CHAPTER II.

GEOGRAPHY.

I. THE FORM OF THE EARTH.

Among various rude tribes we find survivals of a primitive idea that the earth is a flat table or disk, ceiled, domed, or canopied by the sky, and that the sky rests upon the mountains as pillars. Such a belief is entirely natural; it conforms to the appearance of things, and hence at a very early period entered into various theologies.

In the civilizations of Chaldea and Egypt it was very fully developed. The Assyrian inscriptions deciphered in these latter years represent the god Marduk as in the beginning creating the heavens and the earth: the earth rests upon the waters; within it is the realm of the dead; above it is spread "the firmament"—a solid dome coming down to the horizon on all sides and resting upon foundations laid in the "great waters" which extend around the earth.

On the east and west sides of this domed firmament are doors, through which the sun enters in the morning and departs at night; above it extends another ocean, which goes down to the ocean surrounding the earth at the horizon on all sides, and which is supported and kept away from the earth by the firmament. Above the firmament and the upper ocean which it supports is the interior of heaven.

The Egyptians considered the earth as a table, flat and oblong, the sky being its ceiling—a huge "firmament" of metal. At the four corners of the earth were the pillars supporting this firmament, and on this solid sky were the "waters above the heavens." They believed that, when chaos was taking form, one of the gods by main force raised the waters on high and spread them out over the firmament;
that on the under side of this solid vault, or ceiling, or firmament, the stars were suspended to light the earth, and that the rains were caused by the letting down of the waters through its windows. This idea and others connected with it seem to have taken strong hold of the Egyptian priestly caste, entering into their theology and sacred science: ceilings of great temples, with stars, constellations, planets, and signs of the zodiac figured upon them, remain to-day as striking evidences of this.

In Persia we have theories of geography based upon similar conceptions and embalmed in sacred texts.

From these and doubtless from earlier sources common to them all came geographical legacies to the Hebrews. Various passages in their sacred books, many of them noble in conception and beautiful in form, regarding the foundation of the earth upon the waters, “the fountains of the great deep,” “the compass upon the face of the depth,” the “firmament,” the “corners of the earth,” the “pillars of heaven,” the “waters above the firmament,” the “windows of heaven,” and “doors of heaven,” point us back to both these ancient springs of thought.*

* For survivals of the early idea, among the Eskimos, of the sky as supported by mountains, and, among sundry Pacific islanders, of the sky as a firmament or vault of stone, see Tylor, Early History of Mankind, second edition, London, 1870, chap. xi; Spencer, Sociology, vol. i, chap. viii; also Andrew Lang, La Mythologie, Paris, 1886, pp. 68–73. For the Babylonian theories, see George Smith’s Chaldean Genesis, and especially the German translation by Delitzsch, Leipsic, 1876; also Jensen, Die Kosmogonie der Babylonier, Strasburg, 1890; see especially in the appendices, pp. 9 and 10, a drawing representing the whole Babylonian scheme so closely followed in the Hebrew book Genesis. See also Lukas, Die Grundbegriffe in den Kosmogonien der alten Völker, Leipsic, 1893, for a most thorough summarizing up of the whole subject, with texts showing the development of Hebrew out of Chaldean and Egyptian conceptions, pp. 44, etc.; also pp. 127 et seq. For the early view in India and Persia, see citations from the Vedas and the Zend-Avesta, in Lethaby, Architecture, Mysticism, and Myth, chap. i. For the Egyptian view, see Champollion; also, Lenormant, Histoire Ancienne, Maspero, and others. As to the figures of the heavens upon the ceilings of Egyptian temples, see Maspero, Archéologie Égyptienne, Paris, 1890; and for engravings of them, see Lepsius, Denkmäler, vol. i, Bl. 41, and vol. ix, Abth. iv, Bl. 35; also the Description de l’Égypte, published by order of Napoleon, tome ii, Pl. 14; also Prisse d’Avennes, Art Égyptien, Atlas, tome i, Pl. 35; and especially for a survival at the Temple of Denderah, see Denon, Voyage en Égypte, Planches 129, 130. For the Egyptian idea of “pillars of heaven,” as alluded to on the stele of victory of Thotmes III.
But, as civilization was developed, there were evolved, especially among the Greeks, ideas of the earth’s sphericity. The Pythagoreans, Plato, and Aristotle especially cherished them. These ideas were vague, they were mixed with absurdities, but they were germ ideas, and even amid the luxuriant growth of theology in the early Christian Church these germs began struggling into life in the minds of a few thinking men, and these men renewed the suggestion that the earth is a globe.*

A few of the larger-minded fathers of the Church, influenced possibly by Pythagorean traditions, but certainly by Aristotle and Plato, were willing to accept this view, but the majority of them took fright at once. To them it seemed fraught with dangers to Scripture, by which, of course, they meant their interpretation of Scripture. Among the first who took up arms against it was Eusebius. In view of the New Testament texts indicating the immediately approaching end of the world, he endeavoured to turn off this idea by bringing scientific studies into contempt. Speaking of investigators, he said, “It is not through ignorance of the things admired by them, but through contempt of their use-

in the Cairo Museum, see Ebers, Uarda, vol. ii, p. 175, note, Leipsic, 1877. For a similar Babylonian belief, see Sayce’s Herodotus, Appendix, p. 403. For the belief of Hebrew scriptural writers in a solid “firmament,” see especially Job, xxxviii, 18; also Smith’s Bible Dictionary. For engravings showing the earth and heaven above it as conceived by Egyptians and Chaldeans, with “pillars of heaven” and “firmament,” see Maspero and Sayce, Dawn of Civilisation, London, 1894, pp. 17 and 543.

*The agency of the Pythagoreans in first spreading the doctrine of the earth’s sphericity is generally acknowledged, but the first clear and full utterance of it to the world was by Aristotle. Very fruitful, too, was the statement of the new theory given by Plato in the Timaeus; see Jowett’s translation, 62, c. Also the Phaedo, pp. 449 et seq. See also Grote on Plato’s doctrine of the sphericity of the earth; also Sir G. C. Lewis’s Astronomy of the Ancients, London, 1862, chap. iii, section i, and note. Cicero’s mention of the antipodes, and his reference to the passage in the Timaeus, are even more remarkable than the latter, in that they much more clearly foreshadow the modern doctrine. See his Academic Questions, ii; also Tusc. Quest., i and v, 24. For a very full summary of the views of the ancients on the sphericity of the earth, see Kretschmer, Die physische Erdkunde im christlichen Mittelalter, Wien, 1889, pp. 35 et seq.; also, Eicken, Geschichte der mittelalterlichen Welanschauung, Stuttgart, 1887, Dritter Theil, chap. vi. For citations and summaries, see Whewell, Hist. Induct. Sciences, vol. i, p. 189, and St. Martin, Hist. de la Croy., Paris, 1873, p. 96; also, Leopardi, Saggio sopra gli errori popolari degli antichi, Firenze, 1851, chap. xii, pp. 184 et seq.
less labour, that we think little of these matters, turning our souls to better things.” Basil of Cæsarea declared it “a matter of no interest to us whether the earth is a sphere or a cylinder or a disk, or concave in the middle like a fan.” Lactantius referred to the ideas of those studying astronomy as “bad and senseless,” and opposed the doctrine of the earth’s sphericity both from Scripture and reason. St. John Chrysostom also exerted his influence against this scientific belief; and Ephraem Syrus, the greatest man of the old Syrian Church, widely known as the “lute of the Holy Ghost,” opposed it no less earnestly.

But the strictly biblical men of science, such eminent fathers and bishops as Theophilus of Antioch in the second century, and Clement of Alexandria in the third, with others in centuries following, were not content with merely opposing what they stigmatized as an old heathen theory; they drew from their Bibles a new Christian theory, to which one Church authority added one idea and another another, until it was fully developed. Taking the survival of various early traditions, given in the seventh verse of the first chapter of Genesis, they insisted on the clear declarations of Scripture that the earth was, at creation, arched over with a solid vault, “a firmament,” and to this they added the passages from Isaiah and the Psalms, in which it declared that the heavens are stretched out “like a curtain,” and again “like a tent to dwell in.” The universe, then, is like a house: the earth is its ground floor, the firmament its ceiling, under which the Almighty hangs out the sun to rule the day and the moon and stars to rule the night. This ceiling is also the floor of the apartment above, and in this is a cistern shaped, as one of the authorities says, “like a bathing-tank,” and containing “the waters which are above the firmament.” These waters are let down upon the earth by the Almighty and his angels through the “windows of heaven.” As to the movement of the sun, there was a citation of various passages in Genesis, mixed with metaphysics in various proportions, and this was thought to give ample proofs from the Bible that the earth could not be a sphere.*

* For Eusebius, see the Prop. Ev., xv, 61. For Basil, see the Hexameron.
In the sixth century this development culminated in what was nothing less than a complete and detailed system of the universe, claiming to be based upon Scripture, its author being the Egyptian monk Cosmas Indicopleustes. Egypt was a great treasure-house of theologic thought to various religions of antiquity, and Cosmas appears to have urged upon the early Church this Egyptian idea of the construction of the world, just as another Egyptian ecclesiastic, Athanasius, urged upon the Church the Egyptian idea of a triune deity ruling the world. According to Cosmas, the earth is a parallelogram, flat, and surrounded by four seas. It is four hundred days' journey long and two hundred broad. At the outer edges of these four seas arise massive walls closing in the whole structure and supporting the firmament or vault of the heavens, whose edges are cemented to the walls. These walls inclose the earth and all the heavenly bodies.

The whole of this theologico-scientific structure was built most carefully and, as was then thought, most scripturally. Starting with the expression applied in the ninth chapter of Hebrews to the tabernacle in the desert, Cosmas insists, with other interpreters of his time, that it gives the key to the whole construction of the world. The universe is, therefore, made on the plan of the Jewish tabernacle—boxlike and oblong. Going into details, he quotes the sublime words of Isaiah: "It is He that sitteth upon the circle of the earth; . . . that stretcheth out the heavens like a curtain, and spreadeth them out like a tent to dwell in"; and the passage in Job which speaks of the "pillars of heaven." He works all this into his system, and reveals, as he thinks, treasures of science.

This vast box is divided into two compartments, one above the other. In the first of these, men live and stars move; and it extends up to the first solid vault, or firmament, above which live the angels, a main part of whose business it is to push and pull the sun and planets to and

fro. Next, he takes the text, "Let there be a firmament in the midst of the waters, and let it divide the waters from the waters," and other texts from Genesis; to these he adds the text from the Psalms, "Praise him, ye heaven of heavens, and ye waters that be above the heavens"; then casts all these growths of thought into his crucible together, and finally brings out the theory that over this first vault is a vast cistern containing "the waters." He then takes the expression in Genesis regarding the "windows of heaven" and establishes a doctrine regarding the regulation of the rain, to the effect that the angels not only push and pull the heavenly bodies to light the earth, but also open and close the heavenly windows to water it.

To understand the surface of the earth, Cosmas, following the methods of interpretation which Origen and other early fathers of the Church had established, studies the table of shew-bread in the Jewish tabernacle. The surface of this table proves to him that the earth is flat, and its dimensions prove that the earth is twice as long as broad; its four corners symbolize the four seasons; the twelve loaves of bread, the twelve months; the hollow about the table proves that the ocean surrounds the earth. To account for the movement of the sun, Cosmas suggests that at the north of the earth is a great mountain, and that at night the sun is carried behind this; but some of the commentators ventured to express a doubt here: they thought that the sun was pushed into a pit at night and pulled out in the morning.

Nothing can be more touching in its simplicity than Cosmas's summing up of his great argument. He declares, "We say therefore with Isaiah that the heaven embracing the universe is a vault, with Job that it is joined to the earth, and with Moses that the length of the earth is greater than its breadth." The treatise closes with rapturous assertions that not only Moses and the prophets, but also angels and apostles, agree to the truth of his doctrine, and that at the last day God will condemn all who do not accept it.

Although this theory was drawn from Scripture, it was also, as we have seen, the result of an evolution of theological thought begun long before the scriptural texts on which it rested were written. It was not at all strange that Cosmas,
Egyptian as he was, should have received this old Nile-born doctrine, as we see it indicated to-day in the structure of Egyptian temples, and that he should have developed it by the aid of the Jewish Scriptures; but the theological world knew nothing of this more remote evolution from pagan germs; it was received as virtually inspired, and was soon regarded as a fortress of scriptural truth. Some of the foremost men in the Church devoted themselves to buttressing it with new texts and throwing about it new outworks of theological reasoning; the great body of the faithful considered it a direct gift from the Almighty. Even in the later centuries of the Middle Ages John of San Geminiano made a desperate attempt to save it. Like Cosmas, he takes the Jewish tabernacle as his starting-point, and shows how all the newer ideas can be reconciled with the biblical accounts of its shape, dimensions, and furniture.*

* For a notice of the views of Cosmas in connection with those of Lactantius, Augustine, St. John Chrysostom, and others, see Schoell, Histoire de la Littérature Grecque, vol. vii, p. 37. The main scriptural passages referred to are as follows: (1) Isaiah xi, 22; (2) Genesis i, 6; (3) Genesis vii, 11; (4) Exodus xxiv, 10; (5) Job xxvi, 11, and xxxvii, 18; (6) Psalm cxlviii, 4, and civ, 9; (7) Ezekiel i, 22-26. For Cosmas's theory, see Montfaucon, Collectio Nova Patrum, Paris, 1706, vol. ii, p. 188; also pp. 298, 299. The text is illustrated with engravings showing walls and solid vault (firmament), with the whole apparatus of "fountains of the great deep," "windows of heaven," angels, and the mountain behind which the sun is drawn. For reduction of one of them, see Peschel, Geschichte der Erdkunde, p. 98; also article Maps, in Knight's Dictionary of Mechanics, New York, 1875. For curious drawings showing Cosmas's scheme in a different way from that given by Montfaucon, see extracts from a Vatican codex of the ninth century in Garucci, Storia de l'Arte Christiana, vol. iii, pp. 70 et seq. For a good discussion of Cosmas's ideas, see Santarem, Hist. de la Cosmographie, vol. ii, pp. 8 et seq., and for a very thorough discussion of its details, Kretschmer, as above. For still another theory, very droll, and thought out on similar principles, see Mungo Park, cited in De Morgan, Paradoxes, p. 309. For Cosmas's joyful summing up, see Montfaucon, Collectio Nova Patrum, vol. ii, p. 255. For a curious survival in the thirteenth century of the old idea of the "waters above the heavens," see the story in Gervase of Tilbury, how in his time some people coming out of church in England found an anchor let down by a rope out of the heavens, how there came voices from sailors above trying to loose the anchor, and, finally, how a sailor came down the rope, who, on reaching the earth, died as if drowned in water. See Gervase of Tilbury, Otia Imperialia, edit. Liebrecht, Hanover, 1856, Prima Decisio, cap. xiii. The work was written about 1211. For John of San Geminiano, see his Summa de Exemplis, lib. ix, cap. 43. For the Egyptian Trinitarian views, see Sharpe, History of Egypt, vol. i, pp. 94, 102.
From this old conception of the universe as a sort of house, with heaven as its upper story and the earth as its ground floor, flowed important theological ideas into heathen, Jewish, and Christian mythologies. Common to them all are legends regarding attempts of mortals to invade the upper apartment from the lower. Of such are the Greek legends of the Aloïdae, who sought to reach heaven by piling up mountains, and were cast down; the Chaldean and Hebrew legends of the wicked who at Babel sought to build “a tower whose top may reach heaven,” which Jehovah went down from heaven to see, and which he brought to naught by the “confusion of tongues”; the Hindu legend of the tree which sought to grow into heaven and which Brahma blasted; and the Mexican legend of the giants who sought to reach heaven by building the Pyramid of Cholula, and who were overthrown by fire from above.

Myths having this geographical idea as their germ developed in luxuriance through thousands of years. Ascensions to heaven and descents from it, “translations,” “assumptions,” “annunciations,” mortals “caught up” into it and returning, angels flying between it and the earth, thunderbolts hurled down from it, mighty winds issuing from its corners, voices speaking from the upper floor to men on the lower, temporary openings of the floor of heaven to reveal the blessedness of the good, “signs and wonders” hung out from it to warn the wicked, interventions of every kind—from the heathen gods coming down on every sort of errand, and Jehovah coming down to walk in Eden in the cool of the day, to St. Mark swooping down into the market-place of Venice to break the shackles of a slave—all these are but features in a vast evolution of myths arising largely from this geographical germ.

Nor did this evolution end here. Naturally, in this view of things, if heaven was a loft, hell was a cellar; and if there were ascensions into one, there were descents into the other. Hell being so near, interferences by its occupants with the dwellers of the earth just above were constant, and form a vast chapter in mediæval literature. Dante made this conception of the location of hell still more vivid, and we find some forms of it serious barriers to geographical investiga-
tion. Many a bold navigator, who was quite ready to brave pirates and tempests, trembled at the thought of tumbling with his ship into one of the openings into hell which a widespread belief placed in the Atlantic at some unknown distance from Europe. This terror among sailors was one of the main obstacles in the great voyage of Columbus. In a mediæval text-book, giving science the form of a dialogue, occur the following question and answer: "Why is the sun so red in the evening?" "Because he looketh down upon hell."

But the ancient germ of scientific truth in geography—the idea of the earth's sphericity—still lived. Although the great majority of the early fathers of the Church, and especially Lactantius, had sought to crush it beneath the utterances attributed to Isaiah, David, and St. Paul, the better opinion of Eudoxus and Aristotle could not be forgotten. Clement of Alexandria and Origen had even supported it. Ambrose and Augustine had tolerated it, and, after Cosmas had held sway a hundred years, it received new life from a great churchman of southern Europe, Isidore of Seville, who, however fettered by the dominant theology in many other things, braved it in this. In the eighth century a similar declaration was made in the north of Europe by another great Church authority, Bede. Against the new life thus given to the old truth, the sacred theory struggled long and vigorously but in vain. Eminent authorities in later ages, like Albert the Great, St. Thomas Aquinas, Dante, and Vincent of Beauvais, felt obliged to accept the doctrine of the earth's sphericity, and as we approach the modern period we find its truth acknowledged by the vast majority of thinking men. The Reformation did not at first yield fully to this better theory. Luther, Melanchthon, and Calvin were very strict in their adherence to the exact letter of Scripture. Even Zwingli, broad as his views generally were, was closely bound down in this matter, and held to the opinion of the fathers that a great firmament, or floor, separated the heavens from the earth; that above it were the waters and angels, and below it the earth and man.

The main scope given to independent thought on this general subject among the Reformers was in a few minor
speculations regarding the universe which encompassed Eden, the exact character of the conversation of the serpent with Eve, and the like.

In the times immediately following the Reformation matters were even worse. The interpretations of Scripture by Luther and Calvin became as sacred to their followers as the Scripture itself. When Calixt ventured, in interpreting the Psalms, to question the accepted belief that “the waters above the heavens” were contained in a vast receptacle upheld by a solid vault, he was bitterly denounced as heretical.

In the latter part of the sixteenth century Musæus interpreted the accounts in Genesis to mean that first God made the heavens for the roof or vault, and left it there on high swinging until three days later he put the earth under it. But the new scientific thought as to the earth’s form had gained the day. The most sturdy believers were obliged to adjust their biblical theories to it as best they could.*

II. THE DELINEATION OF THE EARTH.

Every great people of antiquity, as a rule, regarded its own central city or most holy place as necessarily the centre of the earth.

The Chaldeans held that their “holy house of the gods” was the centre. The Egyptians sketched the world under the form of a human figure, in which Egypt was the heart, and the centre of it Thebes. For the Assyrians, it was Babylon; for the Hindus, it was Mount Meru; for the Greeks, so far as the civilized world was concerned, Olympus or the temple at Delphi; for the modern Mohammedans, it is Mecca and its sacred stone; the Chinese, to this day, speak of their empire as the “middle kingdom.” It was in accordance, then, with a simple tendency of human

* For a discussion of the geographical views of Isidore and Bede, see Santarem, Cosmographic, vol. i, pp. 22–24. For the gradual acceptance of the idea of the earth’s sphericity after the eighth century, see Kretschmer, pp. 51 et seq., where citations from a multitude of authors are given. For the views of the Reformers, see Zöckler, vol. i, pp. 679 and 693. For Calixt, Musæus, and others, ibid., pp. 673–677 and 761.
thought that the Jews believed the centre of the world to be Jerusalem.

The book of Ezekiel speaks of Jerusalem as in the middle of the earth, and all other parts of the world as set around the holy city. Throughout the “ages of faith” this was very generally accepted as a direct revelation from the Almighty regarding the earth’s form. St. Jerome, the greatest authority of the early Church upon the Bible, declared, on the strength of this utterance of the prophet, that Jerusalem could be nowhere but at the earth’s centre; in the ninth century Archbishop Rabanus Maurus reiterated the same argument; in the eleventh century Hugh of St. Victor gave to the doctrine another scriptural demonstration; and Pope Urban, in his great sermon at Clermont urging the Franks to the crusade, declared, “Jerusalem is the middle point of the earth”; in the thirteenth century an ecclesiastical writer much in vogue, the monk Cæsarius of Heisterbach, declared, “As the heart in the midst of the body, so is Jerusalem situated in the midst of our inhabited earth,”—“so it was that Christ was crucified at the centre of the earth.” Dante accepted this view of Jerusalem as a certainty, wedding it to immortal verse; and in the pious book of travels ascribed to Sir John Mandeville, so widely read in the Middle Ages, it is declared that Jerusalem is at the centre of the world, and that a spear standing erect at the Holy Sepulchre casts no shadow at the equinox.

Ezekiel’s statement thus became the standard of orthodoxy to early map-makers. The map of the world at Hereford Cathedral, the maps of Andrea Bianco, Marino Sanuto, and a multitude of others fixed this view in men’s minds, and doubtless discouraged during many generations any scientific statements tending to unbalance this geographical centre revealed in Scripture.*

* For the beliefs of various nations of antiquity that the earth’s centre was in their most sacred place, see citations from Maspero, Charton, Sayce, and others in Lethaby, Architecture, Mysticism, and Myth, chap. iv. As to the Greeks, we have typical statements in the Eumenides of Æschylus, where the stone on the altar at Delphi is repeatedly called “the earth’s navel”—which is precisely the expression used regarding Jerusalem in the Septuagint translation of Ezekiel (see below). The proof texts on which the medieval geographers mainly relied as to the form
Nor did mediæval thinkers rest with this conception. In accordance with the dominant view that physical truth must be sought by theological reasoning, the doctrine was evolved that not only the site of the cross on Calvary marked the geographical centre of the world, but that on this very spot had stood the tree which bore the forbidden fruit in Eden. Thus was geography made to reconcile all parts of the great theologic plan. This doctrine was hailed with joy by multitudes; and we find in the works of mediæval pilgrims to Palestine, again and again, evidence that this had become precious truth to them, both in theology and geography. Even as late as 1664 the eminent French priest Eugène Roger, in his published travels in Palestine, dwelt upon the thirty-eighth chapter of Ezekiel, coupled with a text from Isaiah, to prove that the exact centre of the earth is a spot marked on the pavement of the Church of the Holy Sepulchre, and that on this spot once stood the tree which bore the forbidden fruit and the cross of Christ.*

of the earth were Ezekiel v, 5, and xxxviii, 12. The progress of geographical knowledge evidently caused them to be softened down somewhat in our King James's version; but the first of them reads, in the Vulgate, "Ista est Hierusalem, in medio gentium possui eam et in circuitu ejus terra"; and the second reads, in the Vulgate, "in medio terra," and in the Septuagint, εἰς τὸν δυτικὸν τῆς γῆς. That the literal centre of the earth was understood, see proof in St. Jerome, Commentar. in Ezekiel, lib. ii.; and for general proof, see Leopardi, Saggio sopra gli errori popolari degli antichi, pp. 207, 208. For Rabanus Maurus, see his De Universo, lib. xii, cap. 4, in Migne, tome cxi, p. 339. For Hugh of St. Victor, see his De Situ Terrarum, cap. ii. For Dante's belief, see Inferno, canto xxxiv, 112-115:

"E se' or sotto l'emisferio giunto,
Ch' è opposto a quel che la gran secca
Coverchia, e sotto il cui colmo consunto
Fu l'uom che nacque e visse senza pecca."

For orthodox geography in the Middle Ages, see Wright's Essays on Archaeology, vol. ii, chapter on the map of the world in Hereford Cathedral; also the rude maps in Cardinal d'Ailly's Ymago Mundi; also copies of maps of Marino Sanuto and others in Peschel, Erdkunde, p. 210; also Münster, Fac Simile dell' Atlante di Andrea Bianco, Venezia, 1669. And for discussions of the whole subject, see Santarem, vol. ii, p. 295, vol. iii, pp. 71, 183, 184, and elsewhere. For a brief summary with citations, see Eicken, Geschichte, etc., pp. 622, 623.

* For the site of the cross on Calvary, as the point where stood "the tree of the knowledge of good and evil" in Eden, at the centre of the earth, see various Eastern travellers cited in Tobler; but especially the travels of Bishop Arculf in the Holy Land, in Wright's Early Travels in Palestine, p. 8; also Travels of Saewulf, ibid., p. 38; also, Sir John Mandeville, ibid., pp. 166, 167. For Roger,
Nor was this the only misconception which forced its way from our sacred writings into mediaeval map-making: two others were almost as marked.

First of these was the vague terror inspired by Gog and Magog. Few passages in the Old Testament are more sublime than the denunciation of these great enemies by Ezekiel; and the well-known statement in the Apocalypse fastened the Hebrew feeling regarding them with a new meaning into the mind of the early Church: hence it was that the mediaeval map-makers took great pains to delineate these monsters and their habitations on the maps. For centuries no map was considered orthodox which did not show them.

The second conception was derived from the mention in our sacred books of the "four winds." Hence came a vivid belief in their real existence, and their delineation on the maps, generally as colossal heads with distended cheeks, blowing vigorously toward Jerusalem.

After these conceptions had mainly disappeared we find here and there evidences of the difficulty men found in giving up the scriptural idea of direct personal interference by agents of Heaven in the ordinary phenomena of Nature: thus, in a noted map of the sixteenth century representing the earth as a sphere, there is at each pole a crank, with an angel laboriously turning the earth by means of it; and, in another map, the hand of the Almighty, thrust forth from the clouds, holds the earth suspended by a rope and spins it with his thumb and fingers. Even as late as the middle of the seventeenth century Heylin, the most authoritative English geographer of the time, shows a like tendency to mix science and theology. He warps each to help the other, as follows: "Water, making but one globe with the earth, is

see his La Terre Sainte, Paris, 1664, pp. 89–218, etc.; see also Quaresmio, Terra Sanctae Elucidatio, 1639, for similar view; and, for one narrative in which the idea was developed into an amazing mass of pious myths, see Pilgrimage of the Russian Abbot Daniel, edited by Sir C. W. Wilson, London, 1885, p. 14. (The passage deserves to be quoted as an example of myth-making; it is as follows: "At the time of our Lord's crucifixion, when he gave up the ghost on the cross, the veil of the temple was rent, and the rock above Adam's skull opened, and the blood and water which flowed from Christ's side ran down through the fissure upon the skull, thus washing away the sins of men.")
yet higher than it. This appears, first, because it is a body not so heavy; secondly, it is observed by sailors that their ships move faster to the shore than from it, whereof no reason can be given but the height of the water above the land; thirdly, to such as stand on the shore the sea seems to swell into the form of a round hill till it puts a bound upon our sight. Now that the sea, hovering thus over and above the earth, doth not overwhelm it, can be ascribed only to his Providence who 'hath made the waters to stand on an heap that they turn not again to cover the earth.'"

III. THE INHABITANTS OF THE EARTH.

Even while the doctrine of the sphericity of the earth was undecided, another question had been suggested which theologians finally came to consider of far greater importance. The doctrine of the sphericity of the earth naturally led to thought regarding its inhabitants, and another ancient germ was warmed into life—the idea of antipodes: of human beings on the earth's opposite sides.

In the Greek and Roman world this idea had found supporters and opponents, Cicero and Pliny being among the former, and Epicurus, Lucretius, and Plutarch among the latter. Thus the problem came into the early Church unsolved.

Among the first churchmen to take it up was, in the East, St. Gregory Nazianzen, who showed that to sail be-

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* For Gog and Magog, see Ezekiel xxxviii and xxxix, and Rev. xx, 8; and for the general subject, Toy, Judaism and Christianity, Boston, 1891, pp. 373, 374. For maps showing these two great terrors, and for geographical discussion regarding them, see Lelewel, Géog. du Moyen Age, Bruxelles, 1850, Atlas; also Ruge, Gesch. des Zeitalters der Entdeckungen, Berlin, 1881, pp. 78, 79; also Peschel's Abhandlungen, pp. 28-35, and Gesch. der Erdkunde, p. 210. For representations on maps of the "Four Winds," see Charton, Voyageurs, tome ii, p. 11; also Ruge, as above, pp. 324, 325; also, for a curious mixture of the scriptural four winds with the classical winds issuing from the bags of Æolus, see a map of the twelfth century in Léon Gautier, La Chevalerie, p. 153; and for maps showing additional winds, see various editions of Ptolemy. For a map with angels turning the earth by means of cranks at the poles, see Grynaeus, Novus Orbis, Basileae, 1537. For the globe kept spinning by the Almighty, see J. Hondius's map, 1589; and for Heylin, his first folio, 1652, p. 27.
yond Gibraltar was impossible; and, in the West, Lactantius, who asked: "Is there any one so senseless as to believe that there are men whose footsteps are higher than their heads?... that the crops and trees grow downward?... that the rains and snow and hail fall upward toward the earth?... I am at a loss what to say of those who, when they have once erred, steadily persevere in their folly and defend one vain thing by another."

In all this contention by Gregory and Lactantius there was nothing to be especially regretted, for, whatever their motive, they simply supported their inherited belief on grounds of natural law and probability.

Unfortunately, the discussion was not long allowed to rest on these scientific and philosophical grounds; other Christian thinkers followed, who in their ardour adduced texts of Scripture, and soon the question had become theological; hostility to the belief in antipodes became dogmatic. The universal Church was arrayed against it, and in front of the vast phalanx stood, to a man, the fathers.

To all of them this idea seemed dangerous; to most of them it seemed damnable. St. Basil and St. Ambrose were tolerant enough to allow that a man might be saved who thought the earth inhabited on its opposite sides; but the great majority of the fathers doubted the possibility of salvation to such misbelievers.

The great champion of the orthodox view was St. Augustine. Though he seemed inclined to yield a little in regard to the sphericity of the earth, he fought the idea that men exist on the other side of it, saying that "Scripture speaks of no such descendants of Adam." He insists that men could not be allowed by the Almighty to live there, since if they did they could not see Christ at his second coming descending through the air. But his most cogent appeal, one which we find echoed from theologian to theologian during a thousand years afterward, is to the nineteenth Psalm, and to its confirmation in the Epistle to the Romans; to the words, "Their line is gone out through all the earth, and their words to the end of the world." He dwells with great force on the fact that St. Paul based one of his most powerful arguments upon this declaration regarding the
preachers of the gospel, and that he declared even more explicitly that "Verily, their sound went into all the earth, and their words unto the ends of the world." Thenceforth we find it constantly declared that, as those preachers did not go to the antipodes, no antipodes can exist; and hence that the supporters of this geographical doctrine "give the lie direct to King David and to St. Paul, and therefore to the Holy Ghost." Thus the great Bishop of Hippo taught the whole world for over a thousand years that, as there was no preaching of the gospel on the opposite side of the earth, there could be no human beings there.

The great authority of Augustine, and the cogency of his scriptural argument, held the Church firmly against the doctrine of the antipodes; all schools of interpretation were now agreed—the followers of the allegorical tendencies of Alexandria, the strictly literal exegetes of Syria, the more eclectic theologians of the West. For over a thousand years it was held in the Church, "always, everywhere, and by all," that there could not be human beings on the opposite sides of the earth, even if the earth had opposite sides; and, when attacked by gainsayers, the great mass of true believers, from the fourth century to the fifteenth, simply used that opiate which had so soothing an effect on John Henry Newman in the nineteenth century—securus judicat orbis terrarum.

Yet gainsayers still appeared. That the doctrine of the antipodes continued to have life, is shown by the fact that in the sixth century Procopius of Gaza attacks it with a tremendous argument. He declares that, if there be men on the other side of the earth, Christ must have gone there and suffered a second time to save them; and, therefore, that there must have been there, as necessary preliminaries to his coming, a duplicate Eden, Adam, serpent, and deluge.

Cosmas Indicopleustes also attacked the doctrine with especial bitterness, citing a passage from St. Luke to prove that antipodes are theologically impossible.

At the end of the sixth century came a man from whom much might be expected—St. Isidore of Seville. He had pondered over ancient thought in science, and, as we have seen, had dared proclaim his belief in the sphericity of the earth; but with that he stopped. As to the antipodes, the
authority of the Psalmist, St. Paul, and St. Augustine silences him; he shuns the whole question as unlawful, subjects reason to faith, and declares that men can not and ought not to exist on opposite sides of the earth.*

Under such pressure this scientific truth seems to have disappeared for nearly two hundred years; but by the eighth century the sphericity of the earth had come to be generally accepted among the leaders of thought, and now the doctrine of the antipodes was again asserted by a bishop, Virgil of Salzburg.

There then stood in Germany, in those first years of the eighth century, one of the greatest and noblest of men—St. Boniface. His learning was of the best then known. In labours he was a worthy successor of the apostles; his genius for Christian work made him unwillingly primate of Germany; his devotion to duty led him willingly to martyrdom. There sat, too, at that time, on the papal throne a great Christian statesman—Pope Zachary. Boniface immediately declared against the revival of such a heresy as the doctrine of the antipodes; he stigmatized it as an assertion that there are men beyond the reach of the appointed means of salvation; he attacked Virgil, and called on Pope Zachary for aid.

* For the opinions of Basil, Ambrose, and others, see Lecky, History of Rationalism in Europe, New York, 1872, vol. i, p. 279, note. Also Letronne, in Revue des Deux Mondes, March, 1834. For Lactantius, see citations already given. For St. Augustine's opinion, see the De Civitate Dei, xvi, 9, where this great father of the Church shows that the existence of the antipodes "nulla ratione credendum est." For the unanimity of the fathers against the antipodes, see Zöckler, vol. i, p. 127. For a very naive summary, see Joseph Acosta, Natural and Moral History of the Indies, Grimston's translation, republished by the Hakluyt Soc., chaps. vii and viii; also citations in Buckle's Posthumous Works, vol. ii, p. 645. For Procopius of Gaza, see Kretschmer, p. 55. See also, on the general subject, Peschel, Geschichte der Erdhunde, pp. 96, 97. For Isidore, see citations already given. To understand the embarrassment caused by these utterances of the fathers to scientific men of a later period, see letter of Agricola to Joachim Vadianus in 1514. Agricola asks Vadianus to give his views regarding the antipodes, saying that he himself does not know what to do, between the fathers on the one side and the learned men of modern times on the other. On the other hand, for the embarrassment caused to the Church by this mistaken zeal of the fathers, see Kepler's references and Fromund's replies; also De Morgan, Paradoxes, p. 58. Kepler appears to have taken great delight in throwing the views of Lactantius into the teeth of his adversaries.
The Pope, as the infallible teacher of Christendom, made a strong response. He cited passages from the book of Job and the Wisdom of Solomon against the doctrine of the antipodes; he declared it "perverse, iniquitous, and against Virgil's own soul," and indicated a purpose of driving him from his bishopric. Whether this purpose was carried out or not, the old theological view, by virtue of the Pope's divinely ordered and protected "inerrancy," was re-established, and the doctrine that the earth has inhabitants on but one of its sides became more than ever orthodox, and precious in the mind of the Church.*

This decision seems to have been regarded as final, and five centuries later the great encyclopedist of the Middle Ages, Vincent of Beauvais, though he accepts the sphericity of the earth, treats the doctrine of the antipodes as disproved, because contrary to Scripture. Yet the doctrine still lived. Just as it had been previously revived by William of Conches and then laid to rest, so now it is somewhat timidly brought out in the thirteenth century by no less a personage than Albert the Great, the most noted man of science in that time. But his utterances are perhaps purposely obscure. Again it disappears beneath the theological wave, and a hundred years later Nicolas d'Oresme, geographer of the King of France, a light of science, is forced to yield to the clear teaching of the Scripture as cited by St. Augustine.

Nor was this the worst. In Italy, at the beginning of the fourteenth century, the Church thought it necessary to deal with questions of this sort by rack and fagot. In 1316 Peter of Abano, famous as a physician, having promulgated

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* For Virgil of Salzburg, see Neander's History of the Christian Church, Torrey's translation, vol. iii, p. 63; also Herzog, Real-Encyklopädie, etc., recent edition by Prof. Hauck, s. v. Virgilius; also Kretschmer, pp. 56–58; also Whewell, vol. i, p. 197; also De Morgan, Budget of Paradoxes, pp. 24–26. For very full notes as to pagan and Christian advocates of the doctrine of the sphericity of the earth and of the antipodes, and for extract from Zachary's letter, see Migne, Patrologia, vol. vi, p. 426, and vol. xli, p. 487. For St. Boniface's part, see Bonifacii Epistole, ed. Giles, i, 173. Berger de Xivrey, Traditions Tématologiques, pp. 186–188, makes a curious attempt to show that Pope Zachary denounced the wrong man; that the real offender was the Roman poet—in the sixth book of the Æneid and the first book of the Georgics.
this with other obnoxious doctrines in science, only escaped the Inquisition by death; and in 1327 Cecco d'Ascoli, noted as an astronomer, was for this and other results of thought, which brought him under suspicion of sorcery, driven from his professorship at Bologna and burned alive at Florence. Nor was this all his punishment: Orcagna, whose terrible frescoes still exist on the walls of the Campo Santo at Pisa, immortalized Cecco by representing him in the flames of hell.*

Years rolled on, and there came in the fifteenth century one from whom the world had a right to expect much. Pierre d'Ailly, by force of thought and study, had risen to be Provost of the College of St. Dié in Lorraine; his ability had made that little village a centre of scientific thought for all Europe, and finally made him Archbishop of Cambrai and a cardinal. Toward the end of the fifteenth century was printed what Cardinal d'Ailly had written long before as a summing up of his best thought and research—the collection of essays known as the *Ymagis Mundi*. It gives us one of the most striking examples in history of a great man in theological fetters. As he approaches this question he states it with such clearness that we expect to hear him assert the truth; but there stands the argument of St. Augustine; there, too, stand the biblical texts on which it is founded—the text from the Psalms and the explicit declaration of St. Paul to the Romans, "Their sound went into all the earth, and their words unto the ends of the world." D'Ailly attempts to reason, but he is overawed, and gives to the world virtually nothing.

* For Vincent of Beauvais and the antipodes, see his *Speculum Naturale*, Book VII, with citations from St. Augustine, *De Civitate Dei*, cap. xvi. For Albert the Great's doctrine regarding the antipodes, compare Kretschmer, as above, with Eicken, *Geschichte*, etc., p. 621. Kretschmer finds that Albert supports the doctrine, and Eicken finds that he denies it—a fair proof that Albert was not inclined to state his views with dangerous clearness. For D'Oresme, see Santarem, *Histoire de la Cosmographie*, vol. i, p. 142. For Peter of Abano, or Apono, as he is often called, see Tiraboschi; also Ginguené, vol. ii, p. 203; also Naudé, *Histoire des Grands Hommes soupçonnés de Magie*. For Cecco d'Ascoli, see Montucla, *Histoire des Mathématiques*, i, 528; also Daunou, *Études Historiques*, vol. vi, p. 320; also Kretschmer, p. 59. Concerning Orcagna's representation of Cecco in the flames of hell, see Renan, *Averoës et l'Averoisme*, Paris, 1867, p. 328.
Still, the doctrine of the antipodes lived and moved: so much so that the eminent Spanish theologian Tostatus, even as late as the age of Columbus, felt called upon to protest against it as "unsafe." He had shaped the old missile of St. Augustine into the following syllogism: "The apostles were commanded to go into all the world and to preach the gospel to every creature; they did not go to any such part of the world as the antipodes; they did not preach to any creatures there: ergo, no antipodes exist."

The warfare of Columbus the world knows well: how the Bishop of Ceuta worsted him in Portugal; how sundry wise men of Spain confronted him with the usual quotations from the Psalms, from St. Paul, and from St. Augustine; how, even after he was triumphant, and after his voyage had greatly strengthened the theory of the earth's sphericity, with which the theory of the antipodes was so closely connected, the Church by its highest authority solemnly stumbled and persisted in going astray. In 1493 Pope Alexander VI, having been appealed to as an umpire between the claims of Spain and Portugal to the newly discovered parts of the earth, issued a bull laying down upon the earth's surface a line of demarcation between the two powers. This line was drawn from north to south a hundred leagues west of the Azores; and the Pope in the plenitude of his knowledge declared that all lands discovered east of this line should belong to the Portuguese, and all west of it should belong to the Spaniards. This was hailed as an exercise of divinely illuminated power by the Church; but difficulties arose, and in 1506 another attempt was made by Pope Julius II to draw the line three hundred and seventy leagues west of the Cape Verde Islands. This, again, was supposed to bring divine wisdom to settle the question; but, shortly, overwhelming difficulties arose; for the Portuguese claimed Brazil, and, of course, had no difficulty in showing that they could reach it by sailing to the east of the line, provided they sailed long enough. The lines laid down by Popes Alexander and Julius may still be found upon the maps of the period, but their bulls have quietly passed into the catalogue of ludicrous errors.

Yet the theological barriers to this geographical truth
yielded but slowly. Plain as it had become to scholars, they hesitated to declare it to the world at large. Eleven hundred years had passed since St. Augustine had proved its antagonism to Scripture, when Gregory Reysch gave forth his famous encyclopaedia, the *Margarita Philosophica*. Edition after edition was issued, and everywhere appeared in it the orthodox statements; but they were evidently strained to the breaking point; for while, in treating of the antipodes, Reysch refers respectfully to St. Augustine as objecting to the scientific doctrine, he is careful not to cite Scripture against it, and not less careful to suggest geographical reasoning in favour of it.

But in 1519 science gains a crushing victory. Magellan makes his famous voyage. He proves the earth to be round, for his expedition circumnavigates it; he proves the doctrine of the antipodes, for his shipmates see the peoples of the antipodes. Yet even this does not end the war. Many conscientious men oppose the doctrine for two hundred years longer. Then the French astronomers make their measurements of degrees in equatorial and polar regions, and add to their proofs that of the lengthened pendulum. When this was done, when the deductions of science were seen to be established by the simple test of measurement, beautifully and perfectly, and when a long line of trustworthy explorers, including devoted missionaries, had sent home accounts of the antipodes, then, and then only, this war of twelve centuries ended.

Such was the main result of this long war; but there were other results not so fortunate. The efforts of Eusebius, Basil, and Lactantius to deaden scientific thought; the efforts of Augustine to combat it; the efforts of Cosmas to crush it by dogmatism; the efforts of Boniface and Zachary to crush it by force, conscientious as they all were, had resulted simply in impressing upon many leading minds the conviction that science and religion are enemies.

On the other hand, what was gained by the warriors of science for religion? Certainly a far more worthy conception of the world, and a far more ennobling conception of that power which pervades and directs it. Which is more consistent with a great religion, the cosmography of Cosmas
or that of Isaac Newton? Which presents a nobler field for religious thought, the diatribes of Lactantius or the calm statements of Humboldt?*

IV. THE SIZE OF THE EARTH.

But at an early period another subject in geography had stirred the minds of thinking men—*the earth’s size*. Various ancient investigators had by different methods reached measurements more or less near the truth; these methods were continued into the Middle Ages, supplemented by new thought, and among the more striking results were those obtained by Roger Bacon and Gerbert, afterward Pope Sylvester II. They handed down to after-time the torch of

* For D’Ailly’s acceptance of St. Augustine’s argument, see the *Vmago Mundi*, cap. vii. For Tostatus, see Zöckler, vol. i, pp. 467, 468. He based his opposition on Romans x, 18. For Columbus, see Winsor, Fiske, and Adams; also Humboldt, *Histoire de la Géographie du Nouveau Continent*. For the bull of Alexander VI, see Daunou, *Études Historiques*, vol. ii, p. 417; also Peschel, *Zeit- alter der Entdeckungen*, Book II, chap. iv. The text of the bull is given with an English translation in Arber’s reprint of *The First Three English Books on America*, etc., Birmingham, 1885, pp. 201–204; also especially Peschel, *Die Theilung der Erde unter Papst Alexander VI und Julius II*, Leipsic, 1871, pp. 14 et seq. For remarks on the power under which the line was drawn by Alexander VI, see Mamiani, *Del Papato nei Tre Ultimi Secoli*, p. 170. For maps showing lines of division, see Kohl, *Die beiden ältesten General-Karten von Amerika*, Weimar, 1860, where maps of 1527 and 1529 are reproduced; also Mercator, *Atlas*, tenth edition, Amsterdam, 1628, pp. 70, 71. For latest discussion on the *Demarcation Line of Alexander VI*, see E. G. Bourne in *Yale Review*, May, 1892. For the *Margarita Philosophica*, see the editions of 1503, 1509, 1517, lib. vii, cap. 48. For the effect of Magellan’s voyages, and the reluctance to yield to proof, see Henri Martin, *Histoire de France*, vol. xiv, p. 395; St. Martin’s *Histoire de la Géographie*, p. 369; Peschel, *Geschichte des Zeittlers der Entdeckungen*, concluding chapters; and for an admirable summary, Draper, *Hist. Int. Devel. of Europe*, pp. 451–453; also an interesting passage in Sir Thomas Browne’s *Vulgar and Common Errors*, Book I, chap. vi; also a striking passage in Acosta, chap. ii. For general statement as to supplementary proof by measurement of degrees and by pendulum, see Somerville, *Phys. Geog.*, chap. i, par. 6, note; also Humboldt, *Cosmos*, vol. ii, p. 736, and vol. v, pp. 16, 32; also Montucla, iv, 138. As to the effect of travel, see Acosta’s history above cited. The good missionary says, in Grimston’s quaint translation, “Whatsoever Lactantius saieth, wee that live now at Peru, and inhabite that parte of the worlde which is opposite to Asia and their Antipodes, finde not ourselves to bee hanging in the aire, our heads downward and our feete on high.”
knowledge, but, as their reward among their contemporaries, they fell under the charge of sorcery.

Far more consonant with the theological spirit of the Middle Ages was a solution of the problem from Scripture, and this solution deserves to be given as an example of a very curious theological error, chancing to result in the establishment of a great truth. The second book of Esdras, which among Protestants is placed in the Apocrypha, was held by many of the foremost men of the ancient Church as fully inspired: though Jerome looked with suspicion on this book, it was regarded as prophetic by Clement of Alexandria, Tertullian, and Ambrose, and the Church acquiesced in that view. In the Eastern Church it held an especially high place, and in the Western Church, before the Reformation, was generally considered by the most eminent authorities to be part of the sacred canon. In the sixth chapter of this book there is a summary of the works of creation, and in it occur the following verses:

"Upon the third day thou didst command that the waters should be gathered in the seventh part of the earth; six parts hast thou dried up and kept them to the intent that of these some, being planted of God and tilled, might serve thee."

"Upon the fifth day thou saidst unto the seventh part where the waters were gathered, that it should bring forth living creatures, fowls and fishes, and so it came to pass."

These statements were reiterated in other verses, and were naturally considered as of controlling authority.

Among the scholars who pondered on this as on all things likely to increase knowledge was Cardinal Pierre d'Ailly. As we have seen, this great man, while he denied the existence of the antipodes, as St. Augustine had done, believed firmly in the sphericity of the earth, and, interpreting these statements of the book of Esdras in connection with this belief, he held that, as only one seventh of the earth's surface was covered by water, the ocean between the west coast of Europe and the east coast of Asia could not be very wide. Knowing, as he thought, the extent of the land upon the globe, he felt that in view of this divinely authorized statement the globe must be much smaller, and
the land of “Zipango,” reached by Marco Polo, on the extreme east coast of Asia, much nearer than had been generally believed.

On this point he laid stress in his great work, the *Ymago Mundi*, and an edition of it having been published in the days when Columbus was thinking most closely upon the problem of a westward voyage, it naturally exercised much influence upon his reasonings. Among the treasures of the library at Seville, there is nothing more interesting than a copy of this work annotated by Columbus himself: from this very copy it was that Columbus obtained confirmation of his belief that the passage across the ocean to Marco Polo’s land of Zipango in Asia was short. But for this error, based upon a text supposed to be inspired, it is unlikely that Columbus could have secured the necessary support for his voyage. It is a curious fact that this single theological error thus promoted a series of voyages which completely destroyed not only this but every other conception of geography based upon the sacred writings.*

V. THE CHARACTER OF THE EARTH’S SURFACE.

It would be hardly just to dismiss the struggle for geographical truth without referring to one passage more in the history of the Protestant Church, for it shows clearly the difficulties in the way of the simplest statement of geographical truth which conflicted with the words of the sacred books.

In the year 1553 Michael Servetus was on trial for his life at Geneva on the charge of Arianism. Servetus had rendered many services to scientific truth, and one of these

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* For this error, so fruitful in discovery, see D’Ailly, *Ymago Mundi*; the passage referred to is fol. 12 verso. For the passage from Esdras, see chap. vii, verses 42, 47, 50, and 52; see also Zücker, *Geschichte der Besiehungen zwischen Theologie und Naturwissenschaft*, vol. i, p. 461. For one of the best recent statements, see Ruge, *Gesch. des Zeitalters der Entdeckungen*, Berlin, 1882, pp. 221 et seq. For a letter of Columbus acknowledging his indebtedness to this mistake in Esdras, see Navarrete, *Viajes y Descubrimientos*, Madrid, 1825, tome i, pp. 242, 264; also Humboldt, *Hist. de la Géographie du Nouveau Continent*, vol. i, pp. 68, 69.
was an edition of Ptolemy's *Geography*, in which Judea was spoken of, not as "a land flowing with milk and honey," but, in strict accordance with the truth, as, in the main, meagre, barren, and inhospitable. In his trial this simple statement of geographical fact was used against him by his arch-enemy John Calvin with fearful power. In vain did Servetus plead that he had simply drawn the words from a previous edition of Ptolemy; in vain did he declare that this statement was a simple geographical truth of which there were ample proofs; it was answered that such language "necessarily inculpated Moses, and grievously outraged the Holy Ghost."*

In summing up the action of the Church upon geography, we must say, then, that the dogmas developed in strict adherence to Scripture and the conceptions held in the Church during many centuries "always, everywhere, and by all," were, on the whole, steadily hostile to truth; but it is only just to make a distinction here between the religious and the theological spirit. To the religious spirit are largely due several of the noblest among the great voyages of discovery. A deep longing to extend the realms of Christianity influenced the minds of Prince John of Portugal, in his great series of efforts along the African coast; of Vasco da Gama, in his circumnavigation of the Cape of Good Hope; of Magellan, in his voyage around the world; and doubtless found a place among the more worldly motives of Columbus.†

Thus, in this field, from the supremacy accorded to theology, we find resulting that tendency to dogmatism which has shown itself in all ages the deadly foe not only of scientific inquiry but of the higher religious spirit itself, while from the love of truth for truth's sake, which has been the inspiration of all fruitful work in science, nothing but advantage has ever resulted to religion.

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* For Servetus's geographical offense, see Rilliet, *Relation du Procès criminel contre Michel Servet d'après les Documents originaux*, Geneva, 1844, pp. 42, 43; also Willis, *Servetus and Calvin*, London, 1877, p. 325. The passage condemned is in the Ptolemy of 1535, fol. 41. It was discreetly retrenched in a reprint of the same edition.

† As to the mixture in the motives of Columbus, it may be well to compare with the earlier biographies the recent ones by Dr. Winsor and President Adams.