perature it is transparent in very thin layers, but is almost opaque in layers 2 mm. thick. In order to determine its boiling-point, the tube containing it was introduced into a vessel containing liquid ethylene cooled to about − 140°. The ozone still retained the liquid form, and only began to vaporize when the temperature of the ethylene had risen to near its boiling-point. The temperature of the ethylene was determined by means of a carbon bisulphide thermometer, which at the moment of incipient ebullition of the ozone indicated a temperature of − 109°, this corresponding to − 106° of the hydrogen thermometer. The boiling-point of pure ozone is therefore approximately − 106°. Experiments with liquid ozone require great caution on account of the readiness with which explosions occur. If, for instance, liquid ozone comes into contact with ethylene gas, an extremely violent explosion occurs in spite of the low temperature. It is therefore necessary to exclude the inflammable gas from contact with the ozone, and then explosion need not be feared.

NOT less interesting than syntheses of vegetable or animal principles are the attempts which are made from time to time to build up minerals of the same crystalline form and chemical composition as those occurring upon the surface of our planet. One of the most widely distributed minerals—the historic magnetite—found so universally throughout the whole of the more basic rocks, and the square or triangular sections of which are familiar to every micro-petrologist, has long been a favourite subject for attempts, partially successful, at artificial reproduction. But probably the best method of effecting this has of late been devised by M. Alex. Gorgeu (*Comptes rendus*, No. 17, 1887), who has obtained fine crystals, sufficiently large to enable him to prove their complete identity with those of native magnetite. His method was to drop iron wire or filings into a bath of fused sulphite and sulphide of sodium, when a double sulphide of iron and sodium was formed, together with an oxide of iron richer in protoxide than magnetite ; in a short time this oxidized to magnetite, and the sulphide and sulphite were converted to sulphate of sodium. The crystals of magnetite obtained, when washed free from the sodium sulphate, were a millimetre in section, of octahedral form modified by faces of the rhombic dodecahedron, and attracted by the magnet ; they possessed the metallic lustre and the same specific gravity and hardness as crystals of naturally occurring magnetite.

WE have received the second edition of Miss Clerke's "Popular History of Astronomy during the Nineteenth Century," published by Messrs A. and C. Black. We regard it as a most encouraging sign of the times that in a period of not over eighteen months, the first edition of such a book as this should have been exhausted. It shows that the number of persons interested in astronomical science who care to read sound treatises requiring a considerable amount of attention is on the increase, and we know no book which is likely to foster the love of the subject among such people better than Miss Clerke's. The mere process of bringing up to date has involved the insertion of a considerable amount of new matter. Celestial photography naturally comes in for an added share of attention, directed chiefly to the discoveries of nebulæ in the Pleiades by the MM. Henry and Mr. Roberts ; to the work in stellar spectral photography in progress at Harvard College ; and to the preliminary essays in photographic charting made at Paris, Liverpool, and the Cape of Good Hope. Other new or extended passages relate to the bright-line spectra of γ Cassiopeiæ and β Lyræ, stellar photometry, the effects of tidal friction on the satellite system of Mars, and the daylight photography of the sun's corona. The theory of sunspots unfolded by Mr. Lockyer in his "Chemistry of the Sun" finds a place in the chapter on "Solar Observations and Theories," and that on "Solar Spectroscopy" includes an account of the observations of the spectra of sunspots at South Kensington, 1879–85, with their results for solar chemistry. We notice some modification in the author's views regarding the dissociation of terrestrial elements in the sun, the presence of the bright-line spectrum of oxygen in the solar spectrum, and Young's "reversing layer." She moreover (apparently on good grounds) withdraws the statement that comets, moving sensibly in the same track in the parts of their orbits near the sun, must have nearly identical periodic times. Paragraphs in the new edition are assigned respectively to the last comer (Comet 1887 I.) of the remarkable group connected with the comet of 1843, and to the singularities of Comet Pons-Brooks ; while the observations on the meteors of November 27, 1885, on the new star in Andromeda, and at Grenada during the total eclipse of August 29, 1886, are fully particularized. We are glad to perceive that Miss Clerke has taken advantage of many of the hints of her critics, supplying, for instance, the few omissions in her work pointed out by Sir Robert Ball in NATURE (vol. xxxiii. p. 314). A completely new feature is a chronological table of the principal astronomical events between the years 1774 and 1887 ; and a frontispiece and vignette, reproducing Mr. Common's and the MM. Henry's photographs of the Orion Nebula, Jupiter, and Saturn, add to the attractions of the second edition.

THE additions to the Zoological Society's Gardens during the past week include a Bonnet Monkey (*Macacus sinicus*) from India, presented by Mr. G. Lester ; a Brazilian Tree-Porcupine (*Sphinghurus prehensilis*) from Brazil, presented by Dr. William Studart ; a Vervet Monkey (*Cercopithecus lalandii*) from South Africa, presented ; a Domestic Sheep (*Ovis aries*, four-horned var.) from Arabia, presented by Mr. C. E. Kane ; a Tooth-billed Pigeon (*Didunculus strigirostris*) from the Samoan Islands, presented by Mr. Wilfred Powell ; a Great-crested Grebe (*Podiceps cristatus*) from Norfolk, presented by Mr. T. E. Gunn ; a Goldfinch (*Carduelis elegans*), a Greenfinch (*Ligurinus chloris*), a Red Bunting (*Emberiza schœnichus*), British, presented by Master H. J. Walton ; an Eyed Lizard (*Lacerta ocellata*) from Cannes, presented by Mr. J. E. Warburg ; a Smooth Snake (*Coronella lævis*) from Hampshire, presented by Mr. H. B. Pain ; a Green Turtle (*Chelone viridis*) from Ascension, presented by Dr. Keenan ; a Squirrel Monkey (*Chrysothrix sciurea*) from Guiana, a Servaline Cat (*Felis servalina*) from West Africa, a Black-necked Swan (*Cygnus nigricollis*) from Antarctic America, two Natterer's Snakes (*Thamnodynastes nattereri*) from Brazil, purchased ; four Prairie Marmots (*Cynomys ludovicianus*), born in the Gardens.

OUR ASTRONOMICAL COLUMN.

THE MELBOURNE OBSERVATORY.—Mr. Ellery has recently issued his Annual Report referring to the year ending June 30, 1886. From it we learn that the new transit-circle has been in constant use during the year, and is in excellent order. There appears, however, to be a very gradual lowering of the west pier of the instrument since its erection in August 1884. There also appears a decided diurnal change in the level, the east pivot being higher in the morning and lower in the evening—probably due to the heating effects of the sun on the earth's crust, or on the building. The objects observed with the transit-circle during the year comprised fundamental clock stars, standard circumpolar stars, faint stars selected from the Melbourne zones, comet stars, refraction stars, and a list of stars proposed for insertion in the *Connaissance des Temps*. The great telescope was almost exclusively devoted to the revision of the southern nebulæ. During the year 214 of Sir J. Herschel's nebulæ were finally revised, 7 were searched for but not found, whilst 30 new nebulæ were discovered. There now remain only 95 nebulæ, which were observed by former observers, requiring final revision before publication. The photoheliograph was not in working order for several months during the year, owing to difficulties arising from the change in the size of the sun pictures taken, from 4 to 8 inches diameter. The number of photographs of the sun obtained during the year was therefore only 92.

THE TRANSIT OF VENUS IN 1882.—Mr. Stone's Report exhibiting the results deduced from the British observations of the transit of Venus in December 1882 has been published. The resulting values for the sun's mean equatorial horizontal parallax from the different phases of the transit, are as follow:—

External contact at ingress $\pi = 8''.760 \pm 0''.122$
Internal ,, ,, ,, $\pi = 8''.823 \pm 0''.023$
,, ,, ,, egress $\pi = 8''.827 \pm 0''.050$ (α)
,, ,, ,, ,, $\pi = 8''.882 \pm 0''.043$ (β)

(α) or (β) are the values resulting from this phase according to the phenomenon selected to represent true contact. The mean of these gives for

Internal contact at egress $\pi = 8''.855 \pm 0''.036$
External ,, ,, ,, $\pi = 8''.953 \pm 0''.048$

The combination of the values deduced from the internal contacts at ingress and egress gives $\pi = 8''.839 \pm 0''.021$ or $\pi = 8''.825 \pm 0''.028$ according as (α) or (β) is used. In the mean from internal contacts $\pi = 8''.832 \pm 0''.024$.

ASTRONOMICAL PHENOMENA FOR THE WEEK 1887 *MAY* 15–21.

(FOR the reckoning of time the civil day, commencing at Greenwich mean midnight, counting the hours on to 24, is here employed.)

At Greenwich on May 15.

Sun rises, 4h. 10m.; souths, 11h. 56m. 8·1s.; sets, 19h. 42m.; decl. on meridian, 18° 51′ N.: Sidereal Time at Sunset, 11h. 15m.

Moon (one day after Last Quarter) rises, 1h. 35m.; souths, 6h. 34m.; sets, 11h. 40m.; decl. on meridian, 12° 20′ S.

Planet.	Rises. h. m.	Souths. h. m.	Sets. h. m.	Decl. on meridian. ° ′
Mercury	3 49	11 3	18 17	13 33 N.
Venus	6 6	14 38	23 10	25 29 N.
Mars	3 59	11 36	19 13	17 33 N.
Jupiter	16 57	22 13	3 29*	9 27 S.
Saturn	7 40	15 48	23 56	22 13 N.

* Indicates that the setting is that of the following morning.

Occultation of Star by the Moon (visible at Greenwich).

May.	Star.	Mag.	Disap. h. m.	Reap. h. m.	Corresponding angles from vertex to right for inverted image. ° °
19	29 Ceti	6½	2 52	3 50	63 260

Variable Stars.

Star.	R.A. h. m.	Decl. ° ′			h. m.	
T Cassiopeiæ	0 17·1	55 10 N.	May	20,		*m*
U Cephei	0 52·3	81 16 N.	,,	19,	2 38	*m*
R Sculptoris	1 21·8	33 8 S.	,,	17,		*M*
S Cancri	8 37·5	19 26 N.	,,	17,	20 28	*m*
U Ophiuchi	17 10·8	1 20 N.	,,	15,	0 16	*m*
β Lyræ	18 45·9	33 14 N.	,,	19,	2 0	m_2
R Lyræ	18 51·9	43 48 N.	,,	16,		*m*
R Cygni	19 33·8	49 57 N.	,,	21,		*M*
S Vulpeculæ	19 43·8	27 0 N.	,,	18,		*M*
η Aquilæ	19 46·7	0 43 N.	,,	19,	23 0	*m*
S Sagittæ	19 50·9	16 20 N.	,,	17,	1 0	*M*
T Delphini	20 40·1	15 59 N.	,,	20,		*M*
δ Cephei	22 25·0	57 50 N.	,,	17,	0 0	*M*

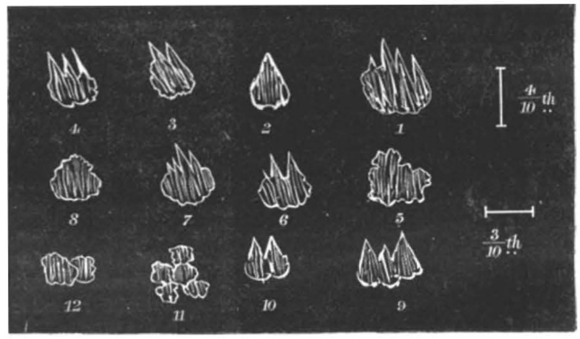
M signifies maximum; *m* minimum; m_2 secondary minimum.

Meteor-Showers.

	R.A.	Decl.	
Near α Coronæ	231°	27° N.	Rather slow and faint.
,, η Aquilæ	294	0	Very swift.
From Delphinus	315	15 N.	Very swift.

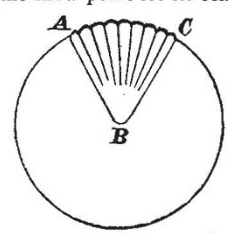
REMARKABLE HAILSTONES.

MR. E. J. LOWE writes to us from Shirenewton Hall, Chepstow, that remarkable hailstones fell there on April 5 from 1 55 p m. till 2 p.m. They were far apart, and fell with but little force, and were entirely opaque, and had a vertical cleavage. Some were conical, with an irregular base; some were spiked at the apex, and of these no two were alike; others were very irregular in form. A great number were composed of two or three united; in one case as many as five were fast together. The longest were four-tenths of an inch long, and three-tenths of an inch broad. They melted very slowly, lasting as much as two minutes. The temperature was 39°·5, wet bulb 35°·4, and temperature on grass 36°·7. The hailstones were quite different from anything that Mr. Lowe had ever seen. The accompanying figure records a few of them.



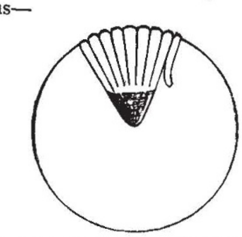
Another account of remarkable hailstones has been sent to us by Mr. Reginald G. Durrant, of Marlborough College:—

"On April 24, about 12.30," Mr. Durrant writes, "while walking between Melrose and Kelso, a friend and myself were overtaken by a sudden and very violent hailstorm, accompanied by thunder. The violent burst lasted about two minutes, in which time the ground was completely covered with large hailstones rather more than half an inch long. I say 'long' advisedly, for all the specimens I examined were conical, and were all of them formed in the same way. The points had all the appearance of snow, being softer than the main bulk of the 'stones.' These snow portions occupied about one-third of the whole length, being white and non-transparent. The main portions of the hailstones were hard and ice-like, stranded lengthwise with from forty to fifty fibres of ice—each fibre curved separately at the top—and together forming a curved surface, as of a sphere having the snow point for its centre. Thus—



Angle A B C of section between 50° and 60°.

"On melting, the pointed part became translucent, while the other part became more opaque than at first, strands often remaining for a time, partially separated and curving outwards, as though they had been freed from compression in their lower extremities. Thus—



"The above appearances might admit of the hypothesis that these hailstones were fragments of radiated crystalline spheres,