THE LANCASHIRE SEA FISHERIES LABORATORY.

THE twenty-first annual report of this laboratory contains an interesting record of the routine work and investigations carried on during 1912. The usual four classes for fishermen were held at Piel during the spring; fifty-two fishermen received instruction in marine biology, with special reference to the life-history and habits of fishes and the more common invertebrates captured in the trawl-net, and thirty-nine of the men attended also the course in navigation.

Mr. Johnstone continues his records of diseased conditions of fishes. He describes and figures a fibromatous tumour from a halibut, melanotic sarcomata in skate, and tubercular lesions in a cod. Piscine tubercle has been known hitherto only in freshwater fishes, and it is therefore of interest to find the present typical lesions in a fish living in the open and not likely to have become infected by land-drainage. Dr. Alexander contributes a review of piscine tubercle, and gives a description of an acid-fast bacillus found in the cod above-mentioned. The lesions were skin infections, resembling lupus, and containing typical tubercles. The organism was found to be non-pathogenic for the guinea-pig.

Mr. Johnstone gives a detailed report on the more important mussel-beds in Lancashire and North Wales in regard to their liability to sewage contamination. His investigations show that the mussels from certain areas, *e.g.* parts of the Conway and Lune estuaries, are objectionable as articles of food, and he urges the necessity for supervision of natural shellfish beds, in the interests not only of public health, but of the shellfish industry.

In his account of the measurements and variations in the condition of plaice, Mr. Johnstone suggests that the main cause of the periodic migrations made by plaice is change of temperature. The migration is of the nature of an adaptation to a change in the environment, the plaice responding by so moving that the temperature-change becomes minimal.

Mr. Riddell gives an account of the plankton collections obtained during 1912 in the Irish Sea. Prof. Bassett, in reporting on the water samples taken at the same time, points out that very high salinities prevailed throughout the year 1912, especially at certain stations on the line from Holyhead to the Calf of Man, due to the flooding of the English Channel and Irish Sea by water of Mediterranean origin. He briefly discusses the types of oceanic circulation in the North Atlantic, and concludes that there are corresponding meteorological conditions, and that the latter, in so far as they affect the succeeding summer, can be foreseen from the value and time of occurrence of the maximum salinities in the Irish Sea.

The intensive study of the plankton around the south end of the Isle of Man has been continued. The maxima of the diatoms and most other plankton groups were earlier in 1912 than 1911. Examination of the various forms of the diatom Biddulphia leads Prof. Herdman and his collaborators to regard *B. sinensis* and *B. regia* as two forms of the original species *B. mobiliensis*. Mr. Scott reports on the pelagic fish-eggs of this area, and Mr Jackson on the decapod larvæ.

Prof. Herdman and Mr. Riddell, in their report on the plankton of the west coast of Scotland, state that the phytoplankton, which was so widespread in July, 1909 and 1911, especially round Mull, seems in the last two summers, and particularly in August, 1912, to have become pushed back or restricted to the more land-locked waters by an unusual influx of characteristically oceanic organisms from the Atlantic, *e.g.* the copepods *Metridia lucens* and *Candacia armata*. It is suggested that in the Hebrides there is a definite connection between the presence of oceanic water containing the copepod Calanus in quantity and shoals of herrings, for large hauls of Calanus were, on several occasions, obtained at places where, either the night before or the night after, good catches of herrings were reported.

BRITISH FORESTRY.[1]

THE useful publication before us (though foresters have to mourn the death of its long-time editor) retains its high standard of excellence. At the annual general meeting of the society, instead of a formal address there was a discussion on the relation of forestry to agriculture, &c. It is sufficient to follow this discussion to see what a strong body of opinion exists amongst practical men—forest owners and foresters—in favour of a comprehensive scheme of national forestry. The conclusions arrived at in this discussion vary little from those expressed in the Coast Erosion report of 1908, and in the similar Committee reports that preceded it.

The average rental of hill grazing ground suitable for forest planting in the north-east of Scotland is not more than 1*s.* per acre. This fact opens up a great national question of the more profitable use of the land in these islands, which are themselves one of the most fertile and productive countries of the world. Then there is the question of small holdings. These are linked with forestry in the sense that they cannot generally exist under present conditions without the help afforded from winter labour in the forest. Looked at from a national point of view, the labour question means, in the case of grazing and shooting, two or three men employed per 1000 acres, against about 10*s.* per acre per year wages in forestry. The careful Prussian statistics give 11*s.* 4*d.* per acre per year as the average forest wages bill. About one man to fifteen is the grazing-*versus*-forest ratio given in the Coast Erosion Committee's report.

This rural labour, priceless from a national well-being point of view, is being lost to the country, and some 30,000,000*l.* is being sent out of the country yearly for timber and forest products which might be produced in these islands.

Says Mr. Munro Ferguson, commenting on the last forest Blue-book (Rept. of Advisory Com. on Forestry, Cd. 6713):—"While the Administration gropes its way in the dark, and while the paramount national interest of silviculture (as affording the widest scope for additional skilled labour on the land) is neglected, 3000 emigrants leave the Clyde weekly." Mr. Munro Ferguson was the first large forest owner in Scotland to bring his own woodlands under scientific management, and he has since then represented forestry in almost every capacity.

The full text is given of the address of Sir John Sterling Maxwell (the retiring president of the Royal Scottish Arboricultural Society) to the Aberdeen branch. This was summarised in the April number of the Quarterly Journal of the English Arboricultural Society. It may be looked on as the most important pronouncement, in favour of a comprehensive scheme of State forestry, that has yet been made by an influential owner of forests in these islands: It is well termed, "The Place of Forestry in the Economic Development of Scotland." No lover of trees, no one

[1] Transactions of the Royal Scottish Arboricultural Society, vol. xxvii. part ii., July, 1913. (Edinburgh: Douglas and Foulis.)

who wishes to see the scientific methods in vogue on the Continent brought to bear on the waste lands of these islands, should be without a copy of this illuminating address. It concludes with the statement that "the Belgian Government obtains on the capital it has invested in forestry a return varying from 4·9 to 5·5 per cent." In his retiring address as president (Proc., p. 10) he adds:—"Scotch forestry is in the toils of the serpent of red tape. In spite of our efforts to keep it free and independent, forestry is now entangled with a number of different departments, some of which in the nature of things can know very little, and perhaps do not care very much, about the subject."

Mr. B. Ribbontrop, who, for many years, was head of the Indian Forest Department, gives a summary of Dr. R. Albert's researches on the peat soils of north-west Germany.

The true character of the seedlings of Japanese larch raised from Scotch seed was discussed at last summer's meeting of the English Arboricultural Society. On one hand, the time (one generation) seemed too short for the environment to have altered so considerably the character of the seedlings. On the other hand, the alteration seemed to be too uniform for hybrids between *Larix europaea* and *Larix leptolepis*. Mr. A. Murray, writing from Murthly, where these seedlings have been closely watched from the first, now gives the opinion that they are not hybrids. It may be noted that a similar alteration has been remarked in the case of an Australian Eucalypt that had been one generation in southern France.

For extracting tree-stumps with gelignite, Dr. Lauder gives the following working formula:—For pine stumps, $\frac{\text{square of girth in feet}}{20}$ = cost in shillings of explosive; and for broad-leaved trees—oak, ash, elm, &c.—about double the cost of pines and firs.

THE MANUFACTURE OF ARTIFICIAL TEETH.

IN the *Bulletin de la Société d'Encouragement* for April last is an interesting and well-illustrated article on "La fabrication des Dents Artificielles Minérales," by M. Maurice Picard, of the firm of MM. Henri Picard and Co., read at the opening ceremony of the first factory established in France, at Versailles, in the presence of M. Lechevalier, the representative of the Minister of Commerce and Industry.

The making of artificial teeth has for more than fifty years been a small but important industry in England and America, where millions of teeth of many shades and shapes are annually manufactured.

This industry owes its origin and early development to illustrious Frenchmen. Pierre Fauchard, in his work, "Le Chirurgien-dentiste," 1728, first suggested the use of enamel. Duchateau in 1744 substituted porcelain for ivory, with the aid of the porcelain manufacturer M. Gerrard, of Paris. Later Duchateau, with Dubois de Chaumant, a dentist in Paris, who suggested the addition of pipe-clay, made great improvements in manufacture. The latter carried the invention to England, and obtained a patent in 1791 for fourteen years. In 1808 Fonzi, a dentist in Paris, fixed platinum pins into the body of the tooth, as a means of attaching the tooth to the artificial plate which holds it in position. M. Plantou manufactured artificial teeth in America in 1817.

Felspar and silica ground to an impalpable powder, to which is added a certain amount of kaolin, form the basis of all porcelain teeth. These are made into a thick paste, and tinted in a variety of colours with oxide of titanium. The paste is pressed into moulds in which are inserted platinum pins. These teeth are then fused in a furnace at a very high temperature. The factory in Versailles already manufactures 225,000 teeth each month.

Incidentally, one may inquire why such an invention should not have found, sooner, an industrial home in the land of its origin? The answer may be suggested, not in lack of enterprise, but in the facts that French people do not readily part with their natural teeth, and they have an innate objection to artificial teeth on plates.

We have no doubt that the refined foods of an advancing civilisation are leading to an increased destruction of teeth by dental caries. We have no evidence to prove that our neighbours' teeth, however, are better than our own, but they submit more readily to the conservative treatment which dentists are trained to give in the preservation of teeth, rather than permit the ravages of the *arracheur de dents*.

R. D. PEDLEY.

THE MUTATIONS OF OENOTHERA.

THE last decade has witnessed many remarkable advances in our knowledge of heredity and variation. The beginning of the present century may be said to mark the turning-point between the observational method of Darwin and the more intensively experimental method now pursued in the study of evolution. This change from observation to experiment in evolutionary study was participated in by many investigators. Among those whose work will ever occupy a prominent place in the renaissance of activity in scientific plant- and animal-breeding may be mentioned de Vries, whose theory of mutation, or the sudden origin of new species, has been a fruitful subject of investigation and discussion.

The views of de Vries, published in 1901, were based to a considerable extent upon his prolonged investigations with the evening primrose, *Œnothera Lamarckiana*. These now classic experiments showed that when this species is cultivated in large numbers, individuals appear sporadically but repeatedly year after year which differ from the type in nearly all their characters. These new types, or mutants, in many cases breed true, giving rise to new races, and the main facts of de Vries's observations have since been repeatedly confirmed.

It is safe to say that these remarkable and at that time unique observations have subsequently led to a more thorough and complete study of the evening primroses than has been accomplished in any other group of plants, not even excepting the garden pea of Mendelian fame. Numerous investigators have attacked the problem thus presented from many points of view, and much light has been thrown upon the general subject of mutations. This is particularly true of the cytological investigations, which have really furnished the key to the explanation of the mutation phenomena.

Since a fortunate discovery in 1906 indicated that various mutants differed in the constitution of their nuclei, the origin of these differences has been an absorbing subject of investigation. Two years later it was possible to show that a basis for changes in the nuclear constitution of different mutants exists in the germ cells, and that the process of mutation is probably in part a result of irregularities in chromosome distribution during meiosis or germ-cell formation. The chromosomes are the constituent parts of the nucleus, and their number is constant for each species, so this furnished the desired proof that, in some