nomena in question, unlike the sanitary arrangements which are supposed to engage the attention of our municipal authorities, are absolutely beyond our control.

A REJOINDER TO MR. A. B. BIGGS'S CRITICISM ON OBSERVATIONS MADE IN RESPECT OF THE "OBSERVED PERIODICITY OF THE DEATH RATE." Etc.

By R. M. Johnston, F.L.S., Etc.

[*Read November* 17, 1884.]

I am glad to see that so able a critic as Mr. Biggs has taken up the important subject of the "Death rate in its observed coincident relation to super-terrestrial phenomena," which was recently introduced by me in a paper read before this Society; although, at the same time, it is to be regretted that he has based his remarks upon a brief abstract from a newspaper rather than upon the paper itself, for it has greatly misled him as regards the nature and scope of my argument.

It appears to me to be very clear that Mr. Biggs' difficulty is caused chiefly by erroneously assuming that the relations commented upon are *simple* instead of *complex*, and that belief in a more or less striking observed *coincidence* seems to be regarded by him as synonymous with a like belief in a corresponding *mutual inter-dependence* between the matters which have been observed to coincide.

Now there is a very wide difference between the conception or conviction of a known agreement or *coincidence* and the conception of an underlying casual relation. We can fairly conceive and admit of identity of movement or action between several phenomena for a limited space of time without prejudice, even when we assume that such coincidence is not uninterrupted for a longer period, or that it may be due (1) to mutual inter-dependence alone; (2) to causes unknown acting independently; (3) to causes unknown acting together; (4) to certain causes known and unknown, or imperfectly known, acting in combination.

Mr. Biggs, therefore, has somehow failed to grasp the scope of my argument when he sets himself to the task to prove that the movements of Jupiter have no appreciable "influence whatever, direct or indirect," upon the coincident phenomena, simply because the variable cycles of the maxima and minima of sun-spots, death rate, magnetic inclination, rainfall, etc., are not *solely* influenced by the movements of Jupiter primarily. This is proving a negative in reference to a complex problem, by ignoring all the factors necessary to arrive at a correct conclusion, save one—viz., the supposed value of Jupiter's influence. Even this influence seems to be unnecessarily restricted by him to the mere point when Jupiter is exactly in *perihelion*.

Mr. Biggs, by demanding proof and demonstration sufficient to produce conviction, again fails to grasp the object of my paper, which so far as the casual aspect of the phenomena discussed is concerned, is most guardedly restricted by me to *mere suggestion*. Now, had he studied my paper closely instead of the brief abstract referred to, he would find that I pointed out that the "coincidences observed are not sufficiently broad and regular to justify prediction;" that, at present, inferences drawn from them are "more suggestive than conclusive," and in consideration of many unexplained anomalies due to unknown and complex relations, I could only hazard from them "*presumption*" in favour of a relatively low death rate in Australasia during years of sun-spot maxima, and a more or less relatively high death rate during years of sun-spot minima. In this last respect it is a pleasure to me to find that I am in accord with Mr. Biggs, who also, with Young, Scott, and others, admits that there seems to be a well-established connection between "solar disturbances and the electrical condition of our globe."

Professor Balfour Stewart, the celebrated physicist and author of the profound work "On the Conservation of Energy" (Inter Series, 1874), in a paper read by him on "Magnetic Declination" (See *Nature*, April, p. 592), states that, although Professor Rudolph Wolf's list of sun-spot observations "extends back into the seventeenth century, and is unquestionably of much value, nevertheless, it must be borne in mind that we possess no sun-spot data sufficiently accurate for a discussion of questions relating to solar periodicity before the time when Schwabe had finally matured his system of solar observations, which was not until the year 1832." Curiously enough that is just one year prior to the period from which my diagram records the coincidences between the solar and planetary phenomena. This being so, it follows, as stated by R. H. Scott (p. 392, Elementary Meteorology, Inter. Series, 1883), that apart

from the last four or five sun-spot cycles which have actually varied from seven years to 14 years, "the data at present available are insufficient to establish satisfactorily" "the precise duration" of extended sun-spot periodicity, and hence Mr. Biggs's argument against the supposed influence of Jupiter, based upon the small differences of the mean of sun-spot periodicity as compared with the period of Jupiter, is not of much force, although in other respects his argument is well sustained and of considerable value.

Although, with Mr. R. H. Scott, I am fully convinced that as yet "it can scarcely be said that the close relation between solar and terrestrial phenomena is capable of accurate demonstration," still, with Tyndall, I am impressed with the feeling that "these guesses and conjectures are by no means leaps in the dark, for knowledge once gained casts a faint light beyond its own immediate boundaries. There is no discovery so limited as not to illuminate something beyond itself." (Scientific Materialism, p. 77.)

DEAL ISLAND.

The following census of the flora of Deal Island, in Kent's Group, was laid on the table by Mr. Justice Dobson, who had enlisted the services of the Superintendent of the Lighthouse on the Island, Mr. Johnstone, to collect and send him specimens of all plants growing there. These were forwarded to Sir F. Von Mueller, who prepared the census. One plant, an orchid, "Pterostylis vittata," is new to Tasmania, but is common to the Continent of Australia:—

Clematis microphylla, De Candolle.
Bursaria spinosa, Cavandolle.
Comesperma volubile, Libillardiere.
Geranium pilosum, Forster.
Zieria Smithii, Andrews.
Correa speciosa, Andrews.
Beyera opava, F. V. Mueller.
Phyllanthus Gunnii, J. Hooker.
Casuarina distyla, Vent.
Tetragonia implexicoma, J. Hooker.
Mesembrianthemum aequilaterale, Haworth.
Stackhousia linarifolia, Cunningham.
Pomaderris apetala, Labillardiere.
Pultenæa daphnoides, Smith.
Goodia latifolia, Salisbury.