

theory, the moon is a body conglomerated (like hail) by the action of fire, and receives its light from the sun. The original

saub. The opinion that the idea of the crystalline heavens being a glacial vault (*aër glaciatus* of Lactantius) arose among the ancients, from their knowledge of the decrease of temperature, with the increase of height in the strata of the atmosphere, as ascertained from ascending great heights and from the aspect of snow-covered mountains, is refuted by the circumstance that they regarded the fiery ether as lying beyond the confines of the actual atmosphere, and the stars as *warm* bodies. (Aristot., *Meteor.*, 1, 3; *De Cælo*, 11, 7, p. 289.) In speaking of the music of the spheres (Aristot., *De Cælo*, 11, p. 290), which, according to the views of the Pythagoreans, is not perceived by men, because it is continuous, whereas tones can only be heard when they are interrupted by silence, Aristotle singularly enough maintains that the movement of the spheres generates heat in the air below them, while they are themselves not heated. Their vibrations produce heat, but no sound. "The motion of the sphere of the fixed stars is the most rapid (Aristot., *De Cælo*, ii., 10, p. 291); as this sphere and the bodies attached to it are impelled in a circle, the subjacent space is heated by this movement, and hence heat is diffused to the surface of the earth." (*Meteorol.*, 1, 3, p. 340.) It has always struck me as a circumstance worthy of remark, that the Stagirite should constantly avoid the word *crystal heaven*; for the expression, "*riveted stars*" (*ἐνδεδεμένα ἄστρα*), which he uses, indicates a general idea of solid spheres, without, however, specifying the nature of the substance. We do not meet with any allusion to the subject in Cicero, but we find in his commentator, Macrobius (*Cic. Somnium Scipionis*, 1, c. 20, p. 99, ed. Bip.), traces of freer ideas on the diminution of temperature with the increase of height. According to him, eternal cold prevails in the outermost zones of heaven. "Ita enim non solum terram sed ipsum quoque cælum, quod vere mundus vocatur, temperari a sole certissimum est, ut extremitates ejus, quæ via solis longissime recesserunt, omni careant beneficio caloris, et una frigoris perpetuitate torpescant." "For as it is most certain that not only the earth, but the heavens themselves, which are truly called the universe, are rendered more temperate by the sun, so also their confines, which are most distant from the sun, are deprived of the benefits of heat, and languish in a state of perpetual cold." These confines of heaven (*extremitates cæli*), in which the Bishop of Hippo (Augustinus, ed. Antv., 1700, i., p. 102, and iii., p. 99) placed a region of icy-cold water near Saturn the highest, and therefore the coldest, of all the planets, are within the actual atmosphere, for beyond the outer limits of this space lies, according to a somewhat earlier expression of Macrobius (1, c. 19, p. 93), the fiery ether which enigmatically enough does not prevent this eternal cold: "Stellæ supra cælum locatæ, in ipso purissimo æthere sunt, in quo omne quidquid est, lux naturalis et sua est, quæ tota cum igne suo ita spheræ solis incumbit, ut cæli zonæ, quæ procul a sole sunt, perpetuo frigore oppressæ sint." "The stars above the heavens are situated in the pure ether, in which all things, whatever they may be, have a natural and proper light of their own" (the region of self-luminous stars), "which so impends over the sphere of the sun with all its fire, that those zones of heaven which are far from the sun are oppressed by perpetual cold." My reason for entering so circumstantially into the physical and meteorological ideas of the Greeks and Romans is simply because these subjects, except in the works of Ukert, Henri Martin,