ANNUAL MEETING OF CHINESE SCIENTIFIC SOCIETIES

A JOINT annual meeting of the Science Society, the Zoological Society, the Botanical Society, the Meteorological Society, the Mathematical Society and the Geographical Society of China was held at Pehpei, Chungking, during July 18–20 of last year. Despite the hot weather which prevailed then, 240 members attended the meeting, which was presided over by Dr. Wong Wen-hao. In his opening address, Dr. Wong said that a joint meeting like this is especially desirable in war-time, in that it is economical in time, labour and expenditure and will enhance co-operation between societies which are related in character. In view of the present tendency to overlook the study of pure science, Dr. Wong remarked that truth is what science values most, regardless of whether or not practical use can be derived from it; and he urged the pure scientists to stand firm. As a geologist and the Minister of Economic Affairs, he illustrated with first-hand examples how what appeared to be pure geology at first turned out later to be of much practical value in the detection of China's natural resources. The address of the Generalissimo was then read, in which he declares: "Pure science is the foundation of all applied sciences. If we wish to stand up among the modern great nations there must not be the slightest tardiness in the prosecution of pure science" (see also NATURE, Aug. 14, 1943, p. 180). While most of the official emphasis has been laid on the practical side in the recent tide of national industrialization, it will do the nation good to remind people of the significance of pure science.

In the business meeting held in the first afternoon, Dr. J. Needham was elected honorary member of the Science Society of China, in appreciation of his distinguished academic work and his service in promoting co-operation between Chinese and Western science, which had been so effectively carried on during the previous six months.

The six societies spent two mornings in communicating original papers dealing with their respective sciences; more than three hundred papers were read. Brief abstracts of these papers will be published shortly, in Chinese with additional English titles.

One of the two remaining afternoons was devoted to a discussion on "Science and National Reconstruction", with special reference to the problem of how science is to be promoted in China. Opinions were formulated on the following four points, which were presented to the Chinese Government for immediate adoption.

(1) The Government is requested to provide a large fund in the forthcoming national budget for, and only for, the furtherance of scientific research and of the scientific education of the masses.

(2) The personnel and equipment of the leading science institutes, such as those of Academia Sinica, must be materially augmented.

(3) The Government must endeavour to establish co-operation between the scientific workers on one hand and officials in charge of national planning on the other, so that the resulting plans may be more practical and fruitful.

(4) While the Government is considering sending a large number of young men of science abroad, it is deemed appropriate that such opportunities should be extended to mature scholars also. Here again, the Government is requested not to neglect pure science in favour of applied sciences and technology.

The last afternoon of the meeting was reserved for a discussion on "International Science Co-operation". To familiarize the audience with some idea of the subject under discussion, four specialists were asked to talk about the co-operative measures hitherto taken, along with the sound results accomplished therefrom, in agriculture, industry, meteorology, and medicine and public hygiene. Dr. Needham's address, entitled "International Science Co-operation in War and Peace", was read next by Dr. H. C. Zen, president of the Science Society of China. In this address, Dr. Needham reviewed the present position of co-operation between Chinese and Western science and the problems arising on the scientific side of the war effort of the United Nations in the Asiatic theatre; he urged, above all, that a science co-operation service should be made a regular part of the United Nations Relief and Rehabilitation Administration. The meeting was unanimous that international science co-operation, founded on international understanding and goodwill, is worthy of striving for. Indeed, Chinese men of science seek co-operation with no less enthusiasm than their friends of the West.

A scientific exhibition intended for the general public has been arranged by the learned societies of China during the present session.

DIRECTIVE AERIALS FOR RADIO COMMUNICATIONS

THE second discussion evening of the current session of the Wireless Section of the Institution of Electrical Engineers was held on January 18, when Mr. J. A. Smale introduced the subject of "Comparative Merits of Different Types of Directive Aerials for Communications". At the outset, it was made clear that the main objects of using directive aerials are to increase the field strength of the signal at the receiving station without increasing the power radiated by the transmitter, and to improve the ratio of signal to noise and interference at the receiving site; another desirable aim is to minimize interference with other users of the ether.

In long-distance communication, interest is confined mainly to wave-lengths between 13 and 100 metres; the maximum obtainable gain, in general, requires one linear horizontal dimension of some 10 wave-lengths, and, while this is realizable up to about 30 metres, it tends to impracticability at the upper end of the wave-length range. In the above range of wave-lengths, transmission is effected by one or more reflexions from the ionosphere, the characteristics of which give to the ray paths various degrees of inclination in the vertical plane. Consequently, aerials have to possess directivity in this as well as in the horizontal plane, and in some types these two directivities are dependent on one another.

The two main aerial systems used are of the broadside and linear or end-fire types. In general, the end-fire type have their horizontal and vertical directivities interdependent; the maximum concentration in the horizontal plane results in very low angles of radiation in the vertical plane, so that for short-distance circuits requiring higher angles no satisfactory compromise is possible. In the case of broad-

side arrays, individual control of directivities is valuable. A high degree of directivity in the vertical plane with broadside arrays, however, requires a height of several wave-lengths. As the wave-length increases, this height and the support of reflector as well as radiator curtains require fairly massive masts and corresponding foundations. The choice of aerials is influenced to a considerable degree by capital and maintenance costs, and availability of land, as well as by the technical considerations which lead to an overall improvement in the efficiency of the radio communication circuit.

Some of the earlier beam systems were built for very high directivity in the horizontal plane; but experience has shown that this may be overdone, since the reflecting medium is not sufficiently stable and accurate, and conditions can obtain when a transmitted beam, if too narrow, may be deflected right off the receiving aerials.

Similar structures can be used for transmission and reception, but the requirements are not necessarily the same. In general, the maximum forward gain is the chief requirement of transmitting aerials; while at the receiving station it is not so much a high signal-level that is required as a good discrimination of the signal in relation to the prevailing noise-level. During the period of maximum sunspot activity backward round-the-world echoes are troublesome, and aerials should have the maximum front-to-back ratio. Experience shows that this is more easily obtained with broadside arrays. This is true with normal broadside arrays; but even better ratios are possible if the aerial is erected off direction and electrically swung on to the forward direction; the result is that backward radiation is swung away from the great-circle bearing.

In the case of receiving aerials this applies also, but the chief requirement is the correct shape of polar reception diagram rather than gain, at least on wave-lengths greater than, say, 20 metres. With modern receivers the limiting factor above this wave-length is not input-signal level but signal-to-outside-noise ratio. In this case the power inefficiency caused by terminating resistances at the non-fed end of 'end-fire' arrays is unimportant; consequently, relatively simple and cheap aerials of the horizontal fish-bone type are adequate, take up small space, and on a given area of land can be multiplied for diversity reception. This type of aerial can be arranged for almost any degree of compromise between end-fire and broadside.

During the discussion, considerable attention was given to the rhombic aerial system, which has the advantage of retaining a reasonable directivity over a wave-length range of about two-to-one. Some of this versatility is lost when several rhombics are used in series in order to secure greater efficiency, but on the other hand greater control of the vertical radiation can be obtained, and this may be a distinct advantage in some cases.

The relative merits of horizontal and vertical polarization in the emitted radiation were discussed by one speaker, who stated that in some experiments with broadcasting transmitters, horizontal polarization had given the best results. It was agreed that a considerably wider horizontal distribution is used in broadcasting than in point-to-point communication, but not necessarily a wider diagram in the vertical plane, because the vertical angle to be covered is often of the same order in the case of communication services and broadcasting.

The chairman directed attention to the widespread interest aroused by the discussion, which showed that the subject is one of great importance to the engineer responsible either for long-distance broadcasting or point-to-point communication services.

REVISED FORMS OF THE CALENDAR

COLONEL C. A. GILL has published a small book entitled "The Reform of the Calendar—a Measure of Social Security" (Reigate: Ancient House Bookshop. Pp. 36. 1*s.*), which contains the proposals for a British Calendar. On p. 26 this Calendar is shown in full, and it agrees with the World Calendar (shown on p. 15), except that the days termed the 365th and 366th days are to be included as an eighth day in the last week of June and December respectively. It is suggested that the 365th day, June 31, should be called Mid-Year Day, and the additional day in leap years, bearing the date December 31, should be called Leap-Year Day.

A prime consideration in fixing the date of bank holidays should be the season of the year when they are most beneficial to the health of the community, and the following proposals are made, the advantages of which will be seen when it is remembered that the first day of each month commences with Sunday. A bank holiday should continue to be associated with Easter, but the date of the Eastertide holiday should have April 9 included. As Easter Sunday falls on April 8 in about 40 per cent of years, this arrangement will increase the length of the Eastertide holidays to four clear days on many years, owing to the inclusion of Good Friday. If Saturday, April 7, and Monday, April 9, were declared bank holidays, the dates of all secular events which now vary annually with the date of Easter Sunday could then take their time from the fixed bank holidays in April. It may be pointed out that April 8 is the date proposed by the World Calendar Association for Easter Sunday—a proposal which may some day materialize.

Other bank holidays which are suggested are Saturday, May 25, and Monday, May 27, irrespective of the date of Whit Sunday. Saturday, June 30, and Mid-Year Day, June 31, if declared bank holidays, would provide a three-day holiday at the end of June, Sunday, July 1, being, of course, included. The bank holiday on the first Monday in August falls on August 6 under the new scheme, and it is proposed to continue with this arrangement, Saturday, August 4, being also a bank holiday. Saturday, September 2, and Monday, September 4, would be bank holidays. As December 25 falls on a Monday, a holiday on Boxing Day with the previous Sunday and half Saturday would provide 3½ days' holiday at Christmas.

Another revised calendar has been proposed by Lieut. Willard E. Edwards under the title "The Edwards Perpetual Calendar" (printed by the *Honolulu Star-Bulletin*, Ltd.). In this, each week begins with Monday, and anniversaries and holidays always fall on the same day of the week. Each quarter has 91 days, and New Year's Day is set apart as a holiday and is followed by Monday, January 1, thus preserving the year of 365 days and the continuity of dates each year. In the case of a leap year, the first day of the second half of the year is Leap-Year