occur? Is there a relation between the times of maxima of different groups of plants or animals? We can hardly look to qualitative plankton work for the answers, and it has been the quantitative methods that have mapped out the spring maxima of diatoms and dino-flagellates, and, in opposition to qualitative results, have shown how in temperate and arctic regions the plankton is greater in volume than in the tropics.

Again, in order to show whether the changes in the plankton are due to inherent qualities in the organisms, to external influential hydrographical conditions, or to both, a combination of hydrographic and planktonic work is required. It is, I think, obvious that there are many problems awaiting solution, and our choice is limited to the alternative of either leaving them alone or adopting quantitative methods.

It has been said that the latter are inaccurate. Of course they are, to a certain extent, but unfortunately we have no better at our disposal, and have considered it better to use the most accurate methods possible, and to remember the error when drawing our conclusions, than to leave the whole question alone. It is significant that all the objections, backed by scientific evidence, which have been brought against the quantitative methods have

FIG. 4.—The Closing Petersen-Hensen Net going down open.

come from investigators using these methods. It is obvious, therefore, that their eyes are open to the defects of the methods and the limits of the apparatus used. In this respect may be mentioned the work of Lohmann and Kofoid on the catching power of the nets (Fig. 4), and of Herdman in regard to the variations in uniformity in the distribution of the plankton, which question was the first to be considered in the Port Erin work. I cannot do better than quote certain lines from the article in the report referred to:—"With the object of formulating such views as to the nature of the Plankton at any particular time, and as to the changes, both diurnal and seasonal, and the determining factors of such changes, we must endeavour to make quantitative catches as accurately and as frequently as possible, so that our samples may be as nearly representative and as nearly comparable one with another as the difficult conditions will admit. These catches should be made with standard nets, should be preserved and measured according to a uniform system, and may then be compared in bulk; but, in addition, the more important organisms should be counted approximately, and the results in round numbers may be used in comparing catches or tracing changes; but such figures should not be made the basis of calculations as to the total numbers of such organisms in the oceans." The last sentence cannot be too strongly emphasised; the quantitative method is *not* used with the object of determining the number of diatoms in the Irish Sea, and *comparisons* of figures obtained in a uniform way should be the feature of the system.

It would be of great value if some system could be arranged so that plankton catches made in a uniform manner could be taken in different parts of the Irish Sea and St. George's Channel simultaneously. This would greatly help in mapping out the distribution of the plankton and tracing the course of the maxima. For example, in July last, after weeks' of catches containing a normal and small number of various copepoda, echinoderm larvæ, &c., the nets one day were found to contain large masses of *Calanus helgolandicus*. The catches were almost pure, and, in fact, practically useless for the echinoderm larvæ that were wanted. This condition of affairs lasted from two to three days, and then the Calanus swarm disappeared as mysteriously as it came. Systematic and simultaneous catches in the Irish Sea would have shown over what area this Calanus swarm extended, and perhaps whence it came.

W. J. DAKIN.

PRIZES PROPOSED BY THE PARIS ACADEMY OF SCIENCES FOR 1911.

GEOMETRY.—The Francœur prize (1000 francs), for discoveries or works useful to the progress of pure or applied mathematics; the Bordin prize (3000 francs), for improving at an important point the theory of triple systems of orthogonal surfaces; the Poncelet prize (2000 francs), for work in applied mathematics.

Mechanics.—A Montyon prize (700 francs), for the invention or improvement of instruments useful to the progress of agriculture, the mechanical arts or sciences; the Vaillant prize (4000 francs); the subject for 1909, postponed to 1911, is to improve the application of the principles of the dynamics of fluids to the theory of the helix, and the question proposed for 1911 is to perfect at some point the study of the motion of an ellipsoid in an indefinite liquid, having regard to the viscosity of the liquid.

Navigation.—The extraordinary prize of 6000 francs, for work tending to increase the efficiency of the French naval forces; the Plumey prize (4000 francs), for improvements in steam engines or for any other invention which would contribute to the progress of steam navigation.

Astronomy.—The Lalande prize (540 francs), for the most interesting observation, memoir, or work useful to the progress of astronomy; the Valz prize (460 francs), for the most interesting astronomical observation made during the current year; the G. de Pontécoulant prize (700 francs); the Damoiseau prize (2000 francs), subject postponed from 1909, the theory of the planet Eros based on known observations, and for 1911, to perfect the "Tables de Jupiter" of Le Verrier.

Geography.—The Tchihatchef prize (3000 francs), for a recompense or encouragement for exploration of the unexplored or partially explored portions of Asia; the Gay prize (1500 francs), for the study of a French African colony from the geological point of view (Algeria and Tunis excepted).

Physics.—The Hébert prize (1000 francs), for a discovery in applied electricity; the Hughes prize (2500 francs), for a discovery or work contributing to the progress of physics; the Gaston Planté prize (3000 francs), for an important invention, discovery, or work in the field of electricity.

Chemistry.—The Jecker prize (10,000 francs), for work in organic chemistry; the Cahours prize (3000 francs), for the assistance of young chemists already known by their original chemical researches; Montyon prizes (unhealthy trades) (2500 francs and a mention of 1500 francs), for a discovery of a means of rendering an art or trade less unhealthy.

Mineralogy and Geology.—The Delesse prize (1400 francs); the Joseph Labbé prize (1000 francs), for geological works or researches leading to effective development of the mining wealth of France, its colonies or protectorates; Fontannes prize (2000 francs), to the author of the best palæontological publication.

Botany.—The Desmazières prize (1600 francs), for a publication on cryptogams; the Montagne prize (1500 francs), for important works bearing on the anatomy, physiology, development, or description of the lower cryptogams; the de Coincy prize (900 francs), for a work on phanerogams; the Thoré prize (200 francs), for the best work on the cellular cryptogams of Europe.

Anatomy and Zoology.—The Savigny prize (1500 francs), for the assistance of young travelling zoologists, not in receipt of Government assistance, who occupy themselves more especially with the invertebrates of Egypt and Syria; Grand prize of the physical sciences (3000 francs), for the morphogenic study of the characters of adaptation to free life in the vertebrates; the Cuvier prize (1500 francs), for a work on zoological palæontology, comparative anatomy, or zoology.

Medicine and Surgery.—Montyon prize (2500 francs, mention of 1500 francs); the Barbier prize (2000 francs), for a valuable discovery in surgical, medical, or pharmaceutical science, or in botany in its relation to medicine; the Bréant prize (100,000 francs), for discovering a cure for Asiatic cholera, or by discovering and removing its cause; the Godard prize (1000 francs), for the best memoir on the anatomy, physiology, and pathology of the genito-urinary organs; the Baron Larrey prize (750 francs), for an army or navy surgeon or physician for the best work dealing with the subject of military medicine, surgery, or hygiene; the Bellion prize (1400 francs); the Mège prize (10,000 francs); the Chaussier prize (10,000 francs), for the best book or memoir on practical or forensic medicine.

Physiology.—A Montyon prize (750 francs), for experimental physiology; the Philipeaux prize (900 francs); the Lallemand prize (1800 francs), for the encouragement of work on the nervous system; the Pourat prize (1000 francs), for a memoir on the origin of the antiferments (postponed from 1909), and (1911) for a memoir on the influence of the mineral elements, especially of calcium, on the activity of the digestive diastases.

Statistics.—A Montyon prize (1000 francs, a mention of 500 francs).

History of Science.—The Binoux prize (2000 francs).

General Prizes.—The Arago, Lavoisier, and Berthelot medals; the Gegner prize (3800 francs); the Lannelongue prize (2000 francs); the Trémont prize (1100 francs); the Wilde prize (one of 4000 francs or two of 2000 francs), for discoveries in astronomy, physics, chemistry, mineralogy, geology, or experimental mechanics; the Lonchampt prize (4000 francs); the Saintour prize (3000 francs), for work in mathematics; the Victor Raulin prize (1500 francs), for assisting the publication of works in geology and palæontology; the prize founded by Mme. la Marquise de Laplace; the Félix Rivot prize (2500 francs); the Pierson-Perrin prize (5000 francs), for a discovery in mechanics or physics; the Serres prize (7500 francs), for works on general embryology applied to physiology and medicine; the Jean Reynaud prize (10,000 francs), for an original scientific work; the Petit d'Ormoy prize (two prizes of 10,000 francs), one for work in pure and applied mathematics, and one for natural science; the Baron de Joest prize (2000 francs).

LONDON COUNTY COUNCIL CONFERENCE OF TEACHERS.

SIX addresses were given from the chair and twenty papers were read at the meetings held on January 6, 7, and 8 at the Birkbeck College. As a rule, the gatherings were large, and the papers read were of considerable importance. We understand that the London County Council will publish and distribute a complete report with the same liberality as in former years.

The subjects of the papers were classed under the headings:—(1) organisation of higher schools; (2) training of engineers; (3) teaching of number; (4) teaching of domestic economy; (5) methods of teaching in schools for the mentally defective; (6) educational experiments in schools. With so varied a programme it is not easy to point to any single idea as dominant in the papers or in the discussions which followed. Nevertheless, it is safe to say that there was a continued endeavour, consciously in some cases and unconsciously in the remainder, to bring the work within the school walls into closer relation with the present and future activities of the pupils in their daily lives.

The main impression produced by the conference as a whole—an impression which could hardly escape the notice of any reflective observer—was that the London education authority is acting with wise foresight in encouraging initiative and individuality among its teachers. One cannot, of course, assume that such encouragement is given in every school simply on the evidence of these meetings, but there is no doubt that men of originality and proved competence are encouraged and helped to put into practice new ideas and new methods, and that this is true for the older as well as the newer subjects of the curriculum. It is not easy to overrate the importance of the attitude of the London Education Committee and its official advisers with regard to this treatment of the teacher. Whether we approve or not, for good or for ill, the growing municipalisation of education in this country is an irresistible fact.

That the administration should be municipalised is probably a benefit; we may agree with Mr. Cyril Cobb (who opened the conference) in his view that the union of education with other municipal work was good, both for education and the other municipal departments which were brought into touch with it. The danger—and it is a grave one—is that the teachers may become bureaucratised—that they may sacrifice the finer elements of professional spirit to the attainment of smooth and trustworthy working as components of the municipal machine. If English schools are to continue to deserve their reputation for training character it can only be by retaining the requisite spirit in the teachers. From these considerations we may regard the tone of these conferences as promising well for the future of London education. With thankfulness we recognise that the London County Council is anticipating the dangers which are liable to accrue from the very efficiency of its system, and is inhibiting their growth by promoting the development of initiative and of independent professional criticism among the teachers in the London service.

Organisation of Higher Schools.

Turning to the headings given above, under (1) Mrs. Millington discussed the aims of the new Central Schools for Girls, for which the age of entry is eleven to twelve and of leaving fifteen to sixteen. Girls needed both fitness to take charge of a home and fitness for commercial or industrial employment. Training for home-making should be given to all girls alike; for this purpose a small house, a day-nursery, and a small garden should be attached to the schools. Poetry, music, and one foreign language were among the essentials. Mr. H. J. Spenser, headmaster of University College School, read a paper on the organisation of a large secondary school, in the course of which he said that, as compared with other nations, we suffered from lack of expert knowledge in our rulers. Abroad, the men who controlled national systems were men who had spent most of their lives in teaching. We pay a heavy price for amateur government. The greatest national need to-day is the need for efficiency in the secondary schools.

Training of Engineers.

The discussion on the training of engineers took place under the presidency of Sir William White, who advocated a preliminary practical training interposed between the secondary school and the technical college. It was during that period that the boy learned most from the workman, and in Germany they had gone back to that system. After Dr. Walmsley had described the "sandwich" system of training as practised by engineering students of the Northampton Polytechnic Institute at Clerkenwell, a paper was read by Prof. D. S. Capper, in which the author reviewed the whole subject. He divided an engineer's training into (1) school training; (2) scientific training; (3) technical training; (4) subsequent training. As regards (1), he deprecated specialisation, advocated freehand and mechanical drawing, and limited the usefulness of school workshops to teaching a boy to use his tools, to think in the solid and to realise methods of simple construction.