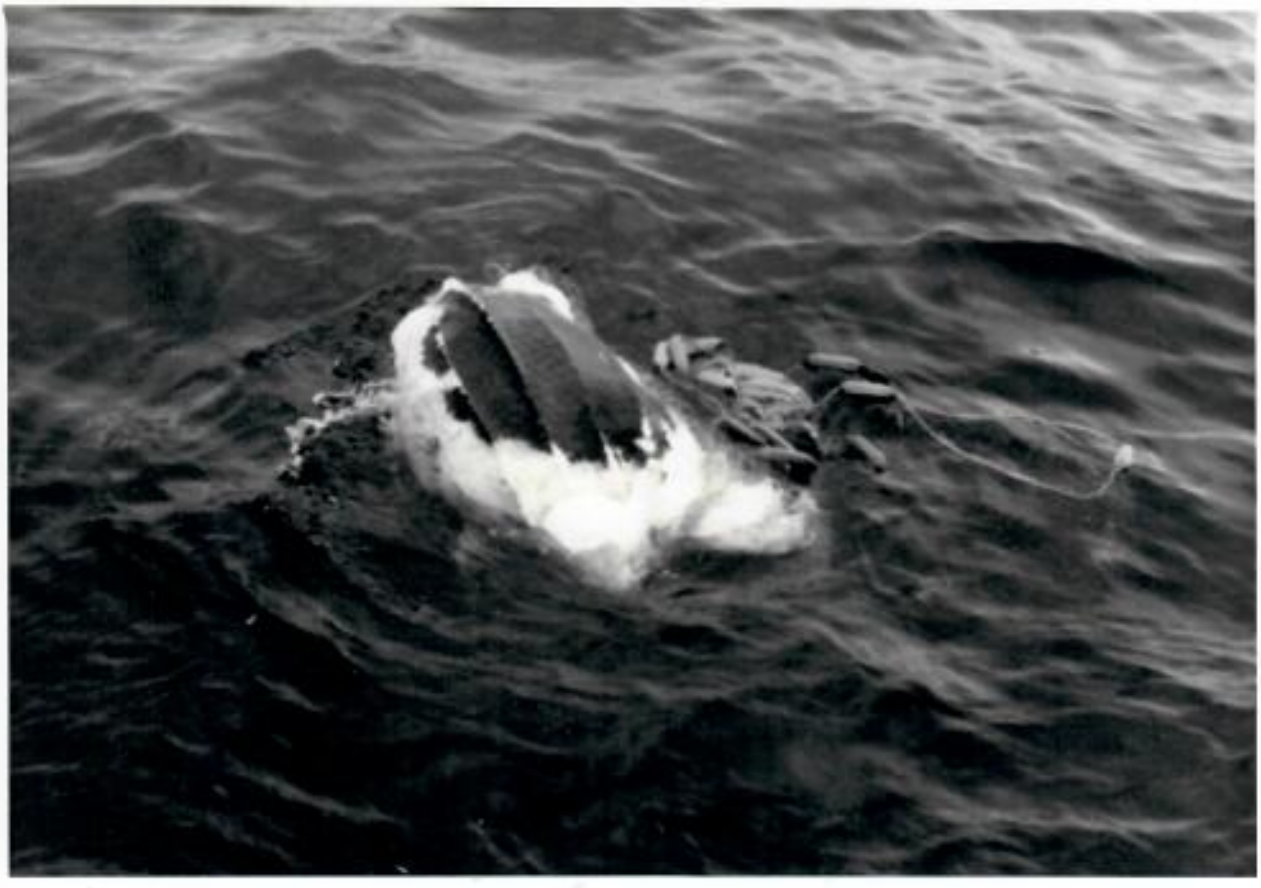


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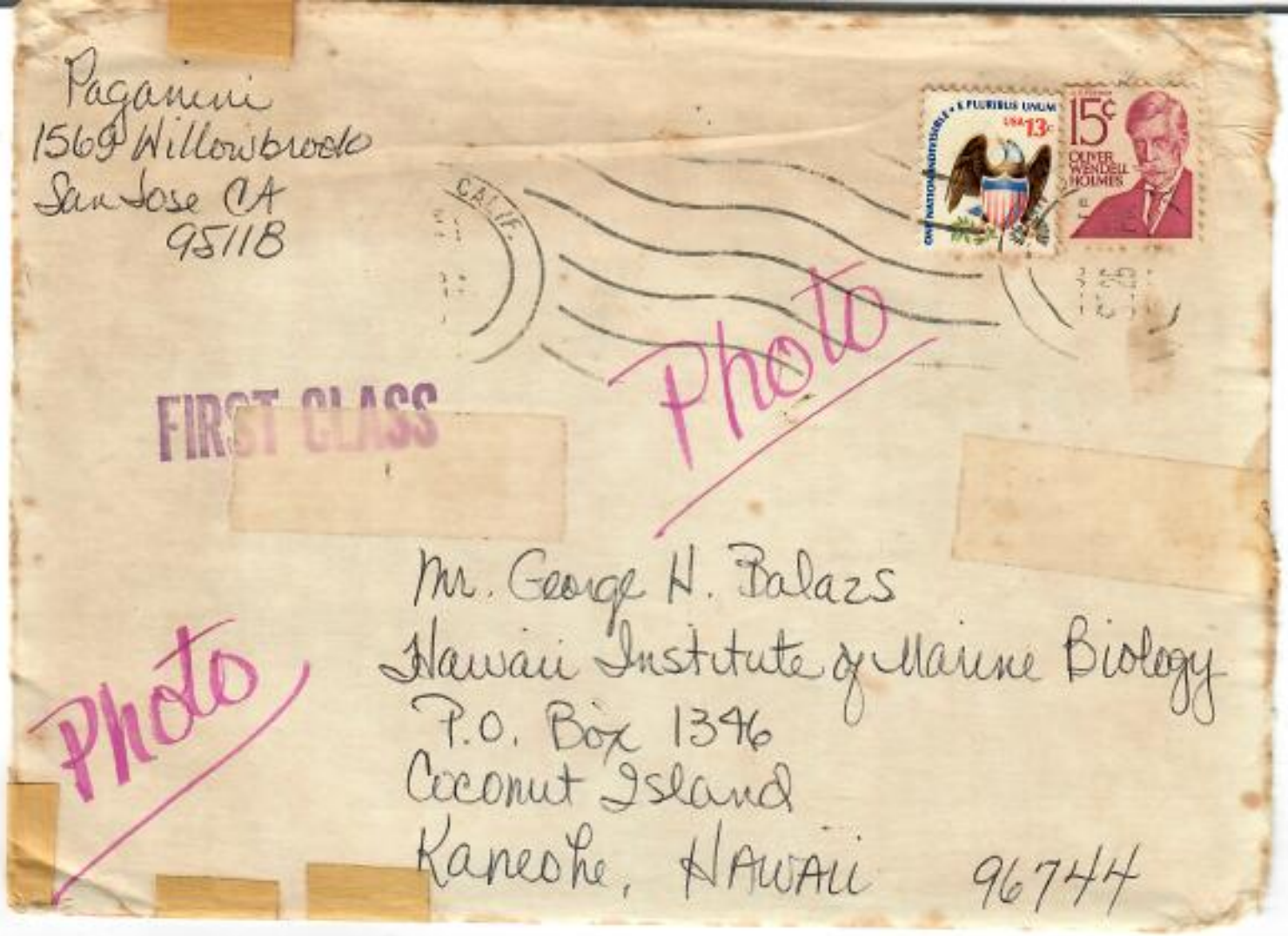

Paganini
1569 Willowbrook
San Jose CA
95118

CALIF.

FIRST CLASS

Photo

Photo

Mr. George H. Balazs
Hawaii Institute of Marine Biology
P.O. Box 1346
Coconut Island
Kaneohe, HAWAII 96744

French Frigate Shoals

front row 3rd from left Joseph E Hutchison

Isle Made For War Now Is Unwanted

1947

By KEYES BEECH
Chicago Daily News Foreign Service

HONOLULU, Oct. 14.—French Frigate, the air field lifted out of the sea in the most fantastic construction project of the Pacific war, is now an unwanted child.

Abandoned by the Navy, unwanted by the Territory of Hawaii, which owns French Frigate Shoal, the tiny air base has been returned to its original inhabitants, the birds and the fiddler crabs.

There was a time when this deserted place, 550 miles northwest of Honolulu, might have influenced the course of the war.

The Battle of Midway demonstrated to Navy strategists the need to get fighter planes from Oahu to Midway, 1,300 miles distant, in a hurry. The catch was that no fighter planes at that time could carry enough gasoline to fly nonstop to Midway.

French Frigate, an almost forgotten shoal aprpoximately midway between Oahu and Midway, was the answer, providing an air field could be built there. Crescent-shaped, 18 miles long and two to three miles wide, French Frigate Shoal is an outcropping of a submarine mountain range that runs all the way from Midway to Hawaii.

The Seabees built the field and its installations, but it was P. N. A. B. (Pacific Naval Air Bases), the vast construction combine which built Navy bases all over the Pacific, that dredged up the coral fill.

The result was an unsinkable aircraft carrier, 3,100 feet long and 250 feet wide, ringed with sheet metal piling to keep it from washing away. The field cost nearly $2,000,000.

The fact that it never paid off was nobody's fault except the Japanese. They never again attacked Midway.

24 Sept 1978

Chives...

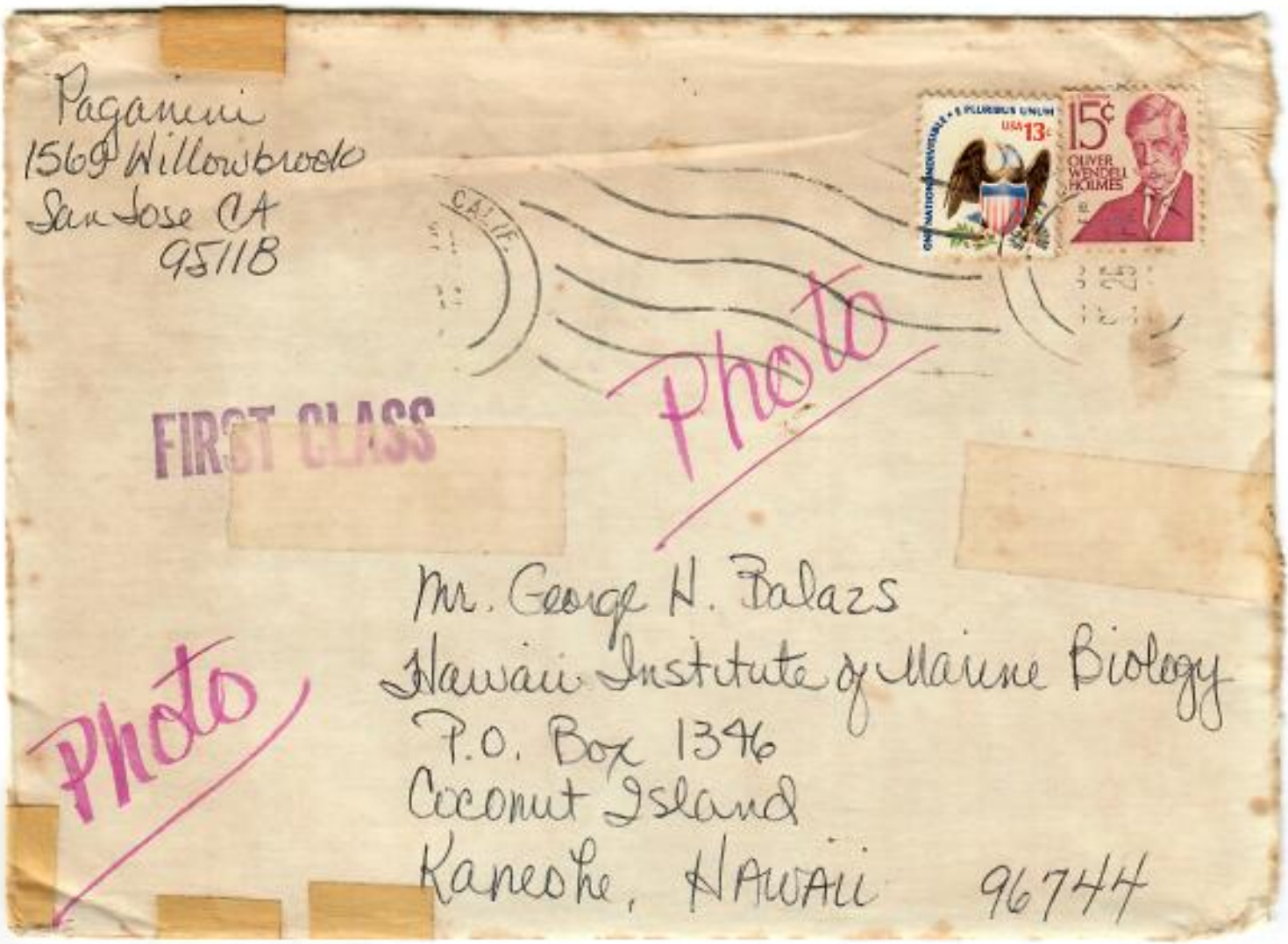
Chives (Allium schoenoprasum) are cultivated for the onion-flavored, edible leaves, and for the heads of lilac-colored flowers which may be used in arrangements. Cut leaves for soups and salads; use in cream cheese mixture; with mashed potatoes; in hamburger; or with eggs in omelettes. Chives can be frozen fresh, or dried for winter seasoning.

Dear Mr. Balazs,

My mother, Melba Hutchison, had asked us to make you a negative of the picture of the 9 men on French Frigate Shoals - please find it enclosed - as well as a 5x7 B+W photo. The original photo was only 2½"x2½" ... therefore the graininess in the 5x7. There are 2 negatives here - #10 is slightly blurred, #11 is a good neg - I'm also sending along a copy of a newspaper article that my Dad had clipped years ago.

I do apologize for taking so long in getting these things ready for you.

Sincerely, Jo Paganini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OLIVER WENDELL HOLMES
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Mr. George H. Balazs
Hawaii Institute of Marine Biology
P.O. Box 1346
Coconut Island
Kaneohe, HAWAII 96744

RARE TURTLE FOSSIL IS UNEARTHED

BAKERSFIELD (AP) — The fossil of a rare sea turtle which inhabited Southern California 150 million years ago has been discovered near here by a Smithsonian Institute archaeologist.

Douglas Emlong unearthed the remains of a species of turtle known as "Psuphorous" in a park 10 miles east of Bakersfield along the Kern River Wednesday.

It is only the second of its kind ever found in this country. The first was dug up on the Palos Verdes peninsula in Los Angeles County, said Emlong, who directs the Smithsonian's west coast operations.

The ancient turtle measured about six feet long and its ribs and vertebrae were evident—an important feature for a fossil discovery, Emlong said.

When alive it probably stretched about seven to eight feet with its head extended, he indicated. It had a soft base and used fins to propel itself through water.

The fossil has been encased in plaster and will be driven to the Washington, D.C., museum in a special truck. Emlong had no estimate of its potential dollar value.

After researching records of other fossil findings in Kern County, Emlong located the shell two months ago in a roadbed. However weather conditions prevented him from digging for it until two weeks ago, and he worked slowly and carefully so as not to damage the shell.

Los Angeles Herald-Examiner July 15, 1977

June 74

D-6 Honolulu Star-Bulletin Tue

Three Isles Designated for Wildlife

7/30/74

One of the Pacific islands quickly converted in 1937 to an airstrip for Amelia Earhart's ill-fated flight is among three recently set aside as National Wildlife Refuges, the Department of the Interior announced today.

The three islands will be refuges for millions of seabirds, thousands of red hermit crabs and also will be nesting sites for rare green sea turtles, according to Lynn A. Greenwalt, director of the U.S. Fish and Wildlife Service.

The refuge area includes the 400-acre Howland Island, which houses a beacon named for Miss Earhart; the 340-acre Baker Island and the 1,100-acre Jarvis Island.

ALL THREE coral islands are located between 1,300 and 1,600 miles southwest of Honolulu. They are not inhabited.

The islands were discovered by New Bedford whalers in the early 19th century and were colonized by Hawaiians in the 1930s when radio and weather stations for air commerce were being set up.

The islands housed as weather stations and airstrips during World War II.

Greenwalt said debris from the war will be cleaned up by the Fish and Wildlife Service and the islands will be restored to help preserve the island ecosnystems, which are of major importance to oceanic birds and to terrestrial and marine life.

Theory of Sea Turtles' Endurance

(C) N.Y. Times Service

NEW YORK — The remarkable endurance and navigational ability of a particular population of green sea turtle, which migrates annually from grazing waters along the coast of Brazil to its nesting ground on tiny Ascension Island, 1,200 miles out in the Atlantic Ocean,

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Turtle rescues woman at sea

Agence Franco-Presse

MANILA — A giant sea turtle has saved the life of a 52-year-old woman lost at sea for two days after a shipwreck in southern Philippines.

She rode on the turtle's back.

The Manila newspaper "Bulletin Today" identified the woman as Mrs. Candelaria Villanueva, a passenger on the Philippine inter-island vessel "Aloha" which burned and sank of Zamboanga del Norte province June 2. Four of the vessel's 271 passengers died in the disaster.

MRS. VILLANUEVA had been adrift for 48 hours when she was sighted by a navy ship on June 4 — riding on the back of the giant turtle. She looked haggard and hysterical.

Navy Lt. Cesario Mana was quoted by the newspaper: "I would not have believed it if I had merely heard about it. But I was an eyewitness myself, along with my shipmates."

Mana said he and his mates initially thought that the woman was riding a "huge oil drum."

THE MEN DID NOT realize it was a turtle until they started hauling up the woman.

After the woman was pulled up into the ship, the turtle "even circled the area twice before disappearing into the sea, as if to reassure itself that its former passenger was already in good hands," said the officer.

The newspaper said the unusual true-to-life rescue story was disclosed at a recent sea-safety seminar held by the coast guard and local shipping associations.

Honolulu Star-Bulletin June 22, 1974

what country has 100,000 turtles 100 banks-12,000 people ...and no taxes?

COUNTRY? The Cayman Islands.

TURTLES? The Green Sea Turtle was nearly extinct five years ago. Today, Mariculture Ltd. on Grand Cayman is home for more than 100,000 captive-bred turtles. It is the world's first and only commercial green sea turtle farm.

BANKS? At last count, 118 from every corner of the globe, including New York, Montreal, Tokyo, London, Zurich, and Frankfurt. What attracted them? Stable government, sound legislation and... no taxes.

PEOPLE? About 12,000 of the friendliest in all the world. No racial strife, no politics (it's a British Crown Colony), no poverty, no unemployment ... just happy hard-working people.

TAXES? Very simply, there are none of the following taxes in the Cayman Islands: Income Tax, Capital Gains Tax, Property Tax, Sales Tax, Corporate Tax, Estate Tax, Inheritance Tax, Death Duty.

THE CAYMAN ISLANDS? One hour by jet south of Miami and 178 miles northwest of Jamaica. An island that lives up to virtually every definition of a "tropical paradise"... with one remarkable additional benefit: it's an investor's paradise as well.

INVESTMENT OPPORTUNITIES? In Grand Cayman, many things change hands—money, gold, property, corporations, securities, to name a few. With its network of banks and satellite communications, the Cayman Islands have become the foremost offshore financial center in the Western hemisphere.

TRAVEL? For daily jet service, call Cayman Airways toll-free at 1-800-432-5595 (inside Florida) or 1-800-327-2504 (elsewhere). For assistance in arranging local accommodations, call Interbankhouse, Inc. in Miami at (305) 358-6555 or Interbancorp Ltd. in Montreal at (514) 285-1321.

INFORMATION? Write, call, cable or telex us in Grand Cayman today for your complimentary copy of "Investment Opportunities in The Cayman Islands".

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TX341 F87 July 1974

food Engineering

CHILTON COMPANY/JULY 1974 VOLUME 46 ■ NUMBER 7

Lloyd E. SLATER – Editor in Chief
Thomas A. MORIE – Publisher

Box 2035
Radnor, Pa. 19089

EVENTS

FOOD ENGINEERING

THE SUPPLY LINE

NEXT ISSUE: Features a special DFISA '74 Show Planner; Better Ways to Calculate Mixes; Detecting and Measuring Trace Elements and much more!

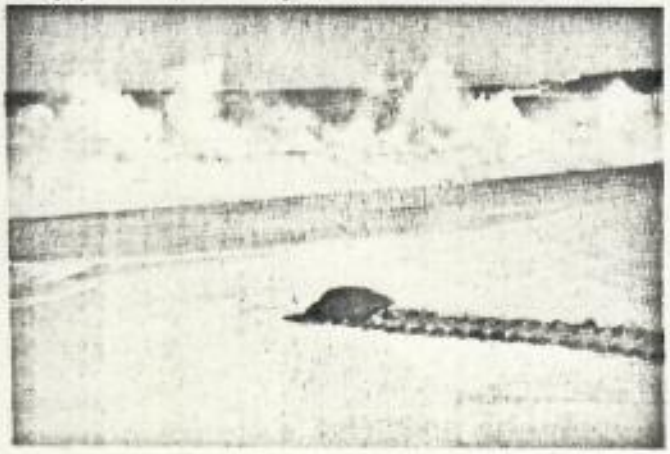
Turtle Livestock Culture: A New Food Technology

EXTRACT: Many futurists predict that by the year 2000 most of man's food must come from the sea . . . and, specifically, from breeding and farming marine plants and animals much as we raise crops and livestock today. Indeed, the basic technique of modern sea farming is developing rapidly and its first practical applications are visible throughout the world. None is more promising than what is now going on at Mariculture Ltd. on the small island of Grand Cayman in the Caribbean. Last year, after three seasons of raising herds of green turtles grown from wild eggs, they finally started breeding in captivity. The result is a new kind of food production that yields at least 50% more high-protein red meat a year in a single shallow acre of sea water than the best that can be done on an acre of prime farmland.

Ten years ago the green sea turtle, long prized and hunted for its sweet, tender meat and shell by products, was nearly an extinct species. Dr. Jacques Costeau, in one of his splendid films, uttered prophetic words: "If the sea turtle is to survive it must be farmed."

Costeau's words, reinforced by the findings of U. of Florida's Dr. Archie Carr, were an inspiration to a group of young scientists and businessmen who formed Mariculture Ltd., the world's first commercial turtle farm in 1969. They built it on Grand Cayman, a British West Indies island due south of Cuba in the Caribbean and fairly close to the few remaining unspoiled hatching beaches on the shores of Costa Rica.

Today, after spending over $3 million to carefully pioneer, often by trial-and-error, a revolutionary new form of farming, Mariculture Ltd. has achieved its first $1 million in sales and projects as astonishing yearly profit of close to $10 million by 1980.



Why the Green Turtle?

In many ways the green turtle, *Chelonia Mydas*, appears the ideal animal to become the world's first domesticated marine livestock. It is about the only animal that, like cattle or sheep, grazes on green grass (in the shallows) and turns it into red meat. While slow growing—it takes about three years under culture to reach a harvestable size of about 100 pounds—protein yield and food value are exceptionally good and almost all parts are used in high return by-products. These virtues are tabulated below:

Comparative Compositions

	% Protein	% Fat	Calories (per 100 gr)
Beef sirloin	*19.0*	*19.0*	*247*
Chicken	*21.0*	*2.0*	*109*
Turtle steak	*23.0*	*0.2*	*102*

Sale Value of Green Turtle Parts

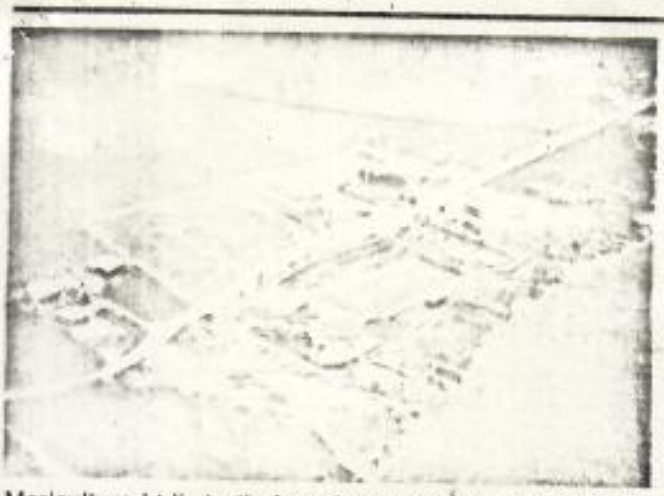
Meat products	*22.7%*
Fat/Oil	*38.5%*
Offal	*1.5%*
Soup products	*5.5%*
Leather products	*12.1%*
Shell products	*19.7%*

It should be noted that turtle oil has many of the same technical characteristics of whale oil and is finding a ready market in the cosmetics industry. Its leather competes favorably with crocodile skin.

The sea turtles' epic migration to lay eggs on the same remote beach each year is well known. In these travels, and during grazing in shallow water, large adults—some weighing up to 800 lbs—are ruthlessly taken for the meat and shells. But a more serious slaughter comes on the beach where the large majority of hatchlings (an average clutch of

SAGA OF THE SEA TURTLE

This adult female green turtle is on her way back to sea after laying a clutch of about 120 eggs deep in a sandy nest on a remote beach in Costa Rica. About 60 days later the hatchlings peck out of the shells, wait for their own shells to harden, and then thrust, en masse, out of the soft sand to scuttle towards the sea. About one in 100 survives the mad dash—most fall prey to predators.



Mariculture Ltd's turtle farm is spread over 6½ acres on the flat subtropical island of Grand Cayman.

Various sized concrete and fibreglass tanks house the turtles during their various stages of growth.

eggs, unmolested, would produce about 120) are eaten by predators before they get to relatively safe deep water. Most scientific findings now confirm that less than one per cent of baby turtles survive and reach maturity in their natural state.

Mariculture & Conservation

The initial concept of Mariculture Ltd. was to gather the fertilized eggs, with the permission of the Costa Rican and Ascension Island governments, and incubate and hatch them in a controlled environment. Then, with an expected hatching yield of over 90%, they would return well over one per cent of the strong young turtles to the sea. As Dr. Costeau suggested, this would be a substantial contribution to the conservation and replenishment of wild stock. This concept has proven successful, and by 1973 they had released over 3,400 domesticated turtles, over five per cent of their stock.

In a small prototype farm, established on natural sea pens, the young firm raise 30,000 fingerlings in 1970. They then decided to build the land based farm, shown in the photos above, utilizing controlled environment pens. By 1973 they had 100,000 turtles, at all levels, in pens and were processing for market at the rate of about 60 animals per day.

A major breakthrough came in April, 1973, when turtles were induced to mate in captivity. An artificial "nesting beach" was quickly established and the pregnant females started laying their eggs on the farm 35 days later. Aside from the enormous savings (in collecting eggs) this achievement brings, it opens the door to genetic selection for faster growing, higher yield and healthier animals. In a word, this new self-contained marine animal culture now faces all of the great possibilities man has achieved with domestic livestock.

Farm Activities

Mariculture's initial farm—a second with four times the productive capacity is being planned—occupies 6½ acres of seaside land. Its total stock of turtles is housed in 123 tanks (concrete and fibreglass), augmented by a 1-million gal. breeding pond and adjacent nesting beach. A central pumping system flushes 2.6-million gals of fresh sea water through the pens and tanks every hour.

Fertilized eggs are incubated in styrofoam boxes for about 60 days. After the hatchlings peck out of the shell they are placed, with yoke sack still attached providing nourishment, in covered plastic trays. After the yoke is absorbed and the shell is hard enough (on the beach at this stage they would be ready to dig out of the nest to face a cruel world) the little turtles are placed in 10-ft circular tanks and fed on specially formulated pellet food. When they reach saucer size they are moved into 30-ft tanks for a year and later into even larger ones. They are processed after three years when over 100 lbs. In the processing plant about 60 per day are dispatched with a captive bolt pistol and the carcass disassembled. The meat is tenderized, weighed, packed, and stored in a large walk-in freezer.

Shells go to a workshop near the main building where they are turned, by skilled local girls, into ornaments and jewelry. The fat is casked and sent for processing into refined oil.

Mariculture Ltd. has put a large portion of its investment funds in research and has a laboratory and full-time staff investigating optimum turtle nutrition and growth densities as well as medical, health and genetic selection procedures. They are also into a promising program of "poly-culture," that is, the rearing of other species such as various crustaceans, on turtle detritus.

A Lusty Connection

One of the founding financial supporters of Mariculture Ltd. in 1969 was John Lusty Ltd., the long established British turtle soup canner. Most of the calipeen—the scraped and sun-dried belly plates of the turtle—is shipped to Lusty for turtle stock. This blended with another stock made from whole turtle meat plus vegetables, beef, mature turtle meat, 23 herbs, and after much straining and clarification, plus a final touch of Madeira wine, yields the company's famous soup.

Building on its dependable new supply of fresh frozen turtle meat, this past year Lusty's introduced turtle steak and turtle stew to the European market. Signs are that it will make an even greater impact on the culinary world than their original canned soup did over 100 years ago. □

INTERNATIONAL UNION FOR CONSERVATION OF NATURE AND NATURAL RESOURCES

SURVIVAL SERVICE COMMISSION

Special Meeting on Commercial Exploitation
of the Marine Turtle Resource
Miami; November 22-23, 1974

PROVISIONAL AGENDA

First Day: Background information. Chairman: Professor A. Carr

1.	Statement from IUCN.	T. Mence
2.	Review of Survival Service Commission position on threatened species conservation in global context, with specific reference to marine turtles.	T. Harrisson
3.	Immediate problems in conservation of marine turtles in Americas and elsewhere.	A. Carr
4.	Egg collecting and farming.	S. de Silva
5.	Tourist factors in turtle conservation.	G. Hughes
6.	Individual presentations by participants.	

Second Day: Immdiate problems. Chairman: Professor T. Harrisson

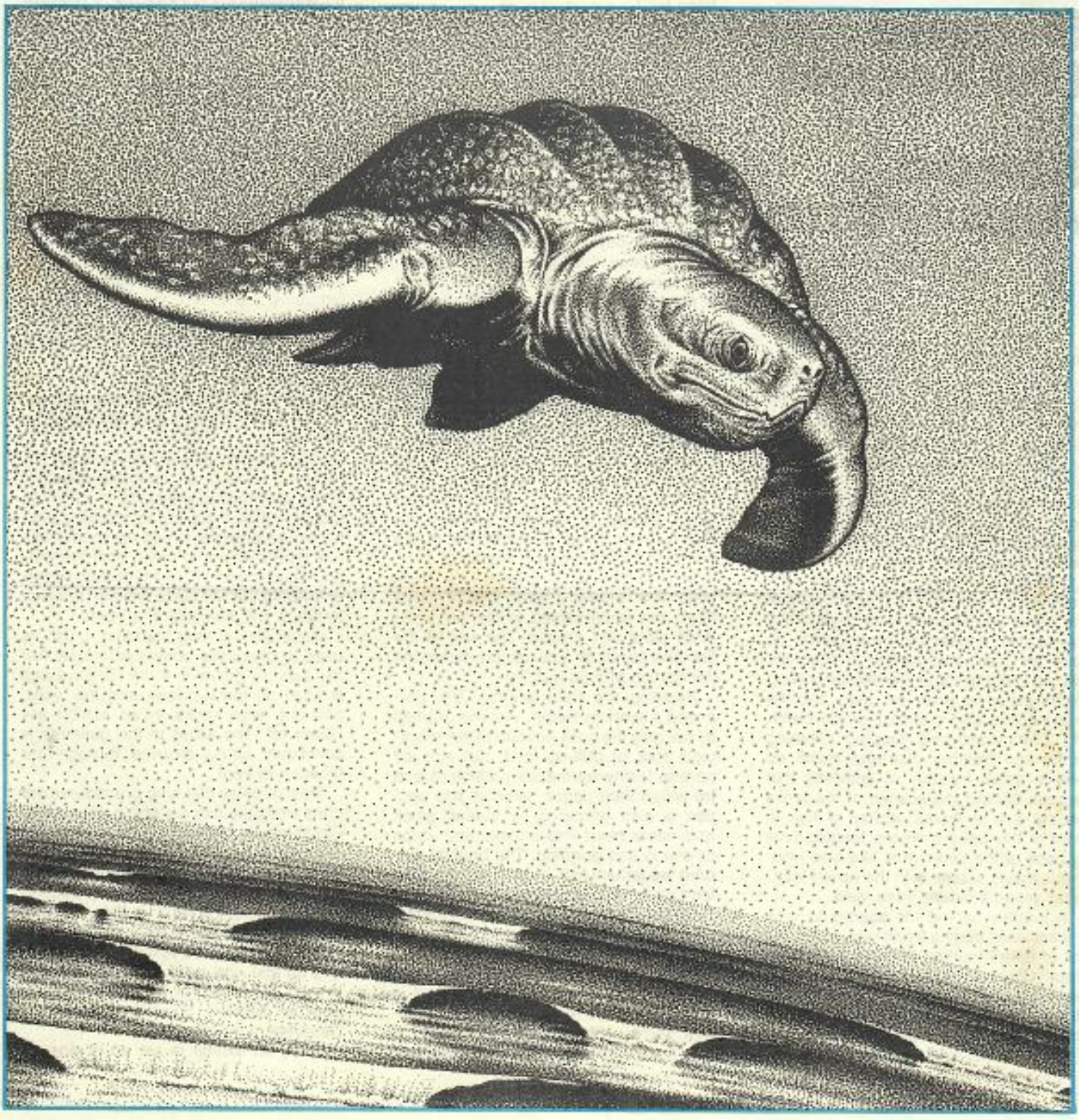
7.	Trawling and exploitation at sea.	Carr/Harrisson
8.	Souvenir trade.	SSC Memoranda
9.	Analysis of world market: supply and demand for turtle products.	
10.	Place of turtle farming.	
11.	Legislation.	
12.	Conservation imperatives.	
13.	Principles of conservation for marine turtles.	

AJM/MF/21st November, 1974

aquaticus

JOHN G. SHEDD AQUARIUM

Volume 6, No. 4
December 1974



Through the Looking Glass

Behind the Scenes at Shedd Aquarium

By Kris Hansen

When visitors and members of the Shedd Aquarium enter the large revolving doors in the front portico, another world awaits them in the six galleries and Balanced Aquarium Room—a world of slithering green moray eels and winsome harbor seals, foreboding piranhas and colorful cichlids. This fascinating underwater world is open to children and adults alike for the price of admission.

There is an equally fascinating world, however, open only to the employees of the Aquarium. This world consists of the day-to-day endeavors of aquarists to care for the basic needs of the fish, marine mammals and invertebrates living in the galleries, reserved areas and the many nooks and crannies of the building. Dietary planning, feeding, cleaning tanks and treating diseases make up only a small fraction of activities that happen behind the scenes of the tanks people see. A frantic scurry of fish in front of the visitors means feeding time in back of the tanks. It is like one wondrous movie screen with the varied technical aspects hidden from view.

A journey behind the scenes to view the activities begins when one enters the set of doors marked "Please Keep This Door Closed" and "No Admittance," warnings to wandering trespassers. Rows of green, sunlit cement tanks are to your left with large skylights overhead. Taking a closer peek at the tanks usually means literally standing eyeball to eyeball with a curious angel fish or sheepshead taking a peek at you.

Walking past playful harbor seals and the gigantic jewfish, you are greeted with a scent not unlike something out of the frozen food section of the grocery store. You have found the center of activity for this section—the workspace.

There are three sections of the Aquarium—salt water, fresh water and the Balanced Aquarium Room—and each section has its own workspace enabling the aquarists to cut, mince or grind the fare for the day. It is equipped with sinks, freezer space, cutting and storage areas.

The two large freezers and one cooler at the Aquarium hold up to 7,000 pounds of smelt, mackerel, herring, horse heart, shrimp, brine shrimp and squid for consumption by the Shedd menagerie and every Monday and Thursday mornings a veritable smorgasbord is prepared from these frozen morsels.

In the salt water section, Galleries I, II and III, aquarists cut smelt, de-tail shrimp and make a "hamburger" mixture by grinding up a combination of smelt, shrimp, horse heart, spinach and Purina Trout Chow. It is then fed to the fish in the form of small meatballs.

In Galleries IV, V and VI, the fresh water fish receive a basic diet of horse heart and smelt served whole, cut up in three sizes and ground. The size of the fish and its mouth size usually determine the portion of food it is fed.

Entering the third section, the Balanced Aquarium Room, you are greeted by not only the busy hubbub of the morning's task of cutting food, but also by several feathered mascots flitting to and fro within their cages. Food in this section is also prepared by cutting smelt and horse heart into chunks and strips or dicing and grinding. The brightly colored aquarium fish in this section also feed on live tubifex worms, brine shrimp, Tetra Min dry food and live glass worms. (The birds are fed bird food and leftovers from the aquarists lunches!)

Then, later that afternoon, the food that has been prepared that morning is fed to the eagerly awaiting fish. Somehow some of them seem to sense that they are going to be fed as though a bell had been rung signifying "CHOW TIME!"

Most of the 4,605 marine specimens at the Aquarium are fed by hand—not taking the food directly from the aquarist, however, but letting it drift slowly down into the tank. They then confront and devour it. The aquarist stays at each tank until the fish have had their fill so as not to have left over food resting on the floor of the exhibit. Food is placed on the bottom of the tanks, however, for the bottom feeders like the horseshoe crabs, lobsters and the various mollusks, as they do not come up to feed.

The whole feeding process takes approximately an hour and a half per gallery and does not include the exhibits of the penguins and Chico, the porpoise, that have been set up to mechanically put them through a series of paces before receiving their food.

On the other days of the week the aquarists are occupied with such domestic tasks as cleaning and adjusting the exhibits.

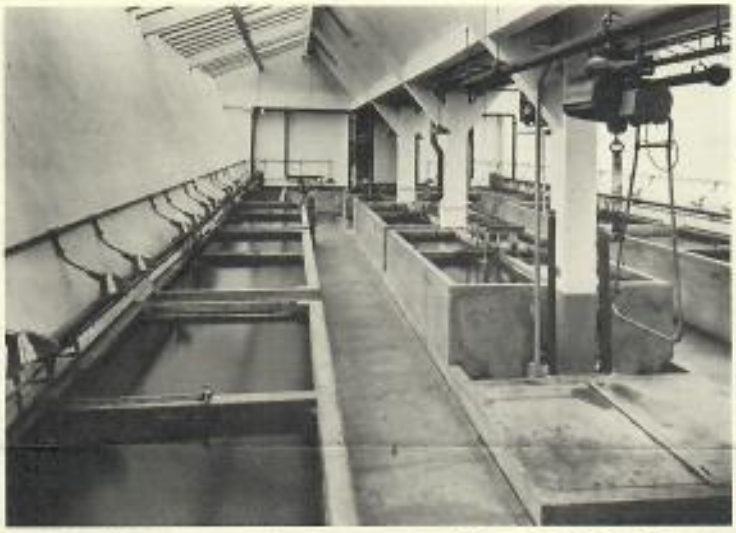
Cleaning the 203 exhibition and 175 reserved tanks is an on-going process. There are several elements to cleaning a tank just as there are to cleaning your home. An aquarist would no sooner use one type of brush to clean both the windows and the gravel in a tank than someone would use the same solution to clean furniture and floor tile in a home.

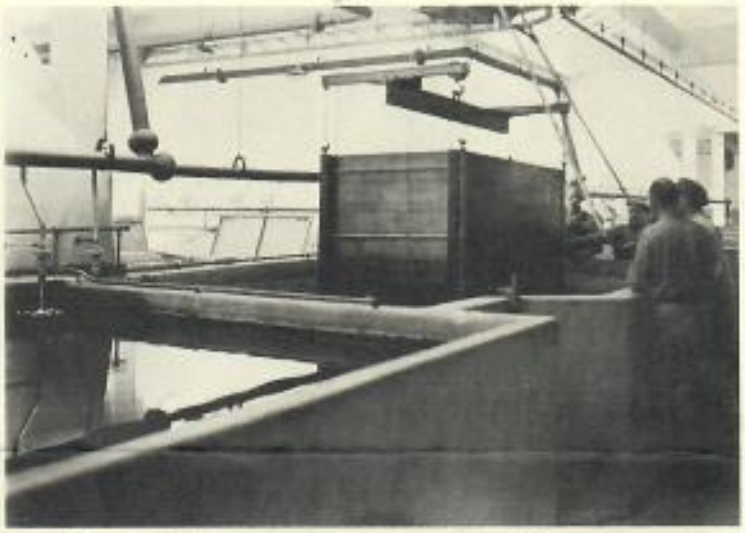
Generally, a long handled brush is used to clean the bottom of a tank that has sand or gravel in it, an abrasive pad is used on the windows and the walls, and the large rocks in an exhibit are hosed off. The water in the galleries is constantly being cleaned through our filtration system.

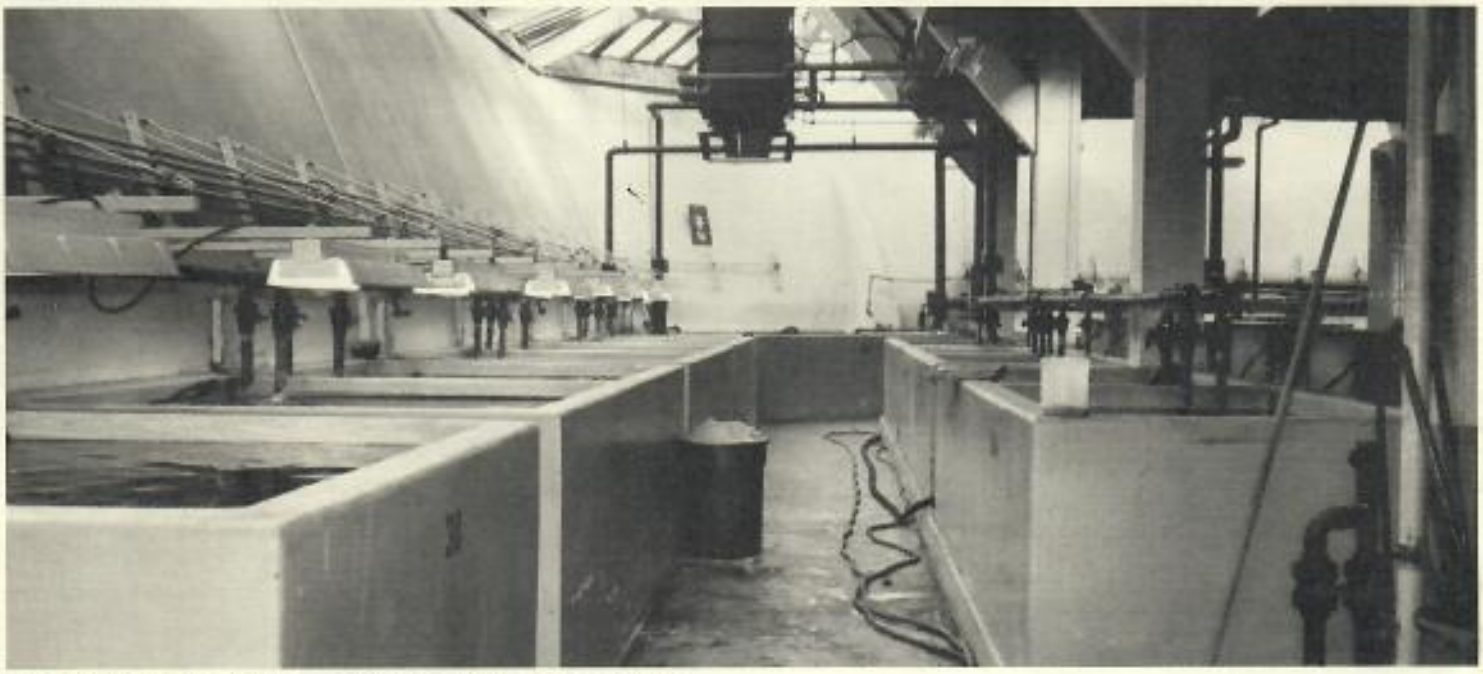
Most of these cleaning procedures are done while the fish are still in their tanks. Occasionally an exhibit is completely stripped to be cleaned or to add chemicals. However, this is not done often because if the fish are handled frequently they lose their protective slime coating, exposing them to bacteria and disease.

The aquarists are responsible for setting up and changing many of the tanks in their galleries. For the larger or more unusual displays, however, the Exhibits Department is called in.

Once an exhibit is set up, it doesn't







Upper left: Gallery I as it appeared in the late thirties and early forties.
Upper right: Tankmen unload cargo "in the old days."
Below: Gallery II as it looks today.

usually change unless the fish are moved to a new tank so the aquarists must be very careful in their decisions in decorating a tank. Rocks, corals, sand and plants must be indigenous to the area of the fish. Their objective is to make the decorations look as natural as possible for both the fish in the tank and the people looking at them from outside in the galleries.

The behind-the-scenes trek terminates near a black and blue door that, when opened, leads to a cubicle-type office which the aquarists share as they take on added responsibilities as divers in the Coral Reef tank. Ken Terrill, Mike Rigsby and Rob Mottice are certified divers and rotate on a feeding schedule in the tank.

Feedings are at 11 a.m. and 2 p.m. daily and the aquarists suit up in their scuba gear in the diver's room and walk to the Reef tank with the bucket of food in tow. The food has been thawed out before the dives and includes such delicacies as herring, mackerel, shrimp and smelt. Once on top of the tank, they call the receptionist to announce the dive and then begin to adjust their fins and the specially made face mask in the "holding tank" area. The face mask has a communication device by the ear so that the tender can call down to the diver. The tender is always at hand on top to keep an eye out for sneak attacks by the two moray eels or a stray turtle.

Once inside the tank, the diver turns into a dietitian for the 200 plus marine animals. The turtles eat herring and mackerel when not attempting to feed on the diver's fingers. The eels also like the mackerel. The sharks, not being man-eaters, usually feed on herring and smelt.

When not feeding in the Coral Reef, one or more divers suit up and dive to the bottom to clean the tank. Abrasive pads and wire brushes are used in much the same manner as in the smaller tanks but, of course, in a much larger area.

In addition to the aquarists who are certified divers, Howard Karsner, Bill Gwozdz and Ralph Bodamer participate with the others in a rotating weekend work schedule.

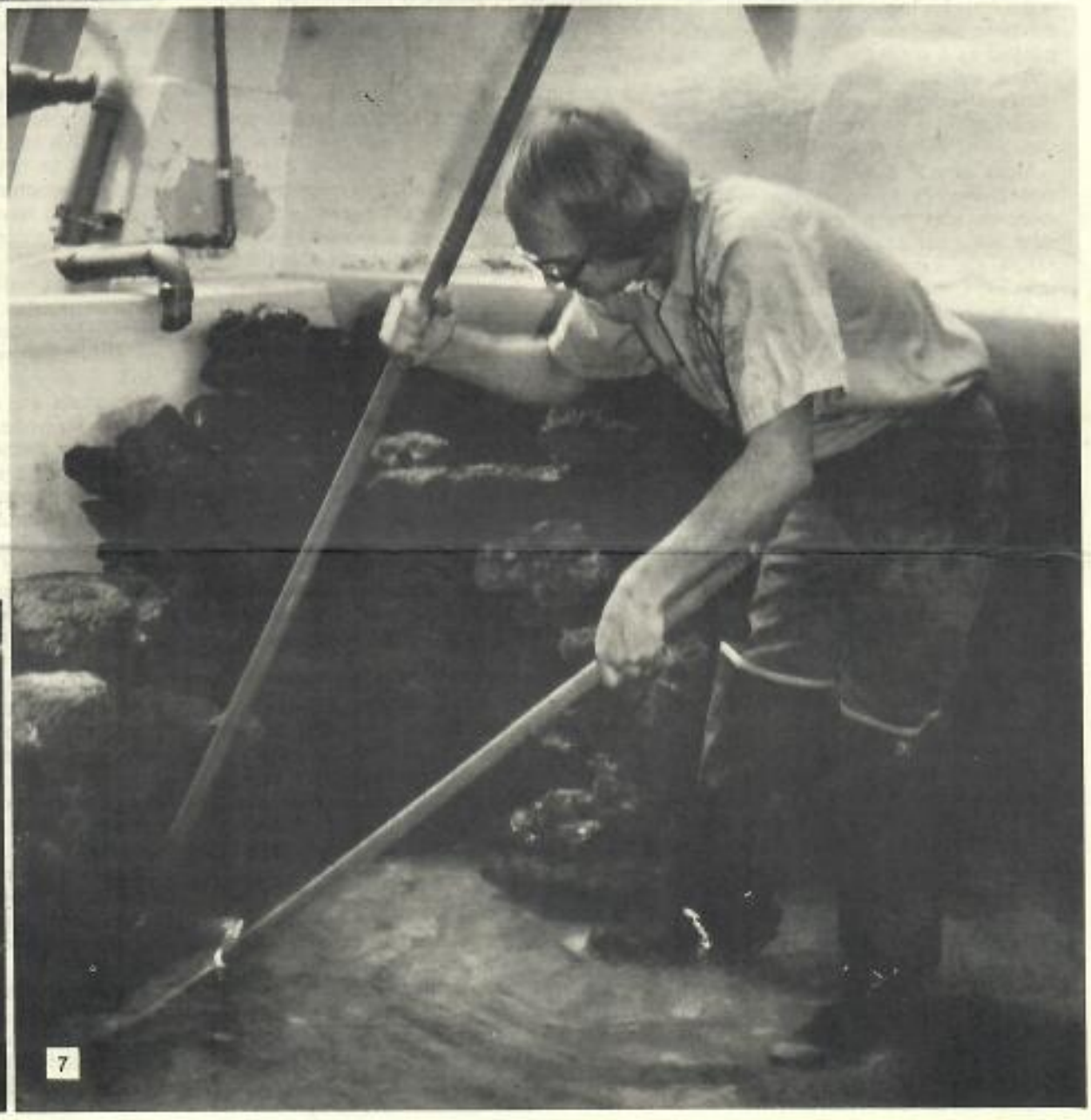
The aquarists are needed seven days a week. Preparing food, feeding fish, cleaning tanks, diving into the Coral Reef tank—it's all a never ending struggle to keep the Aquarium's assorted marine creatures healthy. ▶

1. *Howard Karsner fills a display tank.*
2. *Mike Rigsby arranges rocks in a new display.*
3. *Ken Terrill makes ready for the feeding in the Reef tank.*
4. *Bill Gwozdz feeds brine shrimp to his small charges.*
5. *Ralph Bodamer chops the menu for the day.*
6. *It's chow time in the Coral Reef!*
7. *Rob Mottice catches a specimen that is to be taken out to be cleaned.*

3

4

hile the tank is drained and



7

THE HOME AQUARIUM

By Roger Klocek

VI

Sea Water

If one has access to *pure* sea water, it would be very beneficial to use it in the aquarium. Even for the marine aquarist living at the seashore, obtaining unadulterated, uncontaminated ocean water is not an easy task. Inshore water can contain toxic compounds from industrial wastes, pesticides, or harbor pollutants. One should either go several miles offshore to collect uncontaminated water, or be *positive* that the inshore water is safe to use. Even water which looks clean may harbor toxic dissolved substances.

Any aquarist can obtain commercially available synthetic preparations of sea water from his local marine supplier. The synthetic sea water mixtures are usually packed as a large container of dry salts and a vial of concentrated trace elements. The dry salts may be mixed in the aquarium with dechlorinated tap water until all of the salts are dissolved.

Many minute quantities of trace elements are not found in the synthetic mixtures, and the proportions of major salts may not exactly match those of natural sea water. However, the mixtures work extremely well, and have been used by a host of aquarists in research and public institutions throughout the world.

Delicate fishes and invertebrates do very well in the synthetic mixtures and some of the only successful spawnings of marine animals have been accomplished using synthetic sea water.

p.H.

The p.H. of water tells how acidic or alkaline it is. A reading of 7.0 p.H. means the water is "neutral." A p.H. of less than 7.0 means the water is acidic, and if the p.H. is over 7.0 it shows the water is alkaline. Sea water has an average range of between p.H. 7.5 to p.H. 8.4. Aquarium water is normally kept between p.H. 7.8 to p.H. 8.2. Aquarium water will often show a drop in p.H.

For optimal health of marine animals, it would be advantageous to keep the p.H. at a stable level. This can be done by having at least half of the aquarium gravel composed of *dolomite* (a limestone containing magnesium), or crushed oyster shell. A good growth of algae will also help to maintain a high p.H. If the p.H. falls below 7.8, and does not stabilize, then the addition of very pure sodium carbonate (obtainable from a druggist)is helpful. No more than ¼ teaspoon of the carbonate should be added to the aquarium per ten gallons of water within a 24-hour period. A p.H. test kit from marine dealers is fairly inexpensive and will help the aquarist to determine his p.H.

Lighting

The aquarium should be placed where it will receive some sunlight. This will help provide some natural light, which is beneficial for many invertebrates and algae. Also, it will allow the animals to become gradually accustomed to the morning light, rather than being shocked out of their rest by the turning on of artificial lighting in a darkened aquarium. There are several types of lighting systems available for aquariums.

Fluorescent lights, especially those designed to enhance plant growth and specifically sold for aquariums are desirable. These lights enhance the colors of marine animals and plants, and don't heat up the water as much as incandescent lights. For "low" style aquariums, one watt of output per gallon of water is sufficient to produce good algae growth, and to show off the display specimens well. In a place where the tank gets little or no sunlight, two watts per gallon would be more suitable for the aquarium. "High" form tanks will require at least two watts per gallon of water.

Incandescent lighting produces more of a heat buildup in the aquarium than fluorescent lighting, and doesn't bring out the colors of display animals. Wattages of between ½ to two watts per gallon is sufficient for "low" style tanks, and double this is required for "high" form aquariums.

Natural sunlight is the best illuminator, and helps living corals flourish. If one can situate the aquarium where it will receive copious amounts of sunlight without becoming too warm, then artificial lighting may not be required.

Algae

After a month or so of aquarium operation, the aquarist will notice that a green or brown film of algae starts to grow on the aquarium rocks and glass. The best course for the aquarist to follow is to allow the algae to grow and flourish. Algae are very good biological filters, as they utilize nitrogen compounds as a growth source, and take them out of solution from the water. If allowed to accumulate, the nitrogen compounds can accumulate to toxic, though sublethal, levels. Algae will also keep the p.H. of the water up by utilizing carbon dioxide which the fish give off as a waste product.

Both green and brown algae serve as a food source for many fish which need vegetable matter in their diet, such as tangs, parrot fish, angel fish, butterfly fish, etc. Grazing invertebrates, including many snails, sea urchins, nudibranchs, crabs, and others, either feed on algae exclusively, or include a significant portion of algae in their diet.

Algae do not cause parasites or disease-producing organisms to flourish any more than a non-algaed aquarium does, nor is it a "pollutant," as some older aquarists visualized it. Algae are a natural, beneficial, and necessary part of any aquarium display. At the worst, algae concentrates contain trace elements from the water. With new fresh water being added to the aquarium to make up for evaporation, and the constant addition of food, which invariably contains trace elements, the worry that algae will incorporate all of the trace elements into its system is unfounded.

To cultivate algae, one would do well to procure a small amount from his local dealer, or to obtain a piece of "living rock," on which algae and myriad small invertebrates have become established. Good lighting conditions will help algae to flourish. After several months, most green algae will appear as fine filamentous growths. Brown algae will rarely become filamentous in an aquarium, and will assume a more encrusting growth habit.

Aquarists are often appalled to see their starkly white, bleached corals, used in aquarium decoration, becoming tinted with brown or green algae. Usually, the first reaction to such algae is to remove the corals to scrub and bleach the algae out of them. This is unnecessary and could be harmful to the fishes.

Most corals, when alive, are varying shades of tan, yellow, brown, green and combinations of these colors. Aquarium algae, as they tint the corals, make them look much more realistic and naturalistic.

Secondarily, any disturbance in the aquarium, once it is set up, is to be avoided. Delicate fish may become stressed due to the disturbance, swim frantically around and possibly injure themselves, or in extreme cases, die quickly of "shock." When cleaning corals with chlorine bleach, there is a chance that some of the chlorine will leach from the coral into the aquarium and kill the animals, if the corals are not washed thoroughly first.

The aquarist should regard algae as the next best thing to an undergravel filter, and only clean the viewing glasses of the aquarium with a brush or scraper if any algae obscure his view. □

Topical Tomes

The Complete Book of Saltwater Aquarists. Robert A. Stevenson, Jr., New York: Funk & Wagnalls, 1974. $6.95

While no book on marine aquarium keeping is complete, Mr. Stevenson does an admirable job of introducing the beginning salt water aquarist to the fundamentals of setting up and maintaining marine aquariums and their delicate inhabitants. There is also much information included which could be enlightening to the more advanced aquarist.

There are several points which seem to have been overlooked by Mr. Stevenson. The explanation of a piece of equipment known as a protein skimmer includes a good description of the advantages of its use, but not of its disadvantages. The section on lighting glosses over the fairly inexpensive and non-corroding strip lights now available for marine aquariums, while going into detail about do-it-yourself lighting systems which could be problematical for the beginner.

Despite other minor flaws, the book has very good sections on the collecting of marine specimens, fish behavior and decorating the aquarium. The black and white photographs and drawings are clear and well reproduced. This would be a good companion volume for any beginning aquarist, along with the drier technical treatments of procedures for maintaining marine animals. □

SEA TURTLES RETURN TO THE WILD

In the interest of conservation, the Aquarium has returned three loggerhead turtles to the wild in John Pennekamp State Park, the country's only continental underwater park, located off Key Largo, Florida.

The loggerheads left Chicago in the Aquarium collecting truck for the two-day trip to Florida accompanied by Donald Zumwalt, Aquarium curator of fishes. The truck will return to Chicago with specimens collected in the Florida Keys on the Aquarium collecting boat.

Sometimes referred to as the garbage disposals of Shedd Aquarium because of their voracious appetites, the turtles were carefully weighed and measured before making the trip. The largest weighed in at a healthy 92 pounds and measured 22-1/16 inches. The turtles were all between 3-1/2 and 5 years old.

Supervised by the Florida Department of Resources, the turtles were tagged before being released so that their patterns of growth and migration can be observed and recorded. The Miami Seaquarium also assisted in the venture.

William P. Braker, Aquarium director, noted, "Numbers of sea turtles are declining and some species have reached dangerously low levels. Although the loggerhead is not in danger of becoming extinct, returning these animals to the wild will enable further study of their habits and development."

Loggerheads similar to these can be seen in the Coral Reef exhibit where they are fed twice daily by divers during the regular feeding shows at 11 a.m. and 2 p.m. □

Here's a fellow who seems to enjoy tipping the scales, and he probably also enjoys swimming in the Atlantic Ocean where he now lives in the wild.

Brown Pelican Population Increases

California's only nesting colony of brown pelicans appears on the road to recovery with the report that 305 young were hatched this year in contrast to one produced in 1970, according to the Wildlife Management Institute.

California Department of Fish and Game and U.S. Fish and Wildlife Service biologists found pelicans nesting on West Anacapa Island, the Channel Islands National Monument, and nearby Santa Cruz Island. Similar reports of successful nesting on several islands off Mexico are encouraging signs that pelicans are recovering from reproductive failure attributed to ocean pollution by DDT.

The Department of Fish and Game said that National Park Service action closing West Anacapa Island to public access during the nesting season contributed to the nesting success. □

Please Pass the Salt

How many recipes have you seen calling for 62,000 pounds (that's 31 *tons*) of salt? Well, that's what the recipe for making salt water at the Aquarium requires and that's more than a few bags of salt—620 to be exact! There are 100-pound bags in every nook and cranny of the Aquarium waiting to be mixed with trace elements in just the right amounts for our salt water reservoirs.

In the past it cost less to bring the salt water by barge from Florida to the Aquarium and the last shipment was received three years ago. Now, though, with the rising cost of transportation, it will be more economical to make our own.

The Aquarium reservoirs hold about 1,000,000 gallons of salt water. The 62,000 pounds will make a total of 285,000 gallons, or a bit more than one-fourth of the total supply.

The salt water is mixed in a 600-gallon tank with an electric mixer. Twelve 100-pound bags of salt are added to the water and dissolved. The water is then transferred into the large reservoirs through a garden hose. This supply will last indefinitely except for small amounts that are lost through evaporation. □

Director Attends International Meeting

William P. Braker, Aquarium director, recently returned from Basel, Switzerland, where he attended the annual meeting of the International Union of Directors of Zoological Gardens as an observer. The IUDZG is the important international body of zoo and aquarium directors and is open to membership by invitation only. Prince Bernhardt of the Netherlands, president of the World Wildlife Fund, was the principal speaker.

While abroad, Braker also visited the Amsterdam Zoological Gardens and Aquarium; the Frankfurt Zoological Gardens; the Aquarium of Berliner Zoo; the Wilhelma Zoological Garden, Stuttgart; and zoos in Antwerp, Basel, Bergen, Copenhagen, Helsinore, Köln, and Zurich. □

How thick is the ice in the Arctic Ocean?

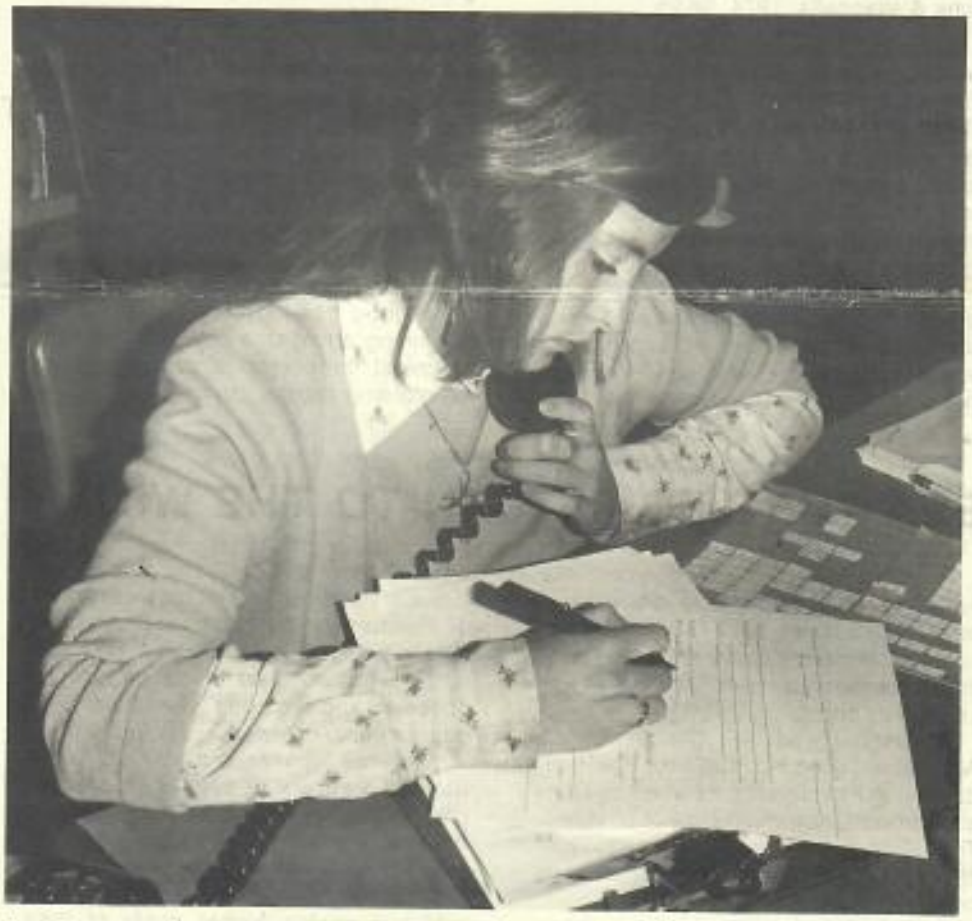
The average thickness of the Arctic ice pack is about 9 to 10 feet, although in some areas it is as thick as 65 feet, with pressure ridges extending downward into the ocean as much as 125 feet.

The atomic submarine *Nautilus*, passing beneath the North Pole on August 3, 1958, measured a pressure ridge extending 25 feet down. The depth of the ocean at the North Pole was recorded as 13,410 feet; depths as great as 13,776 feet have been recorded near the Pole.

Ice floes ranging from 7 to 13 feet in thickness have been reported in the Arctic. Icebergs, which are pieces of glacial ice floating in the sea, are many times thicker than sea floes. □

—National Oceanographic Data Center

Ann Roegge Joins Education Staff



Ann Roegge, a fourth year student at Antioch College in Ohio, is the new assistant in the Education Department. Ann is a native Chicagoan and is majoring in education. She is presently working on translating educational materials into Spanish for the department.

Cover: An illustration from the spectacular 1974 Aquarium calendar now on sale in the Aquarium Sea Shop.

John G. Shedd Aquarium
1200 South Lake Shore Drive
Chicago, Illinois 60605

Non-Profit
Organization
Permit No. 7167
Chicago, Illinois

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WSZE - SHUTD

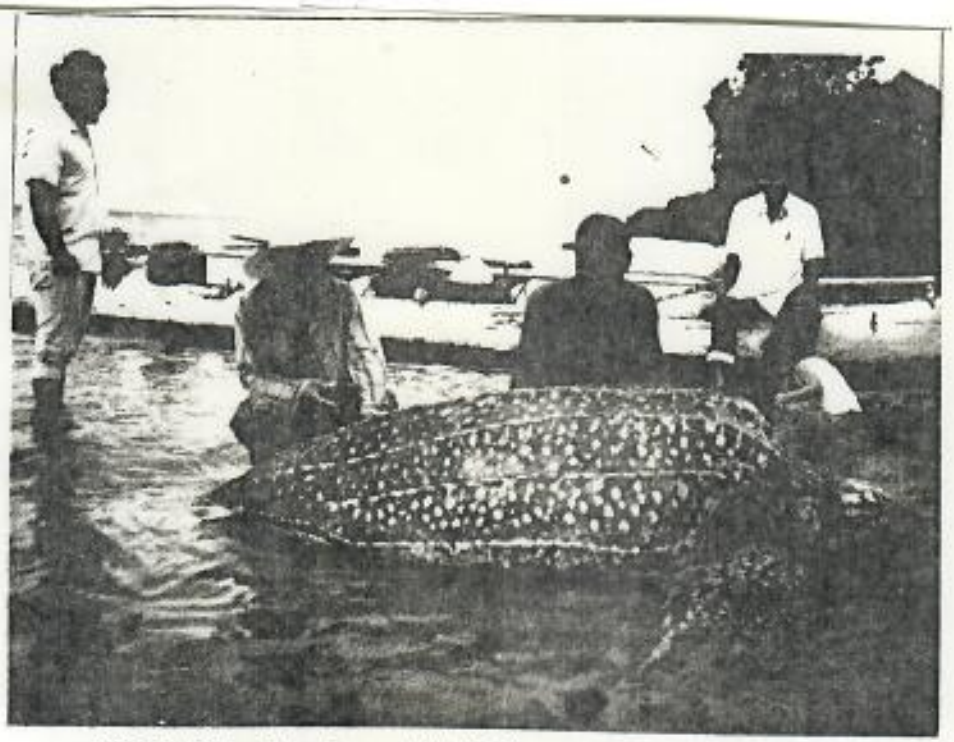
SAIPAN – Saipan's WSZE-TV went off-the-air Thursday (Aug. 30) to await the arrival of an engineer from San Francisco to make "technical adjustments" in an effort to improve its quality.

Wally Schick, General Manager of WSZE-Radio and TV, told the Examiner the "temporary shutdown" will be for about a month and possibly longer. He has "no idea" when the engineer is coming.

Schick said the owner and President of the Micronesian Broadcasting Company, Scott Kilgore, has ordered the money-loosing television station closed. Schick refused to release the contents of Kilgore's letter to the Examiners other than to say that the station will make "structural changes" in its operations. He added the TV will increased its "quality" but again declined to say how this may be accomplished.

He did not anticipate hiring more people to man the TV station nor purchasing new equipments. "But it will be a change for the better of our operations", Schick said in an interview.

Schick admitted that the TV operation and the FM radio "are a waste of money in our operation." He said he wanted to rent out FM



This leatherback turtle caught in Kapingamarangi in 1975 weights 300 pounds. The turtle is on the U.S. Endangered Species List. The Leatherbacks are the largest of all known turtles living today often weighing as much as 1000 to 1300 pounds.

ENERGY CRISIS HURTS DEVEL

SAIPAN—"Reduced fuel allocations, power outages, and curtailed air flights, have occured in the Trust Territory. They may seriously impede socio-economic development of the islands, by interfering the transportation, communication, electrical production and other government services; particularly such essentials such as health and education."

So said Thomas Remengesau, Deputy Director of the Headquarters Office of Planning and Statistics, (Sept. 1) in an address to an Energy Technology Conference now being held at the Fujita Hotel on Guam. He addressed the conference on behalf of High Commissioner Adrian Winkel, Micronesian News Service said.

"Existing power plants operate only on deisel fuel, all of which must be imported," Remengesau said. "This total dependence on imported fuels makes Micronesia extremely vulnerable to global reductions in oil supplies, as Micronesia is economically disadvantaged in competition with industrial nations bidding for oil."

Remengesau said there is a growing need to identify and develop renewable energy resources and employ alternative energy technologies in the Trust Territory. "Equally important is the promotion of energy conservation. These are the objectives of this workshop," he said.

Energy planning in Micronesia requires two focal points, the OPS Deputy Director indicated. These points are examination of indigenous energy resources and conservation.

"Solar, wind, hydropower, ocean thermal, and fuel from biomass can have immediate and long run effects on the energy production capacity of the islands," Remengesau told the conference, adding that the technology for utilizing these resources has already been developed and made commercially available in different parts of the world.

On conservation of energy, Remengesau noted that the efficient use of energy will enable existing resources to better meet current needs. "Conservation efforts may include taxes and incentives, restructuring power rates, efficient use of equipment and vehicles, and substitution, where possible, of renew-

A 500-pound Leatherback Sea Turtle was captured on Kosrae recently by a fisherman in Utwe Harbor. The carapace (the shell which covers the back) measured 52 inches long and 46 inches wide. The turtle was determined unfit for consumption and had to be buried. (PIO Photo).

Commwea 14th Examiner
Vol. I No. 35
Sept. 7, 1979

26/3/82

TINY ISLAND DISAPPEARS:

DAR ES SALAAM, Thursday

A TINY island which was the major nesting place for sea turtles on the East African coast has disappeared beneath the sea, the Tanzanian Daily News reported today.

The government newspaper said two researchers were sent to Maziwi Island, near Pangani on the northern Tanzanian coast, after the Tanzanian Fisheries Institute received reports that the uninhabited island is being washed away.

The researchers found no trace of the island or of the turtles that had nested there, the Daily News said.

The island had accommodated three types of rare turtles: the olive ridley (Lepidochelys olivaces) which was not known to nest anywhere else in East Africa, the green turtle (Chelonia myadas) which had half of its East African population at Maziwi and the hawksbill (Eretmochelys imbricata) which had half of its entire known population on the island.

The newspaper quoted the researchers as saying that the island was swept away by sand erosion. - Reuter

as quoted from the "Malawi Times"

The Boardwalk Restaurant
1555 South Coast Highway
Laguna Beach, California 92651

This is the place where we had dinner with Frank and Carlene on the evening of Monday, March 5, 1979 Mother, Carlene, and I ordered salad. It wasn't on the menu but Frank ordered soup and when he asked what kind of soup was being served the waiter said it was turtle soup. I said it must be mock turtle because it is illegal to sell turtle meat in the State of California. The waiter said it was "real turtle soup and not mock turtle".

The Boardwalk Restaurant is part of the Surf & Sand Hotel. I just noticed on the match-cover that they also have a place in San Diego.

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Los Angeles Herald-Examiner
May 27, 1979

Ripley's Believe It or Not!

TWO-GUN MEN

OF THE OLD WEST
NEVER SHOT BOTH REVOLVERS AT ONCE!
THE SECOND WAS CARRIED AS A RESERVE GUN

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THE LORD AND LADY OF THE BEASTS

Valley of Goreme, Anatolia, Turkey, NATURAL STONE FORMATION

TURTLES

WERE BRED DOMESTICALLY FOR THE FIRST TIME IN 1968 IN THE Cayman Islands, in the Caribbean, ON A TURTLE FARM

TOM DIRINGER

OF NORWALK, OHIO,
ON THE BASKETBALL COURT
OF SHELBY HIGH SCHOOL
IN A PERIOD OF 24 HOURS
SHOT 14,500 FREE THROWS
AND MADE 13,208 OF THEM
FOR A 91.09 PERCENTAGE
July 15, 16, 1978


WHEN ONLY WITCHES WERE BEWITCHING
ANY WOMAN In England DURING THE REIGN OF QUEEN ELIZABETH I (1558-1603) WHO LURED A MAN INTO MARRIAGE WITH THE AID OF MAKE-UP, HIGH-HEELED SHOES OR A WIG WAS SUBJECT TO PUNISHMENT AS A WITCH
GOL GUMBAZ
THE TOMB OF SULTAN MOHAMMED ADIL SHAH, IN BIJAPUR, INDIA, HAS A FLOOR AREA OF OVER 18,200 SQ. FEET— THE LARGEST IN THE WORLD COVERED BY A SINGLE STONE DOME

4th canopy anniversary

canopy
INTERNATIONAL

JUNE 1979
VOL. 5 NO. 6
ISSN 0115-0960

Research newsmagazine published monthly by the Forest Research Institute, MNR, College, Laguna, Philippines 3720

EDITORIAL

It comes as a pleasant surprise to learn that President Ferdinand E. Marcos of the Philippines himself is interested in marine turtle research and conservation.

For it is not very well-known that, taking out for some vacations to the Sulu island groups and seas, the President and his son and daughters would ride on a giant sea turtle one at a time, the First Lady and Minister of Human Settlements, Imelda Romualdez Marcos, watching them in delight. Subsequently, the President brought to Manila a pair of giant sea turtles to pet and let a turtle pond constructed in the backyard of Malacañang Palace for their new home. On his way to the golf course past the turtle pond, he would stop a while, would watch the gentle reptiles — male and grounds. When the water subsided, the giant sea turtles were gone, perhaps they had swum down the Pasig River that cuts just behind Malacañang and drains to the Manila Bay.

When President Marcos read some reports of the Forest Research Institute that the marine turtle population in the Philippine waters is fast diminishing, he at once called up FORI, through Mr. Ruben B. Ancheta, Presidential Assistant on Economic and Development Affairs, to ask for research "findings, status of conservation efforts, and specific recommendations to further strengthen such efforts."

Books of The Times

By Christopher Lehmann-Haupt

TIME OF THE TURTLE. By Jack Rudloe. 273 pages. Illustrated with photographs, and line drawings by Karen Harrod. Knopf. $12.95.

"CONSIDER the turtle," urged Henry David Thoreau in a journal entry dated Aug. 28, 1856, and then proceeded to do so. "Perchance you have worried, despaired of the world, meditated the end of life, and all things seem rushing to destruction; but nature has steadily and serenely advanced with the turtle's pace . . . while [the turtle] rests warily on the edge of its hole, rash schemes are undertaken by men and fail. French empires rise or fall, but the turtle has developed only so fast. . . . One turtle knows several Napoleons. . . ."

Those weren't precisely the thoughts that occurred to me when I came on Thoreau's exhortation in Jack Rudloe's "Time of the Turtle," a new book by the naturalist who runs the Gulf Specimen Company and is the author of "The Sea Brings Forth," "The Erotic Ocean" and "The Living Dock at Panacea." In fact, what I thought of was the first turtle I ever owned, which, in what was probably my earliest attempt at wit, I named New York World's Fair — 1939, after the legend that had been painted on its back beside the trylon and perisphere, in those confident days when technology still prevailed over the rights of dumb creatures like my turtle.

Still Going at 175 Million

Still, the more one considers the turtle, the closer one gets to a basic but forgotten wonder of childhood — those silly groping legs belying the neat compactness of the shell and plastron (beguiling word!). This may be why the idea of a whole book on turtles seems silly at first, and entirely fitting on second thought. For surely we have all considered turtles at length and can understand why the turtle figures so prominently in the myths of primitive peoples. Turtles are as fundamental as the earth they crawl upon and the sea they swim in. They are 175 million years old as a species — one of the few survivors of the age of dinosaurs — and are among nature's most successful innovations.

Mr. Rudloe loves turtles, too, but instead of effervescing he gives us scenes — in which he and a dentist friend struggle to remove the barnacles from inside a giant loggerhead's mouth, to study their adhesive properties for possible use in dentistry: "His big pale yellow plastron swelled with air. He exhaled again, and again we held our breaths. To keep from being nauseated. What a monster he was!"

In which a young Kemp's Ridley — the most intelligent and responsive, to humans, of all the sea turtles, in Mr. Rudloe's opinion — expresses her fury at being force-fed to insure her survival:

"Suzie hit the water and began slamming her flippers on the surface as if there were a hundred sharks after her. She literally flew, splashing water everwhere, making waves roll across the tank and crash on the opposite end. She crashed into the far wall, and for a few minutes kept battering it, as if she were trying to swim through the concrete. If turtles could scream, the whole building would have been filled with blood-curdling cries of anger and terror."

What is appealing about "Time of the Turtle," is that Mr. Rudloe conveys enthusiasm by doing — by admonishing the sullen fishermen of Panacea, Fla., in the act of slaughtering a leatherback who had gotten entangled in their crab traps. After the creature has been butchered for its delectable meat, Mr. Rudloe takes its still-beating heart and returns it to the ocean. Or by waiting up all night on a beach in Costa Rica to watch a female green turtle lumber out of the sea to deposit her eggs. Squeamish readers may not relish the scene in which he eats one of her freshly laid eggs, but it surely testifies to his commitment "to commune with the turtle."

And it is the vividness of these scenes that makes it such a pleasure to absorb the vast amount of turtle lore that Mr. Rudloe manages to convey in the process of depicting them — their mating and nesting habits; the mysteries, still unsolved, of their uncannily precise navigations, and the source of the myths that still adhere to them so powerfully among people whose cultures have been entwined with turtles.

A Confessed Sentimentalist

In a particularly entertaining episode, Mr. Rudloe suffers a run of bad luck after capturing several hundred little diamondback terrapins. Half accepting a belief among the local fishermen that the "wind turtles" have the power to bring ill fortune, he traces the myth back to a time when the Indians of the region held the diamondbacks sacred, and leaves the matter at that.

©Jack Rudloe, 1979

Albino green turtle hatchling

Mr. Rudloe is a confessed sentimentalist about the ultimate value of the sea turtle's survival in the face of threatened extinction. Challenged by a hostile shrimp fisherman who asks, "So what?," Mr. Rudloe feels impotent hauling out "the tired old arguments and devices that desperate biologists use when they're trying to argue for the survival of any species." After all: "Logically I knew extinction was a natural process. Something like 95 percent of all the species that had ever lived on this planet had become extinct."

So he resorts to another tactic. He writes a book that makes sea turtles so appealing that we would simply miss them if they were to become extinct. "Time of the Turtle" is of course that book.

Marcos Sets Up Turtle Guard

MANILA, Philippines (UPI)— President Ferdinand Marcos today formed a task force to prevent the extinction of Philippine marine turtles, whose shells are exported by poachers to the United States and Japan.

The giant turtles, some weighing 150 pounds and measuring more than three feet in length, are vanishing in their home grounds in the Sulu Seas of the southern Philippines because of poaching, the presidential palace said.

3 JULY 79 Honolulu STAR-BULLETIN

WORLD NEWS IN BRIEF

Turtles Protected

WASHINGTON (AP) — Green turtles, once prized by gourmets, soon will disappear from restaurant menus and supermarket shelves, a victim of man's voracious appetite.

A federal court has banned the sale of green turtle soup, stew and steak in the United States after Sept. 5, a move designed to protect rapidly diminishing turtle populations.

But gourmets view the loss as less than tragic, expressing more concern for the beleagured turtle than their palate.

"I hesitate to encourage the eating of turtles," said A.J. McClane, internationally known seafood authority and author of "Fish Cookery."

"I'm glad the ecologists have made their point. The turtles are virtually disappearing," he said.

"I feel sympathy with the turtle," said Rose Narva, manager of the Sheraton-Carlton Hotel in Washington, D.C., where green turtle soup is still on the menu at $2.75 a bowl.

THE WASHINGTON POST Thursday, July 31, 1980

U.S. Indicts 2 Firms For Turtle Imports

The government cracked down on illegal trafficking in the products of endangered species yesterday, indicting two seafood firms on charges of importing more than eight tons of Pacific Ridley turtle meat.

The Pacific or Olive Ridley turtle was placed on the endangered species list in 1978, after its population had been reduced from about 10 million to 400,000. The main threat to the Ridley has stemmed from the sale of its eggs, prized as a delicacy that supposedly enhances male sexual prowess.

The indictment yesterday focused on the meat of the turtle, however. Pat Leroy Pace and the Pace Fish Co. of Brownsville, Tex., and Ben Soloff and Ben Soloff Inc. of Philadelphia were indicted on 12 counts of illegal turtle trafficking.

The Justice Department said the firms obtained the meat from Mexico, and it was brought through customs falsely labeled as fish fillets.

Officials said the indictment was one of the larger endangered species criminal prosecutions, and the first generated by a recently formed interagency task force set up to coordinate enforcement of laws against trafficking in such products.

Officials said the meat is especially popular in New Orleans restaurants. The eggs enjoy a larger market, and the skins increasingly have been used to replace crocodile leather for pocketbooks, cowboy boots and other articles.

The defendants, if convicted, face fines of up to $20,000 and maximum prison terms of five years.

THE NEW YORK TIMES, FRIDAY, AUGUST 8, 1980

Four Indicted in Miami In Slaughter of Turtles

MIAMI, Aug. 7 (AP) — Two Miami men, two Mexicans and their companies were indicted by a Federal grand jury here today on charges of importing 90,000 pounds of meat taken in the slaughter of some 7,500 endangered sea turtles.

According to the 13-count indictment, shipments of meat from the endangered Olive Ridley or Pacific Ridley sea turtle were falsely labeled as coming from a species of Mexican fresh water turtle that could be legally imported.

The indictment named Enrique A. Expeleta and Rogelio Alejandro, both of Miami; Antonio Suárez Gutiérrez of Oaxaca, Mexico, and Juan Alsina Ramírez of Mexico City.

Also named were the Mexican seafood concerns Piosa, Meximpex and Mextimtrade; B and B World Enterprises of Miami, and Jacmel Enterprises and Atlantic Trading Company, both of Hialeah, Fla.

Los Angeles Times

ILY / 1,344,660 SUNDAY TUESDAY, JULY 31, 1979 CC† / 96 P

Workers build sand dike on a Mexico beach south of Brownsville, Tex., to protect turtle breeding ground from a growing oil spill.
Times photos by Rick Meyer

SCIENTISTS HIT THE BEACH ON RESCUE MISSION

Baby Sea Turtles Airlifted Over Oil Spill

BY ROBERT A. JONES
Times Staff Writer

RANCHO NUEVO, Mexico—Richard Byless and 1,000 sea turtles rose uncertainly over the tufted dunes of the beach, their helicopter gaining footing in the light air, and then together they floated away toward the Gulf of Mexico. For the moment on Sunday, they seemed to be winning their war with Mexico's growing oil spill.

Now nearly two months old, the spill from the drilling platform 350 miles south of here has encountered nothing of such biological importance as this isolated stretch of beach in northern Mexico. Nondescript, seemingly indistinguishable from miles of shoreline around it, this beach just south of Brownsville, Tex., is the only breeding area in the world for one of the earth's few species of sea turtles.

When the oil first washed ashore here a week ago, it threatened not adults but an unborn generation of sea turtles that were due to hatch soon on the beach and crawl toward the gulf to begin their lives at sea.

Watching the crude oil shimmer on the surface over the entire length of the beach, the small cadre of scientists feared that the 10,000 young turtles would die of asphyxiation or poisoning before they cleared the spill area.

Thus began a frantic week of international diplomacy and scientific engineering as the American and Mexican workers here decided on a desperate plan to save the turtles even as the hatchings' biological clock ticked toward the moment of their birth.

Byless, an American graduate student at Rancho Nuevo on a grant from the U.S. Endangered Species Office, and a Mexican biologist, Manuel Sanchez, believed that they could interrupt the hatchlings' journey by capturing the young turtles as they crawled from their nests.

Scooping them into large holding pens, the men were confident they could keep the turtles alive for several days until a way was found to circumvent the tide of oil washing ashore.

In this first part of their plan the scientists were aided by the unique breeding habits of the Kemp's Ridley turtle. Each year the females of the species gather off this beach—and no

Please Turn to Page 3, Col. 1

Baby turtles on the beach are about to be flown to safe seas.

PHILADELPHIA'S OWN SNAPPER TURTLE SOUP

*6 oz. vegetable shortening

*1 lb. veal bones (cut small)

*½ lb. pork bones (cut small)

*4 oz. diced celery

*3 oz. diced carrots

*1 each bay leaf

*5 oz. tomato puree

*6 each whole allspice corns

4 oz. flour

2 lbs. fresh snapper

1 gallon water

2 each hard-boiled eggs

2 oz. diced cooked veal

4 oz. sherry wine

Cook fresh snapper turtle in water for 1½ to 2 hours. Remove all snapper meat from bone. Hold snapper stock and meat. Brown together first eight ingredients (indicated with *). Add flour to browned ingredients and make light roux. Add snapper turtle stock and simmer for 2 hours. Strain soup and garnish with diced snapper meat, diced veal and chopped eggs. Add salt and pepper and sherry wine to taste.

Serves 6

UNITED AIRLINES

Featuring Philadelphia's
Famous Snapper Turtle Soup

Try it at home.....the recipe is inside

Scientists Mass to Fight Slick

CORPUS CHRISTI, Texas (AP) — An army of scientists and engineers readied a two-mile floating defense line today in an effort to repel a coastal invasion by the world's largest oil spill.

The first wave of 60 million gallons of Mexican thick crude was expected to enter U.S. waters tomorrow, ending a slow trek north from an oil well in Mexico's Bay of Campeche that blew out June 3.

Officials say the impact on the south Texas shoreline — "America's third coast" — could be catastrophic, endangering a lively tourist trade at beach resorts, killing wildlife and wiping out catches of Gulf of Mexico shrimp.

"We're pretty much resigned to the fact that there's nothing we can do," said Ralph Thompson of the South Padre Island Tourist Bureau. "Just bite the bullet."

THE FLOW OF the now-scattered slick — becoming bigger every day as the runaway well keeps flowing — continued unchecked. Scientists aboard a reconnaissance flight yesterday spotted globs of oil on Mexican beaches within 30 miles of the U.S. border.

Computer projections say the oil will begin to wash ashore on the south Texas coast Tuesday, and oceanographers fear it could continue threatening the beaches for several months.

The battle against the oily threat has attracted about 150 state and federal scientists, engineeers and other workers.

Officials stood by today awaiting orders to put in place a two-mile-long floating fence they hope will corral some of the oil and keep it out of environmentally sensitive areas.

A TEAM OF divers set out today to jump into the slick. National Oceanic and Atmospheric Administration spokesman Carl Posey said the divers will try to determine how much oil is seeping north below the water line.

John Robinson, a scientist with the agency, said the oil that is expected to show up in U.S. waters this weekend probably was the oil that first spewed from the well when it blew out.

If so, Robinson said, oil could continue to head north for two months after the well is capped — and that is not expected until mid-September at the earliest.

"We're getting the first effects now and we're two months removed from the event," Robinson said. "We expect to be here a long time."

SO FAR, THE approaching slick has not hurt business at the long strip of sun-bleached sand that has survived the natural threats of sharks and hurricanes and attracts 850,000 tourists a year. Hotels are at peak occupancy

But Thompson is looking ahead and he wants to know who is going to pay for the damage the oil causes on the Texas coast. Mexican and American officials both have declined to comment on liability.

Officials have said the fine-grained sand along most of the shore would be the best place for the oil to hit. Robinson said those beaches are relatively easy to clean.

Gulf shrimpers awaited results of toxicity tests on oil taken from the spill.

The tests have not been completed, but Robinson said that preliminary indications are not good. He said a sample showed high levels of potentially damaging toxins.

THE PERSISTENT slick also poses a danger to the varied wildlife in the Gulf and in nearby inland waters. It has raised a serious threat to the concentrated effort to save the Atlantic Ridley turtles.

Robert Stratton, refuge manager at the Laguna Atascosa Wildlife Refuge, said special detergent is ready for use if birds in the area are doused in the oil. Refuge workers are also set to force-feed injured birds.

The first battle line will be drawn at the Brazos Santiago Pass at the southern tip of Texas. Officials are confident the floating fences used for oil containment and collection can fend off the invading Mexican oil.

"But we will not attempt to recover all the oil floating in the Gulf. That's a physical impossiblity," said Coast Guard Capt. Robert Madson, the federal task force commander.

have seen their tax bases seriously eroded. ... Failure to provide the assistance necessary for these governments to maintain a minimum level of services can only exacerbate their problems, as people who can afford to leave, leave, in search of better schools and safer streets."

Sen. Henry P. Bellmon of Oklahoma, senior Republican on the Senate Budget Committee, said the federal government, running a $30 billion deficit this year, has no revenue to share with states, cities and counties.

"WHAT WE HAVE is control of the government printing presses, and we can only crank out some more dollar bills" and worsen inflation, Bellmon said.

Brooks — and, apparently, a majority of his committee — opposes any aid program that is activated by a change in the unemployment rate.

The government's measure of unemployment is very erratic, said Goldberg. When efforts are made to gauge the jobless rate in a city or county, the margin of error can soar to 50 percent or more, he added.

Brooks and many of his colleagues also contend that the Senate formula for distributing the money is weighted toward urban areas. Goldberg noted that Kansas, New Hampshire and Wyoming would not get a penny of targeted aid under the Senate plan.

Of the $340 million that would be expected to be doled out in targeted aid in 1980, $70 million would go to New York, $65.7 million to California, $21.3 million for Michigan and $20 million each for Pennsylvania and Illinois.

That would leave $143 million for the other 42 states.

Saturday, August 4, 1979 Honolulu Star-Bulletin A-3

Brisbane Telegraph 24-viii 79

The $6m turtle 'shellout'

DR ROBERT BUSTARD

The Torres Strait turtle farming project, due to close next year, has cost taxpayers nearly $6 million.

The eight - year - old project, judged by the Federal Government as incapable of commercial success, ends a long period of bitter departmental and political infighting over aboriginal affairs.

The turtle farming project which employs about 50 Torres Strait Islanders will be phased out by June 30 next year on the advice of the company running the scheme, Applied Ecology Pty. Ltd.

From MAX HAWKINS in Canberra

The project attracted widespread publicity in 1974 when it was criticised by the then Minister for Aboriginal Affairs, Mr Bryant, and Queensland Labor Senator Georges.

The project's scientific head, Dr Robert Bustard, was sacked, Mr Bryant was removed by the Prime Minister, Mr Whitlam, to another portfolio and the permanent head of the Department of Aboriginal Affairs, Mr Barry Dexter, shifted to the diplomatic service.

In 1973, Dr Bustard predicted that the Torres Strait Islands would become "the centre of a $12 million turtle farming industry."

"It has now become a viable primary industry involving 13 islands and directly benefiting 1000 islanders," he said.

"We have more than 30,000 of all kinds of turtles, and by 1980 we will have at least 150,000 green turtles alone, worth $80 each on the London market."

But directors said yesterday research showed the farms could not succeed because it would take up to 30 years to get turtle to reproduction stage.

Announcing the government's decision yesterday to phase out the scheme, the Minister for Aboriginal Affairs Senator Chaney said financial support would be continued this year to shift the emphasis from turtle farming to the more successful development of Applied Ecology's emu farming project at Wiluna, in Western Australia, and crocodile farming at Edward River, on Cape York in the Gulf of Carpentaria.

The aim of the turtle project had been to develop a commercial enterprise for Torres Strait Islanders.

Funding skyrocketed from an initial government grant of $27,730.

GORDON BRYANT

FORUM

the Readers' Page

Turtles and Refugees

THE TIME is July 1979. The place is the east coast of peninsular Malaysia. The beach is called "Chendor." It was exactly three years ago that I walked this same beach at midnight seeking the telltale tracks left by the giant leatherback turtles as they struggled their way up the sandy slope to lay the eggs that would start a new generation.

Today, as I walked this beach, I see new kinds of tracks, tracks that show the same determination to preserve the species. Here, now, are the footprints of thousands of Vietnamese "boat people" who have fled their homeland across the China Sea to seek sanctuary in this new country.

Like the sea turtles they have arrived on these shores in a continuing struggle for the preservation of their kind. Unlike turtles with hard-shell backs, they have come huddled in the wooden shells of rotting boats.

Like the sea turtles, the refugees have arrived in Malaysia in a continuing struggle for the preservation of their kind.

Those boats that have survived the journey now litter the shore like the skeletons of beached sea creatures. Within their bowels can be found the refuse left behind by those who have been fortunate enough to reach these shores. Rice chaff is mingled with medicine bottles and rags. Barely measuring 36 feet long and 6 feet wide, these boats have carried 100 or more refugees packed like sardines.

On the bow of these decrepit vessels is painted the traditional dragon eye that guides them through the night into an unknown future. Within the wheelhouse, measuring no larger than a phone booth, can be seen the remnants of a well tended Buddhist shrine. One can only hope that the prayers offered before this shrine have been answered.

HOW ARE THOSE who "make it" greeted? Largely by an unconcerned world and guns with fixed bayonets. As these people without a country shakily make their way up the beach they are confronted both by the military and the police, who herd them into detention camps of bamboo and polyethylene sheets, where they wait out the whims of world politics. Even in these rudest of conditions they find life easier than the living hell of present-day Vietnam.

From these beach compounds, they are later shipped to one of several offshore islands, where they hopefully await relocation elsewhere in this non-receptive world. Within sight of this beach is one of these islands. Its once-verdant slopes are now barren, stripped of almost all vegetation for use as shelter and firewood to bring a semblance of comfort to a refugee camp of thousands.

One must sympathize with the Malaysians who live on these shores, for they themselves must eke out a bare existence from this sea and the land on which they live. To suddenly have their villages doubled and tripled in size by an influx of uninvited foreign guests is more than they can bear. Beaches segmented by barbed wire barriers are not sympathetic with their way of open village life.

The barter of fresh fish for U.N. canned food created its own form of inflation. They face the frustrating dilemma of self-preservation vs. their compassion and natural fondness for the foreigner. They know the solution is not in their hands but, at the same time, see very little being done by the world powers who can ease their burden.

The irony of the situation is that governments can rightly budget funds for the preservation of the green-shelled turtles that make their way to this beach, but have difficulty finding the money necessary to preserve their brown-skinned brothers from extinction.

Gerald L. Allison

Wednesday, August 15, 1979 Honolulu Star-Bulletin A-15

"THE ART CAPITOL OF THE WORLD"

The mayor of New York City, Ed. Koch, has announced that the Museum of American Folk Art is the officially recognized host to the original AMERICAN FOLK ART FESTIVAL IN NEW YORK CITY. Among the Week's highlights — from September 10 to 16, 1979 — a major SHAKER exhibition — The SHAKERS IN NEW YORK STATE — will be shown at the Museum galleries; a two-day SHAKER seminar of lectures and slide presentation by members of the movement; a special exhibit at the American Museum of Immigration on Liberty Island; a reenactment of a traditional Shaker meeting at Trinity Church and other exhibits and meetings at prominent points of New York City.

Hedwig Michel, president of the Koreshan movement, will attend the two-day seminar at the Museum of American Folk Art. The seminar is coordinated by Gerard C. Wertkin, a New York City attorney and a member of the Board of The Koreshan Unity, Inc., also associate editor of The American Eagle.

MORE BUSINESS GROWTH IN FLORIDA IS PREDICTED

Tallahassee

Commerce Secretary Sidney Levin pedicted recently that new plant construction and expansion should continue strong in Florida for the rest of the year despite a nation-wide slowdown in capital investment.

Levin, who took over as Commerce secretary earlier this year, said the number of new manufacturing plants moving into the Sunshine State proves that Florida finally has shed its "anti-business" image.

He said changes in Florida tax laws and a new attitude by top administration officials have made the state competitive with southeastern neighbors in the quest for high-paying manufacturing jobs. In past years, many firms bypassed Florida in favor of neighboring states that offer hefty tax breaks to businesses.

"There is still a long and strong commitment from business for expansion; and we're so far behind we can make rapid strides," Levin said.

Levin's comments followed an announcement by Lt. Gov. Wayne Mixson that Monsanto Textiles Co. has decided to construct a new, multimillion-dollar chemical plant in Pensacola. The company also had con-

HEAD-STARTED SEA TURTLE NESTING

Tallahassee

The first pen-reared turtle to be sighted laying eggs was discovered recently on Jupiter Beach. The seven-year-old loggerhead, tag number A196, was released in August 1972 on Hutchison Island by Department of Natural Resources Marine Biologist Ross Witham of the Marine Research Laboratory in Jensen Beach.

Marcia Kartub and Craig Barsumian spotted the turtle midway between the high-tide line and the dunes on June 13 at about 2 a.m. They reported the egg-count to be 132 eggs. Egg counts usually run from 90 to 160 eggs per laying.

When released in 1972, the turtle was almost 8 inches long and weighed slightly over 3 pounds. According to Kartub and Barsumian, the turtle now measures 34 inches in length and weighs approximately 180 pounds.

Witham said the sighting was, "significant, since it is the first report of a head-started sea turtle nesting."

Such turtles are released by the Florida Department of Natural Resources Marine Research Laboratory to study their survival, dispersal and growth.

Bert Furbee

AROUND THE WO

Springvale, ME . . . I have HUMAN SIDE, selected knowing your interest

For those of us who are Albert Einstein has bee All of us can recognize greatness surrounding H yet his most famous acc his theory of relativity, comprehensible to many Helen Dukas (Einstein' secretary) and Banes (collaborator with Eins theory of relativity) ha many of the letters, comments of Einstein published them in book titled Albert Einstein the the book which deals only scientific writings goes rounding out for us human. The picture that a man that is brilliant y pilgram continually sear deeper meaning of life, a human being with a ke humor and a desire t moment to its fullest. It possible in these spiritles times, to find such a man only has to read this vo such a man. I could keep terpretations of the book Is best to let Einstein sp self. I have simply drawn favorite quotations from t sure after you have read you too will have your ow Einstein contributed the the album of a young g near him in Caputh, Germ

"Oh Youth: Do you kno is not the first generation life full of beauty and free know that all your ancesto do — and fell victim to hatred?

Do you know, also, that wishes can only find fulfi succeed in obtaining l

Florida Conservation News - Sept 1979

No Danger From Oil Spill Seen For Florida "But We Are Keeping ... Watch"—Landers

The massive oil spill which is affecting Texas beaches poses no immediate threat to Florida, Department Interim Director Jay Landers said recently.

Landers' statement is based on consultation with national oil spill experts and oceanographers, as well as Department staff.

As a precautionary measure, however, the Department sent a coastal protection officer to Texas to meet with national and regional response teams, Landers announced.

"We see no immediate danger to our beaches at this time," said Landers, "but we are keeping a close watch on developments."

Oil spill experts say tar balls from the spill could eventually reach certain portions of Florida if the runaway crude makes contact with the Gulf of Mexico's loop current south of Mobile. Experts agree a hurricane would alter their calculations.

The oil slicks and tar balls have been drifting toward Texas for two months from an oil well off Mexico's Yucatan Peninsula. Some oil has washed ashore off the southwestern Texas coastline, but currents are stalling and actually reversing in some places, according to U.S. Coast Guard reports.

First Pen-Reared Turtle Seen Laying Eggs

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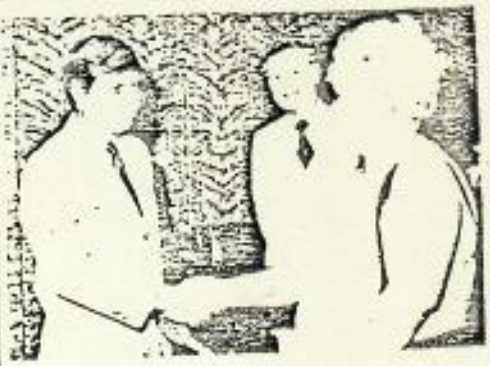
FCC Correspondence Witham/Corr



National oyster shucking champ Heidi Harrelson receives the good wishes of Gov. Bob Graham, top, and a check from Bob Jones, below, to attend the international oyster shucking contest in Ireland Sept. 14. Jones heads the Gulf and south Atlantic Fisheries Development Foundation.

The beach at Anastasia State Recreation Area was the destination this summer for 60 members of the Wandering Wheels, 60 cross-country cyclists. The group departed from San Diego and made the coast-to-coast trip, some 3,000 miles, in 30 days.

September 1979

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30						

1	*Blue Crab Festival, Panacea*
1-3	*Offshore Sportfishing Tournament, Sebastian Inlet.*
3	*Labor Day*
5-7	*Tax Collectors annual meeting, Pensacola Beach Holiday Inn.*
8	*Anniversary of founding of St. Augustine*
13-15	*Artificial Reef Construction/Maintenance Conference, Plaza Hotel, Daytona Beach, sponsored by Florida Sea Grant College.*
14-16	*Marlborough Billfish Tournament, Destin.*
14-16	*Pensacola Seafood Festival.*
15-16	*1979 king mackerel and spinner shark tournament, Ponce Inlet, sponsored by Halifax Sport Fishing Club Inc., South Daytona.*
21-23	*Florida Wildlife Federation annual meeting, Marco Polo Hotel, Miami Beach.*
25-26	*Coastal Campground Operations Seminar, St. Petersburg, sponsored by Marine Advisory Program.*
25-27	*Aquatic Plant Management and Control Conference, Capitol Building, Tallahassee.*

Sampling from Capitol Saddlery's line, including boots with the Texas seal and the famed Yellow Rose; Manhattan's Buie among her wares

Living

Pushin' Boots for Urban Cowpokes

Kicking up a storm in Western footwear

The tall stranger ambles into the shop out of the blistering midday sun and doffs his stetson.

"I came for my boots," he growls.

"These the ones you ordered?" asks the shopkeeper, nervously handing a pair of boots across the counter.

Nodding, the stranger slips his weary feet into the leather, stands up and slaps his hip. "Perfect," he says.

"Fine, that'll be $800 plus tax."

Bat Masterson sprucing up in Dodge City? Gosh, no, this is an urban cowboy on Manhattan's Upper East Side. But the scene could have taken place in almost any American city, east or west of the Pecos. High-stepping city slickers everywhere are discovering that cowboy boots go just as well with a pinstripe suit, a satin disco outfit or designer jeans as they do with a pair of saddle-worn chaps and Levi's. Al Martinez, co-owner of Manhattan's To Boot boutique, has even outfitted an 85-year-old grandmother. Says he: "Sales are phenomenal. This fall will be crazy. I just hope we have enough boots."

It will not be easy to handle the stampede. While old cowhands were satisfied with plain cowhide, today's well-heeled dudes are demanding exotic skins: boa constrictors, sea turtles, swordfish, sharks, ostriches, anteaters and elephants. Custom-made models fetch up to $2,500 a pair, although well-made cowhides go for about $100.

Helping spur this gold rush is Designer Ralph Lauren's hit line of Western wear. Loafers just do not go with a $400 leather-fringed suit. City folks are learning what cowpokes have known all along: boots not only look great but feel good as well. They are also a proud brand mark, explains Judi Buie, 33, owner of Manhattan's Texas at Serendipity 111 boot store, whose customers include Rock Stars Alice Cooper and Boz Scaggs and Actresses Diane Keaton and Mariel Hemingway. Adds Buie: "For Americans, cowboy boots say where we come from."

They also seem to say Texas, home of the country's best bootmakers. At 85, Enid Justin, owner of the Nocona Boot Co., remains the feisty matriarch of the Lone-Star State bootmaking community. Back in 1925, when she founded her business, she cut and stitched the boots herself and peddled them all over Texas from her Model A Ford. Today her workers produce 1,500 pairs a day, though it still takes some 200 separate steps to make a single boot. Another oldtimer is T.C. ("Buck") Steiner, 79, a former rodeo star and owner of the Austin-based Capitol Saddlery. His boots take from five to nine weeks to complete, and prices range from $250 for cowhide to $1,000 for a pair of alligators. But the unquestioned doyen of the Texas bootmakers is Sam Lucchese (pronounced Lew Casey), who is, says Steiner, "in a class by himself, the best in the business."

Lama's lizards and anteaters

Lucchese, 56, learned his craft working in the San Antonio–based business that his grandfather started in 1883. Teddy Roosevelt and his Rough Riders charged up San Juan Hill in Lucchese boots. More recently, they have adorned such native sons as Sam Rayburn, Lyndon Johnson and John Connally, as well as a corral full of foreigners, including Anwar Sadat, Peter Ustinov, Marcello Mastroianni and the Shah of Iran. Lucchese sold his interest in the firm in 1977, and now looks after research and development for El Paso's Tony Lama Boot Co., which last year sold $45 million worth of footwear. But one thing has not changed. Lucchese still wears only cowboy boots because, as he explains, the slanted undercut of the heel stiffens the back and keeps a man walking ramrod straight. Says the 5-ft. 6-in. bootmaker: "That's why cowboys look so tall." ■

Unplain Jane

Is beauty a beastly burden?

Welcome news for plain Janes: stunning appearance may not be a very valuable sexual asset. In fact, according to a University of Rochester study, beauty may not be a help at all.

Probing the social lives of 35 male and 36 female freshmen at the upstate New York school, Social Psychologists Harry Reis and Ladd Wheeler of Rochester and John Nezlek of William and Mary found that physical attractiveness is a great advantage to men, but not to women. The beautiful and the plain spend about the same amount of time with men and report the same amount of satisfaction. The women who do best are those with average to good looks. Says Wheeler: "These borderline women seem very satisfied in their relationships with the opposite sex."

One explanation is that men are threatened by beauty. Another: glamorous women think that men are only interested in them physically. It's plain from this mini-sampling that beauties will just have to bear their burden. Life is hard. ■

Fight On to Save Green Sea Turtle

From Reuters

MANILA—The green sea turtle, endangered because of the value of its flesh, eggs and hide, has been officially classified a protected species in an effort to save it from extinction.

A recent Forest Research Institute survey on the green sea turtles concluded that they were vanishing rapidly because of indiscriminate gathering of eggs and because hunters were taling too many of the animals.

The reptile, scientifically known as Chelonia mydas latrielle, has been driven away from most of the beaches where it once laid its eggs in the Philippines, the survey says.

The institute has urged the government to set aside a number of islands as turtle sanctuaries in the far southwestern Philippines, and it called for stricter implementation of existing safeguards.

President Ferdinand E. Marcos recently created a task force to conserve the country's marine turtles.

The task force seeks to stop poaching, conduct field investigations and persuade the people to help preserve the reptile.

"Marine turtle" is a general term denoting several varieties: the loggerhead, the hawksbill, the leatherback and the green sea turtle, which is a favorite Filipino delicacy. The green sea turtle is also sought as a decorative object.

Officials say sea turtles command handsome prices in the local and foreign markets, particularly Japan.

The turtle shell is used to make combs, buttons and cuff links, and its leathery neck can be made into belts and ladies' handbags.

Its eggs are delicious and nutritious. Turtle soup is on the menu of most Filipino luxury hotels, where sea turtle bones also are served as delicacies.

People in the countryside believe that the fresh blood and liver of the marine turtle have medicinal value, particularly in the treatment of asthma.

One effect of the survey by the Forest Research Institute is that conservationists now are frantically searching for the vanishing green sea turtle, locally known as pawikan. The objective is to discover more of its biology and to come up with an artificial-propagation technique.

In an attempt to study more closely the life pattern of the green sea turtle, the institute has started tagging captured specimens and releasing them again into the sea.

Officials say the aluminum tags help scientists keep track of the turtles' movements and egg-laying sites. They have appealed to fishermen to inform the institute if they find a tagged turtle.

The female turtle swims ashore during the egg-laying season and digs a hole in the sand with its flippers. The nest it makes is about two feet deep.

Egg-laying lasts about 24 hours. Once this is over, the turtle fills the nest almost completely with sand.

Many nests are looted of their 50 to 170 eggs by egg collectors who are adept in recognizing telltale signs of their presence.

When left undisturbed, the turtles hatch after an incubation of three to four months. The babies are easy prey for lizards, snakes, hawks and kingfishers as they make their way from the nest to the sea. In addition, some lose their way and die. The survival rate is less than 5%.

whom? Marginally to the producer country but chiefly to the technologically advanced, importing country. And it is for this reason that conservation has a bad name amongst certain third-world leaders. They feel they are being short-changed.

It is my belief that global conservation will only prosper when the burden of protecting the planet's wildlife is distributed more fairly. If the world's wild animals and plants are the heritage of all mankind - and I hold that they are - those who at present gain most should be prepared to pay most. It is just. It is also expedient.

Curiously enough this idea seems already to be germinating. A perennial species of wild wheat was recently discovered in a Mexican forest. This, the only known wheat perennial, could revolutionize wheat growing. Geneticists from outside Mexico have taken seed samples. But the Mexicans are now regretting their "free" gift and are saying that if "foreign" scientists want further supplies they will have to pay for them.

In my judgment the Mexicans are right. And their stand is also a useful one for conservation. Such a principle, if widely adopted, might make reservations a competitive form of land use.

So I very much hope the idea catches on - ideally through the willing cooperation of the rich importing nations, but failing that through the justified demands of the less rich (and sometimes very poor) primary producing nations.

The Sinking Ark will be reviewed by Robert Allen in a forthcoming issue of the ***Bulletin***.

OBITUARIES

ROGER HEIM, one of the founding vice-presidents of IUCN and president of the Union from 1954 to 1958, died in September.

A French scientist, he was born in 1900, and in 1923 was appointed curator of the Alpine Garden in Grenoble. He went on to become director of the Laboratory of Mycology and Phytopathology in 1940 and director of the Museum of Natural History in 1951.

He helped found IUCN in 1948 and was made a member of honour at the General Assembly in Ashkabad last year.

DR LEV SHAPOSHNIKOV, a former chairman of the IUCN Commission on Education, died in August.

Dr Shaposhnikov was born in Moscow in 1915 and graduated at the Moscow State University. He was one of the pioneers of environmental education and in 1960 was appointed chairman of the Commission on Education, a position he held for 18 years.

DR TSUYOSHI TAMURA has died at the age of 89. Dr Tamura was known as the "Father of the National Parks of Japan" and was one of the main forces behind the setting up of the National Parks Association of Japan in 1927. He served as director of the Japanese Parks system for many years. He was also an active member of the CNPPA and was made an honorary member of IUCN in 1959.

Threatened fish of North America

THE American Fisheries Society, supported by the US Fish and Wildlife Service, has produced a list of the threatened freshwater fish of North America. Covering Canada, the USA and northern Mexico, the list contains 251 taxa under three categories - endangered, threatened and "of special concern". (The third category is for "species that could become threatened or endangered by relatively minor disturbances to their habitat, or that require additional information to determine their status".)

The threats are broken down into five main types, but far and away the most significant is "habitat modification". It affects in some degree 98% of the fish listed. The second biggest threat (37% of fish listed) is "natural or man-made factors" - hybridization, introduced species, predation, competition. "Restricted range" affects 16%, overexploitation by commerce or sport 3% and disease 2%.

The three years' research that have gone into producing the list shows clearly that "habitat restoration and protection" would secure the future of well over 90% of North America's endangered and threatened freshwater fish.

With regard to the situation in the rest of the world, a revised edition of the *Pisces* Red Data Book covering 194 taxa has just been published. It is available direct from IUCN: price $30.00.

Mislabelling of turtle skins exposed

A FRAUDULENT trade, Mexico to Italy, in the skins of "protected" turtles has been uncovered.

Chelonia depressa say the certificates issued by Mexico's Department of Fisheries (*Departamento de Pesca - Direccion General de Regiones Pesqueras*). But *Chelonia depressa* is the Appendix II flatback turtle found only in northern Australia. *All* turtles found in Mexican waters are in Appendix I.

The fraud has come to light through the vigilance of the Swiss. A cargo of these skins re-exported by Italy was scrutinized by the CITES Management Authority in Switzerland, found to be olive ridley, and refused entry. Subsequent consignments of alleged *Chelonia depressa* - this time from West Germany and France but still emanating from Mexico via Italy - were again exposed by the Swiss as being either green turtle or olive ridley. Again they were summarily rejected.

It seems the Mexicans now realize that the *Chelonia depressa* ruse no longer works. But this has not stopped them exporting turtle skins. A recent batch (exported to Italy and thence to Switzerland) was labelled *Podocnemis expansa* - a river turtle found only in the Amazon and its tributaries.

The relevant Management Authorities have been duly alerted to these shenanigans (all the European countries mentioned are parties to CITES) and the CITES Secretariat has also written to the Mexican Department of Fisheries. Mexico is not a CITES member - but this in no way excuses the false labelling by Mexican government officials.

Guatemala, Tanzania and Liechtenstein have ratified the Convention on International Trade on Endangered Species of Wild Fauna and Flora. Guatemala ratified on 7 November, Tanzania on 27 November and Liechtenstein on 30 November. They thus become respectively the 56th, 57th and 58th parties to the Convention.

Week-long courses offered in U.K.

THE protection of plants and animals demands an informed and sympathetic public. A knowledgeable appreciation of the environment is essential, for without it scientific data and legislation alone will achieve little for the conservation of wildlife.

The Field Studies Council in the United Kingdom offers a wide range of field courses all heavily weighted towards conservation and environmental awareness. At its nine residential centres in England and Wales, courses, mostly of one week's duration, are organized for adults and young in such subjects as the ecology of birds, lichens, freshwater algae, coastal ecology, woodlands, wild flowers, nature conservation and the management of nature reserves.

More formal courses are offered for groups of students and teachers from schools and universities. Special courses are arranged for visiting parties from outside Britain.

Excellent laboratory and library facilities are provided at the centres and there is equipment for modern field work. A course may be tutored by staff members whose help is available, if required, to those who wish to conduct their own course. The cost is around £60 per person which includes everything except local travel. Hired transport can be arranged.

The Field Studies Council is a non-profit making organization andas such is able to offer cheap rates to parties of students and adults - reductions are normally made for groups of ten or more. For further details please write to:
Information Office, Preston Montford Hall, Montford Bridge, Shrewsbury, England.

John Sankey - Liaison Officer, Field Studies Council

Requested by U.N. Chief

UNITED NATIONS (UPI) — Secretary General Kurt Waldheim announced Sunday he has requested an urgent meeting of the Security Council to deal with the Iranian hostage stalemate. The United States endorsed the call.

"I consider this the most serious threat to peace since the Cuban missile crisis," Waldheim said at a news conference that ended a day of speculation at the world body that a council session might be held.

In Washington, U.S. officials said the United States is confident the U.N. Security Council's special meeting will lead to a call for the immediate release of all of the 49 American hostages in Tehran.

"The United States is not going into this meeting blind," one official said.

The officials said the United States decided to go along with Waldheim's call for a session after receiving assurances that the council would endorse America's position in the crisis.

Meanwhile, in Tehran, an American congressmen was escorted blindfolded Sunday through mobs of screaming Iranians into the occupied embassy, where he met some of the hostages and reported that one had come down with chicken pox.

As thousands of Iranians mobbed the U.S. compound, the students occupying the embassy invited Rep. George Hansen, R-Idaho, inside to speak with the hostages. He went to Iran on his own and not as an official representative of the American government.

Hansen said he saw "a number of hostages" with their hands loosely tied in front to enable them to read. Most were dirty — not allowed to change their clothes in 22 days — but otherwise in relatively good health, he said.

Hansen said he had a long talk with the students in the embassy and he said their decision to allow an American official to visit the hostages for the first time was a "great step in the right direction."

In his announcement requesting the Security Council

AP Laserphoto

Female Turtle Slowly Makes Her Way Back to the Sea

Plan To Save Sea Turtles To Get Study

WASHINGTON (AP) — The sea turtle, once so abundant that Spanish galleons could navigate in fog by following the sound of migrating herds, is fast becoming extinct.

Hoping to find some strategy that will allow the turtle to survive, conservationists and marine scientists from 40 nations are beginning a week-long conference on the creature today at the State Department.

Preservation of the sea turtle is of more than academic interest. The green turtle, one of the threatened sea turtles, is a rich source of protein for thousands of people around the world. Conservationists hope that the green turtle, if protected from commercial exploitation, can continue to feed subsistence hunters along the tropical coasts.

But against that hope are the commercial realities that threaten the turtle:

- Tortoise shell, the mottled shell of the endangered hawksbill turtle, now sells on the world market at a higher price than that of raw elephant ivory. It is used for jewelry.

- Turtle eggs not only are considered a delicacy in much of the world, they are believed in parts of Latin America to be an aphrodisiac, highly sought after and highly priced.

- The skin of the flippers of most species is valued as leather for shoes and handbags. Turtle oil is used in cosmetics. Turtle cartilage is rendered for soup. Conservationists say that,

Continued on A-2

Albuquerque Journal, Page 1
Mon. Nov 26, 1979

Star Bulletin 11-26-79

WORLD NEWS
IN BRIEF

Turtle Talks

WASHINGTON (AP) — Marine scientists from 40 nations, concerned that the sea turtle soon will face extinction, gathered in Washington today for the start of a week-long conference aimed at finding a strategy to preserve the creature.

They face heavy odds. The turtle has been called the most profitable wild animal in the world because its body can be exploited in so many different ways.

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Turtle eggs are a prized food in much of the world and are believed in parts of Latin America to be an aphrodisiac.

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New Orleans

Sex Study a Mockery?

DANVILLE, Va. (UPI) — The city of Danville will sponsor a $10,000 study of the sex lives of loggerhead turtles rather than pay a fine for polluting the air from its coal-burning steam plant.

The City Council agreed to finance the study, which was suggested by the Environmental Protection Agency in lieu of an air pollution fine.

"This is the the most asinine thing ever to come before this city," Mayor Robert Clarke fumed Thursday.

"Here we are faced with an energy crisis — the president and everybody else is advocating coal — and yet we have a coal burning plant where we've been manufacturing electricity for years and we've had to stop.

"We can't get natural gas so we've got to purchase electricity. And we've still got to pay to study turtles. I can't understand why the federal government does anything anymore."

The study will be conducted by the Virginia Insititute of Marine Science and the School of Marine Scielice at the College of William and Mary.

The study will settle a complaint filed by the Environmental Protection Agency filed against the city because of flyash emissions from its steam plant.

City Attorney W. Ewell Barr said EPA told him the city must finance an "environmentally significant study of general relevance and not be specific to Danville."

Clarke said he preferred the money be used to study snapping turtles, which can be found in the nearby James River, or to help rid the city of wharf rats, which have "grown big as 'possums."

ComingUp

• Yes, sweat fans, it's Honolulu Marathon time again, and as many as 8,000 crazed, sweating souls will be jogging, shuffling and limping along in the annual run for the Ben-Gay today. Starting time is 6 a.m. at Aloha Tower, and the marathoners will run through Kapiolani Park, down Diamond Head Road and Kahala Avenue, up Kealaolu, down Kalanianaole Highway, through Hawaii Kai and back to Kapiolani Park. A true test of the staying power of Arrid Extra Dry.

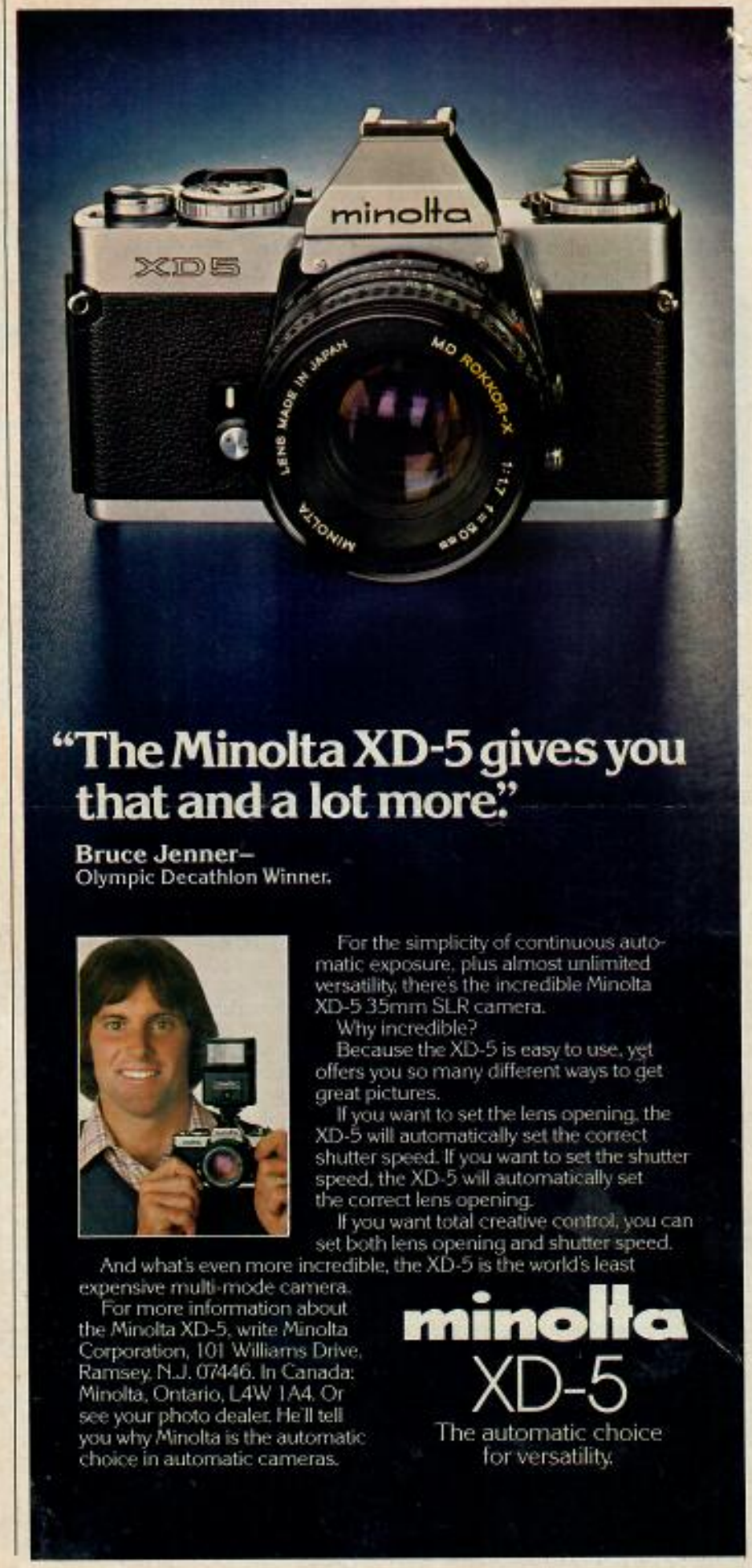
Michael Kienitz

Hasler, salmon: Smelling their way home

The tiny ruby-throated hummingbird could not fly 500 miles across the Gulf of Mexico from the southern U.S. to the Yucatán peninsula if it didn't wait for the right air currents. "Waiting for the right wind is smart," Emlen says. "Even if birds lose their star map to clouds, they can let themselves go downwind and not be too far off."

One group of monarch butterflies rides the wind from the eastern U.S. to central Mexico. The trip must be genetically programed. Monarchs that flew north in March breed and die before September, so the autumn migrants have never seen their destination. "The monarch doesn't know where it's going, but it goes," says zoologist Fred Urquhart of the University of Toronto. But because the wind is too unpredictable, the creatures must navigate, too. Researchers find that monarchs can orient to the sun. Since they have magnetite in their wings, they might also sense the pull of the earth's field on tiny internal magnets.

ADAPTATION: Having made progress in learning how animals migrate, scientists are now asking why they do it. They believe migration arose as an adaptation to changes in the environment eons ago. The green sea turtles that live in Brazil and breed on Ascension Island offer one illustration. Zoologist Carr suspects that 80 million years ago the breeding island was only about 4 miles from Brazil. The drift of land masses over the surface of the globe widened the ocean until the new island lay 1,300 miles away. The turtles just swim farther between the island's sandy beaches that they need to breed on and the sheltered shallows of Brazil where their food plants grow. Turtles do have the ability to follow a sun compass, as pigeons do. Then, once they near Ascension Island, they may follow the distinctive smell of their natal beach, which they re-



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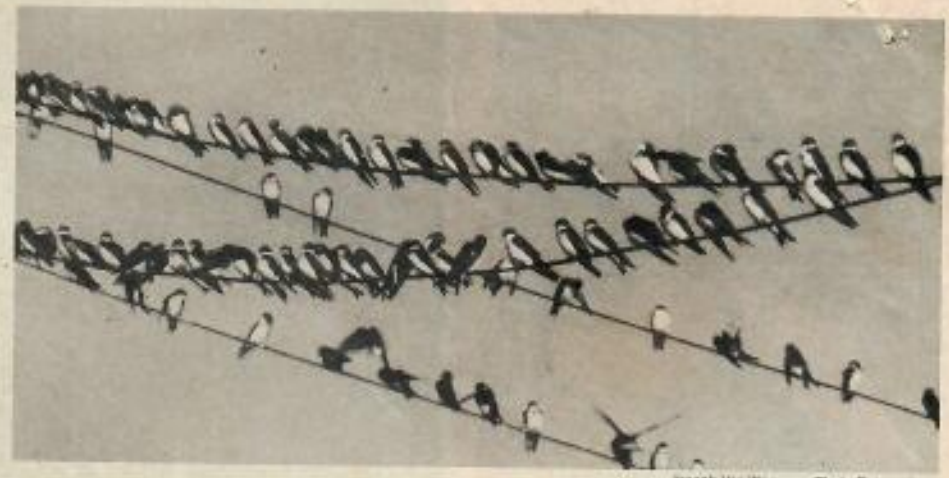
Russ Hamilton

Emlen with migrant: Stellar clues



Joseph Van Wormer—Photo Researchers

When the swallows come back to Capistrano: The same nest, generation after generation

member from their weeks as hatchlings.

Odors may also guide American eels. Eels breed in the warm, salty Sargasso Sea east of Bermuda and the Bahamas, then drift with the currents for a year to coastal waters and swim up rivers. On moonless autumn nights five to twenty years later, the mature eels begin migrating as far as 1,500 miles back to sea to spawn. Eels need one general guide in order to locate the Sargasso Sea, then a specific clue to home to their exact birthplace in its waters. Some experiments show that the eels can sense the weak electric fields generated by ocean currents. Because eels also have an excellent sense of smell, James McCleave of the University of Maine thinks that they might remember the smell of their particular natal water and follow the scent. By tracking eels implanted with ultrasonic transmitters, McCleave hopes to learn exactly how they navigate and where they swim.

NOSES: Salmon also follow odors to their fresh-water spawning streams such as those flowing into the Columbia River in Washington. Like striped bass and shad, salmon spawn in fresh water but spend their adult lives at sea. In experiments by Arthur Hasler of the University of Wisconsin, young hatchery salmon exposed to a distinctive-smelling chemical returned almost exclusively to streams treated with the same chemical. But fish with plugged noses got lost. Hasler says that before young fish swim downstream to sea, they become "imprinted" with the smell of their home stream. If they are moved from their natal gravel bed before this critical time, they home to new waters. Such olfactory tricks have established salmon runs in new streams. Because odors carry just 30 miles out to sea, salmon need another navigation cue to get home. Recent experiments show that they can use the sun and magnetic fields as compasses and might even hear the distinctive sounds of surf on different shores.

Somehow, though, 5 to 10 per cent of the fish go astray every year—but that "mistake" might be genetically programed. If an earthquake obliterated their home river, the errant fish would save the species. Even the mistakes of migrations could be crafty adaptations to an unpredictable world.

SHARON BEGLEY with JOHN CAREY

PLANTS THAT EAT FROGS IN BOGS

In dozens of unique bogs across the South, some of nature's craftiest predators pursue their prey. They gulp down ants, grasshoppers and small frogs. The carnivores are plants—an unusual genus called *Sarracenia,* or pitcher plants. Supplementing their diet by catching animals, the plants eventually spill the remains of their prey onto the ground and enrich the soil. Such natural fertilization supports the bogs' wild orchids, thick grasses and gnarled longleaf pine trees in otherwise barren soil. Yet botanist Edward Weiss of the University of Georgia, who recently discovered the system's successful strategy for survival, fears that it is now threatened by man.

The carnivorous plants kill not just for themselves but for the entire bog. Every spring, these *Sarracenia* sprout their funnel of leaves, or pitcher. Up to 3 feet tall and capped with a flat hood, it secretes nectar that attracts insects and tiny animals. The prey slides down the pitcher's walls, past downward-pointing hairs that prevent escape. At the bottom of the pitcher, enzymes digest the catch. The pitcher is often half full of carcasses by November. Then the withered plants collapse, spilling their organic fertilizer onto the barren ground.

Experiments by botanist Weiss showed that the plants are precisely tuned to their environment. He grew the pitcher plants in a greenhouse, where he could control the ground's fertility. The plants set on fertile plots switch from meat meals to soil nutrients and food produced from the sun: they therefore grow comparatively fewer pitchers and more leaves that photosynthesize instead of prey. When the soil is poor, however, the plants compensate by sprouting a higher proportion of pitchers. "It appears to be a very efficient system for utilizing a limited-resource base," Weiss says.

Fire may undo the work of the pitcher plants. Summer blazes, which occur naturally, burn vegetation and return minerals to the soil in time for plants to resprout that season. Now, however, foresters often set winter fires to encourage the growth of nearby forests by destroying competing vegetation. The fires allow water in the swamp to wash away nutrients before springtime vegetation can exploit them. Despite their helpful pitcher plants, the fragile bogs are in danger of crumbling before the flames.

Meat eaters: Strategy for survival

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15 EPA EST MPG 20 HWY EST MPG

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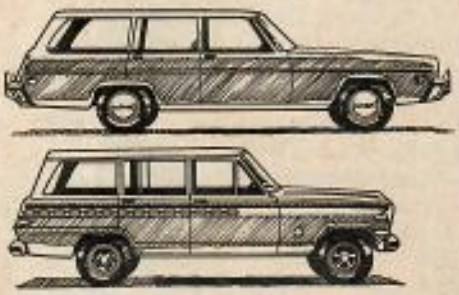

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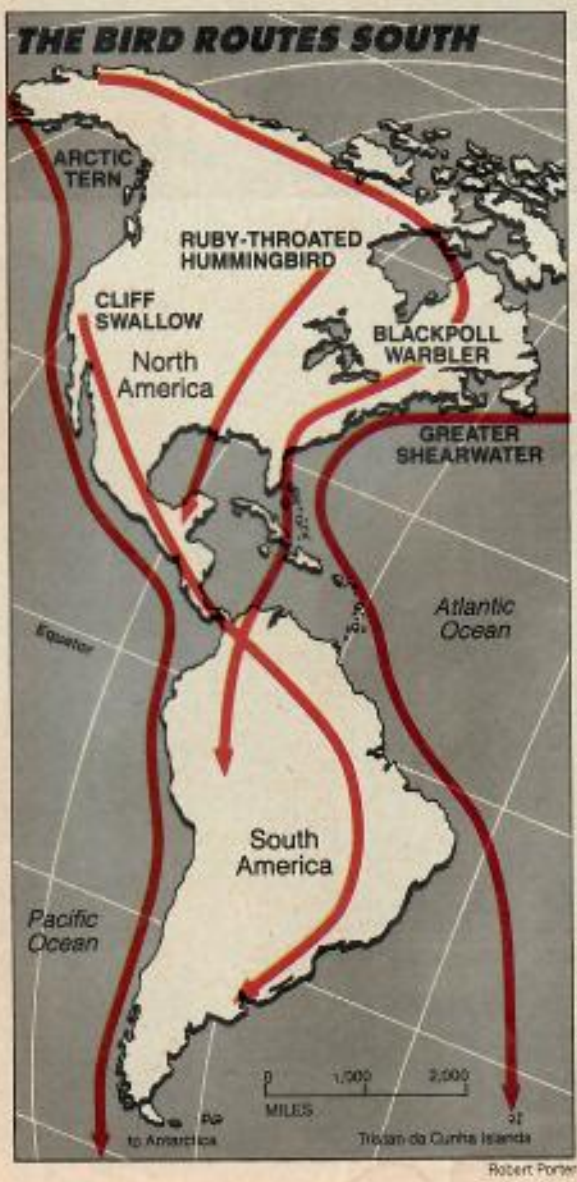
fore we're hit with three more," says Cornell's Keeton.

Scientists keep searching for experimental situations to measure birds' navigational systems. Keeton, for instance, suspected that the birds use a magnetic compass. He mounted bar magnets on pigeons' backs to distort the field around them. Sure enough, the birds homed well on sunny days when they could use their sun compass, but got confused on cloudy days. Apparently, pigeons switch to a magnetic compass when the sun disappears.

THE PULL: Some researchers think the magnetic compass is the pigeons' most important guide. Charles Walcott of the State University of New York at Stony Brook reported last year that pigeons get confused when they fly over land where the magnetic field has been disturbed. Although scientists have not yet proved in the laboratory that pigeons detect magnetic fields, a discovery this summer supports the theory. Researchers found crystals of magnetite, or lodestone, in pigeons' heads. Thousands of tiny magnets within the crystals are pulled by the earth's magnetic field like compass needles. Physiologists are now studying whether birds feel the pull and obtain a fix on north.

A bird must determine location as well as direction, however: it needs a "map." It has to know where it is relative to home before it can find the direction back. Researchers at the University of Pisa believe pigeons smell their way home. They learn the pattern of winds and odors around the home loft. If northerlies bring the faint scent of a pine forest to their loft, for example, pigeons realize they are north of home when they smell pine strongly.

Some researchers doubt the olfactory theory and look elsewhere for maps. Melvin Kreithen of Cornell discovered that pigeons detect infrasound, low-frequency noise inaudible to humans. Winds whistling over mountains and waves breaking on beaches create infrasounds that travel thousands of miles. If birds learn the patterns of the sounds and identify their sources, Kreithen says, they might be able to fix their positions. SUNY's Walcott wonders if magnetic cues not only provide compass direction but also form a map. The magnetic field around the earth points straight down at the North Pole, lies horizontal at the equator, and forms intermediate angles in between. By measuring the angle of dip, a bird would know its latitude. It might find its longitude by measuring the difference between geographic and magnetic north (which varies from east to west). Researchers are now testing these conjectures.



Robert Porter

STARS: Migratory birds probably have less need for a map since their flights seem genetically programed. Indigo buntings, brilliant blue songsters that migrate 2,000 miles from the eastern U.S. to the Bahamas and Central America, navigate by the stars. Scientists have locked buntings in cages but allowed them to see the stars of autumn. The birds can't fly away, but, apparently pulled by genetic instructions, they jump toward the southern side of the cages. Stephen Emlen of Cornell concluded that the birds use patterns of stars to find direction, much as people follow the two pointer stars of the Big Dipper to find the North Star and geographic north.

Even if buntings steer by the stars, they must still choose the right direction at the right time, north in spring and south in autumn. The choice depends on their physiology. In one experiment, Emlen made the light in buntings' cages correspond to the waning days of fall. The birds acted as if it were September although the calendar said May. They molted,

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SCIENCE

built up fat reserves and headed south. Normal birds headed north. In another test, scientists at Louisiana State University injected white-throated sparrows with the sequence of hormones their glands naturally release in spring, and the birds turned north. Fall hormones turned them south.

Even birds with complicated migrations have a genetic flight plan. Whitethroat warblers fly from Germany to Iberia to Africa. When the yearlings are kept in cages in autumn, they first hop southwest itching for Iberia, then turn southeast as if for Africa. "You think they *can't* be that programed, but they are," says Emlen. "Birds have all they need by learning star patterns and responding to their physiology."

MAP SENSE: Older birds use their migratory experience to supplement their genetic programing. When baby starlings that live in the Netherlands and winter in Britain were taken to Switzerland and released, they were confused. Unaware that they had started from the wrong place, they flew southwest anyway. But adults knew better. Their map sense alerted them to the move and they flew to Britain. Their mental map can be so precise, in fact, that migrants find the same grove or speck of land generation after generation. Greater shearwaters fly 8,000 miles from the North Atlantic to the tiny Tristan da Cunha Islands in the South Atlantic. Cliff swallows return from Argentina to California's San Juan Capistrano mission every March—but in fewer numbers since builders encroached on their feeding grounds.

Winds also help migrants, especially the arctic tern. This bird, migration's long-distance record holder, flies 12,000 miles from the Arctic, along the coast of California and past South America to the Antarctic Ocean.

Keeton with pigeon: Magnetic compasses

Russ Hamilton

Stephen Dalton—Photo Researchers

Arctic terns: From the top to the bottom of the world, long-distance record holders

Thomas W. Martin—Photo Researchers

Monarch butterfly: 'It just goes'

Karen Lukas—Photo Researchers

Green sea turtle: Odyssey to Ascension

THE MIGRATION ENIGMA

On a moonlit night at Ascension Island, a green sea turtle wades ashore after eight weeks of battling South Atlantic currents on a 1,300-mile odyssey from Brazil. The giant turtle lumbers to the stretch of beach where she was born, lays her eggs 3 feet deep in the sand and, a few hours later, begins to paddle back to South America. In two months, the hatchlings feel the same biological urge to migrate, and they start their own journey to Brazil. Sometime between eight and 35 years later, this new generation will return to Ascension, continuing a cycle that has existed for centuries. "Intellectually, this migration is one of the most stimulating questions in biology," says zoologist Archie Carr of the University of Florida. "Esthetically, it is irresistible."

Animal migration remains one of the great puzzles of nature, but the last five years have brought an unprecedented scientific quest to understand it. Biologists want to know how blackpoll warblers, songbirds that live in Alaska and weigh less than 1 ounce, can navigate across Canada to the Maritime Provinces and New England every autumn, then fly nonstop to South America, 2,400 miles away. Scientists hope to learn how monarch butterflies flutter 2,000 miles every September from New England to a single grove of trees on a Mexican mountain. And they study how fish find their natal streams 1,200 miles across featureless oceans.

To crack the mystery of migration, scientists from around the world are scanning flight paths and performing a variety of experiments. By tagging fish with ultrasonic transmitters, researchers chart migratory routes. By probing animals' senses, they find the maps and compasses that guide the creatures on their journeys. Animals can see invisible lights, hear inaudible sounds and may even sense tiny compass needles in their heads. "As we discover the many sensory cues that animals use to orient, we have learned more in this decade than in all the previous centuries," says William Keeton of Cornell University. "Our whole idea of migration is changing."

To understand migration, scientists study homing—a simpler behavioral skill. Homing pigeons have carried messages for 3,000 years and are now the white rats of migration studies. Homing is a short form of migration, and pigeons and migrants probably have the same navigation systems.

Pigeons primarily use the sun to navigate. They can find south, for instance, by flying a quarter-circle to the right of the morning sun. But the sun compass cannot be their only guide because they home perfectly well under cloudy skies, too.

BACKUPS: The search for the pigeons' backup compasses is taking scientists down many sensory paths. Recent experiments have found that pigeons respond to magnetism, changes in atmospheric pressure, polarized light and odors. The birds sense ultraviolet light and low-frequency sounds, and last year Cornell researchers reported that pigeons are even affected by the phase of the moon. "There are so many new possibilities, we hardly have time to absorb one discovery be-

Henry C. Johnson—Photo Researchers

Ruby-throated hummingbird: Wind rider

Baby striped bass: Programed to spawn in fresh streams

G. Whiteley—Photo Researchers

NEW STRAITS TIMES, MONDAY, FEBRUARY 18, 1985

Another rare albino turtle discovered

By MANAN OSMAN

KUALA TERENGGANU, Sun. — Another rare albino turtle (above), similar to "Siputih" which died at the Sarawak Museum last month, has been found in Terengganu.

It is already six months old.

The turtle, of the agar or green variety (chelonia mydas), hatched together with 36 others of the same species at the Rantau Abang hatchery last Aug. 4.

Assistant Fisheries Officer Abdul Rahman Kassim said today the eggs were bought from a man in Paka, a fishing village 100km south of here, on June 14.

"The 50 eggs were later placed in one hole at the turtle hatchery in Rantau Abang, and 36 of them hatched about 50 days later," Encik Rahman said.

But to the suprise of fisheries officers, among the black baby turtles emerged a cute white one.

The albino turtle together with five other baby turtles were later taken to the Universiti Pertanian Malaysia's Faculty of Fisheries and Marine Sciences in Mengabang Telipot where it was placed under intensive care. Three of the baby turtles had since died.

Encik Rahman said the albino turtle weighed less than 60gm when it was first taken to the faculty.

"It was the smallest among the six. Now it weighs 438gm and is 15cm long," Encik Rahman said.

Taking care of the baby turtles is quite a tedious job since the sea water has to be changed once in every three or four days.

The baby turtles, including the albino turtle, are fed on squids and kangkung twice a day.

The albino turtle is expected to be removed to the Rantau Abang turtles information centre which is scheduled to be opened to the public in the middle of this year.

Friday September 8, 1978

Dear George,

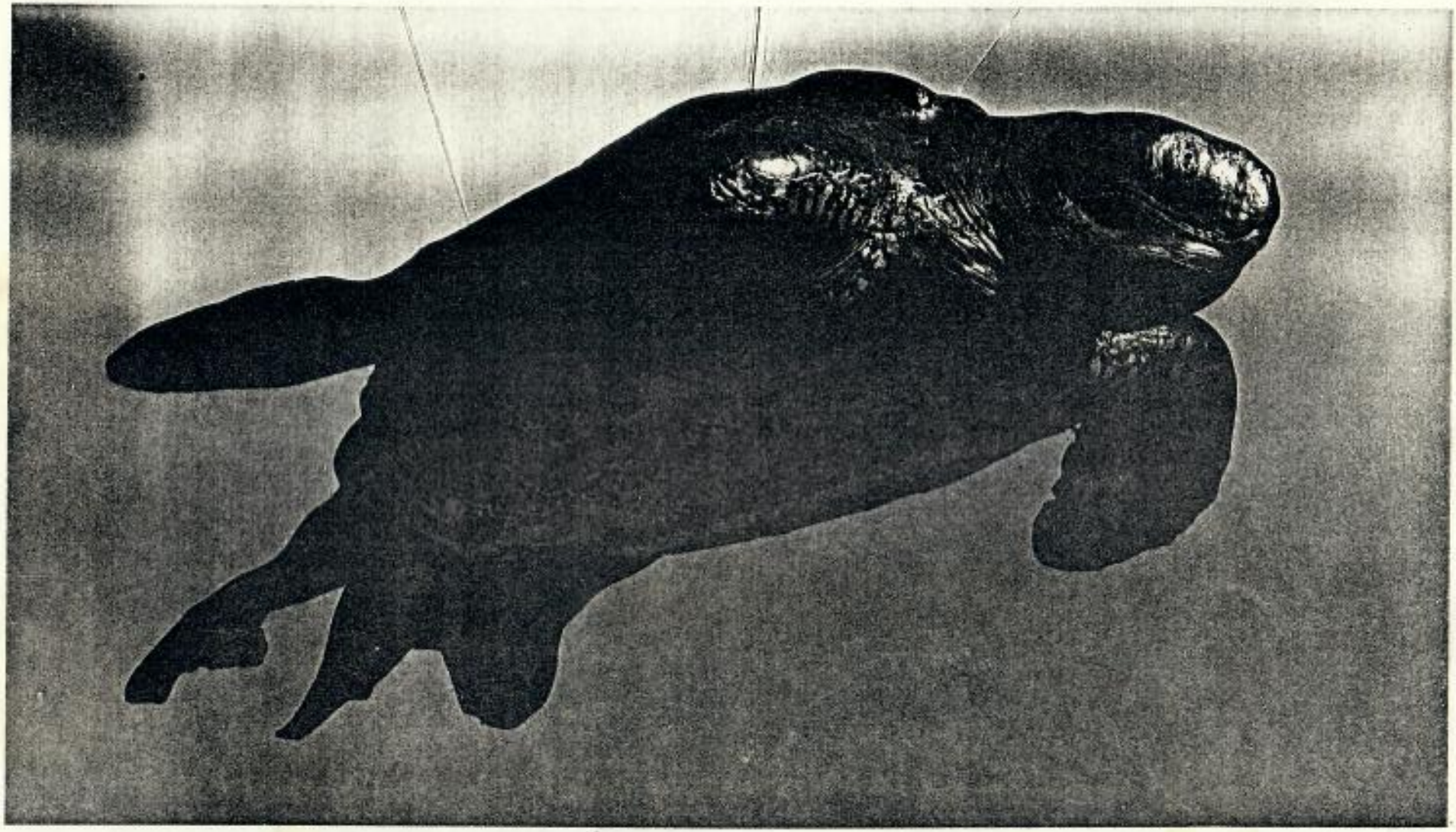
This is a picture of a turtle shell that was hanging on the wall of:

Shores Restaurant
4 miles north of Mackinac Bridge
Business Loop 75
St. Ignace, Michigan

I asked a number of waitresses if they knew what kind of turtle it was but none of them knew. One waitress said that she had been working there for "years and years" and the shell was there when she started. She said that it was supposedly a rare type of turtle that came from either Lake Michigan or Lake Huron. According to her it was rare because the shell is two tone in color. Thats all the information I could get from any employee and the owner wasn't around when we were there.

Hope all of you are fine. We send our love.

Love Mom + Dad



Richard Rush Studio, Inc. 168 N. CLINTON STREET, CHICAGO, ILLINOIS 60606

WARM HAWAIIAN GREETINGS
FOR A
MERRY CHRISTMAS
AND
HAPPY NEW YEAR

ALOHA,
THE WAIKIKI AQUARIUM

HERON ISLAND and the RESEARCH STATION

GREAT BARRIER REEF. AUSTRALIA.

by
PATRICIA MATHER

THE GREAT BARRIER REEF extends along the edge of Australia's north-eastern continental shelf for 1,920 km from 24°30'S to 9°15'S to comprise what is probably the largest system of coral reefs in the history of the earth. Each reef is a veneer of living stony coral colonies that grow upwards and out toward the sunlight around the remains of their predecessors. Emergent peaks of the drowned mainland, known as continental islands, also occur between the reefs of the Great Barrier and the coast and usually have fringing reefs growing in the shallow water around their shores (e.g. Whitsunday and Palm groups of islands).

HERON ISLAND lies 72 km from the mainland port of Gladstone on the Tropic of Capricorn, near the southern extremity of the Great Barrier Reef. It is only 3.3m above sea level at its highest point but is fairly extensive, consisting of some 16 ha.

The island is one of the larger of the Capricorn group of true coral islands (coral cays) formed when winds and currents amassed sand and debris on the surface of a coral reef to raise it above the high tide level. Subsequently, some seeds were deposited by wind and wave and others by birds, which also transferred nutrients from the sea to fertilise the otherwise sterile calcium sands. First the stabilising grasses and shrubs grew, as they are now doing on nearby Erskine Island. More shelter was thus provided for the island fauna, especially for more and different birds which brought more seeds from other islands, and more fertiliser. Thus tall trees grew in the sandy soil and their high canopy changed the wind flow over the island and reduced its vulnerability to erosion by wind and rain, especially during the cyclones which occur in the summer months. Around its northern and south-eastern aspects, the island has been further stabilised by the long term transformation of coral sand into beach rock by only partly understood chemical and biological processes that involve minute algal cells.

The precious beach rock and tall trees with their associated fauna provide the evidence that this island has been long established and confer on it an outstanding scientific significance. To open the canopy of trees by their removal deprives animals of shelter and the island is consequently deprived of fertilising agents. Simultaneously, other elements of the vegetation are exposed to desiccation, stabilising root systems are lost, debilitating weeds are able to proliferate, and the sandy soil itself is exposed to the prevailing elements. Thus, the island's natural beauty is impaired, its scientific importance reduced, and its very existence jeopardised.

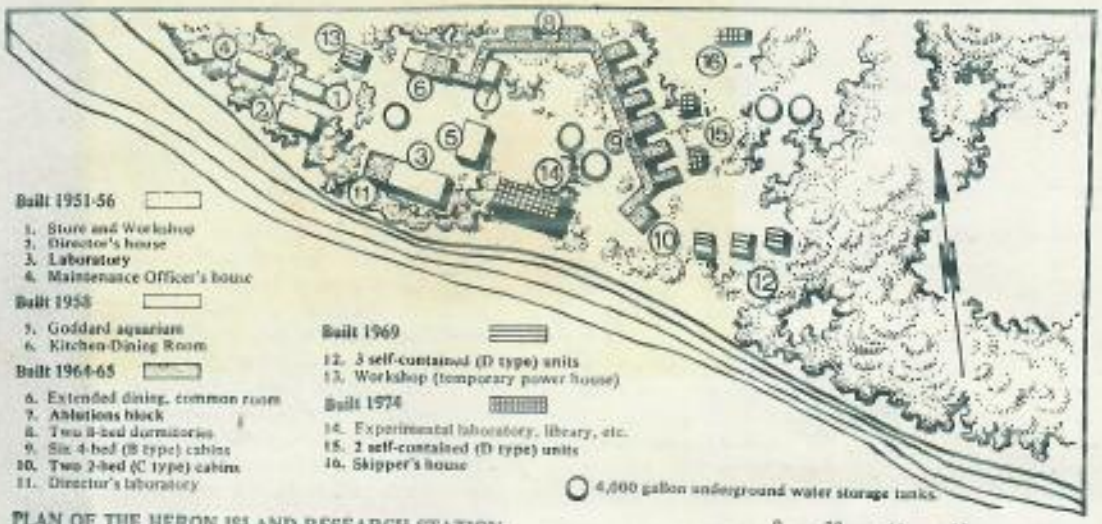
THE HERON ISLAND REEF extends 5 to 6 miles out from the eastern shore but only one half to one mile from the western and south-western shores. It is flourishing and provides outstanding examples of rich and varied coral reef communities. There are more than 400 species of fish recorded from the reef and every group of marine invertebrate is equally well represented. It is surrounded by waters of exceptional clarity and is sufficiently distant from the Queensland coast to be isolated from influences associated with mainland drainage. The island therefore provides an important base for the study of coral reefs and their associated biota, while adjacent reefs provide alternative and variable areas for study. Its location near the edge of the Continental Shelf gives it access to the deeper waters of the Coral Sea and enhances its further use as a land based oceanographic station.

The integrity of the reef is of paramount importance to the island. It can be impaired by imbalance between constructive forces and the destructive predators, boring organisms, winds, waves and man's activities. Breakdown or change in the reef alters the flow of water over it and past the islands shores, threatening them with new erosion patterns.

THE TREES are dominated by *Pisonia grandis* which reaches up to 18 m and forms quite a heavy jungle, especially in the centre of the island. It is of considerable botanical interest and is almost entirely restricted to tropical islands that are uninhabited (or have been so until recently) and have large bird populations. Heron Island is the only National Park supporting a relatively undamaged *Pisonia* forest, for elsewhere (on islands of the Bunker Group) guano mining toward the end of the last century adversely affected the forests and they have not recovered. A belt of *Casuarina* and *Tournefortia* surrounds the *Pisonia* forest. *Pandanus* trees exhibiting "prop" roots, and wild poinsettias and grasses are common.

BIRDS are the most important component of the terrestrial fauna. More than 60 species have been recorded of which about 30 are either regular visitors or resident. Among the most conspicuous is the Wedgetailed Shearwater or Muttonbird (*Puffinus pacificus*), which visits the island between October and April to nest in its underground burrows. White-capped Noddies (*Anous minutus*) are equally abundant and resident through the year, returning each day from the sea. A subspecies of the grey-breasted Silver-eye (*Zosterops lateralis chlorocephala*), endemic to the Capricorn group, is the most common land bird. Other residents include the Banded Land-rail (*Rallus philippensis*), the Bar-shouldered Dove (*Geopelia humeralis*), the Sacred Kingfisher (*Halcyon sancta*) and the Reef Heron (*Egretta sacra*) after which the island is named. The White-breasted Sea Eagle (*Haliaeetus leucogaster*) visits the island but no longer nests there.

TURTLES nest in the sand above the high tide mark during the summer. Both the green turtle (*Chelonia mydas*) and the loggerhead turtle (*Caretta caretta*) are common. Both are rapidly being exterminated elsewhere and are regarded as "endangered" species for which Queensland became a world sanctuary when (in 1969) it afforded them complete protection.



PLAN OF THE HERON ISLAND RESEARCH STATION

THE RESEARCH STATION on Heron Island is unique in providing laboratory and other facilities actually on the Great Barrier Reef. Here scientists from all parts of the world work on projects of their own choice and the considerable bibliography of publications based on work from the Heron Island Research Station forms a major and continuing contribution to the understanding of coral reefs.

The first appeals for funds for the station were made by the Great Barrier Reef Committee in 1948. The Committee was founded in 1922 to promote research into the Great Barrier Reef and the establishment of a laboratory on the reef had long been an ambition of the members. The Committee secured a 20-year lease of the south-western quarter of Heron Island and construction began in 1951. In 1964 it became possible to greatly accelerate operations with grants from the Rockefeller Foundation and the Australian Universities Commission. Today, the Station represents an asset of some $500,000. It provides at minimal costs, laboratory and living accommodation, some basic scientific equipment and some facilities for field work for a maximum of 50 students and scientists at any one time. In 1970, an agreement was concluded between the Committee and the University of Queensland whereby it became jointly owned and is now operated by a joint Board of the two parties - the Heron Island Research Station Board. With the recent addition of the experimental laboratories and 11.6 m Research Vessel *Challenger* (both made possible by a generous grant from Roche Products (Australia) Ltd.,) the Station has reached its full development. The Board is seeking additional recurrent funds for staff and operation.

VISITORS are welcome at the Research Station. Application to work there should be made to the Director, Heron Island Research Station, 4680. Visits of student groups training in field aspects of marine science are specially encouraged. The research vessel is available for scientific and educational programmes. Bench fees and boat hire charges are kept as low as possible to ensure maximum use of the facilities.

Access to the island is by launch or helicopter from Gladstone which is 576 road km north of Brisbane and is served by regular rail and air services. Radio, telephone and postal services are available.

There is a modern tourist resort on the island providing facilities for reef activities such as boating, fishing, reef inspection, swimming, snorkelling, and scuba diving. Further details may be obtained from Heron Island Pty. Ltd., 482 Kingsford Smith Drive, Hamilton, Qld. 4007.

With the exception only of the lease occupied by the tourist resort in its north-western quarter, Heron Island is a National Park with protected fauna and flora. The fauna of the reef is also protected by law and permits to collect for scientific purposes must be obtained.

MAJOR BENEFACTIONS (to 1974):

The Royal Society (London)(1951, 1965)	$ 5,000
E.J. Goddard Memorial Fund (1958)	1,034
Australian New Zealand Association for the Advancement of Science (1958)	3,000
The Australian Academy of Science	1,000
Queensland Government Subsidy (1951, 1958)	15,000
Australian Universities Commission (1964, 1969)	50,000
Trustees of the Rockefeller Foundation (1964)	42,300
Australian Army (1964) - transport of building materials	
Roche Products (Australia) Ltd. (1974)	89,387

CORAL grows best along the seaward slope of a reef where the breaking surf aerates the waters and irrigates the channels, caves and crevices and where the corals are not exposed to the falling sediment and diurnal temperature fluctuations that accompany tidal changes on the reef flat. The upward growth of the coral colonies is limited by the level of the sea and the tips of living coral exposed by low tides may die and break off to contribute to the debris of which the reef is formed. At the edge of the reef flat, before it drops away on its seaward margin, algae and other organisms consolidate the coral debris to form a ridge enclosing the waters of the lagoon that cover the reef flat. The coral colonies assume an amazing variety of shapes and provide habitats for the dense and diverse assemblage of organisms that constitute a unique aspect of a healthy coral reef.

CORAL REEF COMMUNITIES derive their energy through the plants, the primary producers, which comprise the food of a wide range of animals (filter-feeding worms, molluscs, herbivorous invertebrates of every group, and herbivorous fishes). The carnivorous climax species (the large reef fishes, some molluscs, and corals themselves) form the apex of the ecosystem. The products of their eventual disintegration and decay are again made available through the activities of bacteria and scavengers (such as the large black "sea-cucumbers" seen on the reef flat). This dense assemblage of diverse organisms comprises an independent and most highly productive system in which relationships and associations have evolved between its components to confer an efficiency that exceeds most other known biological systems. Thus, in addition to simple predator-prey situations, special behavioural adaptations make it mutually beneficial for many species to live together. Examples of such relationships, even between otherwise antagonistic forms, are provided by anemone fish (*Amphiprion*) that live safely among the tentacles of their host, and cleaner fish that remove the parasites from the gills of their large carnivorous relations.

RESEARCH conducted at the Research Station has already contributed greatly to understanding of the evolution, relationships and distribution of many groups of animals and plants including marine algae, the corals, echinoderms (starfish), molluscs, crustaceans, fishes, turtles and birds. Collections are often made to be studied later in the laboratory, but much of the work is done in the field, sometimes by "marking" individuals to determine their range, behaviour and the dynamics of their population control. Other techniques include the marking of the reef into transects or quadrats in order to measure or count the organisms that occur there from time to time, to assess the succession in which they settle, how they grow, why they die, and the factors affecting them and their populations.

For instance, in one research project conducted at Heron Island it was found that the older (largest and strongest) individuals of a species of cleaner fish, having had a full reproductive life as females, change to dominant males. Accordingly the whole population benefits genetically from the maximum spread of the advantageous characteristics of those resilient individuals.

These and other studies are helping scientists to understand the dynamics of coral reefs and related ecosystems: how the sun's energy is cycled through the system; how populations of so many different species are maintained in a balanced relationship with one another and how the size and quality of populations is maintained; how the reef grows and how it recovers if it is damaged; and what physical, geological and chemical processes consolidate its sediments and determine its form.

FURTHER READING

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Front Cover: Heron Island Reef (Co-ordinator General's Dept. photo. Scale 1.6 cm = 1 km); platform, branching and massive corals from the Heron Island reef slope (D.R. Robertson photo); the Research Vessel "Challenger" (P. Alderslade photo).

THE UNIVERSITY OF QUEENSLAND and GREAT BARRIER REEF COMMITTEE
HERON ISLAND RESEARCH STATION BOARD

Registered Office: The University of Queensland, St. Lucia 4067, Australia.

From Hetrick Tallow

Grab Bag

Ever Consider a Sea Turtle Ranch?

L. M. Boyd

TURTLE MEAT — You can get 800 pounds of beef off an acre of land. And you can get 200,000 pounds of green sea turtle meat out of an acre of salt water five feet deep. That turtle meat is a lot better than beef. Not much fat. Hardly any cholesterol. Low in calories. Tastes great, too. Perhaps we're farming the wrong kind of acreage.

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CARETTA RESEARCH, INC.
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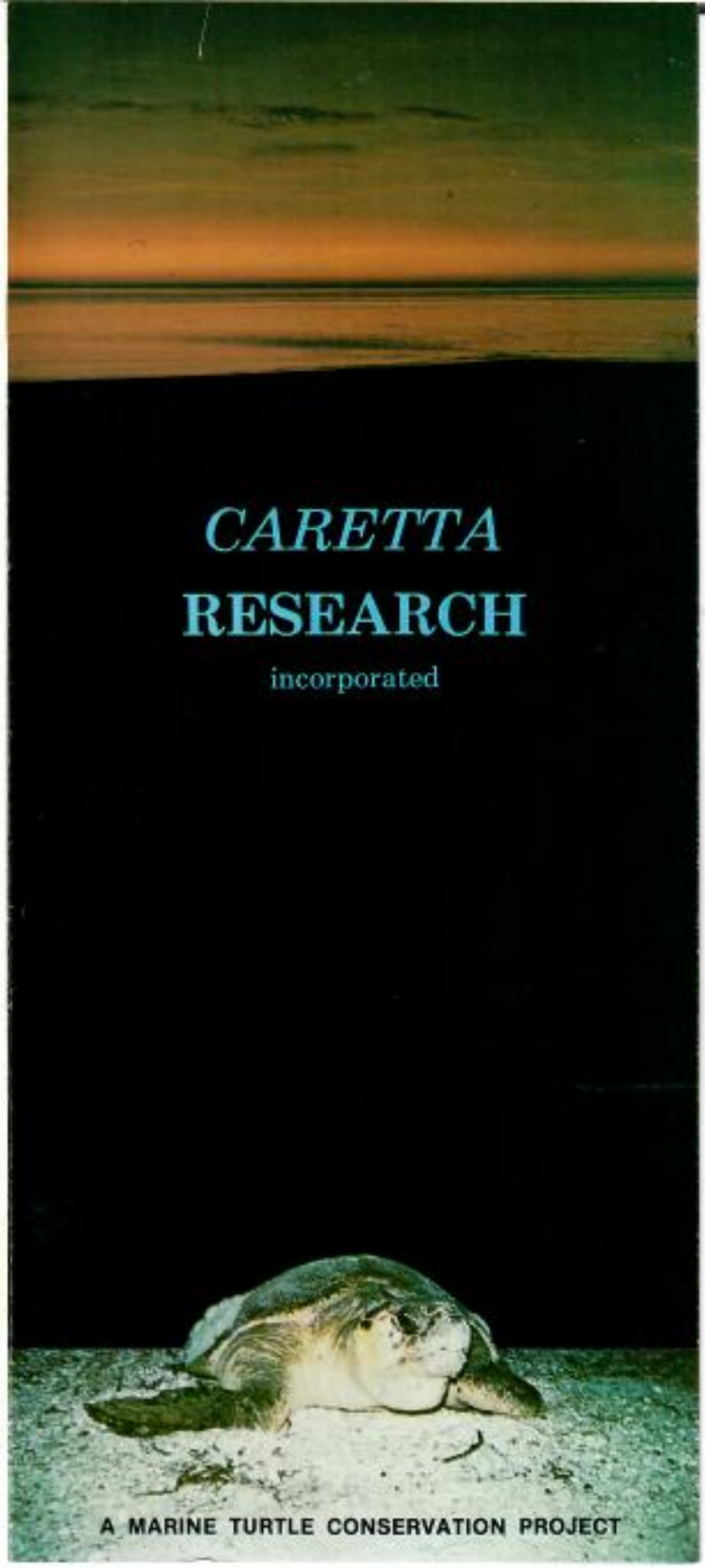

CARETTA RESEARCH, INC.

The organization, *CARETTA* RESEARCH, INC., was founded in 1968 by a group of sea turtle conservationists who were concerned about the future of loggerhead turtles along the Gulf Coast of the United States. Studies made on Sanibel-Captiva Islands in Florida prior to 1968 had indicated that these turtles were seriously threatened in the Gulf of Mexico. *CARETTA* RESEARCH, INC. was formed to study this problem, to restore loggerhead turtles to a stable population, make recommendations to enhance the continued survival of the loggerhead and initiate educational programs.

THE LOGGERHEAD TURTLE AND ITS SURVIVAL PROBLEMS

CARETTA RESEARCH, INC. derived its name from the scientific name of the loggerhead turtle, *Caretta caretta*, a large marine turtle that is distributed worldwide in temperate and tropical seas. In North America, loggerheads are the only marine turtles which nest on our shores in large numbers. Nesting occurs along the coast from New Jersey to Texas, but major concentrations of nesting exist in Florida, Georgia and South Carolina.

In May, June, July and August, usually after darkness has fallen, female loggerheads leave the water and clumsily make their way across the beach until they are above the zone of high tide. With her rear flippers the turtle digs a flask-shaped hole approximately 20 inches deep and 8-10 inches in diameter. She hesitates momentarily after having dug for about twenty minutes, then begins to deposit her eggs. Each egg, slightly larger than a ping pong ball, has a pliable, leathery shell and actually bounces as it falls into the cavity. She will deposit between 40 and 180 eggs, depending on her size and particular cycle in the nesting season.

After she has laid her eggs, the turtle covers them with her rear flippers, and with the front paddle-like ones, broadcasts sand back toward the nest as a camouflaging ploy.

If at this moment *CARETTA* RESEARCH, INC. personnel arrive on the scene, several important things happen. First, the turtle is gently turned upside down to prevent her from reaching the water. A monel-metal tag, bearing a number and an address for its return, is clamped to her left front flipper and the tag number is placed on record. Other pertinent information is noted—various dimensions of her carapace (upper shell) are noted as well as weather, tide, time and location. A portable scale is erected and the turtle is carefully uprighted and allowed to return to the water after weighing.

Sometimes loggerheads land, move up on the beach, and return to the water without laying eggs. These ventures have been termed false crawls. These non-nesting crawls may occur often during a season. Through tagging of nesting loggerheads, it has been discovered that most individuals nest every other year. Each nesting year any Gulf Coast loggerhead may deposit up to six egg clutches in two-week intervals.

CARETTA RESEARCH, INC. workers may excavate the nest, remove the eggs and transport them to a special hatchery area. The hatchery is usually located in a cleared beach area, free of vegetation and debris. A near-duplicate egg chamber is dug. The eggs are counted as they are reburied. Five eggs from the bottom

along with five from the top of the clutch are measured with calipers and the dimensions recorded.

In approximately fifty days, the young loggerheads have broken the tough egg shell and have begun the difficult journey upward. The nest exodus is quite a task. By spurts of effort the group of one hundred or more tiny turtles cave in the chamber ceiling. The falling sand filters through their mass, becomes the floor, and slowly raises them up. This elevator system and frenzied squirming brings the turtles close to the beach surface in three or four days. If they reach to within four inches of the surface during the heat of the day, they hesitate, saving their strength for a burst of speed to escape the sand once the soil above has cooled sufficiently to allow them to pass safely. The temperature factor determines the time of hatching and, because of this, most loggerhead nests erupt several hours after dark.

Leaving the nest takes only a few moments. That is why this phenomenon is seldom seen. On a dark natural beach without interference from artificial illumination glaring from street lights, condominiums or motels, the hatchlings are attracted to the bright horizon of the open sea and head for it in a beeline. When they reach the water they frantically swim near the bottom to avoid turbulence, coming up occasionally for a quick breath, and rapidly diving again.

On wild beaches, without the transplantation program described, the survival of eggs until hatching is a grim situation. In some areas in Florida—Cape Sable for example—destruction of loggerhead nests can reach as

high as 95% of a season's egg production. Raccoons are the chief predators, but opossums, foxes, skunks and feral hogs also take a toll. Sand crabs burrow into nests and easily destroy entire clutches of eggs; ants often invade the egg chambers to penetrate eggs or kill emerging turtles; roots from sea oats can encircle eggs and prevent hatchlings from leaving the eggs; torrential cooling rains can slow development, or drown a column of turtles attempting to reach the beach surface after hatching; erosion on the beach often undermines and dumps entire clutches into the sea; motor vehicles operating improperly on a beach can compress the nests to such a degree that emergence is prevented. These are some of the problems that can be solved by utilization of a well-designed and executed egg transplantation procedure.

THE JOB TO BE DONE

Each summer people, young and old alike, under the supervision of experienced Unit Leaders, are stationed on various loggerhead nesting areas along the Gulf of Mexico. At some beaches, camps may be established for a month or more.

Studies conducted during the summer by *CARETTA* field teams include general aerial nesting surveys, localized on-the-beach nest counts, tagging of adult loggerheads, nest site tenacity studies, determination of depredation on eggs by natural predators, and hatching success. All of these various projects are accomplished under broad project objectives and formalized study plans.

Since the establishment of *CARETTA* RESEARCH, INC., considerable new information on the life history of

loggerheads has been provided. New techniques and expertise in conducting successful marine turtle conservation programs have been developed. *CARETTA* RESEARCH, INC. continues to move ahead with new concepts in marine turtle conservation under the following general objectives:

1. On-going research into population trends within the Florida marine turtle community.
2. Maintain surveillance of sea turtle nesting assemblages along the Florida coastline by both aerial and on-the-ground surveys.
3. Expand the Project's sea turtle tagging program in Florida.
4. Study factors of nesting and production success at a complex of Unit study sites.
5. Collect and transplant loggerhead turtle eggs to hatchery areas to increase nesting colony productivity and decrease destruction of eggs by predators.
6. Maintain young loggerhead turtles in captivity to study growth patterns, evaluate tags and other methods of identification, and also for education purposes.
7. Develop a program of public education publicizing the plight of all marine turtles; sponsor marine science workshops; develop audio-visual packets for distribution to schools, libraries and service organizations.
8. Cooperate and exchange information with other marine turtle conservation groups in the United States.

CARETTA RESEARCH, INC. is involvement—getting engaged in a **real** environmental problem. And it's all done by a group of dedicated volunteers with a common goal—safeguarding our loggerhead turtle resource.

There are no salaried positions in the project and administrative and field functions are ably accomplished by dedication and interest alone. In the summer small stipends are paid on occasion to young men and women who show interest in pursuing a career in the biological sciences. These highly trained and competent young people are assigned to problem areas in which our conservation processes are necessary.

CARETTA RESEARCH, INC. is a tax-exempt organization and is funded by grants from foundations, civic and business groups, membership fees and memorials. Such individual donations or foundation-based financial assistance are welcomed. Only through continued contributions and financial support can the important objectives of *CARETTA* RESEARCH, INC. be realized.

MEMBERSHIP IN *CARETTA* RESEARCH, INC.

Our project is supported by various classifications of memberships. Each type supports the sea turtle conservation objectives of our organization. Membership classes and fees are as follows:

Student (under 18)	$ 5.00
Associate	10.00
Contributing	25.00
Certified	100.00

Send your tax-deductible membership contribution to:

CARETTA RESEARCH, INC.
Post Office Drawer E
Sanibel, Florida 33957

The following individuals, businesses and organizations generously provided funds for production of this brochure:

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Mr. & Mrs. Elisha Camp
The Damroth Foundation
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Hazel B. Gotshall
Island Inn Company
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Sanibel-Captiva Audubon Society
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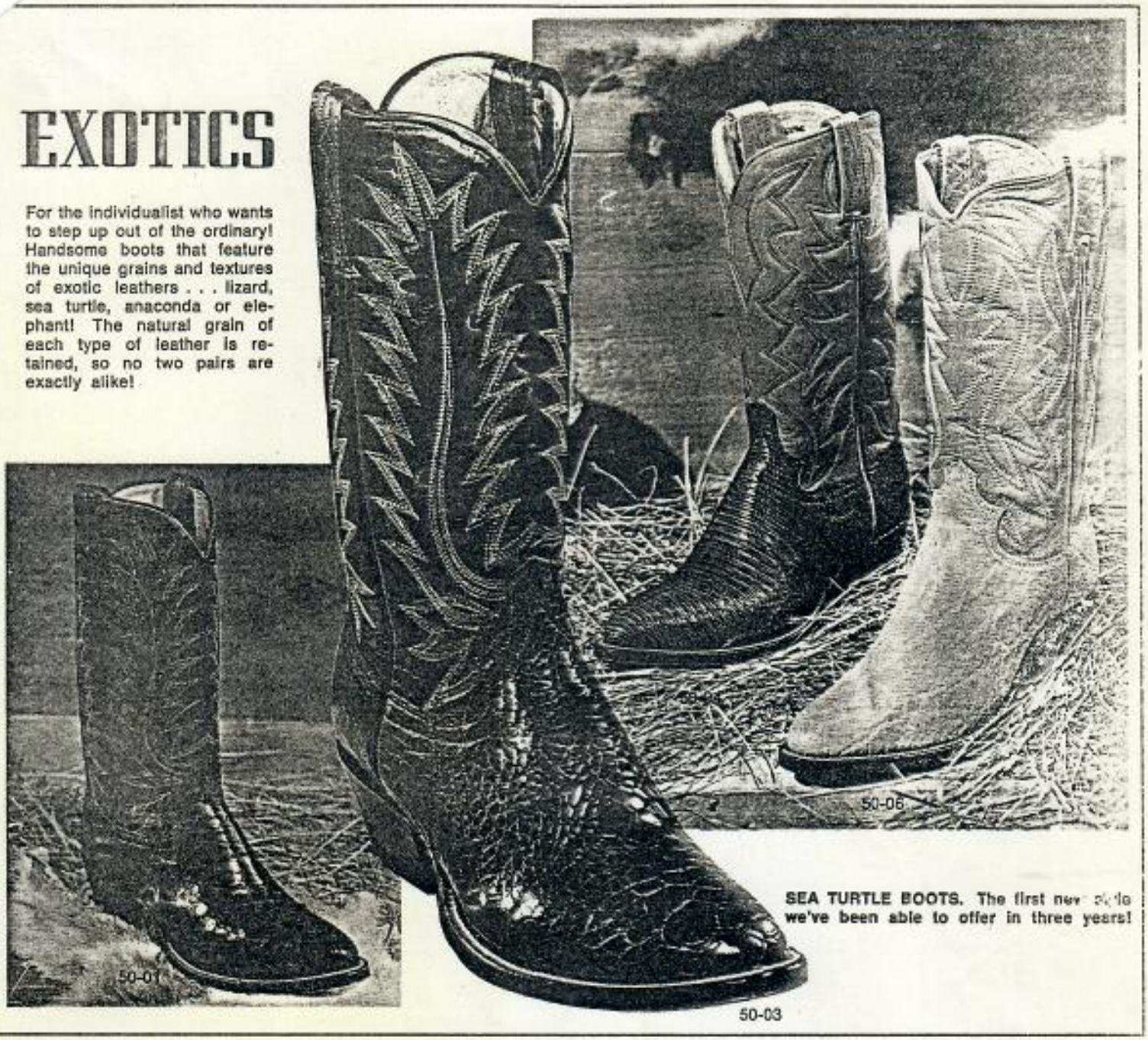
EXOTICS

For the individualist who wants to step up out of the ordinary! Handsome boots that feature the unique grains and textures of exotic leathers . . . lizard, sea turtle, anaconda or elephant! The natural grain of each type of leather is retained, so no two pairs are exactly alike!



SEA TURTLE BOOTS. The first new style we've been able to offer in three years!

"ANACONDA," a reptile leather that's truly unique

An extra-special handmade dress boot loaded with good looks and comfort. The foot is genuine anaconda snakeskin. The unusual grain of this exotic leather is bold, massive . . . lends itself well to brawny western styling. The 12" shallow-scallop calfskin top features a 5-row stitch pattern. Walking heel. Brown, as shown.

Sizes and widths: 9½ thru 12 (A); 8 thru 12 (B); 6½ thru 12 (D); 7 thru 12 (E)

50-01 ..... $100.00
50-02 Size 13 (A, B or D) $102.00

THE "SEA TURTLE," once again available

Three years ago the sea turtle was an endangered species . . . and all hunting was prohibited. Now, however, not only have the herds been replenished, they are so over-abundant as to make hunting a necessity! Ban on hunting will be enforced again as soon as herd is at an optimum number, so now's the time to buy your boots, while we still have them in supply. The foot of this boot is fashioned of sea turtle in rich, deep brown, with the beautiful grain brought out by masterful craftsmanship. Has 12" calfskin top with intricate stitching. Western toe and heel. One of our finest boots.

Sizes and widths: 9 thru 12 (A); 8 thru 12 (B); 6½ thru 12 (D); 7 thru 11 (E)

50-03 ..... $129.95
50-04 Size 13 (B or D) $131.95

SHEPLERS OWN EXCLUSIVE "LIZARD CLASSIC" BOOT

This impressive boot is an eye-catching bit of footwear that will be a standout in any crowd. Handmade and handcrafted in a richly grained genuine lizard foot with a smooth, lightweight 12" calfskin top with a 5-row stitched pattern. So good looking that every time you wear them will be a special occasion and so comfortable that you will want to wear them everyday.

Colors: Peanut brittle or black

Sizes and widths: 9 thru 12 (A); 8 thru 12 (B); 6½ thru 12 (D); 7 thru 11 (E)

50-04 ..... $89.95
50-05 Sizes 13 (A, B or D widths) $91.95

THE "TUSKER" by JUSTIN

You might say that Justin takes this tough and rugged dress boot right out of an African safari. Elephant, with all of its natural-born wearing stamina still displays "never-to-be-forgotten" good looks. Calfskin top with contrasting stitch design.

Colors: Bone, peanut brittle, chocolate elephant or black

Sizes and widths: 8½ thru 12 (AA); 8 thru 12 (B); 6½ thru 12 (D)

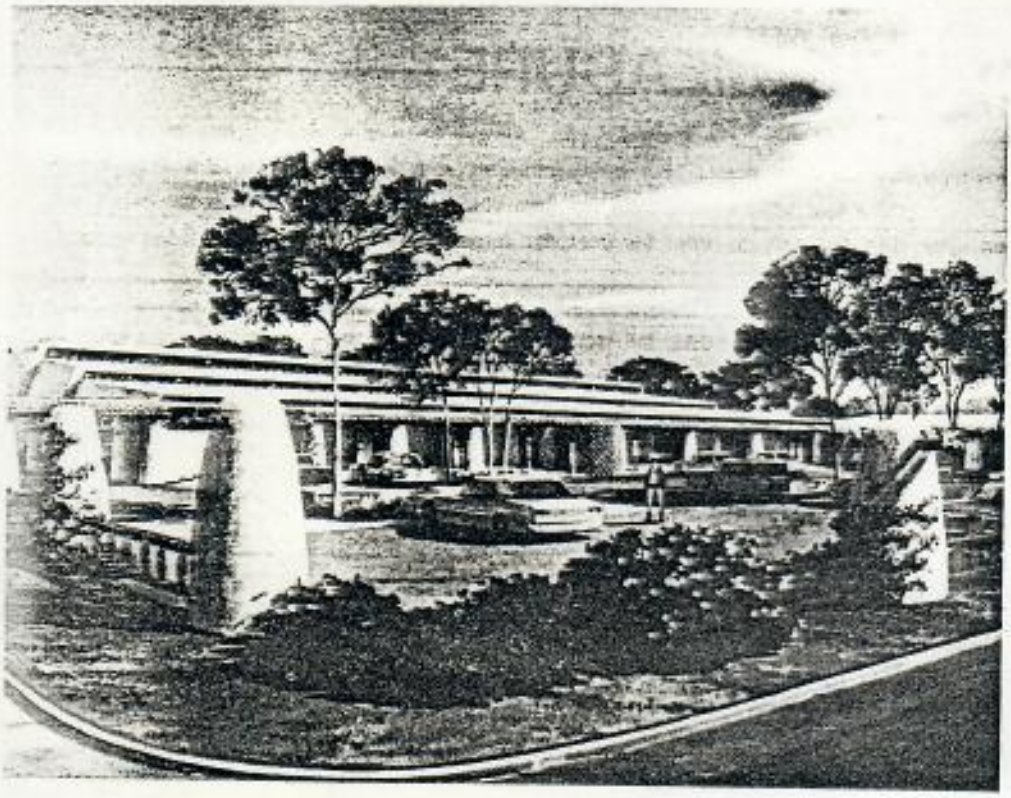
50-06 ..... $100.00

SHEPLERS INC.

WICHITA, KANSAS / OKLAHOMA CITY, OKLAHOMA

The World's Largest Western Stores

Member of the Wichita Chamber of Commerce



Sheplers Saddle and Leather Co. was established in 1946 at 425 North Main in Wichita, Kansas by Harry Shepler. In 1961 he moved this growing business into larger quarters at 6501 West Kellogg . . . a 10,000 sq. ft. building on the main thoroughfare into the city from the west. In 1967, Harry Shepler retired and the business was purchased by the Drys, Mr. and Mrs. J. Robert, Mr. and Mrs. Charles L. and Mr. and Mrs. J. Robert Jr. At this time it became known as Sheplers of Wichita, the world's largest western store. Under enthusiastic new leadership Sheplers continued to thrive and in 1969 this growing enterprise was moved into a brand new 24,000 sq. ft. building. Enormous quantities and selections of name brand merchandise for the entire family became a reality. In 1971, 23,000 sq. ft. was added to the facilities in order to provide greater services to its customers. In 1973 a new 47,000 sq. ft. unit was opened in Oklahoma City, Oklahoma. With this expansion Sheplers has truly become the World's Largest Western Stores, the most exciting stores in the world. When you're in either the Wichita or Oklahoma City area we invite you to stop and browse through our stores. Parking is free and you'll find a friendly and capable staff to make it a memorable visit.

Important Customer Service Information . . . Please read carefully before you order!

OUR POLICY: has been and will continue to be, in serving you in a courteous, efficient and informative manner . . . offering you selections of fine quality name brand merchandise . . . value and service beyond question . . . that we might warrant your trust and confidence in all of our transactions.

OUR GUARANTEE: When your purchase arrives, if it is found defective in any way or if you are disappointed with quality or fit, you may return it promptly in the same condition in which it was received. We will gladly refund your full purchase price, exchange it, or credit your credit card charge account. You must be pleased.

TERMS: Our terms are payment-with-order. To avoid unnecessary errors and delays and to help us process the handling of your order, we suggest that you fill out the order blank completely, (enclosed in center of catalogue) and accompany your order with either a check or money-order. Please, no cash or stamps. All purchases to be shipped to an address in the states of Kansas, Oklahoma, Colorado, Nebraska and Missouri require the appropriate sales tax. This applies to these states only!

If you wish, you may charge your purchases by mail with your Bank-Americard or Master-Charge credit card. Your card conveniently establishes a credit rating with us. No application to fill out. No service charge or fee. It's just a part of the modern customer service found at Sheplers. Simply tell us to charge it to your Bank-Americard or Master Charge account. Write your card number and expiration date on your order. Write the name and branch of the bank which issued your card and place your signature on your order. We will promptly deliver your order and notify your bank. Your purchases will be on your regular monthly statement and you make payment direct to your BankAmericard or Master Charge office. Please be sure to supply the above information on your order.

SHIPPING: Your order will be promptly shipped in the most economical manner by surface carriers, unless otherwise specified. Please include all handling and packing charges with your order. Your order will be processed immediately after we receive it. If your order cannot be filled for some apparent circumstance you will be notified of our anticipated shipping date.

SPECIAL ORDERS: You may order C.O.D. but, we must remind you of the additional cost to you, the customer, due to the higher rates applicable to C.O.D. shipments. If ordering C.O.D. a 25% deposit must accompany your order.

If you order by wire, please wire your remittance at the same time thereby saving costly C.O.D. charges.

TELEPHONE ORDERS: If you desire to phone us for some special reason . . . call 316-943-2151, Monday through Friday from 9:30 a.m. to 4 p.m. (CST). A qualified person will be on duty at all times to handle your order promptly and efficiently. In this case, please send your remittance immediately or charge it to your BankAmericard or Master Charge account so that your order may be processed without delay.

EXCHANGES: Every item you order must meet with your approval. If for some logical reason, you wish a different color or the merchandise does not fit to your satisfaction . . . we are prepared to back our guarantee by exchanging it, refund your full purchase price or credit your credit card charge account. However, we cannot accept for exchange, merchandise held for longer than 10 days, so check it carefully upon receiving it and if necessary, do it immediately. Wrap package in an acceptable mailing manner and return to us. Include your instruction in a letter, enclose in an envelope and attach to outside of your package. Please include the original packing slip in your package. Also insure.

SHEPLERS GIFT CERTIFICATE: An exciting surprise and a practical answer to your gift problems for any and all special occasions. Simply send your check or money order and the name and address of the person to whom you wish it sent. You may include your personal note too, and we'll mail it together with the Gift Certificate and Sheplers catalogue. The recipient will enjoy a refreshing experience browsing through our catalogue of fine quality merchandise from the most exciting store in the world and too, you can be satisfied that he or she has selected a gift of their own choice.

LEISURE LIVING

IN THE WESTERN TRADITION

From the World's Largest Western Stores

FALL AND WINTER EDITION 1974

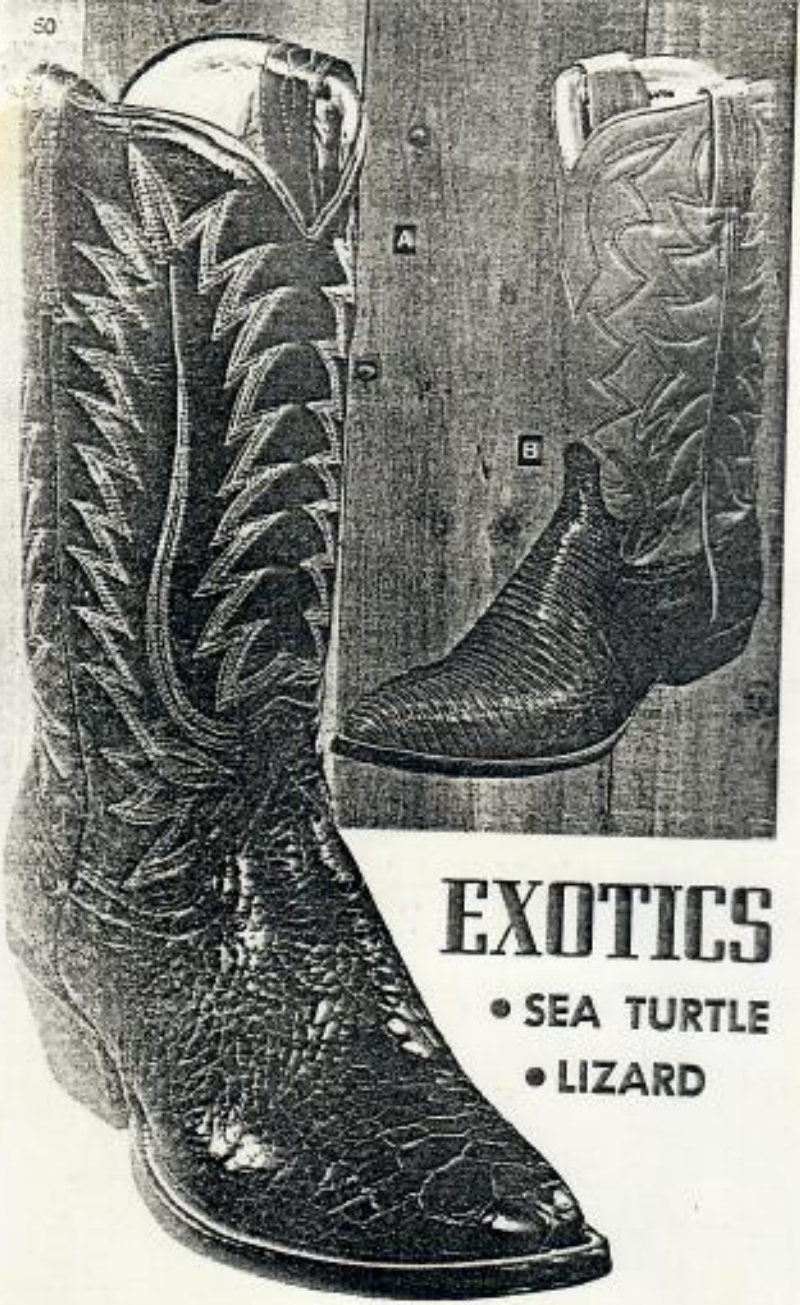
6501 W. Kellogg
P.O. Box 9021
Wichita, Kansas
67209
U.S.A.

SHEPLERS
INC.

Reverses to Fur

Shearling at its finest . . . Our cover coat is antiqued suede finished leather reversing to raccoon dyed lamb shearling . . . ordering information on page 2.

Hat: The "McCloud" sold on page 44.



EXOTICS

• SEA TURTLE

• LIZARD

HANDSOME BOOTS IN UNIQUE LEATHERS

For the man who wants to step up out of the ordinary, boots that feature the unusual grains and textures of exotic leathers. The natural grain of each type of leather is retained, so no two pairs are exactly alike.

A. SHEPLERS OWN EXCLUSIVE "SEA TURTLE"

This sea turtle boot was crafted expressly for Sheplers, and is one of our finest boots . . . in one of the most rare of exotic leathers. The foot is fashioned of the non-endangered Pacific Ridley (Lepidochelys olivacea) turtle. It is a rich, deep brown color with the beautiful grain brought out by master craftsmanship. 12" calfskin top with intricate stitching. Western toe, cowboy heel.

Sizes and widths: 9 thru 12 (A); 8½ thru 12 (B); 6½ thru 12 (D); 7 thru 11 (E)

F5 031-003D $129.95

B. SHEPLERS OWN EXCLUSIVE "LIZARD CLASSIC"

This impressive boot is an eye-catching bit of footwear that will be a standout in any crowd. Handmade and handcrafted in a richly grained genuine lizard foot with a smooth, lightweight 12" calfskin top with a 5-row stitched pattern. So good looking that every time you wear them will be a special occasion and so comfortable that you will want to wear them every day.

Colors: Peanut brittle or black

Sizes and widths: 9 thru 12 (A); 8 thru 12 (B); 6½ thru 12 (D); 7 thru 11 (E)

F5 031-005B $89.95

F5 031-006B Sizes 13 (A, B or D widths) $91.95

LUCCHES

C. THE "CORTEZ"

Lucchese's outstanding styling and unsurpassed craftsmanship i evident in this lavish handmade boot. Meticulously designed 12" top Cowboy heel. The goatskin takes a beautiful shine and is ver comfortable to wear. Black cherry (shown) or black gold. Matching belt (1) sold below.

Sizes and widths: 9 thru 12, 13 (AAA); 9 thru 12, 13 (AA); 9 thru 12 13 (A); 7½ thru 12, 13 (B); 7 thru 12, 13 (C); 6½ thru 12, 1 (D or E)

F5 031-010B $150.00

D. THE "PHOENIX"

Soft, flexible German calf medium scallop upper, with single needle stitching and welt detailing in a quietly distinctive design. Moc seaming sets off the squared receding toe. Cowboy heel. Black.

Sizes and widths: 8 thru 12, 13 (B); 6½ thru 12, 13 (D)

F5 031-121D $150.00

E. THE "WESTERN TREASURE"

Genuine water buffalo boot in a new neutral that blends harmoniously with both the browns and blacks in your wardrobe. Triple row single needle stitching in a neat, simple pattern sets off the top of this fine boot. Medium round toe. Cowboy heel. In black gold.

Sizes and widths: 9 thru 12, 13 (AAA, AA, A); 8 thru 12, 13 (B or C); 6½ thru 12, 13 (D or E)

F5 031-114D $130.00

F. THE "STATESMAN"

The elegant natural look of unfleshed, soft, "glovey" English saddle veal. Exquisite stitched patterns in a 6 row single needle. Hand sewn antique Kano vamp. Squared receding toe. Cowboy heel. Matching belt (2) sold below.

Sizes and widths: 9 thru 12, 13 (A); 8 thru 12, 13 (B); 7½ thru 12, 13 (C); 6½ thru 12, 13 (D); 6½ thru 11, 12, 13 (E)

F5 031-012D $165.00

G. THE "SAFARI"

A real knockout of a boot! This extravagantly beautiful boot is made in a combination of burgundy calfskin and genuine black ostrich. The foot is fashioned in a wing tip design with an inset of ostrich. The 12" top is unusual in that it is straight in front with a medium scallop in back. Fully leather lined. Cowboy heel. A boot for the western individualist. Matching belt (3) sold below.

Sizes and widths: 9 thru 12, 13 (A); 8 thru 12, 13 (B); 6½ thru 12, 13 (D)

F5 031-120D $170.00

H. LIZARD "SUPERBA"

The master craftsmanship of Lucchese is evident in every feature of this outstanding boot. The lizard foot is one piece, with no seams to mar its bold good looks. The 12" calfskin medium scallop top is detailed with 5-row shaded stitching and lizard collar trim. Fully leather lined. Cowboy heel. Truly one of the most beautifully styled boots we've seen in this fine exotic leather. Sure to give you long lasting enjoyment. Matching belt (4) sold below.

Colors: Peanut brittle (shown) black or chocolate

Sizes and widths: 9 thru 12, 13 (A); 8 thru 12, 13 (B); 6 thru 12, 13 (D)

F5 031-119B $195.00

I. THE "CONQUISTADOR"

Exquisite chocolate French calf with squared receding toe, 12" tops and cowboy heel. You'll wear them with pride and comfort. Matching belt (5) sold below.

Sizes and widths: 9 thru 12, 13 (A); 8 thru 12, 13 (B); 7½ thru 12, 13 (C); 6½ thru 12, 13 (D); 6½ thru 12, 13 (E)

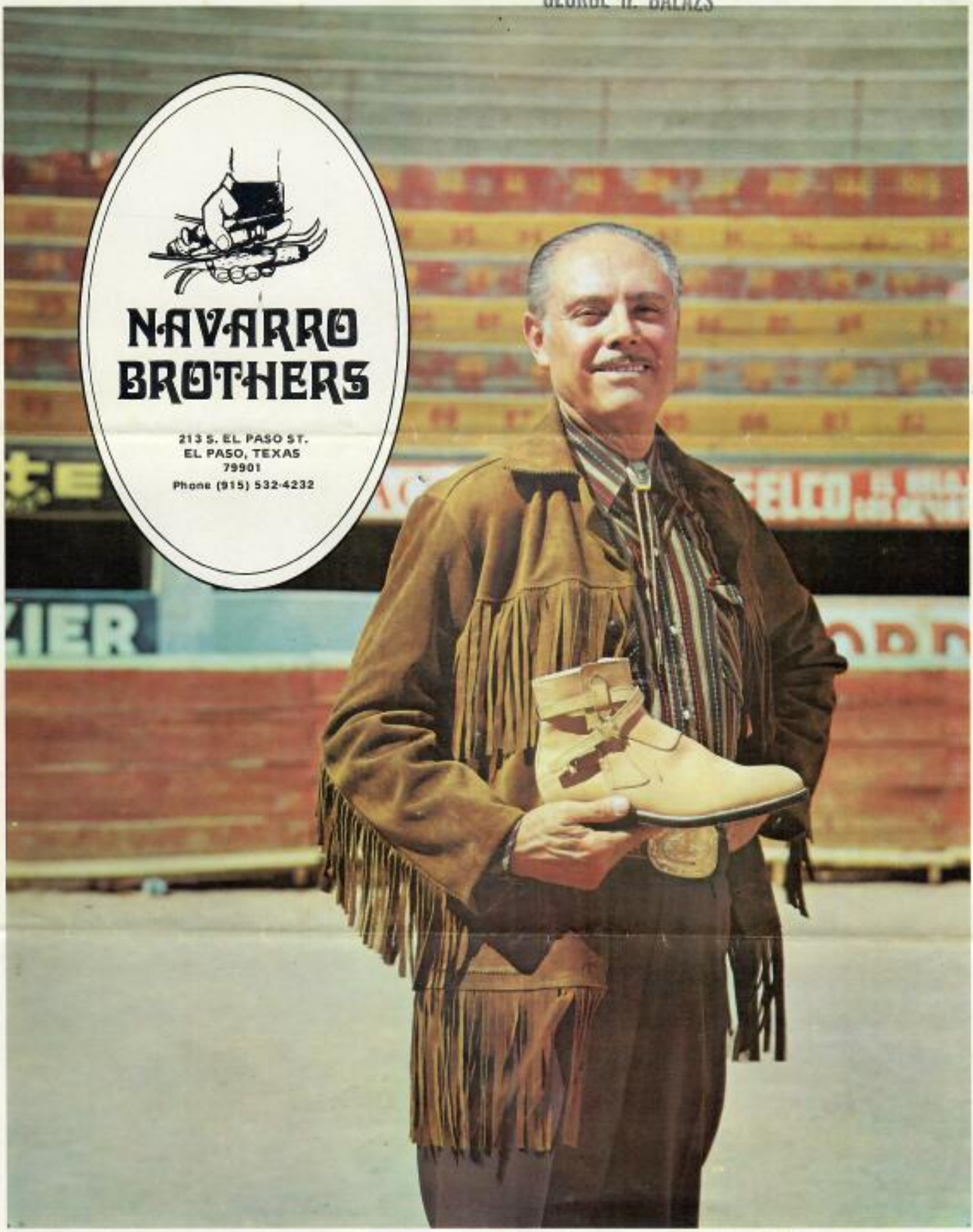
F5 031-008D $150.00

1 thru 5. HANDMADE BELTS TO MATCH YOUR BOOTS

Match both leather and design. 1¾" width, tapering to 1½". Sizes 32 to 44 (even).

1. F5 120-002B "CORTEZ" in black cherry or black gold ... $25.00
2. F5 120-001D "STATESMAN" in English saddle tan $25.00
3. F5 120-050D "SAFARI" in burgundy/black combo $25.00
4. F5 120-049B "LIZARD SUPERBA" in peanut brittle or black $25.00
5. F5 120-004B "CONQUISTADOR" in chocolate $25.00

LIBRARY OF
GEORGE H. BALAZS



Don Ruben Navarro (Mr. Jodphur). Noted for thirty years as the specialist in exclusive, handmade footwear. Customers by the thousands from every state in the union order Navarro Brothers classic styles with assurance. We guarantee satisfaction with every purchase or your money back.

Here Don Ruben wears his famous "El Pasoan" jacket, another one of his leather specialties. This jacket has true western styling and comes in soft suede leather with deep six-inch fringing. Choose yours in coffee brown, tan, or beige. A perfect fit in sizes 36 to 44. Order #706. **39.50 ppd.**

#5006 Cordovan Brown

THE

FLYING JODPHUR

#5006 Brown

#5006 Black

#5006 Tan

OUR BIGGEST SELLER... THE STYLE THAT HAS MADE NAVARRO BROTHERS FAMOUS...

Many thousands of pleased customers attest to the excellence of our classic Flying Jodphur. There's nothing like it! Benchmade, handlasted, hand finished, and fully leather lined. Every pair shows the care of the shoemaker's hand. Perfect for walking, riding, flying, and business wear . . you can't beat it for comfort! Glove-soft and long-wearing. Black, brown, tan, cordovan color leather . . or sand suede as shown on front cover. Rubber heels. 5-13, narrow, medium, or wide. **25.95** ppd.

(Add $3 more for sizes 13½ - 15)

$5 C.O.D. Deposit

#7054

#15

#611

HANDCRAFTED IN MEXICO
BY TRES CABALLOS

CLASSIC JODPHURS

FOR WHICH NAVARRO BROS. IS NOTED

#612

#607

#15: SKY-HI JODPHUR
Same as our Flying Jodphur except has single strap. Glove-soft leather; fully leather lined; rubber heels. 5-13; narrow, medium wide. Black or brown, **25.95 ppd.**

#7054: BOTIN VAQUERO
Authentic cowboy shoe, tough and handsome! Durable, fine leather; elastic sides; square toe with 1½" underslung heel; reinforced steel arch. 4-13, medium or wide. Brown or black. **23.95 ppd.**

#611: GENTLEMAN'S BOOTEE
Benchmade, handlasted, hand finished in fine Palomino or black kid leather! Expandable, invisible elasta-sided vents for snug ankle fit. Leather lined; rubber heels. 5-13; narrow, medium, wide. **24.95 ppd.**

#612: TRAVEL EASE
Imported reversed leather, unusual and extremely comfortable! Sturdy and durable; easy to slip on and off. Brown with black expandable elastic sides. 6½-13; narrow, medium, or wide. **$22 ppd.**

#607: BOTIN CHARRO
A smart dress or work shoe with extra comfort built right in. Elastic sides for healthy ankle support. Sturdy, pliable soles; rounded toes. Choice of 1¼" heel with rubber tap or flat Oxford rubber heel. Black or brown, 4-13; narrow, medium, or wide. **23.95 ppd.**

$5 C.O.D. deposit

1974-1975

#7023

X5603

GENUINE

SEA TURTLE SHOES

HANDLASTED, BENCHMADE BY DOMIT

MEXICO'S FINEST SHOEMAKERS

Here are our three fabulous slip-on styles .. comparable to $60.00 values in a store! Enjoy luxury with years of lasting comfort! Rich, burnished turtle leather ... only the choicest skins. Leather lined; rubber heels. These are shoes of true distinction and status . . . classics of fashion created by DOMIT of Mexico!

1946, above: Buckle shoe with moccasin square toe. Black or brown, 6-14, A to E. $5 C.O.D. deposit **39.50** ppd.

7023, center: Side buckle shoe with new square shaped toe. Black or brown. 6-14, A to E. $5 C.O.D. deposit **39.50** ppd.

X5603, below: Classic slip-on with modified moccasin toe. Black or brown. 4-13½, B to E. $5 C.O.D. deposit **39.50** ppd.

GENUINE ALLIGATOR HANDMADE SHOES
BY COUNT BARRI

#850: Because genuine alligator is becoming extinct, these shoes are expensive - But compare ours at $85 with those in stores for $125.00 and recognize the value here! Buckle model with new squared toe; leather lined; comfortable as a slipper! Imported from Brazil. Sizes 6-13. Black or brown, B to E widths. Blue, burgundy, or beige, D widths only.

$10 C.O.D. deposit on alligator shoes. **$85** ppd.

GENUINE ALLIGATOR

BY FRENCH, SHRINER

The famous "Extra Quality" shoes with highest standards of workmanship. Rare skins beautifully worked . . luxurious comfort for a lifetime. Priced far below what you'd pay in a retail store! 3-eyelet tie. Fully leather lined. Sizes 6½ to 13, AA to E. #x661, Brown. #x662, Black. **89.95** ppd. $10 C.O.D. deposit.

GENUINE ALLIGATOR

BY FRENCH, SHRINER

Again, a far lower price than you'd pay in a retail store for this superbly crafted shoe of finest, richly burnished alligator skins. This model a slip-on style with fashionable square toe. Fully leather lined. Sizes 6 to 13, A to D widths. #x668, Black. #x667, Brown. **89.95** ppd. $10 C.O.D. deposit.

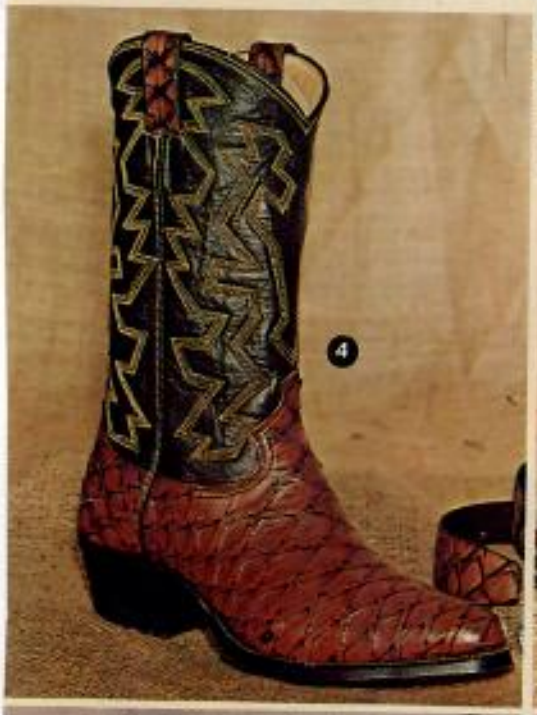
GENUINE SEA TURTLE SHOE,

BENCHMADE IN MEXICO

This remarkably comfortable, long wearing shoe is handlasted by DOMIT, the dean of fine Mexican shoe-makers. Built on American lasts for perfect fit. Compares to $60.00 shoes! 3-eyelet tie in black or brown. Fully leather lined; rubber heels. Sizes 4 to 13½, B to E widths. **39.50** ppd. #x3251 $5 C.O.D. deposit.

FINE HANDCRAFTED BOOTS FROM Justin

JUSTIN BOOTS, a standard of the West since 1879. More than 160 different operations go into the manufacture of these fine styles. From the selection of the leather to final inspection, each step is performed by skilled craftsmen. Most of the operations are still done by hand. Where modern machinery is used, it is used only to improve quality.



Our Biggest Seller - #5006

Many thousands of pleased customers attest to the excellence of our classic Flying Jodhpur. Imitated, but never equaled — there's nothing like it! Benchmade, handlasted, hand finished, and fully leather lined. Every pair shows the care of the shoemaker's hand. Perfect for walking, riding, flying, and business wear . . . you can't top it for comfort. Glove soft and long wearing. Rubber heels. 5-13, narrow, medium, or wide. **33.50** ppd.

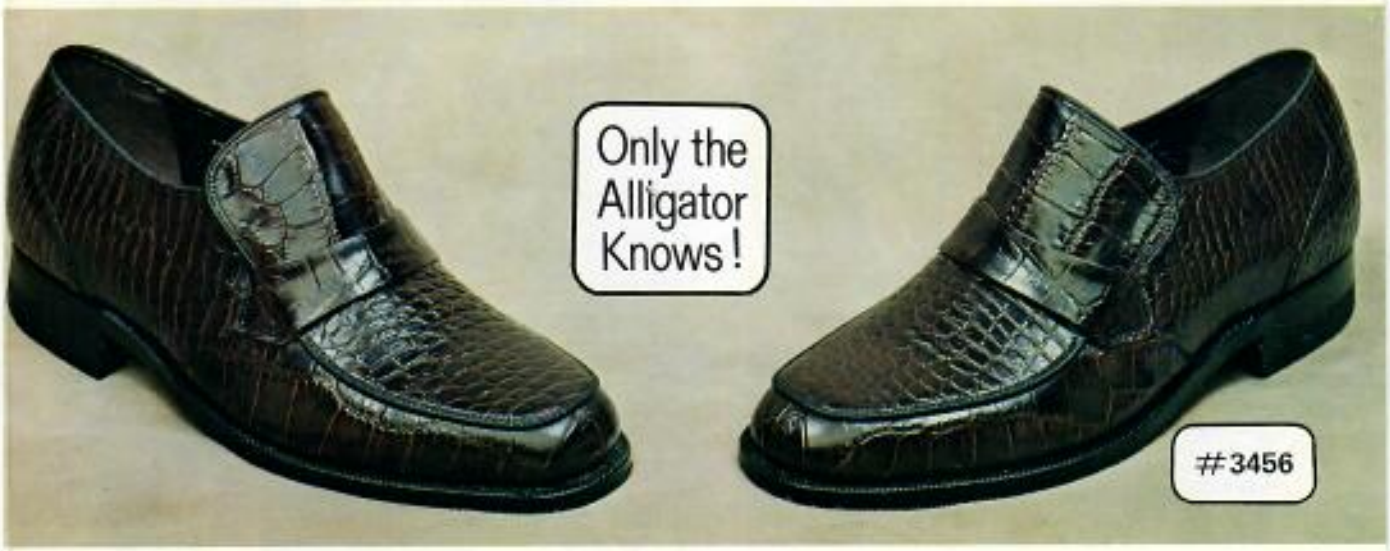
Sizes 13½ to 15 add only $3 extra

$5 C.O.D. deposit required

#5006 Black

#5006 Tan

#5006 Sand Suede



ALLIGATOR EMBOSSED CALF

An aristocratic looking slip-on made of the finest alligator embossed calf. Fully leather lined, genuine Goodyear welts. They fit like a glove and will give you years of comfortable wear. Made in Mexico by Domit's experienced craftsmen who take sufficient time to make a perfect handlasted shoe. Black or brown, 6-13, B to E widths. **37.50** ppd.

$5 C.O.D. deposit required

Texas residents please add 5% Sales Tax.

master charge THE INTERBANK CARD

BANKAMERICARD

Genuine Handlasted, Benchmade

SEA TURTLE SHOES

by Domit of Mexico

Here are our four fabulous slip-on styles . . . comparable to $70.00 values in a store! Enjoy luxury with years of lasting comfort! Rich burnished genuine sea turtle leather — only the choicest skins! Leather lined, rubber heels. These are