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Tractatus on the Sphere

(Translation by Lynn Thorndike)



Argument for the Sphericity of the Earth

THE EARTH A SPHERE.—That the earth, too, is round is shown thus. The signs and stars do not rise and set the same for all men everywhere but rise and set sooner for those in the east than for those in the west; and of this there is no other cause than the bulge of the earth. Moreover, celestial phenomena evidence that they rise sooner for Orientals than for westerners. For one and the same eclipse of the moon which appears to us in the first hour of the night appears to Orientals about the third hour of the night, which proves that they had night and sunset before we did, of which setting the bulge of the earth is the cause.

FURTHER PROOFS OF THIS.—That the earth also has a bulge from north to south and vice versa is shown thus: To those living toward the north, certain stars are always visible, namely, those near the North Pole, while others which are near the South Pole are always concealed from them. If, then, anyone should proceed from the north southward, he might go so far that the stars which formerly were always visible to him now would tend toward their setting. And the farther south he went, the more they would be moved toward their setting. Again, that same man now could see stars which formerly had always been hidden from him. And the reverse would happen to anyone going from the south northward. The cause of this is simply the bulge of the earth. Again, if the earth were flat from east to west, the stars would rise as soon for westerners as for Orientals. which is false. Also, if the earth were flat from north to south and vice versa, the stars which were always visible to anyone would continue to be so wherever he went, which is false. But it seems flat to human sight because it is so extensive.

SURFACE OF THE SEA SPHERICAL.—That the water has a bulge and is approximately round is shown thus: Let a signal be set up on the seacoast and a ship leave port and sail away so far that the eye of a person standing at the foot of the mast can no longer discern the signal. Yet if the ship is stopped, the eye of the same person, if he has climbed to the top of the mast, will see the signal clearly. Yet the eye of a person at the bottom of the mast ought to see the signal better than he who is at the top, as is shown by drawing straight lines from both to the signal. And there is no other explanation of this thing than the bulge of the water. For all other impediments are excluded, such as clouds and rising vapors.



Quod terra etiam sit rotunda sic patet. Signa et stelle non equaliter oriuntur et occidunt omnibus hominibus ubique existentibus sed prius oriuntur et occidunt illis qui sunt iuxta orientem quam illis qui sunt iuxta occidentem, et huius nulla alia causa est nisi tumor terre. Quod autem orientalibus citius oriuntur quam occidentalibus bene patet per ea que fiunt in sublimi. Una enim et eadem eclipsis lune numero que apparet nobis in prima hora noctis apparet orientalibus circa horam noctis tertiam. Unde constat quod illis fuit prius nox, et sol prius occidit eis quam nobis, cuius occasus causa est tumor terre.

Quod terra etiam habeat tumorem a septentrione in austrum et econverso sic patet. Existentibus versus septentrionem quedam stelle sunt sempiternae apparitionis, scilicet que accedunt ad polum articum. Alie vero sunt sempiternae occultationis, que sunt propinque polo antarctico. Si igitur aliquis procederet a septentrione versus austrum, in tantum posset procedere quod stelle, que prius erant ei sempiternae apparitionis, iam tenderent in occasum. Et quanto magis accederet ad austrum, tanto plus moverentur in occasum. Ille item idem homo iam posset videre stellas que prius fuerant illi sempiternae occultationis. Et econverso contingeret alicui procedenti ab austro versus septentrionem. Huius autem rei causa est tantum tumor terre. Item si terra esset plana ab oriente in occidentem, tam cito oriuntur stelle occidentalibus quam orientalibus, quod falsum est. Si terra etiam esset plana a septentrione in austrum et econverso, stelle que essent alicui sempiternae apparitionis semper apparerent ei quocumque procederet, quod falsum est. Sed quod plana sit pro nimia eius quantitate visui hominum apparet.

Quod autem aqua habeat tumorem et accedat ad rotunditatem sic patet. Ponatur signum in littore maris et exeat navis a portu et in tantum elongetur quod oculus existentis iuxta pedem mali non videat signum. Stante vero navi oculus eiusdem existentis in summitate mali bene videbit signum illud. Sed oculus existentis iuxta pedem mali melius deberet videre signum quam qui est in summitate, sicut patet per lineas ductas ab utroque ad signum. Et nulla alia huius rei causa est quam tumor aque. Excludantur enim omnia alia impedimenta sicut nebule et vapores ascendentes.

Item, cum aqua sit corpus homogeneum, totum cum partibus erit eiusdem rationis. Sed partes aque, sicut in guttulis et roribus herbarum accidit, rotundam naturaliter appetunt formam; ergo et totum cuius sunt partes.