OUR ASTRONOMICAL COLUMN.

ROTATION OF JUPITER.—Most of the determinations of the rotation period of Jupiter have been made by observations of surface markings between latitudes 45° N. and 35° S., and little has been known as to the conditions of rotation near the poles. This is due to the fact that conspicuous and sufficiently definite spots are chiefly confined to the equatorial regions of the planet, and partly to the unfavourable conditions under which the poles are presented to us. Some important observations, however, bearing on the rotation in high latitudes, have been secured by Mr. Stanley Williams with the aid of a 6½-inch Calver reflector (*Ast. Nach.*, 3325). On October 10, 1892, a short dusky streak, almost oblong in appearance, was observed quite close to the north limb of Jupiter, and reaching at least as far as 85° N. Other streaks of similar appearance were subsequently observed, and frequent observations of the times of mid-transit were made. Confirmation of the results has been obtained by an examination of several photographs of the planet taken at the Lick Observatory about the same period, the markings being sufficiently distinct for measurement. Generally speaking, the visual agree very closely with the photographic results, the mean rotation period derived by the two processes only differing by about two seconds. The mean result for the rotation period of the surface material of Jupiter, between north latitudes 40° and 85°, is 9h. 55m. 38·9s. ± 1·20s., this being the length of a sidereal rotation expressed in mean solar time. The following statement illustrates the degree of accuracy obtained :—

	h. m. s.	s.	
Spot *a* ...	9 55 33·7	± 1·32	(77 rotations)
Spot *b* ...	9 55 43·8	± 2·25	(41 ,,)
Spot *c* ...	9 55 39·7	± 0·60	(252 ,,

Mr. Denning's value for a spot in latitude 35° N., namely, 9h. 55m. 39s., agrees very closely with the foregoing, and differs by only a few seconds from the period deduced from observations of the red spot.

Supplementary details, which are given by Mr. Williams, indicate that the positions of markings on Jupiter may be determined with quite as much accuracy from photographs as by the best micrometrical measurements in the telescope.

THE PARALLAX OF α CENTAURI.—As part of a discussion of the meridian observations of α Centauri, made at the Cape Observatory during the years 1879–1881, Mr. A. W. Roberts has deduced a new value for the parallax of this interesting system (*Ast. Nach.*, 3324). Mean places for the two components have been computed by applying corrections for proper motion and orbital motion, and assuming a parallax of 0″·75. The errors of a systematic nature, which cannot be certainly accounted for, are believed to be due to an erroneous value of the refraction depending upon the temperature. Disregarding these, and adopting the aberration constant determined by Chandler, 20″·50, the parallax of α Centauri, from declination measures alone, was found to be 0″·81 ± 0″·05. From the right ascension measures alone, the value 0″·66 was calculated. Solving for both coordinates, the resulting value for parallax is 0″·71 ± 0″·05. This corresponds to a little over 4½ light-years and shows a marked agreement with the parallax 0″·75 found by Drs. Gill and Elkin in 1882 from measures made with the heliometer.

NEW VARIABLE STAR OF THE ALGOL TYPE.—*Harvard Observatory Circular*, No. 3, announces that the star B.D. + 17°·4367, magnitude 9·1, and approximate position for 1900, R.A. 20° 33′·1, Decl. + 17° 56′, is a variable of the Algol type. The change in brightness appears to be rapid, and the range of variation to exceed two magnitudes.

THE NATURE OF THE PHYSIOLOGICAL ELEMENT IN EMOTION.

PROF. A. C. WRIGHT contributes an interesting paper "on the nature of the physiological element in emotion" to *Brain* (parts 70 and 71), the object of which is to apply the results obtained by Gaskell's observations on somatic and splanchnic nerves to the study of the emotions. Prof. Wright begins his paper by taking as an example the phenomena observed in a kitten confronted with a strange dog, and shows that such an emotional stimulus would call forth in the kitten a regular series of reflex responses : first of all, through the involuntary visceral efferent nerves ; then the semi-involuntary muscles, such as those of the face, would be called into action ; and, lastly, there would be reflex response of certain parts of the voluntary muscular system. The essential features to be recognised in this example and in every emotional reaction are—the origination of the emotion in a violent sensory stimulus, a condition of extreme neural tension in the reflex centre, and an overflow of neural energy into different paths. This overflow takes place first into channels associated with involuntary muscle, then into those associated with semi-voluntary muscle, and lastly into those associated with voluntary muscle. The physiological essence of the emotion is to be found not in the visceral reflex actions, but in the high neural tension of the reflex centre which gives rise to these actions. In childhood sensory stimuli call forth in each case responses both of involuntary and voluntary muscle, while with increasing age the outflow of neural energy from the reflex centre becomes more and more restricted to paths associated with voluntary muscle. As a result of such transformation we get purposive voluntary action. The author notices the *à priori* necessity for some system of control of the reflexes, since "if each minimal stimulus were to evoke a separate reflex movement in an organism which was endowed with a sensitiveness at all approaching that of the human organism, life would be a mere chaos of muscular movement." Voluntary muscles react to the slightest stimuli, but involuntary muscular actions are only called out by intense stimuli, or by a summation of slighter ones. High neural tension in the reflex centre is therefore necessary for these reactions of involuntary muscles, and all such high neural tension is attended with a sense of distress. The replacing of the "generalised somatico-visceral reflexes of inexperience and childhood by the specialised purposive reflexes of experience and adult life" . . . "is not so much a question of substituting one variety of reflex for another, as it is a question of substituting a condition of low neural tension for a condition of high neural tension."

PHOTOGRAPHY AND CHRONOGRAPHIC MEASUREMENTS.[1]

IN chronographic measurements in physiological experiments, photography has been in constant use for several years, and the methods are well known. I have extended recently the method of what may be called photographic chronography to measuring the velocity of projectiles. On former occasions I have shown that to obtain the best chronographic results, magnetic and solenoidal arrangements should be avoided, since by their use a time lag is introduced. The following chronographic method depends entirely on light. Two sources of light at a suitable distance apart throw two beams of light on to a sensitive plate, carried on the carriage of a tram chronograph. By means of lenses, the beams of light are caused to form two sharp images on the plate in a vertical line, one above the other ; a tuning-fork trace is also made on the plate ; if the plate traverses, when the beams of light are not interrupted, on development, two black parallel lines appear on the plate ; but if, during the passage of the plate, the beams of light are cut by any solid object which shuts off the light, then on development two gaps are seen to exist. The distance between these markings when interpreted in terms of the fork trace, give the velocity of the object which cuts through the beam of light. The method was illustrated by allowing a projectile to pass through the focus where the convergent beams of light from two sources of light cross.

Another method was also shown in which the projectile cut through two thin screens placed in the paths of the beams of light, and so opened a passage for the light. In this case two parallel lines are found on the plate, one longer than the other ; the difference of their lengths, when duly interpreted, gives the velocity of the projectile ; when the distance between the screens is considerable, the beams of light have to be reflected on to the chronograph by mirrors. FREDERICK J. SMITH.

[1] A Note on a Lecture given at Oxford, October Term, 1895.