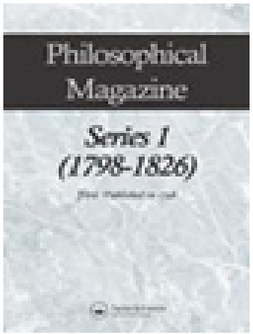


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# IX. On the planet Saturn

M. Smith Esq.

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## IX. *On the Planet Saturn.* *By* M. Smith, *Esq.*

*To the Editor of the Philosophical Magazine and Journal.*

Sir,

OBSERVING in a very excellent work just published on telescopes, by Dr. Kitchener, an account of a singular appearance which the planet Saturn presented in the years 1805 and 1818 (for which appearance no reason has been assigned), and conceiving that the phænomenon admits of an easy explanation, I beg leave to trouble you with the following remarks on it.

The passage in Dr. Kitchener's book to which I allude is the following, at page 349.

"The singular figure of which the body of Saturn was observed by Sir William Herschel on April 19, 1805, when he says 'the figure of Saturn is somewhat like a parallelogram, with the four corners rounded off deeply, but not so much as to bring it to a spheroid,' is very like the appearance which the planet presented in September 1818, when I made a sketch of it, which is like to Sir W. H.'s. I have occasionally observed this planet for nearly 30 years, and I do not remember to have seen the body of it of this singular form, except for a few months at the time I have mentioned."

Now, sir, if we consider that in the year 1818 the earth was in the plane of Saturn's equator, and that it is only in that plane once in fifteen years, we shall easily comprehend the reason of this phænomenon. The true figure of Saturn can never be observed except on such occasions, because it is only then that the visible disc of the planet is bounded by a meridian; for it is evident, that whatever be the true figure of the planet (provided it be a solid of revolution), it must to an eye placed vertically over its pole appear a perfect sphere; consequently, as we recede from the plane of its equator it must approximate to the spherical figure:—on this principle we may expect to see the planet again in its true shape in the year 1833. It may here be proper to remark, that when we are in the plane of Saturn's equator we are also in the plane of his ring; and therefore that in making a diagram of the planet it would be improper to draw it of its true shape, except when the ring is represented edgewise, or as a straight line bisecting the body of the planet; for when the ring appears open, the figure of the planet will not sensibly vary from a sphere.

The manner in which the ring of Saturn is balanced, so that the planet shall always occupy its centre, has been thought wonderful even by some celebrated astronomers. To me it ap-

pears the simplest thing imaginable; for I think it self-evident that if the ring were removed to a distance of two or three millions of miles from the planet and left at liberty, it must by its own gravity fall towards the planet; and after perhaps impinging thereon, it must continue to fall until its centre of gravity coincides with that of the planet: in which case the planet must of course occupy its centre. Now, if Saturn were a sphere, the ring might assume any accidental position with respect to the equator of the planet; but by reason of the spheroidal figure of Saturn occasioning an excess of gravity towards its equatorial regions, the plane of the ring must be drawn into the plane of Saturn's equator, which is exactly the situation in which we find it: the rotation of the ring on its axis is, therefore, unnecessary to its support.

A very curious subject for speculation, which does not appear to have hitherto suggested itself to the inquiry of astronomers, is the following: What is the use of this stupendous ring, which for extent of surface and solidity of structure (as we may infer from its superior brightness) surpasses even the planet itself? Can it be a habitable world? Certainly it may; for the velocity with which the ring revolves on its axis may be so adjusted as to produce a centrifugal force which shall be an exact counterpoise to the force of gravity towards the planet: and in such case the surface of the ring must appear to the annularians as a horizontal plane; while the body of the planet is seen in the distance like an immense mountain, behind which the sun disappears for about one or two hours (according to circumstances) out of every ten hours, or one revolution of the ring. The edges of the ring are probably rounded off, although our instruments will not enable us to verify this fact by observation; and in such case the annularians may travel either by land or water from one surface of the ring to the other without observing any remarkable appearance, except that on passing round the edge of the ring the heavenly bodies will change their altitudes rapidly within a comparatively small space. To those who may be on the inner edge of the ring the body of the planet probably appears as a circular plane directly over their heads, and supported by two great pillars rising from opposite points of the horizon. The satellites of Saturn are probably never seen by the annularians, except by those who may be near the outer edge of the ring; for as they revolve in the plane of the ring, they are always in the horizon: the seventh satellite is, perhaps, an exception; for as it deviates from the plane of the ring, it may occasionally appear a few degrees above the horizon.

It has been conjectured by some who have thought but slightly

slightly on the subject, that the ring was constructed for the purpose of enlightening the planet in the absence of the sun. To those who advance this opinion it may be replied, that for the purpose of illumination the ring is worse than useless, inasmuch as that it intercepts more of the sun's light from the planet than it reflects towards it. To exemplify this, let us assume any particular spot on the surface of Saturn. Suppose a spot whose latitude is equal to that of London. Now by duly considering that the plane of the ring is inclined thirty degrees to the plane of Saturn's orbit, it will be perfectly evident, that to the assumed spot the ring can only appear enlightened by the sun during one half of the year, and that the summer half; to which may be added, that all the portion of the ring which at midnight is near the meridian, must be eclipsed by the body of the planet. The phænomena actually observed will therefore be as follows; viz. Immediately after sunset an arm of the ring will appear in the west, which will gradually shorten and finally set; but before it entirely disappears, another similar arm will rise in the east, and gradually lengthen until the superior brilliance of the ascending sun supersedes its use as an object of illumination. About the period of the summer solstice these two arms of the ring will unite so as to form an entire arch intersecting the horizon in the east and west, and inclined thereto at an angle equal to the co-latitude of the place, at which time there will certainly by considerable illumination. Still it may be remarked that the illumination is most perfect when least wanted. This therefore, as well as the fact that the planet is furnished with seven moons, is demonstrative proof that the ring was not constructed for the purpose of illumination; and no other supposition remains than that it was formed to be a habitable world. It may further be remarked, that although the ring cannot usefully enlighten the planet, yet the planet reflects a very strong light on the ring for about half of each period of ten hours; and therefore the annularians have no reason to regret that the satellites do not rise above their horizon, because the planet reflects them, perhaps, ten times more light than would be the united effect of all the satellites.

The ring of Saturn is now known to be double, or to be in fact two concentric rings; but this circumstance does not affect the justness of any of the foregoing arguments. Perhaps this division may be advantageous to the inhabitants, as affording them a short cut from one surface of it to the opposite; or perhaps the adjustment of centrifugal force before alluded to, may require that the velocity of rotation should in a small degree differ in the two rings, in order to produce an equilibrium, or

counterpoise to the force of gravity towards the planet; for unless this equilibrium be effected, the surface of the ring could not appear to the inhabitants perfectly horizontal.

It has been remarked by Sir William Herschel, that "the ring of Saturn reflects more light than the body of the planet." The natural inference is, that it is formed of materials of greater specific density; and it seems advantageous that it should be so: for otherwise, on account of its comparative thinness, it could not produce an adequate force of gravity perpendicular to its surface, which we must suppose essential to its being inhabited.

The annularians in their systems of geography can only estimate their latitude by the observed altitude of Saturn's pole; for the sun and all the other heavenly bodies have the same altitude viewed from every part of the flat surface of the ring. As for their longitude, I have not hitherto been able to decide how they ascertain it.

Should the foregoing remarks be thought to merit a place in your Journal, the insertion will much oblige, sir,

Your most obedient servant,

Nov. 17, 1825. M. SMITH.

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## X. *Notices respecting New Books.*

*The English Flora*, Vol. III. *By Sir* J. E. SMITH, *M.D.F.R.S. President of the Linn. Soc., &c. &c. &c.*, 1825.

THERE is a knowledge acquired by practice and experience, which carries us much further into an acquaintance with sensible objects than the best instruction and information can do. This is a familiar observation when applied to such occupations as have to do with an article of trade. The farmer for instance, besides the obvious practice of his business, has a great deal of knowledge, the result of long experience, which is incapable of being communicated, even if his vocabulary were richer than it is; and he could no more acquaint a pupil with all the rules by which he judges of the goodness of his samples of grain, than he could convey to him by words an idea of the looks and expressions by which he knows his neighbour's countenance. The same thing is seen in other occupations. We have been surprised at the dexterity with which a wool-sorter selects from a pack containing different samples, at a single glimpse, the locks of wool of the same quality, while to our unpractised eye there was little or no difference among them. It is this empirical knowledge which gives the practical tradesman such advantage, and far outweighs the superior intellect