

two wooden floats. After a general review of the development of the compass card, Prof. Thompson gives a classification of the principal forms which appeared prior to 1600. Beautifully coloured illustrations appear in five of the six plates at the end of the paper. From an artistic point of view it is to be regretted that, as has been the case with ordinary male attire, colour has now disappeared from compass cards. At first almost universal, it seems to have died out before the end of the seventeenth century.

In the *Quarterly Review* for July, Mr. George Forbes, in a review of Sir David Gill's "History and Description of the Royal Observatory, Cape of Good Hope," gives a sympathetic account of the life and labours of "this great man, who will live in the hearts of all who knew him, not only as among the greatest of astronomers, but also as one of the noblest and most lovable of men." Special attention is naturally given to his work at Capetown between 1879 and 1907. The comments on his career by the most eminent astronomers of the day, included in this article, show the great scientific value of his work, and the impression left on his contemporaries by his unselfish devotion to science and by the nobility of his character.

BULLETIN No. 11 of the Indian Association for the Cultivation of Science consists of three papers by Mr. C. V. Raman on the dynamics of vibration, which are well illustrated, and cover fifty-two pages. The first deals theoretically and experimentally with the vibrations of a silk thread attached at its two ends to the prongs of two tuning-forks of different periods the directions of motion of which are parallel to the string. If M and N are the frequencies of the forks, it is shown that the string will be set into vigorous transverse oscillation if the tension of the string is so adjusted that the natural period is nearly $\frac{1}{2}(Mm \pm Nn)$, where m and n are integers. The second deals in the same complete manner with the possible frequencies of oscillation or speeds of synchronous rotation of a soft iron wheel with thirty teeth mounted between the two poles of a small electromagnet fed by an alternating current of frequency 24 or 60 per second. The third describes new methods of studying the relation between the motion of the bow and that of the bowed point of the string it sets in motion, and of recording the motion of each point of the string. It appears from the author's observations that in all cases in which the displacement time curve of the bowed point is saw-toothed, the velocity of forward motion of the bowed point is identical with that of the bow.

THE Government have taken over two battleships, one completed and the other shortly due for completion, which had been ordered in this country by the Turkish Government, also two destroyer leaders ordered by the Government of Chili. Reference is made to the battleship *Sultan Osman I.*, now H.M.S. *Agincourt*, in the paper read at the joint meeting of Naval Architects at Newcastle by Mr. J. R. Perrett, chief of the shipbuilding department at Elswick, where the ship was built. The vessel is 632 ft. long, with a beam of 89 ft. and a displacement of 27,500

tons. She carries fourteen 12-in. guns, twenty 6-in. guns, and a number of small guns. Her main armour belt is 9 in., and the upper belt 6 in. She has various armoured decks and extensive magazine protection. She is designed for a speed of 22 knots.

MESSRS. LONGMANS AND CO. have in preparation "The Year Book of Radiology for 1915." It is to be edited by Dr. R. Knox and J. H. Gardiner, and its object is to give an account of the more recent advances in our knowledge of radium, X-rays, and the allied phenomena, both from the medical and physical point of view. The volume will comprise a series of authoritative articles by specialists working in radiology, and a directory of qualified medical men practising in radiography, X-rays, radium and electro-therapeutics, both at home and abroad, also a list of hospitals and institutions where such treatment is carried out.

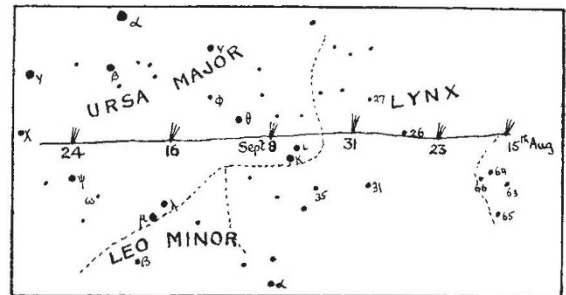
OUR ASTRONOMICAL COLUMN.

COMET 1913f (DELAVAN).—The following ephemeris and chart give the positions of Delavan's comet for the remainder of the present month and September. This ephemeris is given by Dr. Crommelin in the July and August numbers of *Knowledge*:—

Greenwich, Midnight.

		R.A.			Dec.
		h.	m.	s.	
Aug.	15	6	54	24	+43 44
	23	7	31	14	46 22
	31	8	15	43	48 35
Sept.	8	9	8	35	49 56
	16	10	8	6	49 51
	24	11	9	33	+47 56

During the present month the comet is travelling in the constellation of the Lynx, passing



then into Ursa Major. The best time for observation is the early hours of the morning, and Dr. Crommelin thinks "that the prospects are hopeful for this comet being an interesting spectacle in September and October. There is already no doubt that it will be visible to the naked eye."

THE PERSEIDS.—The progress of this shower up to and including August 10 was watched by Mr. Denning at Bristol, and he reports it as fairly active, though on August 10 the number seen was decidedly scanty.

The shower first gave intimation of its oncoming on July 14, and there has been a gradual increase since that date. On August 10 the radiant point was very exactly defined at $43^{\circ}+56^{\circ}$. On nights when the position could be determined from a sufficient number of meteors it showed the usual displacement.

On July 27, at 10h. 58½m., a fine meteor, brighter than first magnitude, was doubly observed by Miss Cook at Stowmarket and by Mr. Denning at Bristol. Its heights were from 85 to 56 miles from over Hailsham to Selsey Bill on the south coast. Its path extended over 49 miles at very swift speed.

On August 7, at 10h. 37m., a brilliant Perseid, giving a vivid flash and leaving a streak for ten seconds, was seen at Bristol. It shot from $286\frac{1}{2}^{\circ} - 2\frac{1}{2}^{\circ}$ to $280^{\circ} - 13\frac{1}{2}^{\circ}$, but no further observations of this fine object have yet been received. On the same night, at 10h. 10m. to 10h. 15m., a "mock moon," or Paraselene, was observed at the same altitude as the moon, and about 23° east of our satellite.

This year, moonlight has interfered with the character of the Perseid display in its earlier stages, but her lustre will not materially obscure the meteors at the period of their expected greatest frequency, on August 11 and 12, when a considerable number of observers will have been engaged in watching them if the weather was suitable.

A NEW SATELLITE TO JUPITER?—In the *Times* of August 8, it is stated that "a telegram has been received announcing the discovery of a tiny object near Jupiter, which appears to be a new satellite of the planet. The discovery was made photographically by Mr. Nicholson at the Lick Observatory, Mount Hamilton, California. He reports that the new body is still fainter than the eighth satellite, which is of the seventieth magnitude, and only about forty miles in diameter, so that it can only be observed with very large instruments." It is further stated that on July 21 the new body was 6m. 41s. west of Jupiter, and on July 24, 6m. 36s. W.

STELLAR RADIAL-VELOCITY OBSERVATIONS.—In 1908 Prof. Küstner published the results of the radial velocities of ninety-nine stars of the spectral types F to M, which he determined during the period 1903 to 1908 with the three-prism spectrograph of the 30 cm. Bonn refractor. The faintest star then photographed in two hours was of the magnitude 5.2. In *Astronomische Nachrichten*, No. 4750, he publishes the radial velocities of 227 stars of the spectral type F to M which he has determined during the period 1908 to 1913, with the same refractor. In this case a new spectrograph was employed in order to continue the work to fainter stars. At the conclusion of the individual observations he compares his values, where possible, with those obtained by Prof. Campbell at the Lick Observatory: the values for 151 stars are available, and he determines the mean differences of the observed radial velocities, Lick minus Bonn, for each spectral class. These differences he regards as errors of the Bonn observations, taking into account the better observing conditions and more efficient instruments available at the Lick Observatory. Mr. J. H. Moore publishes in the Lick Observatory Bulletin, No. 257, the observations of seventeen stars the radial velocities of which vary, and also those of two stars which have large and apparent constant radial velocities. These stars are AGC 7195 and ω Pavonis of magnitudes 5.2 and 5.1 respectively. They belong to the spectral classes G and K, and the velocities derived were +184.8 and +184.4 kilometres a second respectively.

THE SOLAR ECLIPSE.—The *Times* announces that a telegram has been received from Major E. H. Hills, president of the Royal Astronomical Society, stating that he and Prof. A. Fowler, who had intended going to Kieff for the purpose of observing the solar eclipse, have abandoned their project, and are on their way to St. Petersburg.

SOUTH AFRICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

THE twelfth annual session of the South African Association for the Advancement of Science was held in Kimberley, Cape Province, during the week commencing Monday, July 6, under the presidency of Prof. R. Marloth. There was the usual round of festivities and of visits to places of scientific or historic interest. The association meets in four sections, but in view of the increasing interest of matters pertaining to South African native races, Section D resolved to establish a subsection for African ethnology, education, history, language, and native affairs before next year's meeting in Pretoria is held.

The papers read numbered between forty and fifty, and brief outlines of the four sectional presidential addresses and some of the papers contributed by members are given below.

Dr. A. Ogg, professor of physics at Rhodes University College, Grahamstown, in his presidential address to Section A, dealt with some of the ideas in physical science which are under discussion at the present time in the light of recent research, and sought to bring under review some of our fundamental notions or principles, having regard to the fact that what mathematicians and physicists have long considered well established is now being uprooted and replaced by non-Newtonian mechanics based on the principle of relativity. Shape and mass, in fact, are looked upon as functions of velocity. Scientific thought, Prof. Ogg described as so plastic nowadays that the most cherished tenets of the last generation of men of science are being abandoned, and the greatest danger is that the meaning of the involved consequences is not always realised. As to the true physical meaning of the new ideas propounded there is much speculation, and many hold such speculations to be beyond the true scope of science. Quoting Schuster, in conclusion, Prof. Ogg said that all preferred being right to being wrong, but it is better to be wrong than to be neither right nor wrong.

In Section B the presidential address was given by Prof. G. H. Stanley, of the Transvaal School of Mines and Technology, whose subject was "A Decade of Metallurgical Progress on the Witwatersrand." The greatest advances during the last ten years, he said, were in improving methods of carrying out the various stages of the extraction processes, the essentials remaining unchanged. Sorting tables, for example, had been replaced by travelling belts, which were also elevators. Amalgamation is now carried out by flowing the tube-mill product over stationary plates, shaking plates having been discarded. Slime is now being treated more cheaply than sand; classification had greatly improved, and this, together with finer grinding, ensured that the sand residue after cyaniding contained only 0.2 of a dwt. of gold per ton. For slime treatment filtering methods were now sometimes employed, giving higher gold extraction and increased profits. Working costs had been brought as low as 3s. per ton.

In Section C, comprising the biological sciences and agriculture, the presidential address of Prof. George Potts, of Grey University College, Bloemfontein, dealt with rural education. South Africa, except the Rand and some coast towns, Dr. Potts pointed out, is essentially rural, and inland towns depended on the surrounding pastoral population. All grades of education should therefore be made adaptable to a rural people. The following reforms were advised:—(1) More representation for agriculture and the natural sciences on the University Council; (2) encouragement of the study of natural science in university colleges; (3) appointment of additional school inspectors specially qualified