

“pretty” questions unsuitable for a three-hours’ examination paper. At Bangor Mr. Lloyd George had directed attention to the need of explorers who should survey the unknown regions of science. This need was urgently felt in mathematics, both pure and applied. Thus the theory of groups was a newly explored territory which might in time become a field of wealth in the hands of colonists like Prof. Perry. The true explorer would never stand in the way of progress. It was the man who thought he had done everything when he had competed in a walking race over the measured mile of a syllabus who never became an explorer, and never produced explorers. No man who relied only on his powers of walking would ever become an explorer. We required men to be carried over the greater part of the distance by the fastest means of locomotion at our disposal to bring them to the forefront of the unknown territory, and this was in effect what Prof. Perry wished to do. The research mathematician was in reality assisting, not hindering, progress. He had exposed the futility of elementary deductive geometry by raising the foundations of geometry to the level of a very difficult and advanced subject of post-graduate study. As for Fourier’s theorem, modern researches had made the proof of that theorem a subject involving years of study, thus rendering it impossible for the science man to do more than study its applications. As for examinations, Prof. Bryan was thankful he had not been debarred from conducting them, as this work had afforded him most valuable experiences, and, referring to Prof. Perry’s remarks on the solution of triangles, he gave a striking illustration of the cumbersome methods adopted by examinees in finding the area of a right-angled triangle by the unnecessary use of formulae. There was far too much teaching and far too little learning. Prof. Perry lamented the lack of individuality on the part of teachers, and at the same time condemned the specialist teacher. Prof. Bryan, on the other hand, thought that the cause was that the teachers were not sufficient specialists to develop original ideas, and that an all-round man who was put on to teach mathematics, Latin, history, geography, Welsh, and chemistry could never (except in rare instances) get beyond blindly following the text-book or the examination syllabus.

Mr. Godfrey next spoke. He said that subjects such as mechanics, hydrostatics, and optics were, as a rule, taught in one way by the mathematical master and in another by the science master. He would throw the whole teaching of these subjects, both theoretical and practical, on the mathematical master. There was no educator so good as responsibility. The mathematical master would benefit by having the experimental work thrown on his shoulders; the science master would have more time for other work.

The reference to optics might well have been dwelt on at greater length. There is no better exercise in constructive geometry than the construction of reflected and refracted rays, caustics, and images, and the subject is capable of exact experimental verification, thus differing from the study of the motion of impossible particles on equally impossible smooth curves. Mr. Godfrey further pointed out that the clock sums and problems on filling baths had plenty of counterparts in the form of questions on graphs.

Mr. Jackson quoted Emerson’s view that education was what remained when everything learnt at school was forgotten. There was no one panacea for inaccuracy. He recommended for graphs the use of a board with invisible squares scratched on it, identical in principle with the boards used by lightning caricaturists in music halls. He referred to the great French logarithmic tables, the computation of which was done by hairdressers who had been thrown out of work by the Revolution. We wanted to make boys believe that mathematics was a useful element in daily life, and not a punishment for their sins.

Prof. Alfred Lodge thought that in the higher forms boys taking mathematics might dispense with experimental work. He suggested that lists might be drawn up of experiments suitable for illustrating mathematical principles, and, conversely, that in science text-books each chapter might be prefaced by a list of mathematical formulae.

Mr. W. J. Dobbs put in a plea for deductive geometry,

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which, he contended, was really a branch of experimental physics involving properties of matter. He referred to the value of mechanics in teaching trigonometry. He pleaded for the use of simple, inexpensive home-made apparatus, and contended that a great deal of money now spent on costly apparatus should be given to the teachers. Mr. Tuckey pointed out that two subjects taught by the same teacher were not necessarily correlated.

Prof. Armstrong suggested that Prof. Perry would have to tell teachers absolutely what they ought to do. People would be glad to learn, but they were not at present competent to understand his methods. Mathematicians must take off their coats and use their hands. The majority of pupils should not be trained from the scholarship point of view. He asked if there was any particular value in any educational subject.

After Mr. Nunn had spoken the latter question was again raised by the chairman, and Prof. Perry emphasised the necessity of differentiating between subjects which were useful in themselves and subjects which were educationally useful. Every child should be fond of reading and should be good at computation. He should have an elementary knowledge of science, and be able to express his ideas clearly in English. Lord Roberts’s statements regarding the incompetence of men from the public schools when on service during the South African war were quoted. Prof. Bryan urged those present of the necessity of fighting that *practical* mathematics should receive its proper importance in the training of the working citizen, and that it should not be ousted by subjects the study of which had once formed the luxury and pleasure of the now vanishing English middle classes, but had only given rise to sadness and disappointment when these classes had been forced to earn their daily bread in the world at large. A vote of thanks was finally proposed by Mr. Siddons, who gave illustrations of the reforms that had actually taken place in recent years largely at the instigation of Prof. Perry.

#### SCIENTIFIC INVESTIGATIONS OF FISHERIES.<sup>1</sup>

TO the scientific inquirer the issue of these reports is, on the one hand, interesting for statistical and other proofs of the actual condition of the British sea-fisheries, and, on the other, for a statement of the views of impartial men—especially concerning the measures, if necessary, to be adopted for the preservation and improvement of the fisheries.

In the annual report of the English fisheries for 1906 it is gratifying to find that the quantity landed exceeded that of any previous year, and, if corroboration were necessary, the report of the Scotch Board for that year, and also for 1907, tell the same tale. It is further satisfactory to observe that by the methods now adopted the report is more nearly brought into line with modern requirements, and reflects credit on the Board and its staff. It may be pointed out, however, that the terms “demersal” and “pelagic” as applied to the food-fishes (and very suitable for their ova) are not free from misinterpretation even by fisheries’ authorities, and it may be that the old terms “round” and “flat” white fishes and “skate,” as distinguished from “herrings, mackerel, pilchards, sprats and anchovies,” would prove as useful and at the same time be in accordance with the classification adopted by the Scotch Board. It is suggestive, again, that in the south dabs are included in the “decreasing” flat fishes, whereas the Scotch Board lately considered that this abundant form was usurping the areas of the more valuable plaice. The growing scarcity of marketable plaice is anxiously recorded, yet it is a complaint of very old date, and it has not been shown that the numbers of very small plaice show any diminution. The statistics of the average catch of this fish per day during the years 1903–6 must be cautiously accepted, since there

<sup>1</sup> (1) Annual Report of the Board of Agriculture and Fisheries under the Acts Relating to Sea-fisheries for the Year 1906 (1908).

(2) Report of Research-work of the Same Board on the Plaice Fisheries of the North Sea, 1905–6 (1908).

(3) Report of the Committee appointed by Treasury-Minute to inquire into the Scientific and Statistical Investigation of the Fishing Industry of the United Kingdom.



are factors not included in the reckoning, but the adoption by the Board of a chart in which the fishing-grounds of western Europe are divided into "regions" and the North Sea into "areas," according to depth, is excellent, especially in connection with plaice and other flat fishes. In briefly noticing the nature of each area, it is stated that the fishes caught in the North Sea no longer constitute the predominant quantity of a few years ago, but rather more than half the total quantity of "demersal" fishes landed by British vessels, yet the reader is left in doubt concerning the nature of the statistics of a few years ago, and as to whether the recent statistics of the International Bureau have been taken into account. It is interesting that the most prominent fish is the haddock, as in Scotland, a fish about which as many misgivings have been bruited as about the plaice.

On the whole, the report, its foreign and colonial information, and its elaborate, skilfully arranged and important tables, ought to assuage unnecessary fears as to the yield of the sea. It is true statistics are at most approximative, and need the support of scientific experience and a thorough acquaintance with the waters in, as well as adjacent to, the North Sea, both of which were absent, for instance, in the statistics laid by the Scotch Board before the Parliamentary Committee under Mr. Marjoribanks in 1893, but they are indispensable. In all probability the Board will arrange for a more expeditious issue of the report in future. The Scotch Board's report for 1907 is now in hand.

Little need be said about the special report on plaice, by Captain W. Masterman, further than that in its present stage it demonstrates the ability and infinite pains taken by its author in the methods of weighing and measuring specimens from the various "areas" of the North Sea. Four "ichthyometric" ports have been chosen, viz. Grimsby, Boston, Lowestoft, and Ramsgate, and the series of elaborate tables giving the number of large, medium, small, undistinguished and others, from each area, and also their condition as to the viscera, show that every available fact will be grasped. In future reports, no doubt, a record from each area, and from personal observation, of the captures of plaice under 19 cm. which have been thrown overboard before returning to land, will be given, for such would be invaluable in placing the whole subject before the investigator. The use of the small-meshed ground-net of St. Andrews and the various surface- and mid-water nets on each area will probably also add further information. The reported fall from 48 million kilos. in 1903 to 29 million kilos. in 1906 merits full investigation. A careful summary of the captures of plaice from the North Sea by other nations would also be useful, especially as Dr. Kyle has shown that the totals of plaice landed at all the North Sea ports were nearly doubled between 1892 and 1903, and that, ten years after Dr. Petersen had reported the gradual decline of the Danish plaice-fishery in the Cattagat, not only was it more productive, but, as if to emphasise the lesson, an entirely new plaice-fishery by the Swedes on the northern border of the same area had sprung up and was flourishing. Experience demonstrates that when much harrassed and their ranks thinned, the older plaice become, like other fishes, extremely wary, but the vast swarms of very young plaice have shown no diminution on any shore, for it was pointed out long ago (1884) that none occur in deep water. Even a small untrawlable area is of importance in such a question, and it is stated that, in regard to plaice, 17 per cent. of the area of the North Sea is so. Much information may also be procured by the use of plaice-nets on suitable grounds, especially if diminution is reported. Moreover, the misunderstanding of the Scotch Department in summarising the ten years' work of the *Garland* should be borne in mind. The whole question is so complex that any new facts obtained by the able scientific staff of the English Board would be very welcome.

The third and very important report is that of the committee on the scientific and statistical investigations, and the task was one which even the special experience of a long life may well have faced with diffidence; yet the fact that the secretary of the commission was the only one specially trained on the subject may have had its advantages, since unbiassed minds would thus be brought

to bear on the complex question. In this brief notice, however, it is only possible to make a few general comments, and to allude to the main features of the recommendations—premising that the report, in its comprehensive nature, moderation, and fairness, is worthy of the committee.

In the interesting historical summary of scientific fisheries' work ample justice is done to England, but it is not shown with sufficient clearness that it is to Lord Dalhousie's Commission (1883-5) that the country owes the scientific and statistical initiative in the department, and that ever since such work has been as conspicuously Scotch as English. Further, that many of the recommendations in that report (1884-5) have been utilised by the Scotch, English, and Irish Boards—in some cases for many years, whilst others are again brought up in the present report. Amongst other things, it is curious that the herring-brand of the Scotch Board has apparently been thought more important than the ten years' unique work of the *Garland* and the scientific conclusions therefrom, and that the work of the recently formed Ulster Marine Biological Association is duly noted, whilst the committee appears to be unaware of the existence of the oldest marine laboratory in Britain for scientific fisheries' work. The account of the *personnel* of the British section of the international investigations and the historical summary might well have been abbreviated. In their outline of future investigations the committee has prudently followed what has previously been advised (*minus* hydrography and chemistry, both of which are somewhat expensive, whilst the results to the fisheries have been small). Artificial hatching for the stocking of the sea also is, so far as observed, an unnecessary task.

A central fisheries council, representative of the three divisions of the kingdom, as suggested, has much to recommend it, but it would be well to consider—on the score of efficiency and expense—whether one instead of two members from each division would not suffice, the Treasury appointing the other two, after consultation with the Royal Society, not the Meteorological Office. No fault can be found with the restriction of the labours of the council to researches and statistics affecting the common interests of the sea-fisheries of the United Kingdom, and to the other duties stated, provided due attention is given to uniformity of method in the annual reports of each division. Yet a further step is worthy of consideration, viz. the severance of the Fisheries' Department from agriculture and its representation in Parliament by a responsible Minister, as the minority report so far indicates. In regard to the continuance of the grant of 100*l.* *per annum* to the Plymouth Laboratory—with the necessary reservations—no dissentient voice will be heard amongst men of science. There can be no question as to the expediency of appointing a scientific officer and scientific assistants to the English Department of Fisheries. It is difficult to explain why this has so long been delayed. Nor is there any objection to the committee's scheme for international cooperation or to the International Council on the lines indicated. The sea is the highway between nations, and to a large extent their common fishing-ground. It is to be hoped that the Government will, in the main, give effect to the committee's judicious recommendations. W. C. M.

#### THE EUROPEAN POPULATION OF THE UNITED STATES.

PROF. RIPLEY, in his Huxley lecture delivered recently before the Royal Anthropological Institute, on the European population of the United States, raised a number of novel and important problems, for the solution of which the evidence is at present insufficient. In contrast to Europe, where the existing races have grown up from the soil, in America they, "one may say, have dropped from the sky. They are in the land, but not yet an integral part of it. They are as yet unrelated to its physical environment." Further, the influence of environment on this diverse population is as yet little more than a matter for speculation. The day has passed for assuming that the modern American type is a reversion to that of the American Indian; but for the future of this foreign population suddenly planted among new surroundings we must