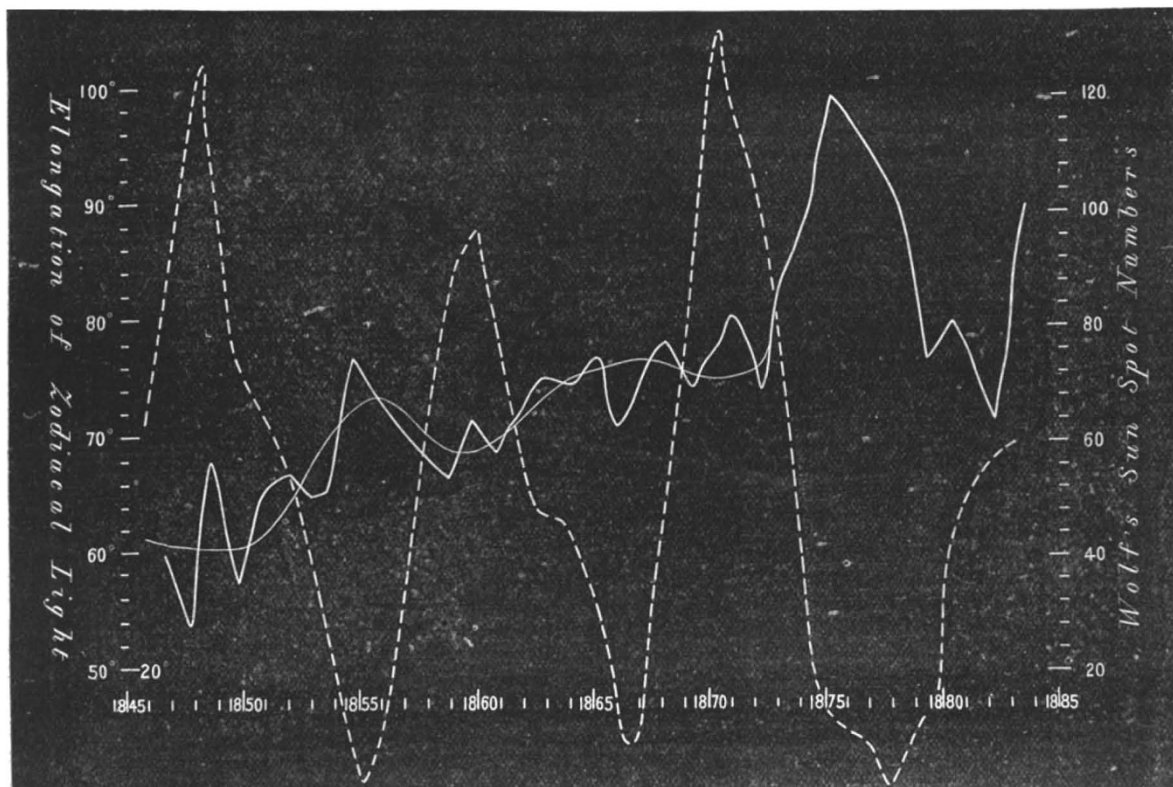


of the apparent apex of the zodiacal light from the sun. It will be seen that each sun-spot minimum corresponds with a maximum of the zodiacal light, and each sun-spot maximum with a minimum of the zodiacal light. The minimum in 1870 must be considered as masked by the forces tending to produce the enormous maximum of 1876. It will be noticed, too, that when the sun-spot phenomena are more extensive, as in 1850 and 1870, the following zodiacal light phenomena are also more extensive; where the sun-spot phenomena are less, as in 1860, the following zodiacal light phenomena are less extensive; and *per contra*, when the zodiacal light phenomena are extensive, as in 1880, the sun-spot phenomena are less extensive. As far as this series goes, the correlation seems to be complete.

We may gain some insight into the relation by tabu-

lating the various spectroscopic observations in their order in the sun-spot cycle. Thus we have Lias, for four years during the rise in the sun-spot period, observing only a faint continuous spectrum; Respighi and Lockyer, just after sun-spot maximum, one bright line; Vogel, the same; Smyth, Secchi, Pringle, about the same date, no spectrum, or only a continuous spectrum; Tacchini, possibly a bright line; Wright, three years after maximum, generally only a continuous spectrum,—three times a bright line; Burton, fourth year after sun-spot maximum, continuous spectrum; generally a bright line; Arcimis, five years after sun-spot maximum, continuous spectrum and *two* bright lines (1480 K and 2270 K). It would seem, therefore, that the zodiacal light is more gaseous at sun-spot minimum, and only slightly, if at all gaseous, at and near sun-spot maximum.



Comparison of zodiacal light elongations with Wolf's relative sun-spot numbers.

The same story is told by the disturbances suffered by Encke's comet.¹

We would consider, therefore, the zodiacal light a locus of condensation.

One may notice, too, that the light appears, in common with the frequency of auroræ and the diurnal range of the declination-needle, to be affected by a disturbance of longer period. But for the present we must restrain ourselves from the connections with terrestrial and cosmical physics with which the matter teems, and ask—what is the principal object of this communication—that those who are not observing will observe, and that those who have, or know of the places of concealment of, any observations, will kindly call them to our attention.

Baltimore, Md.

O. T. SHERMAN.

¹ Gould's *Astronomical Journal*.

CHEMISTRY AT THE BRITISH ASSOCIATION.

IT was hardly to be expected that the proceedings of the Chemical Section of the British Association would be as remarkable at Bath as at Manchester. Nevertheless, at Bath some interesting discussions took place, and some valuable papers were read.

The President's Address was listened to with great interest, and formed a fitting introduction to the discussion, which afterwards took place, on the teaching of chemistry.

In the "Report of the Committee on the Action of Light on the Hydracids, in Presence of Oxygen," read by Dr. Richardson, some experiments were described, in continuation of those read before the Association last

year. The influence of traces of free chlorine and of moisture on the course of the reaction was investigated.

In connection with the "Report of the Committee on the Properties of Solutions," read by Dr. Nicol, a new apparatus for determining solubilities at temperatures below 100° was shown. Excellent results had been obtained, owing to the very intimate mixture of the salt and solvent.

Dr. Johnstone Stoney exhibited to the Section a diagram illustrating the logarithmic law of the atomic weights. Many curious relations are brought out by its means. If, as seems probable, the logarithmic law be a law of Nature, there appear to be three elements lighter than hydrogen.

Prof. Sterry Hunt, in his paper on "The Study of Mineralogy," advocated a system of mineralogy, based on the successive forms which are imposed upon matter: (1) the chemical form or composition; (2) the mineralogical form, or physical state; (3) the crystalline form, being the most accidental.

Some speculations suggested by Van 't Hoff's hypothesis were put forward by Mr. J. E. Marsh, attention being drawn to certain compounds, which appear to be *geometrical* isomers.

The same author, in another paper, suggested a new constitutional formula for camphoric acid.

On the Friday morning an interesting and well-attended discussion (at which the members of Section D were present) was opened by Prof. Michael Foster, on the "Chemical Problems presented by Living Bodies." In the course of his remarks he suggested several subjects for chemical investigation, such as the exact chemical difference of certain proteids, the changes which occur in the curdling of milk and the clotting of blood, and, to the biologist, the all-important question of the relation in which water stands to the organism.

An animated discussion followed, in which several chemists and biologists took part. In reply to Prof. Thiselton Dyer's question, as to whether the processes employed by chemists had any connection with those which take place in Nature, Prof. Armstrong cited several cases in which the chemical changes occurring in Nature bore a suggestive relation to those brought about in the laboratory.

In their paper on the "Incompleteness of Combustion on Explosion," Prof. H. B. Dixon and H. W. Smith show that, on exploding a mixture of oxygen and hydrogen in a long tube, a considerable residue of gas is obtained, which is still explosive. Experiments were made to arrive at the cause of the phenomenon, and an explanation is suggested.

A new gas-analysis apparatus was shown by Dr. Nicol, which combined the advantages of the Hempel apparatus with the means of using mercury and of readily performing explosions.

Dr. Bott exhibited a modification of a vapour-density apparatus, previously described, which can be employed at any temperature or pressure.

On the Saturday morning Prof. Dunstan read the "Report of the Committee on the Teaching of Chemistry," which was followed by a paper on "Chemistry as a School Subject," by the Rev. A. Irving.

In the ensuing discussion, which was confined to the teaching of chemistry in schools, many of the speakers seemed to agree with the opinions quoted in the report, viz.—

(1) That chemistry should be taught in schools, first, and mainly, on account of the mental training it affords; and, secondly, for the sake of its applications, and its direct bearing on the facts of every-day life.

(2) The chief difficulties met with in teaching seem to be those which arise from (i.) defective organization and considerations of expense; (ii.) the lower value attached to chemistry in comparison with other subjects of the school curriculum; (iii.) the time which is devoted to the

subject; (iv.) preparation for various examinations; (v.) absence of good text-books; (vi.) dearth of properly-qualified teachers.

(3) The older plans of teaching are felt to require modification.

The Committee ask for reappointment.

A discussion on "Valency" was opened on Monday by Prof. Armstrong. The question of constant and variable valency was referred to in connection with such compounds as chloroplatinic acid, &c., and a few new terms were introduced. The constitution of such bodies as tetra-methyl-ammonium iodide was considered. Dr. Morley drew attention to the influence which one element in a compound often has in modifying the properties of another not immediately adjacent to it. Chemists were advised to study the facts connected with the question carefully before speculating.

Later on, Mr. Veley described an ingenious arrangement he had invented for studying the action of acids on copper, under simple conditions.

The closing sitting was opened by Prof. Armstrong, who read the "Report of the Committee on Isomeric Naphthalene Derivatives." It was shown that the existence of all the known dichlor-naphthalenes can only be explained by the use of space-formulæ.

In a "Note on the Molecular Weight of Caoutchouc and other Bodies," Dr. J. H. Gladstone and W. J. Hibbert attempted to apply Raoult's method to the determination of very high molecular weights, with fair results.

Some interesting compounds of silicon with thio-carbamide and with aniline were exhibited and described by Prof. Emerson Reynolds, together with several other new thio-carbamide compounds. An account of these exhibits was given in NATURE last week (p. 575).

Dr. Richardson, in his paper on "The Action of Light on Water-colours," drew attention to the very important part played by moisture in assisting their decomposition. Colours are divided into two groups: (1) those which bleach under the combined influence of light, air, and moisture; (2) those on which light exerts a reducing action, which is independent of the air, and in some cases takes place in the absence of moisture.

A paper on "Pyrocresols," by Dr. W. Bott and J. B. Miller, was illustrated by specimens of a large number of derivatives of α -pyrocresol, amongst them being two new azo colouring-matters.

With the reading of this paper the proceedings terminated.

By the courtesy of several chemical manufacturers in the neighbourhood, the members of the Section were enabled, during the course of the meeting, to visit several works where interesting operations were being carried on.

GEOLOGY AT THE BRITISH ASSOCIATION.

THE most important geological work done at Bath this year related to volcanic and earthquake phenomena. Dr. Johnston-Lavis gave an account of the recent eruption in Vulcano, and read the letter which has already appeared in the *Times* from Mr. Narliou, a deeply interested and much-injured witness of the whole occurrence. The chief features seem to have been the ejection of very large blocks to a great distance—one, measuring 10 yards in length, having been found three-quarters of a mile from the crater—and the occurrence of flames, probably caused by the combustion of sulphur deposits. This paper was illustrated by lantern photographs taken by Dr. Tempest Anderson three months before the event. The latter gentleman also exhibited photographs of Vesuvius, Stromboli, and Etna, showing different phases of eruption.