GENERAL SCIENCE

Science Defends Research

Science research with odd-sounding project titles has drawn sharp criticism. But scientists point out the practical benefits of this work, Judy Viorst reports.

➤ AN INDIGNANT citizen recently wrote to the National Science Foundation, "I frankly feel that science is in danger of losing its marbles."

The letter writer's attack on a research project broke down into a haze of confusion, suitable only for filing in a manila folder labeled "crank." But equally strenuous objections have come from more respectable sources.

Sen. Harry F. Byrd (D.-Va.) recently questioned the judgment of the National Institute of Mental Health in granting $1,201,925 to Dr. Harry Harlow, professor of psychology at the University of Wisconsin, Madison, for a six-year study of the infant-mother relationship in monkeys.

Rep. James G. Fulton (R.-Pa.) added that the project sounded "silly."

Dr. Harlow has followed the development of baby monkeys raised in isolation with artificial substitutes for mothers. The monkeys showed little or no ill effects in the very early days; then their behavior became increasingly peculiar. When they, in turn, became mothers, the consequences of their lack of maternal care was strikingly displayed—they were completely incapable of mothering their own children.

Scientists and members of Congress, coming to the defense of Dr. Harlow, have attempted to convey the significance of his work.

Many theories of child development, they have pointed out, are based on the assumption that an unsatisfactory relationship between mother and infant will subsequently produce psychological disturbances. But psychiatrists say that it is virtually impossible to pinpoint the specific areas of inadequacy, because this relationship occurs so early in life and is so complicated.

First Experimental Evidence

Dr. Harlow's work, many psychiatrists agree, has provided the first experimental evidence suggesting that needs such as touching and clinging may be as fundamental and inborn as the sucking instinct. Without sufficient satisfaction of these needs, the evidence indicates, human babies—as well as rhesus monkeys—may develop into troubled, inadequate adults.

Ony psychiatrist has stated that the implications of Dr. Harlow's work are so far reaching that the sum granted to him is a very small price to pay. He said that some past theories have been confirmed, new leads have been provided and the need for important changes in infant and child care has been indicated. The whole approach to the handling of hospitalized children, he said, may have to be altered in light of Dr. Harlow's findings.

Sen. Byrd also cited as an example of questionable-sounding projects the biological control of snails by shellcracker sunfish. The National Institute of Allergy and Infectious Diseases has granted about $7,500 to Dr. Ray Allison of Auburn University, Auburn, Ala., for this work.

A spokesman for the Institute said that the study was aimed at eventual reduction of a snail-borne disease, schistosomiasis, which has infected between 150,000,000 and 200,000,000 people in tropical and subtropical countries. Puerto Ricans, particularly, suffer from this disease, which ultimately disables a very large proportion of those infected. A preliminary report has stated that the results of Dr. Allison's work seem very promising.

The other project Sen. Byrd questioned was a grant of $2,691 to Dr. H. V. Murdaugh of the University of Alabama School of Medicine in Birmingham. Dr. Murdaugh's work was described as a study of diving reflex and volume receptors in the seal.

This grant, said a National Institutes of Health spokesman, was given by the general medical sciences division to investigate the heart and kidney function in seals. Previous studies of marine vertebrates have already enormously enlarged our understanding of the human heart and kidney function.

The Byrd incident is only the most recent in a series of attacks on science research on the grounds that the Government is wasting its money. In 1960 the National Science Foundation was peppered with queries when it granted $50,000 to Cornell University for a study of bird sounds. A prominent weekly magazine characterized the study as "bizarre extravagance." It was also described, inevitably, as "for the birds."

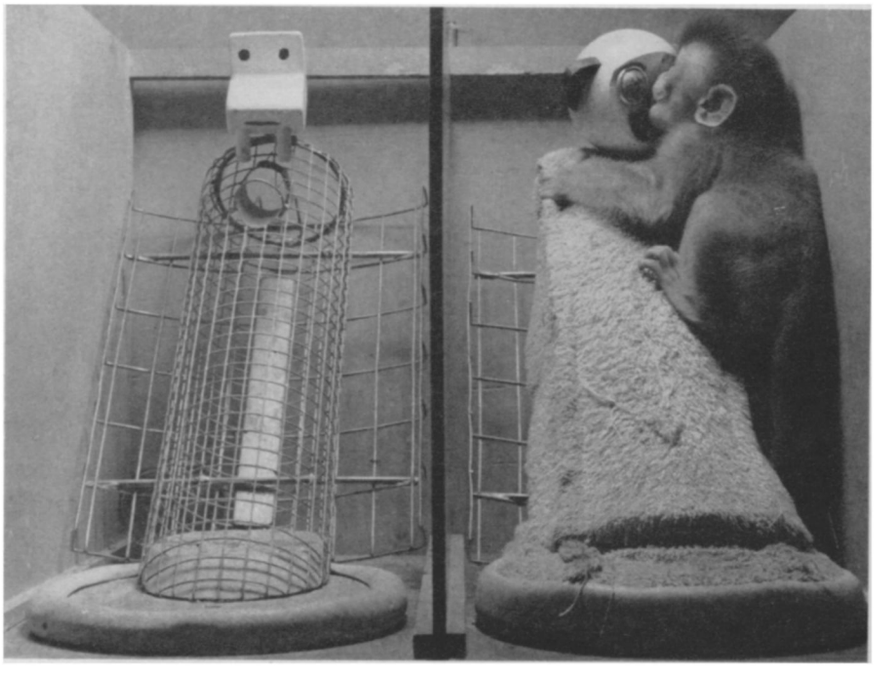
Understanding Communication

The Foundation responded to its critics with an explanation of how knowledge about communication systems in lower life forms was necessary to a better understanding of the human communication system—speech. This understanding, it said, has very practical applications in the treatment of speech disorders, such as stuttering.

A syndicated columnist also jumped on the Foundation, citing names of odd-sounding projects which had received grants. No effort was made by the columnist to investigate the purposes and implications of these projects.

Scientists say that no reputable person would apply for a grant under a grandiose project title like "Cure for Cancer" or "Elimination of Heart Disease." They willingly concede that major breakthroughs are quite rare in the biological sciences.

Most of the research that takes place today, they point out, is designed not to



MOTHER LOVE. In Dr. Harry Harlow's study of infant-mother relationships in monkeys, this little monkey was given a choice of substitute mothers. Its choice—the cuddly one.

produce "Instant Health" but to extend life expectancy and limit the disability and suffering caused by disease. In the process, they say, they are whittling away at basic health problems, and someday the pieces will fit together to produce the cures that will justify every penny being spent on research.

Many scientists complain that people who should know better are tempted to isolate fragments of a total work and, once it is safely out of context, have a field day with it.

Editorial Attacks Government

Two years ago an editorial blasted the Government for handing over taxpayers' money to a researcher who attended 80 cocktail parties in four years and recorded what took place at them. The cocktail party research was, in fact, a very small aspect of a serious, many-faceted study of adult play behavior.

Pick out a few random phrases and any research project can be made to sound absurd, said a scientist. But once the goals are made clear, the humor wears thin.

A study of goat milk at high altitudes, for instance, might raise some eyebrows. But from it will come increased knowledge of circulatory diseases .

A project involving the collection and breeding of kangaroo rats could sound as unimpressive as this desert rodent looks. But such work will contribute to a better understanding of kidney disease.

NSF Cites Study

The National Science Foundation, in response to questions raised about the purposes of its grants, cited a study done on the transfer of tissue from one salamander to another. From this research, it pointed out, came corneal transplants, which today are saving many people from blindness.

All research currently under way will not yield such impressive gains. But, as Dr. Alan T. Waterman, director of the National Science Foundation, said in a letter to a critical correspondent: "It is our purpose to support research which will increase our store of fundamental knowledge, some of which will unquestionably result in applications of ultimate benefit to the health and welfare of the nation."

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For ten straight years, U.S. *airlines* have had less than one fatality per 100,000,000 passenger miles.

Lime stabilization in construction of *highways,* although new to modern engineers, was used by the Romans 2,300 years ago in building the Appian way.

Eucalyptus trees, native to Australia, introduced into Brazilian forests reached a height of 49 feet in two and one-half years, which means a continuous growth rate of six-tenths of an inch a day.

Among the higher plants, *cucumber* is the most effective agent for converting the deadly gas carbon monoxide into harmless carbon dioxide.

INVENTION

Patents of the Week

A leading edge that could be used for reentry of space vehicles, a reconnaissance system, a method for detonating mines and an improved proximity fuze were patented.

➤ A LEADING EDGE that could be used by a space vehicle reentering the earth's atmosphere at hypersonic speeds has won patent No. 3,028,128.

Because of its method of construction, the leading edge is claimed to be able to withstand the extremely high temperatures generated when spacecraft enter the atmosphere. It would make the vehicle capable of controlled flight within the atmosphere and of landing on earth's surface, according to inventor Eugene W. Friedrich of Glen Ellyn, Ill. He assigned patent rights to the National Aeronautics and Space Administration.

The leading edge Mr. Friedrich developed is shaped rather like a capital "D" in cross section. The outer edge is composed of ceramic material, the rest being made of metal.

Satellite Reconnaissance System

To scan earth from space, David R. Power and John W. Beatty of Dayton, Ohio, have devised a satellite reconnaissance system that won patent No. 3,028,449. They assigned rights to the Government through the Secretary of the Air Force.

Their system uses optical observing, and magnetic recording and read-out devices to reduce interference from radiation to a minimum. The image formed by the lens is scanned by photoelectric cells, and the information then stored on magnetic tapes until it is transmitted to earth on command.

Two Patents Kept Secret

Two patents that have been kept under security wraps for 15 years were finally made public.

James M. Kendall, who in 1947 was associated with the U.S. Naval Gun Factory's Naval Ordnance Laboratory in Washington, D. C., devised a method for detonating mines by coded sound signals sent out from a remote distance.

The mine would fire only when the coded signal consisted of a group of impulses received in a predetermined relation of spacing and timing. Depth charges or sonar signaling devices could be used to send the sound signals. Mr. Kendall received patent No. 3,027,837.

An improvement for the proximity fuze, the remarkable device developed early in World War II to explode missiles when they reached their targets, has also been patented. John J. Hopkins of Silver Spring, Md., won patent No. 3,027,842, rights to which were assigned to the Government.

The improvement consists of placing the radio antenna for the proximity fuze within the projectile, thus preventing a soldered connection from melting and, therefore, failure of the device to detonate on target. Prior to this development, failures of proximity fuzes were running as high as 30% to 40%.

Proximity fuzes used in World War II were of two types. The non-rotating type was developed at the National Bureau of Standards, the rotating type at the Applied Physics Laboratory, Silver Spring, Md.

Dr. Merle A. Tuve, director of Carnegie Institution's Department of Terrestrial Magnetism, Washington, D. C., and Dr. Richard B. Roberts, also of the Institution, have pending the basic application covering radio proximity fuzes. It was declassified in October, 1961.

Other Patents of Interest

Among the noteworthy patents were the following:

An improved tube for transmitting explosive gases for firing hand-carried recoilless rifles, awarded patent No. 3,027,839. Andrew J. Grandy of North Hills, Pa., and Robert S. Shulman of Philadelphia, assigned rights to the Government.

A shaped charge with a large penetrating power for a given quantity of explosive, granted patent No. 3,027,838. Lorrain D. Meddick of Whittier, Calif., assigned rights to Borg-Warner Corporation, Vernon, Calif.

A device for making a display case out of the kind of cart used for groceries in supermarkets, awarded patent No. 3,028,066. Inventor John E. Bumby of Ripon, Wis., assigned rights to Ripon Foods, Inc., also of Ripon.

A method for "geobiochemical prospecting" using methane-consuming microorganisms, given patent No. 3,028,313. Rights were assigned to the Sun Oil Company, Philadelphia, Pa., by Paul E. Oberdorfer Jr. and Donald F. Rugen of Claymont, Del.

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AERONAUTICS

Commercial Airfield For Antarctica Suggested

➤ UNITED STATES engineers were studying possibilities of building an all-weather, permanent airfield in the Antarctic, U.S. Navy Admiral David M. Tyree reported.

The airfield could be used by commercial airlines to shorten considerably an air route, such as between Australia and South America.

A site near McMurdo Sound would be suitable for such an airfield. It would be very expensive to build but it might prove worthwhile, he said. Admiral Tyree is the Commander of the U.S. Antarctic Support Forces.

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