

Food of the Herring*

TWO researches on food of adult herring have recently been published. It is interesting to compare the results, although Savage's work covers March–October only, chiefly May–August, and Jespersen's was continued throughout the year. The period covered is the same, from 1931 until 1934 and 1935. In 1931 the herring fishery at Bornholm was very poor in both number and size of fish and it was found that those feeding were remarkably few in number, a fact probably correlated with the scarcity of food, especially copepods. Off Shields and in the northern North Sea, however, the year 1931 was a rich feeding year, due almost entirely to the abundance of *Calanus*. Although *Calanus* is such an important herring food in many regions it is not present at Bornholm (the low salinity accounting for its absence), the chief copepods being *Pseudocalanus elongatus*, eaten during the first half of the year, and *Temora longicornis* and *Eurytemora hirundooides* (taken together), on the whole even more important, eaten throughout the year, but especially in the winter half.

Copepods form the main food of the herring in both districts. There is little feeding during the great East Anglian autumn fishery and in the Bornholm herrings it is lowest in August–October, in and just after the spawning season. In both districts it is highest in spring and early summer and the main food consists of copepods, but *Oikopleura* occupies an important position in some years as food in the North Sea and is not present at all in Bornholm. *Ammodytes*, however, was frequently eaten both at

Bornholm and off Shields although absent from farther north. Whereas, however, it is eaten chiefly in winter and early spring at Bornholm it seems to be eaten indiscriminately at other times of year at Shields. In fact, there is a more marked difference in the seasonal food at Bornholm than in the North Sea with the exception of the all-important *Calanus*, the maximum of which is in all years in May.

In the Bornholm herring in spring the food is principally copepods and young fish, in summer principally copepods and cladocerans, in autumn copepods and in some degree cladocerans, in winter, besides copepods, chiefly larger crustaceans. In the North Sea the principal food, varying in different years, is *Calanus* in spring and summer, *Temora longicornis* in late summer, *Oikopleura* usually in spring and early summer, whilst other copepods, cladocerans and larger organisms, such as *Sagitta*, Crustacea and *Ammodytes* occur at different times, varying in different years. The curve shows a maximum of food, due to *Calanus*, in May, and a characteristic smaller secondary peak at the end of August and beginning of September due to decapod larvae, *Oikopleura*, *Sagitta*, Schizopods, *Limacina* or Amphipods, *Temora* and, occasionally, *Calanus*.

Calanus was the principal item in the food of the Shields herring and the date and size of its maximum in the plankton appeared to have a close relation with the appearance and size of the shoals, an early maximum being associated with abundant herring and a late maximum with poor catches.

It is an interesting fact that the 1931 year-class of herring, that is to say those fish spawned after the rich feeding of that year, has been a very poor one since it entered the shoals as three-year-old fish in 1934; on the other hand, the fish spawned after the poor feeding of 1932 have proved to be a very rich year class.

* Meddelelser fra Kommissionen for Danmarks Fiskeriog Havundersøgelser. Serie Plankton, Bind 3, Nr. 2: The Food of the Herring in the Waters round Bornholm. By P. Jespersen. Pp. 40. (København: C. A. Reitzels Forlag, 1936.) 2.40 kr. Ministry of Agriculture and Fisheries. Fishery Investigations, Series 2, Vol. 15, No. 5: The Food of the North Sea Herring, 1930–1934. By R. E. Savage. Pp. 60. (London: H.M. Stationery Office, 1937.) 3s. net.

Malnutrition and Maternal Mortality

SINCE 1934, the National Birthday Trust Fund has been engaged in an attempt to reduce the high maternal mortality rates which prevail in most of the 'special areas', and some interesting results have been obtained in the last two years. A general outline of the schemes which have been applied in Glamorgan, Monmouth and Durham and the results obtained are described by Lady Williams in *Public Health* (50, 231, and 51, 59; 1937).

The schemes involved additional medical facilities with or without a distribution of free foodstuffs to necessitous mothers. The additional food comprised one pint of milk daily (from the local authority) with Ovaltine and Marmite from the National Birthday Trust Fund, and either Brandox Essence of Beef or Dorsella dried milk. Analysis of the results shows that whereas increased medical facilities alone produced a definite reduction in the puerperal death-rate—to about one third—from 'other causes', the death-rate from 'sepsis' was less affected. On the other hand, in the groups receiving the extra food a remarkable reduction in the puerperal death-rate from 'sepsis' was observed.

In two and a half years, extra food was supplied to 10,384 expectant mothers: the puerperal death-rate per 1,000 total births was 1.63, being 0.09 from sepsis and 1.54 from other causes. Among 18,854 other cases in the same areas during this period, the puerperal death-rate has been 6.15, being 2.91 from sepsis and 3.24 from other causes. In the preceding seven years, the rate in these districts was 5.63. In the first six months of this year the still-birth and neo-natal death-rate among the assisted mothers has been approximately half that among cases in the same areas that were not assisted with extra food.

The evidence adduced by Lady Williams suggests strongly that it is the extra food which is responsible for the reduction in the mortality rates: the constituent or constituents have yet to be determined. Since the beef essence and dried milk were not given in all areas, and yet in all areas, among mothers assisted with extra food, the reduction in the mortality rates was observed it appears that the good results must be attributed to the milk, Ovaltine or Marmite.

It is considered that the amount of extra food given was not sufficient, in all probability, to make the diet of the poorest group of mothers who were assisted, more than equal in *quantity* to that of the better-off groups, which did not receive the extra food and acted as controls to the first group. The additional medical facilities, where provided, were available to all groups without regard to income.

It appears, therefore, that the reduction in the maternal mortality rates must probably be due to the *quality* of the extra foods supplied, rather than their *quantity*. The administration of the schemes has now been handed over by the National Birthday Trust Fund to the Research Committee of the Joint Council of Midwifery, by whom further reports will be issued when the results are available.

University Events

CAMBRIDGE.—The Rockefeller Foundation is providing the University with up to £8,000 towards the support of research in the Department of Experimental Medicine over the five-year period, January 1, 1938–December 31, 1942. The funds will be used for the salaries of a pathologist and a psychiatrist, and for supplementing the amount which the radiologist receives from Addenbrooke's Hospital.

N. F. M. Henny, of St. John's College, has been appointed University demonstrator in mineralogy and petrology.

Dr. A. H. Evans has offered to the University his collection of birds' eggs, of which the Director of the Museum writes: "This collection is practically a complete series of the eggs of British birds, and Dr. Evans has spent much time over many years in perfecting it."

The Michael Perkins Prize is awarded to I. L. Mason, of Pembroke College, for his essay entitled "Hot-spring Animals and their Adaptation to Super-normal Temperatures".

M. C. Burkitt, of Trinity College, T. T. Paterson, of Trinity College, and Dr. E. J. Lindgren, of Newnham College, have been appointed delegates to the Second International Congress of Anthropological and Ethnological Sciences, to be held in Copenhagen on August 1–6.

The Board of Management of the Frank Edward Elmore Fund will shortly proceed to the award of a studentship for research in medicine. The studentships are open to male graduates of any university who were born in any country within the British Empire other than Scotland. The student appointed will work in the Department of Medicine in the University, under the direction of the regius professor of physic. The commencing salary will be £300 a year, and the appointment will be for two years in the first instance. Further information may be obtained from the Regius Professor of Physic, Department of Medicine, University of Cambridge, to whom applications should be sent not later than February 28, 1938.

LONDON.—The title of reader in entomology in the University has been conferred on Dr. O. W. Richards, in respect of his post held at the Imperial College Royal College of Science.

The following doctorates have been conferred: D.Sc. (Economics) on S. J. Madge, an internal student, of the London School of Economics; D.Sc. in botany on F. T. Bennett, an external student; D.Sc. in physics on C. E. Wynn-Williams, an external student.

Science News a Century Ago

The Royal Astronomical Society

IN the report of the Council read at the anniversary meeting of the Royal Astronomical Society on February 9, 1838, it was stated that the printing of the observations made at the Cape of Good Hope by Henderson on the declination of the principal stars and those made by Maclear relative to the reappearance of Halley's comet after its perihelion passage, had been done at the expense of the Government, "an evidence of the encouragement which the Government was disposed to give to science when favourable opportunities presented themselves". The Government had also granted £500 towards the repetition of the Cavendish experiment for determining the density of the earth. A eulogium was passed on the conduct of the British Association for the appropriation of £1,000 towards the improvement and reduction of astronomical catalogues. The report also referred to the arrival of the astronomical and pendulum observations made by the late Lieut. Murphy, during the voyage under Colonel Chesney down the Euphrates, the reduction of which had been undertaken by Sheepshanks and Baily. In conclusion, the Council congratulated the meeting on the flourishing state of the Society and expressed a hope that the same activity and unity of action would continue to influence and pervade their future proceedings. The president at this time was Francis Baily.

Structure of Shells

ON February 9, 1838, John Edward Gray (1800–75) assistant zoological keeper at the British Museum, lectured at the Royal Institution on "The Development, Growth and Structure of Shells". In the course of his lecture he said that the most simple form of crystalline structure is shown in the *Pinna* and a few other shells, where the calcareous particles, as they are deposited on the inner surface of the shell, assume a prismatic crystalline form, the crystals being perpendicular to the surface of the shell and extending from surface to surface, except where they are interrupted by any temporary suspensions of the growth of the animal. The most common form of crystalline structure which is found in most univalve shells is far more complicated, and exhibits one of the most beautiful examples of the extremely simple means by which Nature provides for the protection of her creatures. If man, he said, had but observed the process pursued by Nature in the formation of these shells, she would have taught him hundreds of years ago to combine strength with buoyancy in the perfection of naval architecture, instead of leaving it to be a modern discovery. Shells of this structure are formed of three concentric coats closely adhering together.

Biot's Experiments on Tartaric Acid

"M. BIOT has been making some important experiments and observations concerning the effect produced in rays of polarized light by different solutions of tartaric acid, either purely aqueous or combined with other bodies, which combinations alter the rays. The object of these experiments is to establish the laws of each combination, and the learned professor is still devoting his attention to the subject, in the hope of completing the system." (*Athenaeum*, Feb. 10, 1838.)