

depths near the Bahamas. From March 13 to 20, ichthyologist C. Lavett Smith of the American Museum of Natural History, and two companions, lived in the 16- by 8-foot habitat to study the microcosm around a coral reef.

Their research concentrated on trying to find how the various members of this crowded ecosystem compete for space. They found that various fish species share complex "schedules" of mating and foraging that permits the reef to support a dense population with minimum conflict. The two closely related species, brown and blue chromis, for example, spawn at different times during the day and thus do not have to waste energy chasing each other away in order to reproduce.

Eventually, Smith hopes these insights will help man understand how to preserve the fragile reef ecosystem and also lead to a better fundamental understanding of species evolution.

Finally, recognizing the growing importance of such research, the University of California at Berkeley has just approved the country's first full-credit "aquanaautics" course. Organized by campus diving officer Lloyd Austin, the four-unit course will introduce students to underwater research techniques and teach them the fundamentals of scuba diving. Austin says the course represents a new commitment on the part of the university to further ocean research. □

Vitamins and the fetus: The benefits of B₁₂

Nutrition scientists interested in the well-being of unborn and newly born infants have focused largely on the effects of severe protein deficiencies. They have paid less attention to the effects of vitamin deficiencies. For these reasons Paul M. Newberne and Vernon R. Young of the Department of Nutrition and Food Science at the Massachusetts Institute of Technology decided to study maternal intake of vitamin B₁₂ during pregnancy and its long-range effects on the newborn.

Vitamin B₁₂ is one of the vitamins that animals and humans do not manufacture in their bodies but must take in with their foods. It is essential for a number of metabolic roles. It promotes growth in adolescence. It helps cells use DNA, the genetic material of life. It helps various enzymes, particularly liver enzymes, catalyze different reactions. Liver enzymes are one of the body's prime defenses against foreign toxic substances.

Newberne and Young mated rats, then gave some of the females a standard B₁₂ diet, and others a somewhat higher B₁₂ diet. Both groups received the same food during pregnancy. After giving birth, all the rats were put on the standard B₁₂ diet. After their progeny were weaned, they too were given a standard B₁₂ diet. This way the

researchers were able to measure the effects of a higher maternal intake of B₁₂ during pregnancy on the fetus, particularly as those effects carry over into the first months of life.

As Newberne and Young report in the March 23 NATURE, they found that a higher maternal intake of B₁₂ during pregnancy affected birth weight significantly. Pups born to mothers who had received more B₁₂ weighed more than the other pups, and this greater weight continued during the first year of life. The pups whose mothers had received more B₁₂ also had more protein per body weight than did the other pups. The animals whose mothers had had more B₁₂ also showed more active liver enzymes, suggesting they might be better protected against infection. Indeed, the pups whose mothers had received more B₁₂ experienced lower mortality and more resistance to infection during the first months of life than did pups whose mothers had received less B₁₂.

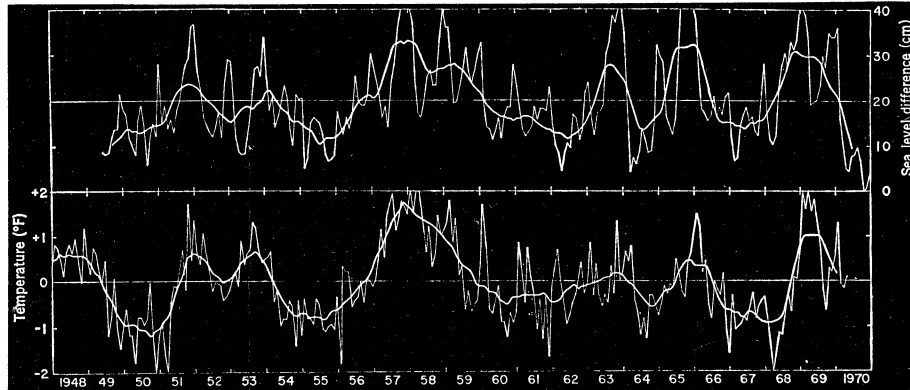
The authors believe that these results might be extrapolated to the human situation. In other words, the B₁₂ a woman consumes during pregnancy might affect the growth and health of her child, particularly if her vitamin B₁₂ intake during pregnancy is marginal and her baby is subjected to trauma or disease before or soon after birth. "Questions about many of the unexplained illnesses in children and

A sea-level warning of El Niño's warming

In the opening months of each year in the north of Peru warm surface waters from the tropical Pacific spread over cooler coastal waters. The phenomenon is called El Niño, because "The Child" (Christ Child) is symbolic of the Christmas season. Periodically, in roughly seven-year cycles, the warm waters extend much farther south, displacing the cold Peru current and causing catastrophic destruction of plankton and fish life. Sea birds die of starvation and the annual guano "crop" fails, causing severe effects on agriculture.

University of Hawaii oceanographer Klaus Wyrski has been studying the relationship between El Niño and the equatorial countercurrent, which flows eastward across the Pacific Ocean.

He has now shown a strong relationship over a 21-year period between the occurrence and severity of El Niño and variations in the quantity of water transported by the countercurrent, as measured by sea-level fluctuations thousands of miles out into the Pacific. Strong transport by the countercurrent of warm tropical waters from the west-



K. Wyrski/April 6 Science

Sea-level difference across countercurrent (top) and off-coastal temperatures.

ern and central Pacific causes warm water to accumulate in the eastern tropical Pacific.

He found that coastal waters become warmer about three months after a peak in the countercurrent transport. This means that the countercurrent must be strong for an appreciable period of time before an effect on the surface temperature in the eastern Pacific Ocean becomes evident, says Wyrski. "It may be possible to use observed sea-level differences to predict temperature trends thousands of kilometers downstream."

Wyrski inferred the water transport of the countercurrent by means of sea-level gauges along the northern trough of the current at Kwajalein and Truk and along its southern ridge at Christmas Island and Canton Island. At times of peak flow the difference in sea level between the pairs of islands was as much as 30 centimeters greater than normal. "It is significant," says Wyrski, "that the transport of a major ocean current can be monitored by very simple measurements such as those of sea level." □