

first fish to be investigated, 15 years ago, and much has been learned from rearing young plaice in tanks and ponds from eggs collected at sea. The best conditions of temperature, salinity, light, water exchange and quantity of food have been investigated for plaice. As a result 400,000 were produced in 1965 until they were large enough to take to the bottom of the sea as adult flat-fish. In the future, however, it is likely that sole will be cultivated more widely than plaice, as it is more valuable, the young grow readily and the adults adapt to tank life and can be induced to spawn. This fish favours a warm temperature and is therefore suitable for cultivation in the heated sea water which is put out by power stations. Dr Cole suggested that within ten years sole production at these power station sites will be in full swing, and turbot and brill are likely candidates for the same treatment. Some shellfish also need warm water and can be grown in these warm water wastes.

Oysters of the *Ostrea edulis* variety were once common in estuaries around Britain, but successive pests and floods have reduced the breeding stock to such an extent that any recovery of the oyster industry will depend on successful artificial rearing. Fifty years of slow but steady progress in artificial breeding at Conway led to commercial scale techniques being used four years ago and a commercial hatchery now being built in South Devon is likely to produce a steady supply of young oysters. New Zealand and Japanese oysters are being investigated, as are American clams. The latter can be planted on the shore at the age of 1-1½ years, but must be protected from crabs by plastic mesh until they grow to an inch in diameter. After four years they are large enough to be marketable.

The English prawn is another suitable species for artificial cultivation, despite its cannibalistic tendencies, and a habit for producing eggs rather than getting fat. As with all other artificially reared fish, the feeding problem for shrimps has yet to be completely solved. The brine shrimp *Artemia* is a useful food source for many kinds of fish, but attempts are being made to produce a protein based artificial food. Waste fish flesh and poultry offal may provide the basis of the substance, which must be soft. Attempts are also being made to find a palatable fish which is herbivorous. Grey mullets and the freshwater *Tilapia* are two possibilities, but as yet there is little demand for these varieties.

Parliament in Britain

Nationalized Industry Research

THE programmes of the National Coal Board provide for estimated expenditure on research and development in the current financial year of £5 million. The Gas Council and Boards will spend £5,650,000; and the Electricity Council and Boards £10,650,000. The National Coal Board in 1966 employed 356 qualified staff on research and development, and the Gas Council and Boards 340; in the current year the Electricity Council and Boards employed about 900. The figures were given by Lord Winterbottom concluding a debate for the Government on February 14.

Atomic Energy Authority

DR J. BRAY, Joint Parliamentary Secretary, Ministry of Technology, stated that the Atomic Energy Authority aimed to achieve cuts of £3.5 million in 1968-69

in the cost of their civil research and development programme principally by some reduction in capital expenditure and by some run down of manpower. The balance of the cut would be met by limiting extramural research and development contracts. The effect of the cut of £6 million in 1969-70 was still being studied by the authority. (Written answer, February 12.)

Scientific Officers

THE Minister of Technology, Mr A. Wedgwood Benn, gave the average age on January 1, 1968, of officers in each grade of the scientific officer class employed in the Ministry's Research and Development Establishments as: chief scientific officer, 52; deputy chief scientific officer, 50; senior principal scientific officer, 47; principal scientific officer, 45; senior scientific officer, 33; and scientific officer, 26. The Minister of Defence for Administration, Mr G. W. Reynolds, gave the corresponding figures for scientific officers in the Ministry of Defence's establishments: 54; 45; 48; 46; 36; 26. (Written answers, February 12.)

Chemical Defence

THE Minister of Defence for Equipment, Mr R. Mason, stated that the work of the Chemical Defence Experimental Establishment was directed towards research on defence against chemical warfare, but some of the work of the establishment had found applications in medical science. Such benefits included the investigation of the mode of action of several toxic compounds leading to the development of measures for treating intoxication; the development of an antidote to poisoning by organophosphorus insecticides (a service providing advice and first-aid treatment had been maintained since 1960); the development of aids to therapy, such as an automatic injection device and a portable resuscitator which is used by fire brigades and other rescue services; the investigation of the structure of the skin and the processes of skin penetration; and the investigation of the nature of the alveolar lining of the lung. Mr Mason later gave the number of qualified engineers and scientists working in defence research and development establishments on December 31, 1967, as 2,838 compared with 2,612 on December 31, 1964. (Written answers, February 13 and 14.)

Protein from Leaves

MRS SHIRLEY WILLIAMS, Minister of State at the Department of Education and Science, stated that the Rothamsted Experimental Station is carrying out research on the extraction of protein from the leaves of crop plants. Figures for the extractability of leaf (including tree-leaf) protein from many parts of the world were now being published. These were not strictly comparable because of differences in the techniques of grinding and pressing. Measurements of the extractability of protein from local crops were an essential prelude to any attempt to make leaf protein for use as a food in regions of protein deficiency. Unexpected differences had been found in the nutritional value of protein preparations. The effects of variations in the technique of precipitation, filtering and processing or drying the protein would be studied and the National Institute for Research in Dairying and the Rowett Research Institute would co-operate in measuring the nutritional value of some of these products. (Written answer, February 13.)