

and only a few eggs succeeded in fixing themselves to the objects introduced. When the currents were strong, the milt were seen not only to swim nearer the bottom but to expel longer ribbons of milt, which reached the bottom before getting dispersed and remained visible sometimes for ten minutes. On gently expressing a male under the water it was never possible to expel so fine or so short portions of milt as escaped naturally, but it was extremely easy expelling a ribbon from 18 inches to 3 feet in length, measuring 2 lines across and 1 line in thickness. Such ribbons fell to the bottom and remained almost unchanged for nearly two hours; they then assumed a segmented appearance, and in about three hours and a half had all but disappeared.

Eggs were allowed to escape into a vessel containing fine sand, and into another containing mud. The eggs after being fertilised underwent the early stages of development, but either owing to their moving freely about with the sand particles or owing to their getting coated over with the sand and mud their development was arrested. I have not yet determined finally if the development is arrested when the eggs are detached while development is proceeding, but this seems extremely probable.

When at Ballantrae I noticed that the trammel nets secured often more males than females. Mr. Wilson, fishery officer at Girvan, informs me that the ripest fish are caught in the trammel nets, while most of the unripe fish are obtained in the drift nets, and that at the end of the fishing season there are about three males taken for every two females, indicating not necessarily that the males are more abundant than the females, but rather that the males remain longer on the spawning ground; and Mr. Wilson believes that herring prefer quiet water free from strong currents when spawning, and that when the weather is fine the herring remain long upon the bank and deposit their spawn leisurely, but when there are strong currents they either hurry the spawning process or disappear into deep water.

As to artificial fertilisation and hatching I found, after many experiments at Ballantrae, that the best results were obtained when both the male and female were held under water while the milt and ova escaped, *i.e.* when the natural process of spawning is followed.

An ordinary wooden tub was obtained and filled with seawater. Into this a small quantity of milt was expressed, the male being held completely under water while the milt escaped. A glass plate was then held about four inches beneath the surface of the water, and the female herring being held about one inch beneath the surface, by gentle pressure the eggs readily escaped in the characteristic narrow beaded ribbon, and, by moving the fish over the surface of the glass, either a close or an open network could be formed. At first, where one loop crossed another, the eggs were two or more layers thick, but, either owing to the weight of the eggs or the gentle currents set up in the water, before a few minutes had elapsed, the eggs formed a single and almost continuous layer, the network arrangement having disappeared. The plate was then allowed to rest for two or three minutes at the bottom of the tub, and a few short ribbons of milt were again introduced. After moving the plate once or twice across the top of the tub in order to wash off any scales that were adhering, it was placed either in a hatching or a carrying box. Many thousands of ova treated in this way contain extremely active embryos, which are expected to hatch on March 22 or 23.

Prof. Ewart exhibited a number of specimens showing herring eggs attached to stones, seaweeds, and sea-firs, and some of the herring fry hatched on March 24 from the eggs artificially fertilised on March 8.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE

OXFORD.—The electors have awarded the Radcliffe Travelling Fellowship after examination to Mr. J. E. Blomfield, B.A., late Natural Science Demy of Magdalen College, and now of University College Hospital, London. The Fellowship is of the annual value of 200*l.*, and tenable for three years provided that the Fellow travels abroad for his improvement in the study of medicine. This is the fourth time in the last five years that this prize Fellowship has been won by a student of Magdalen College.

CAMBRIDGE.—From the report of the last Local Examinations it appears that the answers in pure mathematics exhibited

considerable improvement, while in applied mathematics the work was inferior, and much of the teaching in statics was imperfect, and not based on mathematics. In chemistry great inequality was shown, some centres sending uniformly good work, others being very inferior. The practical work is better done than the theoretical. The teaching of experimental physics is still very ineffectual in its results. In the senior paper in electricity and magnetism only two of the candidates showed any proof of accurate knowledge or scientific training.

In biology the answers were, on the whole, not good, yet at some centres candidates did extremely well. In botany vegetable physiology showed improvement, but floral diagrams are not sufficiently used. In zoology the candidates seemed to have no idea of the relative value of facts. In physical geography a marked absence of scientific method was noticeable in the answers; great ignorance of meteorological terms used in most daily papers was manifested.

The Cambridge Local Lectures have made good progress in the past session, much good having resulted from the conference of local committees and lecturers held last year. In a number of centres local associations have been formed for putting the lectures on a permanent basis. At Derby an Artisans' Higher Education Society has been formed, the subscription being very low. At the Midland Railway works the large mess-rooms have been utilised in giving short lectures to arouse interest among the men, Prof. Teall lecturing on chalk, Mr. Bemrose on the transit of Venus, Mr. Heycock on digestion, respiration, &c., and the men have always been appreciative. In the Newcastle district much eagerness has been shown by pitmen to attend the lectures, often at great personal cost and inconvenience. The cost, indeed, is so great as to form an obstacle of serious magnitude, and it is found that the desire for lectures is such that the overcoming of financial difficulties would lead to an enormous extension of the work. Efforts are being made to get the rules of the Trades Unions altered so as to enable them to contribute towards the cost of the lectures.

It is now proposed to constitute an examination in French or in German as the additional subjects required of candidates for honours degrees, unless the candidates choose rather to pass the General Examination for the B.A. degree. This change would be welcomed by the large number of students to whom the study of works in French and German would be an important aid in their Tripos subjects.

SCIENTIFIC SERIALS

THE *Journal of Botany* for March contains the conclusion of Mr. T. Hick's valuable paper on protoplasmic continuity in the Floridæ. In quite a number of distinct genera belonging to this class he has now traced connecting threads between the protoplasm from cell to cell. He regards these threads as permanent and essential structures, normally present in all parts of the thallus from the oldest to the youngest, not restricted to special localities and special cells.—Some details of the life-history of a rare and little-known British plant, *Lithospermum purpuræceruleum*, are contributed by Mr. Jas. W. White.

American Journal of Science, March.—Experimental determination of wave-lengths in the invisible prismatic spectrum, with plate, by S. P. Langley.—The Quaternary gravels of Northern Delaware and Eastern Maryland, with map, by Frederick D. Chester. From a careful survey of this region the author infers that the peninsula became depressed at least 350 feet towards the close of the Glacial period, when the estuary thus formed received the discharge of the Delaware River, which pushed its way across the present States of Delaware and Maryland to the head of the Chesapeake. By this current and the subsequent distributing action of the waves the red gravel was deposited. Later on the land began to rise, the violence of the flood was abated, and the northern glacier gradually broke up. During this period the Philadelphia Clay was deposited, and the boulders distributed over the estuary by the icebergs from the glacier. The land continuing to rise, the shoal gravels were piled up by the waves and tides, the river began to assume its present channel, and the Delaware and Chesapeake were finally parted.—On the identity of scovillite with rhabdophane, by G. J. Brush and S. L. Penfield.—A theory of the recent sun-glow, by H. A. Hazen. The author attributes the phenomena to the presence of watery vapour, ice