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Biologist in stew over tasty turtle

HONOLULU (AP) — The sea is a potential source of nourishment for the world's hungry millions, but a University of Hawaii marine biologist is working to please the palates of gourmets, too.

George Balazs of the Hawaii Institute of Marine Biology is studying 150 green sea turtle hatchlings, to find out what the tasty turtles eat and how long it takes them to grow to pleaser size.

"Initially, we would be able to supply turtle only for the gourmet market," Balazs said, "but later on it may have a potential for the mass market."

The green sea turtle is prized for its vertebral flesh, its cartilage, cartilage that produces the sticky texture demanded of the best turtle soup and its flippers, which

Turtle steak sells for \$1 a pound on the West Coast, and cartilage will fetch twice that price, Balazs said.

Balazs is feeding the two inch-long hatchlings varying diets of vegetable matter to determine the optimum amounts of protein and calories. One group gets a meat diet.

The sea-cow hatchlings must grow to about 150 pounds before they're ready for market, and Balazs said 80 percent of a mature turtle is marketable, including the shell and the leather from the neck and flippers.

Balazs turtle farming becomes a reality, the turtles must prove they will breed on artificial beaches. And Balazs' initial experiments have not been encouraging.

9-18-72 - Dallas Times Herald

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Biologist Studying Sea Turtle Potential On Gourmet Market

HONOLULU (AP)—The sea is a potential source of nourishment for the world's hungry millions, but a University of Hawaii marine biologist is working to please the palates of gourmets, too.

George Balazs of the Hawaii Institute of Marine Biology is studying 130 green sea turtle hatchlings, to find out what the tasty turtles eat and how long it takes them to grow to platter size.

"INITIALLY, we would only be able to supply turtles for the gourmet market," Balazs said in an interview, "but later on it may have a potential for the mass market."

The green sea turtle is prized for its veal-

like flesh, its calipee (cartilage that produces the sticky texture demanded of the best turtle soup) and its flippers, which make stew.

Turtle steak sells for \$2 a pound on the West Coast, and calipee will fetch twice that price, Balazs said.

Balazs is feeding the two-inch-long hatchlings varying diets of vegetable matter to determine the optimum amounts of protein and calories. One group gets a meat diet.

The one-ounce hatchlings must grow to about 150 pounds before they're ready for market, and Balazs said 80 per cent of a mature turtle is marketable, including the shell and the leather from the neck and flippers.

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**OEO Director
Calls For
Coordination**

Columbia Area Births

Columbia Record Sept. 16, 1972
BAPTIST HOSPITAL

RICHLAND MEMORIAL

A girl to Mr. and Mrs.

Baby Turtles Are HIMB Lunch Guests

University of Hawaii marine biologist George Balazs is currently engaged in a pilot study to evaluate the feasibility of rearing the green sea turtle (*Chelonia mydas*) on a commercial scale. The study, which is being conducted at the Hawaii Institute of Marine Biology, was initiated earlier this year after Balazs and several colleagues noticed the surprising lack of information regarding the management and nutritional requirements of the animals.

This project, which is primarily a nutrition study, has an interesting history beginning with the transplanting of three nests of eggs from East Island in the French Frigate Shoals to the HIMB on Coconut Island. A microphone and temperature probe were buried in the single fertile nest. Although the normal hatching time is 55-60 days, definite noises were not detected until Day 72. Between Day 72 and Day 83 it was found that the level of activity in the nest was directly related to the amount of noise generated by jet aircraft stationed at the nearby Kaneohe Marine Corps Air Station. On the evening of Day 83 the viable nest was completely excavated to reveal 6 live turtles and 72 unhatched eggs. An examination of these eggs showed dead embryos ranging from no development to ready-to-hatch. No single high-fatality age was apparent.

According to some sources, as many as 50% of sea turtle eggs must hatch before any of the turtles can reach the surface, because digging out of the nest requires a team effort of the hatchlings. However, in Balazs' experiment, less than 10% of the eggs hatched. Balazs suggests that the high mortality of embryonic turtles may have been produced by the noise of the Kaneohe jets, but at this point there are many possible causes, so that such a conclusion would be premature.

(Continued in column 2.)

The sea turtle eggs were collected by David L. Olsen, assistant manager for the Hawaiian Islands National Refuge, with the aid of Eugene Kridler. Kridler is the Bureau of Sport Fisheries and Wildlife administrator in Hawaii.

Balazs' nutrition experiments are currently progressing with more than one hundred young turtles, secured from the Leeward Islands with the permission of the Bureau and the efforts of the U.S. Coast Guard.

The turtles are divided into groups and fed highly regulated diets. The formulas vary in their amount of protein, calcium, phosphorus, and other ingredients. The growth rates of each group are charted and compared with the other groups. Several University nutritionists are acting as advisors to the study.

Although little is known about a green sea turtle's first year of life, some biologists have suggested that the animals are entirely carnivorous during this period. Balazs has found that some of his turtles are thriving on strict vegetarian diets, as well as diets composed of by-products from the meat and fish industries.

The data that are expected to be produced from this study, coupled with the arrival of data on turtle behavior and physiology from concurrent studies, could lead to the artificial stimulation of egg production and breeding as is currently being done with poultry.

Advisory Service Adds Specialist

Justin Rutka has been appointed Advisory Services Specialist for the UH Sea Grant Program. Rutka, who began his job in July, joins Advisory Specialists, Margaret Lucas and John Ball on the Sea Grant advisory staff.

Rutka has been focusing his efforts on the broad area of coastal zone management. He regards the title, "Specialist", as a misnomer when it refers to

(Continued on page 6.)



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Pacific Floor to Supply Scarce Minerals

As data concerning the size, quality, and distribution of manganese nodules accumulate, scientists, industrialists, and government officials interested in future supplies of copper, nickel, and cobalt believe that our ocean floors will become the key source of these valuable minerals. They expect that this will happen within the next several years, regardless of current legal problems.

This attitude was widely aired by participants in a workshop-symposium, "Manganese Nodule Deposits in the Pacific", held at the Princess Kaiulani Hotel October 16 and 17. The conference brought together more than 100 scien-

(Continued on page 2.)

New Indexes Coming

Through the National Sea Grant Depository, all publications issued by Sea Grant-sponsored projects and programs are indexed regularly. A new edition of the Sea Grant Indexes will be available this month. The indexes may be consulted at the Ocean Science Information Center, Hamilton Library, on the UH Manoa campus

Individuals or libraries having a special professional need for the Sea Grant Indexes may request copies from Mrs. Barbara Tillett, director of the Ocean Science Information Center.

Lava Ponds on Zoology Agenda

John Maciolek (Cooperative Fisheries Unit) will describe a lava pond ecosystem at a zoology department seminar on Friday, November 10. The program is scheduled for 3:30 in the Plant Science Building (St. John II). It is open to the campus community.

Because of widespread recent interest in the ponds along the Kona coast, Maciolek has written especially for Newsletter readers a brief introduction to some of the topics he will discuss at the zoology seminar. Maciolek, along with several other UH scientists, has surveyed many of the lava ponds along the Kona and Puna coastlines. More detailed investigations of selected ponds are scheduled.

THE "LAVA POND" ECOSYSTEM

Until recently, little scientific attention was given to pools and ponds in the fractured lavas along the ocean shore. Ancient Hawaiians developed a few of the larger ones for fishponds, and some smaller ones for baths or wells (where water was fresh enough to drink). Hundreds of such water exposures occur on coastlines of East Maui and Hawaii Islands. Studies conducted during the past year by the Hawaii Cooperative Fishery Unit have shown these waters to be different from others (oceans, streams) in both environmental factors and biota.

(Continued on page 5.)



He's Incubating a New Industry

Scientist Seeks to

By Helen Altom
Star-Bulletin Writer

If all goes well, a Coconut Island scientist will be the proud father of a batch of green sea turtles sometime in August.

About 282 turtle eggs recently were transplanted into nests and an incubator on the Island from French Frigate Shoals, one of the turtle's breeding grounds in the Pacific.

The transfer was a tricky process, done here for the first time in an attempt both to conserve the valuable reptiles and to try and raise them economically as a source of protein.

George Balaz, University of Hawaii marine biologist, is conducting the experiment under the Sea Grant aquaculture program at the Hawaii Institute of Marine Biology.

THE U.S. Bureau of Sport Fisheries and Wildlife approved Balaz's request for the eggs. They were collected by David L. Olsen, assistant manager for the Hawaiian Islands National Refuge.

He got them from East Island, one of the most remote islands in the refuge.

He said only three turtles were laying at the time, in early June, and he took all three clutches of eggs—making sure they were picked up and redeposited in the same position in which they were laid.

Balaz put 39 eggs in an incubator just to see what will happen. The others are in three nesting pits, about two feet deep, at an isolated end of Coconut Island.

"I know how the female turtle feels because I



NEW HOME — Turtle eggs laid on East Island in the National Wildlife Refuge are placed in a new nesting hole at Coconut Island in Kaneohe Bay. —Photo by Lloyd Watarai.

cleared the pits and put the eggs in there myself," he quipped.

THE FEMALE turtle digs a body pit with her front and back flippers—about six feet deep—and once she's in there uses her back flippers to dig a nest.

She drops her eggs like ping-pong balls and then covers up the entire hole and pats it down—leaving nature to take care of her eggs.

"Trying to find an egg pit

is extremely difficult because she camouflages them so well," Olsen said.

A Star-Bulletin team visited the Coconut Island nesting site with Balaz. Olsen and Eugene Kridler also showed up to see how the eggs were doing. Kridler is the federal wildlife administrator in Hawaii, in charge of the refuge.

Balaz buried a temperature probe with one clutch of eggs to record day and night temperatures. He also has a

tape recorder in one pit, with a microphone. He hopes the turtles will make some noise several days before they hatch.

"WHEN I HEAR the noise, I'm going to get sleeping facilities out here and wait," he said.

Kridler said there is scant knowledge about the green sea turtle, although it is the most important species of

Transplant Green Turtle to Oahu

turtle in the world economically.

No one has ever seen the turtles in the period from birth to "platter size" — about one year old, he said. This is the so-called "lost year."

"Where do they go and what do they feed on? No one really knows — not only here, but on a worldwide basis," he said.

He said the project at the HIME should contribute much practical information about the turtles.

BALAZ IS hopeful but cautious about predicting results. He said survival of eggs in the natural nests is less than 60 per cent. "so what we will get in the transplanting is yet to be seen."

He must devise rations to raise the turtles. They are believed to be carnivorous the first few months — and maybe for the first year — and then are herbivorous, he said.

"That's what they say (in literature) and that's not a heck of a lot," he commented.

He said he became interested in sea turtles while looking up literature about them for another worker at the institute. "Instead of passing it on, I started

reading ...

"They're fantastic animals," he said, "but little scientific work is being done on them."

He said Hawaii has pastures of algae which are not utilized by any other sea animal except the turtle. They come here to graze from their nesting grounds in the Wildlife Refuge.

BALAZ SAID his long-term goal is to raise the turtles to maturity — well over 200 pounds — and try to get them to nest on artificial beaches.

It is hoped that increased knowledge about the nutritional requirements and management of the turtle will lead to aquacultural enterprises.

"If we can supply the market with turtles raised in captivity, it will eliminate pressure on the stock and increase the numbers," Balaz said.

He said he hopes to work with the hawksbill turtle, an endangered species, if his project is successful.

Kridler expressed concern for the depletion of the turtle populations here and

throughout the Pacific, where they are taken for food and for their shells.

"We have no legal authority for protection of the sea turtle except in the refuge," he said.

He noted that turtle meat tastes like veal but said, "I don't eat it any more because it's like eating a friend."

He said the turtles in Balaz's project still are under federal protection and any surplus animals will be tagged and released if they still have the ability to forage for food.