

A Coriolis effect for continents

Most theories on the causes of continental drift involve some kind of thermal convection in the mantle. Martin F. Kane of the U.S. Geological Survey has developed an alternative mechanism that links plate movements with known slow changes in the position of the earth's pole of rotation.

The mechanism he describes could be classified as a Coriolis effect. The concept explains the apparent deflection, due to the earth's rotation, of any object in motion. The Coriolis effect plays an important role in the large-scale clockwise or counterclockwise (depending on the hemisphere) circulation of the atmosphere and oceans.

In his concept he envisions, for example, a continent at the equator. As a result of a gradual change in the position of the earth's pole, the continent is at some later time displaced north of the (new) equator. In the latter situation, there will have been a loss of rotational inertia, because the continent is not as far from the axis of rotation as it had been. But the laws of physics say angular momentum is preserved. This is accomplished, he suggests, by a latitudinal (in this case easterly) movement of the continental plate in relation to the surrounding crust.

This type of polar movement could cause the part of a continental plate north of the equator to tend to move east and that part south to move west. The resulting

stresses could, he suggests, cause separation of the plates along existing lines of weakness.

In the March 24 *SCIENCE*, Kane compares the path followed by the north pole over the past 230 million years with the pattern of continental breakup and drift described by Robert S. Dietz and John C. Holden (SN: 10/3/70, p. 293). The continental movements that Kane's model predicts would result from these pole changes is "in reasonably good agreement" with those that actually took place, he says.

Kane points out that his theory also fits well with proposed links between seismic activity and polar wobble (SN: 12/12/70, p. 453). The total annual energy change predicted by Kane's theory as a result of observed annual changes in pole position is approximately equivalent to the amount of energy released annually by earthquakes. Kane suggests that polar wobble creates strain in a plate as it slows down or speeds up and this strain is manifested as earthquakes.

Kane says that though his theory has not been rigorously tested it fits the general patterns of observations and has advantages over thermal mechanisms. The problem with convection cells, he says, is that they are hard to quantify—their dimensions and elements are difficult to define. His model, on the other hand, is a relatively simple mechanical system in which elements can be defined precisely and predictions can be made. "It's a more tractable system," he says.

pressure to expand enrollment and provide educational opportunity for all Americans—particularly minorities and women. The commission recommends aggressive enforcement of immigration laws and civil and criminal sanctions on employers of illegal aliens. But the United States has traditionally said, "Give me your tired, your poor, your huddled masses . . .," and immigration has always supplied needed cultural inputs. With these considerations in mind, the commission says immigration should be kept at the present level.

The United States is becoming an almost totally urban society, and the commission recommends comprehensive planning to improve urban development and eliminate current patterns of racial and economic segregation. This should be done on an over-all metropolitan and regional scale—not through the current, fragmented city and country approach. Specifically, it says action should be taken to "reduce the dependence of local jurisdictions on locally collected property taxes."

Throughout the report, the commission notes that all recommendations are for the present and should be flexible, subject to future research. But, it notes, there is often as much as a two-year delay in the publication of such research. It suggests speeding up and modernizing the processes. The decennial census for instance, should be supplemented by a mid-decade census of the population. Expanded research would be coordinated through a National Institute of Population Sciences

within the National Institutes of Health, an Office of Population Growth and Distribution within the Executive Office of the President and a joint Congressional committee to provide legislative oversight.

Immediate implementation of all recommendations is not expected, but neither is immediate rejection. (The Commission on Marijuana and Drug Abuse recommended decriminalization of Marijuana [SN: 3/25/72, p. 197]. President Nixon rejected that tactic before and after he read the report.) Instead, the population commission hopes to see many of its recommendations turning up in future legislation. Last week, for instance, the Senate passed the Equal Rights Amendment and the Supreme Court ruled that unmarried persons should be allowed to purchase contraceptives. Both were recommendations of the population commission. □

Prostaglandins: Involved in dental disease

Periodontal, or gum disease might well be considered the dental nemesis of all persons age 21 and over. More adult teeth are lost from this disease than from decay, accident or other causes. In fact, thousands of dentists are saddled with the job of annually yanking out millions of perfectly good teeth and replacing them with dentures. The reason is that the bony foundations of the teeth have been eroded by perio-

dontal disease.

True, the removal of plaque, a substance formed by colonies of bacteria that thrive on teeth and gums, may help stave off the disease. More and more dentists are motivating their patients to follow home plaque-removal measures. Warding off a disease, though, is a far cry from curing it once it sets in. Now a San Francisco scientist has laboratory and clinical evidence that both explains the causes of periodontal disease and provides a possible cure for it.

Jo Max Goodson of the University of California Dental School reported last week at a general session of the International Association for Dental Research in Las Vegas that he has found that local application of prostaglandins, secondary hormone messengers present in humans and animals (SN: 10/10/70, p. 306), can destroy the cranial bone of rats within several days' time. The lesions produced were similar to those caused by periodontal disease in alveolar, or teeth bone. Second, Goodson has found that bacteria from the mouth, which are implicated in dental disease, produce prostaglandins. "As far as I know," he says, "this is the first indication that bacterial species may be capable of synthesizing prostaglandins." (Prostaglandins have been discovered in other lower animals recently—in coral—by A. J. Weinheimer of the University of Oklahoma.

Consequently, Goodson is now trying to show that prostaglandins from bacteria actually erode the alveolar

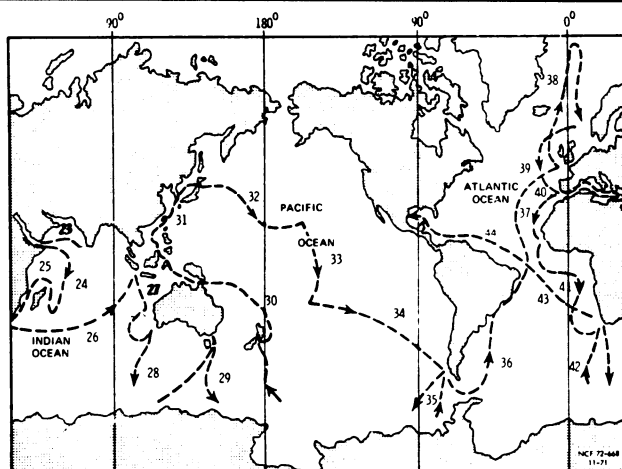
Three more years of deep sea drilling

All good things must pass, but it looks like the Deep Sea Drilling Project won't, at least for a while. Last June, the National Science Foundation, which funds the project, asked Scripps Institution of Oceanography, which manages it, to submit a proposal for a three-year extension of the project. Scripps complied, and this week NSF Director H. Guyford Stever announced that arrangements for the extension have been completed.

The project will be extended to August 1975, permitting 19 more two-month cruises. The estimated cost of the extension is \$33 million. This is the second extension of the project; the 18-month first phase which began in 1968 was followed by a 30-month second phase. This latest \$33-million extension will bring the total cost of the project to around \$68 million.

During the extension, DSDP scientists plan to drill up to 3,000 feet into the lava underlying ocean sediments to learn more about the composition of the crust. Most knowledge to date has come from magnetic observations and from measurements of the speed of sound waves traveling through the crust. The ocean floor beneath Arctic and Antarctic waters will also be probed for the first time. Future work will focus on processes occurring in the oceans—circulation, chemical reactions, formation of oil and metal-bearing sediments, and evolution of marine plants and animals.

So far, scientists on the Glomar Challenger have recovered some 60,000 feet of sediment core from 220 locations in the Atlantic, Pacific and Indian Oceans, the Mediterranean Sea and the Gulf of Mexico. They have



Proposed future paths for the Glomar Challenger.

elaborated past motions of the earth's crustal plates, accumulated data on past climates and ocean currents, confirmed that there have been large vertical movements of the earth's crust, discovered oil in salt domes in the Gulf of Mexico and found that the Mediterranean Sea had once dried up.

Said Stever: "The investigations conducted under the Deep Sea Drilling Project have provoked the interest and respect of scientists throughout the United States and abroad. The extension of this productive expedition reflects the fact that important work in these oceanic studies remains to be done."

bone of laboratory animals. The work will be difficult because the small teeth of laboratory animals are hard to get at. There is a chance, too, that bacteria found in the mouth do not produce destructive prostaglandins. Thus Goodson is also exploring an alternate possibility—that alveolar bone cells or gum cells produce their own destructive prostaglandins in response to the presence of bacteria. "There are good indications," Goodson points out, "that prostaglandins are produced in inflammatory responses in other parts of the body than the mouth. So if the bacteria were capable of stimulating the inflammatory response in the tissue around the teeth, then the tissue would produce its own prostaglandins."

Pending exact definition of prostaglandins' role and bacteria's role in dental disease, Goodson is conducting a double blind clinical study on patients with periodontal disease. He is treating them with several drugs known to inhibit the formation of prostaglandins. In using them, Goodson anticipated that the bacterial deposits on teeth and gums would not go away, but that the drugs would keep the gums from swelling and from leaking prostaglandins into the alveolar bone. Clinical results so far bear out his expectations. Study results, showing whether prostaglandin inhibitors might actually reverse the disease process, should be available in a month. □

Cancer legislation law, but convolutions continue

The legislative contortions to get a souped up cancer research thrust are now in the past (SN: 10/9/71, p. 243). The President signed the National Cancer Act of 1971 into law on Dec. 23. It keeps the National Cancer Institute intact, and gives it more wallop and funds. But the scientific contortions are not over by any means.

Since October, 250 scientists from various fields have been meeting in closed sessions to hash out directives for the new program. A preliminary report of their ideas is being drawn up, and should be made public some weeks

from now, a NCI spokesman told SCIENCE NEWS.

Pending modifications, these are the objectives the scientists have outlined: to reduce the effectiveness of external agents in increasing the probability of cancer; to find a cancer vaccine; to prevent cell conversion to the cancerous state; to prevent tumors from establishing themselves in cells that are already capable of forming cancers; to better diagnose cancer in individuals and in special risk groups; and to cure and rehabilitate as many cancer patients as possible. □

Venera 8 spacecraft launched toward Venus

The Soviet Union launched an unmanned spacecraft toward Venus this week. Venera 8 was launched March 27 and will arrive at the planet Venus in July after traveling some 312 million kilometers. "The program provides for the separation of the landing craft which must make a smooth descent in the Venusian atmosphere and take scientific measurements," Tass reported. The landing craft carries pennants showing a bas relief of Lenin and the coat-of-arms of the U.S.S.R.

Venera 7 descended to the surface of Venus in December 1970 and re-

corded a surface temperature of 747 degrees K. and pressures of 90 atmospheres (SN: 7/10/71, p. 25). The United States has never attempted a landing on the planet. Mariner 10, planned for launch in October 1973, will fly by both Venus and Mercury. Mariner 2, launched in 1962, and Mariner 5, launched in 1967, were both Venus fly-bys.

In addition to Venera 7, two other Soviet spacecraft, Venera 5 and 6, have penetrated the Venus atmosphere. They did not reach the surface of the planet intact. □