is that the credit for the discovery of the Martian Canals does not belong entirely to Schiaparelli as the study of Professor Lowell's lectures referred to above would lead one to believe, but that an earlier astronomer has some share in the credit. This is a fact which is apt to be forgotten, and it is the object of this note to bring it to notice. It is gratifying that in Sir Robert Ball's "Story of the Heavens" the name of Dawes is mentioned as one of the earliest observers of Canals in Mars.

Extracts from Publications.

Gain of Definition Obtained by Moving a Telescope.—Professor E. E. Barnard writes in *Nature* apropos of certain previous correspondence on the subject published in that journal: "Many years ago, when I used to sweep for comets, sometimes nebulæ would be seen to enter the field which were so faint that when the telescope came to rest they were only just discernible or invisible altogether. By slowly swinging the telescope back and forth they would become readily visible, as if the process of motion had the effect of greatly multiplying their light. This was not an unusual occurrence. I remember also that it made quite a difference as to whether the object entered from the right or the left side of the field. It was easier to detect a very faint nebula or comet when it entered from a certain side. I cannot now remember whether this was from the right or left (the sweep being horizontal), but I know I used to take advantage of the fact and sweep so that the stars should enter from the favourable direction."

[*Nature*.

Gyrostats and Gyrostatic Action.—The top as a plaything is despised; nevertheless it is a most important contrivance. The earth on which we live is a top, and a considerable range of astronomical phenomena are most easily explained by reference to the behaviour of ordinary spinning tops. * * * * * *

The properties of a top are best studied in the gyroscope, or gyrostat, as it is better called. This instrument in its simplest form consists of a heavy-rimmed metal disc or fly-wheel capable of rotation with but little friction on pivots held in sockets attached to a metal frame. Thus the fly-wheel may, by the quick withdrawal of a string wound round its axle, or in some other way, be set into rapid rotation in the frame which in its turn is mounted in various ways to show gyrostatic effects. But this ordinary form, as well as some others of a more pretentious character, suffers from the great disadvantage of having no means of maintaining the spin, and the continual renewal of the spin is a great nuisance. In a recent form of gyrostat, this drawback has been overcome by the simple and effective device of making the fly-wheel itself the rotor of a high-speed continuous-current electric motor. This arrangement gives a wheel of great moment of inertia or, as it is more simply termed, " spin inertia," which can be run at high speed for a long time without trouble of any kind from bearings or contacts. * * * * * *

The gyrostat may be set up with the axis of the fly-wheel horizontal in a mounting which consists say of a fork perched upon a pillar. The arrangement has then three distinct possible motions or freedoms as they are called. The fly-wheel can turn about its axle, the frame or case containing it can turn about the line of the pivots at the two ends of the fork, and the fork itself can move round a vertical axis provided in the pillar. These three axles which may be numbered (1), (2), (3) are mutually at right angles and meet at the centre of gravity of the movable system or gyrostat proper. When thus set up, the gyrostat is said to be freely mounted, and the behaviour of such an instrument with the fly-wheel in rapid rotation when an attempt is made to turn it round either of the axes (2) or (3) by the action of a simple tilting force is most startling and unexpected. * * *

The results of observation may be summed up as follows :—The fly-wheel is spinning about axis (1). Any attempt to tilt the gyrostat about axis (2) produces turning about (3) ; any attempt to tilt it about (3) produces turning about (2). This response of the body seems most paradoxical, but in point of fact can easily be shown to be in accordance with elementary dynamical principles. The effect can be briefly described as a turning of the axis of spin *towards* the couple-axis, *i.e.*, towards the axis about which the gyrostat would turn under the action of the imposed tilting force if the fly-wheel were at rest. The turning action or couple may be said to cause the fly-wheel to "precess" towards the couple-axis, and this motion is analogous to that motion of the earth which produces the astronomical phenomenon called the precession of the equinoxes. * * *

Upon the principle of permanence of direction of the axis of rotation, in the absence of a couple producing precession depends the action of the gyrostatic compass and a good many other things besides.

[*Nature.*

A Cheap Form of Grating Spectrograph.—In a recent issue of *Knowledge* Mr. A. H. Stuart describes a cheap form of spectroscope in which a transmission grating is used. The instrument is of a rectangular box form, having the slit and camera at one end of the box. The light after passing through the slit falls on an objective, at the back of which and nearly in contact with it being placed a replica grating; behind this grating is placed a plane mirror at a distance of a few inches. The beam of light passes through the slit to the objective and falls normally on the grating. A large portion of the light passes through the grating unchanged, and falls on the mirror. If it meets the mirror normally it will be reflected back to the grating, and a spectrum will pass out obliquely through the object-glass and fall on the photographic plate at the camera end on one side of the collimator. In order to avoid the faint reflection spectrum the grating is retained in its position at right angles to the incident beam, but the mirror is slightly twisted. Thus a pure spectrum of considerable dispersion is obtained. Mr. Stuart has constructed such an apparatus by the judicious use of 20*s.*, the achromatic lens, 2 inches in diameter, costing 3*s.* 6*d.*, and the grating 10*s.* 6*d.*

[*Knowledge.*

Spectrum of the Pleiades Nebula.—*Bulletin* No. 55 of the Lowell Observatory contains an interesting account of the results secured by Mr. Slipher in the photography of the spectrum of the nebula in the Pleiades. This nebula, as Mr. Slipher points out, would doubtless naturally be classed as a gaseous nebula since in its prominent characteristics it resembles more the great nebula in Orion, the typical gaseous nebula, than the more numerous class of spiral nebulæ. However, with the 24-in. refractor of the Lowell Observatory he made an exposure of twenty-one hours, obtaining, as he states, a perfectly legible record. This spectrum was continuous and crossed by strong hydrogen lines, $H\beta$, $H\gamma$, $H\sigma$, $H\epsilon$ and $H\mu$, and fainter helium lines, those at 4026, 4381 and 4472 (combined with 4481) being recognizable. No trace of any of the bright lines seen in the spectra of gaseous nebula was found, but the spectrum resembled a copy of the brighter stars of the Pleiades. The result suggested the spectrum might be due to the light from Merope scattered and reflected by the large objective. Exposures on the nebula of Orion and of a region near Sirius led him to conclude that "the nebula shines by light, the spectrum of which is a true copy of that of the neighbouring star Merope and of the other bright stars of the Pleiades." It is suggested then that the nebula is disintegrated matter similar to what we are acquainted with in our solar system, as in the rings of Saturn, comets, etc., and that it shines by reflected light.

[*Nature.*

Memoranda for Observers.

Standard Time of India is adopted in these Memoranda.

For the month of July 1913.

Sidereal time at 8 p.m.

	H.	M.	S.
July 1st	14	36	8
,, *8th*	15	3	44
,, *15th*	15	31	20
,, *22nd*	15	58	56
,, *29th*	16	26	32

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

Phases of the Moon.

	H.	M.	
July 4th—New Moon	10	36	A.M.
,, *11th*—First Quarter	3	7	A.M.
,, *18th*—Full Moon	11	36	A.M.
,, *26th*—Last Quarter	3	29	P.M.