EARTH SCIENCES

U.S.-China geophysics research

The first joint research project by U.S. and Chinese scientists — a marine geophysics study of the South China Sea — was announced in June by Manik Talwani, director of Columbia University's Lamont-Doherty Geological Observatory. While U.S. and Chinese institutions have exchanged personnel and information and some U.S. scientific institutions are setting up facilities in China, the South China Sea study will be the first cooperative research project between the two countries.

Scientists from both countries will work aboard LDGO's research ship *Vema* — which will become the first U.S. research vessel to dock at China since World War II — beginning next November. The South China Sea separates mainland Asia from the Pacific Ocean and is bounded on the north by China, on the West by Vietnam, on the south by Borneo and on the east by the Philippines. According to Talwani, the researchers hope to learn how the sea formed — by seafloor spreading or other modes — when it formed and whether the margins are of continental or oceanic origin. To this end, the first stage of the project — near the center of the sea and then at the northern margin — will include measurements of heat flow, depth, gravity field and magnetic field, seismic soundings, dredging and coring. In the second stage, a LDGO ship will conduct seismic experiments in the southern part of the sea, later joining a Chinese ship on the northern margin. LDGO scientists may also carry out geological field work on shore in Chinese coastal areas.

Meanwhile, back at the volcano

La Soufrière, on the Caribbean island of St. Vincent, began erupting April 12, causing almost 20,000 of the nearly 110,000 inhabitants to evacuate and providing alert researchers a unique opportunity to dissect the anatomy of a volcanic eruption (SN: 5/12/79, p. 314).

Now, as in any good story, there's an epilogue. According to a report from the Smithsonian Institution's Scientific Event Alert Network, researchers on May 3 discovered a "lava extrusion" gradually filling the bottom of the crater. Before the April explosions destroyed it, the crater, which was filled with water, contained a 300-foot-diameter lava island that had appeared in 1971, unaccompanied by seismic activity. This new lava extrusion — which measured 725 meters across and 110 m high on June 18 — appears to be the same sort of event, says University of Rhode Island's Haraldur Sigurdsson, who, with Smithsonian's Richard Fiske, visited the volcano in mid-June.

And, says Sigurdsson, because this aseismic lava flow is, by definition, an eruption, it tends to support the researchers' earlier hypothesis that the violent April explosions were caused by water seeping into the volcano's magma source and expanding explosively. "The volcano is still erupting but doing so peacefully in the absence of the lake," Sigurdsson said.

In addition, samples from the new lava flow appear to be composed of the same rock as the 1971 dome, indicating that the recent explosions were fueled by pre-existing magma, not new magma from deep in the earth's interior. As further evidence for a lakewater-initiated explosion, Sigurdsson says his preliminary examinations of samples from the April explosions show that the ashes formed "mud pellets," "clearly an indication that the volcanic column was very wet."

Though earthquakes and explosions no longer threaten the island's inhabitants, another volcanic phenomenon still makes life difficult. Fiske and Sigurdsson observed violent mudflows that swept loose volcanic material down the now-barren sides of the volcano under the pressure of torrential seasonal rains. Many of the flows were so strong that they created recordable seismic activity, Sigurdsson noted.

BIOCHEMISTRY

Julie Ann Miller reports from Toronto at the XIth International Congress of Biochemistry

Gene organization: Another surprise

"Higher organisms do it differently," may become a slogan of geneticists. As new techniques allow analysis of plant and animal genes, scientists are finding major differences between the genes of higher organisms and those of the bacteria, which were previously studied. The first surprise was the frequent presence of interruptions within a single gene (SN: 7/7/79, p. 12). Now two biologists report a second unexpected arrangement of genetic information: The "promoter" can be within a gene.

The promoter site is crucial to gene expression. It is the initial binding place for enzymes, called polymerases, which move along active DNA piecing together the appropriate RNA molecules. Researchers studying bacteria found the promoter a short distance from the beginning of the gene. If the promoter site is removed, polymerase cannot bind and the gene does not function.

Donald D. Brown of the Carnegie Institution of Washington now reports that the promoter seems to be within, rather than outside, a simple frog gene. Brown examined the gene responsible for a small RNA that is a component of ribosomes, the cell's protein-making machinery. That gene is a simple representation of the RNA, with no intervening sequences. Brown looked for the gene's promoter region by observing how pieces of DNA behave in an extract of frog egg. To Brown's surprise, copies of the gene that included no DNA to the left, and also copies that included no DNA to the right, were able to produce RNA transcripts. Brown found that he could even delete the first third or the last third of the gene and still produce an accurate, although truncated, RNA. Brown proposes that polymerase binds to the center of the gene and then reaches out to start copying the gene at its beginning.

The genes for two other cellular RNA's, transfer RNA's that carry amino acids to a growing protein chain, also appear to have promoters within, report Max L. Birnstiel of the University of Zurich and Benjamin D. Hall of the University of Washington. There is some evidence, mostly indirect, that promoter sites for some other plant and animal genes are outside the structural gene. Perhaps higher organisms, with their great diversity, take advantage of several organizational options.

Insulin-producing hamster cells in lab

Detailed analyses of how pancreatic cells make insulin, and perhaps what goes wrong in diabetes, may become possible with cells grown in laboratory culture. Robert F. Santerre and colleagues at Lilly Research Laboratories in Indianapolis report that they have hamster cells that can reproduce continuously outside an animal and that produce both insulin and its normal precursor, proinsulin.

Pancreatic beta-cells previously had failed to grow indefinitely in the laboratory. Santerre and co-workers infected such cells with the monkey tumor virus SV40, which converts cells isolated from many species into continuously growing laboratory cell lines. Santerre says that the cells growing in culture continue to resemble hamster islet cells. For instance, they contain secretory granules and produce about a third as much insulin as do cells in the hamster. In addition, compounds that stimulate or inhibit insulin production in islet cells have the same action on the laboratory cells.

Santerre expects the cells to aid study of hormone action, of gene expression and regulation and of the conversion of proinsulin to insulin. Santerre, however, does not expect the laboratory-grown hamster cells to become a source of insulin for treating diabetics. Because the laboratory cells contain SV40 and because they produce hamster, not human, insulin, bacteria containing recombinant DNA (SN: 9/16/78, p. 195) remain a more likely potential source for therapeutic insulin.