

PHYSICS

Find Space Aging Bad

► THE SLOWER aging of a fast-traveling space traveler compared to his stay-on-earth twin is a drawback, not an advantage as many might think, one of the world's leading authorities on Einstein's relativity theory reports.

Dr. W. H. McCrea of Royal Holloway College, Englefield Green, Surrey, says the idea that when a space traveler returns to earth he will be younger than the twin who remained behind seems to be "repugnant to some minds." To make the idea less repugnant, he uses Isaac Newton as an example in his report in *Nature* (May 4).

"Were a new Isaac Newton born today," Dr. McCrea points out, "we could send him space traveling so as to return to us in 30 years time at, say, the age of three. This would be in accordance with the theory

of relativity and with experimental tests of the theory—and all we should get for our efforts would be a retarded child."

Dr. McCrea has another way of explaining that slowed-down aging is a "loss and not a gain." The object of physics, he says, is to predict the results of experiments concerning stated events.

"The prediction can be thought of as being carried out by automatic computers. Suppose that for a particular experiment to be performed in the terrestrial laboratory 30 years hence, the predictions will be just ready if we keep two computing machines working to capacity until then.

"Let us now," Dr. McCrea suggests, "give one of these machines its share of instructions and then dispatch it on the possible space flight suggested above.

"It will come back having done only one-tenth of its allotted task. Thus the loss I have mentioned, 27 years worth of computing in this case, is a real one. Also it is something about which all observers will agree."

This conclusion, based on Einstein's relativity theory, is also in agreement with thermodynamical principles, Dr. McCrea reports.

He says this particular train of thought, the most recent in a controversial series appearing in Great Britain and in the United States in scholarly scientific journals, was suggested by Dr. J. S. Courtney-Pratt of Caius College, Cambridge. Dr. Courtney-Pratt proposed the space traveler could get his problems solved more quickly than he could do them himself by getting an earth-dweller to do his thinking for him.

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GENETICS

Radiation Shortens Life

► NEUTRON RADIATION from an atomic bomb can shorten the life of a man's children, Dr. W. L. Russell, principal geneticist of the Oak Ridge National Laboratory, warns.

Offspring from a man exposed to such radiation will have their lives shortened on the average of 20 days for each unit of the radiation their father had received.

This shortening of life in the immediate offspring, Dr. Russell says in the *Proceedings of the National Academy of Sciences* (April 15), "will turn out to be of a magnitude that will warrant serious consideration as a genetic hazard in man."

The discovery that neutron radiation cuts an offspring's life span as much as it cuts the father's life was found as a by-product of another study. The original study, made with male mice, was an investigation to find the relative effectiveness of neutrons from an atomic detonation and from a cyclotron in inducing dominant lethal mutations in the mouse.

Dr. Russell found, however, that there was a "significant effect of radiation on the length of life of the offspring . . ." In the male mice, the life of the offspring was shortened 0.61 day for each unit of radiation. Applying this information to human beings' life span, Dr. Russell has figured out that a man's life will be shortened from five to 35 days for each unit of radiation received by his father.

Whether the same results hold true for X-ray and gamma rays as for neutrons is not yet known.

The geneticist says that after "weighing the evidence and uncertainties," it seems reasonable to predict, even under the conditions of radiation exposure in man, shortening of life in the irradiated father's off-

spring will be between 10% and 100% of that in the exposed individuals themselves.

"Also, and more important," Dr. Russell concludes, "since the shortening of life is probably the result of mutations with slight dominant effects, the damage would not end with the first-generation offspring, but would, to a certain, and probably large, degree, be transmitted to later generations."

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BACTERIOLOGY

Ozone Causes Mutations In Human Bacteria

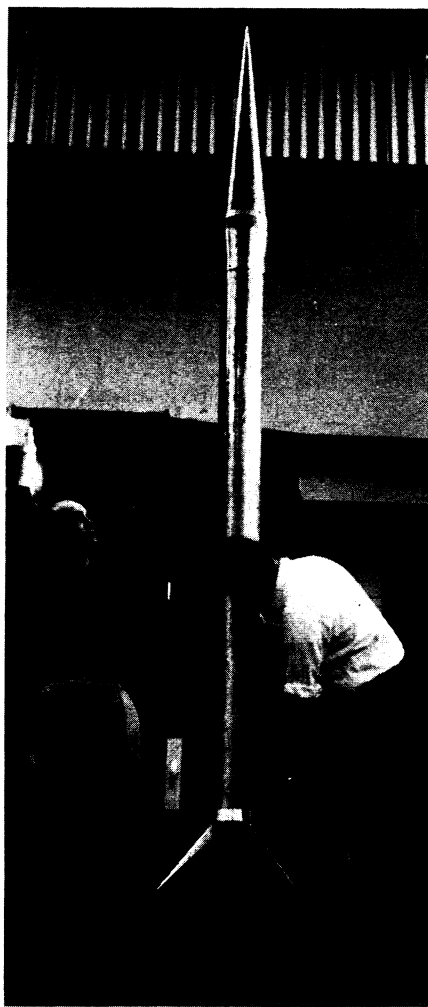
► OZONE, a form of oxygen known for its disinfectant properties, is highly active in creating mutations among bacterial cells, Dr. Irving Davis, School of Aviation Medicine, USAF, Randolph Air Force Base, Texas, reported to the Society of American Bacteriologists meeting in Detroit.

The effects of an ozone solution were tested on two strains of *Escherichia coli*, a type of bacteria found in great quantities in the human intestine. Mutations in the bacterial strains were determined by their changing reactions to the antibiotic streptomycin.

A comparison of the number of mutations between the two strains showed the gas was a highly active cause of mutant bacteria, Dr. Davis reported.

Ozone is a more active form of oxygen produced when an electric discharge takes place in either oxygen or air. Its characteristic odor can usually be detected around an electric motor which is in operation. The gas is also found in the atmosphere where it is produced by both lightning bolts and the action of sunlight on the upper atmosphere.

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CAJUN ROCKET—This rocket is one of 16 that the University of Michigan will fire 75 miles into the air above Ft. Churchill, Canada, during the International Geophysical Year. It will use the propulsion unit from a Nike anti-aircraft missile. William Hansen and Theodore Patinson examine the rocket.