

their real affinities (which the reviewer does not share). But they should have been placed somewhere, for they are important types, both known from skulls and skeletons, and upon no theory of their affinities is their evidence negligible. No reference is made to the gigantic and peculiar rhinoceroses first discovered by Cooper in Baluchistan, reported by Borissiak from Turkestan, and quite recently found in Mongolia by Andrews and Granger. There are unfortunately a good many misprints, and the quality of the paper is not up to the old pre-war standards.

But with allowance for all defects, which, after all, are very few or of quite minor importance in comparison to the enormous mass of facts stored within its covers, the authors deserve the cordial thanks and appreciation of all who are interested in fossil vertebrates, in their completion of a revision that involves an immense amount of labor and erudition and a comprehension of the essential facts of the discoveries they have summarized that is far from common, to judge from the misstatements and misunderstandings of the average critical review.

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QUOTATIONS

THE ANNUAL EXPOSITION OF CHEMICAL INDUSTRIES

THE Ninth Annual Exposition of Chemical Industries is to be held in New York City, Grand Central Palace, September 17 to 22, 1923. The exposition has always been a place where those with inquiring minds could learn much in a short time regarding chemical equipment and the chemical industry. In late years the junior chemical engineers at Yale have assembled under Professor Read to devote the mornings to serious study and the afternoons and evenings to gaining a more intimate acquaintance with chemical equipment on display. The Advisory Committee of the Exposition recommended that a special feature be made of these facilities this year, and an announcement has been issued offering students of chemistry and chemical engineering a course on the fundamentals of chemical engineering and industrial chemical practice. Lectures will be given by men prominent in the various specialties, and a committee of educators has undertaken to make the course as attractive and profitable as possible. Three principal topics are to be the centers about which the work will be done. These are:

1—Plant Equipment in the Chemical Engineering Industries.

- (a) Disintegration—Crushing and Grinding.
- (b) Mechanical Separation—Grading.

(c) Separation of Solids from Liquids—Thickening, Filtration, Centrifugal Separation.

(d) Separation with Phase Change—Evaporation, Distillation, Drying.

(e) Handling of Materials.

2—Materials of Construction—What materials to use, when, where and why.

3—Chemicals in Commerce—The distribution of chemicals.

It is expected that no charge will be made to students. The Exposition management asks instructors to advise how many of their students will care to avail themselves of this opportunity, and further undertakes to assist students in securing living accommodations while in New York. The seriousness of the work is indicated by the announcement that a report or examination on some phases of the course may be required by the committee.

We urge chemists and chemical engineers, whether students in institutions of learning or otherwise, to take advantage of this unusual opportunity. The men most familiar with the equipment and unit processes will be present. Exceptional facilities for examining devices of different designs and makes will be offered. It will be possible to meet those interested in the same field of work and discuss problems with them. Here is an opportunity to gain in one short week information of value, comparable perhaps to the concentration of data commonly found only in hand-books. Do not miss it!—*The Journal of Industrial and Engineering Chemistry*.

SPECIAL ARTICLES

THE PRODUCTION OF "BROWN-SÉQUARD'S EPILEPSY" IN NORMAL NON-OPERATED GUINEA PIGS

BROWN-SÉQUARD was the first to report that operative insults to the nervous system, such as lateral hemisection of the cord, section of the dorsal columns, section of one or both sciatic nerves, produced after a certain lapse of time a variety of interesting motor disturbances in the guinea pig. These disturbances were characterized by attacks of complex, coordinated, tonic and clonic contractions of the muscles of the head, neck, trunk and legs. The motor discharges occurred spontaneously or as the result of pressure stimulation of a certain receptive field of the skin which Brown-Séguard called "epileptogenic zone." This area comprehended roughly the side of the face below the eye and extended backwards, including the scapular region. The zone was unilateral after unilateral lesions and was always located on the operated side when the cord was involved; after damage to the brain, however, the "epileptogenic zone" shifted to the opposite side. In addition to the manifestations mentioned Brown-Séguard also described a transient

"blepharospasm," a "bronchorrhoea" and the expulsion of feces, urine and semen during the attack. Brown-Séquard never observed the symptoms in normal guinea pigs, but Graham Brown¹ in his excellent analysis of these motor phenomena mentions briefly some suggestive motor reactions observable in the normal guinea pig; these appear to have been slight and inconstant, however.

The chief symptoms of the complex known as "Brown-Séquard's epilepsy" may be obtained in the normal, non-operated guinea pig provided certain conditions are fulfilled: (1) The animal must be accustomed to his surroundings, including the experimenter; (2) abrupt movements, unaccustomed noises and apparently also odors, sudden vibrations must be avoided; otherwise the typical reactions following tactile or pressure stimuli of the skin are largely or entirely inhibited. The length of time necessary to fulfill conditions varies considerably in different animals, especially when only touch stimuli are employed.

The touch stimuli were applied by means of long bristles mounted on handles; the pressure stimuli by means of long, slender, wooden rods one eighth to three sixteenths inch in diameter; the stimuli were both of short and long duration and were applied frequently.

The sites where symptoms are most easily elicitable are: (1) A small area just posterior to the angle of the jaw and below the ear; and (2) an area just anterior to the pelvis and above the femur when the animal is in a squatting position. Pressure stimuli are most effective, especially in the beginning. Either side of the body may be stimulated effectively.

Some of the reactions obtained after pressure stimuli in the lumbo-pelvic area are as follows: a lateral arching of the body, the nose of the animal approaching the site stimulated, with rotation of the head so that the plane of the lower jaw is turned towards the body. Associated with this arching, the hind leg of the side stimulated is usually flexed suddenly and strongly at hip and knee, the foot is dorsally flexed at the ankle while the toes may be extended and spread far apart, or the toes may be close together and slightly flexed. At the same time the hind leg of the opposite side is usually strongly and forcibly extended, raising the posterior half of the body, or it may be strongly abducted. The hind leg of the side stimulated may execute a series of scratching movements, the toes moving towards the jaw of the same side; at times the toes actually scratch the jaw and then the toes are usually spread apart. At other times the toes merely approach the jaw and then in general are not spread; when this occurs the dorsal

lift of the femur is apparently especially marked, and the movement now resembles the thigh wiping-reflex of the frog. The scratch reaction may consist of from one to eight and perhaps more, exceedingly rapid flexions and extensions of the thigh, leg and foot. In animals which have been tested for months this pressure stimulus causes the lateral curvature of the body and neck, but often both hind legs are violently extended at the same time, so that the animal is hurled into the air; the animal, however, always righted itself in midair and was never observed to fall on its side or to roll over.

Pressure stimuli just posterior to the angle of the jaw usually cause, in addition to escape movements, a general shaking of the body similar to that executed by a wet dog, with more or less erection of the hair; wiping of the head and face with the front leg of the side stimulated, the head being rotated towards the non-stimulated side, or a more or less marked scratch reaction of the hind leg of the same side may occur. Often the front leg of the side stimulated may execute a series of rapid back and forth shaking movements.

Touch stimuli may give the same motor reactions, but in addition they permit the observation of other responses which are partially masked when pressure stimuli are applied; some of these are chewing motions, slow, audible, grinding movements of the teeth, dorsal or ventral nodding movements of the head, sneezing associated with unilateral or bilateral wiping of the nose, short convulsive contractions of the muscles of the trunk, neck and legs which raise the trunk slightly from the floor, the head being flexed ventrally. Associated with the latter movements one may observe at times a spasmodic retraction of the angles of the mouth accompanied by a wide separation of the jaws and strong closure of the eyelids.

Increased defecation, urination may be readily observed in these animals after repeated pressure or touch stimulation. In two instances several drops of a milky fluid suddenly issued from the nares (a naris?) and fell upon the reflecting mirror of the observation cage where the animal was being tested. The ejaculation of semen was never seen by me.

From this brief description it will be perceived that the so-called "incomplete attack" of Brown-Séquard may readily be obtained under proper conditions in normal guinea pigs. The absence of the "complete attack" is probably attributable to the normal muscular balance of these animals.

The material upon which this study is based consists of about 60 animals, chiefly males; all of them were under close daily observation for months.

JOHN AUER

¹ T. Graham Brown, *Quart. Journ. Exp. Physiol.*, 1910, III, 144.