

DMSO

Red blood cell breakage

Because of its ability to cross biological membranes, carrying with it otherwise insoluble drugs that cannot penetrate tissue by themselves, DMSO (dimethyl sulfide), a chemical solvent, has been the focus of research attention in recent years. Though it is still banned from general use, the Food and Drug Administration has eased restrictions on experimental trials (SN: 10/5/68, p. 341) and it is being tested for certain skin diseases. It is also being studied as an agent that can be used to preserve various body tissues and organs, including red blood cells.

Investigators testing it as a blood preservative, however, find that DMSO hemolyzes or breaks red cells. In May's *JOURNAL OF PHARMACEUTICAL SCIENCES*, Drs. William P. Norred, Howard C. Ansel, Ivan L. Roth and James J. Peifer of the University of Georgia in Athens report the mechanism of this red cell damage.

From electron microscope studies they found that the number of lesions in cell membranes increased in proportion to the dosage of DMSO to which they were exposed. Chemical tests revealed that the solvent interacts with and removes lipids in the cell membrane, disrupting the normal structure of the lipid-protein complex of the membrane, and leading to cell breakage.

Thus far, the investigations have been limited to quantitation of total lipid removal by DMSO. In additional experiments, the scientists will attempt to identify the specific lipids for which DMSO has an affinity.

FDA

Another sweetener condemned

The Food and Drug Administration has given manufacturers 180 days to prove that glycine, an artificial sweetener used in combination with saccharin, is safe. Barring convincing evidence of its safety, it will be banned from the market.

The FDA is basing its action on experiments with rats indicating that glycine in high doses suppresses growth, leads to loss of body weight and an increase in the weight of the liver. In some instances, it was also associated with paralysis of the cervix.

Since the agency banned cyclamates (SN: 10/25, p. 369), there has been increasing use of glycine as a food additive. The substance, a naturally occurring amino acid that cuts the bitter taste of saccharin, was previously on the GRAS (generally regarded as safe) list.

BIOCHEMISTRY

Enzyme defect in arteriosclerosis

In research into the fundamental mechanism of arteriosclerosis, scientists are focusing renewed attention on the blood vessel wall (SN: 4/25, p. 415). Two investigators from the University of Rhode Island in Kingston report in the May 22 *SCIENCE* an association between increased levels of an enzyme, proline hydroxylase, and plaque formation. The enzyme is considered to be a controlling factor in the synthesis of collagen, one of the primary components of vessel walls,

with smooth muscle tissue and elastin, a protein.

Drs. George Fuller and Ronald Langner induced arteriosclerosis in rabbits, subsequently measuring proline hydroxylase levels. Animals studied at four days showed a moderate plaque build-up and a corresponding rise of enzyme. After 14 days when severe plaque build-up was evident, proline hydroxylase activity rose five- to sixfold.

This suggests that plaque build-up is associated with an increase of collagen synthesis at points on the blood vessel wall. Studies by other researchers have previously indicated that atherosclerotic plaques are active sites of collagen synthesis. Though the scientists do not suggest that a rise in proline hydroxylase is the initiating factor in arteriosclerosis, they do contend that it may be an essential secondary response that might be inhibited.

MARIJUANA

Active metabolite synthesized

While two specific chemical components of the marijuana plant are considered to be the active ingredients that produce the drug's effects, some scientists have proposed that activity comes not directly from delta-8 THC (tetrahydrocannabinol) or delta-9 THC, but from a metabolite or breakdown product of these agents (SN: 1/24, p. 103).

In the May 15 *SCIENCE* scientists from the Battelle Memorial Institute in Columbus, Ohio, report evidence substantiating this hypothesis. From the livers of rats injected with delta-8 THC, they have isolated and synthesized a metabolite, identified as 11-hydroxy-trans-delta-8 THC. When this compound is then injected into experimental animals, it produces the same behavioral changes as do delta-8 and delta-9 THC, suggesting that the body converts these latter compounds to another product that is actually the principal active agent.

The studies were conducted by Drs. R. L. Foltz, A. F. Fentiman Jr., E. G. Leighty, J. L. Walter, H. R. Drewes, W. E. Schwartz, T. F. Page Jr. and E. B. Truitt.

PHYSIOLOGY

Breathing before birth

Scientists, with little definitive evidence one way or the other, have long argued about whether an infant carries out breathing movements in the uterus.

Dr. G. C. Liggins of the University of Auckland and Dr. Geoffrey Dawes of Oxford University report findings from experiments with unborn lambs that indicate there is considerable respiratory activity before birth. "It would be most surprising," says Dr. Liggins, "if the human fetus does not behave the same way."

The investigators attached recording instruments to unborn lambs during the early stages of gestation and measured the movements of their respiratory muscles. Fetal lambs, they find, spend about 80 percent of their time making rhythmic movements of respiratory muscles at a rate of up to four movements per second. Dr. Liggins acknowledges that fetuses, submerged in uterine fluid, do not breathe in the accepted sense. He likens the fetal activity to a person conducting breathing movements under water.