were met with in 150 metres, or higher up, were with very few exceptions taken at night.

Cyclothone signata may be said to approximate to this group so far as distribution is concerned, and this form also has large, well-developed light organs. A closer analysis of the occurrence of these forms in different latitudes would probably reveal much of interest, though this must be reserved for subsequent investigations.

It is important to lay stress upon the fact that these shining colours, remarkable light organs, and peculiar telescopic eyes do not belong to the dark region in the sea where the sunlight never penetrates, but, on the contrary, to a region where there are, at any rate, large quantities of the rays which are nearest to the blue, violet, and ultra-violet portion of the spectrum.

There has been a good deal of disputing as to whether the light emitted by the light organs was entirely produced by the vital energy of the organisms, or whether the organisms had the power of transforming the ultra-violet rays of the sunlight into rays of lesser wave-length. The observations I have described here cannot, of course, decide questions of this kind, but they show, at any rate, that the light-emitting organisms live in a medium in which there are quantities of rays from the sunlight; and we recognise, further, in these forms a new biological type of organisms, a separate group with quite characteristic outward conditions of existence.

The higher we ascend towards the surface of the sea, the more varied become the forms and colours of the organisms, and the more diversified become also, probably, their conditions of life. I have up to now only been able to examine a portion of the large material from the uppermost water-layers, and will merely mention a single group from this region, namely, the larvæ and young fish forms. Of these we have collected a very large quantity, amounting to thousands. It has been impossible to determine them all, as this will be a long and laborious task.

A table shows how, out of 3600 transparent large and young fishes, 90 per cent. were secured in the appliances operated from the surface down to a depth of 150 metres. These forms are young stages of many different kinds of fishes.

A very interesting and important question is the quantity of animals in the different depths. This question has not been much studied yet. I believe myself that the upper limit of the red and dark-coloured forms is particularly rich. In the Norwegian Sea I found that the occurrences of a rich intermediate pelagic life corresponded to a great rise in the density of the sea water, and I explained this thus, that the food of the animals, sinking down from the upper layers, might accumulate there. The closer study of our material may give more information about this interesting question.

In my preceding remarks I have given a number of instances of the observations we were able to make regarding the depth distribution of fishes when we examine material collected by means of parallel hauls. But it is obvious, too, that this material can equally well be used for ascertaining their horizontal or geographical distribution, and it is only after studying simultaneously as well their vertical and horizontal distribution that we can characterise the outward conditions under which they live. If we look at the horizontal distribution as found by the *Michael Sars* and compare it with previous observations in the northern Atlantic, we shall get some idea of how little knowledge we possess concerning the most ordinary forms inhabiting the ocean between Europe and the coast of the United States. I will base my comparison entirely on Brauer's valuable summary of what was previously known, and on the same instances that I have employed when discussing the vertical distribution.

Black fishes and red crustaceans were caught at all the stations during the cruise of the *Michael Sars* in the Atlantic wherever we lowered our appliances to a depth of 500 metres.

Transparent young fish were captured over the whole area of investigations, though in very varying quantities.

In the open sea over the greatest depths, the Scopelidæ are undoubtedly the most numerous group among the young fish. We find also many extremely interesting forms with stalk eyes, telescope eyes, and so on. Amongst those with telescope eyes there are many of a perfectly transparent new form, which may in all probability be assigned to the genus Dysomma. They were mostly caught in the uppermost 150 metres.

When we have succeeded in determining these young stages, we will be able to throw much light upon the life-history of many important species of fish. The numerous forms of the group Leptocephalidæ will by no means be the least interesting among them. The 195 individuals that were found are believed to belong to no fewer than twenty species, of which a good many are entirely new.

I have previously (in NATURE of October 24, 1910) published a short description of a number of these Leptocephalidæ, which we were able to prove to be the larvæ of the European eel. These larvæ (forty-four specimens in all) have this much of interest in them as compared with previous finds, that they were met with right out in the Atlantic Ocean, far away from the slopes where they previously had been discovered.

Trawlings.

To operate the big trawl at the greatest depths of the North Atlantic, about 2500 or 3000 fathoms, proved a very difficult task. However, two of our hauls were quite successful. The first was in the Bay of Biscay, at a depth of 2500 fathoms. Our catch contained a number of invertebrates, including holothurians of the genus *Elpidia alcyondae*, sponges, and ascidians, and two fishes belonging to the genus Macrurus.

The second haul, between the Canary Islands and the Azores, at a depth of 3000 fathoms, yielded only a very few living organisms. In the half-barrel of mud brought up by the trawl we found thirty pumice-stones overgrown with Stephanocylis and Limopsis, and there were also two holothurians (*Laetmogone violacea* and Elpidia, sp.), sertulariæ, fragments of an umbellularia, an antipathes, a spike of a cidaris, fragments of shell of argonauta, as well as one Bulla tympanica of a whale, and two shark's teeth, of which the first belonged to a carcharodon and the second to an exyrhina. Of fishes there were one Malacosteus, one Alepocephalus, one Leptocephalus, one Argyropelecus, and a form not yet determined. All these I believe to have been pelagic, and to have been taken during the process of hauling in. Regarding one form alone, there was doubt whether to class it as a bottom fish or as pelagic, namely, an unquestionably new species much resembling *Ipnops murrayi*.

Judging from the appearance of the trawl when being lowered and when being afterwards hauled in, I consider this haul to have been, technically speaking, a success, and I cannot explain the catch otherwise than by supposing that at those profound depths there was an absolute poverty of animal life. It remains a question whether all these great ocean floors are equally barren in regard to animals, and especially fishes. So far as I know, the literature on the subject only records the capture of a few Macruridæ from the greatest ocean deeps, this being all the evidence that there is to favour belief in the occurrence of larger fish there. But is it perfectly certain that even those are not also pelagic? On several occasions during the cruise our tow-nets captured over the greatest ocean depths pelagic specimens of Alepocephalus, which is generally brought up by the trawl. In any case, the animal life there must be extremely scanty; and this is borne out by the vertical hauls with our big net below 1500 metres, which I have referred to when discussing *Cyclothone microdon*.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—The professor of mineralogy has, with the consent of the Vice-Chancellor, reappointed Mr. A. Hutchinson to be demonstrator in mineralogy and assistant curator for five years from January 1.

Dr. Hobson has been appointed chairman of the moderators and examiners for the Mathematical Tripos, Part ii., 1911.

Mr. C. E. Inglis has been appointed chairman of the examiners for the Mechanical Sciences Tripos, 1911.

DURHAM.—Mr. P. J. Heawood, mathematical lecturer, has been appointed to the professorship of mathematics in succession to Prof. R. A. Sampson, F.R.S., who was recently appointed Astronomer Royal of Scotland.

DR. FREDERIC S. LEE has been appointed head of the department of physiology at Columbia University, New York, on the retirement of Prof. J. G. Curtis. He has been connected with the University since 1891, having successively held the posts of demonstrator, adjunct professor, and research professor.

BY the will of the late Mr. W. S. Steel, of Philiphaugh, Selkirkshire, the sum of 5000*l.* is to be set aside for the establishment of "The Strang Steel Fund," the income of which is to be applied for the advancement of education in Selkirkshire, including the burgh of Selkirk. Mr. Steel also bequeathed 5000*l.* to Glasgow University to found a scholarship for promoting research in any department of science the University may consider desirable, and the income of 2000*l.* for the purchase of books for the library of the University.

THE Regent Street Polytechnic, London, is being rebuilt this year at a cost of 90,000*l.* The rebuilding fund was inaugurated by a grant of 20,000*l.* from the London County Council and a loan of 20,000*l.* from the City Parochial Foundation. The 50,000*l.* needed to complete the fund has been subscribed and promised with the exception of 2500*l.*, which has been reserved so that as many old members, scholars, students, &c., of the polytechnic may have the opportunity of participating in the scheme. Donations of 1*l.* to 100*l.* may be sent to the secretary of the polytechnic, 309 Regent Street. Among donations to the rebuilding fund may be mentioned Lord Leith of Fyvie, 30,000*l.*; Mr. Howard Morley, 5000*l.*; and Lord Howard de Walden, 3500*l.*

THE report of the principal of the Huddersfield Technical College, read at the recent distribution of prizes to students of the institution, is a record of steady progress. Not only was there during last session a substantial increase in the number of both day and evening students, but also in the fees paid and the grants received from the Board of Education. In addition to the strictly technical part of the work of the colleges, courses of instruction are provided which enable students to graduate at the University of London. At the conclusion of his report the principal suggested an enlargement of the sphere of usefulness of the institution during the daytime, and consideration is being given to the possibility of expanding the work of the college in the following directions:—the more vigorous conduct and better organisation of the day commercial department; the establishment of day classes for apprentices in various trades; day classes in mining for workers employed on night shifts; trade schools of dressmaking, millinery, or cloth mending; and the opening of a home-making centre, to be worked in conjunction with the department of domestic economy.

AT the convocation of the University of Chicago on December 20, 1910, a letter from Mr. John D. Rockefeller to the president and trustees was read. In the letter, which is printed in *Science* for December 30, Mr. Rockefeller announces that he has had 2,000,000*l.* set aside for the University of Chicago, and that it is to be delivered to the University in ten equal annual instalments, which began on January 1 of this year. Each instalment is to bear income to the University from the date of such delivery only. The letter goes on to point out that Mr. Rockefeller believes that it is better for a university to be supported and enlarged by the gifts of many rather than by those of a single donor, and he states that the University of Chicago has received in addition to his own gifts more than 1,400,000*l.* from citizens of Chicago and the West. With his latest generous gift, Mr. Rockefeller says he has completed the task he set before himself as regards the University; and his letter contains his resignation from the board of trustees, and the announcement of the resignations of his personal representatives. "I am acting," the letter says, "on an early and permanent conviction that this great institution, being the property of the people, should be controlled, conducted, and supported by the people in whose generous efforts for its upbuilding I have been permitted simply to cooperate." A resolution of appreciation of Mr. Rockefeller's generosity, adopted by the trustees, states that altogether the sums received from him amount to 7,000,000*l.* The trustees, too, are able to say in their resolution:—"Mr. Rockefeller has never permitted the University to bear his name, and consented to be called its founder only at the urgent request of the board of trustees. He has never suggested the appointment or removal of any professor. Whatever views may have been expressed by members of the faculty, he has never indicated either assent or dissent. He has never interfered directly or indirectly with that freedom of opinion and expression which is the vital breath of a university, but has adhered without deviation to the principle that while it is important that university professors in their conclusions be correct, it is more important that in their teaching they be free."

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, January 12.—Sir A. Geikie, K.C.B., president, in the chair.—Prof. H. L. **Callendar** and H. **Moss**: The absolute expansion of mercury.—Dr. R. W. **Gray** and Sir W. **Ramsay**: The density of niton (radium emanation) and the disintegration theory.—Prof. J. S. **Townsend**: The charges on ions in gases, and some effects that influence the motion of negative ions. The experiments on charges on ions in gases which had previously been made with air only have been extended to oxygen, hydrogen, and carbonic acid. The value of the quantity N*e* for the negative ions is in all cases very near the value $1{\cdot}22 \times 10^{10}$, which corresponds to a charge, *e*, equal to the charge on a monovalent atom. The ions were produced by secondary Röntgen rays, and it was found that when non-penetrating rays were used the value of N*e* for the positive ions was practically the same as for negative ions, but is much larger when the penetrating rays are used, showing that in this case some of the positive ions have double charges. The motion of the negative ions is considerably changed by carefully drying the gases, and the results of the experiments may be used, in conjunction with the determinations of the velocities made by Mr. Lattey, to determine the apparent mass of the negative ion, which diminishes at low pressures as the electric force is increased. For a given force, the pressures at which the effect of drying becomes appreciable is higher in hydrogen than in oxygen, and much less in carbonic acid than in the other gases.—F. W. **Aston**: The distribution of electric force in the Crookes dark space. The method used in the investigation is one due to J. J. Thomson, and consists in shooting a beam of homogeneous kathode rays transversally through the discharge, and observing the deflection of the beam at various points. The results so obtained are free from the very serious objections which may be urged against the "sounding-point" methods used by previous observers. The electric force in the negative glow is found to be negligibly small, while within the Crookes dark space it is satisfied within experimental error by the simple formula $\mu(D-x)$, where D is the length of the dark space, x the distance from the kathode, and μ a constant. This result indicates the presence of a uniform charge of positive electrification within that region. The distribution is the same for all gases, pressures, and currents used. By integrating the forces so obtained, the potential fall across the dark space is calculated, and is found in all cases to agree within experimental error with the actual potential between the electrodes. The large and abrupt fall of potential at the surface of the kathode found by other investigators is probably a result of faulty methods, an explanation of which is suggested.—Dr. P. E. **Shaw**: The measurement of end-standards of length. A continuation of work published in Roy. Soc. Proc. (December 1, 1905). In recent years the authorities at the National Physical Laboratory have been required to measure and test end-standards with unprecedented accuracy. As a result, the faults of the standards and of the measuring machines have come to light. In this