The completion of other work will prevent my return to this subject at present—perhaps altogether—but I have ventured to publish this incomplete account of an apparently promising method for the measurement of solar radiation, in the hope that it may be of use and interest to others.

University College, Liverpool. J. W. CLARK

P.S.—It may perhaps be found advantageous to use an apparatus like an inverted cryophorus, in which the absorbed radiant energy generates a vapour-pressure, and is made to lift a column of water in the tube—the height of the column and the time being registered photographically.

THE GROWTH OF CEREALS

PERHAPS nowhere is the influence of the different climatic factors on the rapidity of growth so well illustrated as on the plains of Russia. Therefore W. Kowalewski's careful researches into this subject, summarised in the *Memoirs* of the St. Petersburgh Society of Naturalists (xv. 1), are especially worthy of attention. The author has gathered all necessary information for showing the periods of growth of various cereals on the soil of Russia, from the far north of Arkhangelsk, to the southern province of Kherson, and he has arrived at most interesting results, of which the following is a summary. If the periods of growth of the same cereal be taken throughout Russia, it appears that, altogether, it is in the higher latitudes that it ripens fastest. Oats and spring wheat take 123 days and barley 110 days to ripen about Kherson, and only 98, 88, and 98 days at Arkhangelsk, the difference in favour of the north being respectively thus: 25, 35, and 12 days. The intermediate regions show also intermediate differences, while for each latitude the growth of cereals proceeds faster in the eastern parts of Russia than in the western. It is obvious that if the rapidity of growth were due to temperature, the phenomena would be the reverse of what they are. Moreover, the want of moisture in the southern steppes is also a condition in favour of the rapidity of growth: so that it is in the insolation that we must seek for the cause of the above-stated difference. In fact, oats being usually sown about May 17 at Arkhangelsk, and the harvest usually occurring about Sept. 1, the insolation continues there for 2000 hours in 98 days, not to speak of the 240 hours of bright nights; while at Kherson, during 123 days (from April 1 to Aug. 1) the insolation lasts only for 1850 hours. The difference in favour of Arkhangelsk is thus equal to 150 hours (to 400 hours, if the bright nights be added), and it compensates for the influence of temperature. It is useless to add, moreover, that the cereals cultivated in the north have already undergone a certain accommodation to their conditions. As to the intensity of light, Prof. Famintzin's work on the subject, corroborated by ulterior researches, shows that the great intensity of light in Southern Russia, combined with the great transparency of the atmosphere, is rather a condition against the rapidity of growth, the intensity of light exceeding the limits of the maximum of decomposition of carbonic acid. Winter rye shows the same differences as the spring cereals. It appears from M. Kowalewski's tables that in the Arkhangelsk district winter rye takes 375 days to arrive at ripeness, of which there are 202 days of winter rest, 68 days of autumn growth, and 105 days of spring and summer growth, making thus a total of 173 days of growth. At Kherson the total growth lasts for 290 days, of which only 101 days of winter rest and 189 days of productive growth (63 during the autumn and 126 during the summer). The difference reaches thus 16 days in favour of the north, and it would rise to 20 or 25 days if only spring and summer be taken into account. The graphical representation of all these data is most interesting. Thus the lines of simultaneous sowing of winter rye from north-west to south-east correspond to the isochimenes, while the lines of simultaneous ripening of the spring cereals—oats, barley, sarrazin, wheat—run from south-west to north-east, corresponding to the lines of equal summer temperatures. The retarding influence of rain comes out also pretty well.

THE ROYAL SOCIETY OF NEW SOUTH WALES

THE annual general meeting of the members of the Royal Society of New South Wales was held on May 7. The president, Mr. H. C. Russell, B.A., F.R.A.S., occupied the chair, and delivered an address, from which we give the following extracts:—

"There is a very general impression, borne out by the evidence which geology has furnished, that at least the east coast, if not all Australia, is rising in relation to the mean level of the sea. The late Rev. W. B. Clarke, in a report to the Port Jackson Harbour Commission, said 'that the coast has risen in former geological epochs, and that it has risen during the present epoch is capable of distinct proof.' 'Raised beaches of shells, which are not kitchen middens, may be seen about twenty-five feet above the sea, near Ryde, on the Paramatta estuary, and at Mossman's Bay, in Port Jackson, at a height of 132 feet above high-water.' Again, 'regarding the whole coast from Broken Bay to Botany Bay as mere peninsulatic fragments, united only by low isthmuses, bare or covered with sand, as they actually are, one may still see that there must have been oscillations of level, and finally elevation.' Speaking of other portions of the coast, Mr. Clarke says:—'At Adelaide in 1855 the railway between the city and the port was being constructed, and Mr. Babbage has since shown that in four years a difference of four inches of rise between the levels of those places has taken place.' And again, 'according to Mr. Ellery, the accomplished and accurate Williamstown observer, the self-registering tide-gauge at that place indicated a rise of the bottom of Hobson's Bay of four inches in twelve months, and a deposit of recent shells and imbedded bones of sheep and bullocks which had been thrown into the bay is now seen at a level above the reach of the sides.' Again, quoting from a letter by the late Mr. John Kent, of Brisbane:—'A survey was made of a shelf of rocks in Brisbane River in 1842 by Captain Gilmore, Mr. Petrie, and myself, and in making a re-survey in 1858 Mr. Roberts found the relative depths were singularly correct, but that the general depth of water over the shelf of rock had decreased eighteen inches in sixteen years since the first survey was made.' Sir Roderick Murchison, in the *Proceedings* of the Royal Geographical Society of London (vol. vii. p. 42) quotes from a letter he had received from the late Mr. Kent, of Brisbane:—'I have lately drawn the attention of the Rev. W. B. Clarke to the fact that the eastern coast of New Holland is rising at the rate of (say) one inch per annum, as ascertained by the height of rocks in the river Brisbane above tide levels, through a period of twenty years, and he assures me that to the south the same result has been inferred, though the observations have not extended over so long a period. At what rate the rise is now going on there are no data to establish. Till a series of mean tidal levels are marked on the rocks of the harbour, and the alteration made as distinct as that in Hobson's Bay, any deduction as to the rate of rise must be conjectural and unreliable.' I have but taken a few extracts from a great mass of evidence which Mr. Clarke brought forward in proof of the rapid elevation of the coast of Australia. I was deeply interested in this report when it was published in 1866, and as soon as I had opportunity determined to make such observations with a self-registering tide-gauge as would determine the rate of rise, if any, and in collecting information bearing upon this subject during the past thirteen years. I wrote to Mr. Ellery and asked him for further particulars of the rise going on in Victoria, and in reply he said that Mr. Clarke had in some way misunderstood his remarks, which had reference to the silting up of the harbour, not the elevation of the land; and he at the same time sent me a copy of his paper on 'The Tidal datum of Hobson's Bay,' read before the Royal Society of Victoria, August 14, 1879. After giving the history of the tide-gauge, which was started in 1858 under the Harbour Department, and was not under his control till 1874, Mr. Ellery says:—'It is to be regretted that no precise references to mean tide level in the earlier days can be found. Where measurements do exist in Hobson's Bay they are lacking in accurate information as to the state of the tides, and I find nothing trustworthy upon which to base any statements as to change of sea level since surveys have been made. I think it desirable that permanent bench marks on the natural faces of the rock *in situ* should be established around our bay, carefully connected by accurate levelling with one another and with the tide-gauge, for it is very doubtful if bench marks on buildings can be assumed to afford a permanent datum.' The first self-registering tide-gauge in Sydney was erected on Fort Denison by the late Mr. Smalley in 1867. Unfortunately the design was so faulty that all the records of the heights of tides made by it are of no value, although the times of high and low water are correct. The reason for this fault in its records was that an ordinary hempen cord was used