each electrocardiogram.

Much of the new information on interpretation of electrocardiograms was gained with the aid of X-ray pictures used to map the position of the heart while the electrocardiograms were being taken.

Science News Letter, April 30, 1949

PHYSIOLOGY

Spinal Cord Kept Alive

➤ NEW knowledge of how the central nervous system works, of different diseases affecting it such as convulsions, multiple sclerosis and even mental disease, and how morphine, caffeine and anesthetic drugs influence the nervous system is expected from research by two University of Chicago physiologists.

These men, Dr. Ralph W. Gerard and Robert T. Tschirgi, have succeeded in keeping a long section of the spinal cord of a rat alive and working outside the animal's body. The spinal cord with the brain makes up the central nervous system. The one and one-half inch section of the rat's cord which has been kept functioning outside the body corresponds to the part in a human from the bottom of the neck to the middle of the back.

This piece of spinal cord is cut out and placed in a small trough.

Functioning of the nervous system is maintained by continually feeding of synthetic or real blood through the cord arteries, first by a syringe and later by an elaborate pumping system.

To test the functioning of the spinal cord, the sensory nerve roots (the dorsal roots) are stimulated and the electrical impulse in the motor nerve roots (ventral roots) is measured after amplification on a cathode ray oscilloscope.

The reflex action of the spinal cord of the rat, Dr. Gerard and Mr. Tschirgi found, was generally lost in one or two minutes when oxygen was omitted from the fluid sent to the cord. If glucose were omitted, the reflex action was lost in two to four minutes. Even when activity is lost for over 30 minutes, full reflex activity can be restored in one to two minutes after re-adding the missing oxygen or glucose.

Five substances, the University of Chicago investigators discovered, can replace the normal glucose (simple sugar) as the source of energy to keep the reflexes in the nervous system active.

Until the new investigation, glucose was believed to be the only chemical capable of producing usable energy in the nervous system. The five substances substituting for glucose are: pyruvate, iso-citrate, alpha ketoglutarate, glutamine and glutamate, all related to sugars or proteins.

On the other hand, succinic acid which is also related to glucose and which is burned vigorously by tissue, including nervous tissue, was a failure in supporting reflex function. The isolated spinal cord used succinic acid even more than glucose, but succinic acid failed to support reflex response—the motor turned, but the car failed to run.

An additional dozen other common biologically important substances to the body, alcohol, acetate, lactate, and several of the amino acids, also failed to keep the reflex working.

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Common *mustard seed,* spread by the U. S. Forest Service on burned-over areas to get a quick soil cover, is sown in the ashes as soon as they cool off; the ashes anchor the seed against wind, thus giving it a quick start.

Question Box

ANTHROPOLOGY

What causes a receding chin? p. 281.

ASTRONOMY

How far has the telescope on Mt. Palomar penetrated into space? p. 274.

CHEMISTRY

From what may summer clothes be made in the future? p. 280.

ENGINEERING

What are the advantages of the new steel-making process? p. 278.

MEDICINE

What new way of separating blood has been discovered? p. 275.

What promises to relieve sufferers of rheumatoid arthritis? p. 277.

What two kinds of nerves are involved in itching? p. 280

PLANT PATHOLOGY

What kind of plants are plant breeders attempting to create? p. 282.

Photographs: Cover, Libbey-Owens-Ford Glass Co.; p. 275, University of Chicago; p. 277, Henry Rehder; p. 279, Westinghouse Electric Corp.; p. 282, p. 283, U. S. Dept. of Agriculture.

On This Week's Cover

➤ A "BLANK" of glass, behind which the workman is seen fuzzily, is lifted off the production line by rubber suction cups. The glass is on its way to the grinding line in the Rossford, O., plant of Libbey-Owens-Ford Glass Company, where it will be transformed by grinding and polishing into a transparent clear glass.

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