medical sciences

BIOLOGICAL EVOLUTION

Biosynthesis with ancient conditions

Two Texas A&M University biochemist—Drs. Joseph Nagyvary and Claude Tapiero—have completed what they believe is a major step in understanding prebiological evolution leading to formation of life.

As everyone today knows, there is no life without DNA and RNA. They are the genetic keys. Both are nucleic acids, which consist of a deoxyribose or ribose sugar; a so-called heterocyclic base; and a phosphate. While an abundance of carbohydrates and phosphates on the primitive earth can be taken for granted, the formation of heterocyclic bases is less self-evident. With this in mind, scientists have tried for some time to produce a natural nucleotide (a small building block of a nucleic acid) in the lab, using simulated prebiological, or primitive earth conditions. They probably failed. Dr. Nagyvary says, because they used ribose carbohydrate. He and Dr. Tapiero succeeded by using another kind of carbohydrate, arabinose.

In 1970 Drs. Leslie Orgel and Robert Sanchez of the Salk Institute combined arabinose with a heterocyclic base to form an unnatural arabinose nucleoside. (A nucleoside is a precursor to a nucleotide.) Drs. Nagyvary and Tapiero then took this unnatural arabinose nucleoside and converted it into a natural ribose nucleotide. All this was performed using conditions of water vapor, gases, acidity and temperature that geological findings suggest existed on earth at least 3 billion years ago. Thus the A&M researchers can claim to have created the first accepted prebiological synthesis of a natural ribose nucleotide, as found in the living cell today. Their report is in the May 7 NATURE.

HODGKIN'S DISEASE

It may be infectious

Hodgkin's disease, a progressive and often fatal illness that resembles leukemia, may be an infectious disease with an extended incubation period. Evidence for the theory is published in the June 12 LANCET.

The authors, three Albany physicians, base their premises on a retrospective study of members of the 1954 graduating class of Albany High School, because that class was observed to have an especially high frequency of Hodgkin's disease. Although investigations of the class of 317 persons is continuing, so far 12 cases of the disease have been noted. Of the 12 persons, seven are dead.

This constellation of Hodgkin's disease in individuals not related is extraordinary, the authors say, and indicates "an extended epidemic situation of a type that seems not to have been previously noted" in Hodgkin's disease.

SNAKEBITE

A look at cryotherapy

The bite of a poisonous snake can be fatal, so it's not surprising that cryotherapy—binding the limb between bite and body and cooling the tissues around the bite to prevent venom enzyme action—should achieve popularity in the medical community.

Dr. Hugh A. Frank of La Mesa, Calif., however, wonders whether poor results with cryotherapy might not be due to the treatment rather than to the snakebite. For the past decade Dr. Frank has been saddled with repairing and reconstructing limbs that have fared poorly under snakebite cryotherapy.

"One patient referred to me after cryotherapy for snakebite," Dr. Frank writes in the May CALIFORNIA MEDICINE, "had had his forearm and hand immersed in ice water for 10 days. Yet the loss of his fingers and the function of his forearm was attributed by his physician to the snakebite." Dr. Frank believes otherwise. He points out that prolonged exposure to water colder than 15 degrees C. can cause lasting nerve and muscle damage.

Dr. Frank questions whether there is any real evidence that cold immersion ameliorates the lethal or local effects of snake venom. Since the quantity of venom injected, its toxicity and its exact locus in humans are never known, cryotherapy results can be evaluated only in animal experiments. Experiments run so far show that cryotherapy's only real value lies in delaying damage when definitive therapy cannot be secured for more than four and less than eight hours after the bite. Cryotherapy for snakebite, Dr. Frank concludes, should be used rarely, if at all, and physicians should rely instead on antitetanus, antibiotic and antivenom therapy.

HIGH ALTITUDE

Oxygen adaptation

There is little doubt that man can acclimatize to the oxygen improverished atmosphere of high altitude, Drs. Claude Lenfant of the National Heart and Lung Institute and Kent Sullivan of the University of Washington, report in the June 10 NEW ENGLAND JOURNAL of MEDICINE.

From their studies of adaptation at high altitudes they have found no evidence that day-by-day life is in any way altered by altitude. Even at high altitude the activity of natives and long-term visitors is astonishing. Oxygen consumption at rest is normal and for a given work rate remains constant and independent of altitude. However, the effects of environmental hypoxia (lack of oxygen) becomes fully evident during vigorous exercise.

DRUGS FROM THE SEA

One ready for clinical use

Although the oceanic drug chest has barely been pried open, and most of the chemicals dregged up are still under laboratory scrutiny, poison from the sea cucumber may soon be used to treat cerebral palsy and other spastic conditions caused by stroke damage and brain and spinal cord injuries.

Dr. Wilton Bunch of the University of Virginia School of Medicine has shown in tests on cats and frogs that the toxin destroys certain fibers that relay faulty regulative information. Other toxic substances can do the same thing, says Dr. Bunch, but they are nonspecific and they damage the entire motor system in the process.

Dr. Bunch is now trying to see if the sea cucumber toxin is harmful to the body in any way. Following these results and approval by the U.S. Food and Drug Administration, the substance will be tested on humans.