

this up. A serious difficulty to be overcome is the prevalence of piracy. Although registration and licence fees in Bombay amount to only ten rupees a year, it is believed that about fifty per cent of the listeners-in are 'pirates'. As many modern sets work without an aerial, it is particularly difficult to bring the pirates to book. An officer has power to inspect and search houses and a severe penalty is exacted, but the evil still exists.

#### An Alternative to the Severn Barrage

IN supplying electrical energy economically, it is very desirable that all the machines in use should be running as nearly as possible continuously at their full load. The overhead costs divided by the output will thus be a minimum. If the machinery were only to run for one hour per day at full load and for 23 hours per day at a tenth load, nine-tenths of the machines would be lying idle most of the time. If a cheap method of storing electrical energy could be invented, we could effect great economies by having only a few machines, all of which would run fully loaded. In an article in the *Times* of August 24, Mr. J. W. Meares criticises the Severn barrage scheme from this point of view. Between the ebb and flow of the tide there are periods when the turbines must necessarily be inactive, and hence the load on them would be far from being continuous. The chief item in the cost of the scheme is the dam itself. Provision would probably be made for utilising the fortnightly spring tides, and so the load would have a fortnightly fluctuation superposed on the usual twice-a-day one. Mr. Meares suggests that, without using the tides at all, a great deal of electric energy might be generated and stored at some of our steam driven stations. All that would be necessary is to use them to pump water to some elevated reservoir, one situated on a hill for example. At times of peak load this water could be used to drive turbo-electric sets, the electricity generated being transmitted to help supply the load. At first sight it appears a much cheaper method of helping the national supply than utilising the tides. In many cases also the necessary works could be completed in a fraction of the time required for the Severn barrage. It is satisfactory to remember that when the price of coal gets much dearer, we have always tidal power in reserve.

#### Electric Lighting in the Isle of Man

IN 1928 a commission was appointed to inquire into the best methods of supplying the Isle of Man with electric light and power. This resulted in the appointment of an Electricity Board in 1932 to carry out a scheme of supply which is not unlike that adopted in the English 'grid'. The scheme covers the whole of the island except 17 square miles supplied by the Douglas Corporation. It consists broadly of an overhead ring main at 33 kilovolts from which tappings can be taken for the consumers. According to the *Electrical Times* for August 10, the first part of the line was inaugurated on August 3. Considering that the first pole of the line was erected on April 18, this shows how expert

electricians have become in overhead construction. There are now approximately seventy miles of steel-cored aluminium conductors erected. The supply is taken from the Douglas Corporation works, the supply being stepped up from 3,300 to 33,000 volts at a sub-station before it comes to the high tension ring main. The overhead lines are carried on creosoted fir poles, but H poles are used in special positions. Although the lines operate at 33 kilovolts, they satisfy the British Standard Specification for 66 kilovolts. The low-tension substations connected with the ring main supply consumers at 400 volts for power and 230 volts for lighting. The normal span adopted between poles is 400 feet but in a few cases it was necessary to resort to much longer spans on account of the contour of the ground and way leave difficulties. The longest span of 1,013 ft. is at the well-known Laxey Glen. The supports on each side of this span are three poles, each pole carrying one of the three phase conductors.

#### Synthetic Corundum for Jewel Bearings

IN 1904 Prof. A. Verneuil published an account of his successful experiments on the artificial reproduction of ruby. He pointed out at the time that his method of crystallising was of considerable commercial interest, but at first most attention was paid to producing decorative gems. The watch-making industry was the first to adopt these gems for the bearings in watches. Their uniform colour and moderate price have led to their general adoption in this industry. In a paper on "Synthetic Corundum for Jewel Bearings" by E. G. Landmeier, published in the *Journal of the Institution of Electrical Engineers* for May, a description is given of the manufacturing processes used in the production of rough synthetic corundum and of jewel bearings for electric meters and other measuring instruments. A description is also given of the methods now used for the synthesis of sapphire. It was stated that it is difficult to obtain natural stones as hard and as uniform as synthetic ones. A few years ago, practical men found it difficult to believe that synthetic stones grown in the chemical laboratory in a few hours could equal natural stones. It has to be remembered that special processes have now made it possible to obtain for the synthesis of corundum raw material of the highest purity, which is only rarely found in Nature. Numerous photographs are shown illustrating the effect of a rotating pivot on the jewel. Communications from several engineers discussing the author's conclusions are published at the end of the paper. Manufacturers of meters apparently are not yet agreed as to the relative lengths of the lives of the synthetic and natural jewel bearings.

#### World Oil Production

THE Petroleum Economics Division of the United States Bureau of Mines has recently published results of its annual statistical survey of the world crude petroleum production for 1932 (Mineral Market Reports No. 183). During this year the total amount produced was 1,305 million barrels, representing a

decrease of nearly 67 million barrels, or 5 per cent, of the total recorded for the previous year. The analysis of production by countries is interesting. For example, in 1930 the second largest producer was Venezuela, while in 1931 Russia came second on the list, the United States taking as hitherto prior place. In 1932 the production of Venezuela still further decreased, Russia again taking second place to the United States, the total output of which was 781 million barrels, or about 60 per cent of the world's total. Of the British Empire resources, Trinidad is tenth on the list with a production of 10 million barrels. British India was responsible for 8 million barrels; Sarawak for a little more than 2 million barrels; Egypt for  $1\frac{1}{2}$  million barrels; Canada for 1 million barrels, a noteworthy decline. The output of oil from Persia showed an increase over the previous two years with a total of 49 million barrels, while that from Iraq remained much the same at a little less than 1 million barrels. It is probably safe to say that the general decrease in production for the year of some 67 million barrels is due rather to such measures of conservation as may have been satisfactorily adopted and also to general marketing conditions, rather than to any noteworthy decline in the actual natural resources of petroleum.

#### Forecasting Rainfall in Queensland

MANY parts of Australia lie on the marginal zone in which the rainfall is sufficient in good years but in bad years drops below the level required to maintain the pastures. Disastrous droughts have occurred from time to time in the past, and may be expected to recur in the future, but hitherto no satisfactory method of forecasting them has been found. Mr. Inigo Jones, director of the Bureau of Seasonal Forecasting in Brisbane, has been investigating the problem, and as a basis for study, he has collected all the available long records of rainfall in Queensland, including 159 stations, which he has published in the form of monthly tables. The lines on which Mr. Inigo Jones is attacking the problem of foretelling these droughts are set out in another pamphlet, entitled "Seasonal forecasting" (Brisbane, 1932). He believes that the weather of Australia is dominated by solar influences, but that these cannot be expressed simply and directly by the sunspot curve. In some way the solar activity is governed by the revolutions of the planets, resulting in a multiplicity of cycles, but the author's ideas on the subject are vague. This would not matter so much if the meteorological data were handled scientifically, but he proceeds to "prove" this hypothesis by picking out the occasions on which the facts agree, more or less, with the theory. Perhaps a more thorough test is now in progress, based on the extensive rainfall data for Queensland referred to above. It may be remarked that one result of the planetary hypothesis is that the main sunspot cycle should be the period of Jupiter, 11.86 years, but the meteorological evidence is almost wholly in favour of the shorter cycle of just over 11 years, as shown, for example, in the fluctuations of level of Lake George in Australia (NATURE, 112, 918, Dec. 22, 1923).

#### The Collecting Net

THE *Collecting Net* is a flourishing weekly publication belonging exclusively to the biological institutions of Woods Hole. Nos. 1 and 2 of vol. 8 (July 1 and 8, 1933) are now before us. The purpose of the journal is to assemble material of special interest to workers in the Marine Biological Laboratory, the Woods Hole Oceanographic Institution and the United States Bureau of Fisheries. The editorial contents are divided into four parts: results of the scientific work reported during the summer of Woods Hole; items reporting the activities of members of the scientific institution of Woods Hole; worldwide news of the activities of institutions and individuals working in the field of biology; the more important local news. There is a directory for 1933 containing the names and addresses of investigators in the laboratories beside short articles on various researches and apparatus and laboratory notes. Interesting accounts of the Scripps Institution of Oceanography and of the Biological Laboratory of Cold Spring Harbor are written by their respective directors, Dr. Thomas Wayland Vaughan and Dr. Reginald G. Harris. The annual subscription is only two dollars and the magazine is well printed and illustrated.

#### Marine Studies in South Africa

REPORTS 8 and 9 of the Marine and Biological Survey of the Union of South Africa for 1929-31 include two special reports as well as a large collection of important fishery statistics. The latter is the result of extensive investigation over the 2,500 miles of coast from St. Lucia Bay to Walvis Bay. In a valuable paper on the "Post-Brephalus Development of South African Macrura", W. von Bonde describes the various phyllosoma and puerulus larvæ of the Palinuridæ, Panuliridæ, and Scyllaridæ of this region. The work is well illustrated, and contains interesting notes on the development of the nervous system. It is unfortunate that the method of describing larvæ from the plankton samples does not permit of identification of species. Much experimental work on these lines remains to be done. In the second paper, on "Hydrographical Investigations in South African Seas", J. M. Marchand makes a survey of the variation in temperature and salinity throughout the years 1929-31. He notes the effect of the Mosambique and Benguela currents on the coast of the sub-continent, but it is naturally impossible at present to make more than very broad generalisations when working over such a large area.

#### Marine Biological Station at Ghardaga

THE faculty of science of the Egyptian University has issued a report in English for 1931-32 containing a description of researches by members of the staff and a somewhat detailed account of the marine biological station at Ghardaga, which is situated on the edge of a group of extensive coral reefs. Corals of hundreds of different species, especially Madreporaria and Alcyonaria, cover the edges of most of the reefs to a depth of 5-6 fathoms and are in such