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

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