

THE ORIONID SHOWER OF 1916.—These October meteors were fairly well seen this year between October 20 and 25 at Bristol. There were two showers, one at $92^{\circ}+15^{\circ}$, the true Orionids, and a richer one at $98^{\circ}+14^{\circ}$, near γ Geminorum. These results appear to substantiate observations made in 1900 and 1903 at Bristol, when the Geminids exhibited greater activity than the Orionids. The two showers, lying so near together, are very liable to be confused; in fact, in some cases it is impossible to say to which radiant the meteors are conformable.

Of the other showers belonging to this usually prolific meteoric epoch, only a few of well-pronounced character were visible this year. There were, however, some slow meteors from a sharply defined radiant at $72^{\circ}+66^{\circ}$, and some very swift, streaking meteors from a point at $121^{\circ}+43^{\circ}$. Several of the true Orionids, observed on October 20, were recorded at two stations, and their real paths have been computed.

ULTRA-VIOLET RADIATION FROM THE SUN.—Prof. Birkeland has recently given an account of some observations of the zodiacal light, and of the registration of the ultra-violet radiation of the sun (*Cairo Sci. Journ.*, vol. viii., p. 287). The most effective rays of the zodiacal light appear to have a wave-length of about 3200 Å.U. and under, so that, in attempts to obtain photographs, lenses of quartz, or mirrors of Mach's metal (67 Al+33 Mg) or of nickel, should be employed. Regarding the zodiacal light as a manifestation of the general electrical activity of the sun, Prof. Birkeland was led to investigate the ultra-violet radiation of the sun itself by the use of a filter consisting of a silver film which was opaque to visible light. Sunbeams transmitted through such a film were received by a photo-cell and registered in the usual manner. Variations of intensity were observed, and there was some slight evidence of a relation to changes in horizontal magnetic intensity. While allowing that some of the observed variations of the ultra-violet intensity were probably due to atmospheric differences, Prof. Birkeland finds reason to believe that variations also arise through real changes in the electrical state of the sun. The possibility of extending such observations to stars and planets by the use of large concave mirrors, say 4 metres in diameter, is suggested. A new analysis of celestial bodies, giving information as to their general electrical states, might thus be founded.

THE SOIL SURVEY OF WISCONSIN.¹

FOLLOWING the lead set by the American Bureau of Soils, the State of Wisconsin has arranged for a soil survey, and is publishing the results in a series of attractive booklets, well provided with maps, diagrams, and illustrations. First of all, there was issued in 1911 the so-called "Reconnaissance Soil Survey of Part of North-West Wisconsin," in which a general account was given of the geology, climate, soil, and agriculture of the area. This has now been followed by more detailed accounts of the various counties. It is proposed to complete the work by issuing a series of bulletins dealing with the management of the different types of soil, and on the 1-in. maps issued with these reports the various soil types are so clearly defined that the farmer would have no difficulty in locating his land, and so discerning which particular bulletin would give him advice as to cropping and management.

The region lies wholly within the great Mississippi valley, and its main topographical feature is the rela-

¹ Wisconsin Geological and Natural History Survey: Bulletins 28-32 Soil Series, Nos. 2-6, and Bulletins 37-40 (Soil Series, Nos. 7-10).

tively level or gently sloping surface of the land. Like other parts of the valley, it is an undulating plain into which lesser valleys have been cut by the rivers and streams.

The underlying rocks belong to the Cambrian or pre-Cambrian systems, and include crystalline rocks, sandstone, and limestone (mainly magnesian limestone). But on the whole the soils are not derived from the rocks immediately below them. Upon the broad uplands are extensive deposits of Glacial drift which in many cases retain the general forms left by the great ice-sheets that invaded this region. The lakes are here intimately related in origin to the Glacial deposits. There are also extensive wind deposits of loess over large portions of the uplands. In many of the valleys are thick deposits of loose sand and gravel, which assume the form of terraces.

The climate is not influenced by the Great Lakes, but it is by the storms that move eastward along the Canadian border and those that drift up the Mississippi valley from the south-west. As in other parts of the northern Mississippi valley, extremes of temperature prevail, the summer being warm, with abundant rainfall, and the winter cool and relatively dry. The mean temperature of the summer months is about 65° - 70° F.; in January and February about 10° F.; the extremes range from about 105° F. in the summer to -48° F. in winter.

Originally the land was covered with hardwood and pine, the latter being especially abundant on the sandy lands along the rivers. Much of this still remains, and there is considerable land available for agricultural settlement. Only in the west of the area do the thinly wooded and prairie lands occur.

The first settlers after the explorers and fur-traders were lumbermen, and their way into the country was by boat on the Chippewa River. But fifty or sixty years ago the agricultural settlement began, and now all the ordinary crops are raised in quantity, oats being the most important cereal, followed by maize, barley, and wheat. Among the special crops cultivated in certain districts are potatoes, sugar-beets, tobacco, peas, and maize for canning. Dairying is a particularly important industry; and it has further given rise to the well-known researches of Woll on feeding problems, and of Babcock and Russell on the composition of milk and the estimation of fat.

Typical analyses are given of the various soil types; as usual in the States, they are almost wholly mechanical analyses, only very few chemical data being given. In studying the results it must be remembered that the terms have very different meanings from those assigned to them in this country. The substances indicated by the analysis owe their properties to their sizes, and therefore the names given to them are intended simply to define the diameters of the particles, but unfortunately no international agreement has yet been reached, and hence the same name is used in different countries for wholly different-sized particles. Thus the terms have the following meanings in American and British surveys respectively:—

Mean diameter of particles, mm.

	United States	Great Britain
Fine gravel ...	2 -1	Above 1
Coarse sand ...	1 -0.5	1 -0.2
Medium sand ...	0.5 -0.25	Not used
Fine sand... ..	0.25-0.10	0.2 -0.4
Very fine sand...	0.10-0.05	Not used
Silt	0.05-0.005	0.04-0.01
Fine silt	Not used	0.01-0.002
Clay	Below 0.005	Below 0.002

Direct comparison with British soils is therefore impossible, a circumstance much to be regretted, as in

many cases the comparison would undoubtedly prove interesting. But fortunately the descriptions are so good that the student loses less than might be expected, and the results are very valuable, not only to the farmers for whom they were intended, but also to the student of soil problems all over the world.

E. J. R.

THE SCIENTIFIC WORK OF A SCHOOL OF TECHNOLOGY.

THE eighth volume of the Record of Investigations undertaken by members of the Manchester Municipal School of Technology, covering technological researches carried out during the year 1914, has just been issued. It is a highly interesting record of work accomplished, and is comprised in 258 quarto pages replete with explanatory diagrams and photographs illustrative of the text. This attempt to put upon permanent record the investigations conducted by members of the staff and by advanced students was begun in 1905, and has now extended to 2346 pages, and in its eight volumes covers researches carried out since the year 1900 in all departments of the school, including pure and applied mathematics, mechanical engineering, physics and electrical engineering, pure and applied chemistry and metallurgy, the science and practice of sanitation and building, textile manufacture, and the photographic and printing industries.

For investigations in all these important departments of industrial enterprise the school is exceptionally well equipped, and it has, moreover, had the assistance of many enlightened manufacturers, and in this connection many considerable extensions are in contemplation, only awaiting the conclusion of the war to give them full effect. Meanwhile new laboratories for advanced training and research in the subject of coal-tar chemistry in its bearing upon the dye-stuff industry have been opened under the charge of Prof. A. G. Green, of the University of Leeds, with the help and advice of Dr. E. Knecht, the professor of chemical technology, thus giving full opportunity, not only for the efficient training of chemists for the growing demands of the organic chemical industries, but for the establishment of a school of research for the chemistry of dyes and allied substances employed in industrial chemistry.

Many of the articles and researches published in these journals have also appeared in the scientific and technical Press. Lists are also given of important papers read in connection with the various technical societies connected with the school, including the Engineering Society, the Day Students' Chemical Society, the Textile Society, which itself publishes an important journal, the Printing Crafts Guild, and the Bakery and Brewing Students' Societies, together with the titles of fifty-four theses prepared by graduate students in technology for the degree of M.Sc.Tech. in the University of Manchester. Lists also appear of the titles of nearly fifty volumes of technical works issued by members of the staff since 1900.

The eighth volume of the journal under review contains, among other articles of value, interesting papers concerned with the applications of chemical science, such as those on vulcanising, industrial gas-burning, the action of strong nitric acid upon cotton cellulose and of sulphuretted hydrogen upon sodium hydrosulphite, together with papers on the dilution limit of inflammability of gaseous mixtures and on the ignition of gaseous mixtures by the electric discharge. Not the least valuable paper is one entitled "A Contribution to the History of Dyeing in Scotland," being a sequel to one in vol. vii.

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of the journal on the history of dyeing suggested by a remark of the late Prof. Meldola in his presidential address of 1910 to the Society of Dyers and Colourists on "The Antiquity of Tinctorial Art": "I have in mind the desirability of technical societies such as ours including in their work the antiquarian side of their subject. This is, as a rule, neglected. Nevertheless, it is desirable to secure records of the past with respect to ancient industries, and the experts in any particular subject are assuredly the right people to undertake such work." Other important articles in the current number deal with researches on the ultimate endurance of steel and of the results of experiments with lathe-finishing tools, a continuation of valuable experiments and investigations begun in the school so far back as 1903 on high-speed tool steels and cutting tools, which are even now under investigation; on modern boiler-room practice and the prevention or abatement of smoke; on the effect of structure on the strength and wearing qualities of cloth, copiously illustrated; on a null method of testing vibration galvanometers; and on the commutation of large continuous-current generators and rotary converters under heavy-load conditions.

The school is thus "an excellent example of the kind of work which the engineering colleges and the higher technical schools in this country ought to undertake, and must be prepared to perform, if they are to occupy the place of similar institutions abroad in the very important matter of practical research, not merely as teaching young men the elements of technical science, but also as establishments where industrial experiments can be carried out on a practical scale." It only remains to say, as exhibiting the great resources of this school, that the journal has been admirably printed and its illustrations prepared at the school press.

J. H. R.

PHYSIOLOGY AT THE BRITISH ASSOCIATION.

THE attendance of physiologists at the Newcastle meeting was comparatively small, but there was a good programme, and several of the papers elicited considerable discussion. Prof. Cushny, the president of the section, took a pharmacological subject for his address. Reports of research committees were then presented, and Prof. Waller exhibited a simple apparatus for the administration of known percentages of chloroform. The recent modifications suggested by the extensive use of the instrument were described.

A series of lantern-slides illustrating the action of pituitary extract on the secretion of cerebro-spinal fluid was shown by Prof. Halliburton. The increased secretion is claimed by him to be an indirect result of the extract, the immediate cause being ascribed to stimulation of the cells of the choroid plexus by an increased quantity of CO₂ in the blood.

Prof. W. H. Thompson detailed the results of further investigations into the formation of arginine and creatine. An interesting paper by Prof. Cushny on the secretion of urea and sugar by the kidney was the outcome of a repetition of Heidenhain's experiments, with this difference, that urea in some experiments, and sugar in others, were injected instead of a dye into the blood of an animal after transection of its spinal cord. Analysis of the kidneys after a suitable interval showed no increase of urea or sugar in them above the normal, and there was therefore no accumulation of these substances in the cells of the convoluted tubules.

Prof. Herring gave the results of several series of experiments in which white rats had been fed on small