

GENERAL SCIENCE

Neglected Scientific Areas

Some major scientific questions such as photosynthesis, the remodeling of heredity, and the mechanisms of mentality are being overlooked in the moon race—By Watson Davis

► **WHEN THE POTENTIAL** progress of science is explored for a sweep into the future, as was done at the traditional year-end meetings of the American Association for the Advancement of Science, this important query arises:

Are money and brains for research being devoted to the most needed and likely scientific projects?

Millions and, over years, billions of dollars are being spent on favorite and publicized projects. Among them are:

The race to put men on the moon.

Drilling to the inner layers of the earth, the Mohole Project.

Observations of radio signals from distant parts of the universe.

Probing of the interior of the atom with high energy from giant atom smashers.

Research to understand and combat cancer.

Thousands of the world's scientists are spending their long-trained expertness on these gigantic enterprises.

The world has sufficient resources in men and money to do all these and more. Perhaps the time scale needs adjusting, and some of these plans are not as urgent as set schedules suggest. For example, why the rush to get men to the moon within the decade since instruments will do almost as well and be cheaper in resources and human risk.

However, the big question in science exploration is: What good bets are being overlooked, ignored or niggardly supported?

Nominations for large-scale efforts include:

PHOTOSYNTHESIS—We can not duplicate synthetically how the green leaf captures the sunshine's energy and turns it into food and everything else that grows. Some promising fundamental research gives us hints as to how plants do it, but we are evidently not on the verge of artificial duplication. An all-out science effort like that which produced the atomic bomb is justified since success would banish the specter of future world starvation.

REMODELING HEREDITY—Enough is being discovered about the mechanism of heredity for scientists to attempt bringing about permanent changes in the stream of life handed on from generation to generation. First steps would be in bacteria and viruses, then plants and lower animals, but the application to man's future, creating desired qualities in future generations, is a possibility.

MECHANISMS OF MENTALITY—The broad sweep of the training and remodeling of the human intellect, from the cure and prevention of mental illness to faster and more effective education at all levels, needs a major research effort. People are suspicious

of such efforts because of their preconceptions and prejudices, but newer research in psychology and psychiatry points to bold and daring experiments that could revolutionize the operation of human intellect and emotion. We might even learn the ways of keeping peace in the world.

A hazard of looking at the future is that great progress, the desired "breakthroughs," do not come from the obvious but from the unexpected and the unforeseen. If it can be imagined, then someone is probably trying to do it.

To the eternally renewed generations, the concern of our child rearing and education, there is given the great chance for innovation.

To the children in science fairs, for instance, who ask hopefully "Why" and are not afraid to try the impossible, the future belongs.

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METEOROLOGY

Radar, Satellites Aid Great Lakes Forecasts

► **RADAR AND SATELLITES** are two tools helping to make better weather forecasts in the Great Lakes region, a Canadian meteorologist reported.

Radar is particularly helpful in showing where heavy snow may fall on the downwind side of one of the Great Lakes, T. L. Richards of the Department of Transport, Toronto, reported at the American Association for the Advancement of Science meeting in Cleveland.

The satellites are useful in determining snow and ice cover and may someday be able to signal when lake ice is going to break up and permit shipping.

The devastating snowstorms that often paralyze cities and communities on the leeward sides of the lakes result when cold, Canadian air dumps the moisture it has picked up passing over the warmer lake water.

These storms, Mr. Richards said, occur most often in the late fall and early winter. When the five large inland lakes cool down, this kind of storm no longer occurs and the snow comes from another source.

Weather is important around the Great Lakes not only because 16 million persons live there, but also because many more millions use the waters for commerce, fishing or vacationing.

The Great Lakes also are used as a fresh-water source and a waste disposal system, prompting Mr. Richards to term them the "most beautiful septic tank in the world."

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TECHNOLOGY

Fuel Cell Prototypes Accepted by NASA



Pratt & Whitney

► **MOON-BOUND ASTRONAUTS** will depend on a fuel cell power plant such as the one shown above for electricity and drinking water on board. Prototype units have been accepted by the National Aeronautics and Space Administration, and the first three fuel cell units for the Apollo moon spacecraft have already been delivered.

Fuel cells are devices which convert chemical energy directly into electricity. They were chosen for the space missions because of great weight savings over conventional devices such as batteries. The power plants being developed by Pratt & Whitney Aircraft for the space program use hydrogen as fuel.

The fuel cell system will provide power to operate guidance, communications, environmental controls and other electrical equipment. The cells will also supply water as a by-product for drinking and for cooling some of the spacecraft components.

In the Apollo spacecraft, three power-plants will be used.

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Arms Ease-Up Seen As Good for Science

► **A RELAXATION** of the arms race would serve the interests of both American and Soviet science, a mathematician told the American Association for the Advancement of Science meeting.

American science, said Dr. Anatol Rapoport of the University of Michigan, Ann Arbor, would then be free to turn to constructive, non-military fields, and Soviet science would be able to cast off the hampering bonds of political ideology.

In addition, Dr. Rapoport said, the tremendous growth of science in the United States and in the Soviet Union may bring about more freedom and more responsibility in both countries since science itself nurtures these qualities.

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