Extracts from Publications.

At the meeting of the British Astronomical Association Dr. Crommelin said that there was a point in Mr. Holmes's paper on Meteors that lent itself to simple numerical testing; that was the suggestion that many Meteors entered our atmosphere and passed out again. He (the speaker) by blackboard diagrams proceeded to show that of the Meteors of any particular swarm entering the upper atmosphere of the Earth only 1 in 80 would pass out again. He did not think they could increase the ratio in any way whatever, and consequently it would be too small a fraction of any Meteor shower to make any appreciable difference in the behaviour of the average Meteor. He knew very little about Chemistry but he was aware that a large amount of hydrogen was found in most Meteors, and the great affinity of hydrogen for the oxygen of the atmosphere would, he should fancy, accelerate the process of combustion. In the case of a leaden bullet there was no particular affinity between the lead and the atmosphere. He spoke subject to correction, of course. With regard to the resistance of the air, it was admitted that the resistance varied as a high power of the velocity. He thought in some gunnery tables the resistance was taken as varying as the cube of the velocity, and so in the case of these high planetary speeds they got a huge ratio compared with the resistance they got in gunnery. Mr. Holmes pointed out that there were many misleading statements in the text books, and it would be well if the hint were taken and those things were corrected in the future. Still, he thought on the whole there was no doubt the existing theory of Meteors was pretty well correct. Visual examination of their behaviour and inspection of the photographic tracks of Meteors would show that. He had a photograph himself which showed a Meteor entering the upper atmosphere as an almost invisible line; then it rapidly got brighter and brighter, until at last it came to the point where the Meteor burst. He took it that the bursting was one of the things that dissipated the Meteors. The gas got so hot and expanded so much that the outer shell of the Meteor could not hold it, and there was a regular explosion like a shell bursting. The dust resulting from the explosion would be much more resisted by the air than a larger body would be. He took it that the bursting was one of the factors in preventing so many Meteors from reaching the surface of the Earth.

[*Journal of the British Astronomical Association.*

Mr. W. F. Denning in his paper on "Meteoric Shower in Sagitta" says:—

It seems to me that should the photography of Meteors continue to provide us with very slender results, it will become necessary to arrange simultaneous watches for Meteors on an extensive scale. When this is effected on more accurate lines than any previous attempts, it may be possible to suitably investigate various peculiarities of Shower Meteors, such as stationary and shifting radiants.

[*Journal of the British Astronomical Association.*

The Astronomical Society of India.—It is very gratifying to find that so many new societies have recently sprung into existence for the study of Astronomy. To all we wish success, but naturally the Astronomical Society of India appeals more particularly to us, being the only recent one of British formation. Some numbers of the JOURNAL are now before us, from which one may easily gather that the general arrangements of our own Association have commended themselves to the members. We are glad to notice that the President, Mr. H. G. Tomkins, F.R.A.S., is also the Director of the Lunar Section. It will be remembered that a few years ago he contributed to the British Astronomical Association (of which he is a member) several papers in connection with his theory as to the origin of the bright rays on the moon.

[*Journal of the British Astronomical Association.*

Future Policy in Astronomy—In his second address at the meeting of the Royal Astronomical Society, Sir David Gill gave his views on future procedure in two departments of Astronomy which in both cases had some relation to the subject for which the Gold Medal of the Society was awarded. In the first place, he thought that the time had come to limit the observations of the Moon. It is all but certain, Sir David said, that for such periods as a year the discordances between observations and Brown's Tables of the Moon will, apart from a small and practically constant difference for the year, be but a mere representation of the errors of observation, but the mean annual difference will vary slowly from year to year because of some of the long-period terms which remain unexplained by theory. Therefore Sir David suggests that continuous observations of the Moon at Greenwich, at least the extrameridian observations with the altazimulth, should be given up and that some observations during the year, at specially selected times, would be sufficient.

Further, he suggested that for detecting and determining the co-efficient of the long-period terms before mentioned, the observation of accultations of Stars by the Moon would be most valuable, so that future improvement of the lunar theory would be within the resources of the most modestly equipped observatory.

Secondly, the retiring President suggested that, besides doing its routine work for calculating the Almanac, the National Almanac office should be made into a department for the prosecution of Astrodynamics, that its staff should be increased by the appointment of some very able mathematician, who would aid Dr. Cowell in such work as computing the orbits of comets and planets and determining fundamental constants, or in any researches of a mathematical kind, the necessity for which may arise in Astronomy.

[*The Observatory.*

Curvature of Photographic Plates by Pneumatic Pressure.—The plates are, in their normal state, flat; they are flat when they are coated and sensitized, and they are flat when taken out of the telescope, but during exposure to the Stars they are bent by suction against a curved matrix. The enterprise has been successful, and as a consequence the field of good definition has been considerably extended.

Is this method of curving new? Curved plates have, of course, been tried before; it occurs to me to look up a reference to the success of Professor F. L. O. Wordsworth in 1901, and I see it noted that he managed to increase the available field of a double lens from 8° to 30°, and hoped to get even 45°! (Unfortunately he is no longer at work in this direction). But I think his plates were permanently curved. So also were those we tried at Greenwich about 1886, with but indifferent success. The plates were inconvenient to store, and no doubt would have been more inconvenient to measure. The pneumatic plan avoids these disadvantages.

There will be some interesting work in determining the distortion of the field by the curvature, but I expect it will turn out to be a radial distortion varying as the cube of the radius. If we suppose for a moment that all radii remained unaltered in length, then the bending to the surface of sphere radius R would compress the circumference $2\pi r$ into the cicumference $2\pi r\ R\ S\ \text{in}\ r-R$ which differs approximately from the former value by a term

in r^{-3}. But this supposition cannot fit the facts; there will no doubt be extention along the radius and compression perpendicular to it, and it seems not unlikely that both will vary as r^{-3}. Hence we may expect to find on the released plate a radial distortion varying as r^{3} which is apt to occur in any case (*see*, for instance, Mon. Not. LXXI p. 106) on plates with a large field. If the curvature introduces no essentially new disturbance it may be welcomed without reserve.

[*The Observatory.*

Water-vapour, carbonic-acid gas, ozone, and hydrocarbons, in the Earth's atmosphere prevent the rapid radiation of the Sun's heat into space. According to Dr. Arrhenius, the Earth's atmosphere contains about 0·03 per cent. by volume of carbonic-acid gas. If deprived of this, the surface-temperature would fall about 21°, and this would so diminish the amount of water-vapour in the atmosphere that another and almost equal fall of temperature would result. There is little doubt that the atmosphere of Mars contains a comparatively small percentage of water-vapour. That the heat received during the day is lost to a great extent during the night seems to be shewn by the aspect of certain parts of the planet's disc. Such regions as Hellas and Hesperia, in the south Temperate Zone, even in the summer season, are usually very white as they emerge from the night, often becoming dusky as they near the noon meridian, suggesting, as also do many other parts of the planet, the appearance of heavy frosts formed in the night and vanishing only under the noon Sun. Visual evidence thus seems to suggest that the mean temperature of Mars is much below that of the Earth; but the atmosphere of the planet surely possesses some quality which saves the possible Martians from such intense cold as one would expect to experience upon a world so situated.

A slight increase in the percentage of carbonic-acid gas in the Earth's atmosphere would tend to equalise the temperature between different portions of the Earth's surface. Thus, there would be less difference between the Torrid, Temperate and Frigid Zones. Dr. Arrhenius says that the oceans of the Earth, by absorbing carbonic-acid, act as regulators for the atmosphere. According to his figures, the oceans take up five-sixths of the carbon-dioxide artificially produced. Since Mars has no large bodies of water to act in this capacity, we would expect to find a greater percentage per volume of carbonic-

acid gas in its atmosphere than in that of the Earth if the sources of carbon dioxide are proportionately equal.

The Martian atmosphere exerts a pressure of less than 2 lb. to the square inch on the surface of the planet, and this is less dense by about one-half than the air on the tops of the Earth's highest mountains. Although so attenuated, the atmosphere of Mars is perceptible almost at once to the student of the Martian markings. The dark areas emerging from it near the western limb when the planet is near the Opposition, and therefore less gibbous, suggests the appearance of forests seen through a lifting fog. It is the atmosphere of Mars which causes the brilliant illumination all around the edge of the disc. A careful examination of the yellow regions has shown that they are usually slightly lighter near the centre of the disc, gradually darkening towards the planet's limb. Thus the atmosphere seems to absorb the light reflected from the brilliantly illumined deserts, just as a vast stretch of white sand on a beach becomes dusky in the distance. A point is reached near the planet's limb where the light reflected from the atmosphere is brighter than that reflected from the surface below it; hence the brilliant illumination of the extreme edge of the disc.

[*English Mechanic.*

The liquid generally used for cleaning object glasses is pure alcohol, which is applied with a pellet of soft wool. Of course, the glass must not be rubbed hard, and if a not superabundant quantity of the liquid is used, it will not require much drying. A soft camel-hair brush may be applied afterwards to remove threads left by the wool, or such things. The dewing of the object glass is a difficulty which cannot be overcome without much trouble. In a note in the Monthly Notices of May 1910, Mr. Franklin Adams wrote that he could have completed his series of photographs in two years, instead of six, if it had not been for the difficulty of keeping the lens surfaces free from dew; but he had searched and inquired for a satisfactory remedy without any result. Finally, he had devised a dew-cap made of two tubes, and into the space between he forced air chemically treated, which escaped through holes on to the surface of the upper lens. This plan proved effective; but as this would probably be unsuitable for a telescope of the size of Mr. Hibbert's, I do not give more precise details. The suggestion has been made at Greenwich that if a resistance wire were wound round the dew-cap and an electric current passed through it, sufficient heat might be generated to

prevent the deposition of dew, but the plan has not been tried.

[*English Mechanic.*

Major E. H. Hills, Secretary of the Joint Permanent Eclipse Committee of the Royal Society and the Royal Astronomical Society, has received from Father Cortie, of Stonyhurst College, the head of the Government Eclipse Expedition sent out to Vavan in the Southern Pacific, to observe the total Solar Eclipse of April 28th, a cable message to the following effect:—"Thick cirrus clouds at totality, but obtained some photographs of Corona and Spectrum. Corona of type characteristic of minimum sunspot period." Mr. F. W. Dyson, the Astronomer Royal, has received the following telegram from Mr. Worthington, an English Astronomer who went out to Vavan to observe the eclipse:—"Splendid photos inner and outer Corona, one and half degrees." Mr. Clement L. Wragge witnessed the eclipse from Lifuka, Friendly Islands, where he telegraphs: "The weather was cloudless. The hydrogen flames were wonderfully distinct, and four great Coronæ were observed, extending as far as 40,000 miles from the surface of the Sun."

[*English Mechanic.*

Memoranda for Observers.

Standard Time of India is adopted in these Memoranda.

For the month of July 1911.

Sidereal time at 8 p.m.

		H.	M.	S.
July	*1st*	14	34	6
,,	*8th*	15	1	42
,,	*15th*	15	29	18
,,	*22nd*	15	56	54
,,	*29th*	16	24	29

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	*3rd* First Quarter ...	2	50	p.m.
,,	*11th* Full Moon ...	6	23	p.m.
,,	*19th* Last Quarter ...	11	1	a.m.
,,	*26th* New Moon ...	1	42	a.m.