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."

Science News Letter, November 28, 1936

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)

hours, and on the fourth day to one and a half hours.

Following the experience with the Spanish boy, electrosurgical methods were used to extract an impacted tooth in another patient suffering from hemophilia. Seven of this patient's male relatives had died of hemophilia and two of his brothers had been treated in the hospital for the condition. Immediate hemorrhage following extraction of the tooth was completely checked by high frequency electrocoagulation, Dr. Woodhall reported.

This patient's case also showed the possible existence of an automatic safety mechanism that apparently at times protects bleeders from fatal hemorrhages and suggests a method of treating them. The day after the tooth extraction, the patient had two large hemorrhages under the skin. One was around the face, as a result of the local anesthesia given him, and the other involved his entire left arm following puncture of a vein for a blood test. Coincidentally with these hemorrhages, a marked fall in the clotting time of his blood occurred. A similar reduction of the clotting time had been noticed before on this same patient following hemorrhages under the skin.

The hemorrhage itself evidently called up extra blood-clotting thromboplastic substances which served to protect the patient from further dangerous bleeding. Injection of thromboplastic substances from the bleeder's own blood might, it appears, be a valuable procedure.

Science News Letter, November 28, 1936

From Page 343

dation. This consists of an engineer, the noted Dr. C. F. Kettering, two physicists, Drs. Vernon Albers and Harry Knorr, a chemist, Dr. Paul Rothemund, a biologist, Dr. O. L. Inman, director of the laboratories, and several assistants. At the meeting of the National Academy of Sciences on the Campus of the University of Chicago members of this group reported newest progress.

One of the most important forward steps yet taken at their laboratory has been the synthesis, not of chlorophyll itself, but of one of its simpler building-blocks, porphin. With iron added, porphin becomes hemin, a blood pigment. With magnesium replacing the iron, porphin becomes phyllin, a green leaf pigment. A considerable number of porphin compounds have been elaborated, and in each it has been found possible to add either iron or magnesium to the molecule, forming the blood and leaf analogues. The making of these compounds does not lead directly to the solution of the riddle of chlorophyll, but they do throw light on it, and also may yield information of value in other fields, such as chemistry and medicine.

Seeking Precursors

Chlorophyll is an exceedingly complex compound, and quite certainly does not spring into existence at a single bound. But thus far almost nothing has been discovered of its beginnings. By very painstaking extractions from the leaves of plants grown in the dark, it has been possible to obtain a very small quantity of a "proto-chlorophyll," the chemical and physical nature of which is now under investigation.

Chlorophyll is not a single substance, but twins, known respectively as chlorophyll A and chlorophyll B. In ordinary green plants there is about three times as much of the A kind as of the B. But the Antioch scientists have lately discovered that in the pale leaves of plants grown in the dark there will be twenty or more parts of A to one of B. When the plants were exposed to the light and began to turn green, the proportions began to change, and to approach the normal 3-to-1 ratio.

Spectroscopic studies on chlorophyll have often been made with leaf extracts in a glass vessel, to see what kinds of light are absorbed—a most important matter for science, since the absorption of light and the transformation of its energy is chlorophyll's whole reason for being. But this was extracted chlorophyll—presumably dead chlorophyll. Drs. Albers and Knorr have tried an ingenious method for getting a spectroscopic reading on active chlorophyll still in the living cell. They placed one-celled green plants under a microscope, and then applied the spectroscope to that. They learned that chlorophyll has not one but several "favorite" wavelengths, which it absorbs more strongly than it does other light. These wavelengths are not the same for all species of plants, nor even for different individuals of the same species. There seem to be several factors, as yet not understood, governing this "choiciness" on the part of chlorophyll.

Science News Letter, November 28, 1936

● RADIO

December 1, 5:15 p.m., E.S.T.

AMERICAN FURS—Frank Ashbrook of the U. S. Bureau of Biological Survey.

December 8, 5:15 p.m., E.S.T.

COAL AT WORK—Dr. A. C. Fieldner of the U. S. Bureau of Mines.

In the Science Service series of radio discussions led by Watson Davis, Director, over the Columbia Broadcasting System.

EVOLUTION

Jawbone of Unknown Beast Disputes Darwin's Theory

DARWIN'S natural selection theory got severely bitten by a 45 million year old jawbone at the meeting of the National Academy of Sciences.

The jawbone once belonged to an unknown beast of prey that roamed the American West in late Eocene times, quite early in the age of mammals. Dr. William Berryman Scott, noted paleontologist of Princeton University, told of the fossil and explained its significance.

The fossil, a lower jawbone, was sent to Dr. Scott for examination by the Carnegie Museum in Pittsburgh. At first it seemed to be a new species of sabertooth cat, though that in itself was surprising, for Eocene is much too early for such animals. But closer examination, especially of the teeth, showed that it was an entirely different kind of a beast, which Dr. Scott termed a "most amazing imitation of a sabertooth." Once before, an imitation sabertooth of still another kind of animal had been found in South America.

This repetition of the sabertooth anatomy and way of life in three widely different kinds of animals, Dr. Scott explained, constitutes a striking case of what scientists call convergent evolution. The probabilities are almost nil that such near identity could take place on a basis of purely chance variations, as is postulated by the natural selection theory of Darwin.

Science News Letter, November 28, 1936

STANDARDS

Agree on 16-Millimeter Motion Picture Film

A WORLD-WIDE agreement which makes it possible to interchange sound motion picture film and equipment of the 16-millimeter, home movie type, is announced by the American Standards Association. The standards of America are adopted.

Science News Letter, November 28, 1936

An inch was originally as long as a man's thumb is broad.