which are capable of operating under a variation of head equal to 50 per cent. on each side of the mean, with efficiencies which do not fall below 70 per cent. over this range, and with reasonably high speeds of rotation under the heads available.

Even with such turbines, the number of technical problems to be solved before a tidal scheme of any magnitude can be embarked upon with confidence is large. The questions of single-*versus* double-way operation, of storage, of the effect of sudden changes of water-level due to strong winds, of wave effects, of silting in the tidal basin and of scour on the down-stream side of the sluices, of the best form of turbine and of generator, and of their regulation and of that of the sluice-gates, are probably the most important, though not the only, subjects to consider.

On the other hand, the possibilities of tidal power, if it can be developed commercially, are very great. Assuming a mean tidal range of only 20 ft. at springs, and 10 ft. at neaps, and adopting the single-basin method of development with operation on both rising and falling tides, each square mile of basin area would be capable, without storage, of giving an average daily output of approximately 110,000 horse-power-hours. In such an estuary as the Severn, where an area of 20 square miles could readily be utilised with a spring tidal range of 42 ft., the average daily output, without storage, would be approximately 10,000,000 horse-power-hours.

At the present time it is difficult to obtain an even rough estimate of the total cost of such a scheme, owing to the uncertainty regarding many of the factors involved. The whole question would appear to merit investigation, especially on matters of detail, by a technical committee with funds available for experimental work. As a result of such an investigation, it is at least possible that a definite working scheme could be formulated capable of generating power at a cost at least as small as, and possibly much smaller than, that of power generated from any coal-fired installation.

Obituary.

PROF. C. A. TIMIRIAZEFF, FOR.MEM.R.S.

THE death is announced of Clement Arkadievitch Timiriazeff, emeritus professor of botany in the University of Moscow. Timiriazeff was the only Russian botanist who was at all a familiar figure in England. In earlier days he came to England and saw Charles Darwin, while his last visit was made as a delegate to the Darwin celebration in Cambridge in 1909. His earliest publication appeared in 1863—a Russian book on "Darwin and his Theory," which ran through five editions. Here he made his mark as an attractive expounder of science for the general reader, and he followed this work with books on "The General Problems of Modern Science," "Agriculture and Plant Physiology," and "The Life of the Plant." The last was in great demand, there being seven Russian editions between 1878 and 1908, while in 1912 it was translated into English, and is widely read to the present day. Its characteristic note is an exposition of plant structure and function based on the chemical and physical processes at work in the living plant. Without comparison of the early editions we cannot tell at what date this book took the form in which it appeared in English, but it looks as if Timiriazeff was one of the earliest writers to take up this essentially modern outlook. His attitude was no doubt an expression of his early training under chemists and physicists. Born in 1843, he studied under Bunsen, Kirchhoff, Helmholtz, and Berthelot before working with Boussingault.

Timiriazeff made himself famous by work on one single problem—the participation of the different rays of the visible spectrum in the photosynthetic activity of the green leaf. The technique which he brought to the attack on this problem seems almost an exact expression of the combined influence of his teachers: good methods of gas-analysis, pure spectral illumination, and experimentation on isolated leaves; combined with the sound conception that rays utilised for work in the chloroplast must be rays abundantly absorbed by the pigment chlorophyll. Working with a micro-eudiometer, concentrated sunlight, and a narrow spectroscope slit, he was able to disprove the accepted view that the yellow region, which is so bright to the eye, is the most effective region of the solar spectrum, and to locate the efficiency in the red region where absorption by chlorophyll is greater. Afterwards he demonstrated the secondary maximum of photosynthetic effect in the blue region, where also absorption is great.

This work was published in different forms, at various dates, in scientific journals of most European countries, the final presentation being the Croonian lecture to the Royal Society in 1903. The actual experimental work seems to have been all done between 1868 and 1883. There is no evidence that he published research work on any other subject, so that we have in Timiriazeff the remarkable case of a man who, having achieved fame by one important line of research at forty, was content to devote the remaining half of his life to teaching and exposition.

THE announcement of a new book, "A Nation's Heritage," by HARDWICKE DRUMMOND RAWNSLEY, sadly coincides with the record of its author's death. Born on September 28, 1851, the distinguished canon died on May 28, to the last pursuing the self-imposed task of persuading his fellow-countrymen to take care of their own treasures. His mother was a niece of Sir John Franklin, the Arctic explorer. In education Canon Rawnsley had the good fortune to be at Upping-