

most of the districts where the larch saw-fly was making itself felt, and as none of the other parasitic hymenoptera or diptera recovered from the cocoons from year to year showed signs of attaining to anything like its efficiency as a parasite, it was felt that the eventual control of the pest possibly depended largely upon the future activities of this one species. Hence the following observations made during the present season may be of interest in so far as they indicate the probability of other of the parasites attaining to a like importance.

Shouldwaite plantation at Thirlmere, the first in that area to suffer from attack, endured during several summers the severest defoliation, until in 1910, owing to the good offices of *M. tenthredinis*, the ravages of the pest abruptly and almost entirely ceased. In 1911 it was impossible to obtain from there any further cocoons for the purposes of the investigation owing to the scarcity of the saw-fly. In 1912, however, this plantation was invaded by a vast swarm of adult saw-flies, which there was reason to believe came from a badly infested plantation some three miles away. Owing to a period of very unfavourable weather, and perhaps to other causes, the defoliation that ensued was not at all so extensive as it was feared it would be; however it was distinctly noticeable, and the consequences of this re-infection of the area were looked forward to with some anxiety. Would the trees, weakened by the old outbreak, have to submit to renewed defoliations, until such time as *M. tenthredinis*, re-emerged Cincinnatus-like from its obscurity, regained sufficient strength to overcome the progeny of the invaders? An examination of the parasites that have emerged this year from cocoons collected in this area revealed a quite unexpected state of affairs. Scarcely 2 per cent. of the cocoons proved to be parasitised by *M. tenthredinis*, but some 25 per cent. yielded specimens of an ichneumon which had hitherto played quite an insignificant part as a parasite of the large larch saw-fly (a species of *Mesoleius*, as yet undetermined). From approximately 24 per cent. emerged tachinids belonging to the species *Zenillia pexops*, B. and B. (Mr. C. J. Wainwright, who kindly identified it for me, informs me that he knows of but one other record of its having been taken in Britain.) It seems highly probable that both these parasites have followed in the wake of the invading saw-fly, particularly as observation of material from the locality from which it was suspected that the latter had flown has shown that the tachinid at all events is exceedingly abundant there.

It is impossible as yet to have direct proof of the efficacy of these two parasites in warding off defoliation in the areas in which they have so opportunely appeared, but it is very reasonable to suppose that, here and elsewhere, they will prove to be important enemies of the large larch saw-fly.

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#### Mackerel and Calanus.

REFERRING to Prof. Herdman's interesting observations upon the above (NATURE, July 17), I may perhaps mention that the mackerel-drifters, when fishing upon the usual grounds around Scilly and in the Bristol Channel, are largely influenced in their selection of a suitable position by the finding of so-called "yellow water." This condition of the sea in the area under consideration arises from the presence of vast shoals of Calanoids—e.g. *Calanus finmarchicus*, *Pseudocalanus elongatus*, &c.—which impart a yellowish tint to the surface of the water. The

sporadic distribution of such copepods, moreover, is often somewhat remarkable; the fishermen state that it is possible at times to observe the entire extent of a "splat" of "yellow water."

The presence of mackerel is generally to be expected in water of this character, but heavy catches are not invariably made in it. G. E. BULLEN.

The Hertfordshire Museum, St. Albans.

#### THE FUTURE OF OIL FUEL.

THE position of liquid fuel has increased in importance far beyond any expectations its most enthusiastic advocates of but little more than a decade ago ever dreamed, due to the rapid advances made in its use in internal combustion engines. The success of engines of the Diesel type, which can employ crude oil or heavier residues after the lighter fractions of the crude oil have been removed for other applications, has furnished the completing link in the use of oil in such engines. With the petrol engine, slow-speed oil engines working on ordinary burning oil (kerosene), and the Diesel and semi-Diesel engines, high efficiency is now assured with any fraction of the natural oil.

The importance of liquid fuel and the certainty of its more extensive use in the Navy rendered it imperative that the whole question, especially that of supply, should receive consideration, and led to the appointment of the Committee now sitting. The advantages of oil fuel for steam raising were dealt with fully in these columns so far back as 1902 (vol. lxvi., p. 186), when oil fuel was in its early trial in the Navy.

The present general position and future policy of the Admiralty were outlined by Mr. Churchill in a reassuring speech before the House of Commons on Thursday last. Whilst the crude oil output for last year was nearly 50,000,000 tons, Naval requirements were met by fewer than 200,000 tons, and the Admiralty have assured themselves of obtaining all requirements in time of war, so long as British command of the sea is maintained.

This necessarily involves obtaining supplies by suitable contracts, and drawing specially upon supplies under British control, which is now possible from the Mexican fields. A far-reaching step in national policy is the further proposal to establish an oil refinery, so that crude oils may be dealt with as they come cheaply into the market. It is not only essential to have some measure of control of the supply at its source; it is equally essential to provide ample storage and transport facilities. The former has been arranged for on a large scale in this country and throughout the Empire, and by the end of 1914 the Admiralty will possess thirteen transport steamers, the five largest of which have a carrying capacity considerably greater than the quantity of oil fuel consumed throughout the fleet last year.

In connection with the subject of oil fuel, three Cantor lectures recently delivered by Prof. Vivian B. Lewes before the Royal Society of Arts<sup>1</sup> are of especial interest. The first lecture was

<sup>1</sup> Journal of the Royal Society of Arts, May 23, 30, and June 6, 1913.