

ON THE
INFLUENCE OF THE MOON
ON THE
ATMOSPHERE OF THE EARTH,
AND ON THE
PATHOLOGICAL INFLUENCE
OF
THE SEASONS.

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BEFORE proceeding to the consideration of the influence of the moon on the earth's atmosphere, in continuation of my last paper (page 438), I would observe that I omitted to notice in their proper place some speculations of Mr. Morrison on lunar influence, in a paper published about ten years ago in the "London Medical Gazette" (vol. xi., p. 756), wherein he attempted to show a close agreement between the periods of gestation and incubation and the motion of the moon in her heavenly path. After specifying several illustrative instances, he says,—“I find no case in which the planet is not in some position, with regard to her original place at the commencement of gestation or incubation, which forms the angle or supplemental angle of a regular polygon which may be inscribed in a circle.” Mr. Morrison thought he could show, also, that it is the periodic return of the moon to her

own place, or to certain angular distances from her own place, at the woman's birth, which determines the menstrual period. I am not aware that Mr. Morrison has since carried out his views.

To return to the proper subject of this communication: I would observe that amongst the scientific individuals who might be mentioned as denying that the moon exerts a varying influence on the earth's atmosphere as she revolves round our earth, M. Arago is the most distinguished; amongst those who have asserted the reality of that influence the names of Toaldo and Howard are the most prominent. As it is of importance to proleptical science that the question be decided, I shall place the facts bearing on the subject before the reader, giving him, as in previous communications, an opportunity to judge for himself.

There are ten situations of the moon in her orbit when she will have most influence on the atmosphere. The new, and full, and the quadratures; the perigee, and apogee; her passage over the equinox, forming the moon's ascending and descending equinox; and the lunistics, so called by M. Dela Lande, namely, the boreal when the moon is nearest our zenith, and the austral when she is most distant.

M. Toaldo compared a table of forty-eight years' observations of the weather, made in Lombardy, with other tables as to the state of the weather at these ten points. He tabulated the result as follows:—

Lunar Points.	Attended with Change in the Weather.	Attended with no Change.	Proportions Reduced to Lowest Terms.
New moons	522	82	6 to 1
Full	506	92	5 to 1
First quarter.....	424	189	2½ to 1
Last quarter	429	182	2½ to 1
Perigees	546	99	7 to 1
Apogees.....	517	130	4 to 1
Ascending equinoxes	465	142	3½ to 1
Descending equinoxes	446	152	2¾ to 1
Southern lunistics	446	154	3 to 1
Northern lunistics	448	162	2¾ to 1

Several of these points coincide with one another at intervals, in consequence of the inequality of the moon's revolutions. These coincidences are the most efficacious in causing changes in the atmosphere.

	Proportion of Change and no Change in the Weather Reduced to Lowest Terms.
New moon coinciding with the perigee.....	31 to 1
New moon coinciding with the apogee	7 to 1
Full moon coinciding with the perigee	10 to 1
New moon coinciding with the apogee	8 to 1*

Mr. Howard has paid very considerable attention to the periodic influence of the moon. His cycle of the seasons is one of the most important discoveries of modern

meteorology. He has lately published a second edition of his "Seven Lectures on Meteorology," in a cheap form; and a good little book of the kind it is. In this work he says (page 96),—"The moon's position, operating by the common effects of the attraction of gravitation, influences alike the

* For these and other statements vide Magazine of Science, vol. iv., p. 6.

course of the variable *winds*, the daily variation of the *temperature*, and the *rain* of every year; but not in every year alike: there is a constant periodical variation of the variation itself.

"The following are a few of the results:—

1. To begin with 1807, the first year examined in the work, the days on which a *northerly* wind appears under a full moon (the spaces taken being weeks, with the phase on the middle day) are double the number of those that occur under the new moon; and the days on which a *south-west* wind blew under the new moon, are to those under the full as thirty-three to seventeen. The *south-east*, again, are six under new, to four under full moon; while the *east* are eleven under full, to five under new moon.

"2. The rain of the year is found distributed accordingly, viz.:—

"For the weeks under last quarter, 6.92 in.

For those under new moon, 5.09 in.

For those under first quarter, 6.17 in.

For those under full moon, 0.84 in.

"The total for the solar year being 19.02 in., we find that *not a twentieth part of the rain of the year fell in that quarter of the whole space which occurred under the influence of the moon at full.*

"3. Contrary to the state of the *barometrical variation* in 1798, almost all the principal elevations of the column appear in this year under the full moon, along with the *northerly winds*.

"4. Lastly, the *mean temperature* of the weeks preceding new and full moon is lower in this year, by two degrees, than that of the weeks preceding the quarters."

Mr. Howard, however, shows how these results do not hold good for every year; and it is in this respect that his observations are so valuable, because showing how cautious we ought to be in making deductions from a limited number of observations, or in considering observations in a contracted manner. Mr. Howard goes on to say, "But we must not make the year 1807 a rule for others, any more than 1798. The year was remarkable (as has been shown) for *dryness*, and that dryness under the aspect of the full moon; in 1808 the phase in question loses this character quite; and in 1816 (a very wet year) the rain lies, two-thirds of it, on this side of the moon's orbit, and chiefly in the week before the full, the opposite phase being dry in proportion.

"So much for the *phases*; but if we take it by the *declination*, the dry and the wet year agree in the distribution of their rain; and this distribution, so far as it can be reduced to a common principle, appears to be as follows:—*While the moon is far south of the equator there falls but a moderate quantity of rain in these latitudes; while she is crossing the line towards us our rain increases; and the greatest quantity falls while she is in full north declination, or most nearly vertical*

to us; but during her return to the south the rain comes back to its lowest amount.

"The mean temperature, again, appears to increase along with the rain, and to decrease as the quantity of that is reduced, agreeably to the known principle that heat is extricated by the condensation of vapour and passes into the air. But if we have regard to the *phase* instead of the *declination*, as here, then the cold side of the moon's orbit is also found to be the *wet* one; and *vice versa*, comparative warmth brought comparative dryness."

We should at once anticipate that the barometer would vary at the lunar phases. "There is a constant tendency," says Mr. Howard, "in the *ordinary variation*, to show two elevations and two depressions in each lunar revolution, or in a period of twenty-eight days." From observations made at Somerset House it appears that the barometer is highest at new and full moon and lowest at the quadratures; from observations at the Paris Observatory the contrary is the case. According to the former the extent of fluctuation is nearly one-tenth of an inch; according to the latter only one-twentieth.*

I cannot learn that any meteorologist has ascertained the influence on atmospheric changes of a *coincidence of the moon's position with the diurnal variations of the barometer*, as, for example, when the new moon and perigee occur at four or ten o'clock. *A priori*, it might be expected that the changes would be decided. The construction of Herschel's well-known weather-table points indirectly to the coincidence as being influential.

The Influence of the Seasonal Changes.—Before discussing the question how far lunar atmospheric changes influence vital action, it will be advisable to consider the effect of seasonal atmospheric changes. One of the distinguishing characteristics of the works of Hippocrates, Sydenham, and Stoll, is the recognition of the influence of the seasons on diseases. "Some," Sydenham observes,† "happen indiscriminately, whilst many others, by a secret tendency of nature, follow the seasons of the year with as much certainty as some birds and plants. A knowledge of the seasons in which diseases ordinarily arise is of great use to a physician towards discovering the species of the disease as well as the methods of curing it; and the consequence of slighting this piece of knowledge is ill-success in both." A very true and practical remark.

Modern statistical inquiries have shown the pathological influence of the seasons more perfectly. Some of these results I subjoin, and parallel with these the concurrent variations in the barometer, thermometer, and hygrometer:—

* Mr. Lubbock, Phil. Trans, 1831.

† Preface to work on Acute Diseases.

	Maximum.	Minimum.
Variations in the barometer.		
a. Near London, 1807 to 1816	December.	July.
b. In the Deccan	Decem. or Jan.	July.
Variations in the hygrometer (London).....	January.	July.
in the thermometer	July or August.	January.
Amount of evaporation	July.	January.
Number of births (Belgium)	February.	July.
of deaths (Belgium)	January.	July.
Cases of insanity	June, July.	Decem., Jan.
of suicide	Summer.	Winter.
Deaths from Drunkenness } London, 1842 }	Summer.	Winter.
Crimes against persons	June.	January.
Crimes against property	December.	July.*

The preceding results (with two exceptions) are from Mr. Howard's work, already named, and Quetelet's *Essay on Man*, the cheap and useful translation of the Messrs. Chambers. Lieut.-Col. Sykes made the observations in the Deccan; they are detailed in the *Phil. Trans.* for 1835.

I ought to state that summer in the preceding table comprises the months of June, July, and August, and that the winter months are December, January, and February. I have before remarked on the unfitness of the popular division of the seasons as a basis for statistical inquiries. As regards the extremes of cold and heat, the second or third week of January is midwinter; the last week in July, or first or second in August, is midsummer—and not the middle of February and August. I then proposed that the solstices and equinoxes should be the middle of the seasons; and although the time of the year when the days and nights are equal is not the period when the thermometer is at the mean heat of the year, I still

think that that would be the best division, because the hygrometric and barometric variations, and the amount of light to which animals are exposed, are quite as important elements in calculating the influence of seasonal changes as the amount of thermometric variations, even if we overlook terrestrial magnetism altogether. When the registrar-general's report for 1840 came out I made some statistical notes on the tables, illustrating the influence of the seasons. I re-arranged the weekly return for the metropolis according to the *natural* division of the year into seasons, and compared the results with those given in the report based on the *popular* division of the year.

Deaths from Diseases of the Respiratory Organs.	Natural Division.	Popular Division.
1840 { Summer	2981	2793
{ Autumn	2999	4098
1841 { Winter	4732	4534
{ Spring	3943	3385
Deaths from Measles.		
1840 { Summer	301	308
{ Autumn	251	355
1841 { Winter	346	158
{ Spring	102	147
Deaths from Scarlatina.		
1840 { Summer	436	516
{ Autumn	534	416
1841 { Winter	294	167
{ Spring	125	124
Deaths from Small-pox.		
1840 { Summer	213	253
{ Autumn	381	708
1841 { Winter	850	605
{ Spring	354	252

The obvious discrepancies between these results will be more apparent if the number of deaths occurring in summer and autumn, and in winter and spring be added together and tabulated.

DISEASES.	Deaths in Summer and Autumn, 1840.		Deaths in Winter and Spring, 1841.	
	Natural Division.	Popular Division.	Natural Division.	Popular Division.
Respiratory organs	5982	6890	8675	7919
Measles	552	663	448	295
Scarlatina	970	932	419	291
Small-pox	594	961	1204	857

From this table we learn that the fatality of diseases of the respiratory organs is much more dependent upon temperature than is shown by the usual tables; but it is even greater than is shown by this table, since the mean temperature of autumn is higher than that of spring, because "the earth," to use the words of Mr. Howard, "having imbibed heat in the summer requires to lose it before the winter's cold can be established; and in like manner having been cooled in winter, it requires to be warmed again before summer can set in." The vernal month of March corresponds to October, with reference to the sun's declination, but the mean temperature of the latter is 50.79° ; of the former only 42.01° ; and even in April, corresponding to September, the mean is only 47.61° , while in the latter month it is 57.70° .

Correct estimates of the seasonal influence in each year become of much higher importance when it is remembered that it is from data of this kind the difficult problem of the periodic return of epidemics must be solved. The difference between the medical constitution of each year is as great as the difference in the meteorological constitution demonstrated by Mr. Howard. It becomes necessary, therefore, to obtain accurate statistical data of each year for a series of years (at least for eighteen), so constructed that the epidemical constitution may be compared with the meteorological. But I am anticipating a part of my subject. I trust, however, that Mr. Farr will excuse this reference to his own department, and will not think these suggestions unimportant. The whole subject is really a new branch of political economy, possessing surpassing interest for the philosophic statesman. A few thousands a-year would be well spent in the maintenance of meteorological observatories, and in securing accurate digests of the registrar's returns with special reference to meteorological phenomena.

To go back, however, to the original question,—Does the moon so act on the earth's atmosphere as to influence vital action? We have seen, or shall see, that the diurnal and seasonal atmospheric variations in the barometer, thermometer, electrometer, and hygrometer, are distinguished by physiological and pathological changes (I shall subsequently show the *physiological* influence of the seasons), and we have seen that the moon's phases and positions are coincident with atmospheric vicissitudes. The inference then necessarily follows that the moon has an influence on vital action. It is not so evident that the increase or diminution in the density of the atmosphere is the proximate cause of this influence, as maintained by Mead. Like the diurnal periodicity of disease, it is the result of various coincident changes.* If an increase or diminution in the density of the air were the sole cause, we should anticipate marked results in those persons who have ascended high mountains, or made aerial voyages. I have looked into travellers' histories for illustrative facts, but have found little available information. The most interesting statement is that of Lieutenant Wood, who made a journey to the source of the Oxus, a lake situate in a part of the great Himalayan or Hindoo Koosh Chain, at an altitude of 15,000 feet above the level of the sea. He and his party experienced so great muscular debility, evidently from the want of a sufficient supply of oxygen, that even conversation could not be kept up without exhaustion. His observations on the pulse are interesting. He says,—“I felt the pulses of my party whenever I registered the boiling point of water. The motion of the blood is, in fact, a sort of living barometer, by which a man acquainted with his own habit of body can, in great altitudes, roughly calculate his height above the sea. Upon Pamir (the source of the Oxus) the pulsations in one minute were as follows:—

	Throbs.	Country.	Habit of Body.
My own	110	Scotland	Spare.
Gholam Hasein, munshi	124	Jasulmere	Fat.
Omerallah, mule-driver	112	Afghan	Spare.
Gaffir, groom	114	Peshawaree	Spare.
Dowd, groom	124	Kabuli	Stout.”†

* Since my last communication was printed my attention has been called to some remarks of Dr. Graves (in his “Clinical Medicine”) on the subject of diurnal periodicity, and its connection with atmospheric changes.

I am happy to observe that his views do not differ materially from my own.

† Journey to the Source of the River Oxus, &c., 8vo., London, 1841, p. 362.

Water boiled at 184°. It is certainly a reasonable hypothesis that barometric (with hygrometric changes) may induce sanguineous effusion in those persons in whom the vascular system is already diseased. Apoplexy may thus be induced; indeed, the more frequent recurrence of that affection at the equinoxes has been thus explained. This result would, hypothetically, be more certain when the diurnal barometric period and the hebdomadal are coincident; as was undoubtedly the case in the instances of hæmorrhage detailed by Dr. Pitcairn, and referred to in my last communication. However, what theory soever we may adopt, it is quite certain that atmospheric vicissitudes influence vital action most extensively. For the country resident, spiders, a leech in a bottle, sheep or cattle in a field, or rooks, are efficient substitutes for the barometer; while, to the citizen, a rheumatic joint or a tender corn foretell a change in the weather as surely, often more surely, than the weather-glass. It is, undoubtedly, difficult to explain the nature and *modus operandi* of atmospheric influences, but the facts to be observed, and through which the proper knowledge may be attained, are proportionately numerous and accessible. Little more is necessary to its attainment than systematic, sedulous, and persevering observation.

In my next communication I shall consider the changes in vital action, occurring at annual or longer periods.

York, Aug. 26, 1843.

HECTIC FEVER.

As it is the fever which comprises local irritation (especially suppuration), surgeons may be permitted to *remove the cause*, as by amputation. The effect is wonderful. Sleeplessness, colliquative sweats, and purging, cease at once. In hectic fever watch and check the perspiration; take care not to throw the action on the bowels; nourish with light food; support with appropriate tonics.—*Sir Charles Bell.*

GLANDERS.

WHENEVER an animal is suspected of having this disease, the groom, or person attending it, should make a strong solution of alum, and keep it by him in the stable. As often as he has occasion to go near the horse, he should immerse his hands in the alum solution, and keep them there for some moments. Alum is an astringent, closing the pores of the skin of the hand, and which can consequently, for a certain time, prevent absorption of poisonous matter from taking place. Perhaps other astringents, as sulphate of copper, would answer as well, but alum is cheaper, more easily managed, and equally efficacious. If there be a cut on the hand it should be carefully covered with adhesive plaster.—*Veterinarian.*

PRACTICAL OBSERVATIONS

ON THE

CURATIVE EFFECTS OF BELLADONNA

IN CERTAIN AFFECTIONS OF

THE NERVOUS SYSTEM.

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HAVING for a considerable period been engaged in noting the effects of belladonna upon certain morbid affections of the nervous system, I am desirous of placing before my medical brethren, in a condensed and concise form, their results,—knowing how impossible it is that the limited extent of one practitioner's observations can substantiate any important practical fact in medicine, and hoping to induce others to afford this active remedy an impartial trial,—and by this believing that, should their experience lead to the same conclusions I have arrived at, that a valuable remedial auxiliary may be reclaimed from obscurity,—or, on the contrary, if not found as effectual as the belladonna in certain morbid affections is believed by me to be, that it may be left to share the fate of other vaunted remedies, and thus, in either case, an approach to truth attained.

The belladonna has been long employed on the continent, and more particularly in Germany, as a means of relieving pain of a neuralgic character when administered internally; in this country it has been rarely used, excepting as an endermic application, and but little confidence has been placed in its utility. This appears to be principally owing to the apprehensions entertained regarding the dangers attending its administration, which have deterred many from giving it a trial. The following observations are undertaken to show in what cases the belladonna may be given internally with safety and advantage, and under what circumstances dangerous results may be anticipated and expected. The extract of belladonna has been the preparation I have employed, and it is essential that in its further application medicinally, the purity and tested efficacy of the preparation, by the effects produced upon the iris, should be satisfactorily ascertained.

That the poisonous effects of an over-dose of belladonna are mainly exerted upon the cerebrum, there can exist but little doubt; the delirium, cerebral excitement, and subsequent effusion, in fatal cases, prove this to be the case; and the absence of convulsions in the only fatal case which I have witnessed leads me to infer that it is the true cerebral, and not either the cerebro-spinal or true spinal system of nerves upon which any injurious effects are exerted. Should the extended