the production of dry north-west winds on the plains of Western India.

6th. That this dependence of dry winds on the Himalayan snow-fall affords a criterion for forecasting the probabilities of drought in North-Western and Western India.

In setting forth the above conclusions, it is, however, necessary not to ignore the fact that there other conditions besides those here considered which exercise a very great influence on the prevalence of dry winds and drought. During the last famine period in India (the years 1876 and 1877; in the former year in Southern India, in the latter in the North-Western Provinces and Rajputana), the pressure of the atmosphere was persistently and abnormally high, and this was due, as I showed in the reports on the meteorology of those years, to the condition, probably the high density, of the higher atmospheric strata. Moreover this excessive pressure was shown to affect so extensive a region, that it would be unreasonable to attribute it to the condition of any tract so limited as a portion of the Himalayan chain; and if dependent on the thermal conditions of the surface, which may indeed have been the case, this land must rather have been the major portion of the Asiatic continent than merely a relatively small portion of its mountain axis. This question must remain for future inquiry. It is referred to here to guard against too wide an application being assigned to the action of the Himalayan snows.

III. "Report to the Solar Physics Committee on a Comparison between apparent Inequalities of Short Period in Sun-Spot Areas and in Diurnal Temperature-Ranges at Toronto and at Kew." By BALFOUR STEWART, M.A., LL.D., F.R.S., and WILLIAM LANT CARPENTER, B.A., B.Sc. Communicated to the Royal Society at the request of the Solar Physics Committee. Received April 21, 1884.

(Abstract.)

It has been known for some time that there is a close connexion between the inequalities in the state of the sun's surface as denoted by sun-spot areas and those in terrestrial magnetism as denoted by the diurnal ranges of oscillation of the declination magnet; and moreover the observations of various meteorologists have induced us to suspect that there may likewise be a connexion between solar Inequalities and those in terrestrial meteorology.

This latter connexion, however (assuming it to exist), is not so well

established as the former, at least if we compare together Inequalities of long period. It has been attempted to explain this by imagining that for long periods the state of the atmosphere as regards absorption may change in such a manner as to cloak or diminish the effects of solar variation by increasing absorption when the sun is strongest and diminishing absorption when the sun is weakest.

On this account it seemed desirable to the authors to make a comparison of this kind between short-period Inequalities, since for these the length of period could not so easily be deemed sufficient to produce a great alteration of the above nature in the state of the atmosphere.

The meteorological element selected for comparison with sun-spots was the diurnal range of atmospheric temperature, an element which presents in its variations a very strong analogy to diurnal declination-ranges.

There are two ways in which a comparison may be made between solar and terrestrial Inequalities. We may take each individual oscillation in sun-spot areas, and find the value of the terrestrial element corresponding in time to the maximum and the minimum of the solar wave. If we were to perform this operation for every individual solar Inequality, and add together the results, we might probably find that the magnetic declination-range was largest when there were most sun-spots. If, however, we were to make a similar comparison between sun-spot daily areas and diurnal temperature-ranges we might not obtain a decisive result. For at certain stations, such as Toronto, it is suspected (the verification or disproval of this suspicion being one of the objects of this paper) that there are two maxima and two minima of temperature-range for one of sun-spots. The effect of this might be that in such a comparison the temperature-range corresponding to a maximum of sun-spots might be equal in value to that corresponding to a minimum, or, in other words, we should get no apparent result, while, however, by some other process proofs of a real connexion might be obtained. But if we can get evidences of apparent periodicity in sun-spot fluctuations when dealt with in a particular manner, we have at once a method which will afford us a definite means of comparison. And here, as Professor Stokes has pointed out, it is not necessary for our present purpose to discuss the question whether these sun-spot Inequalities have a *real* or only an *apparent* periodicity. All that is needful is to treat the terrestrial phenomena in a similar manner, or in a manner as nearly similar as the observations will allow, and then see whether they also exhibit periodicities (apparent or real) having virtually the same times as those of sun-spots, the phases of the two sets of phenomena being likewise allied to one another in a constant manner.

It is such a comparison that the authors have made, their method of analysis being one which enables them to detect the existence of unknown Inequalities having apparent periodicity in a mass of observations. A description of this method has already been published in the "Proceedings of the Royal Society" for May 15th, 1879. The comparison was made by this method between sun-spot observations extending from 1832 to 1867 inclusive, Toronto temperature-range observations extending from 1844 to 1879 inclusive, and Kew temperature-range observations extending from 1856 to 1879 inclusive. The following conclusions were obtained from this comparison.

(1.) Sun-spot Inequalities around 24 and 26 days, whether apparent or real, seem to have periods very nearly the same as those of terrestrial meteorological Inequalities as exhibited by the daily temperature-ranges at Toronto and at Kew.

(2.) While the sun-spots and the Kew temperature-range Inequalities present evidence of a single oscillation, the corresponding Toronto temperature-range Inequalities present evidence of a double oscillation.

(3.) Setting the celestial and terrestrial members of each individual Inequality, so as to start together from the same absolute time, it is found that the solar maximum occurs about 8 or 9 days after one of the Toronto maxima, and the Kew temperature-range maximum about 7 days after the same Toronto maximum.

(4.) The proportional oscillation exhibited by the temperature-range Inequalities is much less than the proportional oscillation exhibited by the corresponding solar Inequalities.

IV. "Some New Phenomena of Electrolysis." By G. Gore, F.R.S., LL.D. Received April 23, 1884.

Whilst making a series of experiments on the "self-deposition of metals," I observed, by trying a number of different metals, that several of them received an electrolytic deposit of cadmium by contact with cadmium in various solutions of that metal much more frequently than others; I therefore made various experiments to determine whether this was due to difference of density of current or to other causes.

By means of these additional trials, I found, on passing an undivided current through a series of portions of the same metallic solution, that cathodes composed of different metals of equal amounts of immersed surface, required currents of different degrees of density to cause deposits of the same metal upon them, and that the differences in some cases were considerable. Another singular cir-