plex sugar-protein, or glycoprotein, that caused allergic reactions in 12 of 31 volunteers who were injected with it.

Closer chemical analysis revealed that the rutin protein was attached to the glycoprotein found in the leaf, and was also present in cigarette smoke. Rutin can be found in several vegetables, including eggplant, green peppers, potatoes and tomatoes. Investigators doubt that its existence in these foods is dangerous, however; more likely, the protein gains entry into the blood stream by means of the oxygen-transfer system in the lungs rather than through intestinal absorption.

Becker and Dubin say their results indicate that rutin could damage the heart and blood vessels by initiating blood clotting. In steady doses, such as those that occur with habitual smoking, the foreign protein could also aggravate continuous antigen-antibody formations in the lungs. The end result would be clotting, lesions, fibrous growths and perhaps mutant cells. □

Genetic markers may point to cause of RA

Certain "genetic marker molecules" occur much more often in rheumatoid arthritis (RA) sufferers than in nonsufferers, a University of Texas researcher reports. This finding gives new life to the recently discredited theory that the more than three million Americans afflicted with RA may have inherited at least a tendency to develop the disease.

There has always been an undercurrent of suspicion that RA represents a mistake of the genetically-determined immune response. Certain persons, the theory goes, inherit a predisposition to miscue their own defense mechanisms. The body mistakenly attacks itself, with its joints becoming sore, stiff and inflamed.

This "self-sensitization" concept was reinforced in 1974, when University of Washington researchers described an "immunoglobulin G factor"—found in 70 percent of all RA victims—as a complex of molecules that have forgotten their roles (SN: 4/6/74, p. 181). Each molecule, the report said, acts dually as antigen and antibody; each has a perverse affinity for the other, instead of for foreign chemical antigens. It was, as one observer described it, an incestuous relationship.

That inbreeding metaphor was not lost on epidemiologists, who reasoned that if RA were a genetically-determined immune response, then isolated populations might show the disease flourishing throughout specific family trees. A highly publicized study of the Pima and Blackfoot Indian tribes, however, flatly refuted the theory; the incidence of RA did not differ significantly from one family to another. Experimentally, the gene theory took a back seat to approaches that stress environmental factors.

Now, the report from the University of Texas Southwestern Medical School in Dallas seems to bring the thinking on RA back full circle. Peter Stastny, associate professor of internal medicine, reports he has found molecules on the surface membranes of B-lymphocytes and macrophage cells. These genetic markers, he says, occur in significantly higher proportions of RA victims than of control groups without the disease. The presence of these glycoprotein markers is determined by an area on a particular chromosome known as the "HLA-D region," which is known to have a great deal of control over the human immune response.

Fifty-eight percent of the adult RA patients Stastny tested had the HLA-controlled marker known as DW4, while only 16 percent of a control group of disease-free adults had it.

One investigator who has confirmed Stastny's findings, Hugh McDevitt of Stanford University, believes these molecular signposts may lead to diagnostic tests that can identify those people who will eventually develop the disease.

But Stastny does not believe a marker found in about one-half of all RA victims and 16 percent of those without it is specific enough to have much value. He thinks, however, that his evidence of a genetic factor will serve as a touchstone and a catalyst for new conceptual approaches to understanding the disease. □

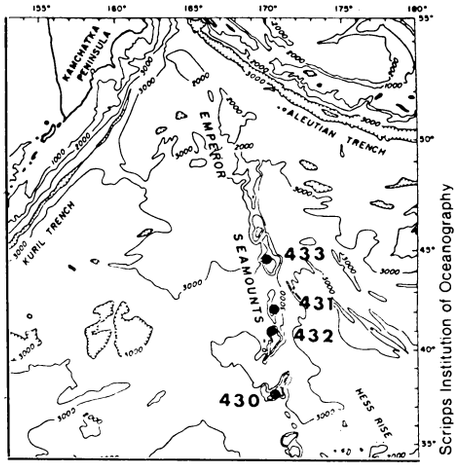
Emperor Seamounts: Hotspot candidates

In the near decade and a half since it was proposed, an idea generally known as the "hotspot theory" has achieved a highly visible position among views of how island chains such as the Hawaiian group are born. As one of the earth's crustal plates moves across a fixed source of heat beneath it, a succession of volcanoes are generated, each one sliding away with the plate to leave room for the next. The volcanic island chains, in other words, are tracings of the plate's wanderings, sketched on the crust from below.

The classic example usually cited is the Hawaiian Islands, which have yielded data in various studies in support of the hotspot theory. Not every island chain seems to fit the expected criteria, however. In 1973, for instance, the Line Islands in the Pacific were sampled by the research vessel Glomar Challenger as part of leg 33 of the Deep Sea Drilling Project (SN: 1/12/74, p. 22). Instead of revealing that the southernmost islands—nearest the supposed hotspot—were substantially younger than the northern ones, the samples showed that volcanic eruptions along the chain apparently stopped during the same period, about 80 to 85 million years ago.

Two U.S. Geological Survey scientists, Everett D. Jackson and Herbert R. Shaw, subsequently proposed an explanation nearly the opposite of the upward-heating hotspot idea. They suggested that a localized "downwelling" of heat might have been produced by friction between the moving crustal plate and the asthenosphere beneath it, leading to a melting period during which heavy materials such as iron would descend and create "gravitational anchors" to hold the viscous influx in place while the plate drifted through.

The two hypotheses need not fight to the end, however; there is room on the earth for both—and examples. The most recently completed leg of the DSDP, leg 55, has probed a string of submerged volcanic rises known as the Emperor Seamount chain, which turn out to fit the hotspot theory's conditions very nicely. The Emperor Seamounts seem to be a northern continuation of the Hawaiian chain, forming a continuous (though partially submerged) mountain range some 6,500 kilometers long, formed over a period of about 70 million years.



Drilling sites among Emperor Seamounts.

One of the Emperor group, for example, is Suiko Seamount, from which the Glomar Challenger extracted a core sample that has preserved evidence of more than 70 successive lava flows. By analyzing the magnetic polarity of the earliest of these flows, leg 55 scientists headed by Jackson and by Itaru Koizumi of Japan's Osaka University were able to determine that the Suiko Seamount was born about 25° south of where it is today. This supports the hypothesis that the peak was carried northward by the movement of the Pacific crustal plate, moving it away from the hotspot that had spawned it.

Leg 55 also produced considerable evidence that at least some of the Emperor Seamounts, now 2 km or more beneath the waves, used to extend above the surface. There are traces of coral, for example, that have since been topped by sediment containing fossils of creatures that lived in water too deep and cold for coral to grow. □