hensive studies have been made of the distribution of various species of the plankton fauna in the Southern Ocean and in the Benguela Current. An interesting feature is the tendency for populations of different species of zooplankton to be segregated in concentric circumpolar zones. A technique for obtaining underwater photographs of squid has been developed and used successfully at depths of 300–1,000 m.

Work has been continued on the distribution and life cycles of whales, a knowledge of which is required in formulating international regulations. An investigation is being made of two alternative methods of age determination in baleen whales: by the laminations in the ear plugs and from the accumulated corpora albicantia in the ovaries. A comprehensive paper has been published on the biology of sperm whales, and a study of ambergris is in progress. Work is also being done on the geographical distribution of the various species of whale and their movements between one ocean area and another.

R.R.S. *Discovery II* was kept in full commission throughout the year, although for three months she was on hire to the Admiralty and so not employed

on the Institute's research programme. For six weeks in July–August 1956 the ship was lent to the Department of Geodesy and Geophysics of the University of Cambridge, for a cruise to the Mid-Atlantic Ridge, which included seismic studies and measurements of heat flow through the sea bed.

The Institute has continued to be directed by Dr. G. E. R. Deacon with Dr. N. A. Mackintosh as deputy director. Its total staff is about eighty (excluding the officers and crew of *Discovery II*), of whom thirty-six are in the scientific and experimental officer grades. In addition, seven visiting scientists from overseas were working in the Institute during the year. The expenditure on the year's work amounted to £193,000, of which £78,000 was for running *Discovery II*. The main source of income was £110,000 in grants from the United Kingdom Government. Commonwealth Governments contributed £9,000. The Treasury has decided to increase its grants to £175,000 per annum for the next five years and this should go a long way towards ensuring the further development of the Institute's research programme.

K. F. BOWDEN

OPENCAST MINING

THE Opencast Coal Bill, which had an unopposed second reading in the House of Commons on January 22, is a complicated Bill which replaces the powers at present exercised under Defence Regulations by a system of planning control, acquisition and compensation incorporating some of the main points made in the Franks report. It provides that no opencast operations can take place without the permission of the Minister, who will, in his consent, insert conditions ensuring that damage is reduced to the minimum, and, when agricultural land is affected, that the land be restored to a reasonably fit state for agriculture.

It is intended to proceed wherever possible by agreement, and the compulsory rights order when used will give the Coal Board the right for a maximum of ten years to use the land for opencast mining. In moving the second reading, the Paymaster-General, Mr. R. Maudling, said there would be a continuing need for opencast coal for a considerable period: about 160 million tons of coal had been produced by this method from 109,000 acres, 13.5

million tons of this in 1957, and the need was generally but reluctantly accepted by the House; though Mr. Maudling, and Mr. A. Robens for the Opposition, alike recognized the damage done to amenity and agriculture and our duty to hand on the land in a better and not a worse condition.

While Mr. G. Nabarro condemned opencast mining generally but supported the Bill, Mr. M. Philips Price and Mr. R. Speir pressed more specifically for safeguards and greater attention to amenity both in mining and in restoring the land. In replying on the debate, the Parliamentary Secretary to the Ministry of Power, Sir Ian Horobin, urged that, given the need for opencast mining, while the provisions of the Bill were not perfect, they were probably the best we could make. The vital question of amenity had not been overlooked and would be permanently in the minds of the Ministers who had to administer the Act. Improvements could possibly be made during the Committee stage and compensation would no longer be arbitrary.

ANIMAL HEALTH IN GREAT BRITAIN

ANYONE interested in the health of domesticated animals and in their transit to and from Great Britain should read the "Report on the Animal Health Services in Great Britain 1956" (H.M.S.O., London, 6s. net), which includes a report on proceedings under the Diseases of Animals Act, 1950. The outstanding features of the report are, on the debit side, the high incidence, during 1956, of foot and mouth disease and anthrax, and the increase of fowl pest; but these liabilities were offset by the steady progress of the Ministry of Agriculture's scheme for the eradication of tuberculosis from cattle in Great Britain, by the demonstration by the Ministry's veterinarians in the Isle of Wight that warble fly

disease can be substantially reduced by co-operation between the veterinarian and the farmer, and by the evidence provided in the report of the very wide range of research that is being devoted to the diseases of domesticated animals.

The year 1956 was the worst year for foot and mouth disease since the widespread outbreaks of 1951 and 1952. In 1956 there were 162 outbreaks, but these were confined to England and Wales. Of the 162 outbreaks, thirty-two, which had no known connexion with other outbreaks, were attributed either to swill or to imported meat, bones or meat wrappers, and it was concluded that the disease came from the Continent. It was necessary to slaughter 10,547

cattle, 13,123 sheep, 4,793 pigs and 42 goats, and compensation paid amounted to £824,658.

Anthrax also increased during 1956, although the average mortality from this disease continued to be very low. The disease was very widespread and Yorkshire was especially severely affected. Circumstantial evidence suggests that the outbreaks were caused by imported concentrated foodstuffs, though the infection could not be traced to any particular ingredient of these.

Swine fever, on the other hand, showed a decline of nearly 50 per cent during 1956, when there were only 741 outbreaks, the lowest figure since 1950. In November 1956, the Swine Fever (Infected Areas Restrictions) Order came into force, the object of which is to make possible the speedy imposition of restrictions on the marketing and movements of pigs in areas in which swine fever is prevalent. Fowl pest increased during 1956 and involved the destruction of 1,205,181 birds and 1,005,023 hatching eggs at a cost of £1,371,710 in compensation. Of the 956 outbreaks of this disease, 550 occurred among the dense poultry population of Lancashire, while 121 occurred in Lincolnshire and 84 in Essex; but twenty-one English counties and the whole of Scotland were free from this disease.

A review of suggestions for the control of warble fly led to the conclusion that, until a dressing can be found that will kill the maggots of this fly while they are in the bodies of cattle, the only method of control is to achieve greater compliance with the Warble Fly (Dressing of Cattle) Order of 1948, and a campaign for this purpose was conducted, which included the showing of a film and announcements by poster, in the Press and on the radio. The fine summer of 1955 favoured the laying of eggs by the warble fly on the hairs of cattle, and measures were taken to meet the expected increase in 'warbles' which occurred in 1956. There are in the Isle of Wight about 600 herds of cattle, and the report shows that, as a result of the work of the Ministry's veterinarians, the numbers of herds in the island completely free from warble infestation were 97 in 1954, 374 in 1955 and 500 in 1956, with a corresponding reduction each year in the numbers of individual animals affected. A considerable degree of control has thus been effected by means of effective dressings applied at the

right time and by co-operation between the veterinarians and the farmers.

An important section of the report describes the good progress that has been made towards the complete eradication of tuberculosis from British cattle. The Tuberculosis (Attested Herds) Scheme, started in 1935, is entirely voluntary, and the report shows that, by the end of 1956, there were 7 million attested cattle in Britain, representing 67 per cent of the total. A map shows the attested areas in the west of Scotland, the Lake District and south and mid-Wales as they existed on January 1, 1957, and the areas in which free tuberculin tests have been available in 1955 and 1956. These include north Wales, an area south of the Lake District and the counties between the Devon border and the east coast of Kent. The testing of cattle is supported by veterinary detection of tuberculous cows liable to infect the milk supply, though these are now rarely found.

Another section of the report describes the work being done on the incidence of *Brucella melitensis*, which causes human Malta fever in the Mediterranean area. This organism has been found either in milk or in the aborted fetuses of cows, on forty-two farms in Britain, but there is no evidence that it has ever caused human illness in the United Kingdom. The slaughter of cattle infected with it has therefore been discontinued. It is not known why this organism, which is a near relative of *Brucella abortus*, the cause of contagious abortion in cattle (Bang's disease), should cause human illness in the Mediterranean area but not in Britain.

The very detailed regulations designed to protect animals in transit to and from the United Kingdom are emphasized in the report, which discusses, with valuable statistics, the export and import of horses, asses, mules, pigs and cattle. A Government inquiry into the export of cattle to the Continent was initiated in 1957, from which developments may be expected in the next report.

The report also describes the wide range of research that is going on at the Ministry's centres of research and veterinary investigation. This research includes studies of every disease or infection that may be encountered in Britain and some that are found elsewhere.

G. LAPAGE

REDUCTION OF ORGANIC HYDROPEROXIDES BY MICRO-ORGANISMS AND ANIMAL TISSUES

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DURING the course of investigations of the bactericidal and bacteriostatic action of organic hydroperoxides, it was observed that 0.01 per cent solutions of several hydroperoxides, including *t*-butyl, *p*-menthane and cumene hydroperoxide, in nutrient media, inhibited the growth of *Escherichia coli* and *Bacillus subtilis* only temporarily. Analysis of the cultures showed that the hydroperoxide had disappeared less than 24 hr. after growth began. The known peroxide-decomposing enzymes, catalase and peroxidase, are not reported to decompose the peroxides employed here, but only methyl and ethyl

hydroperoxides in addition to hydrogen peroxide itself, and it therefore appeared to be of interest to investigate this reaction further.

The concentration of hydroperoxide in bacterial cultures was determined directly with a manual polarograph, using a voltage of 1.0 V. vs. sat. calomel electrode; calibration curves showed that the waves for all the peroxides employed were fully developed at this voltage. Bacteria were grown on the surface of tryptone-glucose-yeast extract agar, harvested in 0.1 M pH 6.9 phosphate buffer, centrifuged down, and resuspended in fresh phosphate buffer.