

does not usually lead to true rickets if sufficient Vitamin A be present, although the bone formation under these circumstances is not quite normal. This explains the well-known curative effect of cod-liver oil in rickets. So marked is the effect of this remedy, that McCollum, not appreciating the relatively enormous concentration of Vitamin A present in it compared with that in butter, as proved by Zilva, has suggested that cod-liver oil contains some other specific substance absent from butter, to which its great superiority is due. The difference, however, seems to be merely quantitative, and the further complication suggested by McCollum appears to be unnecessary.

These experiments on rickets have led to what promises to be a discovery of far-reaching importance. Rats on a diet, which in the laboratory will infallibly

produce rickets, do not acquire the disease if they are exposed to sunlight in the open air or to ultra-violet radiation, and rats which have acquired the disease can be cured by either of these treatments, just as they can be cured by the administration of cod-liver oil. Sunlight and ultra-violet radiation have also been found to be effective cures or preventives of rickets in children. The cures by light and by cod-liver oil seem to proceed in precisely the same way, and the idea naturally suggests itself, especially to the mind of a chemist, that the light actually brings about the synthesis of the Vitamin in the animal body just as it does in the plant. This idea still awaits experimental verification or disproof; but there is no doubt that the discovery of this function of light will lead to profoundly important developments in our knowledge.

### Obituary.

PROF. W. GOWLAND, F.R.S.

PROF. WILLIAM GOWLAND died on June 10 in his eightieth year. He had originally intended to enter the medical profession and actually worked with a medical man in Sheffield for two or three years. Afterwards he became a student at the Royal College of Chemistry, from which he passed in 1868 to the Royal School of Mines. Two years later he obtained the associateship both in mining and metallurgy. He was awarded the Murchison medal in geology and the De la Beche medal in mining.

His first post was that of chemist and metallurgist to the Broughton Copper Company, Manchester. Two years later he went out to the Imperial Mint at Osaka, Japan, and held the post of chemist and metallurgist there for six years. During the next eleven years he acted as assayer, metallurgist, and chief of the foreign staff at Osaka, and was for some time adviser to the Imperial Arsenal. His work was of a decidedly varied nature, and he did much to introduce Western metallurgical and chemical methods into the departments with which he was associated. It was during this period that he acquired the knowledge of Japanese methods of extracting, refining, and working metals for which he afterwards became so famous. He carried out exploration work in Korea on behalf of the Japanese Government, in the course of which his expedition had some lively skirmishes with the natives.

As a young man Prof. Gowland was a keen oarsman, and was the first to introduce rowing into Japan. He had two modern "eights" built to encourage boat-racing among the staff of the mint, but they found these craft too unstable for their liking. Eventually they decided to choose their own boats and presented two for his inspection. He found they had selected a pair of "cutters" and had fitted each with port and starboard lights. He was also the first to initiate the Japanese into the use of the wheelbarrow. He had occasion to do this in connexion with some excavation work in the copper mint, and provided the labourers with barrows. The next morning he was astonished to find that the wheels had been removed and the sturdy Japanese were carrying the loaded wheelbarrows. On leaving Japan in 1889, the order of "Chevalier of the Imperial Order of the Rising Sun" was conferred

on him personally by H.I.M. the Emperor of Japan. During his residence there he gradually built up a very fine Japanese art collection, which included some valuable kakemonas.

Returning to England, Prof. Gowland acted as chief metallurgist to the Broughton Copper Company for some years, and in 1902 was appointed professor of metallurgy at the Royal School of Mines, in succession to the late Sir William Roberts-Austen. This post he held for seven years and retired in 1909.

So far as metallurgy is concerned, his chief interest lay in the non-ferrous metals, principally copper, silver, gold, lead, and their alloys. His knowledge, in particular, of the metallurgy of copper was unique, based as it was upon experience of the best methods in vogue, both in the East and West. In 1914 he published a textbook on the metallurgy of the non-ferrous metals which quickly became recognised as an authoritative work on the subject, and is now in its third edition. He also contributed various papers to the Institution of Mining and Metallurgy, the Chemical Society, and the Society of Chemical Industry. He was an original member of the Institute of Metals, its third president, and its first May lecturer. In 1907 he was elected president of the Institution of Mining and Metallurgy, and in 1909 was awarded the institution's gold medal.

There was, however, another side to his intellectual interests, as shown by his membership of the Society of Antiquaries, the Royal Anthropological Institute, and the Numismatic Society. His publications under these heads were numerous and varied, dealing with, *e.g.*, the early metallurgy of silver and lead, the remains of a Roman silver refinery at Silchester, the burial mounds and dolmens of the early Emperors of Japan, and silver in pre-historic and proto-historic times. From 1905 to 1907 he acted as president of the Royal Anthropological Institute.

Prof. Gowland was a man of great personal charm and distinction. He was extremely thorough in all he undertook, and never spared himself in the execution of his duty. His lectures were very carefully prepared and well delivered. The geniality of his disposition made him a general favourite with his colleagues and students, and he will always be affectionately remembered at the Royal School of Mines. H. C. H. C.