The data previous to 1841 are, I suppose, less reliable; but I may add these two cases of August rainfall under average:

Sun-spot max. 1830	...	Rainfall of August 1831, 2·14 in.
,, 1837	...	,, ,, 1838, 0·93 ,,

By way of showing that in other parts of the country there has been, in recent years at least, a similar variation, I add three similarly smoothed curves of August rainfall for Haverfordwest, Llandudno, and Boston (Lincoln) respectively (*c*, *d*, *e*). The data, however, do not extend back further than 1866.

The case of Greenwich may be presented as follows:—Take each maximum sun-spot year, and a year on either side, and tabulate the August rainfall in each of these. Indicate by the letters *d* (for dry) and *w* (for wet) whether this rainfall has been below or above the average. Then we have:—

Maximum.						
1847, 1848, 1849	...	1·95	4·25	0·45	...	*d w d*
1859, 1860, 1861	...	1·13	3·68	0·57	...	*d w d*
1869, 1870, 1871	...	1·21	2·02	0·86	...	*d d d*
1882, 1883, 1884	...	1·16	0·71	0·67	...	*d d d*

Here we find ten cases of a dry August out of twelve. Those twelve values give an average of 1·55 inches.

Now do the same with minimum sun-spot years:—

Minimum.						
1842, 1843, 1844	...	1·78	3·62	1·71	...	*d w d*
1855, 1856, 1857	...	1·40	2·42	2·50	...	*d w w*
1866, 1867, 1868	...	2·42	2·64	2·61	...	*w w w*
1877, 1878, 1879	...	2·90	5·38	5·19	...	*w w w*
1888, 1889, 1890	...	3·73	1·81	2·54	...	*w d w*

Here we find eleven cases of a wet August out of fifteen. Those fifteen cases give an average of 2·84 inches.

It would be interesting to know to what extent such relations subsist elsewhere, and perhaps some of your readers may be disposed to investigate the matter.

A. B. M.

Alteration in the Colours of Flowers by Cyanide Fumes.

It is well known that the yellows of some insects are turned to red by the fumes from potassium cyanide; but I have not, after some inquiry, been able to obtain any literature describing the effects of such fumes upon the colours of flowers. The reactions I have observed are very curious, and while it seems improbable that they are hitherto wholly unknown, it may not be amiss to direct attention to them. A few lumps of the cyanide are placed in a corked tube, covered with a little cotton, and the flowers are placed on the cotton. It is probably necessary that the day should be hot, or the tube slightly warmed. The pink flowers of *Cleome integrifolia* and *Monarda fistulosa* turn to a brilliant green-blue, and finally become pale yellow. A purple-red *Verbena* becomes bright blue, then pale yellow. The purple flowers of *Solanum slæagnifolium* go green-blue and then yellow. The white petals of *Argemone platyceras* turn yellow—the natural colour of *A. mexicana*. The pale yellowish flowers of *Mentzelia nuda* turn a deeper yellow. Flowers of *Lupinus argenteus*, var., turn pale yellow. White elder (*Sambucus*) flowers turn yellow. The scarlet flowers of *Sphæralcea angustifolia* turn pale dull pink, resembling somewhat a natural variety of the same. Any of your readers will doubtless obtain similar results with the flowers growing in their vicinity.

T. D. A. COCKERELL.

Las Cruces, New Mexico, U.S.A., September 3.

ON THE CONSTITUENTS OF THE GAS IN CLEVEITE.

We have investigated the spectrum of the gas discovered in the mineral cleveite by Ramsay, and have found it to be most regular. It consists of six series of lines, the intensity of the lines in each series decreasing with decreasing wave-lengths. Similar series of lines have been observed in many spectra. The first series was discovered by Dr. Huggins in the ultra-violet spectra of a number of stars. It proved to belong to hydrogen, and to be the continuation of the four strong hydrogen lines in the visible part of the spectrum. Johnstone Stoney had already shown that three of the wave-lengths of the visible hydrogen lines were most accurately proportional to the values 9/5, 4/3, 9/8, when Balmer discovered that these values were given by the formula

$$\frac{m^2}{m^2 - 4}$$

for $m = 3, 4, 6$, and that the other wave-lengths of the series were proportional to the values obtained by substituting for m the other entire numbers greater than three. The series has now been followed from $m = 3$ to $m = 20$, the lines growing weaker and weaker to the more refrangible side, and approaching each other closer and closer. The formula shows that they approach a definite limit for large values of m. This is seen more clearly when we consider wave-numbers instead of wave-lengths, which according to the formula would be proportional to

$$1 - \frac{4}{m} 2.$$

Many series of lines similar to the hydrogen series were discovered by Liveing and Dewar. They have called them harmonic series, and have compared them to the series of over-tones of a vibrating body. They have been further studied by Rydberg and by Kayser and Runge. We cannot here enter into any detailed account. We only want to explain so much as to make the conclusions understood which we have drawn from the spectrum of the gas in cleveite. The wave-lengths λ of the lines belonging to the same series are always approximately connected by a formula somewhat similar to Balmer's

$$1/\lambda = A - B/m^2 - C/m^4.$$

A determines the end of the series towards which the lines approach for high values of m, but does not influence the difference of wave-numbers of any two lines. B has nearly the same value for all the series observed, and C may be said to determine the spread of the series, corresponding intervals between the wave-numbers being larger for larger values of C. As B is approximately known, two wave-lengths of a series suffice to determine the constants A and C, and thus to calculate approximately the wave-lengths of the other lines. It was by this means that we succeeded in disentangling the spectrum of the gas in cleveite, and showing its regularity.

In the spectrum of many elements two series have been observed for which A has the same value, so that they both approach to the same limit. In all these cases the series for which C has the smaller value, that is to say which has the smaller spread, is the stronger of the two. In the spectrum of the gas in cleveite we have two instances of the same occurrence. One of the two pairs of series, the one to which the strong yellow double line belongs, consists throughout of double lines whose wave-numbers seem to have the same difference, while the lines of the other pair of series appear to be all single. Lithium is an instance of a pair of series of single lines approaching to the same limit. But there are also many instances of two series of double lines of equal difference of wave-numbers ending at the same place as sodium, potassium, aluminium, &c. There are also cases where the members of each series consist of triplets of the same difference of wave-numbers as in the spectrum of magnesium, calcium, strontium, zinc, cadmium, mercury. But there is no instance of an element whose spectrum contains two pairs of series ending at the same place. This suggested to us the idea that the two pairs of series belonged to different elements. One of the two pairs being by far the stronger, we assume that the stronger one of the two remaining series belongs to the same element as the stronger pair. We thus get two spectra consisting of three series each,

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