EVENTS

NATIONAL ACADEMY OF SCIENCES

Papers of biological and medical interest read before the National Academy of Sciences, November 16, 17, and 18, are abstracted below.

BENEDICT, F. G., Fox, E. L., and COROPATCHINSKY, V.: The Incubating Python: A Temperature Study.

Other investigations of the Nutrition Laboratory have shown the temperature of snakes to be below that of the environment, except as a result of activity, agitation, or after eating. It was found, however, that a female python, curled—undisturbed, unmoving, and without food—around her nest of 60 to 100 eggs, had a temperature of 3, 4, or 5° above the environment. The suggestion is made that the python may be an intermediate link between the cold- and warm-blooded animals.

DONALDSON, H. H.: The Effect of Exercise Continued for Several Generations on the Weights of the Organs of the Albino Rat.

The brain of the wild gray Norway rat has been found by the author to be 12 to 14 per cent heavier than that of the domesticated albino rat. This difference is not due to the albinism. Since domesticated rats show less activity than wild rats, the specific effect of exercise on the weight of various organs was investigated. A group of albino rats, allowed to run at will in a revolving drum showed marked changes in the weight of certain organs. The brain showed a 2-3 per cent increase in weight, but no further increase occurred in succeeding generations. Other organs—kidney, heart, adrenal—also increased in weight; liver and thyroid decreased.

NICHOLAS, J. S.: Experiments on Early Stages of Rat Embryos.

In a series of experiments, the development of the rat embryo was studied after surgically removing it from the uterus. Transplanting embryos on the ninth day of the twenty-one day gestation period to other abdominal organs is followed by cessation of development in the case of certain organs, while transplants to others show normal development. In extra-uterine pregnancies induced by occlusion of the uterine horns, the development of the fetus is complete in infrequent cases. If a nine-day embryo is transplanted into the mammary gland it exhibits disorganized tissue formation. Although the cells and an occasional organ show differentiation, complete organization does not take place.
RICHARDS, O. W.: The Analysis of the Factors Determining the Growth of a Population of Yeast.

Determinations of growth were made throughout a period of about 1,200 hours on a pure strain of S. cerevisiae. The initial period of constant increase continues until accumulated waste products retard growth, thus establishing an equilibrium where sugar utilization is retarded and fewer cells are killed. The O₂ consumption then increases and food material is made available through cytolysis. This permits a second growth cycle which is terminated, in turn, by accumulated waste products. This reduced activity is accompanied by a change in the cell structure with most of the cells assuming a resting state.

TENNENT, D. H.: The Maturation of the Egg of the Sea Urchin Mespilia globulus.

A study of the chromosomes during oogenesis shows that in the separation of both the first and second polar bodies, the astral end of the spindle is toward the center of the ovum, while the anastral end is more or less extruded. A condensation of granular protoplasm takes place around the center of the spindle forming a definite ring and finally cutting off the polar body from the ovum. The form and number of chromosomes were demonstrated.

BALL, S. C.: Feather Structure in the Phasianidae.

The mechanics of the production of brilliance and sheen in bird-feathers were investigated. The neck hackle feathers were the most brilliant in the male of this species. These were found to have "disintegrated barbule-less barbs"—the lack of barbules accounting for the brilliance. The shape of these barbs in cross-section is nearly triangular, with the base filled with pigment and pith cells, while the upper portion is nearly transparent. The light is reflected from the pigment back to the sides, which act something like a prism. The hue and brilliance of the barbs depend upon: 1 the position of the light; 2 the pigment; 3 the angle of the barbs; and 4 the position of the observer's eye.

WILSON, E. B., and MAHER, H. C.: Cancer and Tuberculosis with Some Comments on Cancer and Other Diseases.

A statistical study was made to determine the so-called association between cancer and tuberculosis. The death certificates of Massachusetts for 1902, 1912, and 1920 to 1927 were employed as a basis. The "coding" of the death certificates having cancer or tuberculosis as the primary or secondary cause of death resulted in the conclusion that there is no "organic association" and also no antagonism. In the cervical glands an association
was found, due to childhood tuberculosis and metastatic cancer. The occurrence of double primary cancer is estimated at one per cent. The opinion of some French workers that cancer of the esophagus leads to tuberculosis is supported by a slight degree of association. C. C. C.

Miles, W. R.: Measures of Certain Human Abilities Throughout the Life-span.

As part of an extensive program investigating the abilities of adults in later maturity, manual motility and reaction speed were examined in a large group of subjects whose ages ranged from 6 to 95 years. In general, the data show a rapid increase in ability from 6 to 18 years of age, with a high point reached between 20 and 30 years. There is very little change in this level of performance until 50 years of age, after which a steady decline is apparent. There was little difference between males and females. The tests of speed of reaction show, on the whole, less decline with advancing age than the tests which emphasize motility. In all the functions examined, the individual differences are greater than the age differences. It is significant that one-third of the individuals over 70 years of age are found to be superior to the average 50-year old person. D. G. M.

Harrison, R. G.: Experiments on the Development and Growth of Limbs in the Amphibia.

With Amblystoma as test material, transplantation experiments were performed to the end of ascertaining the importance of ectoderm and of mesoderm in the development of the limb. In early stages of the embryo the ability to form a limb is confined to the mesoderm. The mesoderm likewise dominates the rate of growth in transplanted limbs, although ectoderm may influence some of the characters of the developing limb. When pigmented species are used the grafted limb takes the pigmentation of the host species. C. C. C.

Peak, H.: Differentiation of Reflex and Voluntary Responses of the Lid.

Photographic records of lid movements show that the longer latency is characteristic of voluntary response and that the extent of closure is greater in such responses than in reflex movements. In responses of the reflex type the promptness with which the eye opens is directly related to the speed at which the lids close, whereas in the voluntary reaction the faster the closure, the more slowly do the lids open. Reflex and voluntary responses are not distinct. J. T. C.
Merriam, J. C.: The Cats of Rancho La Brea; A Climax in Evolution.
A discussion of the fossils obtained from the asphalt deposits near Los Angeles.

Lang, H. B., and Paterson, J. A.: A Preliminary Report on Functional Psychoses.
Study of patients with functional psychoses shows a relation between the type of disturbance and the dispersion of the brain proteins, with schizophrenia and epilepsy at opposite extremes.

Bancroft, W. D.: The Physiological Properties of Bulbocapnin.
The catatonic state produced by bulbocapnin in animals has no relation to the catatonia in dementia praecox in man.

Stone, L. S.: Induction of the Ear by the Medulla and Its Relation to Experiments on the Lateralis System in Amphibia.
If the lateralis placode is transplanted after it has attained its full development it will maintain its polarity.

Stock, C.: Discovery of Upper Eocene Land Mammals on the Pacific Coast.
An account of the discovery of fossils of the earliest Tertiary record of land mammals thus far observed on the Pacific coast.

Boas, F.: Observations on Individual Growth.
Experiments conducted on school children indicate that environmental factors are of more importance than hereditary factors in determining the rate of individual growth.

Stockard, C. R.: The Significance and Inheritance of Leg-length in Dogs.
Breeding experiments show that leg-length in dogs behaves as a true Mendelian character.

Fulton, F. J.: The Genesis of Cerebellar Tremor and Its Disappearance After Removal of the Cerebral Hemispheres.
The tremor which appears in monkeys on removal of part of the cerebellum disappears if the cerebrum is removed on the opposite side. The tremor of cerebellar removal or injury may be due to the endeavor of the cerebrum to compensate for the cerebellar deficiency.
Parker, G. H., and Paine, V. L.: The Rate of Trophic Impulses in Nerves of Cold-blooded Vertebrates.

In the catfish the rate of transmission of trophic impulses is about 2 cm. per day. M. E. W.

Burr, H. S.: Certain Factors Determining the Direction of Growth of Nerve Fibers.

In experiments in which the olfactory placode was transplanted between embryos of Amblystoma punctata results were obtained which indicate that the direction in which nerve fibers grow may be determined by physiochemical factors. R. E. M.

Gesell, A.: The Developmental Morphology of Infant Behavior Pattern.

By taking motion pictures of infants at various ages the unfolding of their behavior patterns can be graphically illustrated. R. E. M.

Cowgill, G. R.: The Vitamin B Requirement.

By means of experimental diets using mice, rats, pigeons, and dogs a formula was derived by which the vitamin B requirement of a given species as a function of body weight could be determined. This formula was proved to be quite accurate in man by analysis of various diets which had proved to be either adequate or inadequate in vitamin B content. R. E. M.

Flexner, S.: Modes of Infection in Poliomyelitis.

Discussion of the modes of dissemination of the virus of poliomyelitis, and of the pathways whereby it enters the body. F. A. W.

McDowell, E. C.: Genetic and Histological Studies on Mouse Leukemia.

Several investigators have shown that certain breeds of mice readily develop spontaneous leukemia and that these leukemias are similar to neoplastic growths. In these studies leukemia was transmitted in susceptible strains by inoculation with lymph gland suspensions from mice with spontaneous leukemia. The growth began always at the point of inoculation and the cells were characterized by immaturity and by large, irregular nuclei that possessed a large mass of chromatin. Inoculation was carried without interruption through 149 mice. From these studies it was concluded that the causative agent was either the cell itself or a factor that required the existence of the cell for its propagation. F. J. A.
Barbour, H. G.: Liver Edema as a Reflex Response to Cold.

The liver is known to be a heat center and a conserver of heat. Experiments on dogs showed an increase of solids during fear. Pyretics produced a temporary edema followed by an increase of solids when the nerve control was intact; application of cold caused a transient increase of solids followed by edema of the liver cells.

Himwich, H. E.: Organs Capable of Producing Acetone Substances.

Only organs which oxidize both fat and carbohydrate are able to produce acetone substances during diabetes.

Fox, A. L.: The Relationship Between Chemical Composition and Taste.

Phenylthiocarbamide was accidentally discovered to have a bitter taste to some people, "tasters," and to be perfectly tasteless to others, "non-tasters". Many similar compounds with benzene and naphthalene bases were investigated. A possible explanation was that the compound was soluble to all but that the saliva of the "non-tasters" contained a factor that precipitated the soluble portion.

Blakeslee, A. F.: Genetics of Sensory Thresholds: Taste for Phenylthiocarbamide.

Investigation of taste of phenylthiocarbamide, quinine, hydrochloric acid, and other compounds showed that besides tasters and non-tasters of the first compound there were further differences in appreciation of the compounds in different dilutions and in the interpretation of the quality of taste. From these experiments it was concluded that two-thirds of the population at large were tasters and one-third were non-tasters of phenylthiocarbamide, that different tasters had different thresholds, and that the interpretation of the quality of taste varied markedly in different people confirming the concept that different people lived in different worlds.

Johnson, T. B.: Artificial Hormone Substances.

The addition of a thiazol cycle to epinephrine and similar bases, ephe- drine, hordenine, tyramin, etc., in different positions produced substances having properties similar to the base, but possessing such increased stability that the hormone could be administered orally.

Smith, A. H., and Anderson, W. E.: Further Studies of Rate of Growth of Albino Rats.

Albino rats fed on diets containing respectively 18 per cent and 32 per cent protein plus the other constituents known to be necessary to health
and growth showed an average daily gain of 7.3 gms. This is the fastest gain yet recorded. The diet was not forced, but the rats were allowed to eat ad lib.

**Kahn, E.:** Some Psychopathological Aspects of the Personality of the Scientist.

It is universal in man to possess curiosity and to desire certainty. Some individuals acquire certainty by living in a limited world of their own making and are therefore psychopathological. Scientists tend to observe, classify and to deduce laws. Different scientists stress the various aspects differently, tending to ascribe greater or smaller values to one or the other aspect. When a so-called scientist, to attain certainty in his interpretation, accepts facts supporting his preformed theories and discards those opposing, he may be said to be psychopathological.

**Riddle, O.:** The Oxygen Carriers of the Blood in Their Relation to Sex and Season.

Quantitative measurements of the red blood cell count and the hemoglobin content of the blood of pigeons, doves, and man showed lowest values in summer and highest in autumn and winter. The male uniformly has higher values than the female. The possible explanation advanced for the seasonal variance is the associated finding of higher basal metabolic rates in the seasons with the high oxygen carrier values. It is also true that male tissue has a higher metabolic rate than female.

**Walker, H. H., and Winslow, C.-E. A.:** Metabolic Activity of the Bacterial Cell at Various Phases of the Population Cycle.

Using three basic media, two containing peptone and one a simple synthetic medium containing ammonium tartrate and lactose, and continually aerating these with air freed from carbon dioxide and ammonia, a more normal picture of the life cycle of a bacterial population is obtained. The results indicate that the production of both carbon dioxide and ammonia nitrogen per cell is enormously increased during the period of active multiplication. Carbohydrate in the medium decreases ammonia production but does not increase CO₂. It appears that the phenomenon of gas production in the ordinary fermentation tube may be related to effects on the solubility of CO₂ rather than to variations in actual production of gas.

**Hilgard, E. R.:** Reinforcement and Inhibition of Eyelid Reflexes to Light and Sound.

Experiments on the human eyelid reflex show that a slight stimulus may greatly augment or diminish the response to a later more adequate
stimulus. Faint stimuli may be important in providing the dynamic background upon which new stimuli are imposed, and consequently the responses to the latter may be in part but expressions of immediately preceding events.

M. E. W.

YALE MEDICAL SOCIETY
December 9

EXPERIMENTAL EPIDEMIOLOGY

Leslie T. Webster, Associate Member, Rockefeller Institute

Direct experimental evidence on the mode of spread of infections of mice is obtained by the study of communities of the animals under controlled conditions. The evidence relates both to the behavior of communities previously unexposed to these infections and to communities in which the specific infection was already present. Concerning the primary response of unexposed communities, it was shown that three general results occurred, depending on the pathogenicity of the infecting organism,—first, an epidemic reaction, involving explosive outbreaks of disease and subsequent disappearance of the specific agent; second, an endemic reaction, involving sporadic endemic disease and permanent establishment of the agent in the community; and third, no reaction, leading to no disease, and no establishment of the agent. These varieties of response under controlled conditions were proved to be due to qualities in the specific bacteria,—the epidemic type of reaction being caused by the virulent non-vegetative pathogens, the endemic type by the less virulent, highly vegetative forms, and the third by the least virulent, least vegetative forms.

In the case of communities already infected the inherent pathogenicity of the specific bacterium proved to be unchanging, and the course of the infection was controlled by the host-resistance variable. Thus the virulences of microorganisms were constant whenever tested, strains obtained from populations during pre-epidemic, epidemic, post- and inter-epidemic periods behaving uniformly when introduced into fresh populations, or when titrated under controlled conditions. The host-resistance factor, on the other hand, appeared to vary in a definite manner according to the prevalence of the infection. Thus, prior to epidemic outbreaks, the survival time of immigrants declined progressively and the number of carriers and available bacteria increased. Again, the actual outbreaks tended to occur at definite population levels and were most fatal to recent immigrants. And finally, the epideemics terminated at relatively definite population levels and in conjunction with a decline in dosage and increase in the survival time of immigrants. These observations indicate that the reduction of population resistance by the addi-
tion of fresh immigrants of definite and relatively low average resistance was responsible for the characteristic outbreaks. Most significant in this connection, however, were the experiments in which changes in population resistance brought about by substituting immigrants of different racial or strain resistance determined the severity of the disease. Thus, the substitution of relatively susceptible Lathrop strain immigrants for resistant Institute ones brought about an increase in the severity and number of epidemics, while the reverse substitution of resistant for susceptible immigrants led to the opposite condition of infrequent epidemics. Host resistance in the communities was also raised or lowered experimentally by changing the diet from adequate to optimum constituents and vice versa.

In an infected community in which the individuals were of average resistance, epidemics occurred when dosage was increased by an environmental agent, such as water, milk, food, housing, etc. Large doses of bacteria of average virulence induced explosive epidemics, while smaller doses gave rise to more moderate outbreaks.

Individual differences in resistance of the population constituents determined the form of the epidemic curve, and the numbers of susceptible individuals determined the duration of the epidemic. Inherent resistance formed the basis of host resistance; specific immunity in these relatively acute and fatal infections played a minor though significant rôle. In short, the spread of native animal diseases seemed to be controlled not by fluctuations in microbic virulence but by definite variations in the resistance and dosage factors in connection with the relatively fixed virulence of the microorganism.

NEW HAVEN MEDICAL ASSOCIATION
December 2
THE CONTROL OF CANCER
J. V. Hibbard, of the American Society for the Control of Cancer

The Westchester Society for the Control of Cancer was formed in 1929, working in close connection with the American Society for the Control of Cancer. The organization is based upon a nucleus of nineteen medical men, a lawyer, and two bankers. It is further amplified by trained nurses and a secretarial staff. It received its initial financial support from a grant, but continued support will be through funds raised from the community. There are at present twelve clinics. The work of the Society consists in the education of both doctors and laymen concerning cancer, especially in its early manifestations; in rendering available expert advice on cancer; and in the occasional provision of free radium emanation.
AMERICAN CHEMICAL SOCIETY: NEW HAVEN SECTION

December 1

COD LIVER OIL—ITS MANUFACTURE AND ITS RÔLE IN HUMAN NUTRITION

ARTHUR D. HOLMES, Research Director, E. L. Patch Co.

After describing in detail the method of manufacture of cod liver oil, attention was turned to the various uses of the oil. Report was made of a study which showed that the administration of cod liver oil increased the body weight and improved the general condition of a group of school children who were, in fact, ill enough to remain at home, but were better off in school because of very poor home conditions. From another experiment it appears that cod liver oil slightly increased the body weight of a group of working girls, and at the same time enhanced their working efficiency.