

PHYSIOLOGY

Placenta Blood Pressure Indicates Pregnancy Time

► **STUDY OF** the blood pressure in a pregnant monkey's placenta may soon be providing researchers with important information on human pregnancies.

So far, measurements of placental blood pressure appear to be good indicators of the "immediate course" of the pregnancy, Dr. Elizabeth M. Ramsey of Carnegie Institution of Washington reported.

During a contraction at the beginning and end of pregnancy, the blood pressure in the placenta and the amniotic cavity (where the fetus lies) is almost double that observed during mid-pregnancy, she told the American Association of Anatomists meeting in Seattle, Wash. This is another indication of the greater muscular activity of the uterus during early and late pregnancy, Dr. Ramsey explained.

Experiments with blood pressure recorders showed pressure differences between the mother animal's arterial circulation and placental circulation. This is believed to be further proof that pressure differences are responsible for keeping blood circulating through the placenta, Dr. Ramsey said.

Observations in human pregnancies indicate that conditions are closely comparable to those in the rhesus monkey so that the monkey can be used as a "yardstick" for the human. Studies with the monkey may help scientists understand normal prenatal development of the human infant as well as the abnormalities leading to miscarriages, stillbirths and malformations.

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ELECTRONICS

Electronic Reliability Is Key to Space Success

► **CHANCES** of getting future space travelers back to earth alive depend on the ability to solve the problem of producing reliable electronic equipment.

The United States has the technical competence required to develop and produce all the hardware necessary for interplanetary flight, but success in space will depend on the ability to make that equipment work when it is supposed to work and under the conditions for which it was designed to work.

These opinions were expressed at the Society of Automotive Engineers National Aeronautic meeting in New York by J. M. Wuerth, chief reliability adviser of Autonetics, a division of North American Aviation, Inc.

Successful space flight will require a degree of reliability impossible to obtain without first providing production consistency, he said. Reliability is the "key to the space age and consistency is the production man's key to reliability."

The technology of reliability is based on the mathematics of probability, he said, and the concept of Mean-Time-Between-Failures assumes the occurrence of failures in a purely random manner.

But despite the practical value of these concepts, it must not be assumed that failures occur without cause. Stringent reliability requirements compel us to find reasons for unreliability and correct them rather than take the easy way out by calling them random failures.

When practicable, said Mr. Wuerth, production processes will have to be mechanized. Where this is not practicable, workmen will have to be motivated to provide the utmost in careful workmanship.

Mr. Wuerth advocated a strengthening of inspection, control and screening processes, and further refinement in measurement standards.

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PHYSICS

Atomic Power Converted Directly to Electricity

► **DIRECT CONVERSION** of atomic to electric power has been achieved at Los Alamos, N. M., using a thermocouple composed of uranium and a gas, cesium.

The process also has direct application to space travel and power for satellites, Dr. Robert W. Pidd, University of Michigan physics professor, said. He reported that the method eliminates virtually all but the nuclear reactor in the production of electric power from fission.

The simple device was tested for the first time on April 3. Its development stems from the discovery last July that a very hot gas could be substituted for one of the metals in a thermocouple to improve greatly its current-generating efficiency.

Dr. Pidd reported the process would:

1. Cut by perhaps one-half the present cost of building power reactors.
2. Pave the way for interplanetary space travel because of the possible reduction in dead weight load of fuel now needed to propel a rocket into space.
3. Allow equipping satellites with a small but powerful and long-lasting electricity source for telemetering data.

The electric power is obtained from a nuclear reactor containing a uranium carbide source surrounded by a plasma of hot, ionized cesium gas. When the reactor is turned on, atomic fission causes the uranium to undergo such an energy release that a current is produced. The current is transmitted by the cesium gas to a collector from which the electricity can be extracted.

A piece of uranium about one-third the size of a cigarette has been used in this manner to light a bulb for 12 hours, although originally it had been expected to stay lit for only a few minutes.

Group leaders for the project, sponsored by the Atomic Energy Commission at Los Alamos Scientific Laboratory, was Dr. George M. Grover of the University of Michigan. Drs. Ernest W. Salmi, also of the University of Michigan, and John R. Reitz, physics professor at Case Institute of Technology, Cleveland, also worked on the project.

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IN SCIENCE

BIOCHEMISTRY

Tobacco Smoke May Alter Body Protein, Life Span

► **HEAVY SMOKERS** may have a shortened life span because of the protein-changing ability of tobacco smoke.

Acetaldehyde, used in perfumes, is also present in tobacco smoke and apparently reduces longevity by stiffening connective tissues, Dr. F. Marott Sinex and Barbara Faris, Boston University School of Medicine, said at the American Chemical Society meeting in Boston, Mass.

Acetaldehyde is so reactive that the moment a puff of smoke enters the lungs, the chemical seeks to combine with proteins.

Dr. Sinex exposed kangaroo tail tendons to water and passed them through puffs of cigarette smoke. It took the tendons 20 times longer to shrink when in the presence of the smoke. This could be analogous to the stiffening of tissues found in aging bones, skin, blood vessels, and especially lungs, Dr. Sinex explained.

Kangaroo tendons were chosen because they have the purest bulk source of the important body proteins collagen and elastin. Elastin is the chief protein component of lungs and blood vessels. Protein is chemically the same anywhere in the living body and presumably reacts the same regardless of location, Dr. Sinex said.

He also suggested a process which might counteract the adverse effects of tobacco smoke.

The amino acid cysteine is capable of reversing the stiffening action of cigarette smoke, and might protect smokers from injurious effects of compounds such as acetaldehyde. But the amount necessary at the moment to give protection would induce serious physiological consequences, Dr. Sinex cautioned.

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BIOCHEMISTRY

Find Crystal Structure Of Part of Gene Carrier

► **THE CRYSTAL** structure of one part of the material believed to store and transport genetic information from generation to generation has been found.

Three scientists report that they have determined the crystal structure of calcium thymidylate, the calcium salt of thymidylic acid that makes up a part of gene-carrying deoxyribonucleic acid. The studies were aimed at explaining the link between the biological role of deoxyribonucleic acid and its molecular structure.

Drs. P. Horn and V. Luzzati of the Macromolecule Research Center, Strasbourg, and Dr. N. K. Trueblood of the University of California, Los Angeles, report their studies in *Nature* (March 28).

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E FIELDS

MEDICINE

New Milk Protein May Solve Gelling Problem

► A NEW PROTEIN in milk discovered by U. S. Department of Agriculture researchers may help solve the problem of "gelling."

After storage, some concentrated milks that have been heat-sterilized form a jelly-like mass. USDA researchers have found that while calcium can cause gelling of concentrated milk, the addition of the new protein keeps the milk fluid.

Basic research on milk proteins has shown that casein, which makes up 80% of the protein, is a mixture of at least three proteins with different properties. Now researchers have found at least five proteins go into alpha-casein. The newest of these five, alpha-z-casein, is the one that may be important in stabilizing milk's calcium-casein complex.

Alpha-z-casein has only 0.1% phosphorus instead of the 0.85% found in most of this protein.

Studies at the USDA's eastern utilization division, Philadelphia, Pa., have contributed greatly to knowledge of milk's chemistry.

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GENERAL SCIENCE

FTC Rules Against Water Softener Claims

► THE FEDERAL Trade Commission has ruled against the claims made by a manufacturer for its water conditioning device.

FTC has ordered Evis Manufacturing Co., San Francisco, to stop falsely claiming that its water conditioning device will "solve hard water problems, make hard water soft, remove unpleasant odors or flavors from water, save soap and reduce cost of heating water and cause dishes or glassware to dry without leaving water stains," among other claims.

In a 12-page opinion released on a complaint filed Feb. 5, 1954, the Commission ruled that evidence given by scientists in support of the charges clearly outweighs testimony given by users who testified for the company.

The opinion, written by Commissioner Sigurd Anderson, reversed the hearing examiner's initial decision which recommended dismissal of the complaint for failure of proof.

"The hearing examiner," the opinion said, "has given little weight to the evidence received in support of the complaint. In many instances of tests or studies being made, he questions the results because of the doubt raised on cross examination about whether the Evis unit was properly installed . . ."

"The scientific evidence and testimony support the allegations of the complaint,

and it is substantial. This evidence is strong, clear and persuasive. Taken altogether it would be of compelling significance under any circumstances."

The decision has been noted by observers as representing an about-face for FTC. In a decision on a case involving the controversial battery-additive product AD-X2, FTC considered findings by the National Bureau of Standards but, in the light of testimony given for the product by users, dismissed charges of false advertising against Pioneers, Inc., of Oakland, Calif. (See SNL for 1953, July 4, p. 6-8, July 18, p. 39, Nov. 28, p. 339, Dec. 5, p. 358.)

A battery of experts testified that the pipe-like water conditioner device did not detectably change the specific gravity, boiling point, viscosity or surface tension of the treated water. Commissioner Anderson noted that witnesses for the company conceded that the device worked in a mysterious way.

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MEDICINE

Surgery and Radiation Used for Breast Cancer

► A DOUBLE-BARREL surgical-radiation technique has been developed for treating breast cancer.

Drs. Richard D. Brasfield and Ulrich K. Henschke, both of New York City, reported at the American Radium Society meeting at Hot Springs, Va.

After a radical mastectomy, or surgical removal of the breast, an incision is made between two ribs exposing one of the major arteries leading to the breast. The artery is tied off, a slit is cut into it, and a small nylon tube is inserted. The open end of the tube is brought out through the skin.

When the patient is back in her room, a wire made of a radioactive isotope (iridium-192 or cobalt-60) is slipped into the tube and left there until the required radiation dose is reached. The radiation kills cancers that have spread to the lymph nodes along the arteries.

The relationship between the physician and the patient undergoing radiation treatment for cancer is an essential factor in the end result.

The quality of the physician-patient cooperation often determines the degree of success or failure, Dr. Howard H. Ashbury, Staunton, Va., told physicians at the Radium Society meeting.

"Such a relation is psychologically complex," he said, "in that the participants are equally dependent upon each other. Not only does the patient need healing, but the physician needs to heal the patient, and a successful resolution of the treatment situation brings mutual rewards to both."

One especially important point the physician must realize, Dr. Ashbury said, is that "there is a discrepancy between what the patient expects and what the doctor can accomplish which is unavoidable in our present state of knowledge."

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MEDICINE

Irradiated TB Vaccine Said to Be Promising

► PRELIMINARY experiments with animals have indicated that a new tuberculosis vaccine made from irradiated TB germs holds promise.

This report is made by Dr. Charles M. Carpenter, A. W. C. Naylor-Foote, Dr. George V. Taplin, Dr. Carl A. Lawrence and Clifford L. Drake at the University of California Medical Center, Los Angeles.

The new vaccine afforded protection against tuberculosis in mice and guinea pigs comparable to that of the BCG vaccine, which contains modified living tuberculosis bacteria.

The UCLA vaccine, which is treated with radioactive cobalt, is thought to offer several advantages over the BCG vaccine. BCG is used widely in several countries but has not been accepted in this country because it is believed that the live germs in the vaccine might be a clinical threat.

Exposure of the TB bacteria to cobalt irradiation inactivates the organism so that it is not capable of infection, but at the same time results in minimal structural and chemical changes in the organism. Thus the ability of the vaccine to stimulate antibodies against invading TB germs is preserved at near maximum.

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GEOPHYSICS

Scientists Measure Range in Antarctic

► A RANGE OF Antarctic mountains whose exact location has been undetermined for 20 years has been measured by a U. S. research team, the National Science Foundation has reported.

The mountains, known as the Executive Committee Range, are located in the heart of Marie Byrd Land and were first sighted from the air during a 1939-40 expedition. At that time four peaks were discovered, but neither location nor heights could be determined. A second air sighting occurred in 1947.

On the basis of flights made last December, however, it was decided that vehicle approach to the mountains was practical, and a team set out on a three-week, 500-mile trek this February.

The party found the range trends north and south for about 60 miles, between 76 degrees 20 minutes south and 77 degrees 20 minutes south. Preliminary geological investigation showed the mountains are volcanic and about 90% covered by snow and glaciers.

The largest of the ten peaks found in the range is 13,856 feet, about 600 feet smaller than Mt. Rainier in Washington.

The party's traverse was part of the continuing program of Antarctic investigations previously conducted during the International Geophysical Year by the U. S. National Committee for the IGY. The program is now coordinated by the NSF.

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