and Wales. Although Mr. Caleb Evans only attained the age of 55 years, he has left behind him a very excellent record of geological work achieved by a private individual in the leisure hours of a busy life.

JOHN ARTHUR PHILLIPS, F.R.S., V.P.G.S., F.C.S., M.I.C.E., ETC.

BORN NOVEMBER, 1822; DIED 5 JANUARY, 1887.

THE new year has deprived us not only of an excellent chemist, mineralogist, and geologist, but of a dear and valued friend. Born at Polgooth, near St. Austell, where several of his family had been connected with that important tin-mine, young Phillips inherited a love of mining and metallurgy which he retained unabated to the end of his useful and valuable life. His school-days were passed at St. Austell, but he does not appear to have developed a love for science until near his 20th year, when the subject of electro-metallurgy attracted John Arthur Phillips' attention, and he exhibited some specimens of electro-deposited copper on lace, for which he received the first prize from the Royal Cornwall Polytechnic Society in 1842 at Falmouth.

This led to a series of investigations into the formation of mineral lodes. But the want of more accurate scientific training led him to Paris in 1844, where he entered as a student at the École des Mines. Here he passed through the regular course of study, and showed such proficiency that he obtained the appointment of engineer to one of the large French Collieries, which he held for some years. On his return to England, he was engaged by Sir Henry de la Beche and Dr. Lyon Playfair to carry out experiments at Putney for the Admiralty, on the various qualities of coal suited for the steamships of the Royal Navy. Lead-smelting and desilvering works next occupied his attention. Thence he went to California on an inspection of the gold-producing regions, and to report upon the machinery and methods in use in separating the precious metal at gold-mines and works. On his return to England, he lectured before the Society of Arts, on May 14th, 1862, on "Gold-Mining," giving the result of his own experience and observations in America. Mr. Phillips published his "Manual of Metallurgy" in 1852, a second edition in 1854, and a third in 1858. At the time of his death he was engaged upon a fourth edition assisted by Mr. Bauerman, which we understand will be almost immediately published. Mr. Phillips was also the author of a work on "The Mining and Metallurgy of Gold and Silver," which appeared in 1867. In 1884 he published his "Treatise on Ore-deposits," giving all the varied natural phenomena connected with the occurrence of metalliferous deposits.

For the last sixteen years Mr. Phillips has mainly directed his attention to the study of petrography, and his paper in the Quarterly Journal of the Geological Society, "On Concretionary Patches and Fragments of Rocks found in Granite," and others of a kindred nature, are of the greatest value to petrologists.

His communications were not however confined to the Geological

Society, but were made also to the Chemical and the Royal Societies, and some were published in the Philosophical Magazine. He was elected a Fellow of the Geological Society of London in 1872, and of the Royal Society in 1881, and at the time of his death was a Vice-President of the former Society. He was also a F.C.S., a M.I.C.E., and an "Ancien Elève de l'École des Mines."

Those who were personally acquainted with Mr. Phillips, while they lament the loss to science which his sudden death has inflicted, mourn still more the extinction of a life of singular simplicity, earnestness, and kindliness. He was a large-hearted and open-handed man, fond of taking every chance that came in his way of doing a good deed and helping every one to whom his help could be of service.

CHARLES FRANÇOIS FONTANNES.

Of the losses by death sustained by Geological Science in the year 1886, none has been greater than that of M. Fontannes. Men of riper age, and of wider reputation, we may have lost; but when we consider the value and the amount of the work performed by M. Fontannes before reaching his 48th year, it will be evident that the gap left by his death will not be easily filled. Especially will this be the case with the "International Geological Congress," which is to hold its next meeting in England in 1888.

There are several Secretaries to the Congress at each meeting, but the bulk of the work falls on one or two. At Bologna, in 1881, M. Fontannes divided the work with M. Delaire; but in 1885, at Berlin, M. Fontannes took it almost entirely upon himself. The "procés verbal" of a foreign scientific meeting is very different from the "minutes" of an English meeting; it is really a full abstract of the entire discussion, and the prompt preparation of this is no small test of a man's powers.

M. Fontannes' earliest work was a notice of the Museum of Lyons, 1873. This was followed in 1874 by a Note on the Infra-Lias of Narcel, and by notes taken at Athens. In 1876 he published, with M. Dumontier, "Description des Ammonites de la zone à *Ammonites tenuilobatus* de Crussol et de quelques autres fossiles Jurassiques nouveaux ou peu connus" (*Mem. l'Acad. Lyon*). In 1879 this was followed up by a work on the same subject by Fontannes himself, Dumontier having died meanwhile. In the Introduction to the later work Fontannes pays a warm tribute to his late master, attributing to his encouragement and influence his own love for geology. These books made known a new Jurassic Fauna for the South-east of France.

The most important works by Fontannes were "Les Invertébres du Bassin du Sud-est de la France—Les Mollusques Pliocènes de la Vallée du Rhône et du Roussillon," of which two volumes appeared (1879-82); and "Etudes stratigraphiques et paléontologiques pour