

BIOLOGY

Biology Future Predicted

Advances in the next decade in biology, employing teamwork, will include greater understanding of the chemistry of the body, human behavior and disease—By Faye Marley

► **IVORY-TOWER** scientists will be replaced with teamwork efforts and large personnel as biology and medicine enter the field of big science, Dr. Chauncey D. Leake of the University of California Medical School told *SCIENCE SERVICE*.

He made ten predictions for long-run trends in an interview preceding the meeting of the Federation of American Societies for Experimental Biology at Atlantic City, N. J.

For the next decade's advance in biology and medicine, Dr. Leake predicted:

1. Increasing understanding of the ways in which our complicated brains work.

2. Beginning control of chemical synthesis in living cells, with recognition of factors that maintain their steady living state.

3. Increasing appreciation of the interrelation of heredity and environment in determining human behavior. The emphasis on DNA, or deoxyribonucleic acid, in trying

to understand heredity has caused a neglect of environmental factors.

4. Realization of the different circumstances controlling activity of living material at different levels of organization, most importantly, differences between behavior of individuals and behavior of human societies.

5. Increasing appreciation of the necessity of adjusting to our entire complex environment if we are to survive.

6. Recognition that our most biting problem is population pressure, and development of ways and means of controlling it.

7. Increasing advance in understanding and control of metabolic disease, including cancer and the rheumatic diseases.

8. Recognition of mechanisms for energy transference in living material, particularly through special enzymes found in all living material such as co-enzymes Q (from quinone). This would lead to repair of injured tissues, resistance to infection, and maintenance of a steady state of living material, which would affect cancer.

9. Increased international cooperation in the exchange of scientific information.

10. Increasing development of psychology, sociology and even politics, or policy determinations, as disciplined self-corrective scientific aspects of the biomedical area.

• *Science News Letter*, 83:259 April 27, 1963

Organ Exchanging Seen

► **SURGICAL DEEP FREEZES** of the near future are expected to store kidneys, spleens, lungs and other organs so that patients can exchange diseased ones for healthy replacements.

To protect the organs from destructive ice-crystal formation and water loss in cells during freezing and thawing, solutions of the drugs dimethylsulfoxide or low molecular weight dextran (LMD) were used in experiments reported to the Federation of American Societies for Experimental Biology meeting at Atlantic City, N. J.

The organs were quickly frozen after removal and kept at 110 degrees below zero Fahrenheit as long as two weeks. Then they were thawed rapidly by microwave diathermy, treated with LMD and replanted in the donor animals.

Dr. J. H. Bloch of the University of Minnesota Medical School reported the animal research, which was done in collaboration with Drs. J. K. Longbeam and R. C. Lillehei. He said it could bring scientists a step closer to replacing diseased human organs with healthy ones in much the same way that blood, bone, cornea and arteries are now replaced from storage banks.

Drugs appear to be the most promising

method so far for preserving organs of experimental animals, and for overcoming the problem of keeping the transplant alive and healthy. At the University of Mississippi Medical Center, Jackson, transplants have been more successful between unrelated animals when drugs were used.

In experimental lung transplantations in 115 dogs, the Mississippi team of scientists reported that the average survival time of dogs given drugs was 30.4 days. Animals that had no drug lived only 7.4 days.

The drug Imuran was more effective than the drugs 6-mercaptopurine, hydrocortisone and methotrexate, which also were tried.

Besides transplants between dogs, the Mississippi researchers performed successful transplants of various organs in the same person. For example, an adrenal gland was transplanted from the normal position above the kidney to a patient's thigh to preserve some activity after the glands had to be removed because of Cushing's disease, which is characterized by marked increase in blood pressure and obesity.

A kidney was also transplanted to another site because of removal for an otherwise inoperable injury high in the ureter, the tube leading from the kidney to the bladder, Drs. James D. Hardy, Sadan Eraslan and Martin L. Dalton Jr. reported.

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Gallbladder Cancer Link

► **CHOLESTEROL**, the fatty substance suspected of causing hardening of the arteries, is now accused as a possible cause of gallbladder cancer.

The link is seen because of the extremely high association of gallstones with this type of cancer. This is because most gallstones are composed of cholesterol crystals, and cholesterol deposits are sometimes found in the wall of the gallbladder.

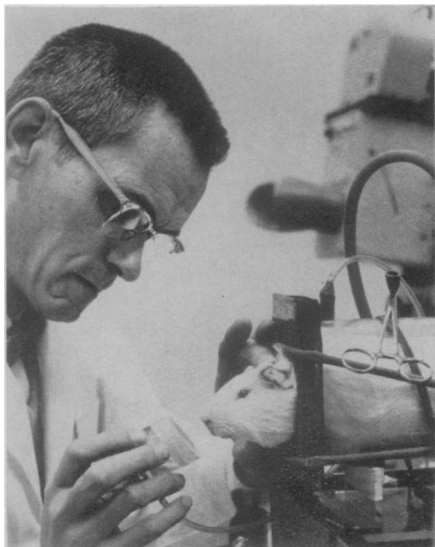
Cholesterol can cause cancer in mice when it forms in a solid crystalline state at the place it is injected, Dr. Fritz Bischoff of the Cottage Hospital Research Institute, Santa Barbara, Calif., reported to the Federation of American Societies for Experimental Biology meeting at Atlantic City, N. J.

Cholesterol is the first natural body constituent, he said, which produces cancer because of a solid state.

Whether or not cholesterol will cause malignancy depends, Dr. Bischoff explained, on its physical state at the injection site. Working with George Bryson, he proved his point by dosing mice with a supersaturated solution of cholesterol in olive oil. At the same time the researchers dosed mice with cholesterol in olive oil in an undersaturated state. Two of the first group developed cancer, but none of the second group did.

In 39 different laboratories, Dr. Bischoff said, cholesterol administered to various species of animals by different routes such as by mouth and under the skin has not produced cancer. In one laboratory in England, however, 3,000 mice were injected under the skin, and 5% got cancer, irrefutable proof that cholesterol was the cause.

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University of Southern California

BREATHING SMOG—One of 240 guinea pigs is used in testing the effect of Los Angeles smog in an experiment conducted by Dr. Henry E. Swann Jr. of the University of Southern California, Los Angeles. In a 15-month study, Dr. Swann and his coworkers reported to the Federation of Societies for Experimental Biology they had found that smog not only irritated the lungs but the eyes of the group breathing smog. Half of the animals, the control group, breathing filtered air remained healthy.

Two-Hour Pregnancy Test

► A NEW PREGNANCY test taking two hours in a test tube can replace the usual methods taking two or more days.

The test-tube test, called Pregnosticon, was developed cooperatively by scientists in Sweden, The Netherlands and the United States and will soon be available. Details of the test were explained in an exhibit at the Federation of American Societies for Experimental Biology meeting at Atlantic City, N.J.

The test tube method uses the principle of "hemagglutination inhibition," or prevention of clumping together of red blood cells, discovered in Stockholm.

Most pregnancy tests used since 1927 require animal reaction to the presence or absence in the urine of a human hormone called chorionic gonadotropin (HCG). In the Pregnosticon test, HCG in the urine upsets the normal clumping pattern to produce a definite doughnut-shaped ring of red cells in the bottom of the test tube. HCG is present in the urine of women only in pregnancy or in the presence of rare disorders.

Dr. Kenneth W. Thompson, research director of Organon, Inc., pharmaceutical manufacturers, said the accuracy of the test is equal to or greater than currently available methods. All of 255 pregnant women verified the new test in a study involving 409 women. Only one of the non-pregnant women was wrongly shown to be pregnant.

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Artery Hardening Cause

► OBESITY in itself was exonerated as a cause of hardening of the arteries and other troubles of the blood vessels in a report of animal experiments at Atlantic City.

Dr. Shapur Naimi of Tufts University School of Medicine, Boston, told the Federation of American Societies for Experimental Biology that after a year of feeding albino rats on a diet including 40% butter, the animals showed only "minor differences" from a second group that had been fed chow.

The condition of both groups, 17 each, was said to be common to all aging rats.

Cholesterol, too, was exonerated partially from causing hardening of the arteries.

Dr. R. E. Olson of the University of Pittsburgh told SCIENCE SERVICE that cholesterol had its bad name because it is found in hardened arteries. He said the hardening agent is not cholesterol itself.

But several papers dealing with cholesterol indicated at least slight dietary influence on the rise of cholesterol blood, or serum, levels.

A group of University of Minnesota scientists fed 22 men a standard daily diet containing these ingredients: 50 milligrams of cholesterol, 20 grams of mixed fat, 114 grams of saturate vegetable fat and three cookies with six grams of oil.

Dr. J. T. Anderson said that when 1,500 milligrams of cholesterol were added to the cookies, the cholesterol level went up 20.3 milligrams. When isocaloric carbohydrate replaced 114 grams of vegetable fat, the

cholesterol in the cookies raised the average serum cholesterol 13.5 milligrams.

Previous studies with a similar diet, but with 1,500 milligrams of cholesterol dissolved in 120 grams of oil, raised the blood cholesterol as much as 31%. These results, Dr. Anderson said, indicate the effect of solution in oil.

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Obese Are Inactive

► FAT TEEN-AGERS can eat the same amount of food as their thinner classmates and still fail to lose weight if they are inactive.

Moreover, hidden anemia was indicated in overweight boys and girls, a study of more than 300 adolescents with normal hemoglobin levels showed.

Dr. Carl C. Seltzer of the Harvard School of Public Health told the Federation of American Societies for Experimental Biology meeting at Atlantic City that he and Dr. Jean Mayer had advised iron treatment for the boys and girls showing low stores of iron in the blood.

In spite of their normal hemoglobin, such persons can have depleted iron reserves and this lack can cause slight impairment of iron-containing enzymes, although no outward disturbance or anemia shows.

Dr. D. M. Watkin of Massachusetts Institute of Technology told of his work with male students between the ages of 18 and 25, which indicated that better work was performed on a high-protein, low-calorie diet.

Dr. Watkin, assisted by J. B. Das and M. C. McCarthy at MIT, required students in their study to walk one hour twice daily on motor-driven treadmills while other students performed no work.

They found that the United Nations Food and Agriculture Organization recommended minimum allowance of four-tenths a gram of protein per kilogram (22 pounds) for normal persons per day is too small. The exercising students used three times that amount of protein.

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Fatty Livers Prevented

► A PREVENTION for fatty liver has been discovered, Dr. Dorothy Arata, biochemist of Michigan State University, reported to the Federation of American Societies for Experimental Biology at Atlantic City, N. J.

The protection method applies to rats on a special experimental diet, deficient in the amino acid, threonine, when the sole carbohydrate source is sucrose, which causes fatty livers. When glucose is substituted as an energy source, the fatty livers do not occur.

This allows Dr. Arata and her colleagues, J. DeHate and D. C. Cederquist, to explore what happens. They conclude that the cause of the dangerous fatty condition is more complex than an amino acid deficiency.

Only the future will tell whether these findings have an application to human fatty livers, often thought to be linked to alcoholism.

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SCIENCE NEWS LETTER

VOL. 83 APRIL 27, 1963 NO. 17

Edited by WATSON DAVIS

The Weekly Summary of Current Science, published every Saturday by SCIENCE SERVICE, Inc., 1719 N St., N.W., Washington 6, D. C., NORTH 7-2255. Cable Address: SCIENSERV.

Subscription rates: 1 yr., \$5.50; 2 yrs., \$10.00; 3 yrs., \$14.50; ten or more copies in one package to one address, 7½ cents per copy per week; single copy, 15 cents, more than six months old, 25 cents. No charge for foreign postage. Change of address: Three weeks notice is required. Please state exactly how magazine is addressed. Include postal zone number.

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Printed in U.S.A. Second class postage paid at Washington, D. C. Established in mimeograph form March 13, 1922. Title registered as trademark, U.S. and Canadian Patent Offices. Indexed in Reader's Guide to Periodical Literature, Abridged Guide, and the Engineering Index. Member of Audit Bureau of Circulation.



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