

# THE ILLUSTRATED LONDON NEWS



*The Copyright of all the Editorial Matter, both Engravings and Letterpress, is Strictly Reserved in Great Britain, the Colonies, Europe, and the United States of America.*

SATURDAY, SEPTEMBER 15, 1934.



# Where the Sky Presents Strange Wonders: Saturnian Nightscapes.

DRAWINGS BY LUCIEN RUDAUX. (SEE ARTICLE ON ANOTHER PAGE.)



THE NIGHT SKY OF SATURN, AS IT WOULD APPEAR FROM REGIONS NEAR ITS EQUATOR: THE RINGS AS A HUGE ARCH, CAUSED BY PERSPECTIVE TO SEEM BROADER IN THE CENTRE THAN AT THE HORIZONS.



THE NIGHT SKY AS IT WOULD APPEAR FROM SATURN'S EQUATOR: THE RINGS, SEEN EDGEWAYS, LOOKING LIKE A THIN VERTICAL STREAK PASSING THROUGH THE ZENITH; WITH SOME OF THE SATELLITES BEYOND.



THE NIGHT SKY OF SATURN AS IT WOULD APPEAR TO AN OBSERVER IN ITS INTERMEDIATE LATITUDES AT MIDNIGHT AT THE SUMMER SOLSTICE: THE RINGS FORMING A COLOSSAL ARCH (BELOW WHICH ARE VISIBLE A NUMBER OF THE STARS) DIVIDED INTO VARIOUS ZONES—THE SHADOW CAST BY THE PLANET SEEN LIKE A BLACK BITE TAKEN OUT OF THE LUMINOUS SURFACE OF THE RINGS.

With a combination of imaginative ingenuity and scientific precision which rivals the *tours de force* of H. G. Wells and Jules Verne, M. Lucien Rudaux, the well-known French astronomer and artist, has reconstructed for us here some of the magnificent spectacles which the night sky of the planet Saturn would

present to an observer stationed at different points on the planet's surface. The famous rings of Saturn are known to all; they are probably composed of dust, minute particles, and asteroids. The planet's surface is thought to be gaseous. Further coloured drawings by M. Rudaux are on the next page.

# Unique in Space: Saturn's Rings, as Seen from its Satellites.

DRAWINGS BY LUCIEN RUDAUX. (SEE ARTICLE ON ANOTHER PAGE.)



SATURN AS IT WOULD APPEAR FROM ONE OF ITS TEN SATELLITES: THE HUGE PLANET FORMING A MAGNIFICENT OBJECT IN THE SKY; ITS DISC PARTLY OBSCURED; THE RINGS SEEN EDGEWAYS AS A SLANTING STRAIGHT LINE, SHOWING FAINT IRREGULARITIES; AND THREE OTHER SATELLITES.



A WEIRD AND SPLENDID SIGHT FROM ONE OF SATURN'S TEN SATELLITES: THE PLANET PARTLY OBSCURED AT ONE OF ITS SOLSTICES, AND ALSO SHADOWED BY ITS RINGS, SEEN EDGEWAYS AS A VERTICAL LINE.

Having given us reconstructions of the appearance of the night sky on the planet Saturn, reproduced on the previous page, M. Rudaux here shows the, if possible, more fantastic appearance it would present could it be viewed from one of its own satellites. M. Rudaux writes (in an article printed on page 385):



SATURN AS IT WOULD APPEAR, FROM A SATELLITE, WHEN TOTALLY ECLIPSING THE SUN: THE GREAT PLANET RIMMED WITH FIRE, ITS RINGS A VIVID SLANTING STREAK; AND TWO MOONS, SHOWING OPPOSITE PHASES.

"We may contemplate the globe of Saturn as a disc or a crescent, colossal in either case, and crossed by the rings, which appear as a long rectilinear line, showing, perhaps, irregularities. From a satellite, the rings could hardly look otherwise, since the satellites are in practically the same plane as the rings."

# AN ASTRONOMER'S "TRIP" TO SATURN:

A SCIENTIFIC STUDY OF THE PROBABLE ASPECT OF SATURN'S RINGS FROM THAT PLANET'S SURFACE, AND OF SATURN ITSELF FROM SOME OF ITS SATELLITES.

Translated and Abridged from an Article by M. LUCIEN RUDAUX.  
(See his Coloured Drawings reproduced on Pages 383 and 384.)

WHO does not know of Saturn and his rings, at least by name? Yet the lovely spectacle which the planet offers must be seen in the field of a telescope to be fully appreciated. It is something that, up to the moment, is unique in the known universe. What, then, would be our sensations if, instead of contemplating it from afar, lost in the depths of space, it were given to us to view this marvellous world from close quarters; or, better still, be transported on to it? This we shall try to visualise.

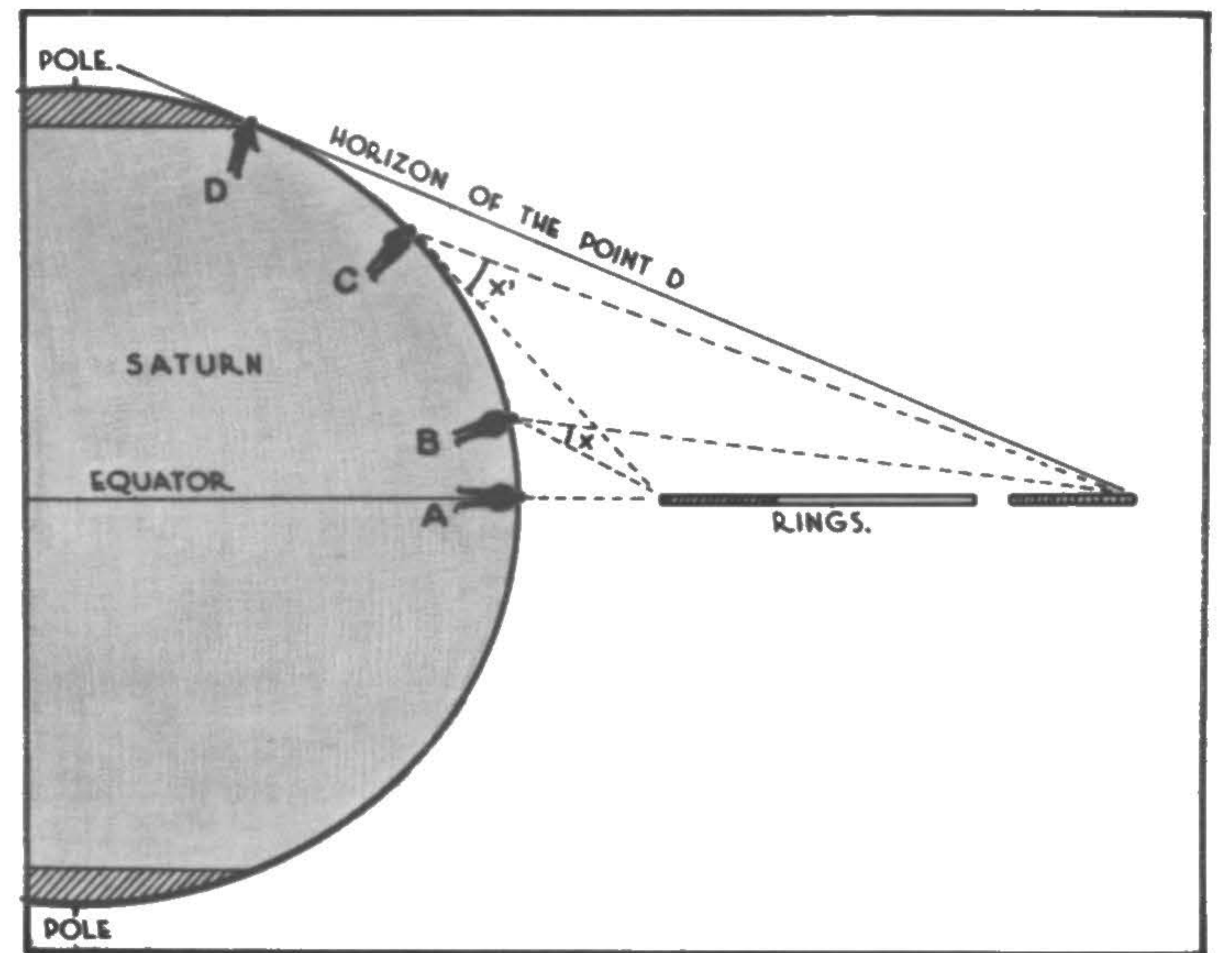
Saturn was long regarded as being at the edge of the solar system, for it is the last planet visible to the naked eye. Its apparent movement is slow: it makes a complete circuit of the sky in about thirty years. This is the period of its revolution round the sun—in other words, its "year." This long period is due to Saturn's great distance from the sun—some 885 million miles. Since we ourselves are some 92 million miles from the sun, an abyss of 793 million miles separates the earth from Saturn.

At such a distance a world of the proportions of our own would appear only as a small point of light in ordinary telescopes. If, therefore, Saturn can be seen and admired here even with quite modest instruments, it is because its proportions are enormous. Its globe, in fact, is 74,000 miles in diameter, giving it a volume 745 times greater than that of the earth. Saturn is somewhat inferior in size to Jupiter, the colossus of the solar system; but outdoes the latter by the impressive spread of its rings,

if Saturn were inhabited, and certain of its inhabitants were situated as our Esquimaux, cut off in the polar regions, these people would be ignorant of the existence of the rings. Their aspect changes constantly with the seasons. First, there are the intervals of visibility and invisibility, both of which continue for half the Saturnian year in each hemisphere—or about fifteen of our terrestrial years! During such periods, and in various regions, sight of the rings would be denied the observer, since the rings would then present their unilluminated face. Yet are they altogether invisible at such times? Possibly their component elements make themselves apparent by transparency or diffusion of light. Be that as it may, this would be, in any case, a very faint phenomenon, to judge from the depth of the shadow which the rings can be seen to throw on the planet's globe; a marked shadow which stretches more or less widely according to the time of year. Many Saturnian regions are thus deprived of the sun, between the autumnal and the spring equinoxes, for a period equivalent to several terrestrial years; this "black" period being preceded and

like a streak in the sky, but like an arch modified by perspective and the observer's situation. Let us not stray too far towards the pole, for after a time the edge of the rings would not be seen above the horizon. We may imagine that,

spectacles recurring with the seasons, and also with the passage of the Saturnian day, which only lasts ten-and-a-quarter hours—such being the speed of the planet's rotation. Its rapidity causes brisk modifications of the light effects, and of the appearance of the planet's shadow on the rings. This shadow appears to rise, run up to the middle of the arch, and sink below the horizon again, within only a few hours! From Saturn itself let us now pass in imagination to one of its satellites. From these

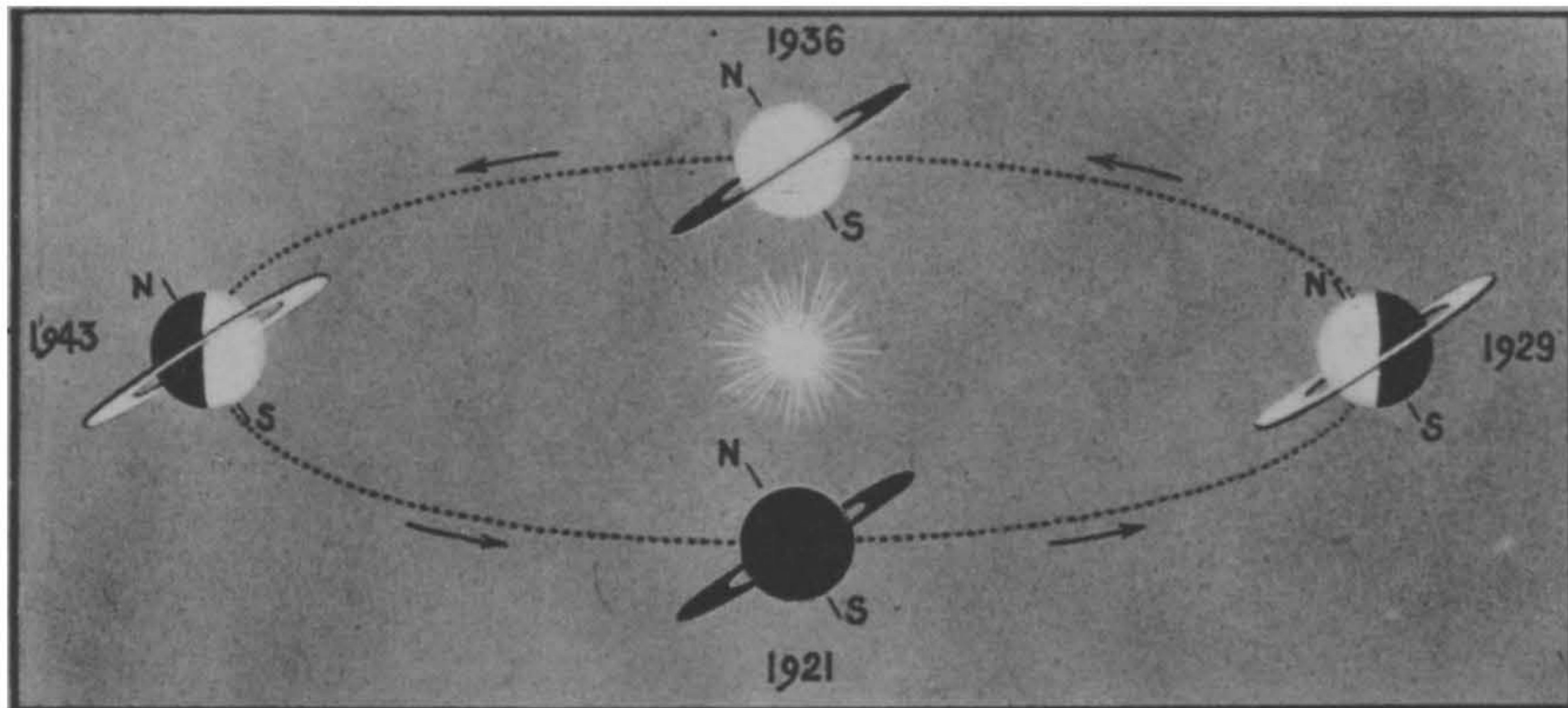


A SECTIONAL DIAGRAM OF THE CONDITIONS GOVERNING THE VISIBILITY OF SATURN'S RINGS FROM THE PLANET: THE RINGS IN THE PLANE OF ITS EQUATOR; AND OBSERVERS STATIONED AT DIFFERENT LATITUDES.

An observer at A, on the equator of Saturn, is in the same plane as the rings, which he thus sees edgewise, like a line drawn in the sky. As he moves from lower to higher latitudes (B, C), he sees the rings affected by a more and more oblique perspective, in accordance with the size of the angles X, X'; while at the same time the rings appear to be situated lower and lower in the sky—until, at a point D, a little above the 63rd parallel of latitude, the rings are altogether below the horizon. The two shaded areas are the polar regions, in which the rings are for ever invisible.

On the other hand, the spectacle presented by the night sky, during the seasons when the illuminated face of the rings is visible in one or other hemisphere, may well compensate for such inconveniences. At such times a colossal arch would appear, spanning the

various bodies Saturn would appear as a fantastic moon, fantastic both from its huge dimensions and certain peculiarities of its illumination. The phases of our moon are caused by its varying positions in relation to the earth and the sun. Saturn's globe exhibits the same phenomenon in relation to its satellites. Hence we may contemplate it as a disc or a crescent, colossal in either case, and crossed by the rings, appearing as a long rectilinear line,



THE PRESENT SATURNIAN YEAR, WHICH ENDED ITS FIRST QUARTER IN 1921, AND WILL ONLY BE THREE PARTS DONE IN 1936! A DIAGRAM OF THE RINGED PLANET MAKING ITS 33-YEARS' CIRCUIT ROUND THE SUN; SHOWING THE SUCCESSION OF THE SATURNIAN SEASONS, AND VARIATIONS IN ILLUMINATION OF THE RINGS.

In 1921 the sun was in the same plane as the planet's rings (northern spring equinox), and will be in the same plane again in 1936 (northern autumnal equinox); at these times the light falls edgewise on the rings. Between these two dates, at the time of the northern summer solstice (1929), it was the northern surface of the rings that was illuminated.

whose extreme diameter is some 170,000 miles. Further, this enormous girdle, though insignificant in thickness, can be seen to be divided into different zones, with one strongly marked hiatus. The rings are made up of dust, minute bodies, and asteroids, moving like so many satellites round the planet, at speeds varying with the distance from its globe. Since these bodies cannot be seen separately, the general effect presented to our eyes has an appearance of continuity. This entire formation lies in the plane of the planet's equator, and the whole system is inclined at an angle of 27 degrees to the planet's orbit. Hence the planet and its rings present a different aspect to the sun's illumination at different positions on its orbit. These variations in illumination, analogous to those experienced by our own globe, correspond to the passage of the seasons—though each Saturnian "season" lasts longer than seven whole years on the earth!

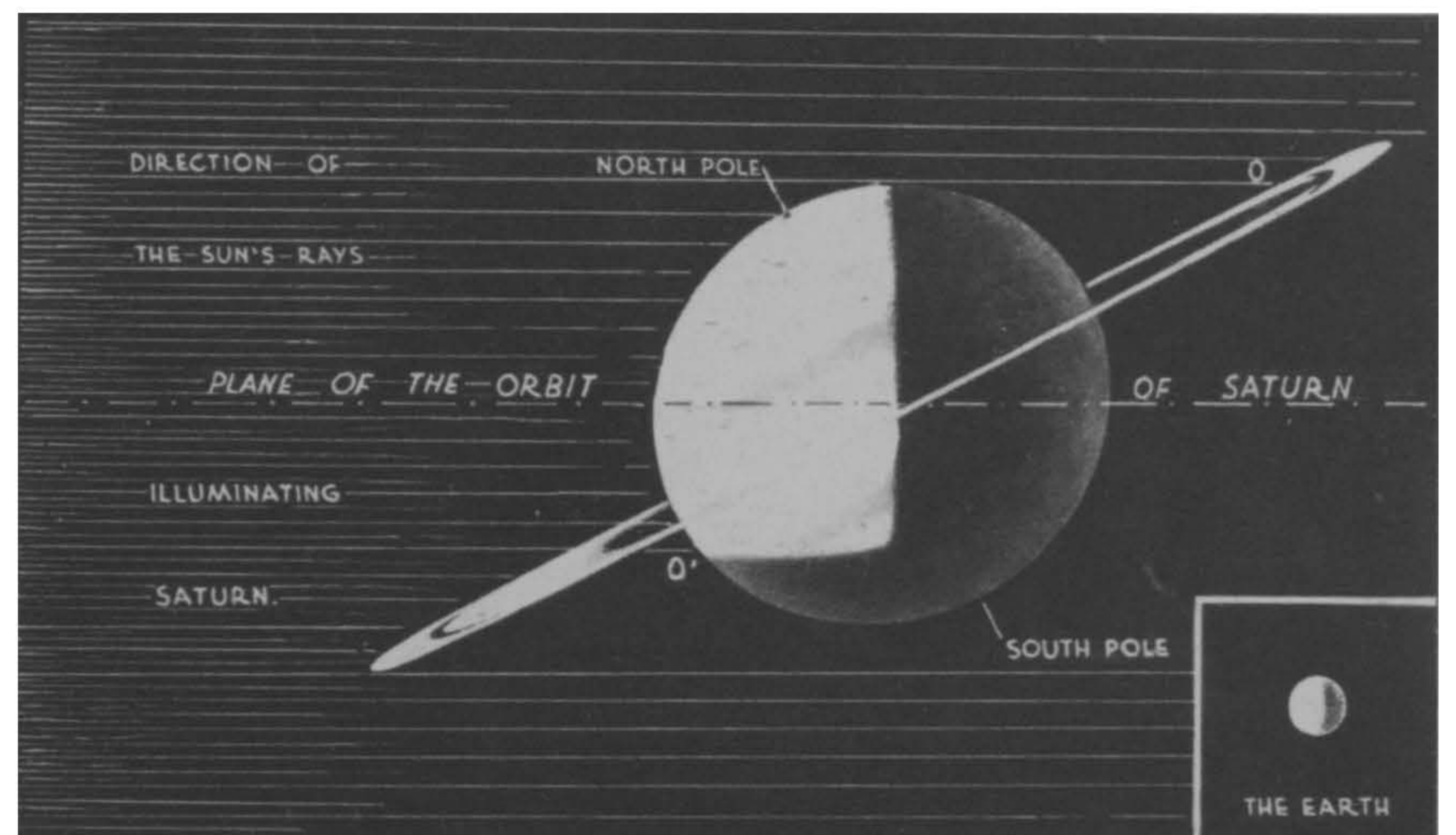
Saturn is also accompanied by ten satellites. Some of these moons are close to the planet, and not far from the outside of its rings. As to the globe of the planet itself, the telescope shows this to be ringed with dark and bright bands, diversified with various spots. The appearance and instability of these details suggest, not a solid surface, but the disturbances in an extensive atmosphere, or a gaseous tract. Moreover, Saturn's low density (almost that of water) indicates a world still in a very different condition from that of the earth.

Let us now voyage to Saturn, in imagination. The famous rings will appear under different guises, according to the point on the planet's globe at which we disembark. If, for example, the observer is at or near the equator, the rings, seen "edgewise," will look like a line traversing the sky. For the rings to be seen, however, a time must be chosen near the solstice, when their illuminated side is denoted by this slender streak of light. At the equinoxes the rings are invisible from the planet, for they more or less eclipse the sun, then in the same plane. As already mentioned, the rings are composed of dispersed elements. Are these elements large enough to be distinguished individually from the planet, or does the impression of continuity which we receive persist there also? The latter is the more probable conclusion.

The solstices would be the time for visiting intermediate latitudes between Saturn's equator and the poles. Here the rings would appear not

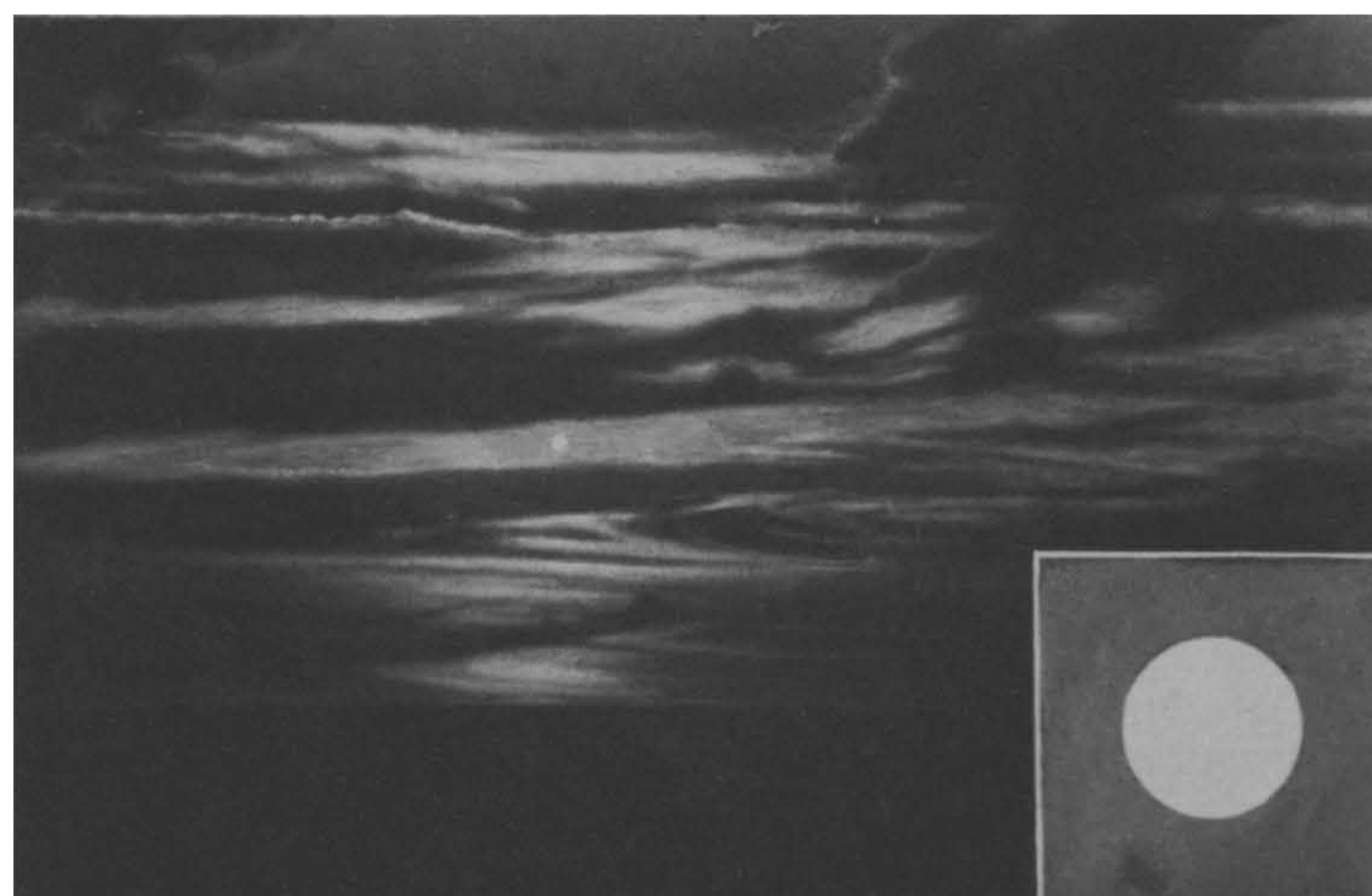
midnight sky like a belt of light, but blotted out in the centre by a huge shadow, varying in its extent and form—the shadow cast by the globe of Saturn itself. Before and after the equinoxes, this shadow, whose edges are rectilinear, cuts the rings into two huge slices; but as the summer solstice draws on it grows shorter and shorter, and becomes an ellipse with its summit broken off at the principal division of the rings, leaving the outside ring visible entirely.

A large volume would be required to describe all the



A DIAGRAM SHOWING THE ILLUMINATION OF SATURN AT THE PLANET'S SOLSTICES: ITS NORTH POLE TURNED TOWARDS THE SUN AND THE RINGS ILLUMINATED ON THEIR NORTHERN FACE. (INSET) THE EARTH ON THE SAME SCALE.

At Saturn's northern summer solstice, as here, the planet's shadow reaches to the point O on the rings, which, in their turn, shadow the globe of the planet (on the other side) as far as O'. During the southern solstice the conditions would be diametrically the opposite.



THE APPARENT SIZE OF THE SUN (ONLY A LARGE POINT OF LIGHT, SHOWN IN THE CENTRE) AS IT WOULD BE SEEN FROM SATURN, COMPARED WITH ITS APPARENT SIZE (INSET BELOW) AS SEEN FROM THE EARTH.

Drawings and Diagrams on this Page by M. Lucien Rudaux.

showing, perhaps, some irregularities. From the first satellite, which lies close to the planet, the apparent dimensions of the rings would be exaggerated, and the system would seem to extend half-way across the night sky!

There would also be weird effects of illumination, due to the combination of the Saturnian phase seen from the satellite and the passage of the Saturnian seasons, in the course of which the planet's globe would be seen shadowed in various ways by the rings. The coloured drawings (on page 384) show some of the varied spectacles visible from one of Saturn's moons. These strange and imposing phases lack only one thing: a certain intensity of brightness. For, at the distance at which Saturn is situated from the sun, the latter has lost the effulgence perceptible on earth. It appears as nothing more than a big, brilliant point of light, reduced to a diameter ten times smaller than that which we see here. Hence the solar radiation shed on Saturn is a hundred times weaker than that bestowed on the earth. By terrestrial standards, the majestic rings and multiple moons which always adorn the Saturnian heavens would only shed a somewhat dim and feeble light. Yet, despite this lack of brilliance, how much should we enjoy the spectacle of such nights!