# DRY FUEL FORESTS OF THE MADRAS PROVINCE

A SMALL illustrated monograph written by Mr. A. L. Griffith, I.F.S.* provincial sylviculturist, Madras, merits the close attention of the administrative and forest officers in West and East Africa.

A century ago in the 1830's and 1840's Madras was passing through some regrettable and painful forestry experiences. The administration for four decades had had no belief in the necessity of a forest policy or in forest protection ; and the people naturally wanted neither. Whilst, therefore, during the first half of the nineteenth century the finest teak forests or the most accessible at that time were despoiled, the larger areas of forest situated in the central and eastern regions—what are termed here the dry fuel forests (savannah or bush in Africa)—were regarded as of no value and the population allowed to cut, burn and overgraze them, as in the past. Even when the Government realized that some form of protection should be given these areas, they were not regarded as 'forests' or placed under the then existing Forest Department. The idea grew and persisted that the work of the forest officer should be confined to the management of marketable timber forests only—an idea which has resulted in irretrievable harm to much forest and has caused the disappearance of large areas both of 'timber forest' and 'dry fuel' or 'bush' forests. Mr. Griffith writes : "The dry fuel forests of the unreserved, waste lands and panchayat forest" (in which the administration at one period placed such a childish faith) "have either completely disappeared or are very rapidly disappearing due to the ravages of man and his animals, chiefly goats." Some of Mr. Griffith's predecessors were writing nearly identical words almost exactly a century ago ; the country, be it remembered, being at that period much less developed and the population and their animals very much less numerous.

At the present day we are told that the dry fuel forests of Madras are one of the most important types occurring in the Province, and in reserved forest alone they consist of roughly 900,000 acres with an annual cut of approximately 30,000 acres which produces an annual revenue of Rs.400,000. This type, says the author, occurs in twenty-two out of twenty-eight districts, and the general climate has an average rainfall of from 10 to 35 in., most of this precipitation coming from the north-east monsoon in October and November. Apart from this rainy period the rest of the year is generally very dry and very hot. These forests are essentially 'local' forests, and supply the needs of the local villages with fuel, agricultural implements, small building timber, grazing, etc.

What is the difference between this 'type' and that of the large areas of so-called savannah or bush in Africa, upon which the people equally depend in one way or another for the chief ingredients of existence ? Yet in Africa, by many of the administration at least —and probably not a few forest officers (all brought up in the belief)—savannah or bush was until quite recently not regarded as forest or as meriting or requiring any attention. That the recognition of the value of the type took upwards of a century in Madras is surely no reason for wasting so long a period and making the same mistakes in Africa. The following brief extract from the monograph, which must be read to be fully appreciated, may be considered :— "These areas which are in the reserved forests are worked in general on a thirty-year rotation, now in many cases being raised to forty years, by the system of simple coppice. At each coppicing the mortality of stools is 5–10 per cent and this is not being replaced by natural regeneration.

"*Hence the improvement and maintenance of these forests by artificial regeneration is an absolute necessity*" (italics are the author's).

During the past ten years it has been shown that this artificial regeneration can be done with a certainty of success and at a reasonable cost even under the poorest conditions by the 'rab' method, and at practically no cost at all by the '*rab-kumri*' method, that is in conjunction with field crops (shifting cultivation).

* "Note on the Artificial Regeneration of the Dry Fuel Forests of the Madras Province" (*Ind. For. Rec.*, Silvic. (New Series), **3**, No. 8. New Delhi, Govt. of India Press: 1940).

# STEAM HEATING OF BUILDINGS

SO long ago as 1653, Sir Hugh Plat, of London, heated glasshouses with steam from a cast-iron pot placed outside. This is described in his book on horticulture, "The Garden of Eden". James Watt is believed to have used in 1784 the first elementary steam radiator. It was fitted in his study and consisted of an iron box with connecting pipes through which steam was passed from boilers. In 1825, Matthew Murray, of Leeds, the well-known competitor of James Watt, heated his house, which was locally known as "Steam Hall", by means of exhaust steam from the engine of his adjoining works. Meanwhile, in 1804, Oliver Evans in the United States had mentioned in one of his patents the use of exhaust steam from engines for heating.

An interesting article by David Brownlie, which deals specially with steam heating in the United States begins in *Engineering* of September 5. He points out that from the technical and scientific point of view, one of the most serious defects of modern civilization lies in the fact that the condensing steam engine and turbine still lose some 55 per cent of the total heat in the coal, or other fuel, in the condenser. Even more serious is the use of the non-condensing engine, of which a particularly bad example is the steam locomotive operating at a thermal efficiency of no more than 6–8 per cent. Now experience with thousands of plants, mostly relatively small, has shown that great economy in fuel can be obtained by employing back-pressure or pass-out engines and turbines and utilizing the exhaust steam for heating and process work. The actual thermal efficiency under average conditions is thus raised to 65—75 per cent by the reduction or elimination of the loss of latent heat.

The exhaust steam can be used directly in individual establishments or by what is popularly termed 'district heating' In general this means the supply of steam or hot water by means of long-distance pipe lines for the heating and general service of all types of buildings extending over a whole district or part of the area of a town.

The re-organization and improvement of the whole fuel system of Great Britain is long overdue, and one of the most important requirements is an extensive development of district heating. To indicate the possibilities in this direction the author first discusses the two chief countries in which district-heating is employed, namely the United States and the U.S.S.R. An important point, the significance of which has not yet been generally realized, is that most of the heating in the United States and all other countries except the U.S.S.R. is carried out on thermally inefficient lines by live steam, and not by the exhaust steam, so that the total power generated in the heating stations is very small. Russia is the only country that has developed district heating upon an extensive scale by using exhaust steam from public supply electric power stations.

In the United States there are at the present time about 175 district heating companies in operation, probably supplying more than 35,000 million pounds of steam per annum. This represents only a small proportion of the total heat used in the domestic field, which requires more than 100 million tons of coal (anthracite and bituminous) per annum in addition to large amounts of oil, natural gas, coke and other fuels. District heating was made a commercial success in 1877, at his house in Chestnut Avenue, Lockport, New York, by Birdsill Holly, who founded the first steam heating company, known as the Holly Steam Combination.

The largest district heating system in the United States at present is that of the New York Steam Corporation. In 1882 the first heating station was put into service at Cortlandt Street in the Broadway area, supplying steam at 80 lb. pressure through three miles of mains. The present total length is equivalent to about ninety miles of 12 in. pipe. It has five heating stations all operated on modern steam-driven power-station lines, the largest being the Kips Bay plant at 35th Street on the East River. The pulverized-fuel equipment for the five boilers at Kips Bay consists of seven mills in an adjoining building with a total duty of 160 tons of bituminous coal an hour. An important feature of the equipment is the softening plant dealing with New York town water.

The ninety miles of mains interconnecting the five stations are of lap-welded steel with welded flanges and corrugated copper expansion joints, and numerous draining stations, capable of operating, if necessary, at 250 lb. per sq. in. pressure. Most of the insulation is 85 per cent magnesia, in blocks 2 in. thick, with canvas and tarred felt outer covering. The mains are generally laid below the pavements in concrete and tile conduits with cast iron covers, the space between the mains and walls and floor of the conduit being filled with loose slag wool.

# ANTARCTIC DISCOVERIES

## BY PROF. R. N. RUDMOSE BROWN

SOME preliminary accounts of the important discoveries of the United States Antarctic Expedition, 1939–41, under Rear-Admiral R. E. Byrd, are published in the *Geographical Review* of July, in an article by Lieut.-Commander R. A. J. English, U.S.N. The vessels of the expedition, *North Star* and *Bear*, reached the Bay of Whales on the Ross Ice Barrier on January 11, 1940. A base to accommodate thirty-seven men was set up on the barrier within a few miles of Admiral Byrd's old base of Little America. The *North Star* then left to establish the east base for sixteen men in Marguerite Bay on the west coast of southern Graham Land. There she was joined by the *Bear* and when the unloading was completed the two vessels left for the United States not to return until the early months of 1941, when both bases were evacuated and the whole expedition left for home.

The year in the Antarctic was well used in sledge journeys and in flights. Between Charcot Island on the east and the Ruppert Coast of Marie Byrd Land there was a gap in the known coast-line of Antarctica extending over some seventy degrees of longitude. To the south of the unknown coast-line Ellsworth had established continuity of ice-covered land with many peaks in his trans-antarctic flight of 1935. Light was thrown on this problem by flights from the *Bear* on her journey from the Bay of Whales to Graham Land, which was approximately along the parallel of 70° S. There were several short but important flights. A flight along the Ruppert Coast to about long. 135° W. revealed a coastal range about 4,000 ft. in height, snow-covered but with rock exposures near the coast. Far to the south the peaks of other ranges were seen. From lat. 70° 58′ S., long. 105° 33′ W. a flight southward again revealed such ranges lying parallel to the coast. Lastly, a flight from lat. 70° 4′ S., long. 95° 19′ W. confirmed the impression of the last flight of a mountainous peninsula immediately to the west, and the main coast-line was found to extend eastward in about lat. 73° S. These flights have thus filled in the coast-line south of the Pacific except for a stretch of some three hundred miles between long. 115° and 122° W.

The general arrangement of the mountains in this section of Antarctica would appear to be a series of ranges more or less parallel with the coast. The Rockefeller Mountains seem to be the western end of a long range broken by many glaciers pouring northward from the high plateau of Marie Byrd Land. The highest peak discovered was Mount Hal Flood, over 10,000 ft. in altitude, in lat. 76° 4′ S., long. 135° 50′ W. Farther eastward there were sighted bare coastal mountains towards which the interior plateau fell. These coastal mountains extended at least as far as long. 133° W. They suggest