EARTH SCIENCES

Sea turtle 'migrates' to Kansas

The signals were coming in loud and clear from the transmitter strapped to the 212-lb. loggerhead turtle. Beamed via the National Oceanic and Atmospheric Administration's Nimbus 6 satellite to NASA's Goddard Space Flight Center in Maryland, the beeps traced the sea turtle as it paddled from south of Gulfport, Miss., skirted the mouth of the Mississippi River, hugged the coastline of Louisiana, clambered out on a beach near Brownsville, Tex., and headed straight for Kansas.... Kansas?

Not to worry — the sea turtle had not suddenly abandoned its aqueous habitat for the Kansas plains. The $5,000 transmitter, NOAA scientists discovered, had been dropped by the turtle and picked up on a Texas beach by a fisherman who took it home to Kansas and was using it as a doorstop.

The turtle tracking experiment, nevertheless, was a success, according to NOAA researchers. Inspired by similar experiments with polar bears, the satellite tailing of the loggerhead — an endangered species — may enable marine scientists to identify the turtles' feeding, nesting and mating areas, according to NOAA's Robert Timko. Such information may ultimately help develop strategies for stocking and management of the turtles.

Similar devices have also been attached to green turtles that journey 1,500 miles each year from the Ascension Islands west to feeding grounds in Brazil. John R. Fletemeyer and co-workers of Nova University in Ft. Lauderdale hope to learn what homing device the turtles use. They report that one turtle, "wired" last May, is moving at a steady 55 miles per day toward Brazil.

DSDP cores record of mass extinction

Like detectives trying to solve a murder with too few clues, geologists have had only the most meager evidence with which to solve a major scientific mystery — the abrupt extinction 65 million years ago of more than half the world's plant and animal species. Causes for the mass extinction, which marks the boundary between the Cretaceous and Tertiary periods, range from an asteroid collision to a climate change due to the movement of continents and altered ocean circulation. Scientists base these widely varying theories on evidence gleaned from sediments deposited at the time of the extinctions, and no conclusive theory has caught hold, in part because so few well preserved, geologically undisputed samples of the crucial sediments exist. But the booty of cores from two recently completed legs of the Deep Sea Drilling Project may provide new leads for geologic gumshoes.

Drilling off the coast of South Africa from the research ship *Glomar Challenger,* Legs 73 and 74 of the DSDP recovered five cores from the Atlantic ocean bottom that record the Cretaceous-Tertiary extinctions. According to John LaBrecque, co-chief scientist of Leg 73, the cores show that surface dwelling sea life disappeared quickly in geologic terms—in about 100,000 years — and that the ocean organisms may have died out as much as 500,000 years before the land animals.

Using the well preserved cores, says the Lamont-Doherty Geological Observatory researcher, scientists may be able to reconstruct the climatic conditions and the changes in the magnetic field that occurred at the time of the extinctions. One of the cores, for example, contains the most complete record yet recovered of the earth's magnetic field reversals since the end of the Tertiary period, he says. In addition, notes Ted Moore, co-chief scientist of Leg 74, four of the cores form a progressively deeper and older transect across part of the South Atlantic. "To be able to look at the Cretaceous-Tertiary boundary with depth is particularly exciting," says the University of Rhode Island scientist. "With these sections, it may be enough to help the investigations of the mass extinctions."

BIOLOGY

Organic farming and the USDA

The United States Department of Agriculture has been charged with neglecting the "new breed" of farmers, those who avoid or largely exclude use of synthetically compounded fertilizers, pesticides, growth regulators and feed additives. Now the USDA has completed its first study of organic farming and finds it a surprisingly varied and successful enterprise.

Organic farming is not limited to young upstarts using old-fashioned methods on small plots of land. The study reports that the size of organic farms the USDA team encountered ranged from 10 to 1,500 acres. The farmers, in general, were found to use modern farm machinery, recommended crop varieties, certified seed and sound methods of waste management and soil and water conservation. The organic farmers themselves varied in age, with 42 percent being 50 or more years old. Forty-four percent had 30 or more years of farming experience, usually including more chemical-oriented crop production.

"In most cases the team members found that these farms, both large and small, were productive, efficient and well managed," says the USDA report. The team found a wide variety of practices, attitudes and philosophies within the community of organic farmers. Some common practices, however, are to rotate plants including legumes and cover plants to provide adequate nitrogen in the soil and to feed livestock grain and forage and then return the manure to the land. The USDA team was impressed with organic farmers' ability to control weeds through timely tillage and cultivation, delayed planting and crop rotation.

In comparison with more conventional chemical-based U.S. agriculture, the USDA team finds organic farming more labor intensive but requiring less energy. The team calculates that the economic return above variable costs was greater for conventional corn and soybean farms than for the rotations of several crops on organic farms. Still, when costs of detrimental aspects of conventional farming, such as water pollution, soil erosion and depleted nutrient reserves, are included, the USDA report says the cost comparisons may be different.

Building a Down's syndrome mouse

A mouse model for Down's syndrome is under construction by scientists at the University of California at San Francisco. Down's syndrome, the abnormality caused by an extra piece of human chromosome 21, affects more than one in a thousand newborns. Children with this condition often are mentally retarded, have congenital heart defects, are unusually susceptible to infections and have an increased incidence of leukemia. Lois and Charles Epstein suggest, with genetic arguments, that the immunological problems are due to a surplus of the protein interferon. This protein, which fights viral infections and may inhibit the growth of cancer cells (SN: 6/7/80, p. 358), also can prevent the body's immune system from adequately fighting certain infections. The gene responsible for a cell's sensitivity to interferon is on chromosome 21, and so in a person with Down's syndrome, an extra copy of that gene may cause the immune system problems.

In mice the gene for interferon sensitivity is on chromosome number 16, the Epsteins and colleague David Cox report in the April PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES. They bred mice to see whether an extra copy of the chromosome would cause Down's syndrome-like abnormalities, and the embryos so far have been found to have defects similar to those of Down's syndrome — congenital heart defects for example. The embryos, however, do not survive to a live birth, so they cannot be thoroughly analyzed. Now the Epsteins are fusing normal mouse embryos and embryos with an extra chromosome 16 in the hope of obtaining for further study a viable "chimeric" animal (SN: 1/27/79, p. 60) with characteristics of Down's syndrome.