

BIOCHEMISTRY

Chemicals Control Body

► THE PROFOUND INFLUENCE of brain chemicals on human emotions and behavior has come to light over the past few years. With such knowledge arises the possibility of controlling mental disease by drugs.

Dr. Guy M. Everett of Chicago's Abbott Laboratories drew these conclusions before several hundred scientists gathered for the annual meeting of the American Association for the Advancement of Science in Berkeley.

His and others' research on the brain opens the door not only to controlling mental disease but to manipulating human behavior in general.

Particular chemicals called catecholamines are intimately related to emotions, said Dr. Everett. It has now been found these compounds also have major effect on physical or motor activity.

For instance, if the level of catecholamines drops below its normal level, a man will be generally depressed and inactive. If the level rises, he will grow gradually more active, irritable, and eventually aggressively agitated.

For his research Dr. Everett used the

tranquilizer, reserpine, to affect the chemical levels of experimental animals. Reserpine lowered catecholamines and the animals became inactive.

There is evidence that the major tranquilizers and anti-depressants are having exactly this effect, Dr. Everett observed. The anti-depressants would act to increase catecholamines and bring on a state of activity.

Higher mental capacities do not seem to be influenced by these chemicals, however. Ability at abstraction, recall and problem solving changes little, if at all, during such experimentation. But, mental alertness and the ability to perform over a long period of time are very much under control of the catecholamines, Dr. Everett noted. The chemicals also modulate hunger and thirst drives.

Recent studies have shown the exact location of the catecholamines. Two of the chemicals are present in nerves of the brain stem, actually a small part of the total brain. They are dopamine and the hormone norepinephrine which becomes active in response to low blood pressure.

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PHYSIOLOGY

Dark May Impair Brain

► A BRAIN THEORY proposed nearly a century ago has been validated for the first time in the laboratory.

The theory, enunciated by the Spanish genius of neuroanatomy, Santiago Ramon y Cajal, states that brain cells will only mature through external stimulation.

Until recently there has been no physical evidence to support the idea. However, in an experiment worked with cats raised in the dark, a University of Maryland physiologist was able to observe poorly developed cells in that region of the brain associated with vision.

Dr. Paul D. Coleman's experiment has important implications for research in human mental retardation. Test results were told at the American Association for the Advancement of Science meeting.

Six cats (three pairs of littermates) were involved in the experiment. Three had been raised in the dark; three had been raised normally. From the visual section of each cat's brain Dr. Coleman cut extremely thin slices of brain material.

He stained the samples with a silver solution, developed appropriately enough by Cajal. The stain infiltrated the cells' branching dendrites, through which messages are relayed from one cell body to another.

Cats raised in the dark clearly illustrated fewer and shorter dendrites than normally raised cats. Equally important, the dendrites of individual cells were less intermingled in the experimental animals.

Dr. Coleman had no way of knowing which brain developed in the dark. The cats had been raised by Dr. Austin Riesen,

at the University of Chicago, who killed the animals, coded their brains and sent them to Maryland.

The physiologist told SCIENCE SERVICE he does not know yet whether the visual results can be expanded to mental ability in general. But he is now attempting the same experiment with retarded rats. The rats have an inbred low capacity for running mazes.

Although the cat experiment proves nothing concerning human retardation, it is in line with current thinking on the subject.

Pediatricians and child psychiatrists have recently begun to suspect that a primary cause of retardation is sensory deprivation. As the theory goes, his senses are unstimulated and his brain cells do not develop.

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TECHNOLOGY

Motors in Tire Hubs Give More Pulling Power

► FOUR-WHEEL DRIVE tractors with 20% to 40% more pulling power than the conventional type are possible using front wheels with motors concealed in the hubs.

Hydrostatic motors mounted right in the wheels are driven by the tractor's engine. Mechanical four-wheel drive systems have the disadvantage that they require matching the speed of the wheels, which is impossible while turning a corner. The hydrostatic system, however, drives each wheel individually at its proper speed, said the manufacturer, Ulrich Hydraulics, Inc., Berkeley, Ill.

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Questions

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GENERAL SCIENCE—Which three states still have anti-evolution laws on the books? p. 7.

PSYCHOLOGY—What in animals and probably in man is an immediate and natural outgrowth of pain? p. 6.

PUBLIC HEALTH—To which viruses that affect U.S. men who have lived in a sanitary environment are the Viet Cong immune? p. 2.

TECHNOLOGY—About how many pieces of mail will the U.S. Post Office handle this year? p. 10.

ZOOLOGY—What are the determining factors in the size and shape of a deer's antlers? p. 8.

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