

## PSYCHOLOGY

# Brain Cell's Signals Heard

**Electrical activity of single nerve cells has been studied. Primitive areas of the brain that control certain glands and a machine that understands speech are reported.**

SCIENTISTS have been able to tune in on the electrical activity of single nerve cells in the brain, Dr. Edward V. Evarts of the National Institute of Mental Health, Bethesda, Md., reported to the National Academy of Sciences meeting in Washington, D. C. He has studied the effects of sleep and waking on this activity.

The "brain waves" that have been studied by scientists in recent years result from the signals "broadcast" by many nerve cells sending out impulses in unison.

Many single nerve cells in the brain, like the "chorus" of nerve cells, show considerable "spontaneous" activity during sleep. When the person awakes, this characteristic spontaneous activity is reduced in many nerve cells.

When the senses pick up signals from the surroundings, as when you are reading or listening, there are after-effects that also

interfere with the spontaneous nerve cell activity. These after-effects of sense signals are naturally more marked during the waking state than during sleep.

The result of curbing the spontaneous activity of nerve cells during wakefulness may serve to allow the brain to respond more accurately to things going on in the surroundings, Dr. Evarts indicated.

*Science News Letter, May 7, 1960*

## Control Secretions

AREAS have been found in the most primitive part of the brain's cortex that control the secretions of certain endocrine glands, Dr. John W. Mason of the Walter Reed Army Institute of Research said in another report to the National Academy of Sciences meeting in Washington, D. C.

The two areas are known to anatomists

as the hippocampus and the amygdaloid complex. The part of the brain in which they are located is called the limbic system. The amygdaloid complex acts to stimulate the secretion of ACTH which, in turn, causes release of cortisone from the adrenal glands.

Hydrocortisone, when secreted in the body, has a vital role in the production of energy for use by the body. Administered by a physician, it is an important remedy for painful rheumatoid arthritis and other diseases.

The other newly studied area, the hippocampus, acts to suppress the ACTH secretion. Dr. Mason reported.

*Science News Letter, May 7, 1960*

## Man Has Three Brains

MAN HAS THREE brains. Although very different in construction, these three brains must work together. The oldest of these brains is basically reptilian, Dr. Paul D. MacLean of the National Institute of Mental Health, Bethesda, Md., reported to the National Academy of Sciences meeting in Washington, D. C.

Man's second brain is inherited from lower mammals. The third brain is a late mammalian development that has made man peculiarly man.

The lower mammalian brain, which we share with all mammals from mouse to man, manufactures the feelings that guide behavior essential to self-preservation and the survival of the species. When the site of this second brain in the limbic lobe surrounding the brain stem is stimulated electrically or chemically, sexual behavior results.

The second brain is also responsible, through our feelings, for our sense of reality.

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## Machine "Hears" Speech

A machine that can "understand" ten spoken syllables has been built and used to develop better ways for man actually to control machines vocally.

Dr. Harry F. Olson of RCA Laboratories, Princeton, N. J., told the National Academy of Sciences meeting in Washington, D. C., that the device is called a "phonetic typewriter." It has helped scientists aim research toward ways to analyze and identify speech and to code and decode it.

Dr. Olson suggested the day is coming when a factory hand may command his production-like machine vocally as well as with hands and feet. Also, he said, phonetic typewriters may be used to feed information into computers, perhaps as a human investigator reads figures from a chart.

*Science News Letter, May 7, 1960*

## Ulcers Not From Cortisone

CORTISONE does not cause ulcers in the upper intestine, scientists at the National Academy of Sciences meeting, Washington, D. C., were told.

Dr. Lester R. Dragstedt of the University of Florida said that most doctors and



**X-RAY OF THE SUN**—First X-ray photograph of the sun has just been made by Richard L. Blake of the U.S. Naval Research Laboratory. The photograph was made from an Aerobee-Hi rocket launched from the White Sands Missile Range, New Mexico (see story p. 292).

research workers agree that ulcers of the upper intestine, or duodenum, are usually caused by an abnormal over-secretion of gastric juice resulting from mental or physical stress. But there has been considerable dispute about the causative mechanism.

One recent concept tried to explain the puzzle by stating that the hypothalamus, a part of the brain, stimulates the pituitary gland which releases adrenocorticotrophic hormone, ACTH. This hormone goes to the adrenal gland and causes increased production of cortisone, which is claimed to cause gastric secretion and duodenal ulcer.

#### ASTRONOMY

## Nova Turns Neutron Star

A BIT of matter the size of a dust grain in a neutron star would weigh more than the biggest ship.

Many scientists now believe that the left-over core from a supernova turns into a "neutron star," Dr. E. E. Salpeter of Cornell University reported at the National Academy of Sciences meeting in Washington, D. C.

It is generally thought that supernovae explode because of the sudden collapse of a star. The remaining core is believed to turn into a white dwarf star that consists mainly of ionized iron at densities of 1,000,000 grams per cubic centimeter. These dwarf stars are about the size of the sun but not as bright.

Dr. Salpeter said he believed this core is similar to that of a white dwarf but of much greater density. When the concentration in this type star reaches densities of about 100 billion grams in each cubic centimeter, the electrons have built up to such pressures that beta decays begin. The result is that common elements like iron are first transformed into heavy and transuranic elements rich in neutrons. At even higher densities they are changed into free neutrons.

During the cooling process of these stars, the densities go as high as 1,000 million million grams per cubic centimeter. As its interior cools, the brightness of this type of star would decrease from about a thousand times that of the sun to about one-hundredth the sun's brightness. The temperature at its center is then comparable to that of the sun or a white dwarf.

At this point, the star may have a surface temperature of about half a million degrees and much of the light emitted would not be visible but a type of radiation called "soft X-rays," Dr. Salpeter said. It is possible that these rays might be observable directly from outside of the earth's atmosphere.

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## Tiny Pieces of Comets

ALL THE "shooting stars" bright enough to be seen by the naked eye are caused by tiny pieces of comets hurtling through the earth's atmosphere.

Comets also supply most of the tiny particles known as meteoroids that may be a danger to operating space vehicles, Dr. Fred

Dr. Dragstedt said his research showed that ACTH, cortisone and epinephrine do not stimulate gastric secretion. He also found that nervous tensions do not stimulate such secretion if the vagus nerves have been cut. The vagus nerve begins in the brain and has branches going to various organs.

He suggests that the stresses of modern life play an important role in duodenal ulcer by causing, in some way, an increased activity of the vagus nerves. This in turn causes an increase in stomach motility and the over-secretion of juices results.

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L. Whipple, director of the Smithsonian Institution's Astrophysical Observatory, Cambridge, Mass., reported to the National Academy of Sciences in Washington, D. C. The definite determination of the source of meteors in the visual range is based on analysis of several hundred meteor photographs taken with the Baker Super-Schmidt cameras in New Mexico. The cometary meteors are extremely fragile, and the density varies greatly from one meteor to another.

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## X-ray of Sun Shows Halo

THE FIRST X-ray photograph of the sun, showing it ringed by a bright X-ray halo, was shown to scientists at the National Academy of Sciences meeting in Washington, D. C. (See picture p. 291.)

Dr. Herbert Friedman of the U. S. Naval Research Laboratory reported that this unique photograph was taken from an Aerobee-Hi rocket carrying an especially designed camera more than 130 miles above the earth's surface. The photograph shows not only the bright X-ray halo but several spots of intense X-ray emission distributed over the solar surface.

The sun's visible disk has a surface temperature of some 10,000 degrees Fahrenheit. Extending high above the disk is a thin outer atmosphere known as the corona. Because its brightness is only a millionth of the visible surface, about equal to that of the full moon, the corona can be seen only during a total eclipse or by special instruments, at which time it appears to stretch millions of miles into space.

Although very tenuous, the corona gas is very hot, averaging about a million degrees, with hot spots of perhaps some 10 million degrees.

Dr. Friedman said that the bright ring around the solar disk represents the thickness of the coronal gas from which X-rays are emitted. Virtually all of the X-ray emission is confined to a height of about one-fifth the solar radius above the surface.

Dr. Friedman also reported that the earth itself has a corona, called the geocorona. Neutral hydrogen from the photochemical action of sunlight on water vapor and methane near the 50 to 60 mile level of the atmosphere forms this earthly corona at times of disturbances in the earth's magnetic field.

At these times a stream of ionized gas approaching the earth from the sun runs into the barrier of the earth's magnetic field, which exerts a magnetic pressure against the stream, opposing its advance and forming a concave distortion in the stream's surface. At the same time, the stream squashes the earth's magnetic field. Resulting reactions cause the stream to flow around the earth, completely enfolding the earth's magnetic field.

The cavity thus formed inside the stream behaves like an elastic balloon inflated with the water vapor and methane. When the sun shines on the neutral hydrogen contained within this corona, it glows with invisible ultraviolet light.

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