The contacts were observed through a binocular (mag. ×8) and the watch used was corrected by means of a sun-dial.

Solar eclipses have another value. It is on these occasions that people at all gaze at the sun, though of course through coloured glasses. If large sun spots happen to be present at the time, they are seen with the naked eye. The partial obscuration of the sun helps to some extent in picking up the spots. There are, however, other times when the spots, if large, become visible to the naked eye. The best time is perhaps a few minutes before sunset. The last occasion, when this happened, and of which I have a record, was on the 22nd April of the last year, *i.e.*, two days after the perihelion passage of Halley's comet. I was looking for the reappearance of the comet just before sunset, when the spot, which was not of extraordinary dimensions, was noticed by some friends who had not previously seen any.

The atmospheric condition in Calcutta is perhaps not favourable for these naked-eye observations. For I could never see the Zodiacal light from Calcutta, while it is an almost every day phenomenon from these latitudes. Then again we saw for a week the rapidly moving comet of January 1910, while none seemed to have noticed it from Calcutta. It is quite a common thing for us here to see Venus at 11 A.M., and sometimes even at 11½ A.M. in strong day light.

Extracts from Publications.

The report of the Departmental Committee on the Solar Physics Observatory, now at South Kensington, is a divided one. Sir T. L. Heath, Mr. Dyson and Professor Schuster recommend that the solar physics work be transferred to Cambridge, with an initial grant for buildings and a fixed annual inclusive grant-in-aid to the University, provided that the University will agree to the following conditions:—(1) That the professor of astrophysics be the director of the solar observatory; (2) that there be a committee or syndicate nominated by the University with functions similar to those of the Board of Visitors of the Royal Observatory at Greenwich; (3) that the Astronomer Royal and the Director of the Meteorological Office be *ex-officio* members of the committee or syndicate; (4) that the University undertake to carry out at the new observatory the necessary amount of routine work on

the general lines indicated in paragraph 14 (*b*) and (*c*); (5) that an annual report, to include a statement of the work done and an abstract of the accounts of the solar observatory showing the application of the grant-in-aid, be presented by the Director to the committee or syndicate, to be by them transmitted to the Treasury. With a view to the permanence of any arrangement, the committee desire to point out the importance of attaching the directorship of the solar observatory, if established at Cambridge, to a professorship which is not merely of a temporary character. Dr. Glazebrook dissents from his colleagues. He says :—"I believe that the evidence placed before the committee and the facts detailed in the report lead to the conclusion that, on a balance of all considerations, a scheme for locating the observatory at Fosterdown.....could be arranged at an annual cost of £3,000, with a capital outlay of £5,000, and would secure the best results."

It appears from an appendix that Sir Norman Lockyer, F.R.S., Director of the Solar Physics Observatory, is not in favour of the transference to Cambridge, and recommends the Fosterdown site.

[*English Mechanic.*

At the October meeting of the British Astronomical Association, the President gives an address on the progress, or otherwise, of the Association, with some remarks on any astronomical subject that he chooses, and Mr. Knobel, after congratulating the members on the new status of the Association, towards the accomplishment of which he himself has done so much, went on to talk of things astronomical, specially dwelling on the question of the application of the dry plate to certain lines of astronomical questions, a practical subject on which he is an expert. The Association evidently begins a new year full of life and vigour, as befits a body which has just attained its majority.

[*English Mechanic.*

The Astronomical Society of Barcelona.—Since receiving the Royal favour a year ago, this Society has considerably increased in numbers. The roll now contains 400 names and the Society is entering upon its second winter season with very rosy prospects. One of the objects of the Society, upon which special stress was laid at its foundation in January 1910, was the provision of a public observatory where members might meet on fine evenings to study celestial phenomena and to discuss points of astronomical interest. Senor Rafael Patxoty Jubert, one of Spain's illustrious men of science, and

a foundation member of the Society, has offered to present his observatory and instruments to the Society, and, needless to say, the offer has been eagerly accepted. This establishment, the Observatori Catala, is situated at San Felix de Guixols, in the province of Gerona, and in importance it stands next to the observatories of Madrid and San Fernando. It has accomplished much valuable astrophysical work under the directorship of its owner during the past ten years, chiefly in the direction of the measurement of multiple stars. The whole establishment will be removed immediately to Barcelona, where it will be re-erected on the roof of one of the public buildings in a position easy of access to all members of the Society. The dome, which is constructed of steel, has an internal diameter of 17 feet and was made by Messrs. Gilon of Paris. It covers a fine double equatorial by Mailhat, visual and photographic, with apertures of 8¾ inches and focal lengths of 10 feet and 7 feet 9 inches respectively. A complete set of accessories of precision is included in the gift-Spectroscope, micrometer, camera, electric pendulum and azimuthal theodolite. Annexed to the observatory in its new position will be a room for meetings of the Society, library, photographic laboratory, etc.

[*English Mechanic*.

Remarkable photographs of the Planet Mars have been taken by M. Tikhoff, states the Gazette of the Russian Observatory at Pulkowa. The superior definition of the new photographs is due to the use of improved plates and coloured screens, which have enabled the astronomer to obtain fine contrasts in his pictures. The best photographs of the "canals" of Mars were taken through red and orange screens, and from these, it is claimed, it would appear that the "canals" are filled with water, or at any rate, something which has a sea-green colour. Further studies of a similar kind in connection with the Polar Cap indicate that ice is present there, and not snow. M. Jarry-Desloges of the Massegros Observatory reports that the northern cap wears a bluish appearance and is particularly brilliant. Sometimes the cap can be traced to the fortieth degree of latitude, and at other times it is much more closely limited to the Polar regions.

[*English Mechanic*.

It is well known, remarks Mr. P. H. Ling, in *Nature*, that the aphelia of many comets are grouped at distances which are nearly the same as those of the larger planets, and astronomers have sometimes attempted to use this fact to demonstrate the existence of a planet beyond Neptune. M. Flammarion mentions two cases—a comet which appeared in 1532

and 1661, and Tuttle's 1862 comet, which is related to the Perseid Meteors, and has a period of 121½ years. These are taken as indications of a planet at a mean distance of about 48 astronomical units. The evidence is obviously insufficient, and special interest therefore attaches to the statement that the Kiess comet (1911*b*) is possibly the same as 1790 I. If the identity can be established, this comet must belong to the same group as the other two, and may be regarded as strengthening their evidence as to the hypothetical planet.

[*English Mechanic.*

With regard to the order of the planets, committing to memory the following sentence may assist some beginners :—

Many Very Excellent Men Joyfully Study Universal Nature.

Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune.

[*English Mechanic.*

The facts in the following newspaper cutting are essentially correct :—

A church spire has recently been saved from destruction in a very odd way. The Astronomer Royal was testing a telescope at the Observatory in Greenwich Park, and chose the spire of St. Johns' Church, Blackheath, a mile away, as a fixed object on which to focus the instrument. He was astonished to see a serious flaw in the stonework of the spire—there was a gaping fissure through which daylight appeared. The rector was informed, steeple-jacks went up, and the crack was found to be about fourteen feet in length. The church is closed and repairs are going on.

[*The Observatory.*

Celestial Photography with ordinary Portrait Lenses.—Perhaps the majority of students of Astronomy are of the opinion that, in order to make photographs of the heavens, the very finest of apparatus must be used. While it is conceded that of two cameras, the one specially made for celestial photography by eminent opticians will produce the best results, yet good pictures can be made with ordinary portrait lenses, which now-a-days may very often be purchased for a trifle at some of the older photographic studies throughout the country. The apparatus I have used in celestial photography is of the simplest possible construction, consisting of a square box of wood, painted black outside as well as inside, to which the lens, a Darlot of 3 inches aperture and of

10 inches focus, is securely fastened. This box is made in two sections, one sliding within the other, making it adjustable for focussing.

It is of no use trying to focus on the stars; the best way is to expose several plates until the star trails show as the finest lines. Most portrait lenses are lacking in a flat field, and it becomes necessary to compromise on the roundness of the field and focus sharply at a little distance from the centre, this will tend to make it sharpen all over, at the expense of the centre.

The camera is securely bolted to the telescope and carries an ordinary 4 × 5 Premo plate holder. The telescope is equatorially mounted and is moved by a simple tangent screw. The eyepiece is provided with cross wires, and when following a star, I put it slightly out of focus, so that it forms a disc, which may then be accurately bisected, and one of the wires is put parallel with the motion of the stars in the field of view.

[*Popular Astronomy.*

The difficulties in the way of saying at once that Mars is habitable by beings like ourselves are three—the lack of heat from the sun, the lack of atmosphere, and the lack of large bodies of water. Being 1'4 further from the sun, Mars receives only half the heat that the earth does, and this fact would argue that in the absence of a dense blanket of water vapour to retain the heat, the temperature must be extremely low, too low in fact for ice to melt at all. The change of the polar caps contradicts this, and those who argue for low temperature are forced to suggest some other substance than snow to account for the caps. Carbon dioxide has been suggested by some as a substance whose crystals are as white as those of snow, and whose temperature of crystallization is much lower than that of water. But Lowell points out that at pressures of anything like that of our atmosphere or less, carbon dioxide passes at once from the solid to the gaseous state. Water lingers in the intermediate state of a liquid. The Martian Cap as it melts is surrounded by a deep blue band, which accompanies it in its retreat, shrinking to keep pace with the diminution of the cap. This is what we should expect if it were water. And if we are to bring in an extra amount of carbon dioxide, a far less increase over the amount found in the earth's atmosphere would so add to the heat-retaining power of Mars' atmosphere as to account for the apparently high temperature indicated by the observed seasonal changes.

Of the rarity of the atmosphere there is no question. The mass of Mars is so much smaller than that of the earth that

the force of gravity at the surface of the planet is too weak to retain an atmosphere of anything like the density of our own. Even the most ardent advocates of the possibility of life on Mars admit that if one of us were to be suddenly transported to that planet, he would probably die in a few minutes because of the rarity of the atmosphere. But it is claimed that beings like ourselves might gradually become accustomed to an atmosphere much rarer than ours, and this is probably true. That water is comparatively scarce there, is also unquestioned. The spectroscopic observations of Mars at Flagstaff indicate very little, if any, absorption by water vapour, and those by Campbell at the summit of Mount Whitney show no trace of any at all. In fact, if Lowell be right, it is this very scarcity of water which has brought about the evidence which comes nearest to proving that there are actually living intelligent beings on Mars.

[*Popular Astronomy.*

Memoranda for Observers.

Standard time of India is adopted in these Memoranda.

For the Month of January 1912.

Sidereal time at 8 p.m.

		H.	M.	S.
January 1st	... ...	2	39	32
8th	... ...	3	7	8
15th	... ...	3	34	44
22nd	... ...	4	2	20
29th	... ...	4	29	56

From this table the constellations visible during the evenings of January can be ascertained by a reference to their position as given in a Star Atlas.

Phases of the Moon.

			H.	M.	
January 4th	Full Moon	... ...	7	0	P.M.
11th	Last Quarter	... ...	1	13	,,
19th	New Moon	... ...	4	40	,,
27th	First Quarter	... ...	2	21	,,