layer on the anode which serves as a mould. It then only remains to vulcanise the deposit in the usual way, either after separation from the metallic surface or while still adhering thereto. Of course it may not be desirable to add the vulcanising agent to the bath, but to effect a cold vulcanisation after deposition. In fact, as may be gathered from the patent literature on the subject, the process is capable of many modifications.

It will be evident that the process which has been outlined eliminates many of the cumbersome mechanical methods at present associated with the rubber industry. The operating conditions can be precisely controlled, whilst by maintaining them constant the process can be made continuous or even automatic; moreover, being a cold process throughout, the original quality and structure of the starting material are retained in the product. Against these advantages must be set the fact that, since rubber is a non-conductor, it is possible to obtain only comparatively thin sheets of rubber product, though further investigation will doubtless remove this limitation. The oxygen liberated by electrolysis at the anode gives rise to a further difficulty, inasmuch as it leads to the formation of a spongy deposit; already, however, many proposals have been made for overcoming this defect, such as the use of porous moulds surrounding the anode or the addition of reducing agents to the bath. When the technique of the process has been perfected, a reduction in the cost of manufacture of sheet rubber goods and rubbered fabrics may be anticipated; not only that, but important developments may be expected in the direction of the coating of metal and other surfaces with rubber.

## Obituary.

### SIR JOHN SCOTT KELTIE.

SIR JOHN KELTIE seemed endowed with perpetual youth. He regulated his activities so nicely to his increasing age that, even when well advanced in his eighty-seventh year, he was able in one day to lunch at his club, attend a long committee meeting and the Council of the Royal Geographical Society, conduct a dinner of the Geographical Club, sit through a long evening meeting of the Society, seeing and hearing everything as clearly as when a boy, and, after returning home, sit up until midnight talking over the past and planning the future for a year or two ahead. He found life so full of interest and satisfaction that there seemed no reason why he should not live to celebrate the centenary of the Royal Geographical Society in 1930, and that of his own birth in 1940. He was happy in being spared the suffering of long illness and the dulling of his physical powers; he died of bronchitis on Wednesday, Jan. 12, at work almost to the last day.

Keltie was born in Dundee on Mar. 29, 1840, inheriting from his ancestors, who dwelt in Glendevon, a store of bodily health and mental fitness, but nothing more. Unaided and self-supporting, he made his way through several sessions, first at the University of St. Andrews and then at that of Edinburgh, though without taking a degree. The choice of a career seemed to lie between the dominie's desk and the preacher's pulpit, and he qualified himself for the latter in the United Presbyterian Church. But the narrow theology of the time repelled Keltie, and he used to tell how many years later he looked up the "Year-Book" of his old Church and found his name branded with the curt comment, "Lapsed into literature."

Keltie's literary work began in 1861 with Messrs. W. and R. Chambers in Edinburgh, who were then publishing the first edition of their famous "Encyclopædia," and at this period he produced many pieces of work in various fields, including a "History of the Highland Clans." He married in 1865, and soon found life in Edinburgh too narrow for his ambition. The southing instinct of his race brought him to London in 1871, when he joined the editorial staff of Messrs. Macmillan and Co., Ltd., and remained in association with that firm to the end of his life. He acted as sub-editor of NATURE from 1873 until 1885, and as editor of the "Statesman's Year-Book" from 1880 until his death, this being the last of his literary activities and that of which he was most proud. In 1873 he wrote an article on the island of Socotra and sent it at a venture to the *Times*, which accepted it, and thus began a lifelong association with that journal. It was probably this chance which turned his attention seriously to geography in time to share in all the stirring episodes of the opening up of Africa, the penetration of central Asia, and the polar expeditions of forty remarkable years. His work on NATURE similarly developed in him a wide knowledge of the literature of science and a keen though unspecialised interest in its advances.

Keltie joined the Royal Geographical Society as a fellow in 1883, and in the following year when the Society was roused, at the instance of Mr. D. W. Freshfield, to deal with educational aspects, he was appointed inspector of geographical education and commissioned to inquire into the methods of teaching in Great Britain and abroad. On this service Keltie travelled through the principal countries of Europe and brought home a very large collection of text-books, maps, and teaching appliances which he exhibited and lectured upon in London, Edinburgh, and other places. He produced a valuable report setting forth the deplorable state of geographical teaching in the British Isles as compared with France, Germany, and Italy. From this report sprung directly the revival in teaching geography which has culminated in the training and appointment of professors or readers in every British University and the institution of a geographical tripos at Cambridge. In 1894 the librarianship of the Royal Geographical Society became vacant and Keltie was appointed to the

post, then a part-time occupation, which afforded great opportunities for the pursuit of private literary work. Keltie soon became the indispensable helper of the assistant secretary—the great naturalist H. W. Bates, whom he succeeded in the secretaryship in 1892. From this time onward the administrative work of the Society engrossed his attention and could well have filled the whole time of a less untiring worker than Keltie; but it only stimulated his literary and journalistic powers and, at a time when the science of publicity was still imperfectly developed, his connection with the press did much to enhance the prestige and popularity of the Society and the fame of the great travellers and explorers with whom he was in daily contact.

Throughout his work at the Royal Geographical Society Keltie was on the side of progress, always encouraging those who were striving after more scientific methods in exploration or discussion and always interposing a moderate but unwavering opposition to reactionary tendencies. The confidence which successive presidents and councillors reposed in his judgment made him a power in the Society and in the geographical world even in his days of silent service as secretary. After he retired from the secretaryship in 1917, he was elected to the Council and latterly acted as vice-president.

Keltie was long connected with Section E of the British Association, in which he was recorder for several years and president at the Toronto meeting of 1897; afterwards he served on the Council of the Association. He bore the lion's share of the organisation of the great International Geographical Congress of London in 1895 and was one of the secretaries at the meeting. He also supported the Geographical Association from its day of small things and helped it forward to its present splendid maturity.

Although most of his work is likely to be forgotten as journalism, much of it ranks as literature and is of more than ephemeral interest, especially his "Partition of Africa"—a study of political geography in the making — and his "Applied Geography." He initiated and edited several important series of books on travel and exploration either alone or in collaboration. In 1893 he reconstructed the serial publications of the Royal Geographical Society and made its monthly *Journal* the most popular as well as the most widely circulated paper of its kind in Europe, while at the same time maintaining to the full its scientific character and the high standard of its cartography. His skill as an editor was of a high order, and he excelled in the art of inducing difficult contributors to follow the rules.

Though no explorer and little of a traveller, Keltie exerted a powerful influence on exploration in every quarter of the globe by his close personal relations with travellers of every nationality during the last quarter of the nineteenth century and the first quarter of the twentieth. He had the quick intuition of the Highlander combined with the slow caution of the Lowlander and balanced by a tact and generalship peculiarly his own. While faithful to his superiors and to his subordinates alike, he never failed in the duty of giving sound even if unpalatable advice to the former, and he always treated the latter as fellow-workers and was scrupulously just in giving them credit for good intentions as well as good work. He attained great success in organising public ceremonial functions, and his private hospitality, aided by the charm of his daughter Mrs. T. L. Gilmour, will long be remembered.

The appreciation in which Sir John Keltie's work is held by those best qualified to judge it may be estimated from the honours he received. These include gold medals from the Geographical Societies of London, Edinburgh, Paris, and New York, the honorary membership of nearly all the geographical societies in the world, the honorary degree of LL.D. from St. Andrews, the companionship of several Scandinavian orders, and finally the honour of knighthood, which he received in 1918.

HUGH ROBERT MILL.

## DR. C. L. WITHYCOMBE.

DR. CYRIL LUCKES WITHYCOMBE, lecturer in advanced and applied entomology, died at Cambridge on December 5, aged twenty-eight years. Born at Walthamstow, the son of a schoolmaster, he early developed a peculiar taste and power for the keeping and rearing of insects, and this indicated his career. He passed his Intermediate Science Examination from Birkbeck College, and then went on to King's College, where he came under the influence of the late Prof. Dendy and of Dr. Mackinnon, on whose advice, with the object of broadening his science, he took the ordinary degree in botany, chemistry, and zoology instead of honours in one subject. He then went to the Imperial College to work under the late Prof. Lefroy, who regarded him as by far the best pupil he ever had.

During these years Withycombe spent all his spare time in the field, and he kept and reared a large series of Neuroptera, on which group he published fourteen papers, the most important being on the biology of the group in reference to the phylogenetic significance of their immature stages (*Trans. Ent. Soc.*, 1923 and 1925). The phylogeny had already been discussed by Handlirsch on palæontological evidence, and by Tillyard and Comstock on external morphology and wing venation. While their work was fully considered, the result was a modestly written discussion of the relationships of the families together, summarised by the propounding of a new phylogenetic tree, based also on the mass of new facts discovered by the author; assuredly this paper marks a stage in the scientific history of the group. It is a pity that the task he had set himself of monographing the British species cannot be carried out.

In 1923 Dr. Withycombe went to Trinidad as lecturer in entomology at the newly founded Imperial College of Tropical Agriculture. He was happy in having agreeable colleagues, and in seeing the tropics and their produce. He described to me