

calculated after Chapman, for the latitude of Calcutta, by assuming that the ionisation is caused by the ultra-violet radiation of the sun. This assumption was justified by results of observations made during the total solar eclipse of August 1933, when the  $E$  ionisation was found to fall to a minimum value a little after the centre of the eclipse, as predicted by theory<sup>6</sup>. No indication was obtained of the so-called 'corpuseular eclipse' which was due about two hours before the optical eclipse.

The normal variation of ionisation caused by the varying obliquity of the sun's rays was very often disturbed by other causes, the chief among which in Bengal in summer months was thunderstorm. Such storms were of frequent occurrence in the months of April-September and were found to increase abnormally the  $E$  region ionisation<sup>7</sup>. This confirms the view of C. T. R. Wilson that the electric field of a charged thundercloud is capable of affecting the ionosphere, either directly by discharge or indirectly by shooting up high-speed electrons. It was found in this connexion that, of the abnormal increases of ionisation observed, the daytime increases were related to thunderstorms and the night-time increases to magnetic storms. Observations during the Leonid meteoric shower showed that the meteors by their

bombardment could increase considerably the ionisation of the upper atmosphere<sup>8</sup>.

Study of the absorption of radio waves during thunderstorm months had shown that the wavelength of the longest wave which could be reflected from the  $E$  region varied in a regular manner from sunrise to sunset, and did not follow the sudden and erratic outbursts of variation caused by thunderstorms<sup>9</sup>. This showed that during daytime an absorbing region of the ionosphere is formed which is distinct from the usual 'reflecting' region.

In conclusion, stress was laid on the fact that in order to make the ionospheric researches most fruitful, it is essential that there should be close co-operation between workers in different parts of the world. The need of a co-ordinating body in India like the Radio Research Board of England was also emphasised.

<sup>1</sup> H. Rakshit, *Phil. Mag.*, **12**, 897 (1931).

<sup>2</sup> G. R. Toshniwal, *Proc. Nat. Inst. Sci. India*, **1**, 243 (1935).

<sup>3</sup> L. C. Verma, S. T. Char and A. Mohammed, *Proc. Inst. Rad. Eng.*, **22**, 906 (1934).

<sup>4</sup> S. R. Khastgir and B. Sen Gupta, *Sci. and Culture* (Calcutta), **1**, 301 (1935).

<sup>5</sup> H. Rakshit, *Phil. Mag.*, **18**, 675 (1934).

<sup>6</sup> S. K. Mitra, H. Rakshit, P. Syam and B. N. Ghose, *NATURE*, **132**, 442 (1933).

<sup>7</sup> J. N. Bhar and P. Syam (in the press).

<sup>8</sup> S. K. Mitra, P. Syam and B. N. Ghose, *NATURE*, **133**, 533 (1934).

<sup>9</sup> P. Syam, *Ind. J. Phys.*, **10**, 1 (1936).

## French Statistics\*

WE have received a copy of the "Annuaire Statistique" of France for 1934. This large volume contains a wide range of statistics on every branch of French life. The first part gives the annual tables for 1932, 1933 and in some cases 1934, of territory, vital statistics, education, health, production, transport, trade, finance and many other aspects. The second part, conveniently distinguished by a different colour of paper, gives comparative statistics for thirty or forty years and in some tables for more than a century. The last section gives figures of area, population, production, trade, etc., of the chief States of the world for the last fifty years. This section is particularly useful. Another official French publication received is the volume entitled "Statistique de Mouvement de la Population", 12, 1932, "Les causes de décès" which gives for the year under review the causes of death grouped under forty-three headings for every department and large town in France.

Some very interesting statistical information relating to French industry, though unfortunately incomplete, will be found in the Census of Production and Wages taken during 1931. In 1928, France signed an international convention on economic statistics at Geneva whereby the Government undertook to carry out a survey of industrial production as complete as might be possible at least every ten years. To implement this convention, the Government voted a credit of 750,000 francs for the purpose when the general Census was being made in 1931. Previously there had been no regular census of production, though so far back as 1669, Colbert had

\* République Française: Présidence du Conseil: Statistique générale de la France. Statistique du mouvement de la population. Nouvelle Série, Tome 12, Année 1932. Partie 2: Les causes de décès. Pp. xiii+287. Annuaire statistique. Vol. 50, 1934. Pp. xi+360+512. Enquêtes annexes du recensement de 1931. Enquête industrielle. Pp. 87. (Paris: Imprimerie Nationale, 1935.)

carried out an industrial survey, and again in 1788, 1812, 1840 and 1860 censuses of industry were undertaken.

The present investigation of 1931 was limited to establishments employing more than ten persons, and only about a quarter of the firms above this size replied to the questionnaires, while in the more important industries such as textiles the proportion was even less. Out of 60,000 questionnaires issued only 25,000 were returned, and after eliminating incomplete returns and those obviously inaccurate, there were left 15,073 returns relating to establishments which between them occupied 159,000 employers and 1,105,000 employees in 1931. Of the employees 772,500 were men, 260,200 women and 72,400 young persons less than 18 years of age.

The summary of the returns shows that in the year previous to the Census, namely, 1930, the 15,000 firms consumed 10½ million tons of coal, 5¼ million tons of coke, 426,000 tons of petrol and benzol, 115,000 tons of heavy oil, 690,000 tons of wood fuel and 269,000 tons of lignite. The power utilised, measured in kilowatts, was 690,000 kw. from steam engines, 246,000 kw. from gas engines, 169,000 kw. from water motors and 1,049,000 kw. from electric motors driven by current purchased from outside the works. The total motive force utilised in 1930 was 2,229,000 kw. and the average number of persons employed during that year was 1,189,000. Net production was valued at 27,303 million francs and the wages of the 1,189,344 employees amounted to 12,035 million francs.

In addition to the French statistics, the Census report provides an interesting summary and a valuable comparison of recent censuses of production in Great Britain and the United States. The historical notes on the early French censuses of production are especially useful and interesting.