his desire, and satisfy that part of his calorie needs not covered by the rationed articles. It was the view of the Royal Society Committee that bread must at all costs remain unrationed—a view which ultimately prevailed. The Cabinet determined that if the various measures of diversion from animals and increased production failed to provide enough bread, then carloads of cereals were to enjoy priority over all other shipping, whether of men or munitions of war. At the same time the bread was made sufficiently unattractive—but without diminishing its wholesomeness—to prevent its wasteful consumption, and efforts were made by propaganda and otherwise to reduce the consumption of cereals by providing other foods which might take their place, especially potatoes.

Order of Preference in Importation.

The maintenance of free purchase of bread demanded a strict adjustment of the importation programme, and the Royal Society Committee assigned the following order of preference:

1. A sufficient amount of cereals should be imported as breadstuffs to avoid rationing and to serve as an elastic reserve for the energy needs of the country, and all cereals in the country should be reserved as breadstuffs to meet the full demand for these.

2. A minimum of 16 oz. of fat should be provided a head a week, taking into account not only the meat fat and margarine, but also the fat contained in milk, wheat, and other foods available. In order to bring up the fat of the food to this amount the necessary quantity of bacon, fat meat, and oil seeds must be imported and the home supplies conserved by limiting the use of fat for industrial purposes.

3. A minimum supply of sugar amounting to 8 oz. a head a week must be supplied. Up to these figures, which the Committee regard as minimal, the import of food into this country should take preference of all other claims on shipping.

4. Any tonnage then available for supplying this country with food should be utilized to bring the meat ration up to 2 lb. a head a week.

With the exception of a temporary shortage in fats during the early part of 1918, which incommenced our population but was not attended by any noticeable ill effects on health and efficiency, the United Kingdom was the only nation in Europe which could maintain that no man, woman, or child had to go hungry or leave his or her hunger unsatisfied on account of war conditions.

Croonian Lectures

ON

THE SIGNIFICANCE OF THE CEREBRAL CORTEX.

DELIVERED BEFORE THE ROYAL COLLEGE OF PHYSICIANS
OF LONDON, JUNE, 1919.

BY

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LECTURE I (*Abstract*).

The Evolution of the Cortex.

IN the first of the series of Croonian Lectures on the significance of the cerebral cortex Professor Elliot Smith defined the aim and scope of his task as an attempt to discover how the cerebral cortex acquired its distinctive powers as the organ of intelligence.

Dr. Henry Head's researches have provided a new vision of the significance of the brain, and have thrown such a brilliant light into some of the darkest corners of cerebral structure and function as to compel every investigator of the nervous system to re-study the results of his own investigations with the aid of this new illumination. The activity of the thalamus is the physiological process which is expressed in consciousness by a crude awareness to contact, heat, cold, and pain, and the affective aspects, the pleasantness or unpleasantness, of these experiences, whereas the cerebral cortex endows these basic functions with spacial qualities, intensity and relativity. Dr. Head's recognition of this fundamental distinction makes it incumbent on those who are investigating the problems of

the evolution of the brain to inquire into the means by which the cortex acquired its powers of memory, of discrimination, and of spacial reference. The fact that these epicritic attributes are especially associated with the neopallium, which is found in its fully developed form only in the mammalian brain, suggests an inquiry into the nature of cerebral function in vertebrates other than mammals, and into the circumstances which brought the neopallium into existence.

The cerebral cortex was evolved from that part of the brain which originally was little more than the receptive centre for impressions of smell and the instrument for enabling the sense of smell to influence the animal's behaviour. Unlike all the other sensory tracts, those which convey impulses from the olfactory organ reach the cerebral cortex directly—that is, without passing through the thalamus. From a psychological point of view, therefore, the sense of smell occupies a unique and distinctive position. It represents the germ of all the higher psychical powers, or, perhaps it would be more accurate to say, the cement that binds together the elements out of which the powers of the cerebral cortex, as the repository of the impressions of past experiences, the organ of discrimination and appreciation of space and time, are developed.

In the primitive vertebrate behaviour is dominated by the sense of smell. It is the means by which the animal finds its food and determines its qualities, by which it recognizes friends or enemies, sexual mates or rivals. Smell is possessed of affective qualities which endow it with a direct meaning such as is not associated with either of the other two "distance receptors" (Sherrington), vision and the eighth-nerve-sense. In the primitive vertebrate living in the water smell is much more nearly akin to taste than it is in man and the land-living animals. When such an animal perceives the odour of food it is really getting a foretaste of the consummation of the reaction, when it captures the food and actually tastes it. Throughout the whole of the anticipatory phase it is under the influence of olfactory sensations, and a series of events, covering the whole period of anticipation and consummation, is linked together by the affective tone of smell into one experience, which includes the germ of memory and of spacial and temporal appreciation. But the sense of smell itself conveys only the vaguest indications of spacial relations. An animal attracted by a scent circles around until it comes within visual range of its quarry; then the eyes convey more precise information as to its position in space and as to its movements. Such visual information is almost entirely devoid of affective tone, of psychological meaning, which it acquires secondarily from the sense of smell. But it is biologically useful, because it enables the creature to steer its course more directly and accurately to the object of the pursuit; and for this reason it is the optic receptive centre, the tectum of the mid-brain, which in the primitive vertebrate is put into direct connexion with the motor nuclei and directs the movements of the animal. The sense of smell starts the reaction; the sense of sight directs it; the vestibular mechanism (the cerebellum) provides the apparatus for effecting the co-ordination of muscles without which the orderly movements of the whole body would be impossible.

In the course of the pursuit of its prey, when the animal is led by the sense of smell and is controlled by its dominating affective tone, the information collected by all the other sensory mechanisms is added to and woven into the tissue of the complex experience. Hence these other senses acquire a meaning and a share in the psychical activities which constantly increases in importance throughout the vertebrate series, until it culminates in the vast mental powers of man, in which smell plays a humbler and less obtrusive part, although still one of imperious importance.

In the following lectures the attempt will be made to explain how these wider powers were acquired, and the part played by the thalamus and the hypothalamus in this process.

THE United States Public Health Service estimates that more than 7,000,000 persons in the United States are infected with malaria. In the South the ravages of typhoid fever, tuberculosis, hookworm, and pellagra taken together do not equal those of malaria.