The mathematical foundations of the subject were covered in a core of six lectures by D. G. Kendall and supported by a further four by F. Downton and R. R. P. Jackson, and the applications of the theory to 'machine interference' and to other practical problems were explained in nine further lectures by F. Benson and others. Two representatives of the Mathematisch Centrum, Amsterdam, also attended the course and contributed greatly to its success.

To one observer the course illustrated the growing importance of applied probability theory as a subject in its own right, and also demonstrated the encouraging fact that, when sufficient trouble is taken, the mathematical subtleties of the theory of stochastic processes can be expounded in a form acceptable to the industrial mathematician. It is generally felt that the course was a success, and a repetition is now being planned to take place in July of the present year.

SCIENCE IN FRANCE

AN article entitled "Science in France" by Dr. A. C. Copisarow, who is scientific attaché at the British Embassy in Paris, appeared in the winter issue of *Britain and France*, the quarterly journal of the Franco-British Society (Vol. 12, 1956; 1*s*. net). Research in France is organized at three levels. First, under the control of the Ministry of National Education are the universities, the Grandes Écoles and the forty laboratories throughout the country administered by the Centre Nationale de la Recherche Scientifique, which corresponds roughly to the British Department of Scientific and Industrial Research. The Association Nationale de la Recherche Technique, the main French technological research complex, has no counterpart in Britain. Secondly, there are some thirty industrial co-operative research organizations, financed by the industries they serve. Finally, there are a number of private establishments, ranging from the Pasteur Institute to the research departments of individual companies.

The development of nuclear power in France began slowly after the Second World War, but in 1955 M. Gaston Palewski prepared a comprehensive plan and obtained for the Atomic Energy Commission the equivalent of £100 million for research and development during 1955–58, to be spent chiefly on industrial contracts. At present, about 1,800 technologists are employed in work on atomic energy in France, as compared with 1,000 for the rest of western Europe, 5,000 in Britain and 15,000 in the United States. The first nuclear reactor is in small-scale operation at Marcoule, near Avignon, a second is scheduled to begin later this year, and a third in 1958, when a total of 50,000 kW. of electric power from nuclear sources will be added to the national grid system. The 200 lb. of plutonium produced annually by the three reactors at Marcoule will be used industrially; it is not intended to manufacture bombs, but the design of nuclear marine and submarine engines is being investigated.

There is a severe shortage of scientific man-power in France, due chiefly to post-war disorganization of the educational system. Of 151,000 students enrolled in 1954, only 29,000 were studying science or engineering: of these, only 3,900 reached the standard required for the diploma and a mere 650 continued as research students. The recent Landucci Commission on Scientific Man-power recommended that the number of scientific and engineering students should be doubled within the next decade and that more grants should be provided for postgraduate work. The Higher Council for Scientific Research and Technical Progress, under the chairmanship of Prof. Henri Longchambon, has also undertaken a detailed inquiry into the deployment of French technological resources. It has initiated a comprehensive stocktaking of the nation's scientific potential in men and materials, defining and financing a number of national research objectives; it is investigating the existing conditions of training scientists and the industrial exploitation of their discoveries; and it is examining the co-ordination of research and the communication of information between the various research organizations.

FORECASTING TORNADOES AND SEVERE THUNDERSTORMS

THE publication by the United States Weather Bureau of "Forecasting Guide No. 1"*, the first of a series, stimulates thought on the degree of official guidance given to weather forecasters. Directors of meteorological services have never, so far as is known to the writer, considered it advisable to lay down fixed rules of forecasting procedure. They have recognized that it is impossible to legislate for all the complex details of the weather and that the forecaster must be given all the information likely to be helpful to him and then offered every encouragement to use his best judgment. This new 'forecasting guide' is unusual in that it seems to be the first time a major meteorological service has produced a publication with so definite an indication of official approval of a code of practice as is implied in the title 'guide'. It is, however, an aid to decision, not a set of rules. We find, in fact, the sentences: "In common with other types of weather forecasting the formulation of a tornado forecast does not entail a simple weighing of parameters or direct application of rules. Instead, the forecaster must arrive at some decision, or series of decisions, in each individual situation regarding the combined relative importance of the climatological, synoptic, thermodynamic and dynamic factors previously discussed".

Tornadoes cause great damage in central North America but are very infrequent at any one place. During June, between 3 p.m. and 9 p.m., in which tornadoes are most frequent in Kansas, the overall probability that one will appear in an area of 20,000 sq. miles on a day chosen at random is only 0·04. This is much lower than the climatological probability of other phenomena covered in weather forecasts. Tornado warnings enable some useful protective steps to be taken, such as sheltering underground and alerting first-aid workers, yet a warning naturally causes great anxiety which should only be aroused for very good reason. The guide includes a history of tornado forecasting which shows that, after some tentative efforts at forecasting in the nineteenth century, the United States Weather Bureau from 1905 until 1938 specifically prohibited mention of the word 'tornado' in the forecasts because

* United States Department of Commerce: Weather Bureau. Forecasting Guide No. 1: Forecasting Tornadoes and Severe Thunderstorms. Edited by Jay S. Winston. Pp. v+34. (Washington, D.C.: U.S. Department of Commerce, 1956.)