nations do not disapprove. (Such disapproval is deemed unlikely by United States officials.) Thus INTELSAT would no longer be an impediment to the sale of rockets to Europe.

European and American industry would have much to gain and little to lose on the agreement on technological flow. Information exchange would occur on two levels: detailed technology (defined as blueprint knowledge enabling reproduction of systems) and general technology (a broad understanding of spacecraft systems). Detailed knowledge concerning shuttle thrusters, for example, would go only to that nation which had chosen to produce the thrusters. That nation, therefore, would retain its proprietary information and not be obliged to share detailed information with other nations. Decision-making authority would also depend on a nation's financial and technological commitment to a project.

The major problem now facing the Europeans is something over which they have no control—the United States Congress. And it is not likely that any major commitment will come from Europe, until Congress decides whether to begin NASA financing of space shuttle and station studies. □

MARINE GEOLOGY

Mountain-building in the Mediterranean

Early studies of mountain geology revealed that mountains are sites of tremendous folding and thrusting of the earth's crust. In many places the oceanic sediments of which mountains are composed are inverted, with the older sediments lying on top of the younger. Terranes of Jurassic and Cretaceous limestone several hundred feet thick are commonly found displaced by several miles from their original locations.

Geologists had proposed that these features could be explained if mountains were formed by compression of the crust, and the theory of plate tectonics provided an explanation for the origin of the necessary compressive forces (SN: 8/15, p. 143).

The results of the Deep Sea Drilling Project's Leg 13, in the Mediterranean Sea (SN: 7/4, p. 20), add further support to the theory that mountains are created by compression between adjacent crustal plates.

The Glomar Challenger, led in its latest voyage by Dr. B. F. Ryan of Columbia University's Lamont-Doherty Geological Observatory and Dr. Kenneth J. Hsu of the Swiss Federal Institute of Technology, returned to port last week with 640 meters of core from 14 sites on the floor of the Mediterranean Sea and one from the North Atlantic. These cores indicate that for the past 5 million years Africa and Europe have been drifting together and that the resulting compression is raising mountains on the bottom of the Mediterranean.

At a trench in the eastern Mediterranean, one oceanic plate is sliding beneath another. Sediments from the subsiding plate, says Dr. Ryan, scrape off against the upper plate and pile up. This accumulation, he explains, constitutes an embryonic mountain.

It had been known for years that mountains are composed of ocean sediments. What the Leg 13 team wanted to learn, Dr. Ryan says, is how the peculiar arrangement of strata found in mountains comes about.

By drilling along the trench, something not previously attempted, the scientists recovered cores astonishingly similar to sediments and rocks found in many parts of the Alpine chains of Europe and North Africa. In one location, they found limestones 120 million years old directly above oozes only 5 million to 10 million years in age. The researchers had expected this, says Dr. Ryan, but were surprised that the drilling technique could reveal it.

The researchers concluded that the beginning phases of thrusting actually occur on the ocean floor. The style of thrusting they found at the trench was identical to that found in the Alps.

One of the original goals of the expedition was to learn something of the Mediterranean's history. The researchers succeeded in this, but what they found was completely unexpected: evidence that the Mediterranean Sea had once been cut off from the Atlantic and had become a veritable desert. The clues that led to this conclusion were thick layers of salt brines and a mineral known as anhydrite that forms only at temperatures exceeding 104 degrees F.

To say that the scientists were surprised at this discovery would be an understatement. The idea that the Mediterranean could have dried up, says Dr. Ryan, seemed preposterous. But it was the only explanation for the data.

Even more mysterious, the layer of salt is broken at intervals by layers of normal oceanic oozes. Dr. Ryan concludes that there must have been a long period 5 million to 10 million years ago during which the Mediterranean basins were alternately flooded and dried up. He believes this could have been caused by mountain building in the lands to the west, which periodically opened and closed gateways to the Atlantic. □

DRUG LABELING

Implementing a review

With much fanfare, the Food and Drug Administration four years ago asked the National Academy of Sciences to review the effectiveness of all drugs marketed between 1938 and 1962, when Congress passed a law saying that drugs ought not only to be safe but to work as well. Confusion, controversy and legal entanglements have been the order of the day ever since the NAS completed its three-year study and turned its findings over to the FDA.

Currently, battle lines are being drawn over a new FDA proposal to require drug-makers to include in their advertising and labeling any adverse opinions of the NAS report. Although manufacturers are already required to cite the pros and cons of a given drug somewhere in the small print of ads that may run four colorful pages or more, they are clearly unhappy about FDA's suggestion that NAS judgments be conspicuously relayed to practicing physicians in a box titled "Important New Information." Because it is generally agreed that doctors obtain a fair portion of their information about drugs from ads in medical journals, FDA's newest proposal carries a particular sting. The industry plans to fight.

In reviewing data on close to 3,000 drug products, the NAS rendered one of six verdicts: effective as claimed, effective *but* (meaning there exists a better drug for the same purpose), ineffective as a fixed combination (which subsequently forced dozens of combination antibiotics off the market) probably effective, possibly effective and outright ineffective. The FDA now has all of the NAS decisions in hand. It has reviewed and published about 15 percent of them. Its troubles have been, and will continue to be, legion.

Concurring with the NAS "ineffective as a fixed combination" rating of combination antibiotics, FDA moved to ban such products. That led to a year-long court fight waged by the Upjohn Company in defense of Panalba, an $18-million-per-year earner (SN: 3/7, p. 242). Only recently did FDA emerge victorious from that one.

Then, just before the final Panalba verdict, the American Public Health Association and other consumer groups brought action to force FDA to release all of the NAS findings immediately, charging that the FDA was willfully allowing the public to take drugs it knew to be questionable (SN: 8/1, p. 95). Legally that case is in limbo. Practically, the present move regarding drug advertising is something of a compromise.

Because the FDA itself is reviewing

the NAS review, and because it occasionally reaches a different conclusion, the agency has no intention of releasing the NAS study wholesale. Instead, it is proposing that once it does publish findings on a specific product, those findings must then be included in advertising immediately—before the company issues a rebuttal and before any final regulatory action is taken. That post-publication process can take months to years. Meanwhile, physicians would be alerted to the questions raised about a product and, presumably, might stop prescribing it.

According to Bruce Brennan, chief counsel for the Pharmaceutical Manufacturers Association, the PMA's specific line of legal attack has yet to be drawn. There are, however, a couple of broad approaches. It may challenge FDA's basic legal right to require such specific, negative disclosures. And it is likely to contest the scientific validity of the judgments rendered by NAS scientists, claiming that they do not represent a full range of medical opinion. By and large, members of the NAS review panels were drawn from academic medicine. Admittedly, they were not always unanimous in their views and, to the distress of drug companies, tended to place little weight on testimonials from industry sources. □

LINEAR ACCELERATOR

Saving space with superconductors

AEC

Two miles of superconducting waveguide could raise SLAC to 100 GeV.

The only practical way to construct high-energy electron accelerators is to build them in straight lines. Electrons revolving in the magnetic fields of circular accelerators lose energy by giving off so-called synchrotron radiation. At energies in the tens of billions of electron-volts, they lose energy almost as fast as they gain it from the machine, and very large amounts of energy have to be supplied by the machine to get a very small increase in the net energy of the electrons.

To achieve the present maximum energy of the Stanford Linear Accelerator, 20 billion electron-volts (GeV), required an accelerator two miles long. To achieve an energy of 100 GeV, a conventional electron accelerator would have to be tens of miles long.

The alternative is to change technology to get more energy per running foot of accelerator. Using superconductors instead of ordinary conductors in the waveguides that accelerate the particles is a possibility that now begins to look favorable, and physicists at the Stanford Linear Accelerator Center under the leadership of Dr. Perry Wilson are working on a plan to rebuild their accelerator with superconductors, jumping its energy to 100 GeV without increasing its length.

Heat from electrical resistance is the main problem in conventional technology. The electrons are accelerated by radio waves that run in metal waveguides. The amount of energy that can be delivered per linear foot is limited by the danger of melting the waveguides.

Superconductors will pass electric currents without resistance. With superconducting waveguides the heating problem virtually disappears.

The advantages are threefold: More energy per foot of flight can be delivered to the electrons; more of the total energy delivered to the machine will get to the electrons, and more of the time the machine is on can be used for actual acceleration rather than for cooling. Under the plan the machine will spend six percent of its time on actual acceleration, 100 times the current percentage.

Superconductors function only at temperatures very near absolute zero. The SLAC physicists envision refrigerating the whole two-mile length to 1.85 degrees K. with liquid helium.

Formidable technical difficulties are involved in designing waveguides and refrigeration systems. Work on these problems has been under way for several years at the Stanford University High Energy Physics Laboratory under the direction of Dr. William Fairbank (SN: 6/22/68, p. 599).

The time that a superconducting accelerator the size of SLAC can be built is not yet, says Dr. Wilson, but "to make big improvements you have to start 10 years in advance." One of the major efforts in the work is finding a good waveguide material. Niobium looks most promising now but its electrical qualities deteriorate on exposure to air. Either a very good vacuum system or a protective coating will have to be developed to use it, says Dr. Wilson.

To bypass some of the problems, the SLAC physicists are constructing what they call Project Leapfrog, a 52.5-centimeter section built to the specifications of the larger project. This should be ready for test early in 1971. If it works, the next step is a prototype between 20 and 40 feet long. So far the project is being funded out of SLAC's operating budget, but the prototype would cost about $1 million and probably require a separate appropriation.

According to Dr. Raymond Fricken of the Atomic Energy Commission's high-energy physics division, the SLAC conversion is one of several things the AEC would like to do in the 1970's. Its cost is estimated at between $70 million and $80 million, which Congress would have to be persuaded to authorize. □

MYCOPLASMA

Vaccine for a pneumonia

When Dr. Norman Somerson got out of graduate school in the 1950's, he couldn't find a job in the field in which he had taken his degree. Almost nobody was interested in mycoplasma. Only three laboratories in the world were at work on these cells, almost as small as viruses and lacking the rigid cell wall that encloses most bacteria. Some workers thought these smallest of free-living forms were an early growth state of well-known bacteria.

But when, a decade later, a species of *Mycoplasmatales* was identified as a major producer of human pneumonia, Dr. Somerson quickly got research funds to pursue the pathogens at Ohio State University School of Medicine.

Last week Drs. Somerson and Dennis Pollack were proud producers of an experimental vaccine against *Mycoplasma pneumoniae* that has evoked a high response of neutralizing antibodies in humans and is easy to purify. Clinical trial began Sept. 10 at Baylor University