OUR ASTRONOMICAL COLUMN.

ASTRONOMICAL OCCURRENCES IN MAY:—

May 1–6. Epoch of Aquarid meteoric shower (Radiant 338° − 2°.)
2. 16h. 50m. Inferior conjunction of Jupiter's Sat. IV. (Callisto).
9. Neptune 10′ south of μ Geminorum (Mag. 3·2).
,, Saturn. Major axis of outer ring = 38″·98, minor axis = 9″·09.
12. 1h. Moon in conjunction with Jupiter. Jupiter 0° 44′ N.
15. Venus. Illuminated portion of disc = 0·969, of Mars = 0·999.
16. Pallas in opposition to the Sun (Pallas Mag. 8).
20. 10h. 52m. Minimum of Algol (β Persei).
21. 9h. 1m. to 9h. 26m. Moon occults o Leonis (Mag. 3·8).
30. 6h. Mars in conjunction with the Sun.

COMET 1904 *a*.—*Circular* No. 65 from the Kiel Centralstelle contains a telegram received from Prof. Pickering, who announces that the comet 1904 *a* was photographed at Harvard on March 11 and 15, and April 1, 5, 13 and 16, and also gives the coordinates for those dates. He further gives the following set of elliptic elements, and an ephemeris, calculated by Messrs. Curtiss, Albrecht, and Leuschner from observations made on April 17, 18 and 19:—

Epoch 1904 *April* 18·62 *Greenwich.*

M = 159° 8′	q = 1·7177
∞ = 258 57	e = 0·1773
☊ = 272 13	U = 3ᵃ·02
i = 126 39	

Ephemeris 12*h. G.M.T.*

1904	α (h. m. s.)	δ (° ′)	Brightness
April 21	16 44 32	47 13	0·98
25	16 31 8	49 30	
29	16 16 8	51 34	
May 3	15 59 44	53 22	0·88

The comet was observed on April 19 and 20 by Herren Wirtz and Becker respectively, who determined the following positions:—

M.T. (Strassburg)	α (h. m.)	α (° ′ ″)	δ (° ′ ″)	Mag.
April 19	9 11·3	252 44 56	45 55 13	9·1
20	11 37·4	251 56 1	46 35 38	9·3

ELEMENTS AND EPHEMERIS FOR WOLF'S COMET (1884 III.).—The following elements for Wolf's comet (1884 III.), corrected for the planetary perturbations up to the epoch June 12, 1904, are given by Herr A. Berberich in No. 3940 of the *Astronomische Nachrichten*:—

Epoch 1904 *June* 12·0 *Berlin.*

M = 312° 52′ 22″·66
∞ = 172 50 38·22 } 1900·0
☊ = 206 28 59·66 } 1900·0
i = 25 14 40·20 } 1900·0
φ = 33 48 59·19
μ = 520″·05191
log a = 0·5559733

An ephemeris for the period May 7–August 11, 1904, from which the following is an extract, is also given:—

Ephemeris 12*h.* (*M.T. Berlin*).

1904	α (h. m. s.)	δ (° ′)	log r	log Δ	Brightness
May 7	18 2 21	+2 50·9	0·5298	0·4223	0·012
11	18 1 1	+3 27·8			
15	17 59 21	+4 4·2	0·5243	0·4044	0·014
19	17 57 23	+4 39·7			
23	17 55 7	+5 13·9	0·5186	0·3881	0·015
27	17 52 35	+5 46·6			
31	17 49 48	+6 17·4	0·5128	0·3739	0·017

STARS HAVING PECULIAR SPECTRA.—In *Circular* No. 76 of the Harvard College Observatory, Prof. Pickering gives a list of stars which have been found, on the Henry Draper Memorial photographs, to possess peculiar spectra. The present list contains the designation, the coordinates, the magnitude and the nature of the spectrum peculiarity of twenty-two stars, and is supplementary to the similar lists previously published.

Circulars No. 77 and No. 78 have also been received. The first is a supplement to the "Provisional Catalogue of Variable Stars" published in vol. xlviii. of the Harvard College Observatory *Annals*; the second deals with the variable stars in the nebula of Orion, and in many cases confirms Dr. Max Wolf's conclusions respecting the variability of a number of the stars published in Dr. Bond's discussion of the nebula, which appeared in vol. v. of the Harvard College Observatory *Annals*.

SPECTRA OBTAINED FROM THE WEHNELT INTERRUPTER DISCHARGE.—Mr. H. W. Morse, of the Jefferson Physical Laboratory, Harvard University, has obtained the spectra of a number of elements, using as the light source the brilliant glow which surrounds the "active" electrode of a Wehnelt interrupter when the current is passing. He hoped to obtain, among other results, some indications, from the nature of the spectra, that the temperature of this glow was intermediate between that of the flame and arc, or arc and spark, and thereby to provide another definite step in the laboratory temperature scale. From the spectra obtained, however, it appears that the environment of the electrode passes through a very great range of temperature with each interruption of the current, for under the same constant experimental conditions the strongest lines of the condensed spark appeared at the same time as lines usually attributed to the flame. Usually the "Wehnelt" spectrum is closely allied to that of the spark, but often some of the strongest lines are missing.

Mr. Morse discusses in detail the results obtained for each of the thirteen elements he used, and in a series of tables gives the wave-length of each line obtained, together with the relative intensity of the line in the arc, spark, and "Wehnelt" spectra respectively. A number of reproductions of the spectra obtained also accompany the paper, which is published in No. 3, vol. xix., of the *Astrophysical Journal*.

VARIABLE STARS OF THE ORION NEBULA.—Prof. Ernst Hartwig, in a communication to No. 3936 of the *Astronomische Nachrichten*, gives a list of corrections to the "Chart of Stars in the Nebula of Orion" which was published in vol. v. of the Harvard College Observatory *Annals*. The corrections have been obtained from observations made by Dr. Max Wolf and from the measurement of a photograph taken by Prof. Scheiner, and are given in tabular form for the equator of 1857.

THE GERMAN ANTARCTIC EXPEDITION.[1]

THE German South Polar Expedition was absent altogether twenty-eight months, of which fourteen months were passed in the south polar ice, ten months with our operations in the South Atlantic and South Indian oceans, and four months with our work and residence in the islands of the Indian and Atlantic Oceans and at the Cape.

After leaving Cape Town on December 7, 1901, a successful series of soundings and investigations was carried on between there and Kerguelen, and further on as far as the fringe of ice. Amongst the results, I lay stress on the demonstration of a trough more than 4500 metres deep, running between the Crozet Islands and Kerguelen, and connecting the abysses of the Indian Ocean with a deep ravine on the outer edge of the Austral Glacial sea.

The results of the expedition cannot be comprehensively surveyed until the whole material and the copious collections, all of which have been brought back in good condition, are worked up and made accessible. It may, however, be already affirmed that the *Gauss* Expedition achieved everything in the region assigned to it that it was possible to achieve in the time available. It discovered a new land, and thereby cleared up an old contested question regarding the nature and extent of the Antarctic continent

[1] Abridged from a paper by Dr. Erich von Drygalski read before the Royal Geographical Society on April 25.

for more than ten degrees of longitude, certainly for about half the debated region between Knox and Kemp's Lands, and perhaps for the whole. At least, for the actual determination of the westerly tract, observations are now at hand by which light may be shed on the specified question. An important factor is the steep fall of the land down to a deep sea discovered by us; important, also, is the structure of the land, which consists of old crystalline rocks; lastly, it is important to find that this margin of the continent is occupied by a volcanic formation the lavas of which contain molten gneisses which have been forced up with them from the bed-rock.

The inland ice covering the continent presents a picture of our former Ice age, and is undoubtedly the vastest Glacial area now existing. Yet it was still more extensive in former times, as shown by traces on the Gaussberg.

To this continent we directed our operations, and endeavoured to study all the phenomena presented by it. In the biological field, these studies ranged with Prof. Dr. Vanhöffen from the large marine mammals and the flocks of rare birds on the seaboard, through the numerous species of the smaller marine fauna to the bacteria which Dr. Gazert was able to detect, if not in the Glacial sea itself, at least in its organisms, as well as in the rookeries of the stormy petrels on the Gaussberg, and in its few lichens and mosses. On the physical side, our observations extended from Dr. Philippi's studies of the Gaussberg lavas and of the continental boulders borne to great distances by the ice, through the numerous properties of the Glacial sea and of the Glacial formations by myself, up to determinations of the force of gravity, and to Dr. Bidlingmaier's determinations of the most delicate oscillations of the terrestrial magnetic forces, both in their normal periodicity and in their stormy perturbations, such as are displayed especially during the appearance of the southern auroras.

But should anyone doubt that we there lived and worked in a new region on the fringe of the south polar continent, conviction will be afforded by the climate. In the north we left behind us the zone of west winds and crossed a trough of low barometric pressure, remaining on its southern slope, where the pressure again rises to a maximum over the continent. Hence the prevalence of the easterly winds, which sweep down from the south over the vast uniform and but slightly inclined surfaces of the inland ice, and appear on the seaboard as easterly, Föhn-like gales.

These gales impart to the south polar region its character and its limits; by their frequency and uniformity they reveal the immensity and the homogeneous nature of those Antarctic lands. Their northern confines may have some importance for practical navigation whenever there is a question of circumnavigating the zone of the Austral west winds.

EDUCATION IN INDIA.

THE promulgation of an elaborate and comprehensive State document by the Home Department of India, already referred to in NATURE (April 7, p. 550), exhaustively reviewing the subject of education in all its branches and laying down the policy adopted by the Government in regard to each, and the recent passing of the Universities Act in the Viceroy's Legislative Council in India, naturally direct attention to the efforts being made in the Indian part of our Empire to place every grade of education upon a satisfactory basis. The various stages in the agitation which preceded the adoption of the Universities Bill by the Legislative Council have already been referred to on several occasions in these columns. In the following brief summary of the distinguishing characters of each of these efforts to advance education in India, continual reference has been made to the columns of the *Pioneer Mail* of Allahabad.

First to deal with the official minute with which Lord Curzon is naturally conspicuously associated. We find the system of public instruction in India includes five universities, those of Calcutta, Bombay, Madras, the Punjab, and Allahabad, which prescribe courses of study and examine the students of affiliated colleges. These colleges are widely scattered throughout the country, and number in all 191 (exclusive of some colleges outside British India, which are not incorporated in the provincial statistics), with 23,000 students on the rolls. In them provision is made for studies in arts and Oriental learning, and for professional courses of law, medicine, engineering, teaching and agriculture. Below the colleges are secondary schools, to the number of 5493, with an attendance of 558,378 scholars, and primary schools numbering 98,538, with 3,268,726 pupils. Including private institutions, there are about 4½ million scholars, maintained at a cost of 400 lakhs, of which nearly one-half is derived from public funds. The total grants from public funds fall short of 1,300,000*l.* a year, and the extension and improvement of education in India are chiefly a matter of increased expenditure.

In India, far more than in England, the majority of students who frequent the higher schools and the universities are there for the purpose of qualifying themselves to earn an independent livelihood; Government service is regarded by the educated classes as the most assured, the most dignified, and the most attractive of all careers. It is, however, justly complained by competent authorities that higher education is too much pursued with a view to Government service, that excessive prominence is given to examinations, that studies are too literary in character, that the memory is trained rather than the intelligence, and that in the pursuit of English education the vernaculars are neglected, and so fail to become the vehicles for the diffusion of western knowledge among the masses. But it is clear from the minute that the Government of India holds that the multiplication of competitive tests for Government service neither results in advantage to Government nor is consistent with the highest interests of a liberal education. In fixing the educational standards which qualify for appointments, it is stated that the natural divisions of primary, secondary, and university education should be followed. School and college certificates of proficiency should, so far as possible, be accepted as full evidence of educational qualifications, and due weight should be attached to the recorded opinions of collegiate and school authorities regarding the proficiency and conduct of candidates during their period of tuition. The questions as to what subjects should be taught and by what means proficiency in them should be tested are considered as a part of the larger problem of the true object of secondary education. The Government of India thinks that the solution of the difficulty will be found in adapting to Indian conditions the system of leaving examinations, held at the conclusion of the secondary course, which has been tried with success in other countries.

Referring to technical education, the minute points out that the first call for fresh effort is toward the development of Indian industries. Technical instruction directed to this object must rest upon the basis of a preliminary general education of a practical kind, which should, as a rule, be imparted in schools of the ordinary type. In fixing the aim of the technical schools, the expansion of the existing Indian markets is of superior importance to the creation of new export trades. As a step towards providing men qualified to take a leading part in the improvement of Indian industries, the Government of India has determined to give assistance in the form of scholarships to selected students to enable them to pursue a course of technical education under supervision in Europe or America. The Government hopes that the technical schools of India may in time produce a regular supply of young men qualified to take advantage of such facilities, and that the goodwill and interest of the commercial community may be enlisted in the selection of industries to be studied, in finding the most suitable students for foreign training, and in turning their attainments to practical account upon their return.

Agricultural education in India is then passed in review. India possesses no institution capable of imparting a complete agricultural education. The existing schools and colleges have neither produced scientific experts nor succeeded in attracting members of the land-holding classes to qualify themselves as practical agriculturists. Both of these defects must be supplied before any real progress can be expected. In the first place an organisation must be created by which men qualified to carry on the work of research, and to raise the standard of teaching, can be trained in India itself. The Government of India has therefore under its consideration a scheme for the establishment