

Röntgen ray and high-frequency apparatus, instruments, and accessories. The list provides full particulars as to a variety of induction coils made by the company, interrupters, fluorescent screens, portable accumulators, and high-frequency sets. The information given as to light baths, vibration apparatus, the Finsen lamp and light, and the orthodiagraph should appeal specially to medical men. The list is conveniently arranged and admirably illustrated.

A NEW edition of "Bradshaw's Through Routes to the Chief Cities of the World" has just been published. This comprehensive handbook of colonial and foreign travel, besides giving descriptive routes of the chief railways, ocean lines, and caravan tracks, supplies an abundance of maps and plans and some useful vocabularies. The volume has been edited by Prof. A. H. Keane and Mr. Stanley Read, and its price is 5s. net. The route numbered 50, dealing with tours round the world, is of special interest, showing as it does the increased facilities for travel since Jules Verne wrote "Round the World in Eighty Days." The actual minimum time required for an all-round journey from London, provided no delay occurred in missing train or boat connections, is 38 days 10 hours, and Lieut.-Colonel Burnley-Campbell recently completed the circuit of the world in 40 days 19.5 hours, following the route: Liverpool, Quebec, Vancouver, Yokohama, Tsaruga, Vladivostok, Harbin, Irkutsk, Moscow, Warsaw, Berlin, Ostend, Dover; but the usual quick rate of travel is still 53 days. The book may be commended to teachers as an interesting example of applied geography.

OUR ASTRONOMICAL COLUMN.

TRANSITS OF SATURN'S SATELLITE TITAN AND SHADOW.—In the Publications of the Astronomical Society of the Pacific, vol. xix., p. 125, Hermann Struve gives the following central transits of Titan and shadow during ensuing months:—

1907	G.M.T.	Distance from centre		Semi-duration of transit
		h. m.	"	
July 17 ...	Shadow ...	8 16 ...	0.5 S. ...	3.0
July 17 ...	Titan ...	13 48 ...	7.0 N. ...	1.6
Aug. 2 ...	Shadow ...	7 30 ...	0.2 N. ...	3.0
Aug. 2 ...	Titan ...	12 6 ...	6.3 N. ...	2.0
Aug. 18 ...	Shadow ...	6 43 ...	0.9 N. ...	3.0
Aug. 18 ...	Titan ...	9 51 ...	5.0 N. ...	2.5
Sept. 3 ...	Shadow ...	5 59 ...	1.6 N. ...	3.0
Sept. 3 ...	Titan ...	7 42 ...	3.2 N. ...	2.8
Sept. 19 ...	Titan ...	5 14 ...	1.3 N. ...	3.0
Sept. 19 ...	Shadow ...	5 15 ...	2.3 N. ...	2.9
Oct. 5 ...	Titan ...	2 48 ...	0.7 S. ...	3.0
Oct. 5 ...	Shadow ...	4 33 ...	2.9 N. ...	2.9
Oct. 21 ...	Titan ...	0 31 ...	2.2 S. ...	2.9
Oct. 21 ...	Shadow ...	3 49 ...	3.6 N. ...	2.8
Nov. 5 ...	Titan ...	22 32 ...	3.1 S. ...	2.8
Nov. 6 ...	Shadow ...	3 5 ...	4.3 N. ...	2.6

Saturn Rises at Greenwich.

	h. m.
July 1 ...	11 28
Aug. 1 ...	9 28
Sept. 1 ...	7 24
Oct. 1 ...	5 22
Nov. 1 ...	3 16
Dec. 1 ...	1 18

COMET 1907d (DANIEL).—A new set of elements and a daily ephemeris for comet 1907d are published by Dr. Strömrgren in No. 418 (*Astronomische Nachrichten*, June 29) of the *Astronomische Nachrichten*. A part of the ephemeris is given here; and, in order to facilitate the location of the object,

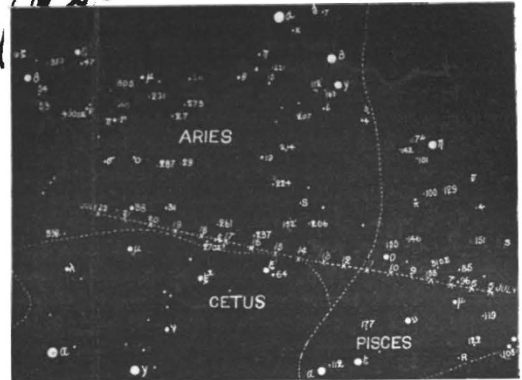
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the daily positions, with respect to the surrounding stars, are marked on the accompanying chart:—

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

1907	a (true) h. m.	δ (true)	log r	log Δ	Bright- ness
July 10 ...	1 39.0 ...	+ 7 35.1 ...	0.1318 ...	0.0216 ...	3.50
12 ...	1 49.0 ...	+ 8 16.7 ...			
14 ...	1 59.5 ...	+ 8 58.8 ...	0.1133 ...	9.9977 ...	4.25
16 ...	2 10.5 ...	+ 9 41.2 ...			
18 ...	2 22.0 ...	+ 10 23.6 ...	0.0942 ...	9.9756 ...	5.14
20 ...	2 34.1 ...	+ 11 5.9 ...			
22 ...	2 46.7 ...	+ 11 47.8 ...	0.0744 ...	9.9558 ...	6.17

According to Dr. Strömrgren's elements, perihelion will occur on September 1907.



Apparent path of Comet 1907d, July 7-22, 1907.

As will be seen from the above ephemeris, the comet is brightening rapidly, and may yet become a faint naked-eye object. At present it is an easy object, when found, in a 3-inch refractor. It has a distinct stellar nucleus which, according to Dr. Zappa, of Rome, was centrally placed and of magnitude 8.5 on June 16. A faint fan-shaped tail was seen on June 21.

MARS: THE DUPLICATION OF THE SOLIS LACUS.—In Bulletin No. 28 of the Lowell Observatory, Prof. Lowell records that the Solis Lacus showed double on May 18, this being the first time that it has appeared divided since the summer of 1894. This is not a case of gemination, for the two portions are not alike either in shape or size, nor were they in 1894. Among the canals which emerge from the eastern part, a new one was detected for the first time on May 18, and has been designated Ichor. The South Polar cap has retreated southward since the last presentation, leaving dark ground behind it, and it is noticeable that the canals connecting with the Solis Lacus on the south are darker and more easily seen than those proceeding from it towards the north, although the tilt of the planet's axis should render the former the more difficult to detect. As the snow has left dark ground behind it, darker than is the case in this region in the later part of the Martian year, Mr. Lowell argues that water, and not CO₂, is concerned. As a consequence, it follows that the temperature in this region—lat. 42°-52°—was already higher than 0° C. on May 18, or, in the Martian year, on a date corresponding to March 13 of our calendar.

VARIABLE STARS.—*Astronomische Nachrichten*, No. 4186 (June 28), contains several important communications concerning variable stars. The first is by Messrs. Müller and Kempf, of the Potsdam Observatory, on the peculiar variable X Persei, which they have now observed regularly for twenty years. The present paper gives the observational record since September, 1899, and is accompanied by a light curve showing the peculiar fluctuations of magnitude which this star undergoes.

In the second paper M. Luizet records some maxima and minima of several long-period variables, among the stars dealt with being α Ceti, R Leonis, and S Coronæ.

The third communication is from the Harvard College

Observatory, and gives the designations, positions, magnitudes, magnitude ranges, and spectral classification of fifteen new variable stars discovered in the regions covered by the Harvard maps Nos. 31 and 62.

NAMES FOR THE THREE JOVIAN ASTEROIDS.—Drs. Wolf and Kopff have chosen the three names Achilles, Hector, and Patroclus, respectively, to designate the three important minor planets (588) [1906 TG], [1907 XM], and [1906 VY] discovered by them at Heidelberg. Readers of these columns will remember that the orbits of these three bodies have been found to extend as far from the sun as that of Jupiter (*Astronomische Nachrichten*, No. 4187, p. 192, June 29).

THE MIRA MAXIMUM OF 1906-7.—From a series of observations made at Utrecht, and extending from July 25, 1906, to March 4, 1907, Prof. Nijland found that the maximum brightness of Mira occurred on December 7, when the magnitude was 2.0. The preceding minimum was recorded on August 7, and, as seen from the curve, was a very flat one, from which a sharp rise to an exceptionally bright maximum took place. The previous maximum took place on January 3, 1906, so that the period between these two successive maxima was 338 days (*Astronomische Nachrichten*, p. 113, No. 4183, June 14).

SOLAR PROMINENCE OBSERVATIONS IN 1906.—The annual summary of the results of the prominence observations made at Catania, for 1906, is published by Prof. Riccò in No. 5, vol. xxxvi. (p. 73), of the *Memorie della Società degli Spettroscopisti Italiani*. The daily record is reproduced, and then analysed, under the heads of the extension, height, and frequencies of the prominences, in the two hemispheres for each month and quarter and for the year. The similarity of the size and distribution of the prominences recorded to those of the previous year indicates a stationary point characteristic of the maximum, whilst the greater frequency during March points to that month as being the actual month of solar prominence maximum.

CONGRESS OF THE ROYAL INSTITUTE OF PUBLIC HEALTH.

THE congress of the Royal Institute of Public Health, held this year at Douglas, Isle of Man, from June 29 to July 5, was presided over by Lord Raglan, the Lieutenant-Governor of the island, who, in the course of his presidential address, gave a cordial welcome to the members of the congress. He referred to the progress of sanitation during the Victorian era, but pointed out that England was handicapped in the hygienic struggle as compared with Continental nations owing to our exaggerated ideas of personal liberty.

Sir James Barr, in the course of his presidential address in the preventive medicine section, urged medical practitioners to take as deep an interest in sanitation as sanitarians. The health of a nation was its most valuable asset, and he would like to see all his adult countrymen able to handle a rifle and take part in the defence of their country should occasion arise, and he would encourage the military spirit as the best means of developing the moral and physical qualities of the nation. He urged that there should be State aid if needed for every child under sixteen to be properly fed and cared for. Huge trusts and millionaires were a danger to society, and part of their wealth should be appropriated by the State.

Prof. Sims Woodhead, in the section of bacteriology and chemistry, delivered an address on the subject of "antibodies," in which he traced the rise and development of bacteriology, and adduced statistical evidence on the value of diphtheria anti-toxin. Dr. Warrington, of Liverpool, introduced a discussion on cerebro-spinal fever, in which he advocated the isolation of cases and the disinfection of places in which the disease had occurred. Dr. Prudence Gaffitien read a paper on the causes of infantile mortality. She said the high infant death-rate was due to the ignorance of mothers, and advocated the prohibition of the use of soothing syrups, &c. The Infant Life Protection Act was worse than useless; the State should provide for the inspection of foster or nurse children.

Prof. Hele Shaw delivered an address in the engineering and architectural section on road locomotion and the public health. He dealt chiefly with the new conditions occasioned by the advent of motor-cars; he admitted that the public had grievances arising from dust, odour, noise, and vibration, but claimed that much was being done to lessen these.

Dr. Sergeant, of the Lancashire County Council, opened a discussion on the milk supply, and a resolution was passed affirming the desirability of dairy regulations being made compulsory by the Local Government Board.

Many valuable papers were read on notification, tuberculosis, and sanatoria.

The social part of the congress was all that could be desired, and many excursions were made to the places of interest in the beautiful island. The congress dinner was presided over by Lord Raglan, and there was a garden-party at Government House.

RECENT CONTRIBUTIONS TO ELECTRIC WAVE TELEGRAPHY.¹

PROF. FLEMING said that the achievements of electric-wave telegraphy had not yet ceased to interest the public mind. In little more than eight years from the time when Mr. Marconi sent his first messages across the English Channel, it had become an indispensable implement in naval warfare, and also a means of communication between ships and the shore, greatly adding to the safety of life and property at sea. At the present time practically the whole of the first- and second-class battleships of the British Navy are equipped with apparatus for electric-wave telegraphy, and about 130 cruisers and smaller craft as well. The Marconi Company alone have fitted with their instruments nearly 100 Atlantic liners and other mercantile vessels, and have an elaborate organisation by which all these ships are constantly in communication with the mainland during their voyage from port to port. Concurrently with this, an immense amount of scientific investigation has been carried on having for its object further improvements and the quantitative study of the phenomena. The object of the discourse was to make known some of these recent additions to knowledge.

A cardinal feature of electric-wave telegraphy is the vertical wire or wires at the transmitting and receiving stations, called the antenna. At the transmitting station high-frequency electric currents are set up in the sending antenna, and these create rapidly alternating electric and magnetic forces in the space around, which are propagated outwards from point to point with the velocity of light. Hence at certain distances, called a wave-length, these forces are reversed in the same way at the same instant. In electric-wave telegraphy the wave-lengths used lie between 200 feet and 20,000 feet or so, covering about eight octaves. The measurement of this wave-length is important. Prof. Fleming described an instrument of his own invention, called a cymometer, used for this purpose. It consists of a spiral of wire in series with a sliding tubular condenser, the circuit being completed by a copper bar. Across the terminals of the condenser is placed a neon vacuum tube. If the bar of the cymometer is placed near the transmitting antenna and the handle of the instrument moved, its capacity and inductance can be altered until it comes into tune with the antenna circuit. When this is the case the oscillations in the antenna create violent sympathetic oscillations in the cymometer, and the neon tube glows brilliantly. An index pointer moving over a scale then shows the wave-length of the waves radiated. The same instrument may be used to measure the wave-length of the arriving waves. Also it can be used to determine the decay of the oscillations in a train.

In spark telegraphy the oscillations are set up in the antenna by an electric discharge, and at each spark a group of oscillations takes place. These may come at the rate of ten to fifty groups per second, and each group may contain from ten to 100 decadent oscillations. The cymometer can be used to draw a resonance curve by which the rate of decay and the number of the oscillations in a

¹ Abstract of a discourse delivered at the Royal Institution on Friday, May 24, by Prof. J. A. Fleming, F.R.S.