pulses were sharply defined. This pulse technique was also described by Mr. J. Moir (British Thomson-Houston Co., Ltd.), who showed pulse records taken in a cinema. Mr. Moir claimed that this technique is the most useful for investigating hall acoustics, but stated that quantitative interpretation of the results is not yet possible.

Mr. Parkin (Building Research Station) summarized the results of a questionnaire sent to 175 expert listeners (for example, music critics), in which they were asked for their opinions of the acoustics of ten selected concert halls. The replies showed conclusively that the New Philharmonic Hall, Liverpool, was considered to have very good acoustics. The Royal Opera House, Covent Garden, and St. Andrew's Hall, Glasgow, are two other halls generally considered to be acoustically good. This 'operational research' approach, which bases the assessment of the acoustical properties of a hall on a statistical analysis of critical subjective estimates coupled with physical measurements, was also evident in Mr. W. A. Allen's contribution describing a subjective test made in a concert hall by six listeners. These listeners changed their position in the hall between items in a concert, and there was substantial agreement on the acoustic conditions at the various positions. Mr. Parkin also pointed out that since calculation gave only a rough guide when designing a hall, it would be advantageous to adjust the acoustics of a new hall while building, on the basis of measurements made when the hall was nearly finished.

Mr. R. Howarth (B.B.C.) stated that in a war-time B.B.C. studio the broadcasting acoustics were much improved by the replacement of the wooden orchestral platform by a solid structure.

Mr. H. L. Kirke (chairman of the Acoustics Group), in his summing-up, emphasized the value of meetings such as this in bringing together architects, musicians and men of science. It was obvious that exact definitions of the terms used are required, and that further and more detailed collaboration is necessary.

P. H. PARKIN

¹ Morse, P. M., and Bolt, R. H., "Sound Waves in Rooms", *Rev. Mod. Physics*, 16, No. 2 (1944).

² Sabine, W. C., "Collected Papers on Acoustics" (Oxford University Press).

OBITUARIES

Dr. James Chumley

ON December 11, 1948, there passed away at his home near Edinburgh at the advanced age of eighty-six, Dr. James Chumley, thus bringing to an end a long life of service to biological science the more worthy of commemoration in *Nature* in view of the fact that most of his work was carried on unseen and unrecorded by publication under his own name.

In the closing years of the nineteenth and early years of the present century, one of the chief centres of zoological activity was the "Challenger" Office, Edinburgh, where John Murray supervised the working out of the immense collections brought home by H.M.S. *Challenger*. From a subordinate position in the office, Chumley rose to become Murray's secretary and right-hand man in the work of caring for the collections, distributing them for investigation by specialists and eventually editing the fifty volumes of "Challenger Reports" which may well be regarded as forming the foundations of the modern science of oceanography. Chumley claimed, no doubt justifiably,

to be the only man in existence who had read every word of these reports.

In addition to his work in the "Challenger" Office, Chumley acted as secretary and treasurer of the Scottish Marine Station at Granton, built with funds subscribed by friends of John Murray, by the margin of a great quarry which had been invaded by the sea and converted into an immense natural aquarium. Attached to the Station were a large lighter with deckhouse laboratory moored in the middle of the quarry and humorously designated the *Ark*, and a small research ship of 30 tons, the *Medusa*. The Granton Marine Station served to introduce various zoologists, including the present writer, to the science of marine biology, and incidentally it may be regarded as the ancestor of the important Millport Marine Station of to-day, for the *Ark* and the *Medusa* were taken through the Forth-Clyde Canal in 1884 and utilized in the Clyde area for investigations supplementary to those of the *Challenger*. After the conclusion of this work in 1892, the *Ark* remained at Millport; it was drawn up on the shore and continued to function as a laboratory until destroyed by a storm in December 1900, an extension having already been provided which still exists as part of the present Station.

Murray's plans to return to the Clyde and take over the Millport Station were brought to nought by his sudden death by accident in 1914. The *Challenger* collections were handed over to the British Museum (Natural History), and Chumley was appointed a teaching fellow in the Department of Zoology, and later as lecturer on oceanography, in the University of Glasgow. There he continued to play the same active unobtrusive part as he had in the "Challenger" Office. The arrangement and cataloguing of the large library and the card catalogues of local fauna were in the main the work of James Chumley; and those in the Department of Zoology who published work during his twenty years in Glasgow owe him an inestimable debt for his ever-ready assistance in matters of bibliography and editorial revision.

As already indicated, Murray carried out, as an extension of the *Challenger* work, oceanographical researches in the Clyde sea area. So far as concerns physical oceanography, the results of these investigations were duly worked up by one of Murray's colleagues, H. R. Mill; but the zoological results had remained untouched. This blank Chumley proceeded to fill, and his first two years in Glasgow were devoted to working through the *Medusa* records with the idea of thereby laying a foundation for subsequent faunistic work. The result was his valuable "Fauna of the Clyde Sea Area", published by the Glasgow University Press in 1918. JOHN GRAHAM KERR

Prof. W. J. Dann

PROF. WILLIAM JOHN DANN, professor of nutrition at the Duke University School of Medicine, Durham, North Carolina, died at his home on December 5. Prof. Dann was born in Bath, England, on November 9, 1904, and graduated at the University of Sheffield in 1925. Later he went to Cambridge, where he received the Ph.D. degree in 1932, after working under the direction of Sir Frederick Gowland Hopkins.

Dr. Dann, who had been at Duke University since 1935, became a recognized authority in the field of nutrition and the study of vitamins. He was a Beit