

Mind Control on Way, Scientist Warns

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—Scientists must start thinking now about the possibilities of mind control that their research may soon make possible, the chairman of a symposium on the brain said today.

This point was made by Dr. David Krech, professor of psychology at the University of California, Berkeley, in opening his session of the annual meeting of the American Association for the Advancement of Science.

"This grand new enterprise, this brave new science of the mind, has already made some major advances, and is on the verge of even more significant achievements," said Dr. Krech.

"Perhaps even in some of

today's papers are the beginnings of genuine breakthroughs into the understanding of the mind. If not today, then tomorrow—or the day thereafter, or the year thereafter. I need not spell out for you what such understanding of the mind may mean in terms of the control of the mind."

Dr. Krech then said he doubted that many persons, including the scientists most intimately involved, had given much thought to the grave problems of ethics, politics and social good that would be generated by the development of drugs to control or influence the mind.

"I don't believe that I am being melodramatic," Dr. Krech said, "in suggesting that what our research may discover may carry with it

even more serious implications than the awful, in both senses of the word, achievements of the atomic physicists. Let us not find ourselves in their position of being caught foolishly surprised, naively perplexed, and touchingly full of publicly displayed guilt at what they had wrought."

Professor Krech presided over sessions today in which reports were made on drugs that erased memory in goldfish and on other drugs that enhanced memory and learning in rats. The sessions also heard much data that indicated science was at last coming to grips with the chemical basis of memory and learning.

There has been a gradual accumulation of evidence

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seeming to link the process of memory with the compound ribonucleic acid, usually called RNA, which is a master chemical of life. It is RNA that direct the production of all protein made in living cells. Some scientists have suggested that it may also carry the code by which information is stored as memory in the brain.

The drugs described today that seemed to affect memory and learning were, in general, chemicals believed to affect either the brain's RNA content or the brain's production of protein.

In many of the experiments reported, fish, rats or other animals were put in enclosures and were given electric shocks after a warning by light or buzzer. Their learning and memory were measured by the number of trials it took them to avoid the shocks and the time—days or weeks—that they would retain memory of the shock and the movements needed to avoid it.

Memory of Fish Erased

In goldfish studied by Dr. Bernard W. Agranoff of the University of Michigan, long-term memory was obliterated if the fish were given minute injections of the antibiotic puromycin shortly after the first trials. Since short-term memory was not much affected, the speaker was led to conclude that the drug interfered with the process by which memory becomes fixed in the brain.

Puromycin is known to interfere with protein formation by interfering with the function of RNA in the cells involved. It is not used medicinally because it produces harmful side effects.

Other reports from the universities of Hawaii, Indiana and North Carolina also produced evidence suggesting a relationship in various species of animals between RNA and the memory-fixing process.

Specialists from Abbott Lab-

oratories in Chicago and from the Illinois State Pediatric Institute described a chemical called magnesium pemoline, already much publicized, that has enhanced retention of memory in rats and presumably enhanced their learning. This drug is being carefully studied in human beings to see if it may have a beneficial effect on memory retention in the elderly.

Another report on experimental drug treatment that seems to affect memory was made by scientists of the State University of New York, Stony Brook, L. I. They reported finding differences in species in the reaction of animals to stimulants to the nervous system. Doses that seemed to aid learning in rats of one strain, might disrupt it in others, the report said.

In another session of the large scientific meeting here a scientist from Yale University showed a film, demonstrating that aggressiveness in monkeys could be turned on or off at will by a radio control mechanism. The device sent signals to electrodes implanted in the animals' brains.

In his introductory discussion of the study of the mind, Dr. Krech said that "for the first time in modern scientific history there now flourishes a sophisticated, multi-disciplinary, serious and, I may add, 'well heeled' scientific inquiry into mind-memory, learning, problem solving, thinking. For the first time biochemists, chemists, pharmacologists, geneticists, anatomists and psychologists have been banding together in an attempt to understand the operations of the brain. And all of this has happened with unprecedented speed."

Scientists today must start considering the probable impact of all this research, Dr. Krech said, and must consider in advance ways to deal with the ethical, political and social problems that may arise.