wider repetition and extension of the work recently done by pioneers in the quantitative approach to the problem. In the consideration of possible links between climatic changes and oceanic productivity, a mechanism was outlined by which the decline in nutrient resources and fisheries in the western part of the English Channel might be explained by climatic changes over the far northern Atlantic Ocean. The available data indicated that the understanding of variations in a fishery may well require a knowledge of the deep-water circulation of the ocean as well as a study of the shelf on which the fish live.

Oceanographic and fisheries surveys of the subtropical and tropical regions of the central Pacific Ocean were used to show that fisheries exploiting the populations of the high seas could profit by guidance from recognizable features of the water circulation just as fishermen in marginal seas have been guided by topographical features. Bottom-living animals were not neglected: emphasis was laid on the uniformity and small number of species living on level sea bottoms as compared with the fauna of rocks, reefs and vegetation, which afford a greater variety of microclimates to their inhabitants. It was made very clear that team-work used to map the level sea floor communities would be a very profitable way of widening our knowledge of marine ecology. The last paper on this day, by Dr. George Wald, of Harvard University, on "The Ocean and Organic Evolution", had the most appreciative audience of the whole convocation. He discussed the ideas of Oparin[1] and extended them with the help of his own studies of retinal pigments and the muscle chemistry of the vertebrates and invertebrates.

The third day was devoted to submarine geology and the relations between oceanography and meteorology. The geological papers dealt largely with the structure of the ocean basins and sedimentation problems. Evidence of the existence of a sharp change in density in the rock about a mile below the sea bottom was given particular consideration. Other topics were evidence of growth of the oceans and atmosphere during geological time and of the changing conditions for plant and animal growth. The dredging of cretaceous shallow-water fossils from the summits of 6,000-ft. deep sea-mounts in the Pacific Ocean and a marked increase in the deposition of calcium carbonate since the middle of the cretaceous period were used as evidence that some 3,000–4,000 ft. depth of water has been added to the ocean since that time.

The discussions on oceanography and meteorology emphasized the similarity of the theoretical treatment needed for oceanic and atmospheric circulation. Prof. Palmén showed how recent studies of the budget of angular momentum in the atmosphere have suggested a new approach to the whole question of transfer of momentum from the atmosphere to the ocean. He demonstrated that the pressure forces produced by the differences in height of the water-level on the east and west sides of the continents provide a more effective mechanism than that of frictional forces at the bottom and the coasts. He gave numerical values of the sea slopes required to provide the necessary momentum transfer. This and following papers dealing with the role of inertia and stratification in the question of transfer of energy, and other aspects of transfer of energy between the ocean and atmosphere, were so specialized as to cause the convocation to end on a rather sober note, largely due to the conviction that the detailed study of such difficult topics is as essential for oceanography as for meteorology, so that oceanography cannot remain the rather light-hearted subject which it has been for the past hundred and fifty years.

The meetings were held in the lecture theatre of the Marine Biological Laboratory, and there was some pleasantry about what took place "on the other side of the street". Visitors to Woods Hole could not help being greatly impressed by the possibilities which exist in the neighbourliness of the Marine Biological Laboratory, the Oceanographic Institution, the new Laboratory of Oceanography, and the laboratory of the Fish and Wildlife Service, for exchange of ideas and co-operation. It was a remarkable experience to hear so much about marine research and to enjoy the company of so many marine scientists, and like many other visitors from Europe I am grateful to the National Research Council and the Office of Naval Research for making this meeting possible. G. E. R. Deacon

[1] Oparin, A. I., "The Origin of Life" (Macmillan, New York, 1938).

OBITUARIES

Prof. H. Stanley Allen, F.R.S.

Herbert Stanley Allen was born in Bodmin, Cornwall, on December 29, 1873. The fifth son of Rev. Richard Allen, a Methodist minister, he was always proud of being "Cornish by birth". He received his early education at Kingswood School, Bath, where he won various scholarships and prizes, was a senior prefect, and took first place for all England in the London Matriculation and, a year later, in the Cambridge Senior Local Examination. He was a contemporary of Prof. T. M. Lowry and a few years junior to Prof. A. E. Taylor.

In 1893 he entered Trinity College, Cambridge, and in 1897 gained a first class in the second part of the Natural Sciences Tripos. After a short time in a temporary post as assistant lecturer in Aberystwyth, he returned to Cambridge to take up research work under Prof. J. J. Thomson. From Cambridge he went to Renfrew in 1900 to take charge of Lord Blythswood's Physical Laboratory, and it was while living in Renfrew that he met Miss Jessie Macturk, whom he married in 1907. Their family consists of a son and a daughter. He joined the staff of the Physics Department at King's College, London, in 1905 and soon became a senior lecturer in physics. For his work there on the photo-electric effect he received the degree of D.Sc. in 1909.

Allen returned to Scotland in 1920 and served, first as a lecturer and later as a reader, on Prof. C. G. Barkla's staff in the University of Edinburgh. In 1923 he was appointed professor of natural philosophy in the United College of St. Salvator and St. Leonard in the University of St. Andrews. His first activity in St. Andrews was directed towards the reconstruction and enlargement of the Physics Laboratory which, after reconstruction, was formally opened by Sir William Bragg in 1925. His early researches covered a variety of subjects including photo-electricity, X-radiation, radioactivity, the Zeeman effect and spectroscopy. In St. Andrews his main interests were the quantum theory and spectroscopy, particularly the band spectrum of hydrogen.

His first text-book, "Photo-electricity", based on lectures he delivered at King's College, London, and

published in 1913, contains an account of his own work, especially that on photo-electric fatigue. "The Quantum and its Interpretation" (1928) was, to quote his own words, "not a treatise on the quantum theory but an attempt to deal with the baffling problem of the nature of the quantum". Although no mean mathematician, he was never content with a purely mathematical representation of phenomena. Wherever possible, he tried to present a picture in terms of a 'model', and he endeavoured "to take a middle course between a mathematical and a purely descriptive treatment". His "Electrons and Waves" (1932) is devoted to the dilemma of particles versus waves. Allen and Moore's "Text Book of Practical Physics", first published in 1916, after frequent reprinting, is now in its third edition, and his "Text Book of Heat", written jointly with R. S. Maxwell, appeared in 1939.

He was elected a Fellow of the Physical Society in 1906 and of the Royal Society of Edinburgh in 1920. He served on the Council of both those Societies and was awarded the Makdougall–Brisbane Medal by the Royal Society of Edinburgh. He was admitted to the fellowship of the Royal Society in 1930, and this honour he shared with his brother, Edgar Johnson Allen, who was for many years director of the Marine Biological Laboratory at Plymouth. When he retired from the chair of natural philosophy in 1944, the University of St. Andrews elected him professor emeritus and conferred on him the degree of LL.D.

Prof. Allen was naturally shy and retiring, and only those privileged to know him most intimately realized the depth of kindness which lay behind his quiet dignity of manner. His junior colleagues gained much from his advice and encouragement, and his students will always remember him for his lucid style as a lecturer. Every lecture which he delivered was thought out with care and presented with the utmost precision and clarity. His whole life was devoted to the search for truth. There are many who mourn his death, which took place at the home of his daughter on April 27. D. JACK

Prof. J. P. Hill, F.R.S.

PROF. J. P. HILL died suddenly on May 24, in his eighty-first year. His first scientific paper was published in 1892; his most recent four years ago; and only three days before his death he was discussing with the librarian of the Zoological Society the placing of the illustrations of Part 7 of his series of papers on the development of the Monotremata, a paper that is now in the press. His span of active scientific work thus covered a period of more than sixty years. There can be few scientists who have enjoyed so long and so fruitful a life of research.

James Peter Hill was the son of Scottish parents. After attending the Royal High School in Edinburgh, he joined the Royal College of Science in London, before returning to Edinburgh, where he studied zoology under Cossar Ewart. His first appointment, in 1892, was as demonstrator in biology in the University of Sydney. From this office he was promoted, in 1904, to the post of lecturer in embryology. In 1906 he returned to England, to occupy the Jodrell chair of zoology and comparative anatomy in University College, London. He relinquished this appointment in 1921, to take up a chair of embryology and histology, which was specially created for him as part of the reorganization of the Department of Anatomy in University College that was carried out by Elliot Smith with the support of the Rockefeller Foundation. He retired from this post in 1938, when he reached the age of sixty-five. He was elected to the Royal Society in 1913, and was awarded the Darwin Medal in 1940. He was an honorary member of several foreign academies of science.

The scientific circle to which J. P. Hill was introduced as a young man in Sydney included the late Prof. J. T. Wilson, who afterwards became professor of anatomy in Cambridge; Sir Charles Martin, who was later professor of experimental pathology in the University of London; and the late Sir Grafton Elliot Smith, who had already begun his now classical studies of the morphology of the vertebrate brain. Hill's first research interest was in the Enteropneusta, but he very soon turned his attention to the embryology of the monotremes and the marsupials, a subject which remained his chief interest throughout his long career. His first paper in this field, published in collaboration with Martin, was entitled "A Platypus Embryo from the Intrauterine Egg". This proved to be the start of a systematic study of the embryology of the duck-billed platypus, which he carried out mainly in collaboration with J. T. Wilson. He also investigated the process of fertilization in monotremes, and the manner of formation of the corpus luteum, the phases of development of which he was able to correlate with the functional stages of the reproductive cycle. In addition, he devoted himself to the problem of the placentation of *Perameles*, showing that this animal has an allantoic placenta, and to the systematic study of the morphology and development of the urogenital organs in the Marsupialia. When he returned to England his attention became partly transferred to the embryology of Eutheria, and particularly to the development of the primates, including man. One of the most important of his publications is his 1932 Croonian Lecture of the Royal Society, on "The Developmental History of the Primates". This monograph provides what is now rightly regarded as the classical account of the blastocyst, of the manner of implantation, and of the formation and structure of the placenta in all the main subdivisions of primates.

Vol. 82 of the *Journal of Anatomy*, published in 1948, was dedicated to J. P. Hill. Prof. D. M. S. Watson, in a foreword, describes J. P. Hill as a general zoologist of wide interest and encyclopædic knowledge; and as a man of delightful and unique personality. He also provides a picture of an enthusiastic teacher; and of a scientist whose quality was not only revealed in his own writings, but also in the work of his research students. For his influence extended not only to his collaborators—J. Brontë Gatenby, Thomson Flynn, E. A. Fraser, A. Subba Rau, to name only a few—but also to numbers of others who, under his guidance and stimulus, undertook research on embryological subjects. J. P. Hill also did much to encourage the work on sex hormones that was proceeding in University College in the later 'twenties and early 'thirties.

It has been said of him that he was too meticulous a scientist, and that he carried a passion for certainty to such lengths that he would wait unnecessarily long to dot the 'i's' and cross the 't's' of his discoveries. A passion for certainty is, however, a fault in the right direction. If it led Hill to withhold from publication certain observations which might well have been published, we can find compensation in the fact that what he did record is of lasting value.