Vogel mapped two faint lines near λ 518 and 554, but these require confirmation. With a 10-inch refractor I have had no great difficulty in glimpsing these fainter lines, but I was unable to confirm their positions. The line at 518 is very suggestive of carbon, and that at 554 of manganese, and, if possible, comparisons with these substances should be made where a large aperture is available. I have very little doubt also, from my own observations, that there are many lines between F and G. Another observation of importance will be that of the character of the brightest line. Observers differ very considerably on this point, some maintaining that it is perfectly sharp on both edges, and others that it is softened off on the more refrangible edge. For this observation it is not desirable to use high dispersion. In the General Catalogue the nebula is described thus:—"A planetary nebula; very bright; pretty small; suddenly brighter in the middle to a very small nucleus." Webb compares the telescopic appearance of the nebula with that of a star out of focus.

(2) Vogel describes the spectrum of this star as a very fine one of the solar type (Class II.*a*), whereas Dunér calls it Group II. According to the latter observer the banded spectrum is feebly developed, 2, 3, and 7 being very narrow, and the remaining bands appearing only as lines. From these observations it is not possible to say whether the star belongs to an early species of the group or a late one. In either case the bands would be narrow, but if the star be at an early stage the bright carbon flutings ought to be very manifest, and if at a late stage, there ought to be dark lines in addition to the narrow bands. Vogel may have mistaken the narrow bands for lines.

(3 and 4) These are stars of the solar type and of Group IV. respectively. The usual detailed observations are required in each case.

(5) This star, according to Dunér, has a well-marked spectrum of Group VI., the blue zone, however, being very feeble. The green and yellow zones are separated by a wide and dark band; the bands 4 and 5 are not visible. Further details or peculiarities should be looked for.

(6) This variable has a well-marked spectrum of Group II. (Dunér). The range is but small—7·0–9·4 in a period of 266 days—and it will be interesting to ascertain whether the bright hydrogen lines appear at maximum as in stars of greater range. Dunér states that though the spectrum is not a very bright one, its characteristics are by no means difficult to observe. There will be a maximum about July 6.

A. FOWLER.

ANNULAR ECLIPSE OF JUNE 17.—The number of the *Comptes rendus* for June 23 contains observations of this eclipse made at various Observatories. The Emperor of Brazil took the time of second contact at Nice Observatory; MM. Charlois, Javelle, and Perrotin those of first and last contact. At Lyons Observatory, M. Gonnessiat made some measures of the position-angle of the shadow. M. Trépied at Algiers succeeded in taking 26 photographs, the times of first and last contact also being noted. The maximum of the eclipse was indicated on the curves of a self-registering thermometer by a fall in temperature of 1°·4. Clouds prevented good observations at Meudon, but four photographs were taken by M. Trouvelot. M. de la Baume went from Meudon Observatory to Canea to observe the eclipse, and a telegram was received from him by M. Janssen stating that the weather was favourable, and that he had been able to obtain photographs of the ring and of its spectrum. M. Janssen also noted that one of the objects of the expedition to Canea was to obtain a photographic spectrum of the annulus, in order to see if the spectrum of the extreme edge of the sun's disk showed the bands of oxygen, and from the telegram received it seems probable that the question will be settled. The photographs obtained at Meudon show the granular structure of the solar surface so well visible during an eclipse, and the granulation can be traced right up to the edge of the moon, thus affording another proof of the excessive rarity of the lunar atmosphere.

YARNALL'S STAR CATALOGUE.—The Catalogue of stars observed at the United States Naval Observatory during the years 1845 to 1877, and prepared for publication by Prof. M. Yarnall, has been revised and corrected, and the stars renumbered by Prof. Edgar Frisby. In preparing this edition a re-examination of all annonymous stars has been made; the named stars have been compared with those of existing catalogues, the names being changed whenever necessary, and new names that existed previous to the publication of the Catalogue have been supplied. The errata in previous editions, pointed out by Profs. Holden, Krueger, and Millosevich, and Dr. Peters, have also been corrected, and the many notes to the Catalogue referring to the mistakes in the second edition, and the changes that have been made, indicate that the task of revision has not been a light one. As the object of the revision was merely for the purpose of correcting mistakes, no observations have been added or any unfinished observation completed, excepting such as were observed but omitted from the Catalogue, the apparent additions being found in some of the published volumes or in an unfinished state in the observing-books. The stars in the Catalogue have all been compared with standard catalogues as far as possible, and Prof. Frisby confidently believes that most of the mistakes have been corrected.

PHOTOGRAPHS OF THE SURFACE OF MARS.—Prof. W. H. Pickering, in the June number of the *Sidereal Messenger*, makes some remarks on fourteen photographs of the planet Mars taken by Mr. Wilson. Seven negatives were taken on April 9, between 22h. 56m. and 23h. 41m. G.M.T., and seven more were taken on April 10, between 23h. 20m. and 23h. 32m. Thus the same face of the planet was presented in both cases. Distinct and identifiable spots and markings are well shown in all the photographs, but in those taken on the latter date the white spot surrounding the south pole is seen considerably larger. It has been known for some years that the size of these polar spots varied gradually from time to time, apparently diminishing in the summer and increasing in the winter of their respective hemispheres. This, however, appears to be the first time that the precise date and approximate extent of one of these accessions has been observed. The appearances described are said to be so conspicuous upon each of the fourteen photographs that no one who had once seen them would have any difficulty in deciding on which of the dates any particular plate was taken.

LIGHTNING SPECTRA.—Mr. W. E. Woods, of Washington, has used a Browning's pocket spectroscope to study the spectrum of lightning during a thunderstorm (*Sidereal Messenger*, June 1890). In several instances he observed what appeared to be bright lines superposed on a faint continuous spectrum; and in each case, when the continuous spectrum was bright enough to be seen, shaded flutings were visible. It is, however, much to be regretted that no diagram or statement as to the approximate position of the lines and fluting is given.

THE MARINE BIOLOGICAL ASSOCIATION.

AT the annual general meeting of the Marine Biological Association, held at the rooms of the Royal Society on Wednesday, June 25, the following Report was submitted by the Council, and unanimously adopted. We omit only the list of those who went as a deputation to the Chancellor of the Exchequer on May 15.

The Council has met nine times during the past year, and the attendance has been fully up to the average of previous years.

The business transacted by the Council has had reference—

(1) To the maintenance and general efficiency of the Laboratory.

(2) To the prosecution of special investigations on economic subjects.

(3) To the financial position of the Association.

(1) It was found necessary to alter the communications between the storage reservoirs and the pumps of the Laboratory at Plymouth, and orders were given to Messrs. Leete, Edwards, and Norman, to supply a new valve-box, connection-pipes, &c. The cost of these alterations has been considerable, but it is satisfactory to note that the results have been very beneficial, and have produced a marked improvement both in the working of the pumps and in the water in circulation.

The Director reports that there was some little trouble over the sea-water in June and July 1889, during the hot weather, and during the alterations to the supply-pipes, which prevented more than one of the storage reservoirs being in use; but that since then, and especially after the alterations were completed, the water has been of admirable quality, and all the animals have done remarkably well.

Great improvement has lately been effected in the Aquarium at a very trifling cost, by hanging curtains between the top of the

fronts of the tanks and the ceiling, so that all the light reaching the spectator must pass through the tanks. Previous to this there appears to have been an excess of light in the tanks, and the fishes now appear to be much more comfortable, and keep nearer to the glass fronts.

The following fishes, molluscs, and crustacea have spawned in the tanks during the past year :—

The Plaice (*Pleuronectes platessa*).
The Flounder (*Pleuronectes flesus*).
The Pouting (*Gadus luscus*).
The Poor Cod (*Gadus minutus*).
The Rockling (*Motella tricirrata*).
The Lucky Proach (*Cottus bubalis*).
The Spotted Dog-fish (*Scyllium canicula*).
Chiton cinereus.
The Whelk (*Buccinum undatum*).
The Purple (*Purpura lapillus*).
The Sea-hare (*Aplysia punctata*).
The Sea-lemon (*Archidoris tuberculata*).
Goniodoris nodosa.
The Lobster (*Homarus vulgaris*).
The Crawfish (*Palinurus vulgaris*).
The Shrimp (*Crangon vulgaris*).
The Prawn (*Palæmon serratus*).
Idotea tricuspidata and *emarginata*,

as well as other species not so well known.

The *personnel* of the staff and servants remains unchanged, with the exception of the fisherman, W. Roach, who left in October. His place has been filled by E. G. Heath, a trawl fisherman of great experience.

The Council sanctioned the purchase, in July 1889, at a cost of £250, of a small steam-launch, the *Firefly*, which has been of great service. Being half-decked, and only 38 feet long, this launch is only suitable for local expeditions, and its purchase in no wise diminishes the necessity for a sea-going steam-vessel for carrying on investigations on food-fishes. The *Firefly* is very economical in coal and water, and has entailed no extra expense in working. The Association now possesses three boats, the *Firefly*, the *Mabel*, a three-ton hook and line fishing-boat presented by Mr. Bourne, and the *Anton Dohrn*, a rowing-boat bought in 1889.

Trawling, dredging, surface netting, and shore hunting have been carried on continuously during the year, and examples of interesting species, many of which are new to the district, have been added to the list since the last Report.

The standard collection of species is making good progress, the collection of Decapod Crustacea being remarkably complete.

(2) The researches on food-fishes and crustacea carried on under the direction of the Council have made considerable progress.

The Director of the Association, Mr. G. C. Bourne, has continued his observations on the pelagic fauna in the neighbourhood of Plymouth, and was also able, through the courtesy of Captain Aldrich, R.N., to make an expedition off the south-west coast of Ireland in H.M.S. *Research* in July last, for the purpose of comparing the surface fauna at the entrance of the Channel with that of the Channel itself. Some interesting observations have been made in connection with the presence of multicellular floating algæ in spring months and the presence of mackerel, which it is hoped may lead to practical results.

The Director has made observations and collected notes on the destruction of immature fish in various localities, and has been able, with the kind co-operation of the medical staff of the Deep Sea Mission to Fishermen, to arrange an extensive inquiry into the presence of immature fish in deep waters in the North Sea, their movements and destruction by beam trawling. This inquiry is in progress, and promises to be full of interest.

In connection with the destruction of immature soles in the estuary of the Thames, the Director has been making arrangements for keeping young soles in inclosed ponds with the view of rearing them to a marketable size, as is done in the Adriatic. For various reasons these experiments have been delayed, and are not yet in progress.

Experiments are also being made on the possibility of cultivating soles in fresh water, and it has been proved that the adult sole may be kept in fresh water.

In conjunction with Dr. G. H. Fowler, the Director has studied the natural history of the oyster, and through the kindness of Lord Revelstoke he has been able to arrange a series of practical inquiries on the natural history and propagation of the oyster in the River Yealm.

The Naturalist of the Association, Mr. J. T. Cunningham, has been chiefly occupied during the past year with a treatise on the common sole, which is now ready for publication.

Mr. Cunningham also has gathered much valuable information about the occurrence of the anchovy in English waters, and the possibility of an English anchovy fishery. A full account of the anchovy is given in the last number of the Journal, vol. i. No. 3.

In the early spring of this year, Mr. Cunningham made several expeditions to procure the ova of soles and other flat-fishes. He was able to secure and artificially fertilize a much larger number of soles' ova than on any previous occasion, and the fertilized ova were successfully hatched and the larvæ reared, up to the period of the absorption of the yolk-sac, in the aquarium.

On March 13 this year the plaice in the aquarium were found to be breeding. The Director and Mr. Cunningham collected a large number of their fertilized ova and transferred them to suitable hatching apparatus. The ova hatched out by March 18, and the larvæ were kept alive in specially isolated tanks till April 2. By this time the yolk-sac was completely absorbed, but the larvæ, although apparently healthy, could not be induced to feed. They died off very suddenly, evidently for want of food, on April 3 and 4, having lived fifteen days after hatching.

A second batch of ova was procured on March 28, and the eggs were hatched out on April 3 and 4. These larvæ were placed in a tank and fed with the pelagic organisms caught in the tow-net. They paid no attention to this food, so on April 22 they were fed with crushed crab, which they appeared to like, for on the following day their intestines could be seen full of food. In spite of this they began to die on April 24, and all were dead by the 26th.

Thus in the second experiment the larvæ were kept alive twenty days after hatching, a considerably longer period than in previous experiments at Plymouth, and, what is more important, they were induced to feed. These experiments show that some steps have been made towards success. None of the larvæ underwent metamorphosis, but Mr. Cunningham has procured some young plaice, flounders, and brill, already "flattened," and these are thriving in the tanks and feeding regularly.

Arrangements have been made with the Fishery Board for Scotland for carrying on an investigation on the food of the common sole, in connection with the work done by the Board on the food of other fishes.

Mr. W. Bateson was working on the sense-organs and habits of fishes, with the view of showing the possibility of using artificial or preserved baits in sea-fishing, from April to October 1889. The results of Mr. Bateson's investigations have been published in the Journal, vol. i. No. 3.

Mr. Weldon continued his investigations on the artificial rearing of lobsters last year. His experiments were apparently turning out successfully, when an accident caused the loss of his larvæ and apparatus. This year the artificial rearing of lobsters is being proceeded with by means of a different form of apparatus suggested by Dr. Fowler's successful method of raising the young of *Idotea*.

In addition to his experiments on lobsters, Mr. Weldon is engaged on important scientific investigations on the variation and natural history of the Decapod Crustacea, his expenses being, as before, met by the grant of £150 from the Government Grant Fund of the Royal Society, intrusted in 1887 by the Government Grant Committee to the President of the Association, the Hon. Secretary, Prof. Moseley, and Mr. Sedgwick.

The following gentlemen and ladies have been engaged on independent scientific researches in the Laboratory since the date of the last Report :—

Dr. G. H. Fowler (Studies in Descent), Mr. M. C. Potter (Marine Algæ), Mr. S. F. Harmer (Development of *Polyzoa*), Mr. T. T. Groom (*Cirrhipedia*), the Rev. Canon A. M. Norman, D.C.L. (Crustacean Fauna), Mr. A. O. Walker (*Amphipoda*), Prof. T. Johnson (*Florideæ*), Mr. A. E. Shipley (*Gephyrea*), Dr. Hans Driesch, Jena (Heliotropism in *Hydroidea*), Mr. P. C. Mitchell (Histology of *Tunicata*), Mr. T. H. Riches (Nephridia of *Mollusca* and *Crustacea*), Mr. Herbert Thompson (Development of *Crustacea*), Miss Marion Greenwood, Newnham College, Cambridge (Physiological Studies), Miss L. Ackroyd, Newnham College, Cambridge (Morphology of *Nebalia*).

(3) Among the receipts of the past year the Council have to acknowledge the following subscriptions and donations:—£100 from Lord Revelstoke; £100 from Sir Henry Thompson; £100 from the Grocers' Company; £200 from the Fishmongers' Company (annual grant for five years); £500 from H.M. Treasury (annual grant for five years).

From annual subscriptions and compositions £143 was received, £61 interest on investments, and £150 for rent of tables and sale of specimens.

The expenditure, as shown in the Treasurer's account presented herewith, amounted to £2992, of which £398 was paid to Mr. Inglis for balance of his fees as engineer, £417 for structural alterations and additions, £112 for bait investigation, and £250 for a steam-launch.

The Association now has in hand, in cash and invested, £1398 2*s.* 11*d.*

The Council have great pleasure in acknowledging the generous assistance which has lately been afforded to the Association by the Fishmongers' Company, by Mr. J. P. Thomasson, M.P., and Mr. Frank Crisp.

The Fishmongers' Company, in addition to substantial grants which they have already made to the Association, have undertaken to contribute £400 per annum to the funds of the Association for a period of five years from the present date.

Mr. J. P. Thomasson has kindly offered a sum of £250, to enable the Council to retain the services of the Naturalist, Mr. J. T. Cunningham, for another year.

Mr. Frank Crisp has kindly given a sum of £120 (£60 per annum for two years) to meet the expenses of special investigations on the culture of sea fishes in inclosed ponds. The Council take this opportunity of placing on record their appreciation of the interest and confidence shown in the work of the Association by these liberal donations.

The thanks of the Association are due to Prof. Haeckel for a copy of his work on the *Siphonophora;* to Colonel Richardson, R.A., for a number of ichthyological works from the library of the late Sir J. Richardson; to Mr. J. W. Clark for back numbers of the Philosophical Transactions of the Royal Society and other books; to Messrs. J. and A. Churchill for the current numbers of the *Quarterly Journal of Microscopical Science;* and to Messrs. Agassiz, Giard, Marion, the United States Fish Commission, the Naples Zoological Station, the officers of the Norwegian North Atlantic Expedition, and other individuals and societies for copies of their publications.

The Council desire to express the indebtedness of the Association to the Council of the Royal Society for kindly permitting the Association to hold the periodical meetings of the Council and Association in their rooms.

In July and August 1889, the Council was in correspondence with the Fishery Board for Scotland and the Fisheries Department of the Board of Trade, with reference to the possibility of procuring scientific information on the alleged destruction of immature fish by beam trawling in deep waters.

Subsequently the Council determined to make an application to H.M. Treasury for a further grant of money in aid of special researches on food-fishes. The Chancellor of the Exchequer kindly consented to receive a deputation on the subject on May 15. . . .

The Council regret to have to announce that Prof. Huxley, who since the foundation of the Association has been its President, has found it necessary to withdraw from the office which he has held with so much honour and advantage to the Association. The Council desire to express their warm appreciation of the eminent services rendered by Prof. Huxley to the Association, and their great regret that he should be unable to continue his office.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

VICTORIA UNIVERSITY.—Last Saturday was Degree-day; the ceremony, presided over by Principal Rendall, the Vice-Chancellor, took place in the Manchester Free-Trade Hall. In the course of his speech, the Vice-Chancellor gave the following details as to the progress of the University:—

"A three-fold scheme for certificates, technical, commercial, and literary, has replaced the narrower project for technical certificates alone, and will be the means of giving University direction and attachment to numerous organizations which have hitherto lacked clearness of aim or recognition of results. The Manchester Chamber of Commerce has entrusted the examinations for its commercial certificate to the University. The local lectures scheme continues to thrive vigorously. In the last three sessions 21 courses, with an average attendance of 130, the large majority in or near Manchester, have been delivered under University auspices. The three colleges of the University are taking action, more or less concerted, for the establishment of day training colleges for primary teachers under the provisions of the new Education Code. Thus step by step the University is comprehending her mission and entering upon her heritage. Those who are forwarding the work may feel that impatience for quick returns which comes of convictions confident and energetic, but the observer and the historian will agree that in content and scope Victoria University has advanced with unparalleled rapidity. In all the colleges of the University building is in progress or in contemplation. At University College the Victoria Building for the arts department is advancing towards completion; at Yorkshire College funds have been raised for the erection of a medical department and other needed extensions; at Owens College further enlargement of the Medical School buildings is now under consideration."

As at Cambridge, the women students have done remarkably well this year, three out of four "first classes" in the B.A. honours schools and the Thomasson Prize for English Essay falling to their share.

ST. ANDREWS UNIVERSITY.—A Scholarship of the value of £30 a year has just been placed at the disposal of Prof. Percy Frankland at University College, St. Andrews University, by Miss E. F. Forster, of London. It is intended that the student holding the same shall devote the whole of his time to the prosecution of original research. The Scholarship, which will be known as "The Forster Research Scholarship," has been awarded for this year to Mr. John MacGregor, M.A.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, June 12.—"On the Position of the Vocal Cords in Quiet Respiration of Man, and on the Reflex-Tonus of their Abductor Muscles." By Felix Semon, M.D., F.R.C.P., Assistant Physician in charge of the Throat Department of St. Thomas's Hospital, and Laryngologist to the National Hospital for Epilepsy and Paralysis, Queen Square. Communicated by Prof. Victor Horsley, F.R.S.

The final conclusions arrived at by the author are as follows:—

(1) The glottis in man is wider open during quiet respiration (inspiration and expiration) than after death or after division of the vagi or recurrent laryngeal nerves.

(2) This wider opening during life is the result of a permanent activity of the abductors of the vocal cords (posterior crico-arytænoid muscles), which therefore belong not merely to the class of accessory, but of regular respiratory, muscles.

(3) The activity of these muscles is due to tonic impulses, which their centres receive from the neighbouring respiratory centre in the medulla oblongata. It is very probable that these impulses rhythmically proceed to the respiratory centre from the stimulation of certain afferent fibres contained mainly, but not exclusively, in the trunks of the pneumogastric nerves, and that they are in the respiratory centre changed into tonic impulses. The regular activity of the abductors of the vocal cords during life, therefore, belongs to the class of reflex processes. The permanent half-contraction of these muscles, in which form their tonic innervation is manifested, can be further increased, in concord with the general laws of the mechanism of respiration, by either volition or other reflex influences.

(4) In spite of their extra-innervation, the abductors of the vocal cords are physiologically weaker than their antagonists.

(5) These antagonists, the adductors of the vocal cords, have primarily nothing at all to do with respiration, and ordinarily serve the function of phonation only. Their respiratory functions are limited to—

(*a*) Assistance in the protection of the lower air passages against the entry of foreign bodies.

(*b*) Assistance in the modified and casual forms of expiration known as cough and laughing.