

developing methods of manufacture of vitreous globes for incandescent gas lighting, which he brought to a successful conclusion only shortly before his death.

Quiet and diffident in manner, slight in build, and far from robust, Dr. Bottomley gave little outward sign of the strength that was in him both of character and ability, and as he published but little and never advertised himself at all, he was not well known except to his associates. By these he was recognised as a man of exceptional judgment, business ability, and integrity, and, besides "being" the Thermal Syndicate, he was a director of Kelvin, Bottomley, and Baird, of Chas. Tennant and Co., and of the Blagdon Manure and Alkali Co. He was also (until the war) a director of the Deutsche-English Quartz Schmelz G.m.b.h., which carried on the quartz fusion processes in Germany.

Dr. Bottomley was married in 1913 to Miss Dorothy Couves, and leaves a widow and two children. He was an outstanding example of the advantage of giving administrative and business responsibility to a man of character and scientific training.

R. A. S. PAGET.

PROF. MAX VERWORN.

By the death of Prof. Max Verworn at Bonn on November 23 last, a notable figure, who could ill be spared on account of the breadth of his outlook, has been lost to biology. Verworn had just completed his fifty-eighth year, having been born in Berlin on November 4, 1863. He received his school and early university education in his native city, and graduated Ph.D. in Berlin in 1887, and later M.D. in Jena in 1889. After graduation in medicine, his interests being then largely zoological, he paid a long visit to Villefranche and Naples, and later continued his investigations along the coast of the Red Sea. On his return to Jena Verworn was appointed assistant in the Physiology Institute, and in 1891 was duly approved as *Privatdozent*. After a few years' work, including a second visit to the Red Sea, he became extraordinary professor of physiology in Jena in 1895. In 1901 he was called to Göttingen as professor of physiology, and in 1910, on the death of Pflüger, he became the professor of physiology at Bonn. Verworn received many academic distinctions. In this country he was an Sc.D. of Cambridge and an LL.D. of St. Andrews. He was also an honorary or corresponding member of many of the Continental scientific societies, in Moscow, Vienna, Rome, Halle, etc. Twice he was invited to visit America, on the second occasion as Silliman lecturer in the University of Yale.

Verworn owed his special, almost unique, position in physiology to the catholicity of his interests. He had been impressed from his earliest student days with the value of zoology, and much of his best and most original work was done in the physiology of the invertebrates of all classes, although perhaps those of the marine fauna engaged his warmest attention. He used this material with skill and ingenuity in his interpretation of physiological problems in general. Undoubtedly the work by which

Verworn is best known is his "Allgemeine Physiologie," which was translated into English by Prof. Lee. This book, which is a mine of information in the lesser-known aspects of general physiology, appeared in 1894, and was immediately recognised as a work of outstanding merit. It has gone through many editions. His Silliman lectures on irritability brought together his special views on the nature and function of the nervous system, a subject which had interested him from the first; indeed, one of his earliest contributions (in 1889) to attract attention bore the title "Psychophysiological Protistenstudien." He also held very definite views on the functioning of living tissue in general, and his name will always be associated with his interesting biogen hypothesis.

That Verworn's interests were not confined to the study, in any strict sense of the word, of ordinary physiology and zoology is evidenced by his writings on the psychology of primitive art and on the evolution of the human spirit. Certainly for many years before the war he was very interested in archaeological and ethnological problems, and the writer has a most vivid memory of a conversation with Verworn, in which he gave an extraordinarily enthusiastic account of a visit to several of the Indian tribes resident in the south-west of the United States. He had visited these tribes to study the nature of their art, more particularly their colour combinations. Verworn also had a profound knowledge of the history of early art in Europe, and a very genuine interest in numismatics.

In spite of his many interests, Verworn managed to edit, with success, two physiological journals, one the *Zeitschrift für Allgemeine Physiologie*, founded by himself, and later, after his appointment to Bonn, the famous Pflüger's *Archiv*. E. P. C.

COL. WILLOUGHBY VERNER.

COL. WILLIAM WILLOUGHBY COLE VERNER, who died on January 25 at his home at Algeciras, was in many ways a remarkable man. He was a product of the Army at its best and a living denial of the too-often-quoted saying that Army officers think little and have no interests beyond sport and their "shop." Col. Verner will be remembered not only as the writer of the history of the Rifle Brigade and as the inventor of the luminous magnetic and prismatic compass and of other aids for military sketching and surveying, but also as an authority on the wild birds of South Spain and the discoverer of many of the rock shelters in South-West Spain that had been painted and decorated by Neolithic or Eneolithic man. Articles on the latter were published by him in the *Saturday Review*, and these brought him into relationship with the Abbé H. Breuil. The result was a careful survey of the whole district with regard to prehistoric man. Col. Verner, while bird-hunting near Ronda, had once noticed paintings on the walls of a cave near the top of the "sierra." This led to the publication by Breuil, Obermaier, and Verner of the first of an interesting group of Palæolithic cave paintings, which recall the northern group of France and Cantabria. But the memory of Col. Verner