

BIOCHEMISTRY

New attack on bacteria

Poly I:C (polyinosinic-polycytidylic acid) and other synthetic polymers including pyran and polyacrylic acid are known to be effective in fighting viruses in animals by stimulating production of the body's natural antiviral protein, interferon. Following the presumption that there may be a common mechanism by which the body attacks all intracellular disease organisms, two Stanford University researchers have tested the action of these synthetic agents against bacteria.

Drs. Jack S. Remington and Thomas C. Merigan report in the April 25 *NATURE* that mice can be protected from at least some strains of bacteria if they receive injections of Poly I:C, pyran or polyacrylic acid before exposure to the pathogens. It appears that this antibacterial action is quite unrelated to interferon stimulation. It may come about because of stimulation of the immune system, they suggest.

ANALYTICAL CHEMISTRY

Weighing the unweighable

Analytical chemists at the National Bureau of Standards have developed a technique for weighing previously unweighable amounts of chemical substances. The method relies on microscopic ion exchange beads, which absorb ions of elements. The beads are spherical and are permitted to absorb all they can contain of a particular element. Based on the diameter of a bead as measured under a microscope and the known partial density of the element (grams of the element per milliliter of bead), the mass of the element contained by the bead is determined. Scientists can get down to at least as low as a few trillionths of a gram with the method.

The beads could be used as microstandards to calibrate such delicate instruments as mass spectrometers, which are among the most sensitive of all analytical instruments.

CHEMICAL ENGINEERING

American titanium entry

Last year, Australian chemical engineers announced a process for enriching ilmenite, the low-grade titanium ore (SN: 6/14, p. 576). The Benilite Corporation of America in New York City has announced its own method, which, according to president S. T. Weng, is the most practical process both economically and technically.

The basic difference between the two processes is that the Australians use total reduction, in which pure hydrogen removes iron oxides from the ilmenite. The Benilite upgrading process is a partial reduction method using coal or coke instead of hydrogen. This makes for a less costly and technically much simpler operation. The United States process follows up with an acid-leaching step, with hydrochloric acid removing iron and other impurities. The acid can also be recovered for reuse in the leaching step.

Benilite has succeeded in tying the acid-leaching and acid-recovery steps together so there is no loss of acid and little waste or pollution.

A plant is now under construction at Corpus Christi, Tex. When completed, it will produce 100,000 tons of beneficiated (upgraded) ilmenite a year and will cost \$10.5 million.

POLYMERS

Degradable plastics

For years chemists have been concerned about the degradation of plastics by sunlight. A research team at the University of Toronto led by Dr. James E. Guillet is going the other way to help solve the growing solid waste problem. Capitalizing on the ability of ultraviolet light to break down plastics, they are making them less stable so they will disintegrate in the soil and be more susceptible to attack or biodegradation from microorganisms.

To accomplish this, the Toronto team attaches sensitizer groups to the polymer backbone. These groups, which can be introduced during the manufacturing process without affecting other properties, absorb the sun's ultraviolet energy and use it to break up the polymer chain. The new plastics would be limited to select packaging applications, where longevity is not a requirement or outdoor exposure is limited.

COATINGS

Wood protection

Scientists at the Central Institute of Fisheries Technology at Ernakulam, India, have improved an age-old treatment for protecting wooden boats. Originally, cashew nut shell oil smeared on Indian fishing boats, alone or in combination with tallow or powdered lime, protected the lumber from marine bacteria, fungi and also land termites.

But the wood was not protected in the water from marine wood borers, fouling organisms and ship worms. Experiments show that incorporating substances such as the pesticide dieldrin and copper salts is effective against the borers and worms, although fouling organisms still remain.

BIOCHEMISTRY

Insulin and gene regulation

When diabetic rats are given insulin, the levels of several liver enzymes rise. Since RNA is needed for the production of enzymes, Drs. Carl Morgan and James Bonner of the California Institute of Technology in Pasadena hypothesized that insulin in the diabetic liver somehow triggers the activity of genetic information that had previously been repressed. This effect, they suggested, leads to increased levels of RNA.

In the April *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES* they report experiments supporting their theory that insulin plays a role in genetic regulation. The protein-hormone apparently acts on those segments of the DNA molecule that code for RNA production, thereby initiating new RNA synthesis. That is followed subsequently by the manufacture of new enzymes, they find.