

Carpenter
Say 1886

36 Craven Park
Berkeley, D. C.

Dec 26. 1886

My dear Sir,

Thank you for your post card of Dec 3, & for sending me a separate copy of the 1885 report of the McGill University. I did not see these separate copies in the Exhibition, but I had read it through in a volume lent me by M. Oriomet - and you will see that in the full text of my paper (a copy

of which I send you) I had
copied some lines from that
very report to which you
now direct my attention,
showing that ~~this~~ you grant
degrees in Science, & have a
4 years training in V. V. U.

I fear that you may be
under the impression that
in preparing my paper, I
had overlooked the work
of the McGill faculty of
Applied Science - but I
think you will now see

that it was duly summarised
& noticed in its proper place.

It was a difficult task
to concentrate so much
into a 45 minutes paper -
and to go into detail about
any special institution
was out of the question.

I shall be glad of another
card to say you have
received this, and have
verified the quotation in
the paper.

// I enclose you an outline
of a recent lecture of mine
which may interest you, as

bringing together many facts. The "Daily News" report of it was very widely copied.

I hope that you & Lady Dawson had a pleasant passage home - and are in good health. We are having a severe winter - keen frosts, snow storms, & violent gales, with ^{almost} ~~an~~ ^{un} precedently low barometer.

With best wishes for you all for the New Year, I am,

Faithfully Yours

W^m Launt Carpenter

Sir W^m Dawson.

SUNDAY LECTURE SOCIETY,

ST. GEORGE'S HALL, LANGHAM PLACE.

SUNDAY AFTERNOON, OCTOBER 17th, 1886,

AT FOUR O'CLOCK PRECISELY;

LECTURE ON

“Sunspots, and their connection with
Terrestrial Phenomena,”

By WM. LANT CARPENTER, Esq., B.A., B.Sc.

(With Oxy-hydrogen Lantern Illustrations.)

SYLLABUS.

Earliest observations of sunspots—noticed by Galileo to be confined to two zones, extending about 35 degrees on either side of the equator—their cavernous nature first demonstrated by Dr. Wilson, of Glasgow, in 1769.

Observations on spots and faculæ by the two Herschels and others. Commencement of work in 1826, by Schwabe, of Dessau, which resulted in the establishment of a periodic variation in the numerical relations of solar spots—Professor Wolf, of Zurich, fixed this at 11.11 years. The existence of minor periods has since been demonstrated.

Carrington's laborious observations—different velocities of spots in different solar latitudes—researches of De La Rue, Balfour Stewart, and Loewy, on planetary influence upon solar activity.

Calling the region from which the light of the Sun proceeds, the Photosphere, Solar phenomena may be grouped as—

- (1) Those beneath (*i.e.*, nearer to the Sun's surface than) the Photosphere; *e.g.*, Sunspots.
- (2) Those connected with the Photosphere, such as the “Willow-leaves” or granules.
- (3) Those taking place above the Photosphere; *e.g.*, Faculæ, Prominences or Red flames, Chromosphere, and above all, the Corona.

The "Willow-leaves" of Nasmyth and Herschel, and the granules of Huggins—their connection with sunspots. Processes of formation, enlargement, and disappearance of spots. Cyclonic motions therein, with a velocity, in some cases, of 120 miles per second. Dimensions of, and changes in, spots—the smallest one telescopically visible must have an area of 50,000 square miles; probably the largest measured was in 1858, whose breadth was 143,500 miles, and whose total capacity probably exceeded the volume of 100 earths. Extraordinary rapidity of the changes in their appearance—use of the spectroscope in the study of their structure; Lockyer's researches.

Connection between sunspots and terrestrial phenomena,—

- a. *Terrestrial magnetism.* Wolf, Sabine, and Gautier, in 1852, first pointed out the correspondence between curves representing sunspot frequency, and the daily range of magnetic variation. Carrington's observations of September 1st, 1859—Magnetic Storms and earth-currents.
- b. *Auroral displays.* Investigations of Wolf, Fritz, and Loomis. The inequalities in the sunspot curve have a tendency to be exaggerated in the auroral curve, and this increases with the number of spots.
- c. *Temperature.* "There can no longer be a doubt that during about four sunspot periods (1810—1860) a most remarkable similarity exists between the curves representing sunspot frequency, and the curves of nearly every meteorological phenomenon which is related to temperature" (Schuster). Discussion by Kœppen of temperature—records from 250 stations in different parts of the earth. Minimum temperature corresponds to maximum of sunspots. Various confirmations of the 11-year period. Evidence obtained by Balfour Stewart and Carpenter of coincidence between sunspot inequalities and daily temperature ranges around periods of 24 and 26 days.
- d. *Atmospheric pressure.* Similarity of its curve to that of sunspots, maximum pressure occurring a short time after minimum of sunspots.

- e. *Intensity of wind.* Meldrum's observations on the number of cyclones in the Indian Ocean. Confirmation by Poey in the West Indies. Apparent connection between wind-weather and magnetic disturbance weather at Kew.
- f. *Rainfall, Hail, and Clouds.* The coincidence of hail-fall statistics and those of sunspots is much more decided than those of rain-fall. Cirri (*i.e.*, clouds of ice-needles) and solar halos vary in frequency with the auroræ. Observations of Tromholdt.
- g. *Thunderstorms.* Statistics of fires caused by lightning in Bavaria, and of thunderstorms in the Indian Ocean, show a decidedly close correspondence between sunspot maxima, and minima of lightning flashes.
- h. *Harvests, Famines, &c.* Both quality and quantity of vine-produce show a well-marked sunspot period. Chambers' comparison for three-quarters of a century between sunspot frequency and the price of Indian food-grains. Fallacy in Jevons's supposed connection between sunspots and the periodicity in commercial crises.

Desirability of the adoption of a provisional working hypothesis, especially in connection with terrestrial magnetism.
Conclusion.

NOTE.—In the Report of the British Association for the Advancement of Science for 1884 (Montreal meeting), pp. 446—463, will be found a *resumé* of the latter part of this subject by Dr. Schuster, with references to a large number of original papers.

The Lecture on Sunday, October 24th, 1886, will be by GEORGE WOTHERSPOON, Esq., M.A.Oxon., on "Mormonism; or the Faith of the Latter-Day Saints; its History and Moral."

Payment at the Door:

ONE SHILLING (reserved seats);—SIXPENCE;—and ONE PENNY.

2.—1000.