

probably from an inlay decoration.

The second batch of tablets, from a shallower excavation, dates from the Old Elamite period of about 1,800 B.C. and are written in Sumerian, a sign of the strong influence of Mesopotamia. The researchers also found seals, friezes and figurines in the same deposits portraying animals, women clasping their hands or holding their breasts, and enthroned kings with attendants.

The third tablet find, from which Reiner discovered the city's identity, was in a room, detected during a cesium magnetometer survey, which had been destroyed in a fire. Its use is uncertain, since few other artifacts were found there.

The researchers' agreement with Iran required that the government get its choice of any 10 unique objects—they took several of the tablets—after which Sumner divided the rest in half and drew lots with the Iranian Government for the right to choose its half.

At present, the Pennsylvania team is carefully unpacking the artifacts returned from Iran, and in the future it will continue to investigate the parts of the site where the various tablets were found.

There is certainly no shortage of places to look. Remains of a wall completely enclose the city with its monumental architecture, and signs indicate several outlying settlements. "It would take several lifetimes," Dyson says, "to excavate all of Tal-I Malyun." □

Nature vs. nurture in African infants

If psychological development during the first year of life is important, then growing up in Africa has definite advantages. A number of studies have shown that sub-Saharan African infants are precocious. On motor- and mental-skills tests during the first year of life these infants outperform their age peers (both black and white) in the United States and Europe. Some researchers have attributed this precocity to genetic factors, others to social factors (SN: 11/4/72, p. 298).

But "these studies leave much to be desired methodologically," say researchers P. Herbert Leiderman, Beatrice Babu, James Kagia, Helena C. Kraemer and Gloria F. Leiderman of Stanford University School of Medicine and the University of Nairobi. So they designed a longitudinal (as opposed to cross-sectional) study to investigate whether or not there is developmental precocity and to assess the relationship of selected social and demographic variables to psychological development during the first year. The study was conducted in a Kikuyu agri-

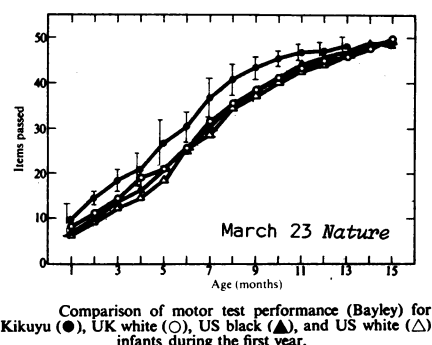
cultural community outside of Nairobi. Sixty-five infants (34 male and 31 female) were tested for mental and motor skills at 2-month intervals for up to 16 months. Information on such matters as family structure, educational achievement, economic status and density of household was collected for each child. The results of the study are reported in the March 23 NATURE.

Test results of the Kikuyu infants were compared with U.S. standards. The African infants surpassed U.S. performance on 38 items of the mental test and 20 items of the motor test. They lagged behind American children on 7 items of the mental test and 2 items of the motor test. The Kikuyu infants continued to score higher throughout the first year of life.

The Kikuyu infants from families with greater economic resources and with more modern amenities such as calendars, clocks and books performed better on the mental test. Infants born to fathers of higher income, more training and more education, scored higher on motor and mental tests than did those of fathers with less income, training and education. Infants from households with two or more persons past the age of 40 did better on the motor tests. This, say the researchers, suggests that additional caretaking of the infant by an older woman or grandmother contributed to motor development.

The researchers admit that a definite answer cannot be given yet for why the African infants have precocious mental and motor development during early life, or for why test performance is apparently influenced by economic and social factors. But assuming the Kikuyu infants to be non-precocious at birth, they say their findings lend support to theories emphasizing environmental influences during the first year of life.

The researchers agree with Arthur Jensen that genetic factors account for a large proportion of the variability of mental and motor test performance during the first year. They conclude, however, that the remaining variance (about 25 percent) is not random, but associated with identifiable social and demographic factors. □



Diving for knowledge of the ocean's life

Though ocean diving is an ancient art—Aristotle described the first diving apparatus and Alexander the Great is said to have made descents—the inner sea remains the great unexplored frontier of earth. Three recent developments reflect the increasing sophistication of diving techniques and the growing importance of the diving art to understanding the oceanic ecosystem.

William Hamner, a zoologist at the University of California at Davis, has adapted scuba-diving techniques to open ocean research for the first time. Scuba has long been used close to shore, where sight of the ocean bottom and plants gives fixed points of reference, but free divers attempting to explore the open sea often experience the same panicky sense of isolation observed in astronauts during spacewalks.

To meet this problem, Hamner erected a framework of floating pipes to give the divers a sense of orientation, and tethered them to a "safety man" in the middle, who kept the lines untangled and watched for sharks. The team has been conducting studies using the technique in the clear waters of the Florida current, off Bimini in the Bahamas, where the depth is about two miles and 150-foot visibilities are common.

On their first expedition, sponsored by the National Science Foundation, the Hamner team has concentrated on studying zooplankton—the floating or weakly swimming animals that make up a vital, and not fully understood, link in the sea's food chain.

Already the Hamner team has observed phenomena not discovered before. Previously, for example, only a few badly damaged specimens of a peculiar pteropod called the Gleba have been found, and no one could figure out quite how it functioned. Now, members of the team have observed several Gleba in their natural environment and watched as the animal fashioned a four-foot-wide net of mucus to ensnare smaller plankton. They also saw how another animal, the Larvacean, secretes a "filter house" that it uses to trap microplankton.

Hamner sees deep-sea scuba as an inexpensive alternative to elaborate bathyscaphes and research submarines and plans to take his team next to conduct research in the Gulf of California.

Meanwhile, after years of having the HYDROLAB underwater laboratory-residence used primarily for testing man's survival in a strange environment, scientists have begun to use the facility for extensive research at 50-foot

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 "aquanautics" 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.

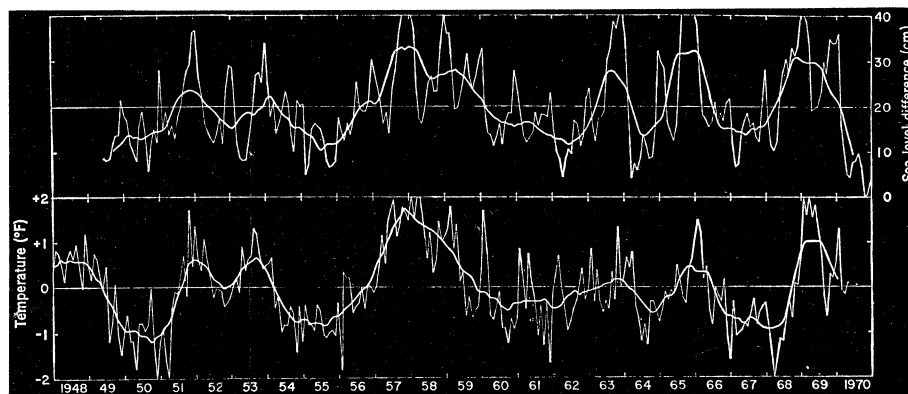
The authors believe that these results might be extrapolated to the human situation. In other words, the B₁₂ a woman consumes during pregnancy might affect the growth and health of her child, particularly if her vitamin B₁₂ intake during pregnancy is marginal and her baby is subjected to trauma or disease 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 Wyrtki 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. Wyrtki/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 Wyrtki. "It may be possible to use observed sea-level differences to predict temperature trends thousands of kilometers downstream."

Wyrtki 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 Wyrtki, "that the transport of a major ocean current can be monitored by very simple measurements such as those of sea level." □