life sciences

GENETICS

Spotting Y chromosomes

Scientists, for a variety of reasons, are interested in looking at X and Y chromosomes. Some are studying the XYY or super male syndrome in which the additional male Y chromosome has been linked to criminality (SN: 7/5/69, p. 2). Others envision the possibility of controlling the sex of children by determining which sperm cells carry the female X chromosome and which the Y. Still others are concerned with the Y chromosome itself and its role in determining maleness.

Until recently, the only way to identify Y chromosomes has been to conduct a complete karyotypic or chromosome analysis, a lengthy procedure in which an individual's white blood cells are cultured and examined. X chromosomes, however, can be easily identified by a staining technique called the Barr body test.

Now there is a simple and complementary test for spotting Y chromosomes. Dr. Digamber Borgaonkar, who has been using it in his laboratory at the Johns Hopkins University, discussed it at a seminar on medical genetics at the Jackson Laboratories in Bar Harbor, Me.

Work pioneered in Sweden by Drs. T. Caspersson and Laura Zech, he says, showed that Y chromosomes and a common antimalarial compound, quinacrine mustard, have a mutual affinity. Quinacrine mustard appears to stain Y chromosomes selectively, causing them to fluoresce. In a test that takes only a matter of minutes, cells can be gathered from buccal or mouth smears, mounted and examined for fluorescence under a microscope with a mercury arc lamp. Human Y chromosomes fluoresce brightly, he recounts, and fluorescence persists for several days, allowing continued study.

ARTERIOSCLEROSIS

Enzyme implicated

High levels of an enzyme that plays a role in the formation of collagen in arteries may be a key factor in the development of arteriosclerosis. According to Drs. George C. Fuller and Ronald O. Langer of the University of Rhode Island, excess levels of proline hydroxylase can be correlated with plaque deposits in the arteries of experimental rabbits.

In a series of experiments, the researchers deliberately injured rabbits' arteries by injecting them simultaneously with epinephrine and thyroxine, causing considerable damage to the lining of the aorta. Within 14 days, large plaque deposits were detectable, along with a sixfold to eightfold increase of proline hydroxylase. The enzyme inhibits formation of new collagen fibrils and thereby blocks normal healing of the injured arterial wall, which is composed largely of these fibrils. As the repair process is disrupted, the arteries become laden with plaque deposits.

PROTEINS

New route to sequences

Sequencing a protein—taking it apart amino acid by amino acid to determine its primary structure—is one of the most tedious and time-consuming of biochemical tasks. Yet as scientists probe deeper into the relationship between the structure and function of biochemicals, it is increasingly important that the job be done. To date, the full structure is known for only a handful of proteins.

Investigators at the National Aeronautics and Space Administration's Ames Research Center in Moffett Field, Calif., propose using an enzyme to speed the sequencing process, which at present is only partially automated. The enzyme being used by Drs. J. Ken McDonald, Paul Callahan and their colleagues is DAP I (dipeptidyl aminopeptidase I), a member of a family of enzymes whose function is to break long protein chains into short polypeptide units. It attacks proteins, sequentially splitting off polypeptides that can then be analyzed. Dr. McDonald and his co-workers employ column and paper chromatographic techniques in conjunction with the enzyme for refined sequence analyses.

TERATOGENICITY

LSD safe for rats and mice

The question of whether LSD deforms unborn children remains open. There have been reports of deformed infants born to women who had taken the hallucinogen and preliminary data indicating it is teratogenic to laboratory animals.

Three French scientists, investigating the effects of LSD on a total of 1,713 animal fetuses, report no evidence that the drug produced deformities, induced abortions or suppressed normal growth. Drs. C. Roux, R. Dupuis and M. Aubry of the embryology laboratory of St. Antoine in Paris administered LSD to pregnant rats, mice and hamsters during critical stages of gestation and subsequently examined 1,003 rat fetuses, 521 mouse fetuses and 189 newborn hamsters. In the Aug. 7 SCIENCE they report no correlation between even massive doses of LSD and birth defects. However, they caution, "It is impossible to conclude from these experimental data that LSD may not be teratogenic in man."

MSG

Additive exonerated

Monosodium glutamate (MSG), the flavor-enhancing food addictive that causes Chinese Restaurant Syndrome in some individuals (SN: 3/8/69, p. 239) came under more fire late last year when a St. Louis investigator reported that it damaged newborn mice and called for its removal from all baby foods (SN: 10/4, p. 295).

This prompted the Food and Drug Administration to ask the National Academy of Sciences-National Research Council to study the matter. On the basis of its review, they have advised FDA that the additive is not a serious hazard but is generally safe for use in food for adults. The report added, however, that adding it to baby foods is unwarranted. Most baby food manufacturers in the United States have already discontinued using MSG, largely on grounds that it confers no advantage.

Further vindication of MSG is reported in the Aug. 14 SCIENCE. Drs. N. J. Adamo and A. Ratner of the University of New Mexico School of Medicine in Albuquerque injected MSG in infant rats and followed them through adulthood, finding no evidence of damage to either the reproductive or nervous systems.