

would survive if returned to the sea. The experiments were conducted with both otter- and beam-trawls, and show that fish from long hauls of the trawl are much less likely to survive than those from short hauls, and that the otter-trawl, which is now practically exclusively used by steam trawlers, inflicts much more serious injury on the fish than does the beam-trawl. The effect of exposure of the fish on the deck of the vessel for different periods of time has also been studied.

Dr. W. Wallace writes on the subject of the size and age of plaice at maturity. The method used for determining age has been the examination of the otoliths or ear-stones of the fish, the alternate dark and white rings of which form a record of seasonal growth. The most striking result of Dr. Wallace's work is the determination of the fact that the average size and age of plaice at first maturity varies in different regions. In the central part of the North Sea, around the Dogger Bank, female plaice are, on the average, 16 inches long, and the majority are just six years old when they become mature for the first time. In the southern bight of the North Sea the average size of the females at first maturity is only 13 inches, and the age five years; in the western part of the English Channel the average size is about the same as in the southern North Sea (13 inches), but the average age is four years instead of five, owing to the more rapid growth of the young plaice in the Devon bays. Similar differences are found for the male plaice also, which mature at a smaller size than the females.

The report on records of catches furnished by the captains of Lowestoft sailing-trawlers, which is written by Miss R. M. Lee, shows the value of such records provided by fishermen in supplementing and extending the work done by the scientific steamers. The area worked over by the Lowestoft men corresponds roughly with the southern bight of the North Sea. The analysis of the figures, which Miss Lee has been able to make, indicates that in the northern part of this region plaice occur in maximum quantity by weight during the summer and in minimum quantity during the winter months. In the southern part of the area, on the other hand, the maximum is in winter and the minimum in summer, whilst in the intermediate region there are maxima in spring and autumn. These records, therefore, clearly confirm the southward migration of plaice for the purpose of spawning in winter, which marking experiments in this part of the North Sea had already foreshadowed.

An account of the hydrographical investigations in the English Channel for the years 1904-5 is contributed by Mr. D. J. Matthews, and is illustrated by a series of very valuable plates, which set forth the results in graphic form by means of coloured charts and sections. The importance of these hydrographical investigations in the English Channel in connection with the problems of North Sea fisheries can scarcely be exaggerated, since the Atlantic water which reaches the southern area of the North Sea comes practically exclusively by way of the English Channel. In both the years 1904 and 1905 the salinities in the English Channel reached a maximum in the early months of the year, and fell to a minimum in the summer. The evidence indicates, further, that the movements of the water were more frequent and rapid in 1904 than in 1905. Special attention was given to the conditions prevailing at the mouth of the English Channel, where the two conflicting currents already demonstrated in 1903 were again encountered, a low salinity current flowing southwards from the Irish Channel across the mouth of the English Channel, and a current of

high salinity entering the Channel from the southwest.

The volume, as a whole, contains a large mass of data of the greatest importance for the solution of many of the problems dealing with marine life, and more particularly with the natural history of fishes. It must be borne in mind, however, that it is essentially a contribution of data to the much wider and more comprehensive scheme of investigation which is being carried out in connection with the International Council, and not until the whole work which the various countries have done has been brought together and the results duly correlated can the full fruit of these researches be gathered.

DOUBLE-STAR STUDIES.¹

A COMPLETE record and discussion of the double-star measures made at the Potsdam Observatory by Prof. Lohse, the director, during the period 1899 to 1908 is given in Publication No. 58 of the Observatory. Prof. Lohse employed a refractor made by Schroeder about twenty-five years ago. The objective is eleven inches, and the flint is dark green. It may be described as a good instrument, but not of the highest quality. Nevertheless, we notice that Prof. Lohse was able to secure measures of some difficult pairs, notably δ Equulei, Pegasi, and Sirius. The filar micrometer has one fixed and one movable thread. Generally the power employed was 550, but occasionally one of 800 was used. The power ordinarily used with the Greenwich 28-inch refractor is 670, and occasionally 1120. Setting out with a definite programme, he chose a working list of 166 double stars made up of known binaries and others of interest, and during the nine years he was making measures of these systems he collected those made by other observers, and hence was in a position to make a useful discussion of his results.

The present volume is therefore divided into two portions. Part i. contains the measures made at Potsdam, and part ii. their discussion in combination with measures made since the discovery of each pair. Prof. Lohse uses the method of Zwiers to determine his orbits, and discusses altogether thirty. The actual elements arrived at in most cases differ little from previous orbital elements, and do not call for special remark, except, perhaps, in the cases of η Cassiopeïæ and γ Ophiuchi. The apparent orbit given for η Cassiopeïæ does not seem the most suitable, and brings out a period of 345 years, or 100 years larger than that generally accepted. In the case of γ Ophiuchi, Prof. Lohse has done a good piece of work in attacking one of the anomalies often found in double-star orbits. It is found that the differences between the computed and observed positions of the companion tend to periodicity. This may be due to some fault in the gravitational theory, to errors due to personality, or to the effect of some disturbing body. The binaries ζ Herculis and γ Ophiuchi are excellent examples of this, and Prof. Lohse, who favours the personality explanation, has taken great pains to compute the relative areas swept out by the companion to γ Ophiuchi every six months, and obtains figures in agreement with those deduced by quite independent methods. He is, however, unwilling to admit the reality of the figures, and remarks that by a judicious selection of observations the deviations from the law of equal areas may be reduced. This is the method advocated by Prof. Burnham, but it is not easy to

¹ Publikationen des Astrophysikalischen Observatoriums zu Potsdam, No. 58. Zwanzigsten Bandes, Erstes Stück. Doppelsterne von O. Lohse (Director). Pp. 168. (Potsdam, 1908; in Kommission bei W. Engelmann in Leipzig.)

understand such an attitude in so experienced a computer as Prof. Lohse. However, this only emphasises the thoroughness with which his work has been done. It is a well-planned and complete work, and Prof. Lohse is to be congratulated on making so real a contribution to double-star astronomy.

The following predicted places for 1910'0 for a few of the more interesting binaries may be found useful:—

η Cassiopeiæ	...	...	...	241'1	and	6'24
Sirius	...	...	...	89'4	..	8'87
Castor	...	...	...	220'5	..	5'44
α Centauri	...	...	...	215'3	..	19'41

NOTES.

THE third International Congress of Physiotherapy will be held in Paris on March 30 to April 2, 1910. The congress is to be divided into seven sections.

A PRIZE of 160*l.* has been awarded to M. W. Haffkine by the Paris Academy of Medicine for his work on inoculation against cholera.

THE Bradshaw lecture of the Royal College of Physicians of London will be delivered on November 2 by Prof. J. A. Lindsay, who will take as his subject Darwinism and medicine. The FitzPatrick lectures will be delivered by Sir T. Clifford Allbutt, K.C.B., F.R.S., on November 4 and 9. The subject will be Greek medicine in Rome.

THE Société d'Hygiène de l'Enfance of Paris, we learn from the *Lancet*, is offering prizes for essays on the punishments of children. The essays, which must be original, and written in French, German, English, Italian, or Spanish, will be received by the society not later than December 31 next. The papers are to become the property of the society, which reserves the right of selecting from them material for a pamphlet.

ACCORDING to the *Times*, the exhibit of British chemical industries at next year's International Exhibition at Brussels promises to be of great interest and importance. It is stated that the new exhibitions branch of the Board of Trade is already experiencing some difficulty in providing for the requirements of would-be exhibitors, although the area originally allotted to the exhibit has been largely added to.

PRIZES to the value of 1500*l.* are offered by the National Medical Academy of Mexico for work on typhus fever. Of the sum named, 1000*l.* will be awarded to the discoverer of the cause of typhus, or of a curative serum, and 500*l.* to the investigators whose work is judged most useful in helping towards such discovery. The competition is international, but all essays must be written in Spanish. They can be received up to February 28, 1911.

THE annual "Fungus Foray" of the Essex Field Club will be held on Saturday, October 30, at High Beach, Epping Forest, under the direction of Mr. George Massee, of the Kew Museum. Botanists wishing to attend should apply for programmes to Mr. W. Cole, the Essex Museum of Natural History, Romford Road, Stratford, Essex.

THE death is announced of Prof. J. Scott, author of various text-books on farm engineering, and formerly professor of agriculture and rural economy at the Royal Agricultural College, Cirencester.

THE death is reported, in his sixty-third year, of Dr. Irving Stringham, professor of mathematics in the University of California since 1882. He was a graduate of

Harvard, and also spent some time in study at European universities. He was the editor of the American edition of C. Smith's "Elementary Algebra," and was the author of a "Uniplanar Algebra."

DR. GEORGE E. POST, whose death was recently reported at the age of seventy, was for many years head of the Medical College established at Beirut, Syria, by the American Presbyterians. He was the author of several medical and scientific text-books in the Arabic language, as well as of a flora of Syria, Palestine, and Egypt in the same tongue. His "Plantæ Postianæ" was written in Latin and French, and published at Geneva. He contributed also to the leading English and American Biblical dictionaries a large number of articles on the flora of Bible lands. In recognition of his work at Beirut Dr. Post received decorations from the Turkish and German Governments.

Science reports the return of the Peabody Museum Expedition, which for the past three years has been exploring the headwaters of the Amazon River in the interior of Peru and Bolivia. The primary object of the expedition was the study of the native tribes of those regions, but, incidentally, collections were made in natural history; meteorological observations were taken, and topographical work was done. A map of the entire region, based on traverses and astronomical observations, was made for the Peruvian Government.

DR. ALLAN KINGHORN has been sent by the Secretary of State for the Colonies to West Africa to investigate sleeping sickness there, with the view of recommending measures for the prevention of the spread of the disease into certain of the British West African colonies. Dr. Kinghorn recently returned from north-east Rhodesia and Central Africa, whence he was sent with Mr. R. E. Montgomery by the Liverpool School of Tropical Medicine to prosecute inquiries into sleeping sickness, and has just completed a report, with Mr. Montgomery, of the Zambezi Sleeping Sickness Expedition.

THE following courses of free public science lectures are announced for delivery in the Manchester Museum:—some forms of vegetation, by Prof. F. E. Weiss, on November 6, 13, and 20; some problems of embryology, by Prof. S. J. Hickson, F.R.S., on January 8, 15, and 22; and the structure of a crystal, by Sir T. H. Holland, K.C.I.E., F.R.S., on February 5, 12, and 19. In addition to the foregoing, Prof. Boyd Dawkins, F.R.S., has begun the delivery of a course of twelve short addresses on geological subjects on Saturday and Sunday afternoons.

WE learn from the *Revue scientifique* that the Institute of France has received a gift of 50,000 francs from M. Patouillard to found two Montyon prizes, one literary and one scientific, of equal value. The latter is to be reserved for some man of science distinguished in electricity chosen by the Paris Academy of Sciences. From the same source we learn that Dr. Von Brunck, formerly director and a member of the committee of management of the "Badische Anilin," has made a gift of 50,000 marks to the Munich Academy on the occasion of the fortieth anniversary of his entry in the industry.

A MEETING was held on October 13 at Christiania to consider plans for the proposed Zeppelin Polar Expedition, at which, the *Times* reports, Prof. Hergesell explained the object of the expedition, which, as at present planned, will last one Arctic summer. It will not be undertaken until the development of the airship has given it an effective scope of 2500 kilometres, or a journey of three