Periodicity in Australian Weather.

METEOROLOGISTS generally recognise that as the sun's radiation heats the earth's surface, provides the energy of winds, and evaporates the water which falls as rain, so most of the variations from year to year in temperature, wind, and rainfall must be in some way caused by variations of solar radiation. The literature of the subject is immense, but is mostly directed towards discovering direct and simple relationships between solar radiation, especially as represented by Wolf's sunspot numbers, on one hand and terrestrial weather on the other hand. With a few isolated exceptions, however, these efforts have met with little success, probably because a simple direct connexion rarely exists, the solar changes working rather through complex changes in the atmospheric circulation. In a recent paper,* Dr. E. Kidson approaches the problem, as it affects Australia, by studying the variations in the tracks and intensities of the moving anticyclones which traverse the country from west to east. The data employed were extracted from the Australian daily weather charts (usually including New Zealand) for the years from 1887 onwards; they are expressed in various ways, including the average latitude of the centres in different longitudes, the annual range in the latitude of the centres, the intensity, and the rate of travel, all of which give fairly concordant results.

The most obvious periodicity in these data is not the sunspot cycle of eleven years, but a shorter one of only eighteen months. The effect is not large—the range between the most northerly and the most southerly positions of the average tracks is only one or two degrees of latitude—and the data require smoothing to bring out the periodicity, but from an inspection of the unsmoothed figures it is probably real. The author believes it to be of terrestrial origin, and he writes: "An eighteen-months period in terrestrial phenomena may at first sight appear unnatural, but it is a period between a season in one hemisphere and the next but one of the same kind in the opposite hemisphere. This suggests an oscillation between the hemispheres which would be of quite a natural type."

Now one of the most striking features of Australian meteorology is a three-year cycle in the pressure of Darwin, which is the basis of long-range forecasts of rainfall in Java. A similar periodicity is widely distributed in other parts of the world, and the author suggests that this is really the same eighteen-month periodicity of the circulation which, having opposite effects according as its maximum falls in summer or winter, actually appears as a three-year cycle. This would account for the frequency with which the latter is interrupted by a secondary maximum. Moreover, this apparent three-year cycle at Darwin is not constant, but breaks down from time to time. These breaks are all near sunspot maxima, and this suggests that the cycle is controlled by solar variations and so kept in step with the eleven-year sunspot cycle. So we arrive at a mechanism in which seasonal changes, a natural oscillation of the earth's atmosphere, and solar control all combine to produce complex variations of weather.

The second half of the paper is devoted to the effect of the sunspot cycle in the rainfall of Australia. The rainfall data are grouped into districts, and the annual totals for each district are then combined to obtain the average variation during an eleven-year cycle. The curves produced in this way are mostly very irregular, and are smoothed over three years. This is legitimate as a graphical process, but the high correlation coefficients which the author obtains between these much smoothed rainfall data and the sunspot figures similarly smoothed can have little significance, and the arguments which he bases on them correspondingly little weight. The deduction of the eighteen-months cycle rests on surer ground, though the question whether this or the well-established three-year cycle is the real primary oscillation seems to need further consideration. C. E. P. B.

* Melbourne, Commonwealth of Australia Bureau of Meteorology. Paper 1. Some Periods in Australian Weather. By Edward Kidson.

Obituary.

DR. H. R. H. HALL.

BY the premature and sudden death, on Oct. 13, of Dr. H. R. H. Hall, the British Museum loses one of its most active and distinguished Keepers, and a large circle of colleagues and friends a genial, generous, and wholesome personality. Hall was born on Sept. 30, 1873, educated at Merchant Taylors' School and St. John's College, Oxford, and appointed to the Department of Egyptian and Assyrian Antiquities in 1896, during the long keepership of Sir E. Wallis Budge. He was promoted Assistant Keeper in 1919, and succeeded his old chief as Keeper in 1924.

Hall's father was an artist, and the dedication of Hall's first book, "The Oldest Civilisation of Greece" (1901), acknowledged and exemplified a very real debt, in its keen appreciation of the beauties as well as the scientific interest of that Ægean culture which he was one of the first to popularise in Great Britain, even before the Cretan material was available. To this culture, though it lay only on the outskirts of his professional studies, he recurred often and lovingly, in his "Ægean Archæology" (1915) and his Rhind Lectures of 1923, published in 1928 as "The Civilisation of Greece in the Bronze Age" with a wealth of illustration which testified to his mature artistic judgment. For, as he wrote, characteristically, "the plan of each lecture as delivered was to explain the pictures". At need, he would come back to Oxford, after his Museum-day, to 'explain pictures' on this favourite theme. Yet this was only one of