

East India Company. He was among the foremost mathematicians of his day, and had his life been prolonged he would undoubtedly have risen to greater fame.

No. 76 of the Publications of the Carnegie Institution contains an account of a series of researches by Prof. Theodore W. Richards, in conjunction with Messrs. W. N. Stull, W. Brink, and F. Bonnet, on the compressibility of a large number of the elements. A very ingenious apparatus was devised for making the measurements, and the results obtained show that the compressibility of an element is a periodic function of the atomic weight, and probably associated with the same causes which determine atomic volume and volatility.

THE July number of the *Journal of Hygiene* (vii., No. 3) is devoted to reports on plague investigation in India. Further experimental evidence is detailed of the transference of plague through the intermediary of the flea. It is shown that close and continuous contact of plague-infected animals with healthy animals, if fleas are excluded, does not give rise to an epizootic among the latter, and that when fleas are present the epizootic, if it does start, varies in severity and rate of progress according to the season of the year and the number of fleas present. The season in which epizootics were readily produced experimentally, and spread rapidly, corresponds with that of the plague epidemic.

A SECOND edition of vol. iii. of the "Descriptive and Illustrated Catalogue of the Physiological Series of Comparative Anatomy contained in the Museum of the Royal College of Surgeons of England" has been published. The volume is sold by Messrs. Taylor and Francis. It contains descriptions of the specimens in the section comprising the nerves of vertebrates not dealt with in vol. ii., and also those in the section including the organs of special sense.

THE eleventh edition, revised, of Mr. W. T. Lynn's "Celestial Motions" has just been published by Messrs. Sampson Bagster and Sons, Ltd. The price of this handy little book of astronomy is 2s. net.

AN interesting article, by Mr. E. V. Heward, upon the physical features of Mars, with particular reference to the habitability of the planet, appears in the August number of the *Fortnightly Review*.

OUR ASTRONOMICAL COLUMN.

ASTRONOMICAL OCCURRENCES IN AUGUST:—

- Aug. 1. 4h. Venus and Jupiter in conjunction. Venus $0^{\circ} 8' 10''$.
- " Daniel's comet very near Aldebaran.
- " 2h. 3m. Central transit of Saturn's Satellite Titan.
- 4. 12h. Vesta in conjunction with the Moon. Vesta $0^{\circ} 52' S.$
- " 15h. 38m. to 16h. 20m. Occultation of χ^1 Orionis (mag. 4.7).
- " Juno very closely S. of ϕ Virginis (mag. 4.9).
- 10. 14h. Mercury and Jupiter in conjunction. Mercury $2^{\circ} 6' S.$
- 10-13. Epoch of August shooting stars, Radiant $45^{\circ} + 57^{\circ}$.
- 11. Uranus $1^{\circ} S.$ of 28 Sagittarii (mag. 5.6).
- 14. Daniel's comet near γ Geminorum.
- 17. 16h. 53m. to 20h. 26m. Transit of Jupiter's Sat. III. (Ganymede).
- 18. 9h. 51m. Central transit of Saturn's Satellite Titan.
- 20. 12h. 42m. Minimum of Algol (β Persei).
- 23. 9h. 31m. Minimum of Algol (β Persei).

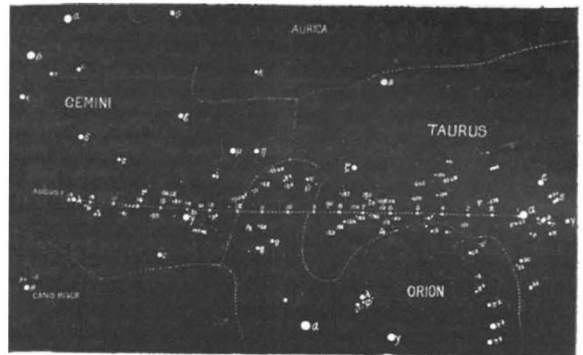
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DANIEL'S COMET (1907d).—Herr Kritzing's ephemeris for comet 1907d is extended to August 19 in No. 4191 (p. 259, July 23) of the *Astronomische Nachrichten*, and a part of it is given below:—

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

1907	α (true) h. m.	δ (true)	$\log r$	$\log \Delta$	Bright- ness
Aug. 3 ...	4 50.1 ...	+16 37.5	9.9453 ...	9.8812 ...	13.8
" 5 ...	5 8.9 ...	+16 57.8			
" 7 ...	5 27.8 ...	+17 12.0 ...	9.9116 ...	9.8878 ...	15.6
" 9 ...	5 46.5 ...	+17 20.0			
" 11 ...	6 4.8 ...	+17 22.0 ...	9.8763 ...	9.9021 ...	17.2
" 13 ...	6 22.8 ...	+17 18.3			
" 15 ...	6 40.3 ...	+17 9.3	9.8399 ...	9.9234 ...	18.5
" 17 ...	6 57.3 ...	+16 55.6			
" 19 ...	7 13.6 ...	+16 38.0 ...	9.8036 ...	9.9499 ...	19.3

An observation made on July 19 gave corrections of +4s. and +1'.9 to the ephemeris, and on that date the magnitude of the whole comet was recorded as 4.0.



Apparent path of Daniel's Comet (1907d). August 1-19, 1907.

From the accompanying chart it will be seen that during the period August 1-19 the comet's apparent path lies between α Tauri and λ Geminorum, its declination varying but by a small amount. On the former date the comet will rise about four hours, and on the latter about three hours, before sunrise.

THE HELIOMICROMETER.—For the purpose of determining the heliographic positions of flocculi on spectroheliograms, quickly and accurately, Prof. Hale has devised an apparatus which he calls the heliomicrometer, and of which he gives a preliminary description in No. 5, vol. xxv., of the *Astro-physical Journal* (p. 293, June).

Briefly, it is a modification of an earlier instrument in which the spectroheliogram was projected on to a bright globe divided by meridians of latitude and longitude, the positions of the flocculi being read off directly from the globe. The angular diameter of the latter as seen from the projecting lens was, essentially, equal to the angular diameter of the sun as seen from the earth.

In the present apparatus, images of the photograph and the globe are viewed with two similar telescopes, the two images being brought into the same eye-piece. Immediately in front of the plate to be measured cross-hairs are mounted, and their intersection may be set on the particular flocculus to be measured by the observer operating from the eye-piece; during this process the bright image of the globe is occulted. The image of the properly adjusted globe is then admitted, and, by means of fine motions—again operated from the eye-piece—the intersection of the central meridian and the equator is brought into coincidence with the intersection of the cross-hairs. The amount that the globe has been rotated in each coordinate is then read off from circles fitted with verniers, and thus the latitude and longitude of the flocculus are obtained directly without any computation.

In testing the heliomicrometer method against that of

the ordinary measuring machine, it was found that the results were in good agreement, and that the actual operations occupied the same amount of time, thus saving, with the former, the time taken by the computations from the polar coordinates in the latter.

SEARCH-EPHEMERIDES FOR COMET 1894 IV. (E. SWIFT).—Owing to the possibility of its identity with the lost comet of De Vico, Swift's comet of 1894 is of particular interest.

During its return of February, 1901, it was very unfavourably placed for re-discovery, and was not seen, but in the hope that it may be re-discovered during its present return, Prof. Seares publishes two search-ephemerides in Bulletin No. 12 of the Lays Observatory, University of Missouri. The former is based on elements indicating July 9 as the time of perihelion passage, whereas the second takes July 25; both show that the comet will attain its maximum brightness, as seen from the earth, about the beginning of October. It is of interest to note that the present position of this comet is near to that of comet 1907*d* (Daniel), although there is no possibility of the identity of the two objects.

According to the ephemerides, the position of Swift's comet on August 1.5 (Berlin M.T.) will be (1) 2h. 25.7m., +12° 31', or (2) 1h. 51.7m., +8° 31'.

A QUICKLY CHANGING VARIABLE STAR.—A star having the position $\alpha = 9^{\text{h}}. 45^{\text{m}}. 39.8^{\text{s}}$, $\delta = +12^{\circ} 20' 3''$ (1900.0), and situated +12.18. in R.A. and 1'.9 in dec. from B.D. +12 20.5, has been found by Mr. Metcalf, of Taunton (Mass.), to change its magnitude from 13.5 to 11.5 in four days. The range of variability is confirmed by the Harvard plates of this region, but the exact period has not yet been ascertained. The designation of this object is 66.1907 Leonis. (*Astronomische Nachrichten*, No. 4191, p. 260; July 23).

THE VARIATION OF THE POLE.—The provisory results obtained by the International Latitude Service during the year 1906-1907.0 are published by Prof. Th. Albrecht in No. 178 of the *Astronomische Nachrichten* (p. 177, June 29). The diagram giving the projected path of the pole from 1899.9 to 1907.0 shows that during the year 1906 a further diminution of the amplitude of the variation from the mean pole took place.

UNIVERSITY REFORM.

THE discussion in the House of Lords on July 24 concerning the present state of the Universities of Oxford and Cambridge serves again to bring prominently before the public the importance of well-equipped universities to the Nation. The Bishop of Birmingham asked the Government to appoint a Royal Commission "to inquire into the endowment, government, administration, and teaching of the Universities of Oxford and Cambridge and their constituent colleges, in order to secure the best use of their resources for all classes of the community." The Earl of Crewe announced at the end of the discussion that the Government requires time to consider the question, and that for the present a Commission will not be appointed. The Bishop of Birmingham unerringly exposed many of the weak points in the older universities as they are administered to-day. "The system of prize fellowships as it was established by the last Commission is," he remarked, "a mistake—post-graduate endowments should be used to subsidise either those who are to be teachers or those who are engaged in researches such as are worthy of advanced students." There were, of course, many champions to defend the present condition of things, but both sides expressed themselves as appreciative of the value to the community of higher learning in all departments of knowledge.

It was not sufficiently realised, however, that the existence of generously staffed and handsomely housed universities is ultimately a question of funds. In directing attention in these columns to the recent appeals made by both Oxford and Cambridge for funds, it was pointed out that, until as a nation we are prepared to make sacrifices

comparable with those undertaken in Germany, the United States, and other countries, our older universities will continue to be a "playground for the sons of the wealthier classes" in order to secure money which is elsewhere provided by the State. There are many inquiries awaiting a Commission when it is appointed, and among them may well be a comparison of the amounts provided by the State for university work in the great countries of the world. The subjoined summary of the *Times* report of the debate in the House of Lords contains the substance of the Bishop of Birmingham's plea for a Royal Commission, the Bishop of Bristol's remarks relating to it, and the reply made by the Earl of Crewe on behalf of the Government.

The Bishop of Birmingham said, in the course of his remarks, that undoubtedly within the last thirty years immense changes had taken place in the higher education of the country—changes so immense that, unless the University was to fall out of the relation which it ought to hold to the whole education of the country, it was inevitable that reforms should be required. To an even greater extent, a fundamental change in the balance of power in the classes which formed the English nation had taken place. It had always been the honour and the pride of the old universities that they trained the governing classes of the country. The term "governing classes of the country" had, however, received a very wide extension. For example, it included now the working classes. There was a very real desire for the diffusion of higher education, and it was hardly possible to exaggerate the need for permeating those classes which were playing, and were destined to play, so increasingly an important part in the government of the country with the best education which we had to offer. Could not the university be brought into more immediate, direct, and effective relations to all those who really desired to be students and to profit by the best education the country could afford?

There could be no reasonable doubt that at present our ancient universities were allowed to become to an extent altogether beyond what ought to be tolerated a playground for the sons of the wealthier classes. As at present constituted, the universities were to a very large extent not in any serious sense places of study at all. There were a vast number of young men who never in any kind of way attained to the position of students—they never acquired the instinct or the power of getting knowledge out of books. The universities should have far more stringent and effective machinery for getting rid of those who had neither the ability nor the intention of becoming students. If those who had no real intention of becoming students were got rid of, the teachers would have more time for study and for the teaching which more properly belonged to a university; and a great deal more teaching power would be liberated for the system of university extension in the real sense—namely, for the purpose of teaching, not popular audiences, but trained and sifted students in different parts of the country, so that the influence of the university might be extended to those who were hungering and thirsting for that sort of knowledge and training which a university was able to supply.

He supposed it would not be denied that a very large part of the endowments of scholars and exhibitioners at the present time went to those who could in any case be at Oxford or Cambridge. It had been calculated recently that two in five of the scholars of the colleges did not, in fact, need the endowment in order to enable them to go there. He did not think it could be denied that the unlimited belief in open competitive examinations which characterised the last Commission had had effects which the reformers of those days never contemplated. Open competition had not really proved to be competition open to all classes; it had given an immense advantage to those whose parents were in a position to supply them with education of the more expensive kind. As a matter of fact, he expected it would be found that the universities did less now than they did generations ago to provide the crown of the educational ladder of the country. If the universities could get rid of the great body of those who had not the slightest intention of using the university as a place of study, there would be room for the employment of the