a period of four years allowed between hydrographic phenomena and herring catches. For a period of fifty years it has been possible to show a relation between the range of tide at Aberdeen and the productivity of the herring fishery of the east coast of Scotland. The curves representing tidal data and herring catches show periods in which they tend to parallelism and to convergency, but until this periodicity is understood and can be foreseen the result will be of little use commercially. Good year-classes can be referred to the activities of Atlantic water, which have been shown by Pettersson to depend upon the periodic variation of lunar influence, but more definite knowledge is required as to the time, intensity, and direction of invasions of Atlantic water into the North Sea. This is particularly illustrated by the conditions which are held to have produced the 1907 year-class, which gave the rich fishery on the east coast of Scotland in 1910. The wide-spread occurrence of the rich year-class of 1904 which was found in the Gulf of St. Lawrence and in practically all waters of north-west Europe suggests that a study of the hydrographic conditions of the North Sea alone is insufficient for a full understanding of the factors which determine the wealth of the different year-classes.

Although the production of good year-classes has the greatest influence on the fishery in that these year-classes give a herring population sufficiently large to yield a succession of large catches throughout the season, or a number of seasons, the migrations of the herrings have an effect which is considerable and they may in some cases bring about the formation of new fisheries or the non-existence of others. Pettersson has shown how the great Baltic herring fishery of the Middle Ages coincided with a maximum activity of Atlantic waters, due to the greatest possible tidal influence of the moon and sun, and, also how the present Baltic fishery fluctuates in a period of eighteen to nineteen years. These fluctuations are noticeable chiefly in shoals of adult fish, and, in our waters, for the shoals off East Anglia and the winter herrings of the east coast of Scotland, they have been found to alternate with those of the Baltic fishery. The composition and nature of the shoals about the Shetlands this year point to migrations which have followed the most recent invasion of Atlantic waters, with which has coincided the lateness of the appearance of the Northumberland July shoals in 1920 and 1921 and of the shoals fished from Yarmouth in September 1921. Before we can hope to understand this periodicity in migrations and the difference from year to year in the arrival of our shoals a much more comprehensive knowledge of the hydrography of the North Sea and of the factors controlling the movements of the waters of the North Atlantic is required. Further, the publication of the statistics relating to the fishery in a form which will allow of their examination as to where and when the catches were made is desirable.

That the poor quality of the herrings and the early maturity of the younger year-classes have coincided with one another and with the presence of large quantities of Atlantic water cannot be taken as solving the problem of their occurrence. Neither does the poor liver yield from Norwegian cod, which, in some years at least, coincided with large numbers of young fish among adult cod and with Atlantic water activity, throw any further light on what must be regarded as a physiological problem awaiting investigation, and one which cannot be considered as explained by a reference to a possible scarcity of copepods.

The problem of the fluctuations in our herring fishery is not one which can be solved by a consideration of one or two isolated set of phenomena. That the activity of Atlantic water has a connexion with periodicity in the fishery and with the production of good year-classes suggests a possible way of approach. It is a problem which demands the attention not only of the zoologist and the hydrographer, but also of the physiologist and probably that of the astronomer. Further, it must not be forgotten that the men engaged in the fishery and the industries connected therewith are concerned more about the fluctuations from year to year than those which are spread over much longer periods.

The Nebraska Tooth.

By W. P. PYCRAFT.

AT the meeting of the Zoological Society on November 7, Prof. Elliot Smith exhibited a cast of the now famous Nebraska tooth, which is regarded by American palæontologists as representing a new genus and species of the human race—*Hesperopithecus haroldcooki*. This tooth—a "second upper molar"—differs, we are assured, on one hand from that of any known anthropoid apes, and on the other from any of the primitive types of man yet discovered.

Prof. Elliot Smith is in agreement with this interpretation; and presented fresh evidence in its support, furnished him by Prof. Osborn. This evidence included the results of radiographing the tooth, together with the teeth of a chimpanzee and Piltdown man. But these, it must be admitted, were unconvincing pictures, since they failed to demonstrate the features they were designed to show.

The teeth of the Piltdown man, it will be remembered, showed a large pulp-cavity placed above the level of the alveolar border of the jaw, as in modern man; wherein, however, the cavity is smaller. But the Piltdown teeth, in this regard, differ as much from the teeth of Neanderthal man, wherein the pulp-cavity was of great size, and evidently developed at the expense of the roots. Sir Arthur Keith has called such teeth "taurodont." They are peculiar to men of the Neanderthal type. The Piltdown teeth, like those of the modern man, are of the "cynodont" type. This fact, it may be predicted, will come to have an additional significance in the near future.

Dr. A. Smith Woodward, in the discussion which followed Prof. Elliot Smith's remarks, reaffirmed his original belief—expressed at the time when the discovery of the Nebraska tooth was first announced, and set forth in NATURE of June 10 (vol. 109, p. 750)—that this tooth was more probably that of one of the primitive, extinct bears (Hyænarctos), than of some primitive member of the primates. Prof. Osborn

dismisses this suggestion on the ground that "the difference is so fundamental that it is difficult to find any single point of agreement." But from Prof. Osborn's own account of this tooth, which appeared in NATURE of August 26, p. 281, it is a no less difficult matter to discover harmony between this tooth and the molars of any of the primates, living or extinct. We cannot escape the conclusion, in short, that the evidence as to the true character of the Nebraska tooth has been only partly sifted. Before we can consider ourselves in possession of the whole of the evidence it must be carefully compared with *worn* teeth of Hyænarctos, and its near allies. Radiographs of such teeth are essential. For the moment the material for such a comparison is, doubtless, limited: but even this can, and must, be taken into account. We trust that Prof. Osborn will see his way to supplement the able summary he gave us in NATURE, in August last, wherein he contrasts the tooth of Hesperopithecus with the teeth of chimpanzee and Pithecanthropus, by a similar pictorial comparison between this remarkable tooth and the teeth of the fossil bears, or at least a Hyænarctos.

The extremely worn condition of this tooth compels caution in every statement made concerning it: and more especially on the part of those who have never seen and handled the actual specimen. The danger of dogmatising on the evidence afforded by photography and casts alone, was forcibly illustrated in the case of the skull of Piltdown man. But it is also imperatively necessary, in the interests of science, that even remotely possible relationships should be seriously examined. It is always unwise to assume that what *ought* to be, *must* be. We cannot help feeling that this applies very pertinently in the case of the Nebraska tooth: and that therefore it would be wise at any rate to entertain the *suggestion*, that it may, after all, represent one of the Ursidæ, instead of one of the Hominidæ.

Obituary.

MRS. A. D. WALLER.

THE announcement of the death on October 22, at sixty-three years of age, of Mrs. Waller, widow of the late Dr. A. D. Waller, must have been noticed with regret by many workers in the world of science. Alice Mary Palmer, which was Mrs. Waller's maiden name, had early aspirations towards a medical career, and after matriculating in the University of London she took up her medical course at the London School of Medicine, where she became the pupil of Dr. Augustus Waller, then lecturer in physiology at the School. Miss Palmer was appointed his demonstrator—a post which she filled with enthusiasm. His original and stimulating lectures were a great delight to her, and the relationship of teacher and pupil ripened rapidly into a closer one.

Husband and wife had much in common: both cared intensely for education and worked throughout their lives for what they considered its best interests. After her marriage Mrs. Waller's chief concern was for her husband's work. In all that he did she had her part; she enjoyed the whole technique of laboratory work, owning apologetically that even a bit of "mere" anatomy never came amiss to her. The house in Grove End Road, which soon became such a centre for scientific interests, was secured for the young couple early in their married life. It was an unusual household, being at once both laboratory and home, and its ways were unconventional; but to those who caught the spirit of the place, the charm of its hospitality was irresistible. All who cared for scientific work were welcomed there, and to the student who sought her advice Mrs. Waller became at once friend, champion, and helper. Foreign friends, distinguished and undistinguished, made Weston Lodge their resting-place when visiting London, and much good talk was heard within the walls of the old study—great were the discussions, vigorous the arguments, and over all debates played the gentle humour of the hostess, softening the sometimes mordant wit of her husband.

During the latter years of their lives the centre of interest was transferred, for the Wallers, from Weston Lodge to the University Laboratory at South Kensington. That laboratory fulfilled to a large extent the purpose for which it was founded. Many will remember it as a place of help, inspiration, and fruitful work, and it may safely be said that there are none who ever worked there but will remember with affectionate gratitude the gentle woman who cared so greatly for the destinies of the laboratory and for the welfare of each of its individual workers.

LADY HERDMAN.

IN educational and scientific circles widespread sympathy is felt with Sir William Herdman at the death of Lady Herdman on November 7. His loss is shared by all who knew Lady Herdman, as well as by many others to whom her life and work were both a stimulus and a standard. Lady Herdman was a daughter of the late Mr. Alfred Holt, and was a student at University College, Liverpool, when Sir William Herdman was professor of natural history there. She graduated in science at London University in 1891, with first-class honours in physics, and in the following year became the first president of the Women Students' Representative Council at Liverpool. She was thus an active worker in the University College of the city before it became the University of Liverpool in 1903; and in promoting this development, as well as since, Lady Herdman was closely associated with her distinguished husband. The scientific world gratefully remembers how in 1916, in commemoration of the death of their brilliant son George in the battle of the Somme, they gave the sum of 10,000*l.* to the university for the foundation of the George Herdman chair of geology, and three years later founded and endowed the chair of oceanography in the university. In these and many other ways, as, for example, by devoted service on the Liverpool Education Committee, of which she was a co-opted member, Lady Herdman exercised an influence which was always beneficial and often more far-reaching than she herself ever conceived. She possessed wisdom as well as knowledge, and the remembrance of her life will long be cherished with affection, to console as well as to inspire.