

how to raise clams with a known amount of antitumor activity," he said.

Somewhat similar work concentrating on sponges is in progress at the Lamont Geological Observatory of Columbia University in Palisades, N.Y. There, Dr. Paul Burkholder and his wife, both biologists, are working with Dr. G. M. Sharma, a chemist, who has been able to determine the structure of two antibacterial compounds from the sponges and confirm the analysis by synthesizing them in his laboratory.

The Burkholders, who spent much of their careers searching for new drugs

from land plants before they turned to the sea, report a large number of potential antibiotics from sponges but as yet the pharmaceutical industry has shown no interest.

Even with generous financial support and industry encouragement, "it's certainly not going to be easy," Dr. Youngken observes. "The ocean environment is a hostile one" that does not give up its secrets easily.

"But if we get just one drug that will cure a disease—for example heart disease or cancer—it will be worth all the effort in the world to get that." ♦

#### GOVERNMENT AND INDUSTRY

### The Lions and the Lambs

The Food and Drug Administration and the drug industry it regulates have never been the best of friends. The 1962 Kefauver-Harris Drug Amendments and the highly publicized hearings that preceded them turned passive tolerance to active feuding. And since January 1965, when Dr. James L. Goddard took control of FDA, tensions between the two have grown steadily in spite of public protestations of friendly cooperation.

Meanwhile, the academic community has remained as aloof as it reasonably could.

Last week, however, the three factions drew in their daggers and met informally at a closed FDA-sponsored conference on evaluation of anticonvulsant drugs. FDA hopes it will be the beginning of a series of meetings of scientists from the agency, the drug industry and universities looking at the various sides of drug studies.

"This was the first such conference of its kind," says Dr. Arthur Wentz, extramural research adviser to the FDA. "The lions and the lambs got together in the same room very peacefully, and, so far, the response we've gotten from the participants has been very favorable."

The purpose of the conference, Dr. Wentz emphasizes, was to evaluate on-going drug studies, to see where more should be done and to spot areas where certain types of research may be unnecessary. Contrary to what everyone thinks, he said, the drug companies haven't got all the money in the world, adding that FDA should not force them into wasteful research spending.

On the other hand, Dr. Wentz says, some research isn't carried far enough. Anticonvulsant drugs, used primarily for epileptics, are a case in point. "Anticonvulsants may be good for other things," he says, "but research seems to have stopped short of exploring these possibilities."

Although the conference summary and recommendations will not be published for several months, Dr. Wentz points to four specific areas of fruitful discussion.

He thinks the conference committee will recommend that researchers submit and FDA take note of the identity of subjects in human drug evaluations. Testing anticonvulsants for six months



Wentz: Scientists, not policemen.

on patients who have seizures on the average of once a year doesn't prove much. If, on the other hand, a product is tested in patients who have 45 or 50 seizures a year and keeps them healthy, then there is evidence of efficacy.

The scientists also evaluated the use of electroencephalograms as a measure of drug activity. The consensus was that even though brain wave tracings have been used traditionally as an indication of anticonvulsant drug action, they are not an ideal test.

The kind of animals used in pre-clinical studies, the scientists agreed, is another area worthy of re-evaluation. Anticonvulsants are often tested in rabbits and cats, though neither species

gets epilepsy naturally; it has to be artificially induced. Within the last year, Dr. Wentz says, scientists discovered that East African baboons often develop epilepsy naturally, making better animal models.

The fourth point of discussion concerned the controversial issue of risk versus benefits. Industry scientists, fearful that evidence of toxic effects will mean rejection of new drugs by FDA, sometimes abandon research projects at the first signs of danger. However, Dr. Wentz points out, just because a drug shows some toxicity in a few rats doesn't necessarily mean it will be toxic in humans. Furthermore, there are times when the advantages of a new drug are so great it should be approved in spite of potential side effects in a small percentage of persons.

Although these four probable recommendations will be made with specific reference to anticonvulsants, their greater importance lies in the pattern of scientific exchange they may set for further conferences which have been suggested covering a variety of drug classes including cardiorenal drugs, tranquilizers, and anti-inflammatory agents.

FDA, Dr. Wentz stresses, does not intend to prescribe minute details for drug studies. "We want to meet industry and university scientists as scientists, not as policemen."

Meanwhile, FDA-industry relations took on a more familiar coloration with the issuance by the Pharmaceutical Manufacturers Association of a 46-page legal brief attacking FDA's proposed regulations on advertising of prescription drugs. These are almost completely unworkable and of questionable legality, PMA said. Its members make some 90 percent of U.S. drugs. ♦

#### EPIDEMIOLOGY

### Sick Worms: Well Child

The barefoot child with cheek of tan can get hookworm in the moist sands of the Northwest and Southeast U.S.

Future techniques of deliberately giving the child hookworms—weakened almost to death's door by exposure to radiation—appear to point to the elimination of this disease and many similar parasitical ailments.

Dr. F. G. Tromba of the Beltsville (Md.) Parasitological Laboratory of the U.S. Department of Agriculture is optimistic about the future of several vaccines against such parasites. He has recently returned from a meeting of scientists from 12 countries and two international organizations in Vienna.

The International Atomic Energy Agency, and the Food and Agriculture Organization of the United Nations are

## The Noisy Sun

jointly interested in using nuclear techniques for study and control of parasitic diseases. Some vaccines produced by the use of radiation have already brought good results in animals.

In making a workable vaccine against parasites, scientists do not have a choice between killed and weakened live organisms as in polio. Killed organisms cannot be used because they do not stimulate production of antibodies.

What has been done is to weaken the parasites with a low X-ray dosage so that some of them can be used as a vaccine. They live long enough to make the vaccinated animal immune.

For several years the University of Glasgow (Scotland) has been in the forefront in perfecting a vaccine against lungworm disease. Dr. T. A. Miller of the Burroughs Wellcome & Co. Laboratory at the university, and Prof. W. Mulligan now have produced a successful vaccine against canine hookworm, soon to be on the market.

**Perfection** of a human hookworm immunization cannot be expected overnight, and some scientists are dubious about the element of risk in what is still an unpredictable technique, but laboratories in this country as well as abroad are at work on various methods.

Promising results in immunization against three other parasitic diseases besides hookworm were reported.

"The radiated vaccine definitely shows protection against the malarial parasites of rodents," Dr. Tromba says. "It is reasonable to believe that the methods used to produce vaccine against parasites in animals can eventually be adapted for human beings."

Immunization against trypanosomiasis (sleeping sickness in man and nagana in cattle) was reported in Vienna. The gapeworm, a serious pest in poultry, has also been conquered.

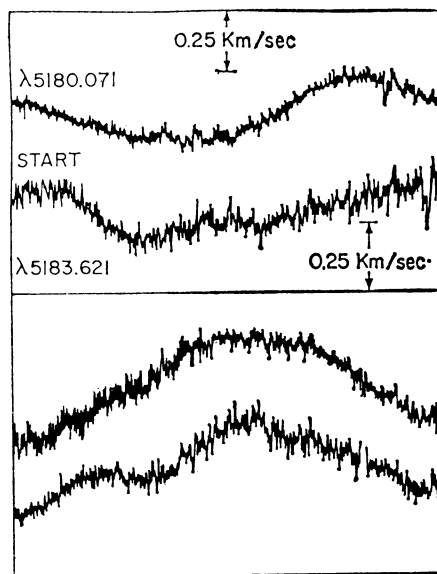
But hookworm is one of the most damaging parasitic diseases. Each female hookworm produces about 9,000 eggs a day that pass to the outside with excreta and hatch into worms. When a bare foot contacts the worms, they burrow through the skin and enter blood vessels.

The blood carries them to the lungs, where they burrow through the delicate tissue and migrate up the windpipe, down to the esophagus and through the stomach and intestines. Here they attach themselves to the intestinal wall and begin to suck blood.

**While a person seldom** dies of hookworm, the parasites weaken resistance to other diseases and cause a victim to become lethargic. Treatment with drugs is possible, but the best method until now has been prevention, through sanitary toilets, wearing shoes and public education. ♦

In addition to pouring out an entire spectrum of radiation ranging from radio waves to cosmic rays, the sun has now been found to emit deep rumbling sound waves. The discovery may explain a long-standing astronomical puzzle.

**Sound waves** from the sun were so unexpected that Dr. Robert F. Howard of Mt. Wilson and Palomar Observatories first thought they were caused by instrumental or seeing defects. However, more than 250 hours of observing time, combined with analytical help



On the large waves, jitters of sound.

from a computer and independent observation, has now convinced him that the sun radiates acoustical waves.

The waves are too low in frequency to be audible. They have been observed in bursts of about two minutes' duration in the hot gases of the solar photosphere, the sun's bright visible surface. Dr. Howard calls them SPO's, for short period oscillations.

The subsonic waves were detected with an instrument that records both the solar magnetic field and the vertical movements of solar gases. The motions appear as ripples, with periods of about two to three seconds, atop slower waves in the sun's atmosphere that are some 50 miles high, rising and falling at the rate of 1,000 miles an hour every five minutes.

Dr. Howard said that his observations show the ripples start at one point and spread in all directions, as sound waves should. The amplitudes of the waves are the same on all parts of the sun, whether detected toward the edge

or in the center, also expected of sound waves.

There is no known connection between the large waves having a period of five minutes and the subsonic motions of two or three seconds. The mechanism that triggers the sound waves is not known, and the discovery is so recent that even speculation concerning a cause is not available.

**Since the sun** has acoustical waves, other stars should also have them. If they do, the sound waves may explain an old quandary—the perplexing "line broadening" observed in the spectra of many stars.

Much information about stars is contained in their spectra, which consist of the stars' light sorted into wavelengths. Superimposed on this rainbow of colors are many dark lines, each of a different wavelength and each representing a specific chemical element.

**The dark lines** are arranged in patterns that reveal the star's chemical composition, as well as the motions and temperatures of its gases. The puzzle has been that these lines for many stars appear to be broader than they should be, and also tend to have fuzzy edges.

A small, constant vibration in a star's atmosphere, the kind Dr. Howard found in acoustical waves on the sun, could produce this effect, thus accounting for line broadening.

Dr. Howard reported to a meeting of astronomers in Budapest on The Structure and Development of Solar Active Regions, held Sept. 5 to 8, that Dr. William C. Livingston of Kitt Peak National Observatory in Tucson had independently observed the same oscillations at the same times he had. ♦

### ASTROPHYSICS

## Ion Signals Across Space

Slightly less than four years ago astronomers were elated by the discovery of another chemical besides hydrogen emitting radio waves in space (SN: 11/23/63)—the hydroxyl ion, part of the water molecule.

**The finding ended** a long search for hydroxyl, not yet seen optically, and scientists were excited because it opened possibilities of a wide variety of new investigations of interstellar space, including charting the distribution of both hydrogen and oxygen and relating this to galactic or stellar evolution.

However, such noble goals are still distant; observations in the intervening years have continually deepened the mystery of the origin of the OH radical and the mechanism by which it emits radio waves. Little, if any, astrophysical information has resulted,