

BIOCHEMISTRY

Trace Hormone Creation

How living things manufacture steroids is now fully understood for the first time, suggesting possibility of finding a blocking agent to interfere with cholesterol formation.

► THE CHEMICAL STEPS by which nature manufactures the steroids, one of the most important compounds in man, animals and plants, have been charted for the first time by a group of University of California scientists.

This is the third major class of compounds whose pathway of synthesis in living systems is now fully understood. The other two are the pathways for fats and carbohydrates.

The new work may expand man's knowledge of the human body and other biological systems as much as the earlier charting of the fat and carbohydrate biosynthetic pathways.

Already the research has touched off speculation that chemical blocking agents might be used to prevent the formation in the body of excess cholesterol, a widely distributed steroid associated with hardening of the arteries in man.

With the complete chemical cycle now known, it may be possible to find a blocking chemical that would interfere with a specific step in cholesterol formation such as sulfonamides interfere with infection.

In addition to cholesterol, other steroids in man include such chemicals as cortisone, sex hormones, and vitamin D. Digitalis, used to treat heart conditions, is an example of a steroid in plants.

The study shows that all the steroids, whether in plants or animals, evolve chemically in the same way, each steroid achieving its distinction by a slight last-minute differentiation in arrangement of outer atoms in a large parent molecule.

The cycle was clarified in six years of work by Dr. William G. Dauben, associate professor of chemistry, with the collaboration of John H. Richards, Thomas W. Hutton and Yoshio Ban.

Scientists have attempted to chart the steroid chemical pathway for 20 years, but the schemes suggested all failed.

In 1950, scientists in England and Switzerland noted a link between the steroids and a group of chemicals called triterpenes. This provided the clue that made it possible for Dr. Dauben to work out the complete pathway.

The scientists showed that steroid construction begins with acetate, a simple chemical unit widely distributed in plants and animals. In man, acetate is a common by-product of the body's burning of fatty acids contained in the diet.

The acetate is converted, in a series of steps, into isoprene-like compounds, a class of chemicals that form the basic units of rubber.

The isoprene is turned into squalene,

found first in shark liver 30 years ago and now known to be universally present in biological systems. Squalene is converted into a triterpene, which is turned into steroids.

Cholesterol has the same structure as a triterpene molecule except that it has lost three carbon atoms.

The chemical steps are achieved by chemical synthesis performed by specialized enzyme systems in plants and animals. Minor differences in the placement of carbon atoms on the edges of the large parent triterpene molecules make the difference between cholesterol, hormones and other steroids.

Dr. Dauben and his colleagues did their experiments by "feeding" acetate containing radioactive carbon 14 to living liver slices in test tubes, to yeast and to eucalyptus wood-rotting fungi.

The carbon 14 was traced from step to step, and in this way a picture of the biosynthetic cycle was built up.

Science News Letter, December 8, 1956

● RADIO

Saturday, Dec. 15, 1956, 1:45-2:00 p.m., EST
"Adventures in Science" with Watson Davis, director of Science Service, over the CBS Radio Network. Check your local CBS station.

Dr. Morton Love, professor of agronomy, University of California College of Agriculture, Davis, Calif., will discuss "Grasses."

ASTRONOMY

Asteroid Comes "Close" to Mars

► A MINOR PLANET will come within about nine million miles of Mars next September, a Russian astronomer reported to the Cincinnati Observatory.

A close approach of an asteroid to a planet is a very rare event, and this is quite a "close" brush, astronomically speaking. Measurements made at that time can be used for determining the mass of Mars, now thought to be about a tenth that of earth's, since coming so close to a relatively large planet will affect the asteroid's motion.

The minor planet is Laodamia, and observations of it are urgently needed now and for the next ten years, during which it will make three quite close approaches, Dr. E. Rabe of the Cincinnati Observatory said.

The Russian who noted the event is Dr. V. A. Isvekov of the Institute of Theoretical Astronomy, Leningrad.

Science News Letter, December 8, 1956



GEOPHYSICAL GLOBE—Showing the world's terrain in three-dimensional relief, this globe, six feet in diameter, was on display at the National Academy of Sciences in Washington. Smaller and much less expensive are the 12-inch globes made of rigid plastic that can be separated at the equator for children to paint or draw on in the classroom. Douglas, Billy and Joan Harmon of Washington, D. C., are shown here with the globes and Kenneth Fagg, co-designer with Sam Berman, Geo-Physical Maps Inc., New York.