EARTH SCIENCES

Watching an ocean grow

There are only two places in the world where the forces that are pushing apart the continents and changing the world's geography are not hidden beneath the ocean. One is in Iceland, where the Mid Atlantic Ridge surfaces. The other is the Afar Triangle, a small, tortured piece of land between Ethiopia and Somalia, which by rights should be at the bottom of the Red Sea. But because it was heaved up by some geological turmoil, scientists can witness there the birth of a new ocean — the Red Sea — as it steadily rips apart the Arabic and African plates. In the May 3 NATURE, P. Allard of the Centre des Faibles Radioactivités in Yvette, France, and co-workers describe a recent stage in that wrenching labor. In November 1978, after more than 800 earthquakes were recorded in the southernmost part of Afar, a set of two dozen faults, parallel to the Red Sea fault, could be traced. A volcanic eruption developed on one of the fissures, spewing lava and gas from Nov. 7 to 14. For Allard, H. Tazieff and D. Dajlevic, it was an opportunity to study an example of "the so many, but invisible, submarine fissure eruptions." Though the eruption, which oozed from the fissure more than exploded, was close to the sea, little chlorine or water could be detected in either the gas or magma samples. Because of this, the highly crystallized nature of the lava and the relatively low — 3 percent — volume of gas in the lava, the researchers concluded that the magma reservoir was probably a narrow, closed system, close to the surface.

Tsunamic magnitude scale for old quakes

Great earthquakes that break extremely long faults — such as the Alaskan quake of 1964 — can cause very large global crustal shifting and deformation. Calculating the energy of such earthquakes, therefore, is important to understanding the problems of plate motion and the rotation of the earth. The energy of recent long-fault quakes can be determined from a magnitude scale called M_w, which uses long-period seismic waves. (The Richter scale, M_s, uses short-period waves and is useless in calculating the energy of great quakes because the scale "saturates" when the fault length is longer than the wavelength used.) But long-period seismic waves have not always been recorded, and though long-fault quakes certainly occurred in the past, seismologists have not been able to accurately determine their energy and therefore their role in crustal deformation. Now, Katsuyuki Abe, formerly of the California Institute of Technology and now at Hokkaido University in Sapporo, Japan, suggests a magnitude scale that uses a different long-period wave — the tsunami wave — to measure the size and energy of old earthquakes. Though the method is limited to earthquakes that generate the huge sea waves called tsunamis, it is "still important because most great earthquakes have occurred beneath oceans, in particular, along the circum-Pacific belt," he says in the April 10 JOURNAL OF GEOPHYSICAL RESEARCH. Abe's scale, called M_t, is determined from the maximum amplitude of tsunami waves measured on tide gauges at various stations and includes a constant for the source region and the data station. Using historical tsunami data, Abe reports the M_t of 65 great earthquakes of 1837 to 1974. The five largest quakes and their sizes on the Richter, M_w (where available) and Abe scales are listed below. As would be expected, the Abe and M_w scales agree closely.

Date	Region	M_s	M_w	M_t
May 22, 1960	Chile	8.5	9.5	9.4
April 1, 1946	Aleutian	7.4		9.3
Nov. 7, 1837	Chile	8+		$9^1/_4$
March 28, 1964	Alaska	8.4	9.2	9.1
May 17, 1841	Kamchatka	8.4		9

BIOLOGY

Is malignancy a quantitative matter?

Malignancy in some cases may be a matter of overproducing a natural cell component, rather than the consequence of a special, malevolent substance. For the first time scientists have characterized a protein essential for tumor initiation by a virus, and that protein resembles a normal gene product. The amount of the viral protein in cancer-like cells, however, is far higher than the amount of the normal protein in nonmalignant cells.

Raymond L. Erickson of the University of Colorado Medical School reported the finding at the recent meeting in Los Angeles of the American Society of Microbiology. He has characterized the product of the avian sarcoma virus gene (*src*), which is responsible for malignant changes in cells. He finds similar, although not identical, gene products in normal cells of both avian and mammalian origin. Because the protein has been changed little during evolution, Erickson reasons, it must serve an essential and basic function in normal cells.

Research by Hidesaburo Hanafusa of Rockefeller University, and also by Peter Vogt (SN: 2/18/78, p. 105), has demonstrated that sarcoma viruses can use a normal cellular gene to initiate malignancies. Hanafusa says, "This supports the hypothesis that the protein products of the viral and cellular gene perform very similar functions." In the experiments, viruses missing parts of the *src* gene pick up genetic material from normal cells and are then able to induce tumors.

Both the cellular and viral gene products seem to be enzymes that transfer phosphate groups to other proteins, a reaction that can alter the function of the recipient proteins. Erickson speculates that such a phosphate transfer is required for cell division. Thus, in cells containing high levels of the viral gene product, the enzyme that normally removes phosphate groups would be insufficient to regulate cell division. "This is the first time that a specific biochemical change has been identified as a key point in tumor formation," Erickson says.

Hens lay low-cholesterol eggs

The cholesterol level in egg yolks, the site of most egg cholesterol, can be controlled by altering a hen's diet. James L. McNaughton finds that feeding hens sunflower meal (as 9 percent of their diet) reduces the yolk cholesterol by 13 percent. Other high-fiber feed components, such as wood shavings, are somewhat less effective in reducing the cholesterol level. From his research at the USDA South Central Poultry Research Laboratory in Mississippi State, Miss., McNaughton suggests coarse dietary fibers scrape cholesterol-containing cells from a hen's small intestine. The result: significant cut in egg cholesterol.

Hepatitis virus gene active in bacteria

Hepatitis B is a serious viral disease that currently cannot be prevented or cured. Because the virus normally infects only humans and apes and has not been grown successfully in a laboratory, insufficient viral material has been available for making a vaccine. In the May 3 NATURE, C. J. Burrell, K. Murray and colleagues at the University of Edinburgh report a first step toward a vaccine. Using recombinant DNA techniques, they transferred genes from hepatitis B virus into the laboratory bacterium *Escherichia coli*. The viral DNA was replicated with the bacterial genes and passed on to bacterial offspring. By large-scale culturing of the bacteria, viral genes now can be produced in the quantities required for detailed analysis of the DNA. The bacteria also produced a protein characteristic of the hepatitis B virus. The scientists plan to improve their technique to provide enough viral protein to develop a hepatitis vaccine and also new diagnostic methods.