

the Rockefeller Foundation's International Health Division and now a Harvard lecturer, was awarded the Academy's public welfare medal for his work on yellow fever.

Important oceanographic researches were recognized in the presentation of

the Agassiz medal to Dr. T. Wayland Vaughan of the Scripps Institution of Oceanography in California. Dr. Vaughan has investigated corals, foraminifera and submarine deposits and he has been a leader in studying the Pacific Ocean area.

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GENERAL SCIENCE

Revolver Shot Produces Definite Emotional Response

National Academy Members See Slow Motion Pictures Of "Startle Pattern"; Hear Physiological Researches

AT THE CRACK of a revolver shot, even the most unemotional and stolid person reacts with a definite "startle pattern" that has not been discovered before because the human eye is not fast enough to catch it.

Presenting ultra-rapid motion pictures instead of a formal scientific paper at the scientific sessions of the National Academy of Sciences, Dr. William A. Hunt of Connecticut College for Women and Dr. Carney Landis of the New York Psychiatric Institute announced this discovery that promises to lead them to new facts on the neurophysiology of emotional behavior.

Never before had students of emotion been able to demonstrate the existence of definite patterns of emotional behavior, because they change so quickly. Ultra-rapid motion pictures, at four or more times the normal camera speed, when projected at a slow rate separate out two definite types of behavior.

Two Patterns

First is a regular behavior pattern of great rapidity, coming and going in less than half a second. This is followed immediately by slower responses which are not regular and which change from time to time in any one individual and between individuals.

The first pattern, however, is universal, and some elements of it were found in all subjects studied. The camera is again proved quicker than the eye, and detects an immediate response which to visual observation has remained concealed by the individualized and socialized behavior following it.

Even the most stolid person, when viewed by the camera, shows some elements of the first, rapid, universal "startle pattern." This pattern consists

of a blinking of the eyes, bending forward of the head, stretching of the mouth as in a "grin," the muscles in the neck stand out, hunching of the shoulders, abduction of the upper arms, bending of the elbows, pronation of the lower arms, clenching of the fists, bending forward of the trunk, contraction of the abdomen, and bending at the knees.

All the elements are not found in

every subject, Drs. Hunt and Landis reported, nor is the strength of the movement always constant, but every subject tested showed some elements of the pattern, and it developed in a regular course. The facial aspects are the most constant.

Apparently it is involuntary, as instructions to the subjects to inhibit the pattern and not to move, did not result in its disappearance. Some subjects showed rapid habituation with successive shots, with most of the pattern disappearing at the second shot. Others did not habituate and were shown to be still responding at the fifth shot. The response seems to be increased by the simultaneous use of the sudden flash of a photoflash bulb. It can also be increased by the injection into the subject of adrenalin. Instructions to hold the body tense did not seem to have any great effect upon the response.

Body "Tunes In"

Not all ultraviolet light is the same in producing healing of rickets. Drs. John W. M. Bunker and Robert S. Harris of the Massachusetts Institute of Technology presented evidence that the body "tunes in," as it were, differently upon different wavelengths. For in-



TESTING FOR RADIUM

A new radio-activity detection method 10 to 100 times as sensitive as older methods was demonstrated by Dr. Robley D. Evans, of the Massachusetts Institute of Technology, at the meeting of the National Academy of Sciences. (See SNL, May 2.)

stance, equal energies of the line in the ultraviolet spectrum known as 2967 Angstroms cures in half the time required by lines 3025 or 2537.

Elephants Are Cooler

The body temperatures of elephants are on the average more than a degree cooler than the temperature considered normal for healthy, human beings. Drs. Francis G. Benedict and Robert C. Lee of the Carnegie Institution's Nutrition Laboratory at Boston reported that the elephant's body temperature is 35.9 degrees Centigrade (96.6 degrees Fahrenheit). Standard human temperature is 37 degrees Centigrade (98.5 degrees Fahrenheit).

Infantile Paralysis Study

The tough and knotty question of immunity or resistance to dreaded infantile paralysis was discussed by Dr. Simon Flexner of the Rockefeller Institute for Medical Research, New York City. Very few persons ever suffer a second attack of infantile paralysis, he pointed out, the majority apparently acquiring immunity to it through the first attack. This is peculiar because the virus of the disease enters the body through the nose and uses the nerve of smell exclusively to reach the brain and spinal cord, Dr. Flexner said. Unlike other disease-causing agents, the infantile paralysis virus never comes in contact with the blood, although it is in the blood that immune substances are developed to protect man and animal from infectious disease. By re-infecting monkeys that have recovered from one attack of infantile paralysis, Dr. Flexner hopes to discover the body's mechanism for acquiring immunity to the disease.

Energy in Yellowstone

An enormous store of energy exists beneath the surface of Yellowstone Park, Dr. Arthur L. Day, director of the Carnegie Institution's Geophysical Laboratory, told the Academy, in a lecture upon the famous hot springs of that national park. For the first time two borings have been made for information as to the actual conditions below ground. In one of these a temperature of 401 degrees Fahrenheit (205 degrees Centigrade) and a steam pressure of more than 300 pounds was developed at a depth of 250 feet.

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Rats live in colonies of 10 to 100, and their burrows have only one entrance.

Canadian scientists have devised a low-priced deep-sea thermometer for fishermen.

PHYSIOLOGY-PSYCHOLOGY

Brain Waves Are Slower In Children Than in Adults

BRAIN waves, those electric impulses direct from the human brain, are slower in children than in adults, and may hold a clue to the time of brain development, Dr. Donald B. Lindsley, of the Brush Foundation, Western Reserve University, told the Midwestern Psychological Association meeting.

The brain waves known to scientists as alpha waves were "tapped" by Dr. Lindsley as they came from that part of the cortex believed to control vision. Records of 46 normal adults were compared with those of 50 children ranging in age from just a few weeks upward.

In adults, these waves occur at the average rate of about 10 per second. For women, the rate is slightly higher than for men, Dr. Lindsley found, and averages about 11 per second.

A 3-months-old child apparently does not have the waves at all. Somewhere between 3 and 6 months they start, and in a 7-month old baby come at the rate of about four and a half per second. At 9 months, they have speeded up to 5 per second; at 13 months, to 6 per second.

The frequency for the five-year-old is between 6 and 7 per second; and for the 12-year-old they have reached adult level.

The absence of the alpha waves in very young babies and their time of starting at between three and six months was especially interesting to the investigators.

"Since infants usually begin to perceive objects and follow them across the visual field at or shortly after 3 months of age," Dr. Lindsley said, "We believe that the onset of alpha waves at about this same time may indicate some relationship with this functional ability.

"It appears that the onset of alpha waves in young infants somewhere between 3 and 6 months may be coincident with the first tendency of the child to perceive objects or to follow them across the visual field. If this is true, the presence of the alpha waves might be considered an indication of the onset of function in the particular brain area investigated."

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PSYCHOLOGY-PHYSIOLOGY

Monkeys Equal to Humans In Vision for Color

MONKEYS are not color-blind as are some of the lower animals. New scientific evidence of this was reported by Dr. Walter F. Grether, of the University of Wisconsin, speaking before the meeting of the Midwestern Psychological Association in Evanston, Ill.

In tests in which the animals were taught to find food in a box illuminated by a patch of light of the color being studied, Dr. Grether found that the color vision of both old- and new-world monkeys is very little if any different from that of normal man.

These results have significance in connection with theories of evolution, Dr. Grether pointed out. This is because they show a high degree of similarity in the color vision of widely separated branches of the primate order, which

includes man, the great apes, and the monkeys.

Scientists have known that the color vision of pigeons also approximates that of man, he indicated. He further said:

"Since lower mammals have very rudimentary color perception at best, it would seem to follow that this visual function has evolved independently in mammals and birds. Yet the final stage of this evolution appears to be almost identical in the pigeon, high monkeys, and man.

"This suggests that for color vision the course and outcome of evolution was not a result of chance variations, but was imposed by some fundamental properties of optic and nervous structures, and the nature of the stimuli which these structures became adapted to analyze."

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