REMARKS ON THE OBSERVED PERIODICITY OF THE DEATH-RATE, WITH SUGGESTIONS AS TO ITS POSSIBLE RELATION WITH THE PERIODICITY OF SOLAR AND OTHER SUPER-TERRESTRIAL PHENOMENA.

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The remarkable curves which determine the maxima and minima of sunspots, auroral and magnetic phenomena, earth-tremors, earthquakes, barometric, magnetic, and other secular disturbances, have again and again attracted the attention of many skilled observers; and while it is generally admitted that the limits of time and space within which records of such matters have been carefully tabulated are, as yet, too circumscribed to throw light upon many anomalies, it is almost conclusive that the movements of the larger of the planets, notably Jupiter, exercise a very powerful influence mediately or immediately upon the several matters referred to. In the March number of the journal of the Statistical Society of London for 1879, there is an interesting paper by Mr. B. G. Jenkins, F.R.A.S., in which it is attempted to be shown that there is a probable connection between the yearly death-rate of England and the position of the planet Jupiter in his orbit. He states that on representing by diagram the deaths in England for the last thirty-nine years he was not a little surprised to find, as he had already expected, that there was a marked difference in the number of deaths every six years; in the majority of cases a low death-rate being succeeded by a very high one. On mapping out the curve for Jupiter's course for the last thirty-nine years ending in 1880, he found, so far as England was concerned, that the perihelion and aphelion of Jupiter corresponded in a very remarkable manner with the periods of low death-rate occurring in the years 1839, 1845, 1851, 1856, 1862, 1868, and 1874, and he accordingly, from his observation, predicted for England in the year 1880 a lower death-rate than during any former period in the history of that country.

Although this prediction was not verified exactly as regards 1880 it is somewhat interesting to note that in the two following years, 1881 and 1882, the death-rate was actually lower than in any former period in which record has been preserved.

There is, however, a serious objection to Mr. Jenkins' conclusions, inasmuch as he has based them on the fluctuations of the English death-rate only, and a comparison which I have made of the mean death-rate of thirteen of the principal States of Europe during the last 22 years does not confirm his conclusions.

On the other hand if we turn to the colonies of Australasia it will be found that there is such a close agreement with each other in the general rise and fall of their respective death rates during the last 25 years that it is not easily accounted for unless it be referred to some super-terrestrial influence of a variable character, which has the effect of intensifying or modifying the death-rate to such an extent that the local causes appear as mere ripples on the swell of a great wave in conjunction with it. Such is the effect of the minor variations of local death-rates that the significance of this common rise and fall can only be fully appreciated when shown in a diagraphical form as in the accompanying plate. It is remarkable to observe how closely the maxima of death-rate agree with Jupiter's movement from aphelion to perihelion, and with the minima of sunspots; and conversely it is still more surprising to find a corresponding agreement between the minima of the death-rate in the four colonies, viz :—Tasmania, Victoria, New South Wales, and South Australia, the maxima of sunspots, and the movement of Jupiter from perihelion to aphelion. Surely such a widely based agreement cannot be a mere coincidence ; and although it must be confessed that if we take the death-rates of the thirteen principal countries of Europe separately, the results are often conflicting or anomalous, yet it is significant that the mean of all these for the period 1861 to 1882 corresponds in a remarkable way with the movements forming the curves of periodic minima and maxima of the mean of the death-rates of the various colonies of Australasia.

Should the same curve maintain its regular course it would appear probable that the death-rate in Australasia would attain its next maximum period about the years 1885 to 1887.

Still, notwithstanding the confidence with which Wolf, Sabine, Balfour Stewart, Meldrum, and other eminent investigators maintain the coincidence of the periodicity of solar and other terrestrial phenomena, it is clear that the death-rate coincidences are not sufficiently broad and regular to justify prediction, although there is a presumption in favour of a relatively low death-rate in Australasia during years of sunspot maxima, and a more or less relatively high death-rate during years of sunspot minima. Although the several thinly populated Australian colonies are as widely separate as the various States of Europe, it is interesting to observe how much more closely the rise and fall of the death-rates of the former correspond to each other, than do the death-rates of the densely populated States of Europe.

It is also noteworthy that the mean death-rate of the Colonies of Australia, for the last twenty years, is lower than the mean death-rate of Europe by about 10 per 1,000 persons

living, and that owing to the absence of a dense population the former is comparatively unaffected by those artificial evils attendant upon crowded centres of population.

These considerations, together with our fortunate immunity from the pestilence of war, help us in some measure to explain the greater extent of agreement which has been demonstrated to exist between the several death-rates of the various colonies as contrasted with the death-rate variations of the European States, and it is also conceivable that a greater freedom from the artificial disturbances referred to makes the death-rate of Australasia a more sensitive index of complex super-terrestrial influences.
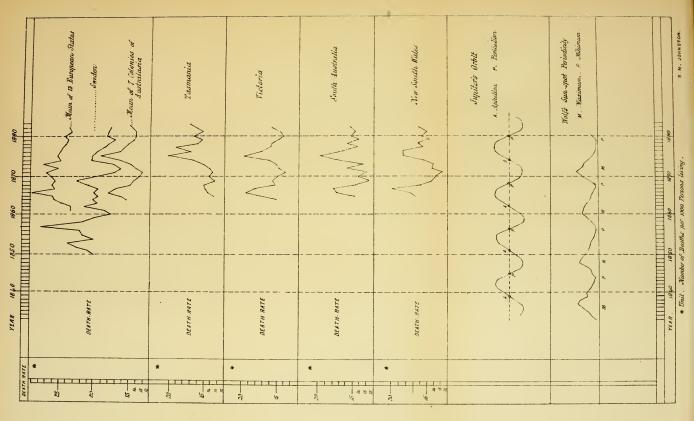
These observations together with the accompanying tables, it is hoped, will serve to excite greater interest in this important subject. I desire in conclusion to repeat that at present the coincidences pointed out by me are more suggestive than conclusive as regards the relations commented upon. I have not ventured to tabulate the death-rate of Australasia prior to 1864, as, owing to the absence of proper records of migration, the estimates of population during the earlier years are not trustworthy. There is sufficient evidence however to conclude that in the years 1853-1856 the death-rates in Tasmania and Victoria, at least, were unusually high. This period also corresponds with the position of Jupiter in his orbit between perihelion and aphelion, and also with the minimum sunspot period.

Doubtless there are other complex relations which obscure the question under consideration, but the independent observations now carried on in all parts of the world by so many skilled investigators will sooner or later enable us to understand them more thoroughly than we do at the present time.

Comparative table showing the suggested coincidence between the death-rate and certain super-terrestrial phenomena :—

DEATH-RATE AND SUN-SPOT PERIODICITY COMPARED

Mean of 13 European States
Sweden
Mean of 7 Colonies of Australasia

Tasmania

Victoria

South Australia

New South Wales

Jupiter's Orbit
A. Aphelion   P. Perihelion

Wolf's Sun-spot Periodicity
M. Maximum   P. Minimum

R. M. JOHNSTON.

* Unit. Number of Deaths per 1000 Persons living.

ANNUAL DEATH-RATE OF VARIOUS COUNTRIES.

	Europe		Australasia							Mean of Thirteen Principal States of Europe	Mean of the Seven Colonies of Australasia	Sun Spot Numbers (Wolf's)	Relative position of Jupiter in his orbit. A Aphelion. P Perihelion.
	England	Sweden	Victoria	New South Wales	South Australia	Queensland	Western Australia	New Zealand	Tasmania				
1804	...	...	...	...	...	...	...	...	...	...	...	73·1*	—
1810	...	...	...	...	...	...	...	...	...	...	...	0·0†	—
1816	...	...	...	...	...	...	...	...	...	...	...	46·4*	—
1823	...	...	...	...	...	...	...	...	...	...	...	1·8†	—
1830	...	...	...	...	...	...	...	...	...	...	...	70·7*	—
1833	...	...	...	...	...	...	...	...	...	...	...	8·5†	—
1837	...	...	...	...	...	...	...	...	...	...	...	138·2*	—
1839	21·8	...	...	...	...	...	...	...	...	...	...	...	A
1843	21·2	...	...	...	...	...	...	...	...	...	...	10·7†	—
1845	20·9	...	...	...	...	...	...	...	...	...	...	...	P
1848	24·7	...	...	...	...	...	...	...	...	...	...	124·3*	—
1851	22·0	20·8	...	...	...	...	...	...	...	...	...	...	A
1853	22·9	23·7	...	...	...	...	...	...	...	...	...	...	—
1856	20·5	21·8	...	...	...	...	...	17·80	...	...	...	4·3†	P
1857	21·8	23·7	...	...	...	...	...	17·10	...	...	...	...	—
1860	21·2	17·6	...	...	...	...	...	19·92	...	...	...	95·7*	—
1861	21·6	18·5	...	...	...	...	...	16·36	...	23·4	...	77·2	—
1862	21·4	21·4	...	...	...	...	...	15·01	...	23·1	...	59·1	A
1863	23·0	19·3	...	...	...	...	...	15·49	...	24·4	...	44·0	—
1864	23·7	20·2	...	...	...	...	...	15·34	...	25·5	...	46·9	—
1865	23·2	19·4	16·97	16·41	14·30	21·42	...	15·13	13·40	26·0	16·3	30·5	—
1866	23·4	20·0	19·37	17·47	17·20	25·67	...	12·86	14·19	28·8*	17·7*	16·3	—
1867	21·7	19·6	18·06	19·64	17·48	17·80	...	12·78	14·44	25·5	16·7	7·3†	—
1868	21·8	21·0	15·00	15·83	14·41	17·36	...	11·94	14·75	25·9	14·9	37·3	P
1869	22·3	22·3	15·47	14·05	12·37	16·20	...	11·73	13·24	25·4	†13·8	73·9	—
1870	22·9	19·8	14·61	13·27	13·94	14·59	...	11·13	14·08	26·1	13·6	139·1*	—
1871	22·6	17·2	13·46	12·54	12·87	14·83	...	10·13	13·46	27·0	12·9†	111·2	—
1872	21·3	16·3	14·38	14·11	15·33	14·97	14·02	11·68	13·83	25·4	14·0	101·7	—
1873	21·0	17·2	15·02	13·84	13·48	16·06	16·24	12·67	14·60	27·4*	14·6	66·3	—
1874	22·2	20·3	15·72	15·12	17·05	17·98	18·74	13·05	16·22	25·0	16·3	44·6	A
1875	22·7	20·2	19·42	18·09	19·45	23·80	17·88	15·92	20·01	25·4	19·2*	17·1	—
1876	20·9	19·5	17·02	18·11	16·28	18·82	14·18	12·66	16·57	24·3	16·2	11·3	—
1877	20·3	18·5	15·80	15·28	13·99	17·29	15·70	11·47	19·19	23·9	15·5	12·3	—
1878	21·6	18·0	15·46	15·88	15·44	20·41	14·07	11·01	15·67	24·2	15·4	3·4	—
1879	20·7	16·9	14·53	14·29	14·09	14·97	14·46	12·46	15·18	23·7	14·3	6·0	—
1880	20·6	18·1	13·70	15·57	14·85	13·59	13·24	11·46	16·12	24·29	14·0†	32·3	P
1881	18·9	17·7	14·16	15·12	14·49	15·02	13·80	11·13	14·77	23·30†	14·0†	54·2	—
1882	19·6	17·4	15·31	16·03	15·15	17·99	14·16	11·19	15·82	23·51	15·2	...	—
1883	...	...	...	...	...	...	...	...	17·06	...	...	...	—

* Maximum period. † Minimum period.