

THE ROTUNDITY OF THE EARTH.

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COPERNICUS, by the statements contained in his work, "De Orbium Celestium Revolutionibus," gave a death-blow to the Ptolemaic system of astronomy. The latter had received the powerful favour of the Church, agreeing as it did with Scriptural phrases. The earth was the centre, with sun and planets revolving around it. Copernicus (1473—1543) made the sun the centre, but he dared not publish these opinions till just before his death. It is however said that the Bishops of Capua and Cologne urged him to publish earlier. In the preface of this work, which was dedicated to Pope Paul III., he says, "Should there be any babblers, who, ignorant of all mathematics, presume to judge of these things on account of some passages of Scripture, wrested to their own purpose, and dare to blame and cavil at my work, I will not scruple to hold their judgment in contempt." About 1592 Galileo enthusiastically advocated this system, and incurred the enmity of the Church. In 1616 the Inquisition condemned the Copernican system, and forbade Galileo to teach it. The animosity of the monks revived again,

when he, in 1632, published his "Dialogues on the System of the World." For this he was summoned to Rome, interrogated by the Holy Office, and forced to retract. But he could not resist stamping his foot on the ground, muttering, *Eppur si muove* ("yet it moves"). The system was further developed by Sir Isaac Newton, in his "Philosophiæ Naturalis Principia Mathematica."

But notwithstanding the lifelong researches of these men, we are now asked to go back to the belief of the middle ages, and consider the earth a plane without motion. Homer seems to have considered it of the form of the oval shield then in use. (Gladstone's "Studies of Homer.") The Ptolemaic system has cropped up again, and has found an enthusiastic advocate in Mr. John Hampden, of Swindon. This gentleman, assisted by "Parallax" and others, has issued several works on the subject, attempting to show the "follies and absurdities of astronomy, as it is now everywhere taught." From a pamphlet by one of this school, "Astronomy as learnt from the Bible" (E. W. Allen, London), we make an extract:—"The earth's true figure is a plane, without axial or orbital motion. It is fixed, or has only a slight fluctuation, a slow rising and sinking in the water, whereby causing the tides. Whereas, the sun is not fixed, but actually travels. As the sweet psalmist of Israel sang, 'It is as a bridegroom coming out of his chamber,' &c. On one occasion the Lord permitted His servant Joshua to arrest its course. Joshua said in the sight of Israel, 'Sun, stand thou still upon Gibeon; and the sun stood still in the midst of heaven, and hasted not to go down, about a whole day.' Josh. x. 12, 13." On such texts as these is the theory founded. In another *brochure* we are told that "sycophant Churchmen prefer to uphold the lying impostures of infidel astronomers, rather than run counter to popular prejudice, by submitting to the express teaching of inspiration. By that infallible guide we learn that the celestial bodies and the habitable earth or world are ever spoken of as two distinct and separate systems. Thus the labour of ages, and the pretended wisdom of the most learned philosophers have been falsified and frustrated by their impious attempts to confound what the Almighty had so manifestly created for separate purposes . . . . If 'the execrable superstitions of Sir Isaac Newton' are worthy of credit, the Bible is only calculated to puzzle and deceive. Hence the infidelity—so prevalent around us—hence the little influence the clergy now possess." We are also told that "the Copernican or Newtonian theory may, very naturally, find favour with those who have been persisting for several centuries in celebrating the Saviour's birth-day, about which neither Scripture nor tradition give the remotest hint, on the *known* anniversary of the birth of Tammuz, the son of Ashtaroth, the object of the demon-worship in the Babylonian mysteries."

Statements like these have been repeatedly controverted in the works of Dean Buckland, Hugh Miller, Archdeacon Pratt, and others. From an able essay on "Mosaic Cosmogony," by Mr. Goodwin, in "Essays and Reviews," we take the following extract:—"It was not unreasonable, that in regard to matters of fact merely,

the Sacred Writing should use the common language and assume the common belief of mankind, without purporting to correct errors upon points morally indifferent. So, in regard to such a text as 'The world is established, it cannot be moved,' though it might imply the sacred penman's ignorance of the fact that the earth does move, yet it does not put forth this opinion as an indispensable point of faith, and this remark is applicable to a number of texts which present a similar difficulty. . . . It is refreshing to return to the often-echoed remark, that it could not have been the object of a Divine revelation to instruct mankind in physical science, man having had faculties bestowed upon him to enable him to acquire this knowledge by himself."

If the world is round of course water is convex. In January, 1870, Mr. Hampden offered to back his opinion to the contrary to the extent of 500*l.* His challenge was accepted some time after by Mr. A. R. Wallace. Each party deposited 500*l.* at Coutts' Bank. Messrs. Coulcher and Carpenter were referees respectively for Messrs. Wallace and Hampden, and the Editor of the *Field* undertook to be umpire if they could not agree. The experiment came off March 5, 1870, on that portion of the Old Bedford Canal between Old Bedford Bridge and Welney Bridge, a distance of six miles. An oblong signal, 6 feet by 3, was placed on the former bridge, its centre being 13 feet 4 inches from the water. A staff was erected three miles distant, having a red disc of wood (1 foot diameter) affixed to it, the centre of which was 13 feet 4 inches above the water, and on Welney Bridge a signal was placed exactly like that on the Bedford Bridge. Whether they looked from Bedford or Welney Bridge, the discs of the central staff appeared above the bridge in the distance, proving the convexity of the water. "The curvature shown by the large telescope is about five feet and a half at the middle signal, three miles distant; equal to 11 feet, if measured at the farther signal; and the depression below the cross hair or true level line being, according to Mr. Carpenter, an equal amount, makes 22 feet in all, leaving less than 2 feet for refraction to bring it to the full theoretical amount, which is something less than 24 feet."

Mr. Walsh (the Editor of the *Field*) states in his decision that "Mr. Wallace by means of the experiment agreed on as satisfactory to Mr. Hampden and his umpire by both these gentlemen, has proved to my satisfaction the curvature to and fro of the Bedford Level Canal between Welney Bridge and Wilche's Dam, six miles, to the extent of 5 feet more or less. I therefore propose to pay Mr. Wallace the sum of 1000*l.* now standing in my name at Coutts' Bank to abide the result of the above test next Thursday, unless I have notice to the contrary from Mr. Hampden."

The money was paid notwithstanding the protests of Mr. Hampden, that gentleman appearing to consider the affair little short of a swindle. Our readers may have noticed the letters in the *Field* on the subject, and we have placed these facts before them as it is probable there will be another trial, and an action at law is spoken of. In justice to Mr. Hampden we give an extract from a report made by Messrs. Gutteridge

of Brighton and Bull of Swindon, dated May 12, 1870, who at Mr. Hampden's request visited the part of the canal before mentioned:—

“Three distinct and separate experiments were made, and the names and addresses of those who were present—and who declare their readiness to repeat upon oath the results of the several tests—obtained. The first experiment was made upon a very small boat as the object of sight from end to end of that portion of the canal situated between the Welney and Bedford bridges. It was an ordinary lighter's boat, about 7 feet in length, and about 15 inches above the level of the water. It was distinctly seen the whole length of the six statute miles and three chains, the eye of the observers being placed 18 inches from the surface of the water at the further end.

“The next test was made with a strip of white calico, one yard wide. This was placed on the sluice gates close to the Bedford Bridge, immediately on its touching the surface of the water. It was most distinctly seen from the extreme end of the six miles, the observer's eye being within 18 inches from the water.

“The third and last experiment was made with lighted lamps, for three successive nights, which were kept burning for two hours each evening. The first night an ordinary carriage lamp, with common mould candle, was suspended on a post at Welney Bridge, 3 feet from the surface of the water, and the light was distinctly and clearly seen in a small boat, with the eye of the observer about 12 to 18 inches from the surface of the water at Old Bedford Bridge. On the subsequent evenings the carriage lamp (with ordinary wax carriage candle) was suspended on the same post at Welney Bridge, 2 feet 2 inches from the surface of the water, and a tin lamp, 1 foot square, with wax carriage candle, was suspended 2 feet 1 inch from the water on the sluice gates at Old Bedford Bridge. Both lights were distinctly seen from either end.”

As the result of these experiments is totally different from the received theory, and in direct opposition to the phenomena observed from every mast-head or rocky shore, we must ask for an experiment in the presence of eminent scientific men before we place any reliance upon it. In order to support his peculiar views respecting the shape of the earth, or “for the defence of God's truth against man's impostures,” Mr. Hampden in July last resuscitated his journal called the *Armourer*. Its contents, as may be supposed, have been characterized by many absurdities, and extreme bitterness towards scientific men. We have already mentioned Mr. Wallace as the gentleman to whom the 500*l.* was awarded upon the first Bedford Level experiment, and Mr. Bull, of Swindon, as one of those who carried out the second. It appears that the latter gentleman is Mr. Hampden's printer, and as such he has just been called upon to make a public apology for “certain gross libels” on Mr. Wallace contained in the *Armourer* (see *Nature*, March 2, 1871).

To show still further how the flat-world theory is supported, we may state that an article published some time since in a provincial journal (the *Gloucestershire*

*News*<sup>1</sup>) on the sphericity of the earth roused Mr. Hampden's ire, and led to a paper-war on the subject. The following is a quotation from the article in question:—

“Amongst the ancients strange notions prevailed respecting the form of the earth. Science, however, has for ages past clearly indicated the exact shape of our planet, though to an untrained mind the proofs of its sphericity are not always apparent. There are some reasons usually given in our school books, such as the disappearance of a ship at sea, circumnavigation, and the phenomena of eclipses. But the following, though less common, is by far the most convincing. From this there is absolutely no appeal, unless reason herself be blind, and mathematical science a delusion.

“If we stand on the surface of an extended plane, just half the apparently concave surface of the heavens is visible, and all lines drawn through the zenith from one point on the horizon to another are semicircles. Let an ascent be made, and more than half the surface of the hollow sphere of the sky comes into view, so that lines drawn from horizon to horizon through the zenith are greater than semicircles. Imagine this ascent continued indefinitely, and the arch of the sky will continue to enlarge, while the angular space occupied by the earth, instead of being 180 degrees, or equivalent to the visible part of the heavens, will become smaller and smaller, till our great globe would at last die away into an invisible point, and form a telescopic star.

“Now a plane is an extended surface, which is always referable to a sphere which it cuts into two equal parts, the centre of the one being the centre of the other. Hence, if the earth were a plane, it would be impossible, from the very definition of the term, to see more than half the spherical surface of the heavens, because such a plane would divide space into two apparent halves. Under such conditions, greater elevation would merely give a wider field of view, and though a height of millions of miles were attained, and Lord Rosse's telescope employed to scan the horizon, no change in the angular dimensions of the heavens could take place. But a change does occur, therefore the earth is not a plane. And, further, this angular increase, or dip of the horizon, is, in all cases, exactly proportional to the elevation attained. As this could not take place except from the surface of a sphere, it follows that the earth's surface must be spherical.”

Writing to the editor in reply to this, Mr. Hampden says,—

“You will be good enough to inform the writer of this article that I am willing to deposit any amount he likes to name, on the shape of the surface of any river, lake, or sea he can name. I have hitherto met with such a pack of swindlers that I must require him to refer me to his solicitor. I shall have nothing to do with *appearances* in the sky. We know too well the base imposture of such pretended ‘proofs,’ and I shall therefore insist on being shown the convexity of the earth by reference to it *alone*. I assert, and can prove, and will deposit a thousand pounds on the *fact* that the surface of *all water* is at right angles to any number of perpendiculars that can be set up, all parallel with each other. Any one who asserts the earth is a globe, and dares not meet me on this single question, is only worthy of the contempt of every honest man in the kingdom.”

It came out, however, in the course of the controversy that an experiment was made on the Yare, near Norwich, some fourteen years ago, with results precisely similar to those obtained on the Old Bedford Level in March last year. Ultimately Mr. Millard, a civil engineer, of Norwich, who had taken part in the experiment on the Yare, offered to renew it in the presence of Mr. Hampden, who was merely to pay his own expenses. The latter declined this offer, alleging that he would not “spend five

<sup>1</sup> Edited by Mr. J. Moden, a gentleman well known for his scientific attainments, who has more than once publicly refuted the sophistries of the individual calling himself “Parallax.”

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shillings nor travel a hundred yards out of his way to witness the scandalous imposture" he was invited to see.

Here we may let the matter rest ; leaving our readers to judge for themselves whether the ravings of anti-scientific zeal merit further consideration.

