OUR ASTRONOMICAL COLUMN.

BARNARD'S PROPER-MOTION STAR.—It was shown in *Mon. Not.* for November, 1916, that this star was observed by Lamont at Munich in 1842, being Mun. (1) 15040. Further confirmation of this is given by K. Graff in *Ast. Nach.* (4989 and 5007). He has surveyed the region with the 60-cm. refractor at Bergedorf, and gives visual magnitudes on the Harvard scale, and colour on the Osthoff scale, of twenty-eight stars in the region. The Barnard star is of mag. 9·37 and colour 3·4, being the reddest star in the field. There are nineteen individual measures of its magnitude, ranging from 9·22 to 9·60, but they are not grouped in a manner suggesting variability. The magnitude of the star Mun. (2) 6966, which Bauschinger observed in 1886 in an unsuccessful search for Mun. (1) 15040, is 10·79 and colour 2·0. Its proper motion is small, and it must have been extremely near the Barnard star in 1843. As there was some doubt whether the star B.D. +4° 3561 was the Barnard star or Mun. (2) 6966, Prof. Kustner has re-examined the original zones at Bonn, with the following interesting result. Zone 462 was observed on 1854 May 30, the air being very clear. The following two stars were recorded in the region:—

	Mag.	R.A. 1855·0 h. m. s.	N. Decl. 1855·0 ° ′
(*a*)	... 9·5	17 50 43·8	+4 16·5
(*b*)	... 9·5	17 50 44·3	+4 17·9

Zone 472 was observed on 1854 July 24, the air again being clear; on this night a single object was recorded in the place, thus:—

(*c*)	... 9·3	17 50 41·9	+4 17·3

In editing the B.D. it was assumed that objects (*a*) and (*c*) were the same, and their mean was taken as the position of +4° 3561, while object (*b*) was omitted as insufficiently observed. However, making use of our later knowledge, it is fairly certain that (*a*) is Mun. (2) 6966, (*b*) is the Barnard star, while (*c*) is probably the two objects observed as one (the telescope was small and the magnifying power low). This would account for the greater brightness recorded on July 24, which is unquestionably too high for Mun. (2) 6966. In view of these facts, the two stars must divide the claim to the title B.D. +4° 3561, but another early observation of the Barnard star (1854 May 30) has been established with tolerable certainty.

Mr. Graff estimates the diameter of the Barnard star as 1/20 of the sun's, or half that of Jupiter. This is based on its absolute magnitude and an estimate of its surface brightness from the character of the spectrum. It seems, however, unlikely that so small a body could ever attain the temperature necessary for a sun-like state. Prof. Eddington considered that a mass 1/8 of the sun was the minimum for the attaining of a sun-like condition. If we assume a density eight times the sun's, or twice that of the earth, this would give a diameter 1/4 of the sun's. It seems unlikely that the actual value is less than this.

THE GREAT SOLAR PROMINENCE OF LAST MAY.—Several reproductions of the photographs of this object, taken by the eclipse expeditions, have recently appeared (*Observatory*, November, and the British Astronomical Association's Journal, October). The Monthly Notices for June contained some photographs taken with the Cambridge spectroheliograph. The *Astrophysical Journal* for October gives some beautiful photographs taken at short intervals with the Yerkes 40-in. refractor. The first photograph was taken at 1h. 17m. G.M.T., about midway between the Sobral and Principe pictures. The prominence then formed a great arch, extending from −42° to +6° in latitude, and 4·5′ high. It was rising rapidly, and 1¼h. later it had broken away from its terminal columns. Successive plates show that the rising continued steadily, and at 7h. 57m. G.M.T. its height was 17′, or more than a solar radius. It rose from 200,000 km. to 760,000 km. in 6h. 40m. Mr. Evershed also secured many photographs of the object at Kodaikanal, but the longitude of Yerkes was more favourable for securing its most dramatic stage. The prominence had been in existence since March, but on the eclipse day it suddenly changed from the quiescent to the eruptive type. The Yerkes observers direct attention to a claw-like marking at the base of one of the columns, from which they infer that this base was exactly on the sun's limb.

ATOMIC DISINTEGRATION AND HEAT ENERGY.

SIR OLIVER LODGE, in the Trueman Wood lecture to the Royal Society of Arts, referred to last week, asked whether atomic energy may not already be being unconsciously utilised. The recognition of radio-activity as a process of natural transmutation, in which a large and previously unknown store of energy associated with the atomic structure is released in the disintegration of the atom and its change into totally different kinds of atoms, dates, of course, from the early years of the century. The natural conclusion is that, before this energy can be rendered available, artificial transmutation must be possible, and that this transmutation certainly does not occur in any other case than in that of the radio-elements, and then only spontaneously and in a manner not to be altered by artificial means.

Sir Oliver Lodge appears, however, to think that internal atomic energy may be being already unconsciously made use of, and cites two possible cases. The first is vision. The retina is supposed to contain a substance the atoms of which are capable of accumulating a few million impulses of æther-waves of luminous frequency. This causes the atom to eject one or more electrons, and it is these electrons rather than the original light-waves which stimulate the nerve-endings. Even accepting this as an interesting and suggestive new photo-electric theory of vision, which accounts satisfactorily for the extreme sensitiveness of the eye, the energy involved is surely the energy of the exciting radiation rather than internal atomic energy. Photo-electric effects in general are not supposed to be different from or more fundamental in character than other electro-chemical effects.

In the other example it is the energy of the electrons emitted by an incandescent wire which is in question. It is possible to welcome and recognise the very great advance which the use of this phenomenon, by means of the thermionic valve, has achieved in wireless telegraphy and telephony, without accepting the view that any new form of energy is utilised. The emission of electrons is, indeed, described as analogous to the evaporation of molecules from a surface, the velocities being distributed in accordance with Maxwell's law for a monatomic gas. It would seem sufficient to ascribe the energy of the electrons to heat energy, at least until it is proved that it is not so derived. The mere latter-day interpretation of many of the changes studied by the chemist and electro-chemist in terms of the electron does not alter their character, which is well understood by chemists not to be of the type they would regard as transmutational, or to involve the kind of energy disclosed by radio-activity, or, indeed, any other kind than what has been familiar in chemical, electro-chemical, and physical changes since these subjects began to be studied.