BIOCHEMISTRY

# Chemistry of Skin Cancer

➤ SKIN CANCER may be tied to a decline in body protein, according to a report to the American Chemical Society in New York.

A decrease in collagen, a protein normally found in abundance in the skin, accompanies the development of skin tumors in animals, Dr. I. Gordon Fels of the Veterans Administration Hospital, Hines, Ill., said.

The decrease in collagen was indicated chemically by the gradual disappearance of an essential chemical-building block for the protein, called hydroxyproline, he explained. This change makes it possible to trace "chemically what happens as a tumor makes its appearance and displaces the normal tissue."

In developing this technique, Dr. Fels and his co-workers painted susceptible mice with a tumor-producing agent in solvent benzene. "Control" animals were painted only with the benzene for the same period.

Tissue injury was present in both groups of animals. Hydroxyproline levels dropped in both cases, but in the control animals they returned to normal after the painting was stopped. The telltale chemical made an "abortive rise" in the tumor-affected animals and then continued to decline until the skin was devoid of collagen.

"The decrease in hydroxyproline content in the 'tumor' animals is believed to be caused by the destruction of the cellular agent responsible for the synthesis of collagen, namely the fibroblast," Dr. Fels said.

In the case of the control animals which did not receive the tumor-producing agent, the process was reversible. In the case of the tumor animals, it was not.

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# Blood Links Men and Apes

➤ A COMMON ANCESTOR of man and apes is suggested by the similarity of their chemical "fingerprints," their hemoglobin (red blood pigment) patterns, Dr. Emile Zuckerkandl, a chemist from the California Institute of Technology, told the American Chemical Society in New York.

He reported the results of hemoglobin analysis done with Nobel winner Dr. Linus Pauling and Dr. R. T. Jones in studies of genetics and evolution. The hemoglobin patterns of man and 11 adult animals of different kinds were analyzed, including the gorilla, chimpanzee, orangutan, cow, pig, sheepshead fish, shark, lungfish, hagfish, and a marine worm. These represent a very wide spread on the evolutionary scale, he noted.

"The fingerprint technique shows that man's hemoglobin is almost indistinguishable from that of the gorilla and chimpanzee," Dr. Zuckerkandl said.

"The evidence suggests that the hemoglobin of man and the higher apes has changed very slightly since their common ancestor was alive 10,000,000 to 35,000,000 years ago."

A hemoglobin molecule consists of some 600 amino acid building blocks attached to one another in a definite sequence, "like beads in a chain," Dr. Zuckerkandl said. There are 21 different kinds of amino acids. In most animals, each molecule contains four separate chains.

"The more related two kinds of animals are on the evolutionary scale, the more alike are the sequences of the amino acids in the various chains of their hemoglobin molecules," he explained. In other words, the hemoglobin pattern reflects to some extent the evolution of the entire animal.

Spot patterns of hemoglobins on filter paper used for the study were first developed by Dr. Vernon Ingram of Massachusetts Institute of Technology and called "fingerprints" because identical hemoglobins invariably form the same pattern, the California chemist stated. They are visible with an electronic microscope only in clusters. A single molecule of hemoglobin cannot be seen even with an electron microscope.

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CHEMISTRY

# Plastic Coats Fertilizers

➤ THE LATEST in garden wear—for fertilizers—are plastic coatings, Dr. Kirk Lawton, professor in soils at Michigan State University, reported to the American Chemical Society meeting in New York.

The purpose of the coating is not to minimize odor. The dressed-up fertilizers can create "lush lawns and gorgeous gardens" better than conventional uncoated fertilizers because the coating slows down the rate at which their various constituents are released to the soil, he explained.

The plastic coatings on fertilizer make it possible to meter out the nutrients more nearly as plants require them, Dr. Lawton said.

Laboratory and greenhouse experiments carried out by Dr. Lawton showed that a coated fertilizer lost only 5.4% of its potassium (an important fertilizer mineral) while the same amount of uncoated fertilizer lost 81.3% in the same period of time.

Most fertilizer used on farms and gardens and lawns in the United States is applied before or at the time a crop is planted or starts growing. The components of soluble fertilizers, therefore, are largely free to react with soil minerals. At this time, the nutrient requirements of seedlings or transplants are small.

Plastics used for coatings in the experiment included vinyl acetate, paraffin, acrylic resin and polyethylene, all of which were effective in reducing the rate at which soluble fertilizers normally dissolve in soils.

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## Adapts Russian Resin

➤ IT TOOK AN AMERICAN to find a commercial use for a Russian-discovered resin that has been sitting unused on the laboratory shelf every since 1903, the American Chemical Society was told at its New York meeting.

The resin, formolite, was discovered by the Russian chemist A. M. Nastyukov. It is made from formaldehyde and an "aromatic" organic compound, Dr. J. E. Goodrich, research chemist with the California Research Corporation, Richmond, Calif., reported. It is Dr. Goodrich who found the use for the Russian resin.

By adding a dispersing agent to the resin, Dr. Goodrich has produced resins with very small particle size and large surface area. They have many potential uses as thickeners in lubricating grease, lacquers, paints, varnishes, inks, putty and adhesives.

The advantage of the American-adapted Russian resin in lubricating greases, said Dr. Goodrich, is that the high-temperature performance of the grease is not limited by the high melting point of the thickener.

Melting points of these resin-thickened greases are in excess of 500 degrees Fahrenheit, he said.

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## Rubber Puts Out Fire

➤ RUBBER that can take extremes of heat and cold was reported to the American Chemical Society meeting in New York.

A new nitroso rubber is not only flameproof. It extinguishes flame. It also remains flexible and usable at 40 degrees below zero Fahrenheit, is resistant to solvents and a wide variety of strong chemicals and stands up against sunlight and ozone, Dr. J. C. Montermoso of the U. S. Quartermaster Research and Engineering Command, Natick, Mass., said.

Used to coat fire-fighting uniforms, the new material will provide greater protection for firemen. It will also give some protection against nuclear blasts which generate short-impulse, high intensity heat, Dr. Montermoso said. The molecular "backbone" of nitroso rubber is made of carbon, oxygen and nitrogen.

Direct contact with a flame causes the rubber to give off a gas that tends to extinguish the flame, Dr. Montermoso said.

*(See other Chemistry story on p. 222)*

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