SEARCHING FOR TUNA

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As part of the cooperation that exists between the Atlantic Oceanographic Laboratories of ESSA and the Tropical Atlantic Biological Laboratory of BCF (both in Miami, Fla.), I participated in the Atlantic Tradewind Expedition (ATEX) as an observer. The purpose of ATEX was to study oceanographic and atmospheric conditions in the central tropical Atlantic. This expedition was undertaken by three nations in February 1969: W. Germany furnished the two research vessels 'Planet' and 'Meteor'; Great Britain used the 'Hydra'; and the United States assigned the Coast and Geodetic Survey ship 'Discoverer'.

The four ships took up positions in the mid-tropical Atlantic at the beginning of February on the corners and at the center of a triangle, each side of which was about 350 miles long, and then drifted for $2\frac{1}{2}$ weeks, instead of occupying oceanographic stations along a planned cruise track.

Research at the Tropical Atlantic Biological Laboratory (TABL) centers on the biology of commercially important tunas in the tropical Atlantic Ocean. Research cruises over the past several years have produced large volumes of data from various sections of the tropical Atlantic, but biological investigations in the central tropical Atlantic--the area covered by ATEX--have been virtually nonexistent. TABL therefore welcomed the opportunity for one of its biologists to be present aboard the Discoverer during the expedition. Knowledge of the presence or absence of larval, juvenile, and adult tunas in the region could be important to an understanding of the life cycle of tunas and, conceivably, might help commercial fishermen in their quest for new fishing grounds. Collections made on ATEX of marine life other than tunas might also be valuable as indicators of the kinds of prey organisms that are available in the central Atlantic to large pelagic fishes, particularly the tunas. My objectives as an observer on the Discoverer were to collect small tunas and other organisms by dipnet under a night light, to collect larval tunas and other zooplankton by 1-meter net tows, and to observe and make records of schools of tuna and other large fishes.

On February 5, 1969, when the Discoverer occupied a position at 13° N. 39° W., a platform and an 800-watt light were rigged on the downwind side of the vessel. Part of each of the next 18 nights was spent dipnetting from the platform. Each midnight a plankton tow was made. The ship's rate of drift varied from 1.0 to 1.7 knots, which was slow enough to allow us to observe gradual changes in the composition of marine animals over a considerable distance.

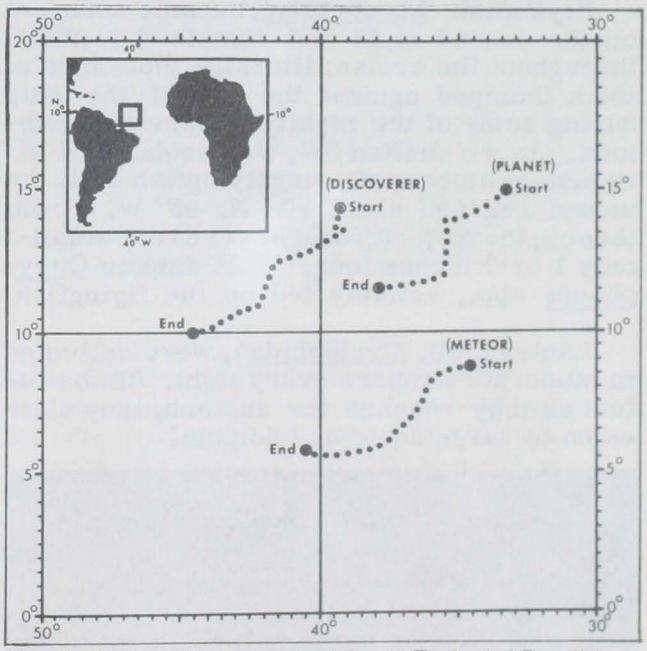

Fig. 1 - Drift tracks during the Atlantic Tradewind Expedition (ATEX), February 1969. The small square on the inset map (upper left) delineates the area shown in the figure. No trackline was available for the R/V Hydra.

During the first two nights, great numbers of the blanket octopus, Tremoctopus violaceus (rare in museum collections), were seen and caught. Fewer were netted during the third and fourth nights and, by the fifth night (at 12° N. 40° W.), they had completely disappeared. Specimens were up to $1\frac{1}{2}$ inches long; males of this size were adult, but females

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were juvenile. (Dr. Gilbert L. Voss, personal communication, Institute of Marine Sciences, University of Miami, reported that the adult female of the blanket octopus reaches a length of 3 to 5 feet.)

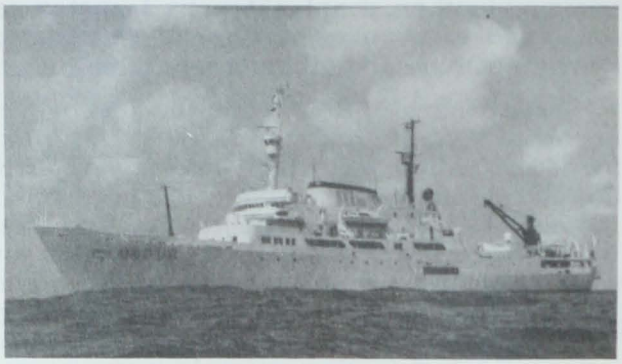

Fig. 2 - The R/V Discoverer on ATEX.

Flyingfish, Exocoetidae, became abundant on the second night and remained plentiful throughout the cruise; literally thousands of them thumped against the hull of the ship during some of the nightly observation periods. As we drifted SW, we encountered increasing numbers of young flyingfish until the vessel reached about 10° N. 43° W. From then on, the majority caught were very small--only 1 or 2 inches long. Adult dolphin Coryphaena spp., actively fed on the flyingfish.

Lanternfish, Myctophidae, were collected in moderate numbers every night. Almost as fast as they reached the surface, they were eaten by large squid and dolphin.

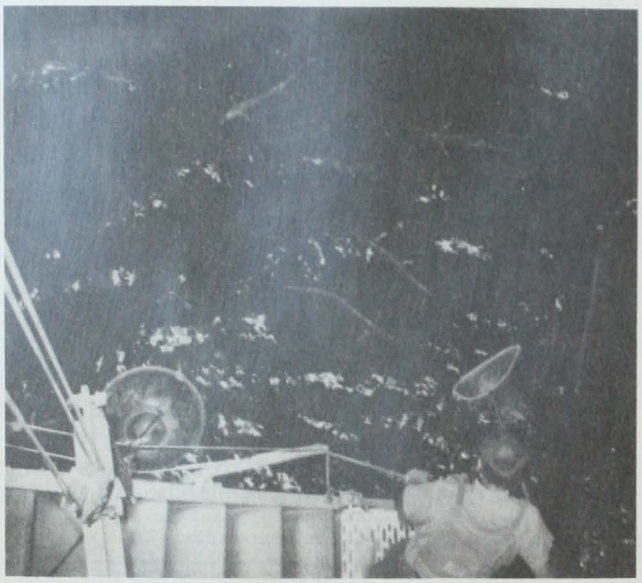

Fig. 3 - Night lighting. Dolphins feeding on organisms attracted to the light.

Small juvenile dolphin were caught around the light in good numbers but were apparently less abundant than the large adult ones. The numbers of adult dolphin milling about the ship increased each night until, at the end of the drift period, they were visible in a wide area all around the ship. We estimated at least one fish for every square yard of sea surface. In the daytime the dolphin scattered and few were observed. Many of the adult dolphin caught on fishing tackle by the crew averaged 5 to 10 pounds and some exceptionally large ones weighed 40 pounds. Sharks of 10 to 15 feet were seen often. Most were whitetip sharks, Carcharhinus longimanus, which were occasionally accompanied by rainbow runners, Elagatis bipinnulatus. Other species were caught under the light, but in smaller numbers than flyingfish, octopi, dolphin, and lanternfish. A number of squid were captured also. Several times the ship drifted into large patches of salps that luminesced when touched. Sometimes the area on the windward side of the ship was lit up by the salps as the vessel touched and drifted over them.

Fig. 4 - Sorting night's catch aboard R/V Discoverer.

On February 22, the drift period ended at 10° N. 44° W. The vessel had drifted about 360 nautical miles.

The biological observations made during the cruise in this poorly known mid-Atlantic area may be summed up as follows:

1. Not a single school of tuna was sighted and no juvenile tuna were collected, although the chances of finding tuna appeared favorable on the basis of the temperature (25-27° C) and the presence of organisms suitable as tuna food.

2. Dolphin, the only large pelagic fish present in large concentrations, fed heavily on flyingfish. To my knowledge, this is the first report of concentrations of dolphin in the mid-Atlantic.

3. Study of the plankton tows made during this voyage (now in progress at TABL) has so far revealed the presence of a few skipjack tuna larvae. When all samples have finally been studied, better conclusions may be drawn as to the presence or absence of tunas in the tropical mid-Atlantic.

4. The many large concentrations of flyingfish, lanternfish, octopi, and salps observed, and the other organisms seen or collected, suggest an abundance of forage organisms suitable for tuna, marlin, and other large pelagic fishes.

WHAT UNIVERSITIES AND COLLEGES HAVE OCEANOGRAPHIC COURSES?

Before World War II, only two universities in the United States granted degrees in oceanography. By 1966, at least 50 colleges and universities were granting degrees in oceanography, marine biology, and ocean engineering; at least 20 others offered courses.

Because oceanographic facilities and ships are expensive, most institutions offer a broad training program covering the basic sciences, mathematical sciences, and some introductory environmental courses. Normally, the oceanographic curriculum is available to those who have completed the bachelor's degree. Specialization in marine biology and marine geology is available to undergraduates at some schools. In June 1966, the Sea Grant College Act, first suggested by Dean Athelstan Spilhaus, now President of the Franklin Institute in Philadelphia, and introduced into Congress by Senator Claiborne Pell (Rhode Island), was passed. This project to develop and support universities in much the same fashion as land grant colleges is being administered by the National Science Foundation.

A student interested in becoming an oceanographer should first major in one (or more) of the basic sciences--physics, biology, geology, chemistry, or meteorology. His later study of the ocean will relate to his past major. Most institutions offering degrees in oceanography require a bachelor's degree as a prerequisite. Oceanographers are expected to have mathematics through calculus.

Individuals planning to become oceanographers should begin preparation in high school; courses should include the sciences, mathematics, and a foreign language if possible. The best training for oceanography is to get into the "toughest" undergraduate science curriculum possible and to work hard.

Single copies of a list of colleges and universities offering degrees in oceanography may be obtained without cost from the National Oceanography Association, Suite 301, 1900 L Street, N.W., Washington, D. C. 20036. ("Questions About The Oceans," U.S. Naval Oceanographic Office.)