Meteorology in India

THE report on the Administration of the Meteorological Department of the Government of India in 1932–33 (Delhi: Manager of Publications, 1933. 12 annas; 1*s*. 3*d*.) includes an account of internal adjustments made, in the face of a cut of more than twenty-five per cent in the Department's budget, with the view of providing meteorological information for aviation. The Administration had to meet, so far as was practicable, increasing demands for forecasts and warnings due to extensions of the aerial passenger and mail services. The situation revealed by the report is such that it can only be hoped that less difficult financial times will very soon lead to its improvement; about 4,000 miles of the main international air route has to be dealt with by the meteorological centres at Karachi and Calcutta, now that the offices at Delhi and Rangoon have been abolished, and with the staff available only two daily forecasts have been possible, one at noon and one at 8 p.m., and the preparation of special weather charts during disturbed weather has been greatly curtailed.

Partially to compensate for this, auxiliary centres have been established at landing places on the main route, in charge of meteorological assistants, and a scheme for increasing the frequency of weather reports throughout the whole weather report system has been drawn up with a view to its early introduction. It is satisfactory to note that other branches of applied meteorology have not been neglected, the services rendered to the public and to public bodies having actually increased. Valuable assistance was rendered to the Everest flight and expedition; the exploration of the upper atmosphere by sounding balloons carrying meteorological instruments has been continued, a large number of records having been obtained which extend into the stratosphere; the section for agricultural meteorology organised a model observatory at an agricultural college with the view of providing facilities for agricultural workers requiring training in the study of weather in relation to crops, and in addition a number of special pieces of research work have been carried out and the results published.

The Meteorological Office at Poona is situated between two rivers. Katabatic winds develop in the river valleys at night under certain conditions and may overcome the normal wind drift due to the general pressure gradient over the west of India. A study of the dust haze and fogs that develop at night over the city in the cold season and of these conflicting winds—that have an important bearing on fog formation—has been attempted recently, the upper limit of the obscurity being determined either photographically—on moonlight nights—or with the aid of a searchlight and theodolite. The observations were made by L. A. Ramdas and S. Atmanathan and are discussed and illustrated in some detail in *Scientific Notes*, vol. 5, No. 54, of the India Meteorological Department. The establishment of inversions of temperature after sunset and their break-up after sunrise is demonstrated by readings of temperature made on the tower of the Meteorological Office with an Assmann ventilated thermometer between ground level and a height of 34·5 metres.

The visual and photographic studies towards the end of the paper on the behaviour of the top of the haze or fog at the time of its dispersal are perhaps the most valuable portion, especially those showing the effect of a katabatic wind from the south-west, which may be to remove the top part of the haze so as to leave a sloping upper surface at the same time that the whole area of haze is displaced towards the north-east. At an early stage of the dispersal of fog by sunshine, distinct cumulus clouds were sometimes observed to result from the breaking up of the top layers, but at a later stage the fog boundary became very blurred at the same time that it extended upwards, under the action of turbulence, the distant hills eventually showing through the fog, as turbulent diurnal winds began to complete its dispersal.

In the memoir entitled "The Indian Southwest Monsoon and the Structure of Depressions associated with It" by K. R. Ramanathan and K. P. Ramakrishnan (*Mem. India Met. Dept.*, vol. 26, part 2) an attempt is made to gain a clearer insight into the nature of the depressions accompanying the cyclonic rains that occur in the Indian rainy season, making use on one hand of the more complete information about upper winds furnished in recent years by pilot balloon ascents, not only in India but also in Arabia and Burma, and on the other hand the method of analysis by fronts developed by the Norwegians. The wind data have been used to obtain normal lines of air-flow over this area at heights of 1, 2, 3, 4, 6 and 8 kilometres in the months of May, June and July, the latter month being the one during which the monsoon is normally at its height, and these have been supplemented by mean isotherms at 2, 3 and 4 kilometres calculated from the figures obtained with sounding balloons.

Information of this kind has, of course, great value apart from its application to particular theories of the nature of depressions, while attempts at relating rainfall to the normal conditions of the upper atmosphere, such as the one made in the second part of this paper, are very desirable and

may lead to increased accuracy of weather forecasting. Two depressions during the monsoon of 1930 are examined in considerable detail. The conclusion is reached that the main fronts were formed between 'fresh' monsoon air, resulting from an accelerated advance of this damp air from the far side of the equator, and 'old' monsoon air, that is, air that had a similar origin but had been modified since its first advance, having become the warmer of the two; that fronts also formed between monsoon air and heated continental air that was part of the westerlies of middle latitudes and was the warmer up to about 3 kilometres. It is concluded that depressions retain their strength so long as plenty of fresh and old monsoon air is available.

Another paper dealing with the same subject on the same lines forms the next in this series of memoirs. It is by N. K. Sur, and is entitled "On the Physical Characteristics of Fronts during the Indian Southwest Monsoon" (*Mem. India Met. Dept.*, vol. 26, part 3). Both these papers appear to have been inspired by an earlier paper by Wagner "On the Aerology of the Indian Monsoon" (*Gerlands Bei. Geophys.*, 30, 196–236, 1931). The Indian authors appear to question the truth of Wagner's picture of cold dry westerlies extending right across the north of India, so as to form the cold sector of a vast stationary depression in which the ascending warm current is drawn primarily from the seas to the south and west of India, and has been deflected westwards by the mountains of Burma and Assam.

In Sur's paper stress is laid on the difficulty of determining the lines of flow in the upper air during times of increased activity of the southwest monsoon, owing to the fact that the amount of cloud generally makes it impossible to follow pilot balloons to high levels. It is shown that at times, in the most active stages of the monsoon, a wedge of dry continental air separates the southwesterly winds from the Arabian Sea from the easterlies of the Gangetic valleys, and the characteristics of some of the fronts occurring with these three air streams are discussed with the aid of sounding-balloon data; cases of cyclonic rains in Central India are described in which continental air played, apparently, no part, the easterlies ascending directly over deflected south-westerlies from the Arabian Sea, moving towards the east. It is these studies that make the author doubt the reality of Wagner's conception.

News and Views

Science and Human Values

IN the course of a recent address to the Ripon Diocesan Conference at Harrogate, the Archbishop of York, Dr. Temple, remarked that "there has sprung up an immense multitude of new schools which are predominantly scientific in type", and that "while education until lately had been unduly literary in its emphasis, there is a risk now of its becoming unduly scientific". Leaving out of consideration for a moment the inferences drawn by Dr. Temple from these suggested developments, it would be interesting to know what group of schools he particularly had in mind. The largest group in which science occupies a place in the curriculum is the 1765 secondary schools recognised by the Board of Education as efficient. There are more than half a million pupils in these schools, and the attention given to the various subjects of instruction may be estimated from the subjects taken by candidates in School Certificate examinations. Of the 68,406 candidates who presented themselves in the First School examination last year, more than ninety per cent took English, history, French and mathematics. Latin, chemistry and art each attracted about forty per cent. In the Second School examination, the highest percentage of entrants was in mathematics (44·6), and succeeding percentages were French (38·3), English (37·5), history (33·1), physics (31·6), chemistry (31·0), Latin (21·5). This examination leads up to university scholarship standards, and the number of open scholarships and exhibitions awarded by the universities of Oxford and Cambridge last year were in classics, 148; history, 115; science, 104; mathematics, 70; modern languages, 53; and others, 99.

THESE figures may be taken to represent fairly what are the chief subjects taught in our secondary schools; and they give little support to the view that an immense number of schools is giving predominant attention to science. There is indeed not even a remote possibility that our secondary schools will become unduly scientific instead of unduly literary; and very few men of science would wish them to be. What Dr. Temple fears is that, as science is concerned with observation and measurement instead of human values, "there is great danger in it if the proportion between scientific and humanistic training is seriously distorted". Why, because "All the things that matter most in life, such as friendship, fellowship, and loyalty, are not capable of measurement, nor can they be submitted to any laboratory test", it should be assumed that students of science are necessarily unfamiliar with these intangible attributes is difficult to understand. The purpose of a scientific training should be to observe or investigate evidence before arriving at judgments; and the world would be all the better if this method were followed in political and other social spheres.