

## CHAPTER XI.

### *FROM "THE PRINCE OF THE POWER OF THE AIR" TO METEOROLOGY.*

#### I. GROWTH OF A THEOLOGICAL THEORY.

THE popular beliefs of classic antiquity regarding storms, thunder, and lightning, took shape in myths representing Vulcan as forging thunderbolts, Jupiter as flinging them at his enemies, Æolus intrusting the winds in a bag to Æneas, and the like. An attempt at their further theological development is seen in the Pythagorean statement that lightnings are intended to terrify the damned in Tartarus.

But at a very early period we see the beginning of a scientific view. In Greece, the Ionic philosophers held that such phenomena are obedient to law. Plato, Aristotle, and many lesser lights, attempted to account for them on natural grounds; and their explanations, though crude, were based upon observation and thought. In Rome, Lucretius, Seneca, Pliny, and others, inadequate as their statements were, implanted at least the germs of a science. But, as the Christian Church rose to power, this evolution was checked; the new leaders of thought found, in the Scriptures recognized by them as sacred, the basis for a new view, or rather for a modification of the old view.

This ending of a scientific evolution based upon observation and reason, and this beginning of a sacred science based upon the letter of Scripture and on theology, are seen in the utterances of various fathers in the early Church. As to the general features of this new development, Tertullian held that sundry passages of Scripture prove lightning identical with hell-fire; and this idea was transmitted from generation to generation of later churchmen, who found an

especial support of Tertullian's view in the sulphurous smell experienced during thunderstorms. St. Hilary thought the firmament very much lower than the heavens, and that it was created not only for the support of the upper waters, but also for the tempering of our atmosphere.\* St. Ambrose held that thunder is caused by the winds breaking through the solid firmament, and cited from the prophet Amos the sublime passage regarding "Him that establisheth the thunders." † He shows, indeed, some conception of the true source of rain; but his whole reasoning is limited by various scriptural texts. He lays great stress upon the firmament as a solid outer shell of the universe: the heavens he holds to be not far outside this outer shell, and argues regarding their character from St. Paul's Epistle to the Corinthians and from the one hundred and forty-eighth Psalm. As to "the waters which are above the firmament," he takes up the objection of those who hold that, this outside of the universe being spherical, the waters must slide off it, especially if the firmament revolves; and he points out that it is by no means certain that the *outside* of the firmament *is* spherical, and insists that, if it does revolve, the water is just what is needed to lubricate and cool its axis.

St. Jerome held that God at the Creation, having spread out the firmament between heaven and earth, and having separated the upper waters from the lower, caused the upper waters to be frozen into ice, in order to keep all in place. A proof of this view Jerome found in the words of Ezekiel regarding "the crystal stretched above the cherubim." ‡

The germinal principle in accordance with which all these theories were evolved was most clearly proclaimed

\* For Tertullian, see the *Apol. contra gentes*, c. 47; also Augustin de Angelis, *Lectiones Meteorologicae*, p. 64. For Hilary, see *In Psalm. CXXXV* (Migne, *Patr. Lat.*, vol. ix, p. 773).

† "Firmans tonitrua" (Amos iv, 13); the phrase does not appear in our version.

‡ For Ambrose, see the *Hexameron*, lib. ii, cap. 3, 4; lib. iii, cap. 5 (Migne, *Patr. Lat.*, vol. xiv, pp. 148-150, 153, 165). The passage as to lubrication of the heavenly axis is as follows: "Deinde cum ipsi dicant volvi orbem cœli stellis ardentibus refulgentem, nonne divina providentia necessario prospexit, ut intra orbem cœli, et supra orbem redundaret aqua, quæ illa ferventis axis incendia temperaret?" For Jerome, see his *Epistola*, lxix, cap. 6 (Migne, *Patr. Lat.*, vol. xxii, p. 659).

to the world by St. Augustine in his famous utterance: "Nothing is to be accepted save on the authority of Scripture, since greater is that authority than all the powers of the human mind."\* No treatise was safe thereafter which did not breathe the spirit and conform to the letter of this maxim. Unfortunately, what was generally understood by the "authority of Scripture" was the tyranny of sacred books imperfectly transcribed, viewed through distorting superstitions, and frequently interpreted by party spirit.

Following this precept of St. Augustine there were developed, in every field, theological views of science which have never led to a single truth—which, without exception, have forced mankind away from the truth, and have caused Christendom to stumble for centuries into abysses of error and sorrow. In meteorology, as in every other science with which he dealt, Augustine based everything upon the letter of the sacred text; and it is characteristic of the result that this man, so great when untrammelled, thought it his duty to guard especially the whole theory of the "waters above the heavens."

In the sixth century this theological reasoning was still further developed, as we have seen, by Cosmas Indicopleustes. Finding a sanction for the old Egyptian theory of the universe in the ninth chapter of Hebrews, he insisted that the earth is a flat parallelogram, and that from its outer edges rise immense walls supporting the firmament; then, throwing together the reference to the firmament in Genesis and the outburst of poetry in the Psalms regarding the "waters that be above the heavens," he insisted that over the terrestrial universe are solid arches bearing a vault supporting a vast cistern "containing the waters"; finally, taking from Genesis the expression regarding the "windows of heaven," he insisted that these windows are opened and closed by the angels whenever the Almighty wishes to send rain upon the earth or to withhold it.

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\* "Major est quippe Scripturæ hujus auctoritas, quam omnis humani ingenii capacitas."—Augustine, *De Genesi ad Lit.*, lib. ii, cap. 5 (Migne, *Patr. Lat.*, vol. xxxiv, pp. 266, 267). Or, as he is cited by Vincent of Beauvais (*Spec. Nat.*, lib. iv, 98): "Non est aliquid temere diffiniendum, sed quantum Scriptura dicit accipiendum, cujus major est auctoritas quam omnis humani ingenii capacitas."

This was accepted by the universal Church as a vast contribution to thought; for several centuries it was the orthodox doctrine, and various leaders in theology devoted themselves to developing and supplementing it.

About the beginning of the seventh century, Isidore, Bishop of Seville, was the ablest prelate in Christendom, and was showing those great qualities which led to his enrolment among the saints of the Church. His theological view of science marks an epoch. As to the "waters above the firmament," Isidore contends that they must be lower than the uppermost heaven, though higher than the lower heaven, because in the one hundred and forty-eighth Psalm they are mentioned *after* the heavenly bodies and the "heaven of heavens," but *before* the terrestrial elements. As to their purpose, he hesitates between those who held that they were stored up there by the prescience of God for the destruction of the world at the Flood, as the words of Scripture that "the windows of heaven were opened" seemed to indicate, and those who held that they were kept there to moderate the heat of the heavenly bodies. As to the firmament, he is in doubt whether it envelops the earth "like an eggshell," or is merely spread over it "like a curtain"; for he holds that the passage in the one hundred and fourth Psalm may be used to support either view.

Having laid these scriptural foundations, Isidore shows considerable power of thought; indeed, at times, when he discusses the rainbow, rain, hail, snow, and frost, his theories are rational, and give evidence that, if he could have broken away from his adherence to the letter of Scripture, he might have given a strong impulse to the evolution of a true science.\*

About a century later appeared, at the other extremity of Europe, the second in the trio of theological men of science in the early Middle Ages—Bede the Venerable. The nucleus of his theory also is to be found in the accepted view

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\* For Cosmas, see his *Topographia Christiana* (in Montfaucon, *Collectio nova patrum*, vol. ii), and the more complete account of his theory given in the chapter on *Geography* in this work. For Isidore, see the *Etymologia*, lib. xiii, cap. 7-9, *De ordine creaturarum*, cap. 3, 4, and *De natura rerum*, cap. 29, 30 (Migne, *Patr. Lat.* vol. lxxxii, pp. 476, 477, vol. lxxxiii, pp. 920-922, 1001-1003).

