

pancreas has about the same rating in its production of pancreatic juice.

Thermostat Under Brain

There is a thermostat under the brain, that regulates body temperature. Experiments on monkeys demonstrating its existence were described to the Academy by Dr. S. W. Ranson of Northwestern University Medical School.

The temperature-regulating mechanism is in the hypothalamus, a group of structures on the under side of the brain, running back toward the base of the spinal cord; it includes, among other things, the pituitary gland, now famous as the "boss gland" of the body.

Cats and monkeys in which the hypothalamic region had been injured were used in the experiments. Those in which the injury was toward the front part of the region would heat up rapidly if placed in warm incubators, running temperatures as high as 103 to 105 degrees, without sweating. They seemed, however, to be able to bring their body warmth up if they were subjected to subnormal outside temperatures. However, when the injury was located toward the rear of the hypothalamus, the animals could not compensate for cold, and data thus far accumulated seem to indicate that they are also unable to protect themselves against heating. They have become in effect cold-blooded animals, like reptiles and fish.

Juvenile Sex Hormones

Grafting salamander tadpoles together to form artificial Siamese twins has proved the existence of juvenile sex hormones quite different from those of adulthood, Prof. Emil Witschi of the University of Iowa declared. When immature salamanders of opposite sex were thus grafted together, the ovaries of the female were first practically suppressed by the secretions introduced into her blood stream by the male. Later, male-like secondary sex characters appeared on her body, induced by the maturing male's adult glandular secretions.

"Grappling Bridge"

A typical four-legged animal, like a horse, is structurally a combination of bridge, steam shovel or dredge, and automobile, in the evolutionary analogy presented at the Academy's principal evening lecture by Prof. William K. Gregory of the American Museum of Natural History. The legs are the piers, the backbone a sort of cantilever arch, the neck is a crane, ending in the grab

bucket of the mouth. Prof. Gregory coined the descriptive phrase, "self-moving grappling-bridge," to cover the whole situation.

As for man, he is physically a quadruped turned up on end. "A comparison of the skeleton of *Homo sapiens* with those of his nearest subhuman relatives shows that he has longer legs and shorter arms and that his cranium has become greatly inflated," Prof. Gregory said.

Surgical Mistake

Cutting a nerve to put the adrenal glands out of action, in cases of high blood pressure, is a major surgical mistake, Dr. J. M. Rogoff of the University of Chicago indicated. It does reduce the pressure, but it induces Addison's disease, a much worse ailment, which kills the patient off much more quickly.

Science News Letter, November 28, 1936

ASTRONOMY

"Nervous System" Guides Eye of a Telescope

WHILE biologists were discussing the mechanisms of life before the National Academy of Sciences, an almost-living electrical mechanism was being described by the two astronomers who are its creators, Drs. A. E. Whitford and G. E. Kron of the Washburn Observatory, University of Wisconsin.

Their device is designed to perform one of the most precise, exacting, and wearisome tasks that at present burdens some of the most skilled eyes, nerves, and fingers in the world—keeping great telescopes trained with split-hair's-breadth exactness on a star during the long hours required to make an astronomical photograph. At present, astronomers must sit by their instruments as a gunner sits by his cannon, keeping the sighting crossed hairs undeviatingly on the same tiny spot of light, while all the rolling world sleeps about them.

But with the automatic guider now under test in the Wisconsin observatory, all this precise and tedious labor is delegated to a photoelectric cell. The astronomer picks up a star that is to serve as guide. Its light is divided into two beams by a reflecting knife edge, and the two beams are made to shine alternately on the light-sensitive surface of the cell. If the star is not perfectly centered on the knife edge one beam will be brighter than the other and there will be a flickering intensity.

Suitably amplified, this flicker controls a motor which makes the proper correction to center the star on the knife edge and reduce the flicker to zero.

Naturally, such an electromechanical system is almost unimaginably delicate and has offered its share of troubles. Said Dr. Whitford:

"The principal difficulty is the extremely small amount of light available to actuate the mechanism, so that the feeble impulse from a star must be amplified as much as a billion billion times (10 to the 18th power, or 1,000,000,000,000,000,000). This amplification is so great that the graininess of electricity is a serious limitation, that is, the original photoelectric current is not a steady stream but a procession of irregularly spaced electrons. The use of the new Zworykin electron multiplier has made it possible to extend the working limit somewhat beyond that attainable by conventional methods of amplification. The control is exercised entirely through electron tubes, without mechanical relays.

"The instrument is still in the experimental stage, but successful preliminary tests have been made on the 60-inch telescope of the Mount Wilson Observatory using stars down to the eighth magnitude. Artificial errors were introduced into the driving mechanism of the telescope, but the guider continuously corrected them and produced satisfactory star images."

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BIOLOGY

Biology and Engineering Attack Basic Food Problem

BIOLOGY and engineering have united both points of view and methods of attack, for efforts toward the eventual solution of the world's basic food problem—the problem of chlorophyll.

Chlorophyll is the green stuff in plant cells that captures the energy of sunlight and uses it to tie water and carbon dioxide together to form sugars and starches. It is a large-moleculed, complex substance, related chemically to the red hemoglobin of our own blood. Not very much is known, as yet, of how it works, or of how it is formed in the growing plant.

These and related problems are under attack in many laboratories. Among the most notable of research teams that have tackled chlorophyll is the group working at Antioch College, Ohio, on the Kettering Foun- (*Turn to page 350*)