

PHYSIOLOGY

Tadpole Studies Show What Alcohol Does to Nerves

Lastingly Hurt by "Spree" But Little Harmed By Mild Drinking, Virginia Scientist Reveals

LITTLE or no perceptible harm is done to the nerves by mild, daily drinking of alcoholic beverages, but permanent damage is done by the alcohol consumed on a "spree." These facts, observed on frog tadpoles, but nevertheless applicable to man, were reported by Dr. C. C. Speidel, professor of anatomy at the University of Virginia Medical School.

The question of just what happens to the nerves during alcoholic intoxication is important because of the fact that the mental processes, the coordinating mechanism, the senses and control of muscles and movements, which are all known to be affected by alcohol, are intimately related to the proper functioning of the nerve cells.

Maps Nerves Day by Day

Dr. Speidel has for several years been observing directly the behavior of nerves in living organisms, using small frog tadpoles whose nerves are constructed essentially on the same plan as man's nerves. What he does is anesthetize the animal slightly and place it on a specially prepared microscopic slide. Then he observes the individual nerve fibers in the transparent tail fin, using very high magnification. From this observation, Dr. Speidel makes a map of the nerves. The animal is then replaced

in pond water and on the next day the same region and the same nerves are again studied. By this method, histories of individual nerve fibers over a period of several months may be obtained.

"A conspicuous feature of a mature fiber is the myelin sheath, a fatty covering which encases the nerve fiber and protects, insulates and nourishes it," Dr. Speidel explained. "This sheath is in the form of segments arranged somewhat like a string of sausages. As it responds quickly to irritation of almost any sort, it is an excellent indicator of alcohol effects. It may degenerate or partially degenerate, even though the nerve axis within remains alive. It never persists, however, if the nerve axis degenerates."

Dr. Speidel found that in very dilute alcohol, less than five-tenths of one per cent., tadpoles may live indefinitely with little or no indication of any special nerve irritation. In much stronger alcohol solutions, more than three per cent., death usually ensues within an hour or two. Alcohol solutions in the neighborhood of two per cent. brought on marked changes in the nerves, such as marked swelling, undulating movements of the myelin sheath, appearance of vacuoles, or spaces between the myelin sheath and the enclosed nerve axis, followed by gradual separation of these structures, and an assumption of an irregular wavy course by the nerve axis.

Explains Actions of Drunk

In strong alcoholic intoxication, the myelin sheath separates from the nerve axis. According to one theory, the surface of junction of the myelin sheath and the nerve axis plays the chief role in conducting nervous impulses. If this is true, Dr. Speidel's observation that the sheath separates from the axis under strong alcoholic intoxication explains why a drunken man cannot walk or talk straight and is more or less insensible to pain.

The structural changes brought about in the nerve fibers are not specific to

alcohol but are due to the irritation it produces and can be brought about by other irritants.

The complete degeneration of the myelin sheath segments by strong alcoholic intoxication is permanent, but the slight irritative changes from mild daily intoxication of brief duration are quickly repaired, Dr. Speidel found. New sprout growth and new formation and growth of myelin segments may take place on fibers subjected to such irritation.

Dr. Speidel discussed the effects of alcohol on nerves in a radio talk under the auspices of Science Service broadcast over the Columbia Broadcasting System.

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ARCHAEOLOGY

Notched Bone Apparently Heidelberg Man's Tool

WERE man's earliest tools made of bone rather than stone? Was there a Bone Age before the Stone Age?

A new bone of contention, in a literal as well as a figurative sense, has been found in the gravel beds near Heidelberg that yielded the famous Mauer Jaw, the only actual skeletal remains ever discovered of the Heidelberg race of man, among the oldest human beings in Europe. This bone object, described by Dr. Ilse Voelcker of the University of Heidelberg in the German journal *Forschungen und Fortschritte*, bears notches and other markings that point almost certainly to hand-working and indicate its use as a tool. The bone is about six inches long, roughly pointed at one end, and notched on the other side as if for binding to a handle or shaft.

Dr. Voelcker conjectures that it may have been Heidelberg Man's spearhead; therein disagreeing with Prof. Heinrich Quiring of Berlin, who holds that shafted spears did not come into use until nearly the end of the Old Stone Age, many thousands of years later than Heidelberg Man's time.

The present find is the third bone object with apparent man-made cuttings to be found in the Mauer gravels. It is part of the legbone of a bison. The other two earlier finds were made from the legbones of either horse or moose.

Dr. Voelcker does not regard certain "eoliths" found in the Mauer gravels and elsewhere as genuine man-made tools.

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▼ WEATHER AND THE NEW DEAL

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an address by

W. R. Gregg

Chief, U. S. Weather Bureau

Wednesday, April 4, at 4:30 p. m., Eastern Standard Time, over Stations of the Columbia Broadcasting System. Each week a prominent scientist speaks over the Columbia System under the auspices of Science Service.