affords. Comparisons of its determinations with those simultaneously made with the Kew magnetometer, over a period of five months, are reported on in Bulletin No. 35 (Cairo, 1932) of the Helwan Observatory; they disclose a difference of about 30γ between the two sets of measures. From January 1, 1932, the new instrument is to be adopted as the Helwan standard instrument.

A Centrifugal Machine for Examining the Adhesion of Layers of Lubricant to Metallic Surfaces.—In a paper read before the Institution of Petroleum Technologists, W. F. Parish and L. Cammen describe a high-speed centrifugal machine, built on the lines of the Sperry gyroscope, and capable of being rotated without appreciable vibration up to speeds of 18,000 revolutions per minute. An oil film present on the rotor of this machine is thrown off in stages, as the speed of rotation is increased. The first portions to fly off are those constituting the thick film responsible for the 'complete' or 'film' lubrication, in which the laws of hydrodynamics hold good. The outer portions of this layer are torn off fairly easily, the inner portions less so, the adhesion to the metal apparently increasing on passing from the exterior to the interior of this fluid film. Possibly the intensity of the attraction to the metal varies as the inverse square of the distance in this region. When the whole of this outer film has been thrown off, there still remains a layer of oil, termed the 'Langmuir' layer, which is many molecules thick, and can be wiped off by a piece of paper. It cannot, however, be thrown off by centrifugal force, until speeds many thousands of revolutions greater than those needed to remove the whole of the 'Coulomb Law' or loosely attached layer are reached. When this 'Langmuir' layer has been removed by wiping, further centrifuging causes a fresh, very similar layer of oil to appear, almost certainly by extrusion of oil occluded in very fine cracks in the metallic rotor. Several such films can be reconstructed from the occluded oil, after wiping off each film in succession after formation. The authors state that the occluded oil is prevented from coming out during the first centrifuging by the restraining effect of the first 'Langmuir' film. The instrument has been used as a means of performing a 'mechanical fractionation' on castor oil, some part of which appears to have a different affinity for the metal from the rest.

Astronomical Topics

The Partial Lunar Eclipse of September 14.—Prof. C. D. Perrine, director of the Cordoba Observatory, sends a note on the final phase of this eclipse. He states that the departing shadow was dark greyish, almost black, and that it was considerably broader than the amount to be expected at the time, which was, however, not accurately noted. Its sharpness recalled a partial solar eclipse. He thinks that it was from fifty to a hundred miles broader than the computed value, and asks what the appearance was to those who saw the maximum phase of the eclipse. This was observed by the writer of this note, and there was an unmistakable sunlit rim at the moon's north limb; it was not measured, but agreed roughly with the predicted amount.

Prof. Perrine notes in his letter that there was still a considerable amount of volcanic ash in the air at the time; if the terrestrial region throwing the shadow had been in his neighbourhood, we might ascribe the broadening of the shadow to this cause; but actually it was far north of the equator, indeed near the arctic circle; the cause therefore is unexplained.

Star of Greatest Known Mass.—A few years ago Prof. J. S. Plaskett announced that the star B.D.+6° 1309, in Monoceros is a very massive spectroscopic binary, the minimum masses of the two components being 76 and 63 times that of the sun; this was the most massive star known, for Miss Maury showed that the mass of some 300 times the sun, announced by Ludendorff for Upsilon Sagittarii, was based on a misinterpretation of the shifts of lines in its spectrum; it is a massive star, but far below Ludendorff's estimate. Dr. J. A. Pearse announces (*Mon. Not. Roy. Astro. Soc.*, Oct.) the detection of another very massive star at Victoria Observatory; this is H.D. 698, magnitude 7, in Cassiopeia; its spectral type is *B9sek*; it is a binary with a period of 55·9 days, eccentricity 0·03; both spectra are visible, but that of the smaller star is faint; the minimum masses are 113·2 and 44·9 times that of the sun. An interesting feature is that for part of the revolution the *K* line of calcium appears triple, the third component being due to interstellar calcium. The strength of the latter line is used to deduce the distance of the star, which comes out as 1220 parsecs. The absolute magnitudes are −3·1 for the brighter star, and −1·6 for the fainter one, which is of type *B5*. The star gives further confirmation of the existence of interstellar calcium. It is only in very distant stars that the lines due to it can be detected, and only in certain spectral types; since if the star has broad calcium lines of its own, these mask the interstellar ones, unless they are separated by rapid motion in the line of sight.

Annual of the Astronomical Observatory of Madrid.—The annual of this Observatory, besides giving the usual information of an astronomical almanac, contains much other interesting matter. There is a table of the parallaxes, magnitudes and spectral types of the 36 newest stars, and another of the elements of comets seen at more than one apparition (there are two omissions, the comets Pons-Coggia-Winnecke-Forbes and Grigg-Skjellerup); there is also a definitive orbit of comet Wilk, 1930 II, by Rafael Carrasco:

T	1930 Jan. 22·305227 U.T.	
ω	157° 29′ 18·78″	1930·0
Ω	179 0 11·78	
i	124 31 0·23	
$\log q$	9·8276021	
$\log a$	2·8975315	
Period	22197 years.	

He gave similar elements last year, but the present investigation is more exhaustive, including all known observations. Mr. F. E. Seagrave found a similar period, but he did not include so many observations.

Another useful chapter deals with the families of asteroids discovered by Prof. Hirayama, with diagrams showing how they are grouped. There is also a table of all the asteroids arranged in order of period, which for many purposes is more useful than the order of discovery. Finally, there are details of the observations of solar prominences made at Madrid in 1930.