

showed that the thalamus is concerned with the affective side of consciousness, and deals with crude awareness to contact, heat, cold, and pain; while the sensory cortex exercises the rôle of discrimination and endows the basic functions of the thalamus with spatial qualities, intensity and relativity.

The war afforded Dr. Head the opportunity for testing his theories as to the functions of the sensory cortex on a large scale. He made an intensive study of fifty men with strictly localised bullet wounds of the post-central convolution and the areas adjoining it in front and behind: as the result he has revolutionised our conceptions of the nature of the work of the cerebral cortex.

Destruction of the sensory cortex causes a dissociation between the spatial and the qualitative aspects of sensation. The patient loses the power of recognising movements or the posture of the affected parts: he can no longer localise the position of the stimulus, or respond adequately to variations in its intensity: he has no idea of the size, shape, weight, or texture of an object in contact with his body. Yet he can appreciate the tactile, painful, and thermal aspects of the impressions it evokes.

Thus it is possible to recognise the qualitative aspects of a sensation without of necessity obtaining any information concerning the stimulating object, as a constituent of the external world. Sensory qualities, and the affective states with which they are associated, are in themselves discontinuous. They are relative to ourselves, and

appear and disappear in consciousness, without leaving any connective factor in the activities of the mind.

On the other hand, the projected aspects of sensation relate these qualities, not to ourselves, but to the external world. An "object" might be defined as a complex of projected sensory responses. These functions of the cortex are not only responsible for sensory projection in space, but also ensure recognition of sequence in time.

The power of recognising serial movements in both space and time seems to be based on the same physiological processes. They give us a direct appreciation of succession: this is translated into sensations of serial movement in either space or time, according to the nature of the concomitant sensory impulses.

These physiological responses, which are so clearly bound up with the activities of the sensory cortex, are characterised by a strict dependence on past events. All projected sensations leave behind them a coherent train of physiological dispositions: thus a movement occurring at one moment is measured against the consequences of those which have preceded it.

It is difficult to estimate the magnitude of the vast revolution in our conception of the functions of the cerebral cortex that we are witnessing. Moreover, Dr. Head's work lays the foundation of a new and true psychology and illuminates the age-long problem of the relationship of body and mind. It is a matter for just pride that we owe this new vision to an Englishman.

Obituary.

PRINCIPAL R. M. BURROWS.

KING'S COLLEGE and the whole University of London have suffered grievous loss by the death of Dr. Ronald Burrows. Born on August 16, 1867, Dr. Burrows went from Charterhouse to Christ Church, Oxford, with a scholarship, and took his degree in 1890 with first class honours in Classical Moderations and *Literae Humaniores*. After five years as assistant to Prof. Gilbert Murray, who then held the Greek chair at Glasgow, he was appointed professor of Greek at Cardiff in 1898, and rejoined his Cardiff colleague, Dr. R. S. Conway, as Greek professor in Manchester in 1908. By travel, during these years, in the Mediterranean, he had gained valuable experience of topography and excavation, and also that first-hand knowledge of the modern politics of Greece and the Balkan States which served him so well in later years. His published work, mainly about Greek battlefields, ancient sites in Bœotia (where he conducted most instructive excavations at Rhitsona and the Delion), and the newly revealed Minoan civilisation, gained him the degree of D.Litt. in the University of Oxford in 1910, and his "Discoveries in Crete," published in 1907, went into a third edition.

An excellent scholar, a vigorous and fluent

writer, and a teacher of untiring drive and wide humanity, Dr. Burrows contributed much to "save Greek" during a difficult period by the simple and characteristic method of making his pupils interested in it, and infecting them with his own keenness; and this did not stop "out of school." His lifelong interest in young lads, and his strenuous and successful work for the Cardiff University Settlement and for the Ardwick Lads' Club at Manchester, were for him all of a piece with the "humanities" of which his Greek studies should be the crown. He enjoyed life and enjoyed people, and his sunny temper and good fellowship were the happy counterpart of his learning and judgment.

Dr. Burrows moved from Manchester to King's College as principal in 1913, at a time of crisis and manifold difficulty. Apart from other qualifications, he had, as was said, "more bishops in his family" than had all the other candidates put together, and more experience, too, than most of other "happy families" where sciences and arts could "live and let live." His width of interests and sympathies, enabling him to bring in new subjects to restore the balance between them and the old; his ready speech and debating skill; and his real grasp of principles and policies, gave him a position which experience con-

firmed. The college organisation for modern languages, literatures, and national histories, which best commemorates him, was conceived and founded just in time for the war, which so fully endorsed his foresight and amplified his opportunities, less perhaps among the Romance languages than in the Slavonic and modern Greek departments which lay nearest to his personal interests. Knowing as intimately as he did the problems and the possibilities of the city-state world of ancient Greece, he was able in an exceptional way to interpret here the ideals, no less than the failures, of the Balkan peoples, whom he understood and impressed like the naughtier boys in his settlement clubs. Honours conferred by the Greek and Serbian Governments, and the close personal relations which he maintained with leaders such as M. Venizelos and President Masaryk—the latter one of his professors until his own country claimed him—are testimony enough on this side, and he just lived to see in the act of realisation much for which he had long striven. Such a man would not spare himself, and he would lavish help and encouragement along the whole breadth of his interests at times when only the greatest prudence could have preserved his health; but so he loved to live.

WE regret to announce the death in London on May 6 of DR. J. HAMILTON FULLARTON, so long associated with scientific fishery research in Scotland. Dr. Fullarton was born at Brodick, Arran, in 1856. He had a distinguished career as a student at Glasgow University, taking many prizes and bursaries, and graduated M.A., with the highest honours in natural science, in 1881, and D.Sc. ten years later. After acting for some years as assistant to the professor of natural history in his *alma mater*, Dr. Fullarton entered the service of the Fishery Board for Scotland as a naturalist on the scientific staff in 1889, a post which he held for eight years. On quitting the Fishery Board service, Dr. Fullarton studied medicine with a view to a medical career, and received the qualifications of L.R.C.P. and L.R.C.S.(Edin.). After serving for a short period as medical officer on an Atlantic liner, he settled in London as a consultant, and gradually built up a considerable practice. Prior to this, on the initiation of the international fishery investigations, Dr. Fullarton re-entered the service of the Fishery Board, and did valuable work for a year in the supervision of the scientific investigations on board the research steamer *Goldseeker*. It is as an expert on fisheries that he will be chiefly remembered in scientific circles. He devoted himself in particular to the study of shellfish, such as the common edible mussel, the oyster, the cockle, and the "clam," and wrote numerous papers on their cultivation and natural history. In connection with this branch of his fishery work Dr. Fullarton on more than one occasion visited the districts in France and Holland where oyster-culture and mussel-culture are principally carried on. He also made

NO. 2638, VOL. 105]

a useful series of researches on the breeding and development of the European lobster.

THE death is announced at Copenhagen of the well-known Danish philologist, PROF. L. F. A. WIMMER, at eighty-one years of age. Prof. Wimmer was the author of an important book on the Runic alphabet, "Runeskriktens oprindelse og udvikling i Norden," published in 1874, in which he suggested that the Runes were really Latin letters adapted for carving in wood, and of four volumes on Runic inscriptions in Denmark. In several of the Sagas it is recorded that Runes were inscribed on round pieces of wood, called *Kefli*, or Runic sticks. It has been suggested that the Eddas were recorded in this way, but the evidence is not quite satisfactory.

THE bearer of a name highly esteemed in botanical circles has just passed away in the person of AUGUSTIN PYRAMUS DE CANDOLLE, who died at Vallon, near Geneva, on May 9, at the age of fifty-one, surviving his father only eighteen months. The family is of French origin, but for four generations it has been settled at Geneva, adopting the local fashion of employing a capital letter for *De*. Born in England in 1869, the late botanist visited our shores on many occasions; in 1889 he came to London to receive the Linnean gold medal awarded to his grandfather by the Linnean Society of London, and in 1904 he attended the British Association meeting at Cambridge. He published but little, only about a dozen short memoirs on systematic descriptions of new plants from Madagascar and Tonquin, on parthenogenesis, and on the influence of electricity on the germination of seeds. He filled the office of president of the Société Botanique de Genève in 1905. The brilliancy of the line was shown in the grèat-grandfather, A. P. De Candolle (1778-1841); grandfather, Alphonse De Candolle (1806-93); and father, Casimir De Candolle (1836-1918).

By the death, on February 27, of ALFRED J. MOSES, professor of mineralogy at Columbia University, the science of mineralogy has lost (says "H. P. W." in *Science*) one of its most eminent and valued exponents. Prof. Moses's work as a teacher, as a writer, and as a scientific investigator can scarcely be too highly esteemed, and his loss to all branches of his profession is most keenly felt. His text-book on "Mineralogy, Crystallography, and Blowpipe Analysis" will for many years remain the standard in a large majority of the universities in which courses in these subjects are given. His work on "The Characters of Crystals," published in 1899, is the first treatise published in America upon physical crystallography, a branch of crystallography which was early recognised by him as of primary importance to chemists, geologists, and mineralogists, and has within very recent years assumed a scope and developed practical applications which have more than justified his early visions of its future.