

NEUROLOGY

"Pumps" Force Ions Past Brain "Barriers"

► A KEY factor in the operation of the central nervous system may be tiny, pump-like mechanisms which force vital substances through formidable "barriers" in the brain, it has been found by Dr. Robert Tschirgi of the University of California at Los Angeles Medical School. He is doing research on the brain under a U. S. Public Health Service grant.

Many substances carried by the blood are useful to other tissues, but harmful to sensitive, highly specialized brain cells. Brain cells are protected from these substances by difficult-to-penetrate barriers. For example, sodium ions, which go quickly from the blood into other body tissues, take 64 hours to penetrate brain tissue.

Pencillin, which is not toxic to other tissue, but is extremely toxic to the brain, readily penetrates other parts of the body but does not penetrate the brain.

"The brain is apparently assured of a carefully regulated quantitative and qualitative flow of substances necessary for its normal operation by a complex system of pumps," Dr. Tschirgi says. "Disorders of the nervous system such as epilepsy and cerebral palsy may occur when these pumps fail."

The most formidable barrier apparently exists between the brain blood vessels and the "moat" of cerebrospinal fluid that surrounds the central nervous system. This "moat" also serves as a reservoir of brain "fuel." Differences in the electrical potential between the blood and the cerebrospinal fluid indicate differences in the activity of the pumps that regulate the passage of soluble substances between the two fluids. These differences can be measured by sensitive instruments.

Science News Letter, September 12, 1953

MEDICINE

Chlorophyll, House Calls, Twins Are Medical News

► RECENT MEDICAL news, according to the American Medical Association, concerns chlorophyll, house calls and twins.

The value of chlorophyll derivatives taken internally as deodorizing agents has not been determined, the association declared in an editorial in the *Journal of the American Medical Association* (Aug. 29).

Although some research has been done, "no final conclusions can be reached" until: the composition of the various preparations is more exactly spelled out; the fate of the swallowed chlorophylls in the body determined, and more objective testing done.

In one out of four cases a request to a doctor to make a house call is unwarranted because the patient is able to go to the doctor's office. Two out of three such calls are to treat women. This conclusion is drawn by Drs. William T. Couter, Alvin T. Held and Charles L. York of Decatur, Ill.

They base the conclusion on a study of 1,000 consecutive house calls made by them during two and one-half years.

Tuberculosis which had spread throughout their bodies and their generally weak condition made it impossible for doctors to separate Tasmanian Siamese twin girls who were joined at the top of their heads like the Brodie twins of Chicago. The girls were born in March, 1950, and died in January, 1951. They were barely able to stand a short, preliminary operation.

First detailed U. S. medical report of these twins is given by Dr. E. Graeme Robertson, honorary neurologist at the Royal Melbourne Hospital and Children's Hospital, Melbourne, Australia, in the *Archives of Neurology and Psychiatry*.

Science News Letter, September 12, 1953

SURGERY

Instrument Spares Operation on Patient

► MANY CANCER patients whose cancers have spread to the liver and other organs in the abdomen can be spared useless operations by an instrument called the peritoneoscope, three doctors from the Veterans Administration Hospital at Des Moines, Iowa, report in the *Journal of the American Medical Association* (Aug. 22).

The three are Drs. Samuel J. Zoeckler, Philip G. Keil and George J. Hegstrom.

The peritoneoscope is an optical instrument equipped with lights and mirrors. It is inserted through a small cut into the abdomen. Peering through it, the doctor can see various small areas within the abdomen without having to perform the major operation of opening the entire abdomen, called laparotomy.

If he sees through the peritoneoscope a mass that might be cancer, he can remove a bit through the instrument with a forceps and this bit can be examined under the microscope for positive diagnosis.

If the cancer has spread so that it cannot be removed by operation, the patient is spared useless surgery. Over half, 51%, of patients have been spared such useless operations since the doctors started using the peritoneoscope as part of the routine study of those with suspected cancer. In addition, the instrument showed cancers that could be removed by operation in many of the patients.

Equally important, the doctors report, was the fact that in patients who had been operated on and returned to the hospital with various symptoms, peritoneoscope examination showed that 50% had more cancer but 27.8% did not. Probably most of these would, without the instrument examination, have been advised to have further operations.

Cancer was ruled out and other conditions shown as the cause of symptoms in 93% of a group of patients suspected of having cancers that could not be disproved by other means of diagnosis.

Science News Letter, September 12, 1953

IN SCIEN

NEUROLOGY

Better Nerve Surgery for Blood Vessel Disorders

► HOW TO get better results in nerve-cutting operations for relief of blood vessel disorders and high blood pressure was reported at the Ninth International Physiological Congress in Montreal by Drs. William J. Cox, Walter C. Randall, William Alexander, K. B. Coldwater and A. B. Hertzman of St. Louis University School of Medicine and the Veterans Hospital, Jefferson Barracks, Mo.

One object of the nerve-cutting operations is to free blood vessels from nervous control so that they will be more relaxed and permit blood to flow with less pressure from, and work by, the heart.

The conventional operation, when blood vessels in the legs or feet are affected, is to remove only the second and third lumbar ganglia (nerve cell mass). This sometimes fails to give the desired results and another operation must be done to remove other nerve cell masses near the spine.

The same situation exists in cases when the operation is done to relieve blood vessel disorder in the arms and hands.

The failures can be avoided, the St. Louis researchers suggest, by applying electrical stimulation to the nerves at the time of the operation, and measuring the sweating on the arms or legs, hands or feet. The action of blood vessels and sweating usually is controlled by the same nerves, so the sweating after nerve stimulation can serve as guide to which nerves should be cut to free the blood vessels.

However, the action of the blood vessels and sweat glands is not always tied together, so the scientists said the project must be pursued further on the basis of blood vessels alone in relation to the sympathetic nervous system.

Science News Letter, September 12, 1953

ASTRONOMY

Mysterious Patches Discovered on Sun

► LARGE MYSTERIOUS patches have been spotted mathematically on the sun's visible surface, but they have not yet been identified with anything that can be seen. Such patches of granulation are spaced about 9,000 miles apart over the surface, Dr. J. H. Rush and F. E. Stuart of the High Altitude Observatory, Boulder, Colo., have found. They reported their evidence of these large patches to the American Astronomical Society meeting in that city.

Science News Letter, September 12, 1953

CE FIELDS

BIOCHEMISTRY

Vital Adrenal Glands Work Before Birth

► THE TINY but vital adrenal glands, famous because they produce the arthritis remedy, cortisone, and the heart stimulant, adrenalin, or epinephrine, start their work before birth. This is true, at least, for unborn lambs, reports Dr. S. R. M. Reynolds of the Carnegie Institution of Washington's department of embryology in Baltimore.

By producing adrenalin before birth, these glands may play a part in saving life threatened by pre-birth or birth asphyxiation, he reports in *Science* (Aug. 28).

Dr. Reynolds studied baby lambs delivered prematurely by Caesarean operation. When the heart and circulation of the animal is in a state of acute distress as a result of asphyxia and consequent oxygen lack, the time it takes the heart to recover is prolonged and its rate after recovery is less when the animal lacks adrenal glands.

Since, in the experiments, the heart had been freed from nervous system control, its recovery when the adrenals are not removed cannot be due to the nervous system stimulation. The slower recovery with the adrenals removed pointed to a stimulus from these glands. This, Dr. Reynolds says, could only be epinephrine or some other related substance from the adrenal glands.

Science News Letter, September 12, 1953

CHEMISTRY

Simplify Cortisone Production Method

► FIRST PROMISE of "unlimited supplies of cortisone," hormone famous for relief of arthritis and some other diseases, comes from a new, simplified method of producing the chemical, worked out by Monsanto Chemical Company, says its organic chemicals division research director, Howard K. Nason.

The Monsanto chemists responsible for this accomplishment, under the direction of Oliver J. Weinkauff, include William S. Knowles, Lloyd Barkley, Martin W. Farrar and Harold Raffelson.

Prof. Robert B. Woodward of Harvard University was the first to achieve a total synthesis of the saturated steroid nucleus, such as is found in cortisone. The Monsanto process starts with an inexpensive, plentiful material. It involves the discovery of new and more practical intermediates as well as the simplification of Woodward's procedure.

Specifically, the report in the *Journal of the American Chemical Society* describes

the synthesis of dl-cortisone acetate from an intermediate known as Woodward's tricyclic ketone in 17 steps, as compared with the 37 steps reported by Dr. Woodward. The process described by Monsanto does not require rare reagents and yields are reported as excellent.

Dr. Nason emphasized that the development by Monsanto does not mean that large quantities of totally synthetic cortisone will be available immediately. Some time will be required, he said, to translate the laboratory findings into full-scale plants capable of producing the synthetic hormone in commercial quantities.

Science News Letter, September 12, 1953

MARINE BIOLOGY

Potato-Like Sponges Fill Eastern Beaches

► STRANGE-LOOKING THINGS are being washed up on the East Coast beaches these days. They look like potatoes.

Some beachcombers thought they had found ambergris, the \$15-an-ounce stuff that comes out of sperm whales and is used in making perfume.

Dr. Jay D. Andrews, oyster biologist at the Virginia Fisheries Laboratory, however, found they are sponges.

The sponges were sanded over by the recent hurricane, Dr. Andrews believes. The strong waves during the storm probably dislodged them from their root-like attachment in the sand or mud where they grow. As they died and disintegrated, they floated to the surface and were washed up on the beaches.

Sponges grow all over oyster bars in Hampton Roads, many parts of Chesapeake Bay, and probably all along the Atlantic coast. Dr. Andrews' phones kept buzzing with calls from curious vacationists at nearby Virginia beaches, some confident of having found a fortune in ambergris.

Actually, if all that potato-like sponge cluttering up beaches in Virginia actually had been ambergris, the market would be flooded and the price would drop to a new low. Today's price varies from \$3 to \$15 per ounce, depending on the quality of the ambergris and on the demand in the perfume industry.

Science News Letter, September 12, 1953

EDUCATION

Need Desks to Match Bigger School Children

► TODAY'S SCHOOL children are bigger, as well as more numerous, than the school children of 50 years ago. They have outgrown the desks, seats and even coatracks that served their parents and grandparents. To help schools get the right sizes when they shop for new equipment, the U.S. Office of Education has just issued a handbook, "Basic Body Measurements of School Age Children" (see p. 172).

Science News Letter, September 12, 1953

ECOLOGY

Aussie Animals With Pockets Growing Smaller

► AUSTRALIA'S MARSUPIALS, those odd animals with pockets for their young which so charmed the GI's in World War II, are going through an evolutionary process of gradually getting smaller.

This is reported in *Nature* (Aug. 29) by Dr. Edmund D. Gill of the National Museum, Melbourne.

Dr. Gill found an upper molar tooth near Hamilton, Victoria, which he identified as having come from the mouth of a cuscus, prehistoric marsupial which lived there in the Upper Pliocene age. This brings to three the total of known Australian Tertiary marsupials. Others found previously were a kangaroo of the Lower Pliocene, older than the cuscus, and a possum of the Lower Miocene or Upper Eocene.

The series of three fossils show that the marsupials were small in the Tertiary. They were of giant size in the Pleistocene, when smaller forms also existed in smaller numbers. And they were small again in the following Holocene age. It is this process of getting smaller that is still going on today.

The bigger kangaroos are now tending to die out, while the small marsupials are thriving.

Science News Letter, September 12, 1953

ENGINEERING

Big Powerhouse to Serve New Aluminum Plant

► GIANT ELECTRICAL contacts on huge circuit breakers are scheduled to snap shut in April, 1954, putting the world's largest private hydroelectric plant "on the line."

Created in what is believed the largest underground powerhouse in the world, the electric power will be fed to the Aluminum Company of Canada's new aluminum reduction works 50 miles away at Kitimat, B.C.

The big power plant is situated on the Kemano River 500 miles from Vancouver and 185 miles from Prince Rupert. It ultimately will develop 2,400,000 horsepower for the aluminum company.

Powerful turbogenerators will be turned by water falling 2,585 feet to their blades. The water will be stored in a reservoir 125 miles long.

F. W. Lawton, power expert with Aluminum Laboratories Ltd., Montreal, told the American Institute of Electrical Engineers meeting in Vancouver, B.C., that the hydroelectric power will be transmitted to the smelting facilities at 300 kilovolts—an uncommonly high voltage. He said these will be the first 300 kv cables in North America.

The cables themselves are said to be unique: they consist of the world's largest steel-reinforced aluminum conductors.

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