BIOCHEMISTRY

Study Chemical Imbalance

The balance between cholinesterase and acetylcholine, two chemicals found in the brain, apparently influences an animal's ability to learn.

➤ CAPACITY for learning may be governed by the balance of two chemicals in the brain.

The chemicals, known as cholinesterase and acetylcholine, have various effects on man and animals depending on their concentrations in the brain.

Studies by two psychologists and a biochemist at the University of California, Berkeley, point to a possible relationship between the amount of cholinesterase activity in the brains of rats and the ability of the animals to learn their way around in a maze.

The psychologists, Drs. David Krech and Mark R. Rosenzweig, and the biochemist, Dr. Edward L. Bennett, reported at the National Academy of Sciences meeting in Berkeley, Calif., that "maze-bright" rats had significantly higher cholinesterase activity than did "maze-dull" rats. (See p. 324.)

To determine whether their observations were merely chance, the scientists cross-bred the bright and dull rats and performed similar experiments with the offspring. Results indicated that while there is a definite learning-cholinesterase relationship, it is not a simple linear one in which increase in one is followed by increase in the other.

Drs. Krech, Rosenzweig and Bennett suggested that learning capacity has some dependency on the balance between cholinesterase and acetylcholine.

Both chemicals are widely but unevenly distributed in the central nervous systems of animals. The activity of acetylcholine in the cerebral cortex (that part of the brain which is most massive in man) is less in the human than in lower animals. The farther down the evolutionary scale the animal is, the greater is the acetylcholine activity. On the other hand, cholinesterase is most active in man's cortex.

Previous studies by other scientists have shown cholinesterase injections into the human brain can in some cases temporarily relieve the symptoms of schizophrenia, a severe mental disorder. Dr. Stephen L. Sherwood, Middlesex Hospital, London; Drs. Warren S. McCulloch and P. M. Cooke and Miss Ellen Ridley, University of Illinois College of Medicine, Chicago; and Drs. W. H. Mosberg, T. N. Tausig and A. P. Bay, Illinois State Hospital for Mental Diseases, Manteno, Ill., conducted the research in these phases.

The reduction of cholinesterase in rats in still other experiments has resulted in no change at first, then improved performance, then rapid loss in efficiency, and finally convulsions and death. This work was done by Dr. Roger W. Russell, executive secretary, American Psychological Association, at University College, London.

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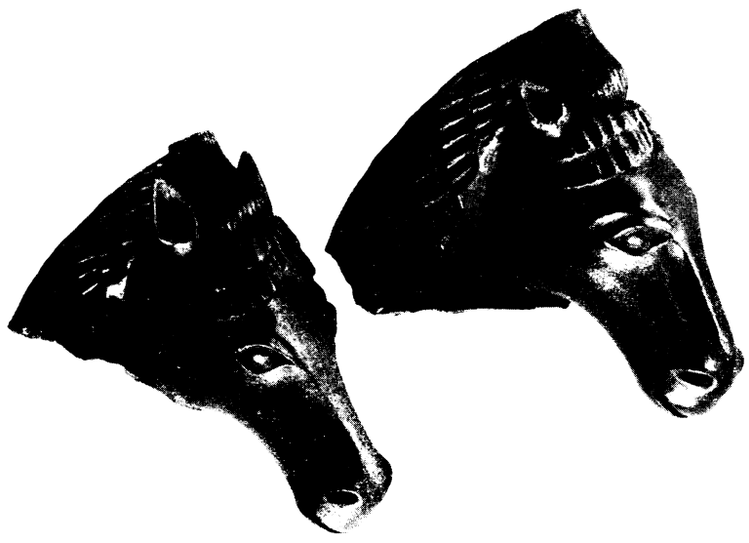

ANCIENT HORSES—Two bronze heads of horses in an excellent state of preservation were removed from the "east dump" section of the excavations. They were made toward the end of the 6th century B.C. and had probably been dedicated to Poseidon who was god of horsemanship as well as of the sea. These are among the finest specimens of Greek archaic art.

ARCHAEOLOGY

Greek Ruins Bare Clues To "Mystery Religion"

See Front Cover

➤ A STRANGE pit containing evidence of a pre-Christian "mystery religion" has been discovered in Greece by a University of Chicago expedition.

Oscar Broneer, field director of the team of archaeologists, said he and his son, John W., also found an ancient wall used for defense against invaders 3,200 years ago. The father and son discovered the wall near Corinth.

Cut in native rock, the pit is 15 feet wide and extends to an unknown depth. Excavations turned up tiny figures of horses, a porpoise, and other tokens of bronze and gold, believed to have been gifts to the gods.

Judging from the piles of beakers and miscellaneous pottery, including oil lamps unique in Greece, Mr. Broneer believes the early Greeks used the site for "intense nighttime ritual." The pit is estimated to date from the 6th and 5th centuries B.C. It was found 55 miles west of Athens on the Isthmus of Corinth.

The wall is near a canal which cuts across the Isthmus. Mr. Broneer said that from its construction, the barrier was probably erected by the Achaean rulers of the Peloponnese at the end of the Bronze Age to halt hostile raids.

Although it may have withstood the attacks for a century, the aggressors finally broke through in what is known as the Dorian invasion.

Ironically, Dr. Broneer said, the end of the Isthmian temple installations occurred when soldiers of the Emperor Justinian in the 6th century A.D. broke down the pagan structures and used the material for a new wall to defend the Peloponnese against another surge of invaders from the north.

Other archaeological work in the area sponsored by the University since 1952 has discovered a temple to Poseidon, god of the sea, and a temple to Palaimon, a boy-god worshiped by early Greeks.

The photograph on the cover of this week's SCIENCE NEWS LETTER shows the foundation for the temple of the boy-god Palaimon. Through the foundation runs an underground passage which formed a crypt. Here it was customary for men, probably the Isthmian athletes, to descend to take their oaths in the name of the god. Dire punishment awaited those who perjured themselves, Dr. Broneer reported.

The east and north sides of the precinct of Poseidon remain to be cleared and excavation in the theater has barely begun, Dr. Broneer said. Other buildings at greater distances from the main sanctuary are the temples of Demeter and Kore, Artemis, Dionysus, and Euteria.

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