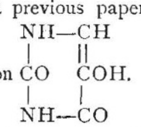
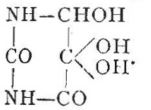
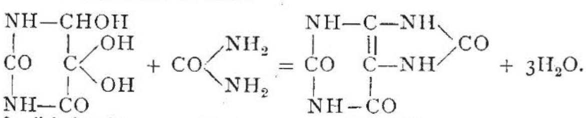
in a previous paper of Dr. Behrend's to possess the constitution



(6) By oxidation of iso-barbituric acid with bromine water another acid is obtained, which is found to be isomeric with dialuric acid, but differs entirely from that acid in properties; it is therefore termed iso-dialuric acid. From its reactions it is shown to correspond to the constitution



It crystallizes in long rhombic prisms containing a molecule of water of crystallization, which it loses at 100° C. The yield is very good, 80 per cent. or more of the theoretical. (7) It now only remains to mix this iso-dialuric acid with one equivalent of urea and six equivalents of sulphuric acid, the latter to take up three molecules of water which are eliminated in the reaction between the two former substances. The reaction is complete in the cold in twenty-four hours, or in five minutes if the mixture is gently warmed upon a water-bath. On cooling and adding water, uric acid is precipitated in small crystals, which, on purification, exactly resemble those of natural uric acid. The equation is very readily understood, there being a simple combination of iso-dialuric acid and urea with formation of uric acid and elimination of three molecules of water—



Iso-dialuric acid. Urea. Uric acid.

Hence the formula of Medicus and Fischer for uric acid may now be considered as finally proved.

THE additions to the Zoological Society's Gardens during the past week include a Purple-faced Monkey (*Semnopithecus leucoprymnus*) from Ceylon, presented by Mr. J. H. Taylor; a Vervet Monkey (*Cercopithecus lalandii* ♂) from South Africa, presented by Dr. W. K. Sibley; an Otter (*Lutra vulgaris*) from Cornwall, presented by Mr. Basset; a Long-eared Owl (*Asio otus*), British, presented by the Hon. Eric Thesiger; a Herring Gull (*Larus argentatus*), British, presented by Mrs. Gainsford; a Yellow-billed Amazon (*Chrysotis panamensis*) from Panama, presented by Lord William Cecil; two Common Kestrels (*Tinnunculus alaudarius*), captured at sea, presented by Captain Janes; two Common Rheas (*Rhea americana*, juv.) from Uruguay, presented by Mr. J. D. Kennedy; a Black Swan (*Cygnus atratus* ♂) from Australia, presented by Mrs. Siemens; a Long-eared Owl (*Asio otus*), British, presented by the Rev. F. Hopkins; two Natterjack Toads (*Bufo calamita*), British, presented by Master H. Millward; two Natterjack Toads (*Bufo calamita*), British, presented by Master A. Smith; a Bonte-bok (*Alcelaphus pygargus* ♂) from South Africa, deposited; a Squacco Heron (*Ardea ralloides*) from South Europe, three Japanese Teal (*Querquedula formosa* ♂ ♀ ♀), from North-East Asia, an Amherst Pheasant (*Thaumalea amherstiæ* ♂), from Szechuen, China, purchased; two Moor Harriers (*Circus maurus*) from South Africa, received in exchange.

OUR ASTRONOMICAL COLUMN.

THE RESIDUALS OF MERCURY.—In a recent discussion of the perturbations of Mercury (*Astronomical Journal*, No. 191, April 15, 1889), Mr. O. T. Sherman has arrived at some important and highly suggestive results relating to the residuals. His method of determining these appeared in No. 173 of the *Astronomical Journal*, and this process has been employed in obtaining the data given in the article referred to. The values arrived at show a remarkable relation to the heliocentric latitude of the planet, the maximum effect being nearer the solar equator, and the effect decreasing as the latitude increases. Since the lower latitudes correspond to maximum and the higher ones to minimum solar activity, the apparent connection of the disturbances of the planet with solar phenomena should also bear some relation to the sun-spot period, and Mr. Sherman gives figures to show that this is the case. The chief disturbances occur in the years when the sun-spots are increasing in frequency, and it is pointed out that this result is in strict accordance with the retardations of Encke's Comet during perihelion passage.

It is further stated that "the forces deflecting the planet are sunward when the planet is in that part of space towards which the sun is travelling, and away from the sun when the planet follows in his path." This, taken in conjunction with the disturbances of Encke's Comet, seems to Mr. Sherman "to indicate a considerable amount of matter coming to the sun from space. If so, its place of meeting with the matter coming from the sun should abound in collisions, and display local spectra showing bright lines. Our knowledge of the zodiacal light is fully in accord with such a supposition."

If the more detailed investigations of the residuals, which it is intended to make when more observations have been collected, confirm the results already obtained, we may look for a considerable advance of our knowledge, especially of the nature of the solar surroundings. Already the residuals clearly admit of explanation by supposing that the sun, with its meteoritic surroundings, in the form of the corona and the zodiacal light, is moving with considerable velocity through a meteoritic plenum. In that case the planet would encounter most meteorites when on the advancing side of the sun, and it would obviously be more retarded there than elsewhere.

The apparent relation to the sun-spot period is of great interest in connection with the meteoritic theory of the formation of sun-spots. According to this theory, there should be most meteorites in the solar surroundings at maximum spot period, and greater disturbances of the planet at that period would therefore be expected. The collisions between the two sets of meteorites would further produce the spectroscopic phenomena associated with the zodiacal light—namely, the appearance of a line near wave-length 558, which has been ascribed to manganese. It seems probable that the variability of this spectrum which has been suspected by Mr. Sherman (letter to Mr. Lockyer, quoted in Roy. Soc. Proc., vol. xlv. p. 248) may also subsequently be shown to be connected with the sun-spot period.

RIGHT ASCENSIONS OF NORTH CIRCUMPOLAR STARS.—Prof. T. H. Safford, Field Memorial Professor of Astronomy at Williams College, Mass., has just published a very useful piece of work in the shape of a Catalogue of North Polar Stars. This Catalogue, which is a first instalment of a more extensive one, the observations for which are now in progress, has been constructed by Prof. Safford in order to strengthen what he felt to be the weak point of all the standard Catalogues, viz. the right ascensions of Polar stars. It was also a consideration with him that it would be easier to take account of instrumental corrections if a more extended list of Polars were generally used than has been the custom. These stars are also of importance in the study of proper motions, since their early observations are accurate.

The observations for this Catalogue were made at the Field Memorial Observatory, and not at the Hopkins Observatory of Williams College, and the meridian circle with which they were made was a fine one of 4½ inches (French) aperture, by Repsold. The observations were made at first by eye and ear, but a fillet chronograph was used in 1887 and 1888. Prof. Safford's intention throughout was to make his Catalogue a differential one; the stars he has relied upon for his instrumental corrections, being those of Publication 14 of the Astronomische Gesellschaft, which lie within 10° of the Pole. Besides the catalogue itself, which contains 261 stars, of which just 200 are within 10° of the Pole, a very important part of the work is the discussion of the right ascensions, with a view to clearing up certain points as to mode of observation, as well as to find the weights and systematic corrections necessary for combining this series with others. The result of this discussion is to show that it tends to greater accuracy to base a catalogue of Polar R.A.'s on standard places in all hours of right ascension rather than on double transits alone; that the eye-and-ear method should be used as the standard only near the Pole; and that a thorough comparison of it with the chronographic method through a wide range of magnitude and declination is desirable; that modern meridian instruments are subject to irregular small changes of position which are not direct functions of temperature; and that, therefore, it is well not to trust the instrumental zero points for more than two hours without re-determining the most essential.

Prof. Safford is at work on a paper, now well advanced, on the proper motions of the stars within 10° of the Pole, and he hopes shortly to complete the comparison of the chronographic and eye-and-ear methods which the present discussion had shown him to be needed.

TWO REMARKABLE SOLAR ERUPTIONS.—Father Jules Fényi, of the Kalocsa Observatory, records, in a note to the Paris Academy of Sciences, his observation of two remarkable solar eruptions which he observed on September 5 and September 6, 1888. Both eruptions would have been remarkable had they occurred at a time of maximum activity; but, coming as they did nearly at dead minimum, they stand out as most unusual. The first prominence was seen to rise from a height of 25″, as seen at 6h. 6m. (Kalocsa M.T.), to 151″·4 at 6h. 19m., its speed of movement attaining at one time 171 kilometres per second. A number of brilliant metallic lines were seen, some so bright that, with a wide slit, they showed as a small prominence, reaching 19″ in height on 1474 K and 15″ on the D lines. The second eruption was seen eighteen hours later, on September 6, at 11h. 45m., and was even more violent. In 6½ minutes it mounted from 37″ to 158″, with a speed at one time of 296·8 kilometres per second. It was of dazzling brilliance whilst it lasted, but passed away in about 14 minutes. The two eruptions were nearly but not quite in the same heliographic latitude. The first was on the east limb in S. lat. 18°; the other was distant some 4½°, and, as the base of each was about 3° in length, they could not have overlapped, and if connected in origin, must have sprung from a deep-seated source.

COMET 1889 *b* (BARNARD, MARCH 31).—This object is now too near the sun for observation, but accepting the elements of its orbit as hitherto determined, it will not travel far from its present position for some time to come. Dr. Krueger gives its position for Berlin midnight (*Astr. Nach.*, No. 2893) for the end of May and beginning of July as under, but with reserve from the uncertainty of the elements:—

1889.	R.A. h. m. s.	Decl. ° ′	Log Δ.	Brightness.
May 28	... 5 6 52	... 14 13·1 N.	... 0·5099	... 0·71
July 3	... 5 9 8	... 12 19 0 N.	... 0·4944	... 0·76

ASTRONOMICAL PHENOMENA FOR THE WEEK 1889 *MAY* 19–25.

(**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 19

Sun rises, 4h. 4m.; souths, 11h. 56m. 15·8s.; daily increase of southing, 2·8s.; sets, 19h. 48m.: right asc. on meridian, 3h. 45·6m.; decl. 19° 52′ N. Sidereal Time at Sunset, 11h. 39m.

Moon (at Last Quarter on May 21, 22h.) rises, 23h. 50m.*; souths, 3h. 50m.; sets, 7h. 53m.: right asc. on meridian, 19h. 37·9m.; decl. 22° 25′ S.

Planet.	Rises. h. m.	Souths. h. m.	Sets. h. m.	Right asc. and declination on meridian. h. m.	° ′
Mercury..	4 57 ...	13 29 ..	22 1 ...	5 18·2 ..	25 27 N.
Venus ...	3 0 ...	10 12 ..	17 24 ...	2 1·5 ...	13 8 N.
Mars ...	4 25 ..	12 30 ...	20 35 ...	4 19·2 ...	21 53 N.
Jupiter ...	22 48*...	2 44 ...	6 40 ...	18 32·1 ...	23 0 S.
Saturn ...	9 42 ...	17 19 ...	0 56*...	9 9·3 ...	17 35 N.
Uranus...	15 48 ...	21 18 ...	2 48*...	13 9·0 ...	6 38 S.
Neptune..	4 24 ..	12 11 ...	19 58 ...	4 0·4 ...	18 59 N.

* Indicates that the rising is that of the preceding evening and the setting that of the following morning.

May.	h.	
20 ...	12 ...	Venus stationary.
23 ...	3 ...	Neptune in conjunction with the Sun.
24 ...	19 ...	Mercury at greatest elongation from the Sun, 23° east.

Variable Stars.

Star.	R.A. h. m.	Decl. ° ′		h. m	
U Cephei ...	... 0 52·5	... 81 17 N.	... May 21,	0 50	*m*
R Persei ...	... 3 23·0	... 35 18 N.	... ,, 19,		*M*
U Monocerotis	... 7 25·5	... 9 33 S.	... ,, 21,		*M*
S Leonis ...	... 11 5·1	... 6 4 N.	... ,, 22,		*M*
S Boötis ...	... 14 19·2	... 54 19 N.	... ,, 21,		*M*
R Boötis ...	... 14 32·3	... 27 13 N.	... ,, 23,		*m*
δ Libræ ...	... 14 55·1	... 8 5 S.	... ,, 20,	22 59	*m*
U Coronæ ...	... 15 13·7	... 32 3 N.	... ,, 19,	1 35	*m*
R Draconis ...	... 16 32·4	... 66 59 N.	... ,, 24,		*M*
U Ophiuchi...	... 17 10·9	... 1 20 N.	... ,, 22,	0 55	*m*
			,, 22,	21 3	*m*
T Herculis ...	... 18 4·9	... 31 0 N.	... ,, 24,		*M*
R Lyræ ...	... 18 52·0	... 43 48 N.	... ,, 21,		*m*
U Aquilæ ...	... 19 23·4	... 7 16 S.	... ,, 25,	2 0	*M*
η Aquilæ ...	... 19 46·8	... 0 43 N.	... ,, 21,	0 0	*m*
T Vulpeculæ	... 20 46·8	... 27 50 N.	... ,, 21,	22 0	*M*
T Cephei ...	... 21 8·1	... 68 2 N.	... ,, 19,		*M*
δ Cephei ...	... 22 25·1	... 57 51 N.	... ,, 25,	0 0	*M*

M signifies maximum; *m* minimum.

GEOGRAPHICAL NOTES.

IN the new number of *Petermann's Mitteilungen*, Dr. Rink describes the recent Danish researches in Greenland, especially those carried out in East Greenland under the leadership of Captain Holm. The aim of the expedition was mainly antiquarian and ethnological; at the same time the report of its work contains valuable observations on the geology, geography, and especially the glacial conditions of the region visited. In the first volume of the Report, the first chapter, by Prof. Steenstrup, is devoted to a discussion of the situation of Osterbygd. The second chapter contains the report of Captain Holm and Lieutenant Garde on the results of the expedition of 1883–85. The principal results may be thus summarized:—Graah's map of the east coast of Greenland has been corrected and completed; a map has been prepared of a part not previously surveyed, and now named Christian IX. Land; and, after sketches and information from the natives, the outline of the coast has been continued from 66° to 68½° N. lat. It was found that the country called after Christian IX. was inhabited by a branch of the Eskimo which, before the arrival of the expedition, had not been in contact with Europeans. Detailed observations have been made on their mode of life, their customs, language, legends, &c., and a large collection made of articles of ethnological interest. During the various journeys of the expedition, and especially in their winter quarters, systematic researches were made in the physical geography of the country. Geological and botanical observations were made and specimens collected along the east coast. It was found that the east coast of Greenland is not so inaccessible as has hitherto been supposed. The expedition explored the east coast as far to the north as it was at all likely Osterbygd could have been located, without discovering the least trace of buildings which were not of Eskimo origin, and without finding anything in the physiognomy, the customs, mode of life, or legends of the natives that could furnish the slightest ground for inferring former relations with Europeans. From this it is concluded that Osterbygd could not have been situated on the east coast of Greenland. The third chapter deals with the geography of Danish East Greenland, *i.e.* as far as 66° N. This part of the east coast is divided into five natural zones—(1) the most southerly part as far as Anarket; (2) from Anarket to Ikermiut; (3) from Ikermiut to Igdlolnarsuk; (4) from Igdlolnarsuk to Inigsalik; (5) the section which extends to the east of the last-named place. Zones 1, 3, and 5 have strong resemblances with each other, as also zones 2 and 4. The three first-mentioned zones are cut by deep fjords, crowned with lofty serrated mountains, never covered by the continental ice. Some places are characterized by a vegetation comparatively rich. Beneath the mountains there are, in general, numerous glaciers, which often descend to the fjords, and towards the interior is found a mountainous region filled with large local glaciers. Zones 2 and 4 have a different aspect. The country is very barren, and the continental ice descends almost directly to the sea, or to the edge of the fjords, only a few mountains or rounded groups of mountains emerging from the ice. Another characteristic of the east coast is the parallelism of