Getting bacterial signals uncrossed

Biologists have in the past 10 years pieced together a fairly extensive understanding of how simple, one-celled bacteria can sense and respond to the miniature environments around them. Bacteria exhibit (quite impressively, considering their limited equipment) the functioning of a primitive sensory system, motor system and tiny brain all in one cell. Their chemotaxis—movement toward or away from chemicals—in fact represents the simplest model of animal behavior.

There has been a quantum leap forward, if only by one orbit or so, in the study of bacterial chemotaxis. Biologists already understand the mechanics by which bacteria receive chemical signals, then respond by swimming toward attractants, away from repellants or tumbling in place. They are focusing now on the translation mechanism—the molecular process by which the chemical signals are interpreted and translated into motor response. Two teams of biochemists headed by Julius Adler of the University of Wisconsin at Madison report new details of this molecular translation process in both the October and November PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES.

One team found that the amino acid methionine plays a role in both the tumbling process itself and is involved in information processing. Without tumbling, the cells cannot move toward attractants or away from repellants normally. Using bacteria that are methionine auxotrophs (cannot make the amino acid themselves) and some that are tumbling mutants (can only tumble in place rather than swim and tumble) they found that most cells deprived of methionine could no longer tumble. They also found that the speed at which the ability to tumble is lost in the absence of methionine depends on the concentration of attractant present. This involved bit of explanation means, simply, that methionine is involved in information processing. How it is involved in tumbling and molecular translation is unknown.

The other team reports that a cell membrane protein, which they named MCP (methyl-accepting chemotaxis protein), must receive a methyl group (CH_3) from methionine before chemotaxis can occur normally in certain bacteria. Exactly how MCP and methionine interact, and how this interaction leads to information processing is unknown, but the teams see the findings as first steps toward understanding. □

Project Sanguine's lost report card

The history of Project Sanguine has been anything but that. The huge, land-based communications grid has been sought for years by the U.S. Navy as an extreme-low-frequency antenna for keeping in touch with its nuclear submarines, but environmental fears from many quarters have hampered it almost from the start. It has been tossed out of Wisconsin, locked out of Texas and now faces an uncertain future in Michigan. The latest blow to the controversial effort is the discovery and release by Sen. Gaylord Nelson (D-Wis.) of a two-year-old, Navy-sponsored report on the state of the Navy's own research into the "biological-ecological effects of ELF radiation, with special attention to Project Sanguine."

"It appears," Nelson says, "that the Navy kept the wraps on the existence of this report because it contains the very first scientific evidence that Sanguine indeed would have an adverse environmental impact." Learning of the report from a Michigan professor, he requested a copy from the Navy, but, he says, it was not provided until after he threatened to raise the matter on the Senate floor.

One significant finding in the report was the discovery of elevated triglyceride levels in the blood of six out of eight subjects who had been working in a Sanguine test facility in Wisconsin. Further study, the seven-man panel concluded, was "urgent and absolutely necessary."

Sanguine, originally to have been a buried grid covering 25,600 square miles, nearly half the area of Wisconsin, is now being sought as a 2,500-square-mile surface grid in Michigan under the name Seafarer. □

Antibiotic test a 'killer' for M.D.'s

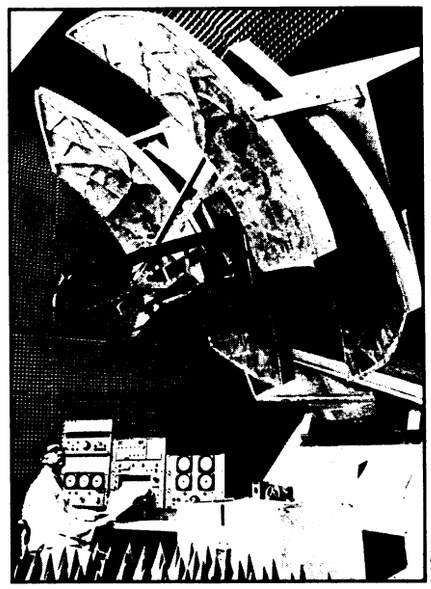
Concern has emerged recently over the misuse of antibiotics during treatment of infectious diseases. Many physicians, it is feared, just aren't keeping up with new research on antibiotics, even though one of five pills prescribed in an antibiotic, and misprescription can sometimes have serious side effects.

An educational organization, the Network for Continuing Medical Education (NCME), designed a 75-minute videotape test two years ago to help doctors assess their own expertise— or lack of it—on this subject. Harold C. Neu of the College of Physicians and Surgeons and Sara P. Howrey of NCME analyze the scores of the first 4,513 to take the test in the Dec. 18 NEW ENGLAND JOURNAL OF MEDICINE.

Physicians, it seems, didn't do well on the self-test. The mean correct score was 68%. The supposition that many aren't keeping up was confirmed by the finding that those in practice 15 years or more averaged 62%, those in practice 6 to 15 years 68% and recent graduates 70%. The test was difficult though; infectious disease specialists averaged only 86%.

The test is not definitive, Neu and Howrey warn, but it does indicate the need for continued education. They were encouraged by the popularity of the videotape format, however, and by increased scores during post-tests. □

RCA Satcom A: New corporate talksat:



RCA Satcom A in anechoic test chamber.

It began with the government, developing and launching the pioneering communications satellites. Then came Intelsat, the multinational consortium representing the first major transfer of satellites to the at least quasi-private sector. The most recent step has been the acquisition of talksats by individual corporations, beginning in 1974 with Western Union. The newest corporate member of the space club is RCA, whose opening entry, Satcom A, was launched Dec. 12 by NASA (which gets paid back for the job).

Satcom A is stationed in geosynchronous orbit, 23,000 miles above the equator at longitude 119° W, roughly south of Los Angeles. Two more are to be launched in 1976, completing a system intended to provide television, voice channels and high-speed data transmission for the United States, including Alaska and Hawaii. The latter satellites are destined to reside at 99° and 129° W. Planned for a minimum lifetime of eight years, each satellite will offer services through 24 36-MHz channels, with ground stations at San Francisco, Los Angeles, Valley Forge, Alaska and later Hawaii. □