being much better on this area than on the rest of the field. It is pointed out in conclusion that many points still remain to be investigated before the use of the overhead electric discharge can be definitely recommended as a sound extension of agricultural practice.

THE growing importance of magnesite as a refractory material and for use in magnesian cement has led to its exploitation at the mining township of Bulong, in the N.E. Coolgardie Goldfield of Western Australia (F. R. Feldtmann, in Ann. Report Geol. Surv. of W. Australia for 1915). The material requires picking from the serpentine in which it occurs, but veins up to 2 ft. in thickness have been traced. In this, as in other instances, the magnesite is held to have been formed by waters containing carbon dioxide permeating a decomposing igneous complex of basic character.

WE have received from Mr. David Currie a letter relating to the article on "Empire Development and Organisation" which appeared in our issue of April 26. He directs attention to the fact that, although Canada is by far the largest producer of raw asbestos, Russia mines a substantial amount of this mineral, and Rhodesia is being developed as an important field. He regards the statement that the United Kingdom is largely dependent on outside sources, especially the United States, for its manufactured asbestos as incorrect, affirming that the imports from the States are "insignificant and even less than our exports to the States, in spite of the prohibitive tariff." The authority for the statement challenged by Mr. Currie is contained in paragraph 336 of the Blue Book Cd. 8462. Moreover, in the appendix (p. 172) the Commissioners state:—"It is to be noted that the United Kingdom, although possessing the most up-to-date plants and methods, is largely dependent on foreign sources for the manufactured asbestos it uses. In 1913 the net imports of asbestos manufactures were valued at 232,000*l.*, while the exports of asbestos manufactured in the United Kingdom (excluding engine packing) were valued at 105,000*l.* Quantities and countries of origin are not recorded."

THE *Revue générale des Sciences* for March 15 contains a clearly written and readable article on telemeters by Prof. H. Pariselle, of the French Naval School. It explains the principles on which telemeters act and describes the best-known instruments of each type. For infantry fire a simple and robust instrument is necessary, and no high degree of accuracy can be expected. A triangular slit in a small sheet of metal, held at arm's length and moved until a soldier seen at a distance fills the interval between the top and bottom edges of the slit, is a popular form of instrument, and is fairly accurate at small distances. For greater distances some form of double-image field glass or telescope has been much used. The two images of a soldier may be arranged to fall in the same vertical line, and the point on the upper image, at which the top of the head of the lower appears, may be noted, and the distance determined from its position. For the use of the artillery much more accurate instruments are necessary, and some form of double-image instrument, using a short base from the ends of which the two views of the object are taken, has come into universal use. The Barr and Stroud instruments use bases from 80 cm. to 274 cm., the shorter in field work and the longer in the Navy. Recently the Lawford-Copper instrument, on similar lines to the Barr and Stroud, but with a variable base, has been introduced.

WRITING in the *Scientific American* for April 21, Mr Ellwood Kendrick deals with recent chemical developments in America. He points out that in treating metals the manufacturer has gone ahead by leaps and bounds, the reason being that, beginning with Andrew Carnegie and the Pittsburgh ironmasters, the chemist has been called in. He has also been welcomed in the petroleum industry, in the making of explosives, and latterly in the manufacture of coal-tar and other products. In other fields the chemist has not been wanted; the dread of the theorist has kept the doors of certain industries closed to him, with consequent waste and loss. After reference to the growing use of ferments and bacteria in chemical industry, Mr. Kendrick deals with a recent article on nitro-starch as an explosive The difficulties with this nitro-product have been, in the first place, lack of stability when made by any practical method, and, secondly, difficulties in nitration owing to clotting, etc It is claimed that the problem of producing a permanent nitro-starch has now been solved. By working up 80 to 85 per cent. with nitroglycerine a suitable explosive is obtained, and comparison is made between it and dynamite. Nitro-starch is claimed to be the cheapest of all high explosives. With present food problems, however, it can have no immediate interest for Europe. It is also stated that a licence has been granted in Switzerland for the manufacture of alcohol, primarily for industrial purposes, from calcium carbide. The works will be built at Visp.

THE annual general meeting of the Society of Chemical Industry is provisionally fixed to be held at the University of Birmingham on July 18–20. The following papers are promised:—"Chemical Porcelain," H. Watkins; "Duro-Glass," Dr. M. W. Travers; "British Sources of Sand for Glass and Metallurgical Work," Dr. P. G. H. Boswell; "Refractory Materials," W. C. Hancock; "Synthetic Nitrates," E. K. Scott; "Nitrates from the Air," Dr. Maxted; "Low-temperature Distillation Fuel," Prof. O'Shea; "Industrial Fuel from Gas Works," E. W. Smith; "Calorific Value of Industrial Gaseous Fuel," W. J. Pickering; "High-pressure Gas for Industrial Purposes," Mr. Walter; "Some Sources of Benzol and Toluol for High Explosives," T. F. E. Rhead; "Artificial Silk," L. P. Wilson; "Activated Sludge Process," E. Ardern; "Organisation of Industrial Research," H. W. Rowell; "Scheme for Co-operative Industrial Research," H. W. Rowell; "Vulcanisation of Rubber," Dr. D. F. Twiss.

OUR ASTRONOMICAL COLUMN.

COMET 1917*a* (MELLISH).—The following revised ephemeris for this comet, based upon a new orbit calculated from observations made on March 21, April 4. and April 20, has been received from Copenhagen:—

1917	R.A. h. m. s.	Decl.	Log Δ	Mag
May 27	1 56 28	−12 56·2	0·2236	7·2
June 4	2 7 28	14 11·5	0·2419	7·5
12	16 53	15 31·8	0·2559	7·8
20	24 45	16 59·8	0·2666	8·0
28	31 5	18 37·3	0·2748	8·2
July 6	35 46	20 25·6	0·2810	8·4
14	38 46	22 24·2	0·2859	8·6
22	2 39 54	−24 33·1	0·2901	8·7

The comet is now too far south for observation in Europe. It was apparently this comet which was observed in Australia on April 19, and described as a new comet (see NATURE, April 26, p. 172).

DISPLACEMENTS OF SOLAR LINES.—In continuation of previous work on iron, Dr. Royds has recently made an extensive series of comparisons of the spectra of the sun and arc for nickel and titanium, and has also investigated the displacements at the negative pole of the arc in the case of these elements (Kodaikanal Bulletin, No. 51). Unsymmetrical lines of nickel and titanium, as indicated by their behaviour at the negative pole, and by records of their appearance under pressure, were found to be very numerous, and it was only possible to confirm to a limited extent the conclusions arrived at from the lines of iron. It is considered, however, that the new results are not inconsistent with the conclusions deduced from iron by Mr. Evershed, namely, that the displacements at the centre of the sun's disc, and at the sun's limb, are Doppler effects due to descending motion in the line of sight, and that the solar pressure is of the order of three-quarters of an atmosphere. The spectrograph employed in these investigations has been provided with a new Anderson grating having 75,085 lines on a ruled surface of 9·7×12·8 cm.

THE PROBLEM OF SPIRAL NEBULÆ.—The view that spiral nebulæ may be distant galaxies, or "island-universes," is discussed in an interesting article by Dr. Crommelin in the May number of *Scientia*. In recent years this hypothesis has received considerable support from the discovery that a large proportion of the non-gaseous nebulæ are of spiral form, and by the accumulation of evidence that our own system has a somewhat similar structure. One of the chief difficulties with regard to it is the fact that such nebulæ are mainly concentrated in the vicinity of the galactic poles, thus suggesting a connection with our system, but Dr. Crommelin considers that this apparent avoidance of the galactic plane by the spirals may be explained by assuming the existence of patches of obscuring matter which become more numerous as the galactic plane is approached. Moreover, if the spirals were inside our system, their grouping would probably be about an axis through the centre of the galaxy, and not about an axis through our sun at right angles to the galactic plane. The alternative view that the spirals may be emanations driven out of our system by some agency seems to be rendered untenable by the recently discovered fact that their radial velocities are greatly in excess of any velocities which have been observed within the system. Dr. Crommelin concludes that most of the evidence seems to favour the extra-galactic position of the spirals, and if this view be adopted, it follows that they are of dimensions comparable with those of our galaxy. They are probably at a comparatively early stage of development, much of their matter being still scattered and diffused in clouds which reflect some of the starlight.

ELIAS ASHMOLE, F.R.S., FOUNDER OF THE FIRST PUBLIC MUSEUM OF NATURAL HISTORY.

MAY 23 next will be the three hundredth anniversary of the birth of Ashmole, antiquary, herald, and man of science. He included among his interests not only the entire world of Nature, but, like some physicists of the present day, he delighted to explore the regions of the preternatural. He has often been blamed, and we think unjustly, for devoting so much time to astrology and alchemy, which were the "scientific" pursuits in fashion at that period; but we should dwell upon what has lasted of his work rather than upon what was trivial and ephemeral. So far as science is concerned, the outcome of his lifework will always be memorable, for he became the founder of the first public museum of natural history in Great Britain; next, he must be regarded as the founder of the first university chemical laboratory; and, thirdly, he founded the first chair of chemistry in Oxford.

Ashmole was born at Lichfield, and received his early education at the local Grammar School. At the age of twenty-seven circumstances brought him, in the character of a commissioner of excise, to Oxford, where he continued his education in physics and mathematics as a member of Brasenose College, and imbibed from a Capt. George Wharton that taste for the study of astrology and alchemy which led him to give these subjects so much of his time. In October, 1646, he moved to London, and there for the next ten years eagerly assimilated the experimental facts and visionary lore of Lilly, Booker, and Martin Backhouse. He vigorously pushed forward his studies in astrology, chemistry, and botany; was a guest at "the mathematical feast at the White Hart"; edited Dr. Dee's writings; published the "Theatrum Chemicum," and, to quote Selden, "was affected to the furtherance of all good learning."

Ashmole lacked the touchstone of modern training which renders a student competent to discriminate between false and true learning; it was beyond the power of any one man to investigate every recipe for the philosopher's stone, and discover for himself the futility of this and similar quests. But during those years of research in London Ashmole arrived at the best method of stimulating interest in scientific matters, knowledge which was put to the best use some years later. We will not therefore regard him as a scientific observer nor as a successful experimentalist, but as the promoter of one of the most effective methods of primary scientific education, which aims at awakening and developing the intellectual activity of the young by putting before their eyes remarkable objects of natural history. Prof. Tyndall well expresses the essentials of the method in his address on "The Importance of the Study of Physics as a Branch of Education for all Classes"; he points out the great value of the incentive that the exhibition of natural objects and phenomena supplies in the stimulating of mental activity:—"As the nurse holds her glittering toy before the infant she would encourage to take its first step, so it would appear as if one of the ends of the Creator, in setting those shining things in heaven, was to woo the attention and excite the intellectual activity of His earth-born child." Without going so far as the distinguished physicist, in attributing motives to the Creator, we would insist that the more strongly the senses of the observer can be arrested by objects or phenomena of curious or unusual nature, the more vivid are the images of thought which are conjured up in the mind. When objects become commonplace, or operations a part of our everyday life, they lose this power of stimulation. Impressions arising from accidental circumstances often exercise so powerful an effect on the young as to determine the direction of a career. Humboldt relates that his early desire to visit tropical countries sprang partly from seeing some pictures of the shores of the Ganges in the house of Warren Hastings in London, and from the sight of a colossal dragon-tree in the old tower of a botanic garden. To a mind susceptible to impressions of this kind such object-lessons have the greatest educational value. And it is for this reason that Ashmole, as the founder of the first public museum of natural history, has the greatest claim to our consideration.

The oldest specimens in his museum had been collected by John Tradescant the elder (died 1638) during his travels in Holland, Russia, and Barbary, about the end of the sixteenth century. He left the collection to his son John (died 1662), who enriched it by adding new specimens collected on his travels in Virginia,