

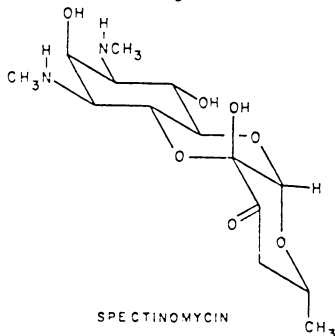
CHEMISTRY

Julie Ann Miller reports from the joint meeting of the American Chemical Society and the Chemical Society of Japan in Honolulu

Flexible scheme for antibiotic synthesis

Spectinomycin, an antibiotic important in gonorrhea treatment, has been synthesized in the research laboratories of the Upjohn Co. The drug, which is marketed as Trobicin, is naturally produced by *Streptomyces spectabilis*, a microorganism found in soil. Although spectinomycin was discovered 20 years ago, attempts at laboratory synthesis failed because of the complexity of the drug's structure and its instability in the presence of acids and bases.

The successful synthetic scheme developed by David R. White and Richard C. Thomas is short, uncomplicated and flexible. It allows the chemists to create novel variations on the drug, analogs that may be useful in treating a variety of diseases. Spectinomycin itself inhibits a wide spectrum of bacteria and does not cause kidney damage or hearing loss, side effects common to related antibiotics. Thomas described a totally synthetic spectinomycin analog (with a modified sugar component) that is active against a variety of test organisms.



disease. Perfluorochemicals can dissolve large amounts of oxygen, so the substitute carries more oxygen than do the normal concentration of red blood cells. The Japanese scientists found that the selected perfluorochemicals in a fine emulsion do not accumulate in the body and are not toxic. Furthermore, the preparation does not deteriorate during a year's storage.

Another synthetic body substance, a replacement for internal eye fluid, was described by Yasuo Matsuzawa of Nitten Co. of Nagoya, Japan. A hydrogel of polyvinyl alcohol injected into rabbit eyes can replace vitreous fluid and sustain the rabbit's vision. Vitreous fluid normally maintains eyeball shape and transmits nutrients to the lens and cornea. Matsuzawa and collaborators suggest that polyvinyl alcohol gels may be used to alleviate eye problems, such as clouding of the fluid and retinal detachment. In a more prosaic application, the gel works as a base for superior eye drops. The researchers say it releases drugs more slowly than a liquid does and causes no irritation.

Botanical clues to pest control

With the health, environmental and resistance problems now associated with synthetic pesticides, chemists are scrutinizing plants' chemical storehouses in the hope of finding alternate methods of pest control. A component of the Indian plant calamus, or sweet flag, for instance, sterilizes insects of several species. Stephen Hsia, John A. Adamovics and Charles F. Burant of the University of Wisconsin have developed a simple method to synthesize the active ingredient, beta-asarone, in the laboratory. Hsia says the synthesis is easier and less expensive than extracting the compound from calamus roots. He and colleagues have also synthesized modified compounds. Hsia expects the chemicals to be especially useful for protecting stored grain because beta-asarone is potent against the rice weevil and, being volatile, can permeate storage areas without leaving a residue.

A Panamanian hardwood, cocobolo, which is resistant to fungi attack, is the source of other chemicals being studied by Leonard Jurd and G. D. Manners of the U.S. Department of Agriculture in Berkeley. The natural compounds are not strongly active against insects, but the researchers report that, by structurally changing the molecules, they have discovered a variety of new compounds that sterilize flies, inhibit development of the common malaria mosquito, repel flour beetles and are toxic to insect pests of several crops. These compounds have low toxicity to mice and do not cause mutations in bacterial tests.

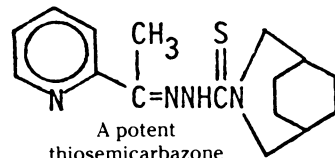
No drinks for the heart?

Recent research has suggested that a drink a day may keep a heart attack away. A National Institutes of Health study found that the blood of men with moderate alcohol intakes had increased levels of high-density lipoprotein cholesterol, a fat believed to protect against heart disease (SN: 8/13/77, p. 102). Now Herbert K. Naito and colleagues at the Cleveland Clinic report contrary results. A study of 800 male executives in for their annual check-ups found no difference in high-density lipoprotein cholesterol levels in those who abstained and those who drank low to moderate amounts of alcohol. The levels were higher only in the men who took, on the average, more than four drinks a day. Naito made it clear that he does not consider heavy drinking a reasonable means of avoiding heart disease; he would go instead with good diet and jogging. Naito's results seem also to contradict a recent Honolulu study which reported a lower incidence of coronary heart disease among modest drinkers. That study, which examined only men aged 58 to 77 who had at the outset no signs of heart disease, may have selected people particularly resistant to alcohol or to heart disease.

Chemical family: versatile new drugs

The search for a new antimalarial agent has turned up a class of chemicals that, in the first round of experiments, appear to be effective ammunition against a surprising range of diseases. Daniel L. Klayman and colleagues at the Walter Reed Army Institute in Washington showed that many chemicals of the group called 2-acetylpyridine thiosemicarbazones counter malaria in mice. With a variety of modifications of the chemical originally tested, the scientists have increased antimalarial activity ten-fold. The compound is still not as effective as the best drugs now available, but the researchers hope that further modifications will further improve its activity. The chemical probably operates by a different mechanism than existing antimalarial drugs.

Gonorrhea, leprosy, herpes simplex infection, bacterial surgical infections and a therapeutically resistant atypical tuberculosis also appear sensitive to chemicals of this family. Researchers at Walter Reed and elsewhere have preliminary evidence of thiosemicarbazones' activity against the disease-causing organisms. With new analogs they hope to raise medicinal, and decrease toxic, effects. The scientists predict a low cost for any medicines that eventually are developed from these chemicals; the materials are cheap and the manufacture simple.



Synthetic vital body fluids

Monkeys can survive temporarily with a mere 2 percent of their natural blood when blood substitute Fluosol-DA is used. The mixture of starch, yolk product and two perfluorochemicals is far more successful than commercial blood expanders, according to Kazumasa Yokoyama and R. Naito of the Green Cross Corp. in Osaka, Japan. Rats survived the replacement of 90 percent of their blood with the new substitute; within 2 weeks the blood components had returned to normal levels.

The advantage of blood substitutes over transfusion with real blood is that substitutes can be given without regard to the recipient's blood type, and there is no danger of transmitting