

PHYSIOLOGY

Brain Gives Orders to Pituitary Master Gland

➤ ASPIRIN and morphine, which stimulate ACTH production, apparently act on the endocrine system through the brain, two scientists in the University of California School of Medicine have found.

ACTH is the pituitary gland hormone which stimulates the adrenal glands to produce cortisone.

The drugs apparently induce the brain to tell the pituitary gland to step up ACTH production, and the added ACTH makes the adrenals put out more steroid hormones.

The fact that the brain can order the pituitary around is a further bit of evidence weakening the long-held view that the endocrine glands are a self-governing system controlled by the "master" pituitary.

The scientists, Drs. E. L. Way and Robert George, used rats in their experiments.

They tracked down the site of action of the drugs by a process of elimination. They were able to prevent the hormone-stimulating effects of the drugs if they destroyed a point in the brain known as the median eminence.

The two drugs' actions on the pituitary appear to involve transmission of a signal from some area in or near the hypothalamus. This portion of the brain is not fully understood, but is known to influence sleep, appetite and temperature regulation.

The two scientists said further work is needed to explain fully the nervous pathways of aspirin and morphine, and that there may be more than one mechanism for influencing the pituitary.

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OCEANOGRAPHY

New Ocean Stream Found Under Gulf Stream

➤ ANOTHER DEEP ocean stream flowing in the opposite direction moves under the Gulf Stream, at least off the South Carolina coast. There, the upper half of the water column moves northward, while the lower half goes southward.

This finding, if proved true for the rest of the Atlantic Ocean from the Arctic to the Antarctic, will mark a revolution in present ideas concerning ocean circulation. The low-lying underwater current flowing southward was discovered in cooperative research by scientists of the British Institute of Oceanography and the Woods Hole Oceanographic Institution, Woods Hole, Mass.

They used the B.I.O.'s 234-foot Discovery II and the Woods Hole 142-foot Atlantis to detect directly the massive deep stream. Its existence was first suggested by Henry Stommel of Woods Hole, who believes the deep southward current is caused by temperature differences.

To test the theory, a British device that measures ocean currents directly was lowered into the water a little to the east of

the surface Gulf Stream, which flows northward along the western edge of the Atlantic. Called a "pinger," the device consists of electronic signalling apparatus encased in an aluminum alloy pipe nine feet long and two inches in diameter.

The pinging float can be adjusted to remain at any desired depth, and is then carried along at the same rate and in the same direction as the subsurface current.

After the usual observations of temperature, saltness and oxygen content of the water from the ocean surface to the bottom were made at stations two miles apart, the expected deep current velocities and directions were computed. Then the pinging floats were set out one at a time and followed for periods ranging from 18 hours to four and a half days.

Loran stations helped the scientists to determine their positions with the extreme accuracy needed.

The direct observations of the deep current by the British confirm Mr. Stommel's prediction of a subsurface stream flowing southward. The current was found to be slowest between depths of 4,500 and 6,000 feet, and to increase steadily in velocity at greater depths, as was predicted.

The southerly current ranged from about 600 to about 2,000 feet per hour at a depth of about 8,400 feet. In contrast, the surface velocity of the Gulf Stream along the narrow inshore edge nearest the United States ranges from about 24,000 to 30,000 feet per hour.

The southward moving lower layer exists only 18 inches from the bottom, the test showed.

The confirmation of Mr. Stommel's theory may answer a question long puzzling oceanographers—why is there no equivalent of the Gulf Stream in the South Atlantic Ocean? The only significant surface current found there is the Brazil Current, which is weak and broad compared with the narrow, swift Gulf Stream.

Mr. Stommel believes a strong subsurface movement will be found under the sluggish Brazil Current. A report on the research appears in the current *Research Reviews* (May), a publication of the Office of Naval Research.

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CHEMISTRY

Coffee and Tea Leave Deposit in Blood

➤ COFFEE and tea drinkers can be spotted by a chemical, either caffeine or a closely related substance, found in their blood as much as nine hours later, two scientists report.

The chemical shows up as a spot that absorbs ultraviolet light when blood plasma is extracted by chloroform, then tested by paper chromatographic methods.

Drs. D. Abelson and D. Borchers of the department of medicine, Postgraduate Medical School of London, England, report their research in *Nature* (June 1).

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IN SCIEN

MARINE BIOLOGY

Barnacle Breeding For Better Boat Paint

➤ ARCTIC BARNACLES will breed either faster or slower depending on the temperature, a fact that may help mariners find a better paint for the bottoms of their boats, D. J. Crisp, marine biology station, University of North Wales, Bangor, reports in *Nature* (June 1).

The two types of barnacles tested become fertilized only once a year in their normal environment. But in the laboratory, if they are kept in water at cold temperatures around 43 degrees Fahrenheit, breeding takes place several months before it normally would.

Increasing the temperature to around 60 degrees Fahrenheit has the opposite effect and even the once-a-year breeding time is lost.

When searching for toxic substances to put in barnacle paint, test solutions of them are put in sea water containing barnacle larvae. The test is simple and quick. The only drawback is that a constant supply of barnacles is hard to come by.

But now with the knowledge of temperature effects, it should be possible to make a good supply of the larvae available the year around, the biologist reports.

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BIOLOGY

Study Energy Conversion In Luminous Clams

➤ RARE luminous clams from Italy will soon join the common firefly in helping to solve the problem of converting chemical energy to light energy.

Dr. William D. McElroy, biology professor at Johns Hopkins University, Baltimore, has for several years used thousands of fireflies' tails in research directed at discovering how the insects produce their so-called "cold light." Now, with the cooperation of the Naples Experimental Zoological Station, Dr. McElroy hopes to be able to extend his research to include these unique mollusks.

The clam, known scientifically as *Pholas dactylus*, and the firefly each require the two substances, luciferin and luciferase, an enzyme, in order to emit light. In fireflies, the amount of light varies with the amount of a chemical called adenosine triphosphate, or ATP, that combines with the luciferin and luciferase.

ATP is not only important for light emission, however. It is a compound, found in all living things, that enables them to utilize energy.

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CE FIELDS

PSYCHOLOGY

Chimp Can Learn to Work Hands Independently

► A CHIMPANZEE can learn to use his two hands independently but simultaneously like the boy who pats his head with one hand while he is rubbing his stomach with the other.

This discovery, which makes it possible to use the chimp as an experimental animal for new kinds of behavioral research, is reported in *Science* (May 31) by Dr. C. B. Ferster of the Yerkes Laboratories of Primate Biology, Orange Park, Fla.

The animals used in the experiment were first reduced down to 80% of their normal weight. Then they were taught to press a key to get food. After a fixed number of presses, the animal was rewarded by a morsel of food.

The chimps acted as animals normally do when they work on this sort of "piece-work" pay schedule. They worked at a high, sustained rate except when they were rewarded only after a large number of "pieces." Then they paused after getting their rewards, much like the man who does not show up for work on the day after payday.

Next, a second key was set up about six inches to the left. The chimp worked this key with his left hand while he continued to work the first one with his right—a possibility for the chimp because of his erect posture.

But on the left key, the pay was on the basis of time, not piece work, and the intervals of time varied. The result was a constant, moderate rate of work, quite independent of the rate with the right hand. There were no pauses after the reward.

Food received as pay for work with the left hand was taken and eaten while work with the right hand went on without stopping.

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MEDICINE

Test Spots Heart Attack Damage

► A MORE SENSITIVE test for detecting heart muscle damage after a "heart attack," called the C-reactive protein test, was reported by Dr. Irving G. Kroop, Jewish Chronic Disease Hospital, Brooklyn, N. Y., and Nathan H. Shackman, State University College of Medicine, Brooklyn, to the American College of Cardiology meeting in Washington.

C-reactive protein is an abnormal serum globulin produced by the body in response to injury or inflammation. It is a highly sensitive index of tissue damage and when

there is no other bodily injury it can be used to diagnose cases of heart muscle damage, the cardiologists explained.

Chemical tests are necessary in heart conditions because heart damage will sometimes not show up on an electrocardiograph for weeks.

A comparatively recent development in chemical tests has been the SGO-T, or serum glutamic oxalacetic transaminase test. This substance is an enzyme widely distributed in the body cells but most highly concentrated in heart muscle.

Although the SGO-T test is more specific for heart damage than the new C-reactive protein one, it is not as sensitive as the new one since a varying amount of the enzyme exists normally.

C-reactive protein, on the other hand, is not normally found in the serum and any amount detected is significant.

In 45 cases of milder heart muscle damage the SGO-T test did not show up the damage while the C-reactive protein test did, the cardiologists reported.

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BIOLOGY

Male Prostate Cancer Due to Female Hormones

► THE FEMALE sex hormone, not the male one, is responsible for both enlargement and cancer of the male prostate gland, Dr. Sheldon C. Sommers, Boston University School of Medicine, has discovered.

This unexpected finding was based on microscopic examinations of the various hormone-producing glands in both men with prostatic cancer and those without any kind of cancer.

Two sets of glands in men, the testes and the adrenals, produce the female hormones, estrogens, as well as male hormones. Female ovaries and adrenals also produce the hormones of both sexes. So far as hormones go, sex is a matter of degree and there is no such thing as 100% maleness or femaleness.

The study showed 80% of the men who had died with prostatic cancer had produced enough estrogen to enlarge their prostates. In most of these cases, the cells producing chiefly male hormone had withered away.

Only about half of the non-cancerous controls showed enlarged prostates, considered a sign of predominant estrogen production.

The results raise the possibility that both enlargement and cancer of the prostate come about because of the same hormonal imbalances.

These imbalances appear to be a product of the aging process, during which male hormone-producing cells were still highly active.

Other scientists have described a "third sex" of old men and women whose glands produce mainly the hormones of the opposite sex.

Dr. Sommer's research was reported by the Massachusetts division of the American Cancer Society.

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PHYSIOLOGY

Finger-Sized Structure Controls Brain Function

► YOUR AWARENESS of the world and ability to think, learn and act depends upon a tiny structure in your brain no larger than your little finger.

Dr. John D. French, neurosurgeon at the Long Beach Veterans Administration Hospital and the University of California at Los Angeles Medical School, has experimented with a recently discovered tiny nerve network in the brain stem known as the RAS.

Current research at UCLA and other research centers has suggested the RAS is an integrating machine. It awakens the brain to consciousness, keeps it alert and directs the traffic of messages in the nervous system.

The RAS monitors the myriads of stimuli that beat upon our senses, accepting what we need to perceive and rejecting what is irrelevant, says Dr. French. It also tempers and refines our muscular activity.

In addition, it contributes in an important way to the highest mental processes—the focusing of attention, introspection and, doubtless, all forms of reasoning.

It is possible to live for months or even years after injury has destroyed the RAS. But without it, Dr. French points out, an individual is reduced to a blob of protoplasm.

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VIROLOGY

Virus Takes Off "Armor," Strips Down for Action

► ONCE it has invaded the "fortress" of a living cell, a virus apparently takes off its "armor" and strips down for action.

This has been suggested in tobacco mosaic virus research conducted at the University of California at Los Angeles by Drs. Albert Siegel, William Ginoza and Samuel Wildman.

Tobacco mosaic virus in its native state consists of two substances, a thin strand of nucleic acid, surrounded by a thick mass of protein, Dr. Siegel points out.

Nobody is certain what the function of the protein is, he says. It has been suggested that it may serve as a protective "suit of armor" for the nucleic acid, which is very sensitive and vulnerable to all sorts of factors when it is outside a cell.

Experimentally it is possible to initiate infection with the nucleic acid strand of the virus after the protein coat has been stripped. This "naked" virus starts multiplying sooner in the cell than the complete virus particle.

The investigators believe the cause for this is that the complete virus must "strip" for action after it invades the cell and before it can start multiplying at the expense of the host cell. The process of "stripping" takes about two hours and thus the "naked" virus has a head start over the complete "armored" virus.

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