Wind Diagrams and Medieval Cosmology

By Barbara Obrist

Investigating medieval wind diagrams represents something of an exploratory enterprise. Historians of science have rarely looked into conceptions of the physical world during the period extending from Isidore of Seville (d. 637) to the late eleventh century. Instead they have limited their research almost exclusively to the related topics of astronomy and reckonings of time, leaving unexamined medieval speculations on the composition of the world and on such natural phenomena as winds.[1] Two assumptions have led to this neglect. The first is a belief that Roman and, a fortiori, early-medieval physics was extremely rudimentary and therefore unworthy of attention; the second is a belief that, with the acceptance of Christianity, the physical world no longer held interest as a subject of study and was invested solely with spiritual meaning. Until recently,[2] these widely accepted assumptions remained unchallenged.

Because of these assumptions, detailed studies of diagrams and pictorial representations of the corporeal world remain few.[3] John Murdoch's *Album of Science* gives a general panorama of medieval diagrams used in the disciplines of the trivium and the quadrivium.[4] While astronomical diagrams[5] and also maps[6] have received detailed analysis by historians of science and geography, the articles by Léon Pressouyre and Harry Bober have long remained the only ones concentrating on schemata relating to the elementary structure of the world.[7] Art-historically oriented research on medieval cosmological illustrations with an interpretative

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[1] A recent volume on science in the Carolingian period, Paul Leo Butzer and Dietrich Lohrmann, eds., *Science in Western and Eastern Civilization in Carolingian Times* (Basel, Boston, and Berlin, 1993), is a case in point: physical science is not mentioned at all. See also Brigitte Englisch, *Die Artes liberales im frühen Mittelalter (5.–9. Jh.),* Sudhoff's Archiv, Beiheft 33 (Stuttgart, 1994).

[2] Marina Smyth, "The Physical World in Seventh-Century Hiberno-Latin Texts," *Peritia* 5 (1986), 201–34, and *Understanding the Universe in Seventh-Century Ireland* (Woodbridge, Eng., and Rochester, N.Y., 1994).

[3] Yet see the innovative study by Harry Bober, "An Illustrated Medieval School-Book of Bede's 'De natura rerum,' " *Journal of the Walters Art Gallery* 19–20 (1956–57), 65–97.

[4] John E. Murdoch, *Album of Science: Antiquity and the Middle Ages* (New York, 1984).

[5] Bruce Eastwood, *Astronomy and Optics from Pliny to Descartes: Texts, Diagrams and Conceptual Structures,* Collected Studies Series 291 (London, 1989).

[6] Most recently, Patrick Gautier Dalché, "De la glose à la contemplation: Place et fonction de la carte dans les manuscrits du haut moyen âge," in *Testo e immagine nell'alto medioevo,* Settimane di Studio del Centro italiano di Studi sull'Alto Medioevo 41 (Spoleto, 1994), 2:693–764.

[7] Harry Bober, "In principio: Creation before Time," in *Essays in Honor of Erwin Panofsky,* ed. Millard Meiss, De Artibus Opuscula 40, 2 vols. (New York, 1961), 1:13–28; and Léon Pressouyre, "Le cosmos platonicien de la cathédrale d'Anagni," *Mélanges de l'Ecole française de Rome: Moyen âge* 78 (1966), 551–93.

perspective has focused on their spiritual dimension, in most cases following the method of analysis initiated by Friedrich Ohly.[8] Those that could not be placed into the exegetic frame were left aside or else interpreted in line with medieval hermeneutics.[9]

Among the many neglected cosmological images are those of winds. The catalogue of their personifications by Thomas Raff[10] represents a useful guide for further studies, but it remains fragmentary since in the Middle Ages diagrammatic representations of winds antedate those of their personifications and are far more numerous. It should also be noted that historians of geography have overlooked several maps for the very reason that they are part of wind diagrams.

In comparison with other domains of the sublunary world—above all, the four elements and seasons, which might be expected to have provoked equally diverse treatment—the winds received the most developed attention. Representations of winds are not only diverse but also numerous. While the large number is an indication of their importance, the diversity reveals facets of medieval views of the universe that otherwise are not always apparent; the drawings are particularly striking when placed alongside textual passages on winds, which seem, in comparison, more restricted in scope. Throughout the Middle Ages widely differing representations accompanied the standard lists of winds. Clearly, conceptual developments took place on a pictorial level, the result partly of an autonomous process of combinations and recombinations of graphic elements and partly of what must have been oral discussions based on ancient doxographic information scattered in handbooks. Wind diagrams can therefore be regarded as complementary to textual sources. In a more general way, standard diagrammatic types and their incessant reelaborations give precious indications regarding the vast domain of implicit knowledge: they bring to the foreground categories considered essential but that were not necessarily made explicit on a textual level, and they are instrumental in relating those categories. An analysis of wind diagrams, therefore, should contribute to an understanding of medieval cosmographical ideas and at the same time help clarify some of the mechanisms of pictorial codification.

The history of medieval meteorologic conceptions about winds and corresponding diagrammatic representations can be divided into two major periods. In the earlier period, starting with Isidore of Seville's *De rerum natura* (ca. 613), the prevailing cosmology was the Greco-Roman tradition that regarded winds as a sublunary atmospheric phenomenon. Subsequently, especially during the twelfth century, theories on winds occasionally merged with views that had them originate

[8] Friedrich Ohly, *Schriften zur mittelalterlichen Bedeutungsforschung* (Darmstadt, 1977). Of special interest with respect to my subject are Barbara Bronder, "Das Bild der Schöpfung und Neuschöpfung der Welt als *orbis quadratus*," *Frühmittelalterliche Studien* 6 (1972), 188–210; Barbara Maurmann, *Die Himmelsrichtungen im Weltbild des Mittelalters: Hildegard von Bingen, Honorius Augustodunensis und andere Autoren* (Munich, 1976); and Anna Esmeijer, *Divina quaternitas: A Preliminary Study in the Method and Application of Visual Exegesis* (Amsterdam, 1978).

[9] For example, A. van Run, "Annus, quadriga mundi: Over de adaptatie van een klassiek thema in de vroegmiddeleeuwse kunst," in *Annus, quadriga mundi: Opstellen over middeleeuwse kunst opgedragen aan Prof. Dr. Anna C. Esmeijer* (Zutphen, 1989), pp. 152–79, at p. 166.

[10] Thomas Raff, "Die Ikonographie der mittelalterlichen Windpersonifikationen," *Aachener Kunstblätter* 48 (1978–79), 71–218. For their personifications in antiquity, see Kora Neuser, *Anemoi: Studien zur Darstellung der Winde und Windgottheiten in der Antike,* Archaeologica 19 (Rome, 1982).

in, or even above, the celestial sphere and that therefore related them to the Godhead. In turn, this theologically oriented view of the role of winds was sometimes buttressed by conceptions of pneuma that had their origin in Stoic physics.

The main emphasis of the present study will be on the little-investigated early-medieval conceptions of the corporeal world, beginning with an overview of ancient and early-medieval ideas of the world and of the place of winds therein. On this basis, an outline of the major types and themes of wind representations will be made, ending with a brief discussion of twelfth- and early-thirteenth-century textual and pictorial documents. However, the abundance of wind diagrams is such that many variants, interesting as they may be, have to be left out.

Conceptions of the Physical World and of Winds

From the beginning of the medieval period the universe was conceived, in strict continuity with the Greco-Roman worldview, in terms of three spherical layers of elements around the central globe of the earth.[11] Fire, air, water, and earth were the basic organizing spatial as well as temporal principles. In the all-pervasive Aristotelian scheme, "natural" places were allotted to these elementary constituents, the earth making up the lower and central part, fire the upper and peripheral one; these places were determined by the opposites heavy and light.[12] The cohesion of the whole structure was guaranteed by the cyclical transformation of the elements one into another, which was explained by way of a further set of opposites, namely, hot and cold, dry and humid. Respectively, two of these qualities were assigned to each element, and these were thought to be the product of the cyclical association and dissociation of qualities (for example, fire resulted from the combination of hot and dry).[13] Depending upon the ecliptic course of the sun, the whole process became manifest through seasonal change.[14] As transmitted above all through Isidore's *De rerum natura,* this view of cosmic cohesion prevailed in the earliest part of the Middle Ages.[15] From the Carolingian renaissance on, Neoplatonic speculations based on numerical proportions gained in favor, while the Stoic theory of cohesion guaranteed by pneuma, commonly designated as air and spirit in Latin cosmological handbook and poetic literature, was put forward only sporadically. In general, the classification of ancient physical theories in pre-twelfth-century documents, and the study of the use of those theories, is research that still remains to be done.

[11] In the earlier part of the Middle Ages, the Aristotelian fifth element played a negligible role.

[12] Aristotle, *On the Heavens* 1.3 (269b 23 ff.), 4.1–4 (W. K. C. Guthrie, ed. and trans. [London and Cambridge, Mass., 1953]) is the ultimate source. Friedrich Solmsen, *Aristotle's System of the Physical World: A Comparison with His Predecessors* (Ithaca, N.Y., 1960), chaps. 12–13. As an example for the handling of these categories in the late Roman world, see Macrobius, *Commentarii in Somnium Scipionis* 1.22.4–13 (J. Willis, ed. [Leipzig, 1983]; W. H. Stahl, trans., *Macrobius, Commentary on the Dream of Scipio* [New York, 1952], pp. 181–84).

[13] Again, the fundamental source is Aristotle, *On Coming-to-Be and Passing Away,* esp. 2.3–4 (E. S. Forster, ed. and trans. [London and Cambridge, Mass., 1955]). Solmsen, *Aristotle's System,* chaps. 17–18.

[14] Aristotle, *On Coming-to-Be and Passing Away* 2.11 (338b 1–5).

[15] Barbara Obrist, "Le diagramme isidorien de l'année et des saisons: Son contenu physique et les représentations figuratives," *Mélanges de l'Ecole française de Rome: Moyen âge* 108/1 (1996), 95–164.

In ancient handbook literature and in its medieval continuation,[16] two theories prevailed concerning the material substance of winds. Winds were considered to be a condition or state of air, or moving air, or air flowing in one direction. Thus Isidore defines wind as "moved and agitated air" or, citing Lucretius's *De rerum natura,* states that "wind arises when air is stirred up."[17] Otherwise, following the Aristotelian view, winds were defined as dry, earthly exhalations.[18] As to what caused the movement of air (and of exhalations), a multitude of theories was put forth, with the sun as the overall efficient cause but with the planets playing a role as well.[19] In the Stoic physical tradition, winds were said to be caused by a force inherent to air.[20] Throughout this period, the tangible elementary qualities and their interactions served as basic explanatory principles for the phenomenon.[21] Mechanistic explanations circulated as well, made in terms of expansion and rarefaction of air masses.[22] Winds and breezes could rise from the surface of the earth (and of the sea), gather in subterranean caves,[23] and originate in clouds.[24]

[16] William Harris Stahl, *Roman Science: Origins, Development, and Influence to the Later Middle Ages* (Madison, Wis., 1962).

[17] Isidore of Seville, *De rerum natura* 36.1.1–3: "Ventus est aer commotus et agitatus, adprobante Lucretio: Ventus enim fit ubi est agitando percitus aer" (Jacques Fontaine, ed. and trans., *Isidore de Séville, Traité de la nature* [Bordeaux, 1960]). Cf. Isidore of Seville, *Etymologiae* 13.9.1 (W. M. Lindsay, ed., *Isidori Hispalensis episcopi Etymologiarum sive Originum libri XX* [Oxford, 1911; repr. 1985]); Lucretius, *De rerum natura* 6.685 (W. H. D. Rouse, ed. and trans., rev. Martin Ferguson Smith [Cambridge, Mass., 1975]); Pliny, *Natural History* 2.114: "fluctus aeris" (H. Rackham, ed. and trans. [Cambridge, Mass. 1958]; J. Beaujeu, ed., *Pline l'Ancien, Histoire naturelle, Livre II* [Paris, 1950]); Vitruvius, *On Architecture* 1.6.2: "Ventus autem est aeris fluens unda cum incerta motus redundantia" (Frank Granger, ed. and trans. [London and Cambridge, Mass., 1962]); Seneca, *Quaestiones naturales* 5.1: "Ventus est fluens aer. Quidam ita definierunt: ventus est aer fluens in unam partem" (Th. H. Corcoran, ed. and trans. [Cambridge, Mass., and London, 1971]). These definitions go back to Theophrastus and Posidonius. See Peter Steinmetz, *Die Physik des Theophrastes von Eresos* (Bad Homburg, Berlin, and Zurich, 1964), esp. pp. 39–41. For the medieval transmission of these texts, see L. D. Reynolds, ed., *Texts and Transmission: A Survey of the Latin Classics* (Oxford, 1983).

[18] Aristotle, *Meteorologica* 2.4 (360a 13–14, etc.; H. D. P. Lee, ed. and trans. [Cambridge, Mass., and London, 1978]), transmitted, among others, by Pliny, *Natural History* 2.114; Seneca, *Quaestiones naturales* 5.4.1; and Apuleius, *Liber de mundo* 8.305.21 ff., in *De philosophia libri* (P. Thomas, ed. [Leipzig, 1970]). See Reynolds, ed., *Texts and Transmission,* pp. 16–18. Knowledge of the *Meteorologica* in the ninth century is discussed below.

[19] Handbooks tend to give lists without precise hierarchy. See Pliny, *Natural History* 2.114, 116 (Beaujeu, ed., cf. 2.186 ff. and 2.191 ff.); Seneca, *Quaestiones naturales* 5.1–2. For exhaustive discussions of ancient wind theories see R. Böcker, "Winde," in *Paulys Realencyclopädie der classischen Altertumswissenschaft,* 2nd ser., 8/2 (Stuttgart, 1958), cols. 2211–2387; and Otto Gilbert, *Die meteorologischen Theorien des griechischen Altertums* (Leipzig, 1907; repr. Hildesheim, 1967), pp. 511–39.

[20] Seneca, *Quaestiones naturales* 5.5.1. Steinmetz, *Die Physik,* p. 69.

[21] For example, Vitruvius (*De architectura* 1.6.2) holds that winds rise "when heat strikes moisture and the onrush of the force presses out the power of the breath of the blast" ("Nascitur cum fervor offendit umorem et impetus factionis exprimit vim spiritus flatus"), a theory he confirms by way of an experiment with a water kettle on fire.

[22] Seneca, *Quaestiones naturales* 5.4.3. Pliny, *Natural History* 2.114. Böcker, "Winde," cols. 2223, 2226–27, and 2232.

[23] Seneca, *Quaestiones naturales* 5.4.1 and 5.14.1–3. Lucan, *Civil War* 10.247–48 (J. D. Duff, ed. and trans. [London and Cambridge, Mass., 1957).

[24] Seneca, *Quaestiones naturales* 5.12.1–5. Gilbert, *Die meteorologischen Theorien,* pp. 536 and 559–63. Böcker, "Winde," col. 2225.

But winds always remained a problem with respect to the order of nature and had, as it were, a basic dual character and role. Mainly because of their irregular and violent movements, winds could not be completely integrated into the general explanatory schemes—a fact revealed by the very proliferation of theories on the genesis of winds and the diversity of their representations. Aristotle therefore states the subordinate position of winds in the cosmic scale of perfection when, at the beginning of the *Meteorologica,* he emphasizes that the movement of winds is less regular than that of the elements, which, in turn, is less regular and perfect than the spherical rotations.[25] Throughout Western cosmology, irregularity was associated with irrationality[26] and violence,[27] and accordingly winds were sometimes correlated with evil in the hierarchy of moral values.[28] Their negative aspect also has to do with the fact that their location was never an entirely fixed one. While texts on natural philosophy and handbook summaries tend to press them into a rigid scheme of distribution in the sky or on the horizon and to give a neutral account of winds, ancient poetic texts convey a vivid picture of the constant threat of their breaking free. In Ovid's *Metamorphoses* the Divine Artisan succeeds in creating harmony between the fighting elements of chaos, but the winds remain marginal and cannot be entirely subjugated. And although the creator is not willing to allot them the whole airy space, "even as it is, they can scarcely be prevented, though they control their blasts, each in his separate tract, from tearing the world to pieces. So fiercely do these brothers strive together."[29] In an eschatological Christian perspective, winds could become instrumental in the final cosmic disruption.[30]

[25] Aristotle, *Meteorologica* 1.1 (338 a 20 ff.).

[26] For a medieval rendering of the theme, see Pseudo-Bede, *De mundi celestis terrestrisque constitutione* 132–33, who associates the motion of the firmament with the only rational movement, because it "never deviates from the same course, whereas the planets fall into different routes." Thus characterized by irrational movement, the planets in turn move the air, which "does not remain in that circular path for long, as we also observe at times in a whirlwind" (Charles Burnett, ed. and trans., Warburg Institute Surveys and Texts 10 [London, 1985]).

[27] Isidore, *Etymologiae* 13.9.1: "Dictus autem ventus, quod sit vehemens et violentus. Vis enim eius tanta est ut non solum saxa et arbores evellat, sed etiam coelum terramque conturbet, maria commoveat." Cf. Rabanus Maurus, *De universo* 9.25 (*Patrologia Latina* [henceforth cited as PL], 111:281A).

[28] In her *Hortus deliciarum* ("De firmamento") Herrad of Landsberg compares the rational movement of the firmament with that of the soul, while the irrational and erratic movements of the planets signify carnal desires, etc. (Rosalie Green, et al., eds. [London and Leiden, 1979], p. 17).

[29] Ovid, *Metamorphoses* 1.57–60 (F. J. Miller, ed. and trans., rev. G. P. Goold [Cambridge, Mass., and London, 1984]). In Virgil's *Aeneid* 1.56 ff. they are maintained by Aeolus "and did he not so, they would surely bear off with them in wild flight seas and land and the vault of heaven, sweeping them through space . . ." (H. R. Fairclough, ed. and trans., rev. ed. [Cambridge, Mass., and London, 1994]). In Statius's *Thebaid* 1.346–49, they break out of the "rocky prisons of Aeolia and . . . fling loose heaven's vault from its fastened hinges, while each strives for mastery of the sky" (J. H. Mozley, ed. and trans. [Cambridge, Mass., and London, 1955]). In Lucretius, *De natura rerum* 1.280–98, the devastating winds are compared to torrents of water.

[30] See the representation of the dissolving structure of the cosmos at the end of time in Hildegard of Bingen, *Scivias* 3.12 (A. Führkötter, ed., Corpus Christianorum, Series Latina 43 [Turnhout, 1978]). While the visionary merely states that underneath the Judge's throne she perceives "hanc maximam tempestatem purgationis mundi," the accompanying miniature features three-faced monstrous wind masses at the cardinal points. Charles Singer ("The Scientific Views and Visions of Saint Hildegard

However, the four major winds also appear in the opposite role of guarantor of cosmic order, by being associated with the cardinal axes, the other winds being reduced to the subordinate position of potential troublemakers. Pictorial representations of winds constitute a main source of information on the view of winds as maintaining the stability of the cosmos, while textual evidence, ancient and medieval, of some sustained kind is scarce for the period preceding the twelfth century.

The importance of winds in the seafaring Mediterranean world hardly needs to be stressed. As pointed out by Vegetius (383–450) in his influential handbook for the naval commander, the *Epitoma rei militaris,* "Liburnian vessels often have been damaged more seriously from storms and waves than from the force of the enemy."[31] Winds were just as vital in agricultural life,[32] medicine,[33] and city planning.[34] In his *On Winds* (ca. 300 B.C.) Theophrastus sums up the prevailing view: "What happens in the sky, in the air, on earth and on the sea is due to the wind. And to put it briefly, our inquiries deal with matters which also concern the life and well-being of plants and animals."[35] The handbooks give impressive lists of meteorologic and terrestrial phenomena that they induce: *septentrio* produces snow; *subsolanus* dissolves everything and dries out; *auster* generates clouds; *zephyrus* brings forth flowers, generates storms, rain, and thunder, and so on.[36]

Basic Texts on Winds

The Roman handbook tradition on winds entered the early Middle Ages by way of what appear to be variants of the lost *De natura rerum* by Suetonius, itself based on equally lost chapters by Varro. Two of these variants are anonymous

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[1098–1180]," in *Studies in the History and Method of Science,* 1 [Oxford, 1917], pp. 1–55, at p. 26) states, incorrectly, that the winds "are subjecting the elements to the crucible heat of their combined blasts." Their respective threefold blasts are, however, clearly meant to be of an airy nature, as is shown by their blue-white color and by a comparison with the representations of the four elements in vision 1.2 of the *Scivias.* Color plates of the now-lost Rupertsberg codex of ca. 1165 are in M. Böckeler, trans., *Hildegard von Bingen, Wisse die Wege,* 1st ed. (Berlin, 1928; repr. Salzburg, 1954), plates 3 and 33.

[31] Vegetius, *Epitoma rei militaris* 4.38.677–78: "Procellis namque et fluctibus liburnae gravius quam vi hostium saepe perierunt . . ." (Alf Önnerfors, ed., *P. Flavii Vegeti Renati Epitoma rei militaris* [Stuttgart and Leipzig, 1995]).

[32] For example, Pliny, *Natural History* 17.10–12 and 21–23; 18.325–39.

[33] See, among others, the concise summary by Vitruvius, *De architectura* 1.6.1–3. The Hippocratic *On Airs, Places, and Waters,* which circulated in the early Middle Ages, recommends that the student of medicine first consider the seasons and second the hot and cold winds and the situation of cities with respect to winds (K. Kühlwein, ed., from Paris, Bibliothèque Nationale, MS lat. 7027, in *Hermes* 40 [1905], 248–74; G. E. R. Lloyd, ed., J. Chadwick and W. N. Mann, transs., *Hippocratic Writings* [Harmondsworth, Eng., 1978], pp. 148–69). See also Pearl Kibre, "Hippocrates Latinus: Repertorium of Hippocratic Writings in the Latin Middle Ages," *Traditio* 31 (1975), 99–126, at p. 124.

[34] Knowledge of the rose of the winds served to plan the layout of the streets so as to shut off winds: Vitruvius, *De architectura* 1.6.1, 7–8, 12–13.

[35] Theophrastus, *On Winds* 1 (V. Coutant and V. Eichenlaub, eds. and transs., *Theophrastus, De ventis* [Notre Dame, Ind., and London, 1975], p. 3).

[36] Isidore, *De rerum natura* 37.1–4.

poetic versions of Suetonius, and the third is Isidore of Seville's chapter 37, "De nominibus ventorum," of the *De rerum natura.*[37] To these may be added Vegetius's *Epitoma rei militaris.*

The longer poem, which has been attributed to Suetonius, begins as follows:

> Four winds blow from the four parts of the world,
> Each maintaining two companions inferior to it.
> They are placed as in a circle [each] beneath a fixed climate.
> Thus they move the elements so that these do not come to the same winds at the same time. . . .
> The first comes from the axis and brings freezing cold. . . .
> Circius is to the right of it, Boreas flies to its left. . . .

The concluding lines are these:

> From the cardinal point in each quarter
> Twelve winds sweep in ample windings right over the earth. . . .[38]

A shorter poem, clearly related to the longer one but lacking the concluding verses, begins thus:

> Four winds rise up from a fourfold boundary.
> Around these four winds twin winds are joined on the right and on the left.
> And so they surround the world with a twelvefold blast. . . .
> First is Aparctias Arctos to blow from the axis. . . .[39]

Although isolated phrases in Isidore of Seville's *Etymologiae,* such as "Hi duodecim venti mundi globum flatibus circumagunt,"[40] show that he knew other parts

[37] Ibid., 37.5.1. See also Jacques Fontaine, *Isidore de Séville et la culture classique dans l'Espagne wisigothique,* 2 vols. (Paris, 1959; rev. ed., 1983), p. 749.

[38] Quatuor a quadris uenti flant partibus orbis:
quisque sibi comites geminos alit inferiores.
hi uelut in circo positi sub climate certo
sic elementa mouent, ut eisdem non simul instent. . . .
Primus ab axe uenit concretaque frigora ducit. . . .
circius huic dexter, boreas uolat inde sinister. . . .
Hi sunt bis seni quadro sub cardine uenti
perflantes mediae spatiosa uolumina terrae. . . .

Augustus Reifferscheid, ed., *C. Suetoni Tranquilli praeter Caesarum libros reliquiae* (Leipzig, 1860), pp. 304–6, no. 151a. See also C. Pascal, ed., in *Letteratura latina medievale* (Catania, 1909), pp. 29–32; M. C. Díaz y Díaz, *Index scriptorum Latinorum medii aevi Hispanorum* (Madrid, 1959), no. 262; and B. Munk Olsen, *L'étude des auteurs classiques latins aux XIe et XIIe siècles,* 1–3 (Paris, 1985–89), pp. 570–71.

[39] Quatuor a quadro consurgunt limite venti:
Hos circum gemini dextra laevaque iugantur,
Atque ita bis seno circumdant flamine mundum.
Primus Aparctias Arctoo spirat ab axe. . . .

H. Meyer, ed., *Anthologia veterum Latinorum epigrammatum et poematum* (Leipzig, 1835), 2, no. 1056. See also Alexander Riese, ed., *Anthologia Latina,* 1/2 (Leipzig, 1870), no. 484; Reifferscheid, ed., pp. 305–8, no. 151b; Díaz y Díaz, *Index,* no. 263; and J. Szövérffy, *Weltliche Dichtungen des lateinischen Mittelalters* (Berlin, 1970), p. 323.

[40] Isidore, *Etymologiae* 13.11.3.

of this tradition, chapter 37 of his *De rerum natura* is limited to the list of winds with their characteristics:

> Ventorum primus cardinalis Septentrio, frigidus et nivalis; flat rectus ab axe et facit arida frigora et siccas nubes; hic et Aparctias. Circius, qui et Thrascias: hic a dextris Septentrionis intonans facit nives. . . . Secundus ventorum cardinalis Subsolanus, qui et Apeliotes; hic ab ortu intonat solis et est temperatus. Vulturnus ipse, qui et Caecias vocatur, dexterior Subsolani; hic dissolvit cuncta atque desiccat. Eurus, ex sinistro latere veniens Subsolani, orientem nubibus inrigat.[41]

Following a long-established tradition, these texts have in common that the four major winds are closely associated with the cardinal directions whence they blow, with the north wind, *septentrio,* coming first.[42] The collaterals are located to their left and to their right, making up a total of twelve, the names of which are given in Latin and in Greek. That the duodecimal classification of winds had found wide acceptance in Rome, where it was favored by, among others, Seneca[43] and Vegetius,[44] is also indicated by anemoscopes such as the one found south of Porta Capena, near the Via Appia (second century; Fig. 1)[45] and the one found between the Esquiline and the Colosseum[46] (second–third century; Fig. 2).

In the Middle Ages the twelve-wind scheme was so generally accepted that when Einhard mentioned Charlemagne's reform of the old Germanic system of four winds, he took it for granted that their number was to be extended to twelve.[47] Although differing lists of winds were circulated from Carolingian times on,[48] with

[41] Idem, *De rerum natura* 37.

[42] Cf. Steinmetz, *Die Physik,* p. 26. But Vegetius, *Epitoma rei militaris* 4.38.690, begins with the east: "A verno itaque solstitio, id est ab orientali cardine, sumemus exordium, ex quo ventus oritur apheliotes, id est subsolanus, hic a dextra iungitur caecias. . . ."

[43] Seneca, *Quaestiones naturales* 5.16.3: "Some make them twelve winds. For they divide the four sections of the sky into three parts each and assign two subsidiary winds to each of the other winds. Varro, a diligent man, classifies them according to this system, and with good reason. For the sun does not always rise in the same place . . ." ("Quidam illos duodecim faciunt. Quattuor enim caeli partes in ternas dividunt et singulis ventis binos subpraefectos dant. Hac arte Varro, vir diligens, illos ordinat, nec sine causa. Non enim eodem semper loco sol oritur . . .").

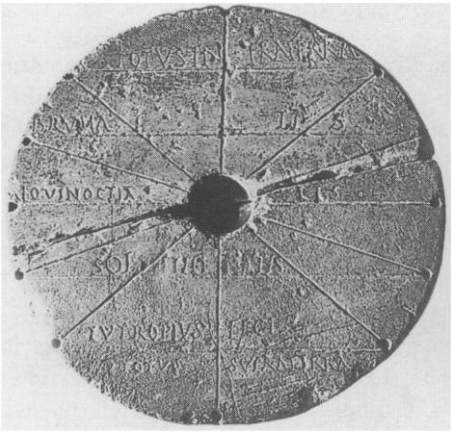
[44] Vegetius, *Epitoma rei militaris* 4.38.686 ff.

[45] Albert Rehm, "Griechische Windrosen," *Sitzungsberichte der Königlich Bayerischen Akademie der Wissenschaften,* Philos.-Philol. und Hist. Kl., 3rd Abh. (Munich, 1916), pp. 65–69, fig. 9 (an eighteenth-century engraving of its supposed original setting); O. A. W. Dilke, *Greek and Roman Maps* (London, 1985), pp. 110–11, fig. 21; Dilke, in J. B. Harley and David Woodward, eds., *Cartography in Prehistoric, Ancient, and Medieval Europe and the Mediterranean,* The History of Cartography 1 (Chicago and London, 1987), pp. 248–49; and D'Arcy Wentworth Thomson, "The Greek Winds," *Classical Review* 32 (1918), 49–56.

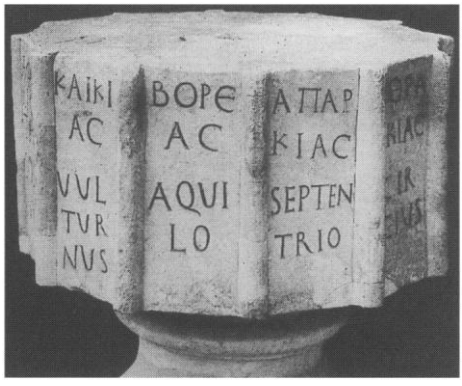
[46] In the proximity of San Pietro in Vinculis. See P. Giuseppe Lais, "Monumento Greco-Latino di una rosa classica dodecimale in Vaticano," *Pubblicazioni della Specola Vaticana* 4 (1894), pp. xi–xv, pl. I. For further monuments with twelve winds, see Rehm, "Griechische Windrosen," pp. 50–52; and K. Nielsen, "Remarques sur les noms grecs et latins des vents et des régions du ciel," *Classica et mediaevalia* 7 (1945), 1–113, at p. 102.

[47] Einhard, *Vita Karoli Magni* 29.18–20: "Item ventos duodecim propriis appellationibus insignivit, cum prius non amplius quam vix quattuor ventorum vocabula possent inveniri" (G. H. Pertz, G. Waitz, and O. Holder-Egger, eds., *Einhardi vita Karoli Magni* [n.p., 1911; repr. Hannover, 1965]).

[48] After Varro, it was customary to enumerate varying wind systems: four, eight, twelve, and more. See Richard Reitzenstein, "Die geographischen Bücher Varros," *Hermes* 20 (1885), 514–51, at pp. 518–25; and Nielsen, "Remarques," pp. 107–8.



1. Twelve-wind anemoscope from Rome, marble, ca. A.D. 200. Pesaro, Biblioteca e Musei Oliveriani.
(All photographs reproduced by permission.)



2. Twelve-wind anemoscope from Rome, marble, second–third century A.D.
Vatican City, Musei Vaticani.

a preference given to eight winds by Favorinus in Aulus Gellius,[49] Pliny,[50] and Vitruvius,[51] the duodecimal classification remained dominant.

Chapter 37 of Isidore's *De rerum natura* along with the related chapter in his later *Etymologiae*[52] and the shorter wind poem cited above formed the core of meteorological knowledge in the period preceding the twelfth century. These texts were widely disseminated in what may be called the depositories of astronomical and physical knowledge of monastic culture, the computistic miscellanies. Frequently they include several wind diagrams. In continuity with the ancient Roman world and in conformity with the general character of computistic collections, interest in winds was above all practical. Accordingly, theorizing on the genesis of winds was rarely associated with the Isidorian wind list and the verse on winds. Although essential excerpts from Aristotle's *Meteorologica* had been translated into Latin in the second half of the ninth century, from the mid-sixth-century collection of philosophical texts put together by Priscianus Lydus,[53] the study of longer philosophical texts on meteorologic phenomena virtually ceased.

[49] Aulus Gellius, *Attic Nights* 2.22.16–18 (R. Marache, ed. and trans. [Paris, 1967]). The lecture by Favorinus is also given in Apuleius, *De mundo* 13 (J. Beaujeu, ed. and trans., *Apulée, Opuscules philosophiques* [Paris, 1973]).

[50] Pliny, *Natural History* 2.119.

[51] Vitruvius, *De architectura* 1.6.4–5. But he also places winds to their right and to their left, which are varieties of the main winds (1.6.9). On Galen and Vitruvius, see G. Kaibel, "Antike Windrosen," *Hermes* 20 (1885), 579–624.

[52] Isidore, *Etymologiae* 13.11.

[53] I. Bywater, ed., *Prisciani Lydi quae extant: Metaphrasis in Theophrastum et Solutionum ad Chos-*

Basic Diagrammatic Structures

Together with ancient texts on winds, the Middle Ages inherited diagrammatic representations in which Greek and Latin names of the twelve winds were distributed on a circle symbolizing the horizon. Instructions for construing such diagrams, or roses of the winds, were transmitted as well, namely, those of Aristotle, Pliny, and Vitruvius. Although the direct impact of these appears to have been slight, they were known in the ninth century and must be taken into consideration, especially the fundamentally important text by Aristotle, for understanding how the diagrams were read and for explicating their function.

The Latin *Meteorologica* excerpts that circulated in the ninth century include Aristotle's general directions for construing a diagram, but they omit the geometric details and abbreviate his introduction: "The treatment of their [the winds'] position must be followed with the help of a drawing. For the sake of clarity, we have drawn the circle of the horizon, which is why our figure is round. And it must be supposed to represent the section of the earth's surface in which we live; for the other section could be divided in a similar way."[54] In order to determine the location of the winds on the circle representing the horizon, Aristotle drew the cardinal lines, first from the equinoctial sunset to the equinoctial sunrise for the location of the west and east winds, and second from the north to the south pole for the corresponding opposing winds. Then are added four more winds, by diameters drawn between the summer and winter sunsets and sunrises. The remaining space is filled in with three further winds, which are associated with the polar circles.[55] The twelfth wind was added by Timosthenes, fleet commander to Ptolemy II Philadelphus,[56] and, as far as can be judged from published material, the Greek manuscripts of the *Meteorologica* do occasionally include it.[57]

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roem liber, in *Supplementum Aristotelicum,* 1/2 (Berlin, 1886), pp. 41–104. Chapter 10 is devoted to winds; see p. 99, lines 7 ff. Marie-Thérèse d'Alverny, "Les 'Solutiones ad Chosroem' de Priscianus Lydus et Jean Scot," in *Jean Scot Erigène et l'histoire de la philosophie* (Paris, 1977), pp. 145–60, gives two manuscripts from the third quarter of the ninth century (pp. 147–48 and 149): Paris, Bibliothèque Nationale, lat. 13386 (Corbie) and lat. 2684.

[54] Aristotle, *Meteorologica* 2.6 (363a 25–30). *Solutiones ad Chosroem,* p. 101, ll. 11–15: "Duae enim sunt sectiones illius quae habitari potest regionis. . . . Secundum hoc oportet accipere et orizontis circulum et in sectionem quae apud nos est inque eam quae est alterius partis." The principle of construction is the following (p. 101, ll. 15–20): "Et huic attendentes divisioni haec de positione ventorum dicenda sunt. Ipsi enim attribuuntur locis et per diametrum sibi invicem sunt contrarii. Aequinoctiali enim ortu apeliotes [Greek letters], id est subsolanum, habente zephyrus contrarius est ex diametro, aequinoctialis occasus dum sit."

[55] Aristotle, *Meteorologica,* 363a 34 ff.

[56] Opinions concerning the origin of the different systems vary. For a detailed discussion of Aristotle and Timosthenes, see Gilbert, *Die meteorologischen Theorien,* pp. 544–49; Rehm, "Griechische Windrosen," pp. 36–53; and Nielsen, "Remarques," pp. 27 ff. and 41 ff. An article on the subject by Germaine Aujac is forthcoming: "La rose des vents, de Timosthène de Rhodes à Ptolémée," in *Aufstieg und Niedergang der römischen Welt,* pt. 2, 37/5: *Wissenschaft: Geographie, Mathematik, Naturwissenschaft.*

[57] Alfred Stückelberger, "Aristoteles illustratus, Anschauungshilfsmittel in der Schule des Peripatos," *Museum Helveticum* 50 (1993), 131–43, at p. 137, illus. 4 (Paris, Bibliothèque Nationale, MS gr. 1853, fol. 152v). But cf. illus. 5b (Vienna, Österreichische Nationalbibliothek, MS phil. gr. 100, fol. 118r). See also Stückelberger, *Bild und Wort: Das illustrierte Fachbuch in der antiken Naturwissenschaft, Medizin und Technik* (Mainz, 1994), illus. 3.

A system of eight winds was taught by Vitruvius, who provided a diagram that "seems to be so arranged as to receive the number, names, and quarters whence the fixed currents of winds blow."[58] It is so "mapped out that it may appear whence the certain breezes of the winds arise."[59] Drawing the diagram (or, rather, carving it into a marble slab) is instrumental in calculating the movement of winds, and Vitruvius adds it at the end of his *De architectura*.[60] Pliny's instructions, also for an eight-wind system, are addressed to farmers.[61] First has to be determined the north-south line, or the *cardo,* by observation of the position of the sun at midday. The line formed by a shadow is traced on the ground and at its center is drawn a small circle, the *umbilicus*. Then the *decumanus* is added and so on.[62] All these schemata are compass cards,[63] the circle of the horizon being subdivided according to varying, more or less sophisticated methods with reference to the cardinal axes and/or to the tropical risings and settings of the sun.[64]

In the Middle Ages these basic structures of wind diagrams underwent manifold variations. From the earliest period, which otherwise is not rich in pictorial manuscript evidence, there survive (at least) three variant types, the most sophisticated being a diagram from ca. 600 accompanying excerpts of Vegetius's *Epitoma rei militaris* (Fig. 3). Another one, which encloses four representations of winds as three-faced heads, was copied into a late-seventh-century Visigothic *Orationale*.[65] Isidore of Seville's chapter on winds was summarized by a circular table of their names (Fig. 4), which also survives in a seventh-century fragment of the *De rerum natura*.

It was only in the Carolingian period that wind diagrams were elaborated as part of a specific way of schematizing cosmological ideas. Their elaboration, which included combinations with other cosmological domains and phenomena, was stimulated by ancient material newly available. From that material were also taken full-length personifications, and these were made part of the diagrammatic structures. The distinctive feature of Carolingian cosmological illustrations is the com-

[58] Vitruvius, *De architectura* 1.6.5–6: "Hoc modo videtur esse expressum, ut capiat numerus et nomina et partes, unde flatus certi ventorum spirent."

[59] Ibid., 1.6.12: ". . . ita deformatum, ut appareat, unde certi ventorum spiritus oriantur. . . ." Rehm, "Griechische Windrosen," pp. 11–14.

[60] Vitruvius, *De architectura* 1.6.12, plate A in the Granger edition. It is to be found as a marginal drawing in a beautifully written manuscript dated ca. 800, British Library, MS Harley 2767, fol. 16v; see Reynolds, ed., *Texts and Transmission,* p. 441.

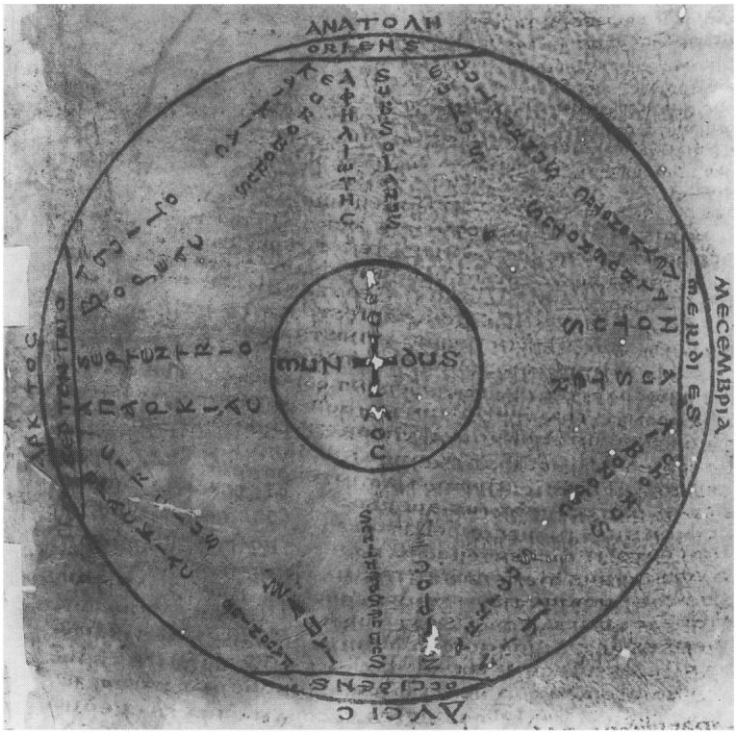
[61] They are told to draw the figure in the earth of their fields or else on wood for frequent use: Pliny, *Natural History* 18.326, 329.

[62] Ibid., 18.327–29.

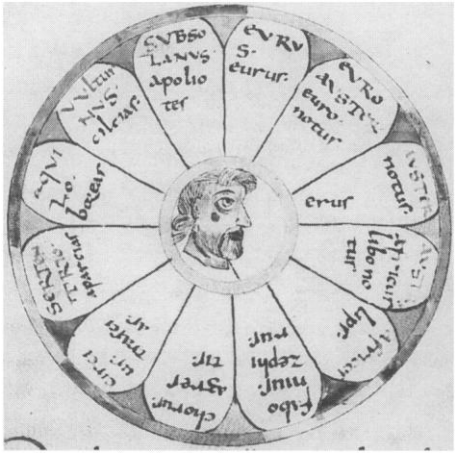
[63] Silvanus P. Thompson, "The Rose of the Winds: The Origin and Development of the Compass-Card," *Proceedings of the British Academy* 6 (London, 1918), pp. 1–31.

[64] Rehm, "Griechische Windrosen," pp. 9–18.

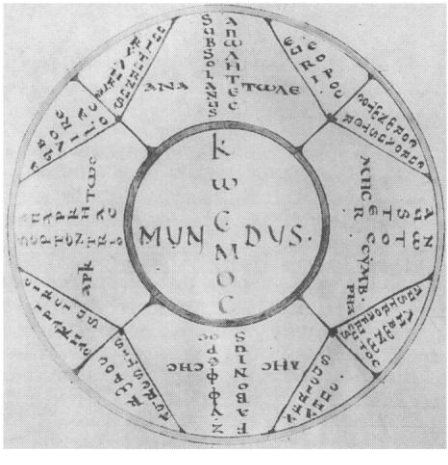
[65] Verona, Biblioteca capitolare, MS 89, fol. 3r, reproduced in *Storia della cultura veneta dalle origini al trecento,* 1 (Vicenza, 1976), illus. 9. This type remained peripheral to the medieval representations of winds. Their names are distributed along the circumference of the circular figure, and four medallions enclose three-faced winds with winged heads, all set around a central chi-rho cross. Raff, "Die Ikonographie," illus. 109, gives a partial drawing, leaving out the names. See also John Williams, *The Illustrated Beatus: A Corpus of the Illustrations of the Commentary on the Apocalypse,* 1 (London, 1994), p. 39, fig. 14 (partial drawing).



3. Vegetius, *Epitoma rei militaris,* beginning of the seventh century.
Vatican City, Biblioteca Apostolica Vaticana, MS Reg. lat. 2077, fol. 99r (detail).



4. Isidore of Seville, *De rerum natura,* end of the eighth century.
Munich, Bayerische Staatsbibliothek, clm 16128, fol. 35v (detail).



5. Computistical miscellany, ca. 800.
Cologne, Dombibliothek, MS 83 II, fol. 141r (detail).

bination of the circle and the square. And indeed, one of the wind diagrams included in the important computistic compendium in Cologne Cathedral Library, dated ca. 800 (Fig. 19), ranks among the earliest instances of this newly developed pattern.

Wind diagrams of Carolingian computistic compendia are of great variety, ranging from the simplest possible circular list of names to comprehensive cosmological diagrams in which winds play a major role. With or without figurative elements, these schemata remained basic. Although they were continually subjected to variations, no clear and uniform line of development can be traced. My presentation of wind diagrams dating from the early ninth to the early twelfth century will therefore privilege a typological rather than a chronological approach.

The Earliest Tradition of Medieval Wind Diagrams

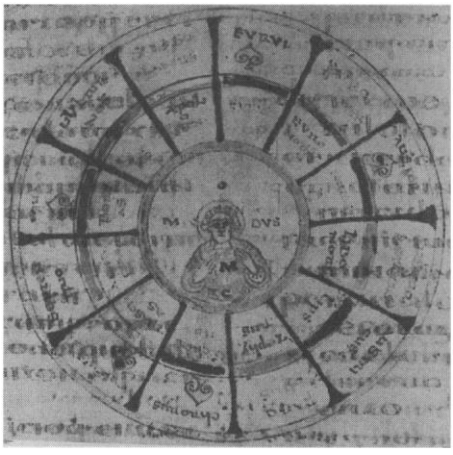
As far as can be judged from surviving evidence, wind diagrams of the pre-Carolingian era were based, above all, on Isidore of Seville's *De rerum natura,* the backbone of early-medieval cosmography. In the oldest manuscripts two pictorial traditions can be distinguished. In the first version, the figure that sets the minimal structure is a circle divided into twelve sectors with a central medallion, which in most cases is empty[66] but which sometimes includes a head in profile, as in Munich, Bayerische Staatsbibliothek, clm 16128, fol. 35v (Fig. 4).[67] The names of the winds are distributed within the sectors, *subsolanus-apoliotes* being at the top, while the text has *septentrio* as a "first" wind.[68] This figure is nothing more than a circular table of Greek and Latin names, with not even the four cardinal directions being indicated.

In the second, more elaborate version, the central medallion is divided crosswise by the words *kocmoc* (vertically) and *mundus* (horizontally); these words are surrounded by the names of the cardinal winds. Although the words displayed crosswise suggest that winds are associated with the cardinal directions, these are

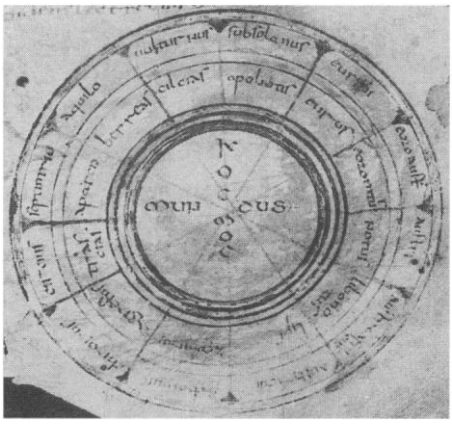
[66] Thus in the oldest surviving Spanish copy, El Escorial, R. II. 18, fol. 20r (seventh century). See Fontaine, *Traité de la nature,* p. 20; and Bernhard Bischoff, "Die europäische Verbreitung der Werke Isidors von Sevilla," in his *Mittelalterliche Studien,* 1 (Stuttgart, 1966), pp. 171–94, at p. 173.

[67] Related to Munich, clm 16128, fol. 35v (ca. 800) and clm 14300, fol. 35v (ca. 800). See Fontaine, *Traité de la nature,* pp. 23 ff.; Bischoff, "Die europäische Verbreitung," p. 179; Katharina Bierbrauer, *Die vorkarolingischen und karolingischen Handschriften der bayerischen Staatsbibliothek* (Wiesbaden, 1990), cat. nos. 133, 134, illus. 260; and Bernard Teyssèdre, "Un exemple de survie de la figure humaine dans les manuscrits précarolingiens: Les illustrations du *De natura rerum* d'Isidore," *Gazette des beaux-arts* 102 (1960), 19–34, illus. 17 (Paris, Bibliothèque Nationale, MS lat. 6413, fol. 27v, eighth century).

[68] The discrepancy between diagram and text has been corrected in a tenth-century compendium mostly of Bedan cosmographic and computistic writings (Strasbourg, Bibliothèque Nationale et Universitaire, MS 326, fol. 120r). Cf. Paris, Bibliothèque Nationale, MS lat. 5239, fol. 139r (ca. 1100). This diagram accompanies the Isidorian chapter on winds as well as the poem "Quatuor a quadro consurgunt limite venti." Moreover, it encloses in its spokes parts of the Isidorian text. In accordance with both the Isidorian chapter and the poem, *septentrio* is at the upper side of the figure. The compiler of this manuscript modified not only the diagram but also the Isidorian text by adding a sentence announcing the circular figure: "De qualitate ventorum sub caeli axe liquide et aperte inveniet si circuli similitudinem prudens lector inquirat" (fol. 119v).



6. Isidore of Seville, *De rerum natura,* ca. 700.
Paris, Bibliothèque Nationale, MS lat. 6400G, fol. 142r (detail).
(From *Gazette des beaux-arts* 102 [1960], 30, fig. 15.)



7. Isidore of Seville, *De rerum natura,* seventh–eighth century.
Bern, Burgerbibliothek, MS A 92/20, fol. 2r (detail).
(From Homburger, *Die Handschriften,* illus. 12.)

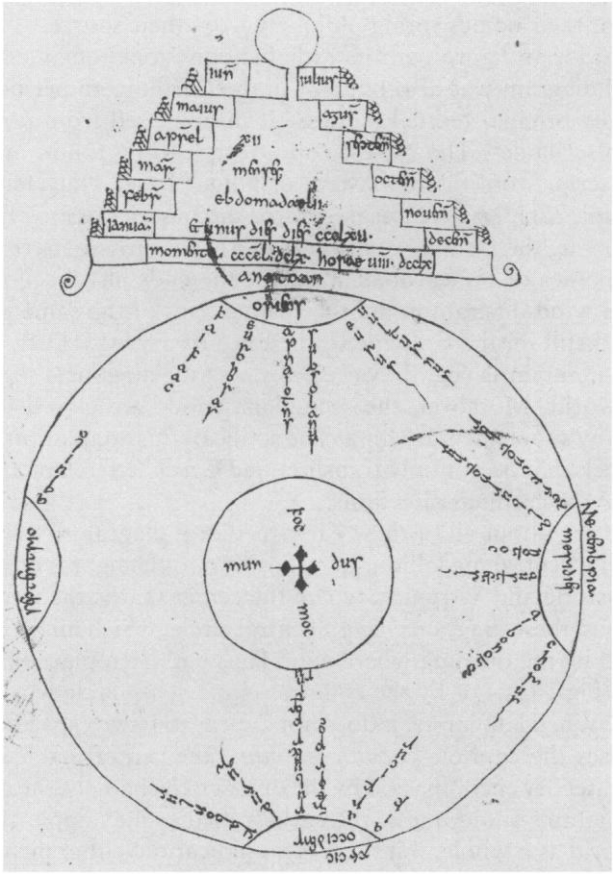
again not named. A supplementary circular line (or double line) separates the outer range of Latin names from the inner Greek one. The diagram in a manuscript dated ca. 700 from Fleury (Paris, Bibliothèque Nationale, MS lat. 6400 G, fol. 142r)[69] is of particular interest because in it can be seen the half-length personification of the nimbed cosmos, which subsequently disappeared (Fig. 6). In certain variants of the diagram, such as in Bern, Burgerbibliothek, MS A 92/20, fol. 2r (ninth century),[70] the lines intersect in the center, thus betraying something of the underlying geometric construction (Fig. 7).

Through the inscription *kocmoc-mundus* the second type of Isidorian wind diagram can be linked to a much more elaborate one, represented by the palimpsest of Vegetius's *Epitoma rei militaris* copied ca. 600, formerly in the Chapter Library of Benevento, now Vatican Library, MS Reg. lat. 2077, fol. 99r (Fig. 3).[71]

[69] E. A. Lowe, *Codices Latini antiquiores,* 5 (Oxford, 1950), nos. 566 and 564a; Fontaine, *Traité de la nature,* p. 25; Teyssèdre, "Un exemple," pp. 29–30, illus. 15; Marco Mostert, *The Library of Fleury: A Provisional List of Manuscripts* (Hilversum, 1989), no. BF1081. The same pattern is, among others, in Laon, Bibliothèque municipale, MS 423, fol. 29r (eighth century; see Fontaine, *Traité de la nature,* p. 30); Cambrai, Bibliothèque municipale, MS 937, fol. 59v (eighth–ninth century; see Fontaine, *Traité de la nature,* p. 27; and Mostert, *Library,* no. BF243); and Bern, Burgerbibliothek, MS 224, fol. 172v (see Otto Homburger, *Die illustrierten Handschriften der Burgerbibliothek Bern: Die vorkarolingischen und karolingischen Handschriften* [Bern, 1962], pp. 65–69; and Mostert, *Library,* no. BF123).

[70] Homburger, *Die Handschriften,* pp. 41–42, illus. 12; Mostert, *Library,* no. BF065.

[71] First published by Fabio Troncarelli, *Boethiana aetas: Modelli grafici e fortuna manoscritta della "Consolatio Philosophiae" tra IX e XII secolo* (Alessandria, 1987), pl. XVc. According to the author, Reg. lat. 2077 "è con ogni probabilità influenzato da abitudini vivariensi" (p. 59). See Reynolds, ed., *Texts and Transmission,* p. xxvi.



8. Isidore of Seville, *De rerum natura,* with additional schemata, end of the eighth century. Basel, Universitätsbibliothek, MS F III 15a, fol. 22r.

It may, therefore, tentatively be called the Vegetian type. In opposition to the Isidorian figures, this has a distinctly spatial and topological dimension. Here the center is occupied by a cross the branches of which are extended by the words *kocmoc-mundus;* at the circumference the Latin names of the cardinal directions are marked out by segments, their Greek equivalents being shifted to the outside. In accordance with the predominant orientation of medieval maps, *oriens* is at the top.[72] From the segments symbolizing the *plagae mundi* the Latin and Greek names of the three winds radiate. Thus the theory found in the Vegetian, Isidorian,

[72] On this subject, see Harley and Woodward, *Cartography,* pp. 301 ff.; and Gautier Dalché, "De la glose," pp. 705 ff.

and poetic texts that each cardinal wind has two side winds is graphically brought out here in that their names spring obliquely from their source.

While the Isidorian figure with its radial subdivisions remained standard, the Vegetian wind diagram was also popular in the Carolingian period, although always outside its original textual context. It disappeared from post-Carolingian computistic miscellanies. The closest copy of it is to be found in a late-eighth-century manuscript from the monastery of Fulda (Basel, Universitätsbibliothek, MS F III 15a, fol. 22r),[73] where it is integrated into a series of mostly astronomical schemata following the *De rerum natura* (Fig. 8). The cross-pattern *kocmoc-mundus* with the names of the cardinal winds at the ends also occupies the central medallion of a wind diagram in another manuscript of the same period, around 800, from, and still in, the Cologne Cathedral Library, MS 83 II, fol. 141r (Fig. 5).[74] Here the diagram is slightly varied in that four diagonals separate the four parts of the world. Moreover, the secondary winds are closed off toward the circumference by supplementary lines. The scribe of this adaptation was obviously so fond of Greek that he not only transliterated Greek letters but also omitted the Latin names of the cardinal directions.

What is striking about all of these early-medieval diagrams is that they consist of a circle with a central medallion. In opposition to the figures described by such authors as Aristotle and Vitruvius, where the center marks the intersection point of diagonal lines, these diagrams have a central circle, which might originally have been suggested by the opening where wind flags had been placed in the center of anemoscopes (Figs. 1, 2) or by the compass circle. This circle was put to various symbolic uses. When left empty, it does not appear to have a specific function; but when it encloses the caption *kocmoc-mundus,* the central circle stands for the most general category encompassed by the outer circle, namely, the universe. These latter wind diagrams stand out as the earliest medieval examples that nominally refer to the world as a whole. But there is no indication, either pictorial or verbal, as to whether winds were regarded as belonging to a specific stratum of the universe. Does the *mundus-kocmoc* caption refer to the universe in such a way as to include the celestial spheres, or to the sublunary part as a whole, or merely to the airy space? More generally, it is often not clear whether the central unit of circular diagrams simply delimits and defines a category, or whether it also has an iconic function, or both—a problem that becomes a particularly vexing one as diagrams came to include, besides the categories of winds and *mundus,* more categories and subcategories. Thus, what prevents viewers from interpreting diagrams of the Vegetian tradition to mean that winds are located, not within, but around, the uni-

[73] This series has subsequently been included into numerous computistical miscellanies. On the manuscript, see Fontaine, *Traité de la nature,* p. 31; Bischoff, "Die europäische Verbreitung," p. 185, n. 90; and Wesley M. Stevens, "*Compotistica et astronomica* in the Fulda School," in *Saints, Scholars and Heroes: Studies in Medieval Culture in Honour of Charles W. Jones,* ed. Margot H. King and Wesley M. Stevens (Collegeville, Minn., 1979), 2:27–63.

[74] On the manuscript see Anton von Euw, *Monumenta Annonis. Köln und Siegburg: Weltbild und Kunst im hohen Mittelalter,* exhibition catalogue (Cologne, 1975), no. A. 35, illus. 95; and "Die künstlerische Gestaltung der astronomischen und komputistischen Handschriften des Westens," in *Science in Carolingian Times,* ed. Butzer and Lohrmann, pp. 251–69, at pp. 252, 255 ff. This latter article discusses merely the astronomical diagrams.

verse and outside of it? Indeed, on a merely verbal level, the polysemy of the word *mundus* is not necessarily a help in clarifying things. It could mean the world including the heavens, or merely the sublunary part, or simply the central earth globe, or even the surface of the earth.[75] Thus Isidore defines *mundus* as "caelum et terra, mare et quae in eis opera Dei"[76] or as "universitas omnis quae constat ex caelo et terra,"[77] yet he also asserts, in accordance with the shorter wind poem, that the twelve winds blow around the globe of the world.[78] In contrast, the longer wind poem has them sweep through the wide spaces of the earth ("spatiosa uolumina terrae").

Wind Diagrams with Central Circular Maps

More precise indications were given, above all, with respect to the central circle of the diagrams. In an important series of schemata the central circle was used to symbolize the surface of the *oikoumene* with its three continents. In these cases the inner circle line coincides with the earthly horizon, while the outer one refers to some upper, airy or celestial region and limit whence winds blow. The central part could be occupied not only by T-O maps but also by maps of a rectangular or square form. It is difficult to know to what extent these combinations of maps and winds are medieval developments of ancient models or medieval innovations, for scant Roman or Greek evidence survives.[79]

The three continents marked out by a T within the circle of the inhabitable world are to be found in ninth-century manuscripts of Cassiodorus's second book of the *Institutiones* (recension 3). These manuscripts also include several other texts that had started to circulate with the *Institutiones* in the eighth century as part of an effort to make it into "a fuller compendium of the seven Liberal Arts."[80] Along with excerpts from Augustine and Boethius are two illustrated texts, a treatise on the four elements[81] and the short wind poem cited above. This combination of documents suggests that the diagrams also had been copied or adapted at the same period.[82]

The drawing of Bern, Burgerbibliothek, MS 212/I, fol. 109r (first third of the

[75] For the last, see Rabanus Maurus, *De universo* 12.2 (PL 111:332 D–333 A).

[76] Isidore of Seville, *Etymologiae* 13.1.

[77] Idem, *De rerum natura* 9.1.

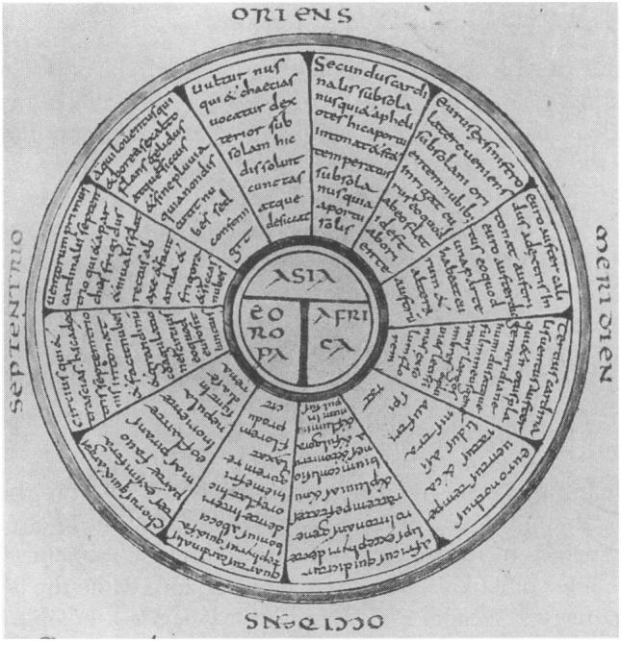
[78] Idem, *Etymologiae* 13.11.3.

[79] There are thirteenth- and fourteenth-century Byzantine copies of a zonal map surrounded by ten winds that includes the *oikoumene* in the northern hemisphere; the map has been dated between the first and third centuries A.D. by Otto Neugebauer: "A Greek World Map," in *Hommages à Claire Préaux: Le monde grec,* ed. Jean Bingen et al. (Brussels, 1975), pp. 312–17, pl. III (Venice, Biblioteca Nazionale Marciana, MS gr. 314, fol. 222v). See Dilke, *Greek and Roman Maps,* illus. 29.

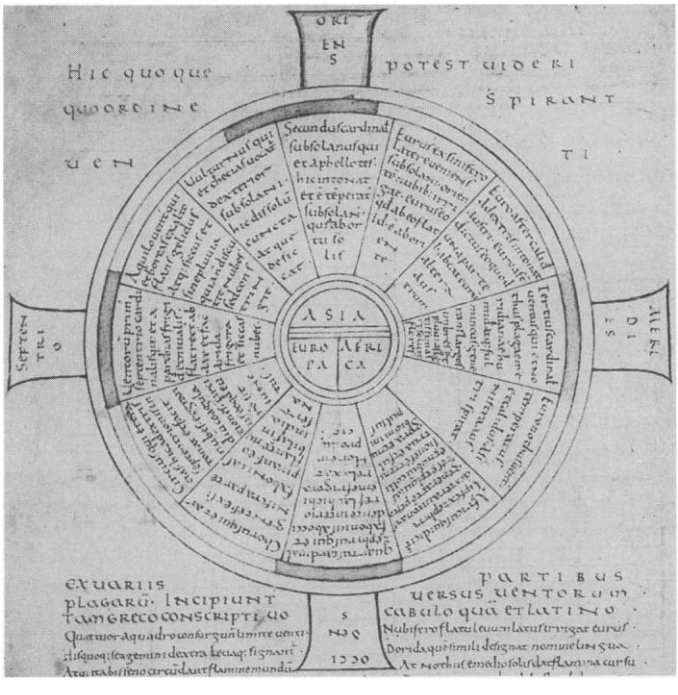
[80] R. A. B. Mynors, *Cassiodori Senatoris Institutiones* (Oxford, 1937), pp. xxx and xxxix.

[81] Text and drawings have been published by Mynors as appendix A.

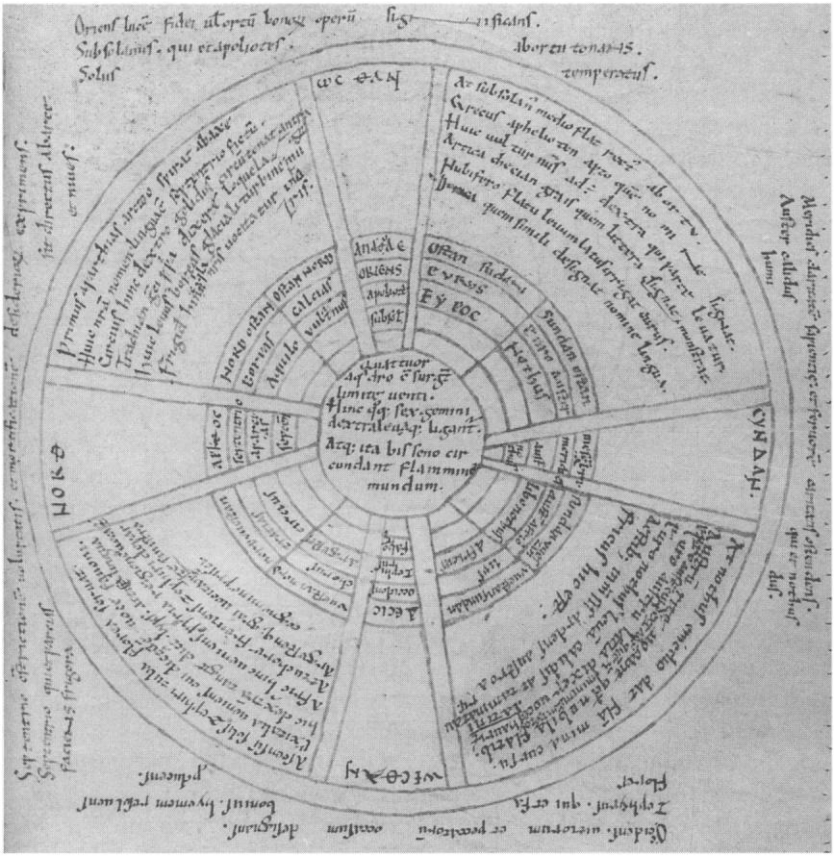
[82] Troncarelli (*Boethiana aetas,* pp. 58–59) thinks that the wind diagram is of ancient origin, the Isidorian text being a mere "interpolation." However, to consider the poem "Quatuor a quadro consurgunt limite venti" as Isidore's source is a rather questionable assumption, for it is quite possible that the poem is posterior to Isidore's text; see Pascal, *Letteratura latina,* p. 35.



9. Bern, Burgerbibliothek, MS 212/I, fol. 109r (detail), first third of the ninth century.
(From Homburger, *Die Handschriften,* illus. 74.)



10. Berlin, Staatsbibliothek, MS Phill. 1830, fol. 3v (detail), ninth–tenth century.



11. Computistical miscellany, beginning of the eleventh century. Dijon, Bibliothèque municipale, MS 448, fol. 75r (detail).

ninth century, from the Mainz cathedral school),[83] may serve as a representative example of this type (Fig. 9). Within its twelve sectors, the diagram encloses the names of the winds together with the beginnings of the corresponding Isidorian paragraphs on their characteristics (*De rerum natura* 37.1–4). The names of the four cardinal directions are placed along the outer circumference of the circle. Following the usual custom, the T-O map in the center is oriented to the east, *subsolanus* being thus promoted to the most eminent place at the top of the circular figure, while the "first wind" of the list, *septentrio,* is relegated to its left side.

A slightly more developed form of the figure with a central map and incorporated Isidorian text, as well as the accompanying poem, is to be found in a computistic miscellany that originated in Reims or, possibly, Laon around 840 (Trier,

[83] Homburger, *Die Handschriften,* pp. 85–86, illus. 74.

Stadtbibliothek, MS 2500, fol. 20r)[84] and in another ninth-century manuscript from Metz (Berlin, Staatsbibliothek, MS Phill. 1830, ninth–tenth century, fol. 3v; Fig. 10).[85] The center again symbolizes the three continents, and the names of the four directions are placed outside of the circle, enclosed in *tabula ansata*-like projections. The diagram is surrounded by the following caption: "Here can be seen in what order the winds blow from the different parts" ("Hic quoque potest videri quo ordine spirant venti ex variis partibus plagarum").[86]

The Isidorian text was frequently made part of the diagrammatic structure, with the short wind poem occasionally added. In these cases the initial part stating that winds rise from the four corners of the world and surround it with a twelvefold blast is placed in the central medallion, while the rest of the text is distributed within the surrounding sectors. A fine version of this type has been copied into Dijon, Bibliothèque municipale, MS 488, fol. 75r (Fig. 11).[87] In this eleventh-century diagram the cardinal directions, which are designated by the letters of Adam's name, are provided with allegorizations of the four parts of the world.[88]

From the ninth century on, wind diagrams with central T-O maps were quite frequently extended to include information on tides, thus becoming the so-called tidal *rotae*. Around the T-O map and twelve-wind sectors are laid three rings with divisions of the lunar months, the repeated word *aqua*, and the tidal cycles; four medallions with more information are at the outer diagonal corners.[89]

As can be seen from these few examples of wind diagrams with T-O maps, the central medallion has an obvious topological dimension. But again, despite the fact that the winds are related to the surface of the *oikoumene* as circumscribed by the inner circle, their location with respect to the other parts of the universe remains undetermined. Also, it is unclear whether one is to take the central T-O map as a designation for the whole diagram, parallel to the *mundus-kocmoc* type, or as confined to the inner circle. If the latter is the case, two interpretations of the surrounding portion are possible: either it is simply a circular list of names placed around the horizon, meant as an aid in associating the names with the diverse parts of the universe, or it is intended to suggest that the winds extend through some kind of space around the earth. Without some prior knowledge the viewer cannot tell from the diagram whether this space is the airy sphere or the

[84] *Karolingische Beda-Handschrift aus St. Maximin, Stadtbibliothek Trier* (Trier, 1990), pp. 14–25, illus. p. 19.

[85] Valentin Rose, *Verzeichnis der lateinischen Handschriften,* 1: *Die Handschriften-Verzeichnisse der Königlichen Bibliothek zu Berlin,* 12 (Berlin, 1893), no. 129; Julius Kirchner, *Beschreibende Verzeichnisse der Miniaturen-Handschriften der Preussischen Staatsbibliothek zu Berlin,* 1 (Leipzig, 1926), pp. 21–30.

[86] The last word is found only in the Berlin manuscript.

[87] Yolanta Zaluska, *Manuscrits enluminés de Dijon* (Paris, 1991), pp. 30–33.

[88] The same figure is in an eleventh-century manuscript of Boethius's *Philosophiae Consolatio* (Kraków, Biblioteka Jagiellońska, MS Berl. 939, fol. 2r), reproduced in Troncarelli, *Boethiana Aetas,* pl. XV b; see pp. 35, 37, 42–43.

[89] For ninth-century examples, see Bober, "An Illustrated Medieval School-Book," fig. 3 (London, British Library, MS Harley 3017, fol. 135r); fig. 13 (Paris, Bibliothèque Nationale, MS lat. 5543, fol. 135v); and pp. 69, 85, and 96. Many later instances might be added, for example, Strasbourg, Bibliothèque Nationale et Universitaire, MS 326, fol. 120v; and Paris, Bibliothèque Nationale, MS lat. 5239, fol. 142r.

whole universe. It is, however, fair to assume that the space was almost automatically associated with the airy sphere, as winds were considered to be meteorologic phenomena occurring between earth and heaven. This point was made explicit by Macrobius, for example, when he set out to prove, with the help of a geometrical figure, that the spherical earth is at the center and the bottom of the universe: rain falls on the earth from every region of the atmosphere ("ex omni aeris parte"). Accordingly, the earth surrounded by the belt of the atmosphere (*orbis aeris*) is represented by two concentric circles.[90]

Wind diagrams devoid of figurative elements give no clue about the relation of the winds to the *oikoumene*. While it was more than clear from both experience and handbooks that winds blow toward the earth, from abstract diagrams the reader could as well have inferred a reverse relation along the lines of the Aristotelian theory of the origin of winds as dry earthly exhalations. Winds could also be supposed to blow in a circular horizontal path around the earth[91] or around the universe. In some cases, as in the Berlin and Trier manuscripts, a written guide for establishing the correlation of earth to winds was added.

Wind Diagrams with Masks

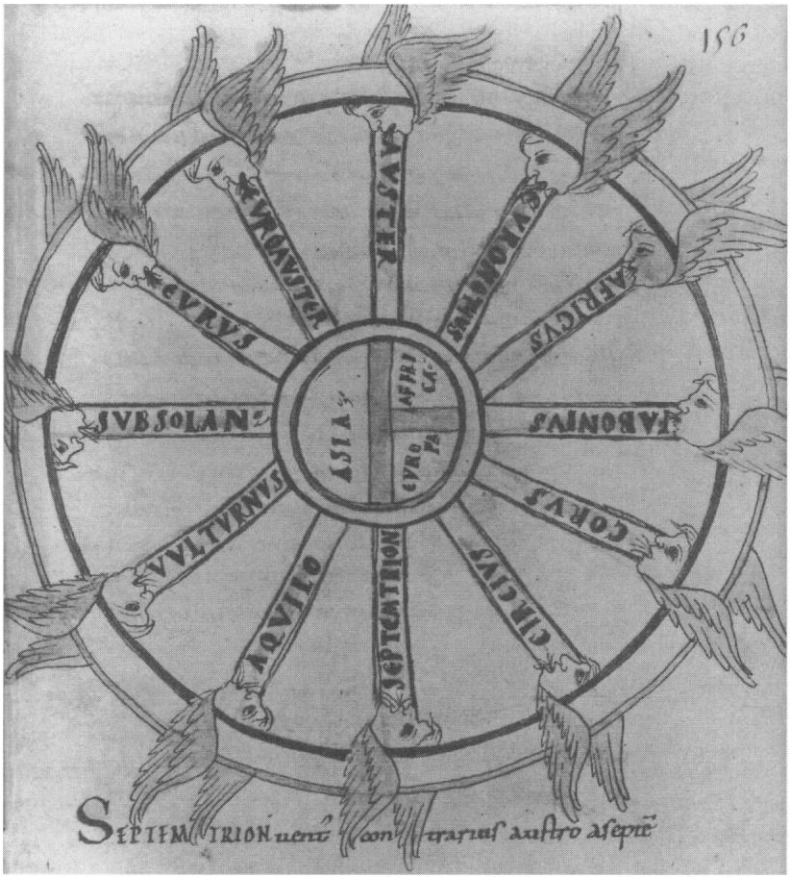
In many instances, the problem of choosing a specific reading of a diagram was resolved in a simple and pleasant way by the insertion of wind masks. When and where this type first appeared is uncertain, but it was widespread in the eleventh century. In the well-known medical miscellany in Paris, Bibliothèque Nationale, MS lat. 7028, wind heads, all depicted in profile, are placed on the outer circle ring on fol. 156r (Fig. 12).[92] One of the wings attached to their necks passes behind the outer circle. The wind names follow the direction of the spikes in such a way as almost to appear to be emitted by the winds.[93] Here the orientation of the T-O map is different from the preceding ones, east being to the left, south at the top. The accompanying, rather corrupt chapter, "De ventorum virtutibus vel naturis," is interesting in that it presents a remote echo of the wind diagram of the Aristotelian tradition, which is construed on the basis of diametrically opposed wind

[90] Macrobius, *Commentarii in Somnium Scipionis* 1.22.8–13, with drawing.

[91] In a passage that was sufficiently obscure to provoke many differing comments, Aristotle discusses the different directions of the winds and their relation to the earth in *Meteorologica* 2.4 (361a 23–361a 36): "Winds blow horizontally; for though the exhalation rises vertically, the winds blow round the earth because the whole body of air surrounding the earth follows the motion of the heavens. So one might raise the question whether winds originate from above or below, for their movement is derived from above. . . . But since a wind is a body of dry exhalation moving about the earth, it is clear that though their motion takes its origin from above, the material from which they are produced comes from below."

[92] Ernest Wickersheimer, *Les manuscrits latins de médecine du haut moyen âge des bibliothèques publiques de France* (Paris, 1966), no. lxvi.

[93] In an early-twelfth-century manuscript in the British Library, Cotton Tiberius E. IV, fol. 30r, the twelve winds do emit the words designating their action. *Vulturnus* says, "omnia dessicco"; *aquilo,* "constringo nubes," and so on. See Bober, "An Illustrated Medieval School-Book," fig. 6.



12. Medical miscellany, eleventh century.
Paris, BN, MS lat. 7028, fol. 156r.

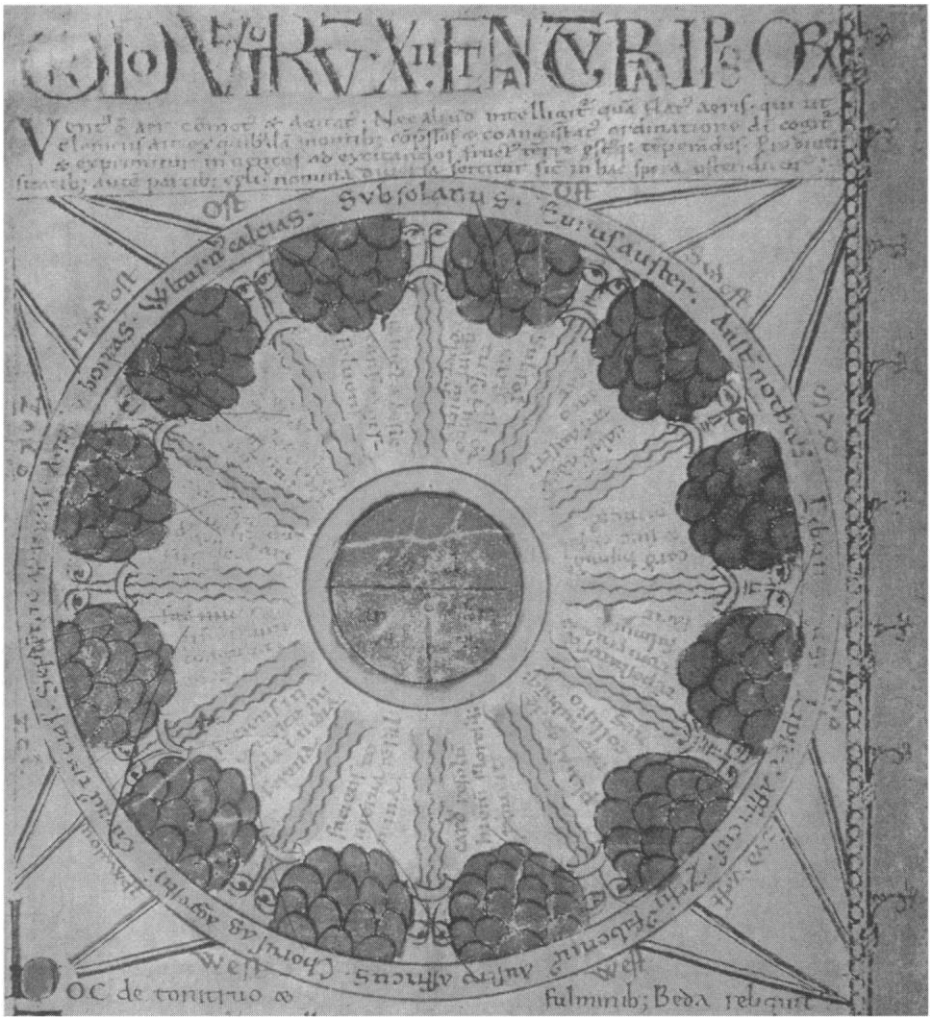
locations. It begins thus: "Circius dextram ramusculus septentrionis contrarius est euronoster. . . ."[94]

There exists another document from the monastic world in which some elements of the Peripatetic meteorologic tradition can be traced, namely, the diagram with wind masks in the Ghent manuscript (ca. 1120) of Lambert of Saint-Omer's voluminous encyclopedia, *Liber floridus* (Ghent, Universiteitsbibliotheek, MS 92, fol. 24r; Fig. 13).[95] Twelve (approximate) three-quarter circles protrude from the outer circle, corresponding to those found in a diagram accompanying the Greek commentary on Aristotle's *Meteorologica* by Alexander of Aphrodisias (A.D. 189–211) in Milan, Biblioteca Ambrosiana, MS E 93 sup., fol. 263r (Fig. 14).[96] These,

[94] Cf. Aulus Gellius, *Attic Nights* 2.12–15.

[95] *Lamberti Liber floridus,* facsimile ed. (Ghent, 1968). On the intellectual context, see the *Liber floridus Colloquium,* ed. Albert Derolez (Ghent, 1973).

[96] The commentary was translated into Latin by William of Moerbeke (A. J. Smet, *Alexandre*



13. Lambert of Saint-Omer, *Liber floridus,* ca. 1120. Ghent, Universiteitsbibliotheek, MS 92, fol. 24r (detail).

as well as the central compass circle, are missing in most of the Greek manuscripts of Aristotle's text.[97]

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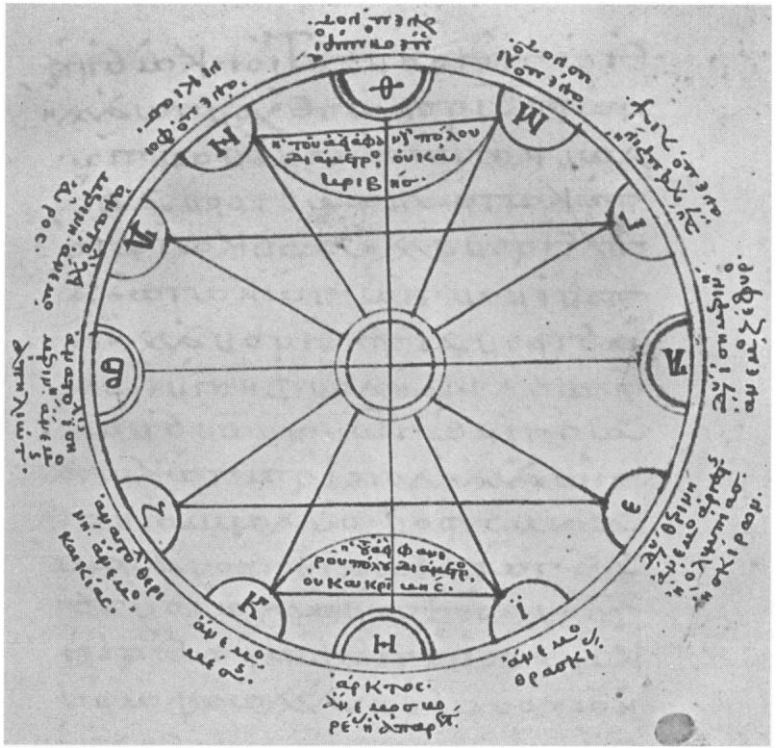
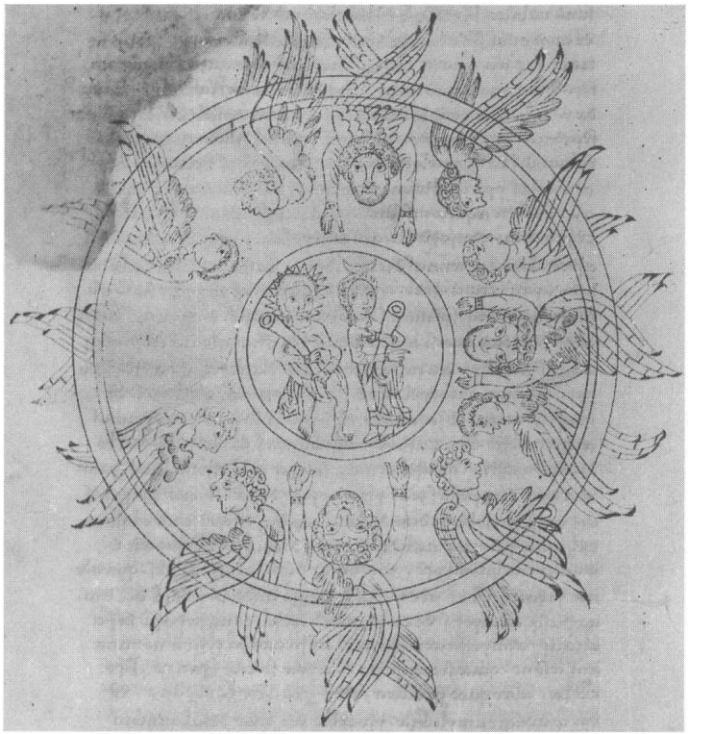
d'Aphrodisias, Commentaire sur les Météores d'Aristote [Louvain and Paris, 1968]). For schemata, see Stückelberger, *Bild und Wort,* illus. 5 (Vatican Library, MS Vat. gr. 1027, fol. 243r), and "Aristoteles illustratus," p. 137, illus. 5a. See also Charles Graux and Albert Martin, "Figures tirées d'un manuscrit des Météorologiques d'Aristote," *Revue de philologie* 24 (1900), 5–18, at pp. 13–14, pl. III. As pointed out by P. Louis (ed. and trans., *Météorologiques* [Paris, 1982], p. xxxiv), the manuscript these authors discuss but do not name is Salamanca, Biblioteca universitaria, MS 2747 (twelfth century).

[97] For a discussion of the *Meteorologica* manuscripts, see Louis's edition. The oldest one dates from



14. Aristotle, *Meteorologica,* with the commentary by Alexander of Aphrodisias, twelfth century.
Milan, Biblioteca Ambrosiana, MS E 93 sup., fol. 263r (detail).



15. Computistical miscellany with works of Bede, mid-eleventh century.
Cava dei Tirreni, Abbazia della Santa Trinità, MS 3, fol. 198v (detail).

In the Greek manuscripts of Alexander's commentary, the half circles obviously symbolize the sectors from where the twelve winds blow. In the Lambert figure the corresponding shapes are colored in blue and provided with undulating lines. The thus modified figures seem to be a mimetic reflection of wind, made in analogy to water, that is, that wind is agitated or flowing air. Above Lambert's wind diagram can be read the corresponding definition (followed, in this case, by an allegorization): "Ventus est aer commotus et agitatus. Nec aliud intelligitur quam flatus aeris. . . ." The interval between the central circle (the green earth) and the outer circle is clearly meant to be an airy space. The diagonals, which in the Aristotelian diagram are geometric devices instrumental in determining the location of winds, are here interpreted as blasts of wind directed toward the central earth and have been moved to the wide-open mouths of wind masks.

Before turning our attention to wind diagrams with rectangular central parts, a less widespread but nevertheless interesting eleventh-century type with wind masks should be mentioned in which the central circle refers neither to the world as a whole nor to the *oikoumene* but to superior cosmic ruling principles, namely, the sun and the moon (Cava dei Tirreni, Abbazia della Santa Trinità, MS 3, fol. 198v; Fig. 15).[98] Here the shoulders of the four cardinal winds are provided not only with wings but also with arms, in such a way that they seem to plunge toward the central part. This type, which originated in southern Italy, also includes (as in an eleventh-century Bari Exultet roll) Christ-Logos as the supreme ruling principle.[99] Yet another treatment of the central circle may be noted in a twelfth-century variant of the Cava illustration in Madrid, where we find halfway diabolic creatures, namely, sirens.[100]

Central *Mundus* and *Oikoumene* Rectangles

Like the circular central parts of wind diagrams, those of a rectangular or square form refer either to the world, *mundus,* or to the surface of the earth, or to both. One variant of these has been integrated into a figure illustrating the hiemal, estival, and equinoctial courses of the sun by way of three curves linking the respective rises to settings. Integrated into a series of astronomical figures, the drawing circulated from at least ca. 800 on,[101] while its geographic and meteoro-

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the ninth century (Vienna, Österreichische Nationalbibliothek, MS phil. gr. 100). See also Stückelberger, *Bild und Wort,* illus. 3 (Paris, Bibliothèque Nationale, MS gr. 1853, fol. 152v); and *Museum Helveticum* (1993), illus. 5b (Vienna, Österreichische Nationalbibliothek, MS phil. gr. 100, fol. 118r).

[98] Mario Rotili, *La miniatura nella Badia di Cava,* 2 vols. (Naples, 1976), 1, no. 1.

[99] Ibid., p. 24, fig. 3.

[100] Madrid, Biblioteca Nacional, MS 19, fol. 120r (twelfth century). See *Inventario general de manuscritos de la Biblioteca Nacional,* 1 (Madrid, 1953); and A. Cordoliani, "Un manuscrit de comput ecclésiastique mal connu de la Bibliothèque nationale de Madrid," *Revista de archivos, bibliotecas y museos* 57 (1951), 5–35.

[101] For example, Basel, Universitätsbibliothek, MS F III 15a, fol. 19v (ca. 800, from Fulda), with the following text in the central medallion: "Hoc modo solis cursus hiemalis et aequinoctialis et estivus designatur"; and Cologne, Dombibliothek, MS 83 II (ca. 800), fol. 81v. For the latter see Anton von Euw, "Die künstlerische Gestaltung der astronomischen und komputistischen Handschriften des Westens," in *Science in Carolingian Times,* ed. Butzer and Lohrmann, pp. 251–69, illus. 10.

logic expansion is to be found in manuscripts from the tenth century on, either isolated or in association with various texts.

Both variants are reproduced on the same folio in a tenth-century computistic compendium from western France (Strasbourg, Bibliothèque Nationale et Universitaire, MS 326, fol. 118v; Fig. 16).[102] In the upper figure, the winter and summer tropics are related in such a way as to form the corners of a rectangle, *mundus,* but the names of the twelve winds are not yet included. The figure is oriented to the east, the three curves symbolizing the courses of the sun above the horizon being on the right side of the *mundus* rectangle.

The computistical miscellany in Dijon, Bibliothèque municipale, MS 448, reproduces on fol. 74r a more developed figure of this type: a second, innermost rectangle encloses the words *mundus, asia, europa,* and *affrica* (Fig. 17). The names of the winds are placed between this rectangle and the outer one, the corners of which are determined by the summer and winter settings and risings of the sun. We thus have a rectangular map of a long-established Greek cartographic type.[103]

That the outer rectangle is meant to refer to *mundus* as a whole is confirmed by variant examples in which the surface of the *oikoumene* and the all-encompassing world are differentiated into two distinct central units, namely, a T-O map inscribed into a square designated as *mundus.* This arrangement occurs in (at least) two manuscripts, the early-eleventh-century copy of the ninth-century Leiden Aratus (Boulogne-sur-Mer, Bibliothèque municipale, MS 188, fol. 30r)[104] and another eleventh-century manuscript, from St. Maximin in Trier (Trier, Stadtbibliothek, MS 1084/115 4°, fol. 99r; Fig. 18).[105] Diagonals linking the corners of the square to the outer circle divide the intermediate space into four main parts, which, in turn, are subdivided into three sectors, the cardinal winds occupying the middle sectors. The total of twelve sectors is filled with the Isidorian text on winds. A caption placed along the inner upper and lower sides of the square specifies that the world has four angles and four different parts ("Mundus iiii angulos habet et iiii partes diversas"). Here is introduced the temporal, calendric dimension, which, surprising as it may seem, is missing in most wind diagrams: around the square are placed the names of the months. To the cardinal directions on the outside of the figure are added captions referring to the side winds: *Huic dexter, Huic sinister.*[106]

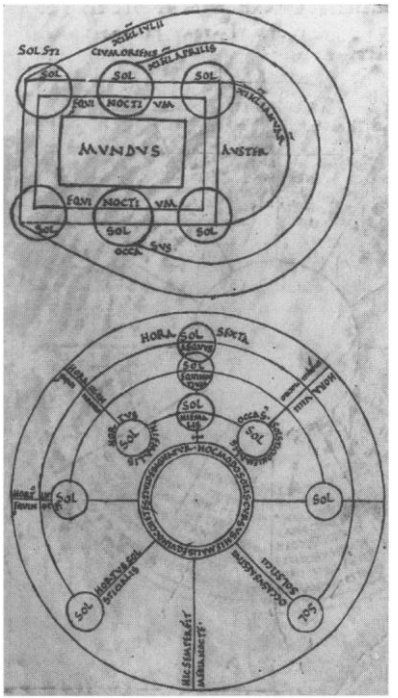
[102] The text surrounding the central medallion in the lower diagram is the same as in Carolingian schemata: "hoc modo solis cursus hiemalis equinoccii et estivi designatur."

[103] Cf. Strabo, *Geography* 1.2.28, referring to Ephorus (G. Aujac, ed. and trans., *Strabon, Géographie,* 1/1 [Paris, 1969], pp. 195–96); and Cosmas Indicopleustes, *Christian Topography* 2.80 (Wanda Wolska-Conus, ed. and trans., *Cosmas Indicopleustès, Topographie chrétienne,* 1 [Paris, 1968]).

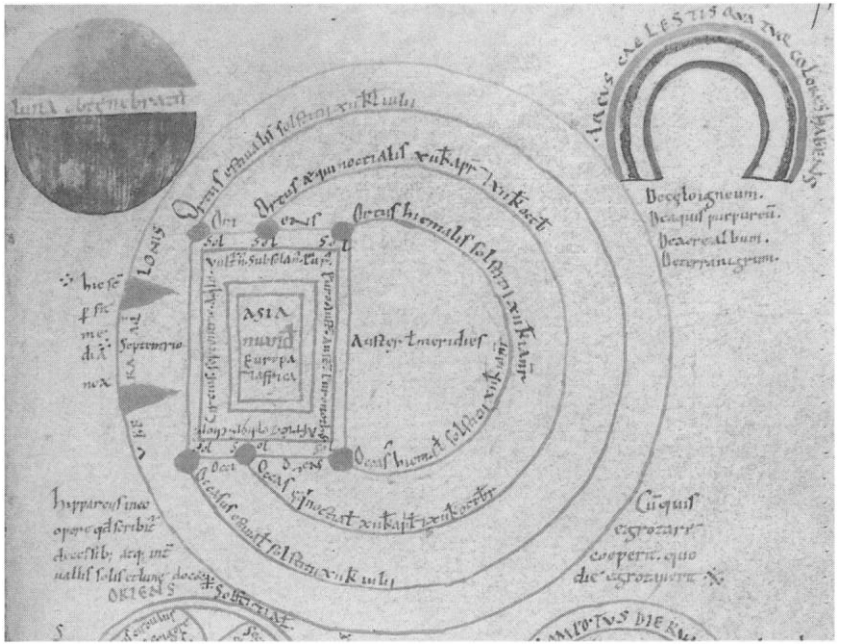
[104] Here, the representation of the planetary spheres and the zodiac has circular figures at its four diagonal corners. The wind figure is at the lower right corner. See Hans Georg Gundel, *Zodiakos: Tierkreisbilder im Altertum* (Mainz, 1992), cat. no. 432; and *Aratea: Kommentar zum Aratus des Germanicum Ms. Voss. lat. Q. 79,* Bibliotheek der Rijksuniversiteit Leiden, 2 vols., facsimile ed. (Lucerne, 1989), illus. 6.

[105] *Karolingische Beda Handschriften,* no. 33, illus. p. 63.

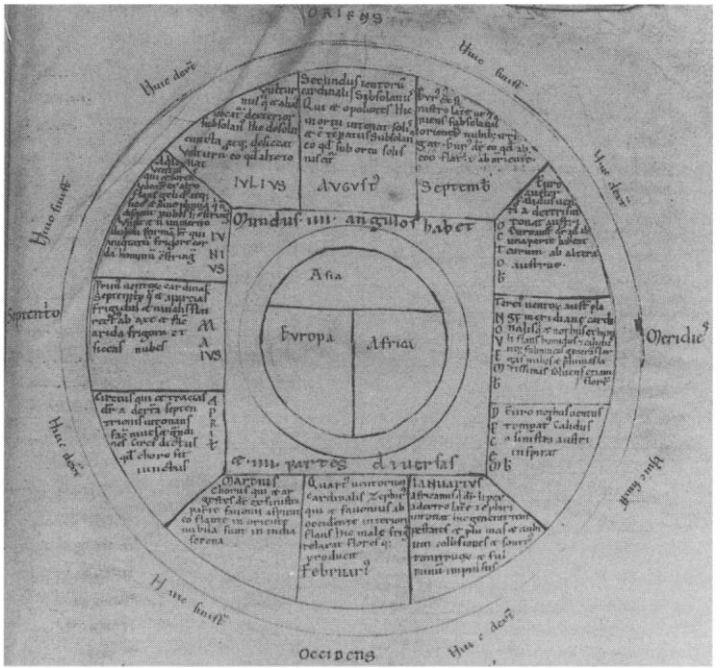
[106] In Dijon, Bibliothèque municipale, MS 448, fol. 74v, the square is omitted but alluded to by an altered form of the above-quoted phrase in a caption running around the *orbis* medallion: "Mundus quatuor angulos habet et partes tres divisas." The cardinal directions are provided with the same spiritual interpretations as on fol. 75r.

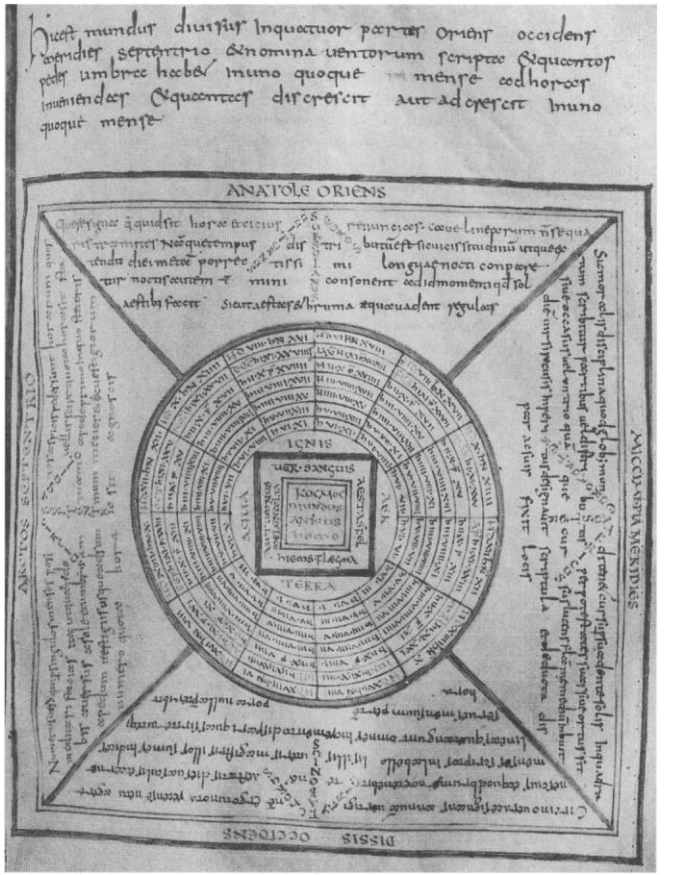


16. Computistical miscellany with works of Bede, tenth century.
Strasbourg, Bibliothèque Nationale et Universitaire, MS 326, fol. 118v.



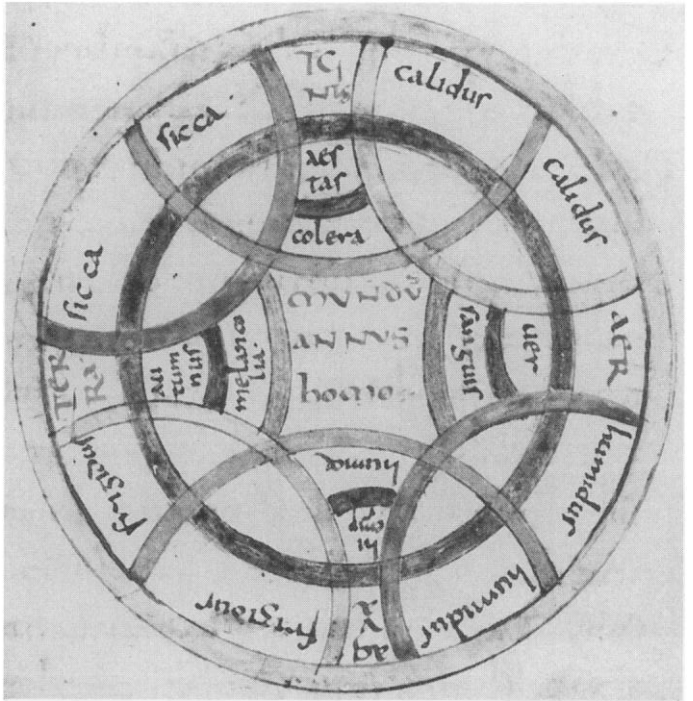
17. Computistical miscellany, eleventh century.
Dijon, Bibliothèque municipale, MS 448, fol. 74r (detail).



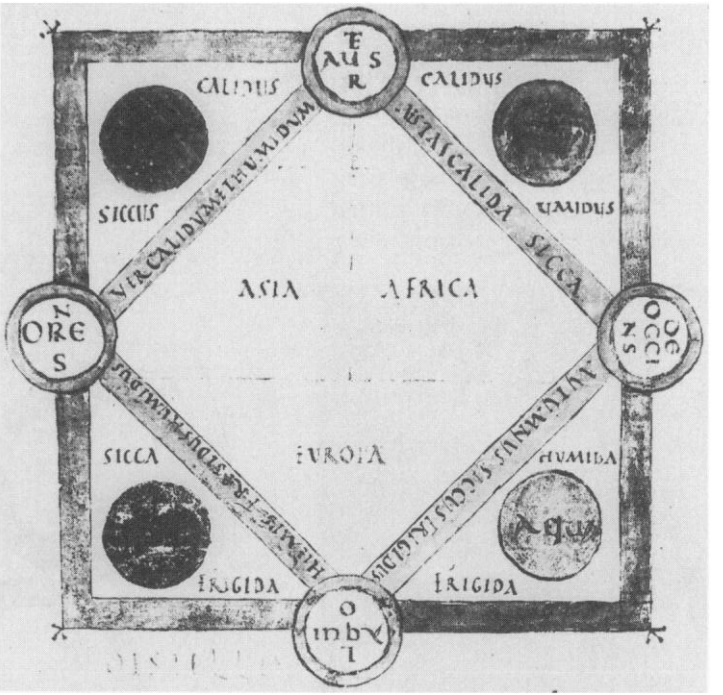


18. (*Top*) Trier, Stadtbibliothek, MS 1084/115 4°, fol. 99r (detail), eleventh century.
(From *Karolingische Beda-Handschrift aus St. Maximin,* p. 63.)

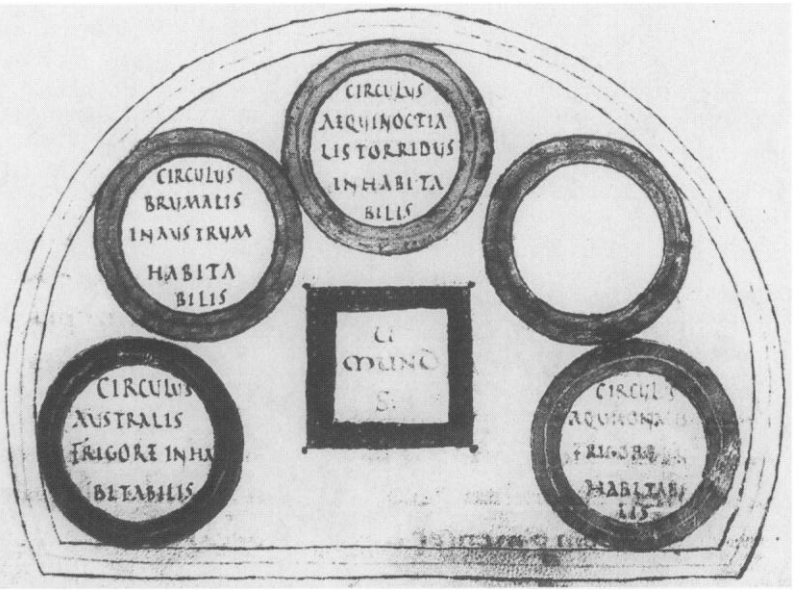
19. (*Right*) Computistical miscellany, ca. 800.
Cologne, Dombibliothek, MS 83 II, fol. 84r.



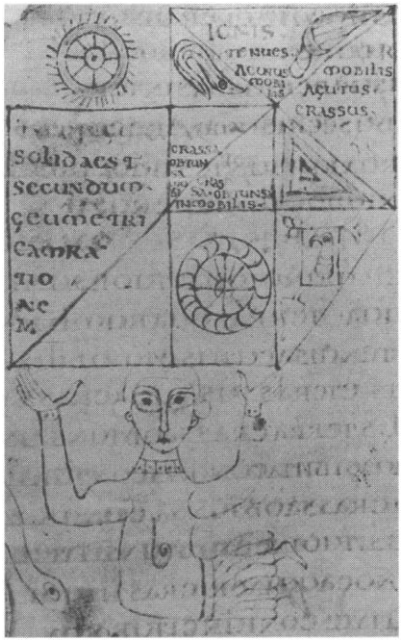
20. Isidore of Seville, *De rerum natura,* end of the eighth century.
Munich, Bayerische Staatsbibliothek, clm 16128, fol. 16r (detail).



21. Computistical miscellany, ca. 818.
Vienna, Österreichische Nationalbibliothek, MS 387, fol. 134r (detail).



22. Computistical miscellany, ca. 818.
Vienna, Österreichische Nationalbibliothek, MS 387, fol. 133r (detail).



23. Isidore of Seville, *De rerum natura,* eighth century.
Paris, BN, MS lat. 6413, fol. 4v (detail).
(From *Gazette des beaux-arts* 102 [1960], 25, fig. 8.)

A complete reversion of the sequence circle-square-circle is represented by a second wind diagram in the above-mentioned computistical miscellany in Cologne Cathedral Library, MS 83 II, fol. 84r (Fig. 19). Here the whole figure and the innermost part are squares; in between is a circle. The explanatory text above the diagram again refers to the square in terms of the world divided into four parts. In addition, it mentions the names of the winds and the length of the shadow in each month: "Hic est mundus divisus in quatuor partes oriens occidens meridies septentrio et nomina ventorum scripta et quantos pedes umbra habet in unoquoque mense ad horas inveniendas et quantas discrescit aut adcrescit in unoquoque mense." Again, diagonal lines set apart the four quarters. That not only the outer but also the inner square of the Cologne diagram symbolize *mundus* is made clear by the central caption, "Kocmoc-mundus-annus-homo." Indeed, the central part of this diagram is an altered form of the Isidorian *mundus-annus-homo* wheel,[107] which has the microcosm in the center of the greater world, the macrocosm (Fig. 20).

With this combination of square and circular forms we are far removed from mere circular lists of names of winds and mere compass cards. The introduction of the square does not, however, facilitate the reading of wind diagrams, although, per se, its function seems obvious enough: in parallel to the circle, it symbolizes the surface of the earth and the world in its spatial extension. This can be observed in other schemata of major contemporary computistic compendia. In the Vienna and Munich sister manuscripts of the so-called Carolingian encyclopedia, in its third revision probably made in 818 by Arn, archbishop of Salzburg,[108] the three continents of the *oikoumene* are somewhat awkwardly squeezed into a square the angles of which are related to the cardinal points (Vienna, Österreichische Nationalbibliothek, MS 387, fol. 134r; Fig. 21).[109] The "T" within this square having been reversed, with Europe below the crossbar and Asia on the left, the bottom of the "T" points to the south at the top. This *orbis quadratus* map has on its sides the names of the seasons and of their respective qualities and is circumscribed by a second square. Inside the four corners of the outer square are the names of the four elements and their qualities. In the same manuscripts the square lying on its side is surrounded by five zonal circles, which are projected on the surface. Here the square is designated as the world (Vienna, Österreichische Nationalbibliothek, MS 387, fol. 133r; Fig. 22).

Obviously, the function of the square with its angles related to the cardinal points is to introduce directional differentiations and to designate the four parts

[107] Isidore, *De rerum natura* 11.2–3.

[108] See the important recent study by Arno Borst, "Alcuin und die Enzyklopädie von 809," in *Science in Carolingian Times,* ed. Butzer and Lohrmann, pp. 53–78, esp. pp. 73–74.

[109] The Munich diagram is on fol. 132v of Bayerische Staatsbibliothek, clm 210. See Fritz Saxl, *Verzeichnis astrologischer und mythologischer Handschriften des lateinischen Mittelalters,* 2: *Die Handschriften der National-Bibliothek in Wien* (Heidelberg, 1927), pp. 79–82; Georg Swarzenski, *Die Salzburger Malerei von den ersten Anfängen bis zur Blütezeit des romanischen Stils* (Leipzig, 1913; repr. Stuttgart, 1969), pp. 13–21; H. J. Hermann, *Die frühmittelalterlichen Handschriften des Abendlandes,* Beschreibendes Verzeichnis der illuminierten Handschriften in Österreich 8/1 (Leipzig, 1923), no. 43, pp. 145–52; Marcel Destombes, *Mappemondes, A.D. 1200–1500* (Amsterdam, 1964), pl. H; and Bierbrauer, *Die vorkarolingischen und karolingischen Handschriften,* no. 135, pp. 72–75.

of the earth.[110] But the presence of the square symbolizing the world in its spatial extension remains to be explained. In the Vienna, Munich, and second Cologne wind diagrams, the sides of the square are related to the four elements, and one is therefore led to suppose that this *mundus* icon refers to the four elemental parts of the body of the world. This figure is indeed a residual form of a cube that had been used in Neoplatonic commentaries on the *Timaeus* to illustrate the combination of the Platonic geometric elementary shapes within the cosmic sphere. Commentators on the *Timaeus* had been confronted with the problem that the Platonic conception of the composition of the world did not allow for change because the geometric shapes of the elements could not readily be combined. They tried to resolve the problem by attributing three qualities to each of the three-dimensional elementary bodies and their diverse geometric shapes (e.g., fire is thin, acute, and mobile). The transformation of the elements into one another took place by way of changing combinations of the various qualities. Put all together, the four elements were supposed to form a cube.[111] In a debased form, the Neoplatonic elementary solid was transmitted to the Middle Ages by Isidore's *De rerum natura*[112] (Fig. 23). As the copyists had become increasingly less capable of drawing a geometric solid, the cube was reduced to a single-plane figure,[113] and in the Carolingian period the square was quite generally used to symbolize the elemental composition of bodies. Combined with the circle, it represented the physical conception of the universe (sometimes including the microcosm) as an elemental solid. It retained the connotation of the solidity of the links between its constituent parts and thus of the stability of the whole structure.[114]

[110] There are contemporary discussions that help understand its function. When interpreting Matt. 24.31, "Emittit angelos suos . . . et congrebabunt a 4 angulos terrae," and trying to reconcile this scriptural statement with others in which the earth is called *orbis,* Rabanus Maurus pointed out that one can learn from Euclid how to inscribe a square within a circle. He then explained that the angles of the square are formed by lines connecting the cardinal points (*De universo* 12.2, PL 111:333 B–C). This specific combination of square and circle can be seen, for example, in the *Majestas Domini* illustration of the eleventh-century Saint-Omer Bible in which Christ rules over the world; see C. R. Dodwell, *The Pictorial Arts of the West, 800–1200* (New Haven, Conn., and London, 1993), illus. 58.

[111] A summary of these theories was transmitted by Calcidius (ca. 400) in his *Commentary on Timaeus,* chap. 20 (J. H. Waszink, ed. [London, 1962]). See also J. H. Waszink, *Studien zum Timaioskommentar des Calcidius* [Leiden, 1964], p. 74, and detailed discussion in Obrist, "Le diagramme isidorien des saisons," pp. 155 ff. For comments on the diffusion of the *Timaeus* in the ninth century, see Rosamond McKitterick, "Knowledge of Plato's 'Timaeus' in the Ninth Century," in *From Athens to Chartres: Neoplatonism and Medieval Thought. Studies in Honour of Eduoard Jeauneau,* ed. H. J. Westra [Leiden, 1992], pp. 85–95; and Michel Huglo, "La réception de Calcidius et des *Commentarii* de Macrobe à l'époque carolingienne," *Scriptorium* 44 (1990), 3–29.

[112] Isidore, *De rerum natura* 11.1, gives a summary in which only the elementary qualities are enumerated; the whole discussion of geometric shapes is left out and is merely alluded to by the caption designating the figure: "haec figura solida est secundum geometricam rationem" (Fontaine, *Traité de la nature,* p. 212 bis).

[113] In the oldest Spanish manuscripts of the *Etymologiae,* the four combined elements are already symbolized by a simple rectangle divided by diagonal lines. See Fontaine, *Isidore de Séville et la culture classique,* pl. III (El Escorial, MS P. I. 6), pp. 410 and 685.

[114] Originally, this latter characteristic had been attributed by Plato to the cubic form of the element earth, *Timaeus* 55D–E and 56D (F. M. Cornford, *Plato's Cosmology: The "Timeus" of Plato Translated with a Running Commentary* [London and New York, 1937; repr. New York, 1957], pp. 216 and

In order to emphasize the idea of the universe in its spatial extension, the time-oriented, circular, Isidorian figure *kocmoc-mundus-annus-homo* (Fig. 20) illustrating the transformation of the four elements as manifest in the macrocosmic seasonal and microcosmic humoral rhythm has been altered to a square in the second Cologne wind diagram (Fig. 19).[115] That it seeks above all to bring to the foreground the structure of the cosmos becomes clear from the way the names of the four elements are arranged: fire (*ignis*) is at the top of the *mundus-kocmoc* square, and earth (*terra*) at the bottom, following an old cosmological tradition ultimately based on Plato's *Timaeus*[116] and especially on Aristotle's *On the Heavens* regarding the opposites light-heavy. In accordance with these fundamental tenets of Greco-Roman cosmology, the arrangement of the diagram has as underlying organizing principles the opposites light-heavy, and not the tangible opposites of hot-cold and dry-wet (as currently used to account for the transformation of the elements, and humoral liquids, one into another). But now, because of the constraints of the diagrammatic arrangement, the incompatibility between the two organizing spatial and temporal sets of premises comes cruelly to the foreground:[117] what were normally considered to be arch-opposites, fire and water, become immediate neighbors.[118]

Thus in the Cologne figure we have again, as in wind diagrams composed of two concentric circles, twelve winds related to the world as a whole. But now the body of the world is clearly differentiated into its constituent temporal as well as spatial parts; moreover, the microcosm is also included. The texts of the wind poems, where winds blow "a quadris partibus orbis," or "quadro sub cardine," or "a quadro limite," have found their iconic equivalent.

The wind diagrams discussed so far are concerned above all with the location of winds in the universe and with their characteristics, rather than with displaying causal connections. The relation of the winds to the four parts of the world is, above all, a topological and directional one: winds are said to rise from the four corners and parts, from the ends of the world, just as they surround it.

But since winds are also related to the world in its elemental constitution and to the four seasons, as well as to the corresponding microcosmic structure, the question of their role within the physical *machina mundi* thus arises: What is the nature of their relation to the elements and to their cycle of change? What about

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225). John Philoponos (first half of the sixth century) discusses the fact that geometers qualify the combination of heaven and earth as a "cube" in relation to Job 38.37–38, and justifies the choice of this apparently strange figure by pointing out that it constitutes the immutable basis of all solid figures. The passages are quoted by Wanda Conus, *La "Topographie chrétienne" de Cosmas Indicopleustès* (Paris, 1962), p. 133. More generally, the theme of stability is frequent in cosmological poetry of late antiquity.

[115] There also exist examples of Isidorian wheels with a central square. See Einsiedeln, Stiftsbibliothek, MS 167, p. 92 (tenth century), in Pressouyre, "Le cosmos platonicien," illus. on p. 560.

[116] Plato, *Timaeus* 31B–32c.

[117] On this never-solved problem in Aristotle's cosmology, see Solmsen, *Aristotle's System,* pp. 363–64, and James Longrigg, "Elementary Physics in the Lyceum and Stoa," *Isis* 66 (1975), 211–29, at pp. 214–15.

[118] In Munich, clm 2655, fol. 105v, the arch-enemies fire and water even hold hands. See Obrist, "Le diagramme isidorien des saisons," illus. 33.

the physical category of force? A priori, one does not know whether winds threaten the stable cosmic order or contribute to maintaining it.

Personifications of Winds

Specifications on the role of winds within the world were introduced by way of personifications. Starting in the early ninth century, with what appear to be copies or adaptations of late-antique models, the naked four cardinal winds are placed along the vertical and horizontal axes of circular figures, their feet converging toward the center. They hold either full-length personifications of the side winds or their heads in the hands of their outstretched arms. The central parts of several of these illustrations are closely related to those of abstract schemata: again we can observe the alternate or combined use of circle and square. These illustrations come with the same texts as the purely diagrammatic figures. However, textual passages within circular figures were replaced by personifications and pushed to the outside, where they again tend to fall into patterns reflecting the disposition of winds in the four parts of the world.

What appear, so far, to be the earliest ninth-century examples are the illustrations in manuscripts of Flavius Josephus's *Antiquitates Judaicae* from St. Gall (Milan, Biblioteca Ambrosiana, MS A 222 inf., fol. 1r; Fig. 24)[119] and Laon (Bibliothèque municipale, MS 422, fol. 5v; Fig. 25).[120] Moreover, an early-eleventh-century variant of the Laon illustration in the Vatican Library appears to be derived from the same pictorial source (Fig. 26).[121] The Laon and Vatican manuscripts are particularly interesting because they include similarly construed representations of the four seasons standing respectively on a central platform of a spatially construed cube—a rarity—(Fig. 27) and on segments of circles.[122]

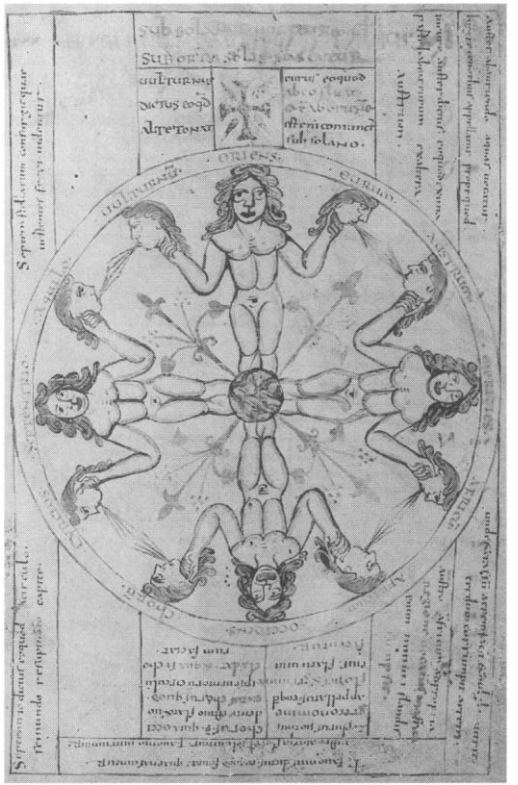
A variant included in the above-mentioned Dijon computistic miscellany (Bibliothèque municipale, MS 448, fol. 80r) also belongs to this group of illustrations (Fig. 28). This illustration is different in that the four cardinal winds (which here lack wings) do not have side winds but instead emit double blasts through trum-

[119] Paolo Revelli, *I codici ambrosiani di contenuto geografico* (Milan, 1929), no. 15, and "Una rosa dei venti del secolo IX," *Bollettino della Società geografica italiana* 47 (1910), 269–79; Renata Cipriani, *Codici miniati dell'Ambrosiana* (Vicenza, 1968), p. 157; Raff, "Die Ikonographie," p. 163, illus. 133, and p. 147, n. 584. See also the description in H. Otte and E. Aus'm Weerth, "Zwei frühmittelalterliche Windrosen," *Römische Quartalschrift* 8 (1894), 295–307, at pp. 301–5.

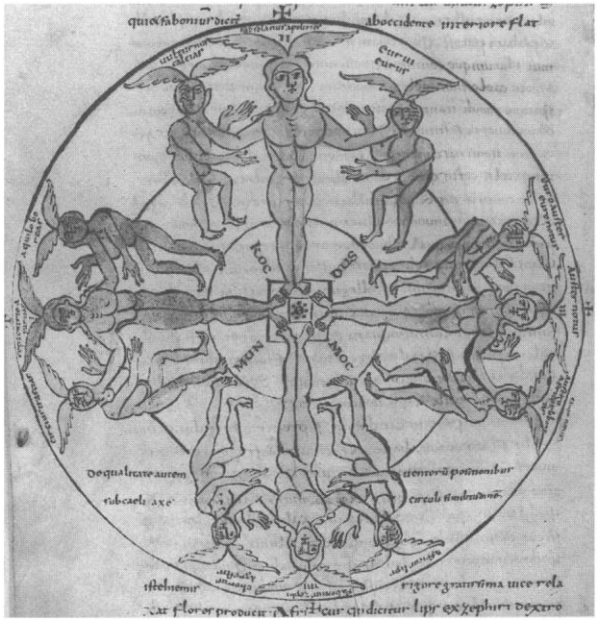
[120] Edouard Fleury, *Les manuscrits à miniatures de la Bibliothèque de Laon étudiés au point de vue de leur illustration,* 2 vols. (Paris, 1863), 1:28, pl. 3b; Otto-Karl Werckmeister, *Irisch-northumbrische Buchmalerei des 8. Jahrhunderts und monastische Spiritualität* (Berlin, 1967), pp. 150–51, illus. 44c; J. Hubert, J. Porcher, and W. F. Volbach, *L'empire carolingien* (Paris, 1968), illus. 176; R. Laufner and P. K. Klein, *Trierer Apokalypse,* 2 vols. (Graz, 1975), p. 98, illus. 46 (according to the authors, the Laon illustration is contemporary with the Trier Apocalypse, ca. 800); Raff, "Die Ikonographie," pp. 133, 147, illus. 114; and A. Dell'Era, "Una rielaborazione dell'Arato latino," *Studi medievali,* ser. 3, 20 (1979), 269–301, at p. 171 (the manuscript is dated 800–830).

[121] L. Delisle, "Notice sur vingt manuscrits du Vatican," *Bibliothèque de l'Ecole des chartes* 7 (1876), 471–527, at pp. 489–90.

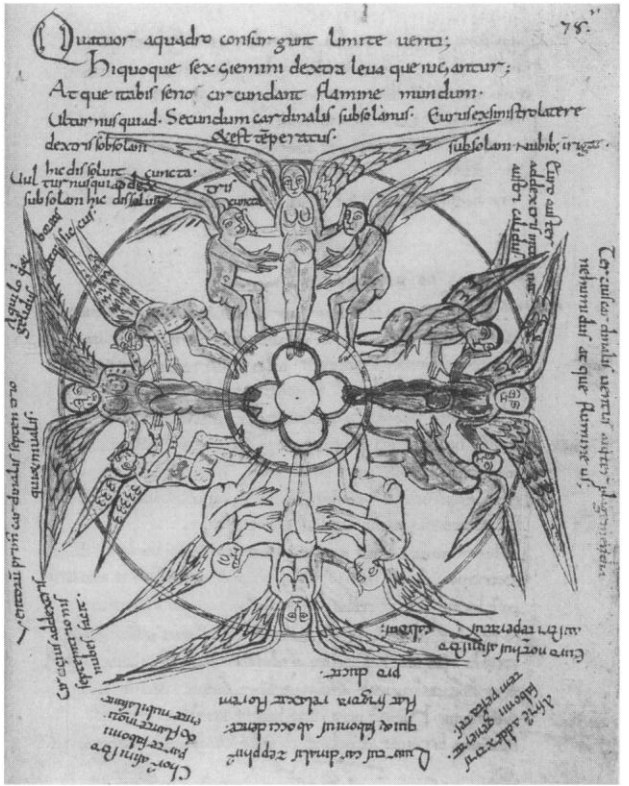
[122] Obrist, "Le diagramme isidorien des saisons," pp. 136 ff.



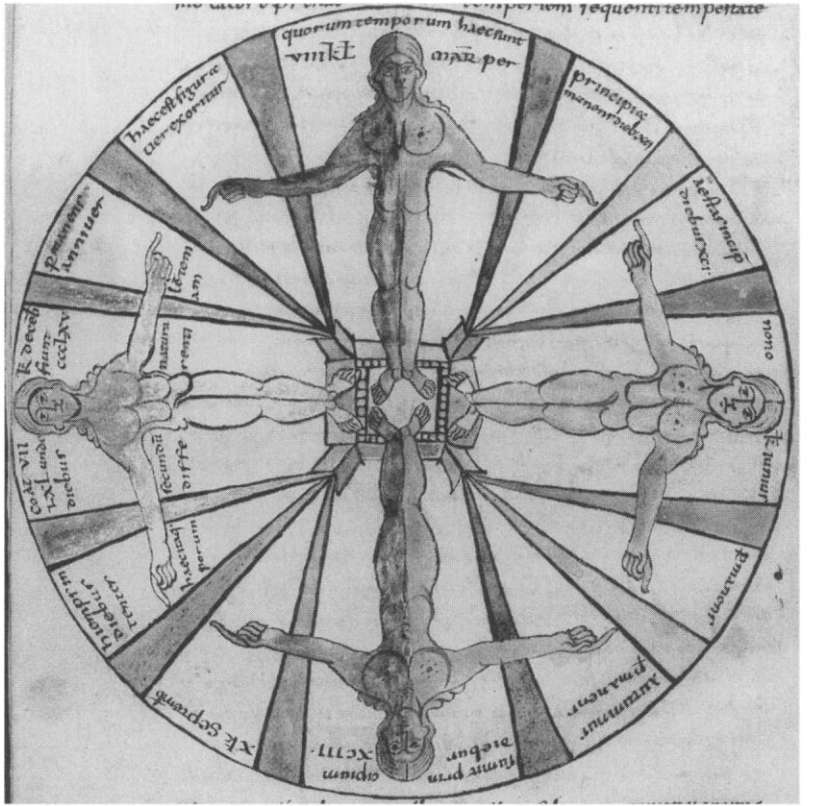
24. Flavius Josephus, *Antiquitates Judaicae,* beginning of the ninth century.
Milan, Biblioteca Ambrosiana, MS A 222 inf., fol. 1r.



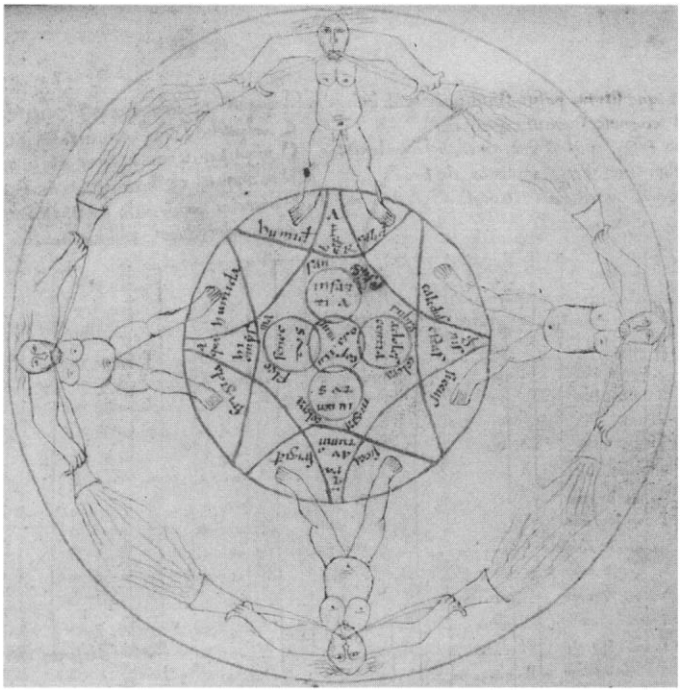
25. Isidore of Seville, *De rerum natura,* beginning of the ninth century.
Laon, Bibliothèque municipale, MS 422, fol. 5v (detail).



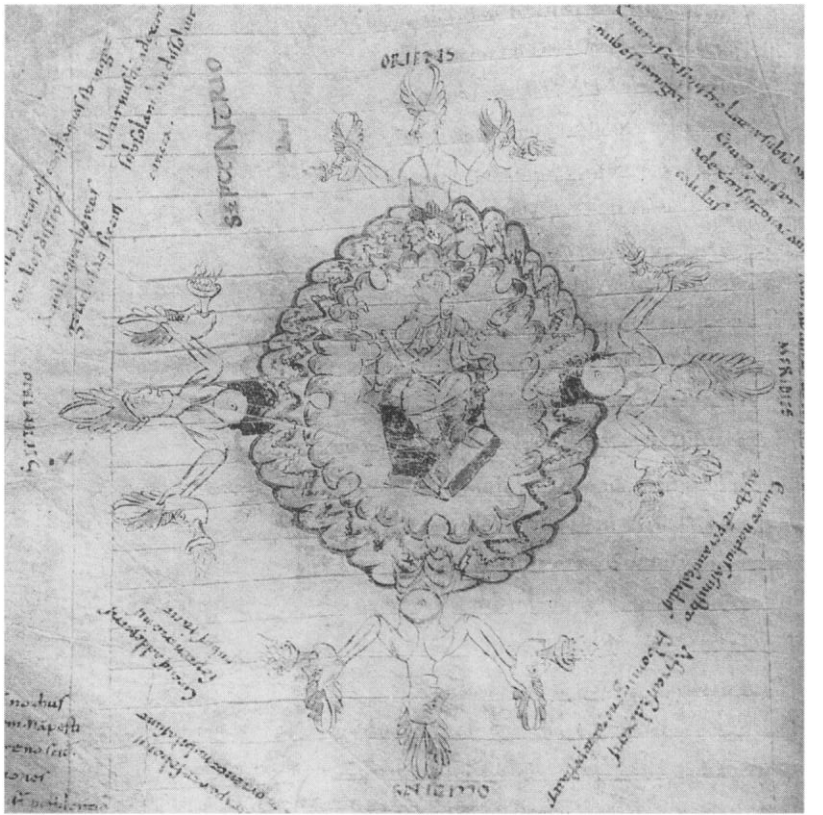
26. Computistical miscellany, eleventh century.
Vatican City, BAV, MS Reg. lat. 1263, fol. 78r.



27. Isidore of Seville, *De rerum natura,* beginning of the ninth century.
Laon, Bibliothèque municipale, MS 422, fol. 6v (detail).



28. Computistical miscellany, eleventh century.
Dijon, Bibliothèque municipale, MS 448, fol. 80r (detail).



29. Alençon, Bibliothèque municipale, MS 12-II, fol. 58v (detail).

pets.[123] Another, very intriguing illustration from the tenth century should be mentioned here because of the motif of the principal and side winds (Alençon, Bibliothèque municipale, MS 12-II, fol. 58v; Fig. 29).[124] It is preceded by the *Versus Platonis de deo.*[125]

All these illustrations are clearly based on ancient models, as can be judged especially from muscle design and hairstyle.[126] However, from antiquity itself, there seem to survive only abstract wind diagrams, carved on marble slabs or on floors. Unlike the Laon and Vatican examples, the side winds are, in most other cases, reduced to heads or busts. In representations of Rev. 7.1 in Spanish manuscripts of the *Commentary on the Apocalypse* by Beatus of Liébana (which might be copied from ancient African models),[127] and in Carolingian Psalter and Apocalypse illustrations (which also include late-antique formulas), the heads of the collateral winds were variously modeled on cut-off heads of enemies proudly displayed by their conquerors, on heads of demons,[128] or possibly even on ancestor busts.[129]

With the exception of the Alençon illustration, these personifications exercise a double action, one being directed toward the central part of the diagram on which they stand, the other directed toward the side. Within that general framework we can observe a number of variations. The center of the Milan illustration (Fig. 24) depicts the green earth into which are sunk the feet of the axial figures. The Laon illustration (Fig. 25) is derived from the Vegetian tradition of wind diagrams: the personifications of the cardinal winds, which here replace their names in the vertical and horizontal axes, stand on a central square; from the corners of the square protrude the words *kocmoc-mundus,* which diagonally divide the enclosing circle into four parts. Even the feet of the personifications form a square, which, in turn, circumscribes a further square with a small central circle surrounded by seven dots. It is difficult to correctly read the imbrications of square and circular forms, but it is fair to assume that the surface the winds stand on symbolizes the *orbis terrarum quadratus.* In the variant representation of the Vatican manuscript (Fig. 26), the artist chose to exclude the angular forms and to locate the winds on segments of circles surrounding a central circle, thus emphasizing the temporal rather than the spatial dimension. The central part of the Dijon picture (Fig. 28) is an only slightly varied form of the Isidorian *mundus-annus-homo* figure: the

[123] On this motif, see Léon Pressouyre, " 'Marcius Cornator': Notes sur un groupe de représentations médiévales du mois de mars," *Mélanges d'archéologie et d'histoire* 75 (1965), 395–473, esp. pp. 400–407.

[124] Colette Jeudy and Yves-François Riou, *Les manuscrits classiques latins des bibliothèques publiques de France,* 1 (Paris, 1989), pp. 21–22.

[125] Riese, *Anthologia Latina,* 1/2, no. 490.

[126] Obrist, "Le diagramme isidorien des saisons," pp. 244–45.

[127] Williams, *The Illustrated Beatus,* p. 36.

[128] For both, see the illustrations to Psalm 51(52) in British Library, MS Harley 603, fol. 29r, in Thomas H. Ohlgren, *Anglo-Saxon Textual Illustration: Photographs of Sixteen Manuscripts with Description and Index* (Kalamazoo, Mich., 1992), illus. 2.50.

[129] Beatus of Liébana (eighth century), *Commentary on the Apocalypse,* Lisbon, Arquivo Nacional da Torre do Tombo, no shelfmark, fol. 118r; dated 1189 (Raff, "Die Ikonographie," illus. 90). See also the Trier Apocalypse, Trier, Stadtbibliothek, MS 31, fol. 21r (Raff, illus. 91).

most general category referred to is man, for the innermost circle has the words *micro-cosmos* displayed crosswise. The legs spread astride of the personified main winds end in four segments of the central configuration. Between their feet the names of the four elements are displayed vertically while the names of the four seasons appear horizontally with the names of the elementary qualities under their feet.

With respect to the inner sections, personified winds placed in the axes represent a superior principle. When these innermost parts symbolize the earth and the world in its spatial extension, the relation is clearly one of domination. Treading on the world divided into four sections is a well-known motif in the domain of imperial and religious symbolism, with the cosmocrator standing or sitting above the universe and the earth.[130] That this motif, which can be seen in the Dijon illustration (Fig. 28), was associated with the exercise of constraining force can be gathered from the sixth-century description of the ceiling decoration of the bathhouse of Gaza, by John of Gaza. On this ceiling were assembled the personified cosmic forces, including four "calm" winds called East, West, South, and North. Referring to the South wind holding back a side wind, he writes that "with legs astride he sets his power in motion."[131] In the comprehensive Dijon diagram the winds appear to dominate over the elemental and humoral transformations as they manifest themselves in the seasonal cycle and the corresponding ages of man.

Things are, however, quite different with the Alençon illustration (Fig. 29), where the center is occupied by a cosmic force superior to winds. Here, a ruler figure, who can be none other than King Aeolus, is seated in an egg-shaped dwelling place in the clouds from which he governs the winds.[132] Designated by the names of the four cardinal directions, *septentrio, oriens, meridies, occidens,* the busts of the winged major winds, seemingly released by their ruler, emerge from the undulating lines symbolizing clouds and possibly also agitated air.[133]

The sideways-directed actions of cardinal winds are also aimed at domination: holding the side winds in their hands, they subdue and control them. This motif recalls the second line of the longer and older wind poem in which each cardinal wind "maintains two companions inferior to it," while in the shorter poem and in the Isidorian chapter the relation is a neutral one. The motif has a further verbal equivalent in the above-mentioned text by John of Gaza. As if conducting a team

[130] Among many other examples, this can be seen in the eleventh-century Saint-Omer Bible, where the feet of the Godhead rest on the circle of the universe including a square the corners of which are related to the cardinal points; see Dodwell, *The Pictorial Arts,* illus. 58, and Bronder (above, n. 8), pp. 192–93 (for older literature on the subject).

[131] Paul Friedländer, ed., *Johannes von Gaza und Paulus Silentiarius: Kunstbeschreibungen justinianischer Zeit* (Leipzig and Berlin, 1912), 1.225–71.

[132] The possible identification of the ruler figure as Aeolus has been suggested by Jeudy and Riou, *Les manuscrits classiques,* p. 21. Cf. Virgil, *Aeneid* 1.52–63, and Lucretius, *De rerum natura* 6.194–203.

[133] For the meteorologic theory of the winds originating in clouds and for Aeolus imprisoning and releasing winds, see above, nn. 24 and 29.

of four horses, the four calm winds restrain four stormy winds, dancing and pawing the air, held in check by their power.[134]

The rigid, frontal position of the main winds conveys a strong impression of immobility. This is antithetically enhanced by the contortions and unstable positions of the collateral winds, the heads, necks, or ears of which are squeezed in the hands of the axial figures. The fact that the main winds are associated with the cardinal axes, and their immobility and frontality, makes it clear that they are superior physical forces, which maintain order by subduing irregular wind currents.

More generally, the very distribution of the cardinal winds is indicative of their ordering function. Following established custom, they are closely associated or identified with the cardinal directions.[135] Indeed, in the Milan and Alençon illustrations, the captions immediately above their heads are those of the cardinal directions. Moreover, the name of *subsolanus* and the text explaining that this wind rises *sub oriente* are added at the outside of the Milan illustration. Although they lack wings, the four axial figures nevertheless have to be understood as winds since they maintain the side winds.

The ordering function of major winds is also directed to the elements and seasons. The nature of the relation of winds to the four elements is alluded to in the longer wind poem, in which winds are said to move the elements in order to avoid their coming to "the same place at the same time." The widely read Hippocratic *On Airs, Places, and Waters* starts out with the recommendation that doctors ought to observe the seasons and the hot and the cold winds, since they influence the humoral equilibrium.[136] Commenting on this tract, Galen specifies that winds have to be observed because "they all change bodies."[137] Thus, from scattered textual bits and from illustrations it becomes clear that the major winds are, above all, regulating and moving forces: they bring about, or prevent, change.[138]

However, in most handbook summaries four (major) winds, four parts of the world, four elements ("bodies"), four seasons, four humors, etc., are correlated without further specification. Thus, in an anonymous medical manual that circulated in the early Middle Ages, and which sometimes bears the promising title *De quattuor ventis et quattuor angulis celi et quattuor corporibus,* all these categories are juxtaposed in an initial phrase; afterwards merely the relation between the seasonal changes and the four humors is discussed.[139]

[134] Friedländer, ed., 1.270–71, pp. 183–84.

[135] Personifications of the four cardinal directions are to be found in Cambridge, Gonville and Caius College, MS 428, fol. 22r (1120–30). See F. Saxl and H. Meier, *Catalogue of Astrological and Mythological Manuscripts of the Middle Ages,* 3: *Manuscripts in English Libraries,* 3/2 (London, 1953), illus. 222.

[136] Kühlwein (above, n. 33), pp. 248 ff.

[137] This text did not circulate in the early Middle Ages but is nevertheless indicative of what must have been more common interpretations. For an English translation and extensive commentary, see Abraham Wasserstein, *Galen's Commentary on the Hippocratic Treatise Airs, Waters, Places, in the Hebrew Translation of Solomon ha-Me'ati* (Jerusalem, 1982), G 3, p. 15.

[138] On this point see further below, p. 77.

[139] Madrid, Biblioteca Nacional, MS 19, fol. 88v, for example, has the title cited above. The text begins thus: "Quattuor sunt venti, quattuor anguli caeli, quattuor tempora. Vernum, aestivum, autumnum et hiems, quattuor humores in humano corpore: colera rubea, colera nigra, sanguis et flegma . . ." (M. Wlaschky, "*Sapientia artis medicinae:* Ein frühmittelalterliches Kompendium der Medizin," *Kyklos* 1 [1928], 103–13).

With respect to texts like these, the advantage of diagrammatic representations is obvious: the diagrams correlate categories in such a way that the reader is immediately able to detect a certain hierarchy, for example, that winds dominate elements and seasons, and not vice versa. The Dijon illustration with personified winds (Fig. 28) is a good example of such a comprehensive, well-structured summary of the relation of winds to the constitutive parts of macro- and microcosm.

In the Dijon diagram winds direct, or have an influence on, the most general manifestation of the cyclical transformation of the elements one into another: the seasons. A number of texts refer to a relation between winds and seasons, sometimes in precise terms, especially in medical and agricultural contexts,[140] more often in vague poetical associations.[141] This relation is the main theme of a beautiful twelfth-century illustration, which, once more, appears to be a copy of an ancient model. It is to be found at the beginning of a Psalter in the Biblioteca Laurenziana in Florence (Fig. 30). Here, *annus* represents the most general category, as its personification occupies the central medallion. The naked four seasons of the year are radially disposed around it,[142] while the twelve winds emerge from the concave corners of the circular figure, a motif that might have been inspired by the opening line of the short wind poem cited above, "Quatuor a quadro consurgunt limite venti." The gusts of the winds lift up the hair of the seasons.

Thus all diagrams with personifications of winds in their axes represent the cardinal winds as the foremost regulators of spatial and temporal cosmic order. Their disposition, attitudes, and actions are related to the physical category of force. This persistent feature of wind diagrams with personifications raises the difficult question of the continuing influence of the Stoic notion of cosmic cohesion and life as ensured by pneuma (conceived either as air or as a mixture of air and fire permeating both the macro- and the microcosm).[143] In opposition to the Platonic and Aristotelian account of cosmic cohesion, the Stoic conception was one of constraining force.[144] The theme of coercive, cosmic pneumatic power was widespread in late-antique cosmological poetry,[145] and theories of the cohesive

[140] In the Hippocratic *On Breaths* 3.3 (J. Jouanna, ed. and trans., *Hippocrate, Des vents, De l'art* [Paris, 1988]), wind, pneuma, or air "is the cause" of winter and summer. On the indebtedness to Anaximenes, see pp. 26 ff. This text was not translated into Latin before the end of the Middle Ages.

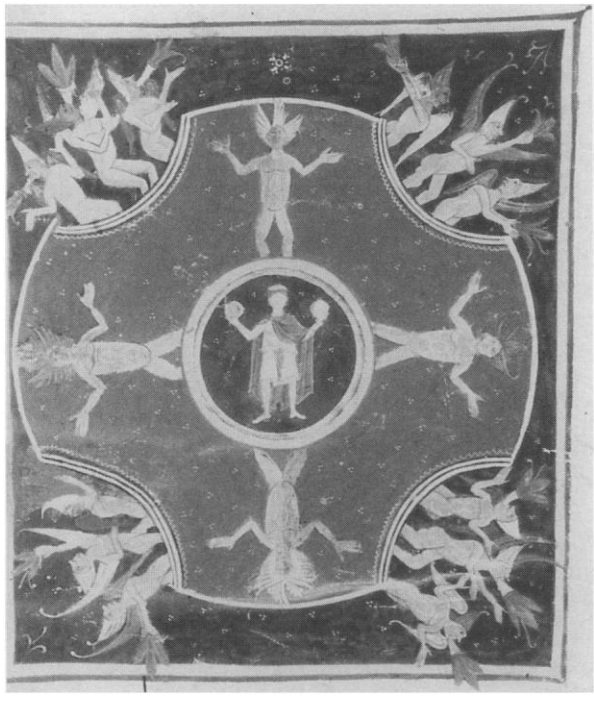
[141] Lucretius, *De rerum natura* 5.737 ff. Here the winds simply come along together with the seasons, as if in a procession.

[142] Paolo D'Ancona, *La miniatura fiorentina (secoli XI–XVI)* (Florence, 1914), pp. 4–5, pl. II; and Knut Berg, *Studies in Tuscan Twelfth-Century Illumination* (Oslo, Bergen, and Tromsoe, 1968), p. 123, cat. no. 21, fig. 148. On the personifications of the seasons, see Obrist, "Le diagramme isidorien des saisons," pp. 102–5 and 126 ff.

[143] The difficulty with Stoic physical notions is the scarcity of sources and their wide assimilation into other cosmological frames. Thus the directive function of pneuma with respect to the elements must once have been a fully developed theory. See Michael Lapidge, "Archai and Stoicheia: A Problem in Stoic Cosmology," *Phronesis* 18 (1973), 240–78, esp. pp. 262 ff.; and H. A. K. Hunt, *A Physical Interpretation of the Universe: The Doctrines of Zeno the Stoic* (Carlton, Australia, 1976), pp. 40–43.

[144] On this issue see Samuel Sambursky, *Physics of the Stoics,* 1st ed. (London, 1959), esp. chaps. 1 and 2.

[145] This has been amply demonstrated by Michael Lapidge, "A Stoic Metaphor in Late Latin Poetry: The Binding of the Cosmos," *Latomus* 39 (1980), 817–37.



30. Psalter, third quarter of the twelfth century. Florence, Biblioteca Laurenziana, MS Plut. 17.3, fol. 1r.

function of air, or *spiritus,* persisted in the period prior to the eleventh and twelfth centuries, and this not only in texts by Cicero and Seneca.[146] Among these are several examples in which pneumatic functions are attributed to winds. The identification of wind with pneuma is not surprising since winds were commonly defined as moved or agitated air, while the cohesive and life-conferring function of pneuma was attributed to the tension (*tonos*) produced by its centripetal and centrifugal movements.[147] These were sometimes called "streams of air" (*pneumata*) and, as such, also *hexis.*[148] The identification of pneuma with wind, obviously made in this context, is reported by Pliny: "wind is the famous 'breath' that

[146] So far, the influence of the physical concepts of only Cicero and Seneca on the cosmology of the twelfth century has been studied. See Michael Lapidge, "The Stoic Inheritance," in Peter Dronke, ed., *A History of Twelfth-Century Western Philosophy* (Cambridge, Eng., 1988), pp. 81–112. The pseudo-Bedan *De mundi constitutione,* for example, would be worth an analysis with respect to the impact of Stoic notions.

[147] Sambursky, *Physics,* pp. 29 ff.; and Lutz Bloos, *Probleme der stoischen Physik* (Hamburg, 1973), p. 66.

[148] See the important pages accompanied by quotations in translation in Hunt, *Physical Interpretation,* pp. 40–43.

generates the universe by fluctuating to and fro as in a womb."[149] Pseudo-Aristotle (or Apuleius) asserts, "For this [wind] is nothing but air moving in quantity and in a mass. It is also called breath-pneuma. In another sense, 'breath' means that substance found in plants and animals and pervading everything that brings life and generation. The breath that breathes in the air we call wind."[150] The much-read poem *De laudibus Dei* by Dracontius (end of the fifth century) attributes to wind—"a spirit without body"—the vivifying function of pneuma in both the macrocosm and the microcosm because of its alternating advancing and receding breath (*flatus*).[151] But on the whole, when one compares pre-twelfth-century textual and pictorial evidence relating to winds as ordering cosmic forces, it becomes clear that the theme was developed in a consistent way on the pictorial level only.

From the early Middle Ages, the dominant tendency in the cosmological handbook literature was to present the functioning of the universe as an immanent mechanism of natural forces. The action of winds, treated as meteorologic phenomena, was confined to the sublunary airy space. In diagrammatic representations of their distribution, characteristics, and actions the emphasis is on the central part of the world, namely, the earth, while the peripheral area where the winds originate remains relatively indeterminate: it is a simple delimiting circle.

Winds in the Twelfth and Early Thirteenth Centuries

In the twelfth century the by then long-established types of wind diagrams continued to be used. What changed was that, in a context of growing interest in theorizing about the relation of nature to the Godhead, the outer circle was sometimes circumscribed by the all-embracing Divine Spirit.[152] In the first part of the twelfth century, other cosmological images were also framed in this way.[153] But the distinctive feature of wind diagrams is that in a combined use of biblical, patristic, and Stoic physical traditions winds were directly related to God. As is

[149] Pliny, *Natural History* 1.116. For parallel passages attributed to Stoic philosophers, see Sambursky, *Physics,* p. 31, and W. Kroll, "Plinius und die Chaldäer," *Hermes* 65 (1930), 1–13.

[150] Pseudo-Aristotle, *On the Cosmos,* 394b 8 ff. (D. J. Furley, ed. and trans. [Cambridge, Mass., and London, 1955]). Apuleius, *Liber de mundo,* ed. Thomas, 10.310.17–21.

[151] Dracontius, *De laudibus Dei* 1.584–99: "Spiritus interea servit sine corpore ventus; / . . . Flatibus alternis redeunt commercia vitae; / itque reditque suos repetendo spiritus haustus . . ." (C. Camus and C. Moussy, eds. and transs., *Œuvres,* 1–3 [Paris, 1985–88]); see Lapidge, "A Stoic Metaphor," p. 831. The phraseology of the whole passage is closely related to medical theory but at the same time emptied of what makes the core of Stoicism, namely, the corporeal nature of pneuma. This is obviously done as a preparation to the following lines, 1.600–603: "Spiritus ille Dei, quo corpora cuncta moventur, omnia complectens agitat fovet inserit urget, / unde genus diversa trahunt et semina rerum."

[152] Stanislaus J. Grabowski, "God 'Contains' the Universe: A Study in Patristic Theology," *Revue de l'Université d'Ottawa* 26 (1956), 9–113 and 165–87; M. Frickel, *Deus totus ubique: Untersuchungen zur allgemeinen Gottesgegenwart im Rahmen der Gotteslehre Gregors des Grossen* (Freiburg, 1956), esp. pp. 86 ff.

[153] As in Cambridge, Gonville and Caius College, MS lat. 428, fol. 10r (ca. 1120–30): Christ circumscribes the cosmic circle composed of the four elements and their respective qualities. A color plate of this unedited illustrated treatise (*Tractatus de quaternario*) is in Danielle Lecoq, "La mappemonde du 'De arca Noe mystica' de Hugues de Saint-Victor (1128–1129)," in *Géographie du monde au moyen âge et à la Renaissance,* ed. M. Pelletier (Paris, 1989), pp. 9–13, fig. 6.

well known, in biblical texts winds act as direct agents of God, carrying out his will, sometimes as messengers, namely, angels,[154] sometimes as spiritual creatures subordinate to angels.[155] They are also intimately associated with the Divine Spirit insofar as the action of the breathlike Word implied movement.[156] In the Stoically oriented perspective of Seneca's *Quaestiones naturales* (5.18.1) Providence has distributed winds so that they "might prevent the air from becoming stagnant and by continual agitation make it wholesome and life-supporting for all that will breathe it." In general they serve as intermediaries between the terrestrial and the celestial in that they "maintain the union of sky and earth."[157] The patristic tradition is of particular importance with respect to my theme in that it assimilated Stoic concepts of pneuma in order to describe metaphorically the action of the incorporeal (and immaterial) Christian Divine Spirit.[158]

In his *De arca Noe mystica* (ca. 1128–29) Hugh of Saint-Victor gives a detailed description of a cosmological diagram circumscribed by Christ.[159] In it, however, winds are still merely natural phenomena among others and are confined to the airy space,[160] but in other textual and pictorial documents of the twelfth century they play a much more prominent role: they permeate the whole universe and are direct instruments of divine will. For example, in the *Liber divinorum operum* (1163–73) Hildegard of Bingen wrote that winds blow either through "natural causes" or through a "special decree of God."[161] According to Hildegard, winds accomplish all inner-cosmic functions of importance—all life-giving and cohesive functions—and in numerous passages she enlarges on the functions of the winds, which the earlier handbooks had merely alluded to in short statements.

On a pictorial level, the closeness of the winds to the Divine Spirit (and Providence) finds topological expression: in three cosmological diagrams of the *Liber divinorum operum* winds emerge, in the form of animal heads, out of a circle in the "upper fire,"[162] located below the outermost, fiery girdle of Spirit. From there, their pneumatic currents (symbolized by lines) traverse the macro- and microcosm

[154] Ps. 103(104).4. Beatus of Liébana, in his *Commentary on the Apocalypse,* identifies winds with angels on the basis of a comparison of Rev. 7.1–3 with Rev. 9.13–15 (H. A. Sanders, ed. [Rome, 1930], p. 430). The text is quoted by Raff, "Die Ikonographie," n. 508.

[155] Rev. 7.1: "Vidi angelos stantes super quatuor angulos terrae tenentes quatuor ventes terrae. . . ."

[156] For example, Acts 2.2. Thus the Spirit moving upon the waters is sometimes depicted in the form of blowing winds, as in Oxford, Bodleian Library, MS Junius 11, frontispice; see Ohlgren, *Anglo-Saxon Textual Illustration,* illus. 16.1.

[157] Seneca, *Natural Questions* 5.18.13, "Dedit ille [god] ventos ad custodiendam caeli terrarumque temperiem. . . ."

[158] Gérard Verbeke, *L'évolution de la doctrine du pneuma du Stoïcisme à S. Augustin* (Paris and Louvain, 1945). See also Marcia L. Colish, *The Stoic Tradition from Antiquity to the Early Middle Ages,* 2 vols. (Leiden, 1985); besides giving a history of patristic conceptions indebted to Stoicism, vol. 2 is especially useful for the sixth century.

[159] Hugh of Saint-Victor, *De arca Noe mystica* (PL 176:700C–702A), discussed by Patrice Sicard, *Diagrammes médiévaux et exégèse visuelle: Le Libellus de formatione arche de Hugues de Saint-Victor* (Paris and Turnhout, 1993).

[160] PL 176:701B–C.

[161] "Natural cause" means, above all, the course of the sun and the corresponding intensity of heat, but also that of the other planets. See Hildegard of Bingen, *Liber divinorum operum* 1, *Visio* 2.29 (PL 197:773C, 769C–D, 791B–C, 797B, 798C–D, etc.).

[162] Ibid., 1, *Visio* 3.1, col. 791A, etc.

(Fig. 31) as a life-sustaining force.[163] In Hildegard's text the theme of winds controlling the four elements is given in the form of a fully developed physical argument of Stoic import: winds move elements through the portions of air contained in each of the elements;[164] likewise, they move and alter the humoral liquids composing the microcosm.[165]

Beyond the Stoic-influenced conceptions of the dynamic, cohesive, life-sustaining function of winds in the macro- and microcosm,[166] Hildegard also expounds the theory that winds are agents of local movement: they move the firmament and the planets.[167] What appear to have originally been pre-Socratic (Anaximenian) doctrines to this effect had been transmitted to the Middle Ages in a paragraph of Lucretius's *De rerum natura,* which begins with the statement that air presses on the poles, holding them in place, while "flowing air makes the heavens turn."[168] The same idea is also present in the Hippocratic *On Breaths,*[169] but the more complete argument, as expounded by Hildegard, is not derived from those sources. For Hildegard, winds are not only agents of cosmic and local change, but their balanced motion contributes to the stability of the whole structure, holding the universe in place.[170]

There exists another document that gives parallel evidence of the important

[163] Ibid., 1, *Visio* 2.18 and 24, col. 763A: "Nam nec mundus subsisteret, nec homo vivere posset, si flatibus ventorum istorum non vegetarentur." Col. 769C: "Quia venti, tam principales quam isti qui eis collaterales sunt, mundum universum ac hominem . . . fortitudine sua conservant, ne in defectum cadant." The circular figure of Lucca, Biblioteca Statale, MS 1942, fol. 37r, has, in its center, the globe divided into quarters. Here the winds influence, above all, atmospheric and seasonal phenomena. See the color plate in Singer, *Studies,* pl. IX.

[164] *Liber divinorum operum* 1, *Visio* 3.1, col. 797A: "Unicuique enim superiorum elementorum aer qualitati illius conveniens, per quem illud scilicet elementum vi ventorum ad circumvolutionem impellatur, inest, alioquin non moveretur . . ." ("Each of the upper elements is met by the air that is suitable for it and through which that element is forced by the strength of the wind to turn around. Otherwise, that element could not be moved . . ."). See also col. 791B. The winds are distinguished from air in that they are moving forces. Thus Hildegard often speaks of *aer et ventus* (see the following note). On spirit (in this case a fiery vapor) controlling the elements in Dracontius's *De laudibus Dei* 2.193–99, see Lapidge, "A Stoic Metaphor," p. 833.

[165] *Liber divinorum operum,* col. 791B: "Deinde etiam vidi quia per diversam qualitatem ventorum et aeris cum sibi invicem concurrunt, humores qui sunt in homine commoti et immutati, qualitatem illorum suscipiunt."

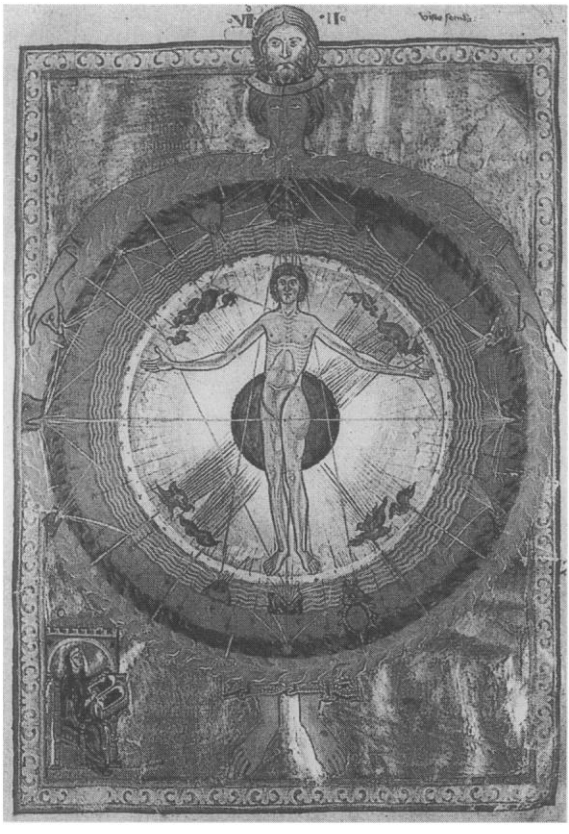
[166] Ibid., *Visio* 2.18.24, 3.1.8, etc. (cols. 763A, 773C, 791C–D, 798D).

[167] Ibid., *Visio* 3.1, col. 789D–791A: "Vidi et ecce ventus orientalis ventusque australis cum collateralibus suis per flatus fortitudinis suae firmamentum moventes, illud ab oriente usque ad occidentem super terram circumvolvi faciebant, ibique ventus occidentalis, nec non et ventus septentrionalis et collaterales ipsorum illud suscipientes, spiraminibusque suis impellentes, ab occidente usque ad orientem sub terra rejiciebant" ("I saw the east wind and the south wind, together with their side winds, set the firmament in motion with powerful gusts, causing the firmament to rotate around the earth from east to west. Here in the west the firmament was snached up by the west wind and the north wind, together with their side winds; it was driven by their blowing and thrown backward from west to east beneath the earth"). On the planets, driven in the reverse direction, see col. 795C–D.

[168] Lucretius, *De natura rerum* 5.509–23.

[169] Hippocrates, *On Breaths* 3.2–3.

[170] *Liber divinorum operum* 1, *Visio* 2.39 and 4.3, cols. 785A–D and 808B–C: . . . "Deus firmamentum igne firmavit . . . ventis quoque sustinet, quatenus cursum suum assidue peragat. In quatuor enim plagis, scilicet in oriente, in austro, in occidente, et in septentrione firmamentum ad circumvolutionem per ventos impellitur."



31. Hildegard of Bingen, *Liber divinorum operum,* thirteenth century.
Lucca, Biblioteca Statale, MS 1942, fol. 9r.
(By permission of the Ministero per i Beni Culturali e Ambientali.)

cosmic role of winds, the so-called *Astronomy of Nemrod,* and it does so in such terms that it becomes clear that it and Hildegard's text are based on common, but so far unidentified, sources from late antiquity.[171] The *Astronomy of Nemrod,* which circulated from the late eleventh or early twelfth century on,[172] but parts of which appear much older,[173] has neither been edited nor analyzed with respect

[171] B. Obrist, "Les vents dans l'Astronomie de Nemrot," in *Astronomie et sciences humaines,* Publications de l'Observatoire astronomique de Strasbourg 6/2 (1994), 57–76.

[172] According to Charles Homer Haskins, *Studies in the History of Medieval Science* (Cambridge, Mass., 1924; repr., 1927, 1960), pp. 336–37, it was mentioned first by Philip de Thaon, *Li compoz,* in 1119. For further instances see S. J. Livesey and R. H. Rouse, "Nemrot the Astronomer," *Traditio* 37 (1981), 203–66, esp. pp. 237 ff.

[173] Haskins, *Studies,* pp. 344–45. For further discussion see A. Van de Vyver, "Les plus anciennes traductions latines médiévales (IX–XIe siècles) de traités d'astronomie et d'astrologie," *Osiris* 1 (1936), 658–91, at p. 684.

to its rich cosmological content. Not only do the more complete manuscript copies include over sixty diagrams, but their function is discussed by the author, who also glosses the pictorial representations.[174] Of the two complete manuscript versions, the delicate wind diagrams of the older, probably early-twelfth-century copy (Vatican Library, MS Pal. lat. 1417, fols. 1v–2v) have unfortunately grown very pale,[175] while those of the ca. 1200 Venice manuscript (Biblioteca Marciana, MS lat. 2760; Figs. 32–33) are accurate but lack sophistication.[176]

Following an introduction with a representation of Nemrod and Atlas both carrying the world, the series of diagrams starts out with no fewer than three wind diagrams. In this more astronomically oriented document, the emphasis is on the winds as causes of spherical and planetary motion.[177] They are the means whereby the movement of the Prime Mover is transmitted to the universe. As with Hildegard, winds also have a stabilizing cosmic role. In one instance the author emphasizes that the four winds at the corners of the universe should not be compared to pillars (e.g., as in Job 9.6, 26.11, etc.) but to ligaments.[178]

In a general way, this document is much indebted to the Jewish cultural tradition. But although the idea that winds cause sidereal revolutions and planetary movement and maintain the immobility of the earth is to be found in the *Book of Henoch,* the *Astronomy of Nemrod* is not directly indebted to that work.[179]

Although the Nemrod and Hildegard passages on the cosmic role of winds are closely related, the corresponding illustrations differ widely. Hildegard made original compositions corresponding to her visions into which she occasionally interwove elements of existing representations, while the author of the Nemrod text glosses established iconographic types, slightly varying them in order to make them conform to his views. These passages are therefore important as a source for the medieval understanding of wind diagrams.

In the first of the three wind illustrations (Venice, Biblioteca Marciana, MS

[174] For a choice of texts, see Haskins, *Studies,* p. 340, and Peter Dronke, *Dante and Medieval Latin Traditions* (Cambridge, Eng., 1986; repr. 1988), pp. 118–23.

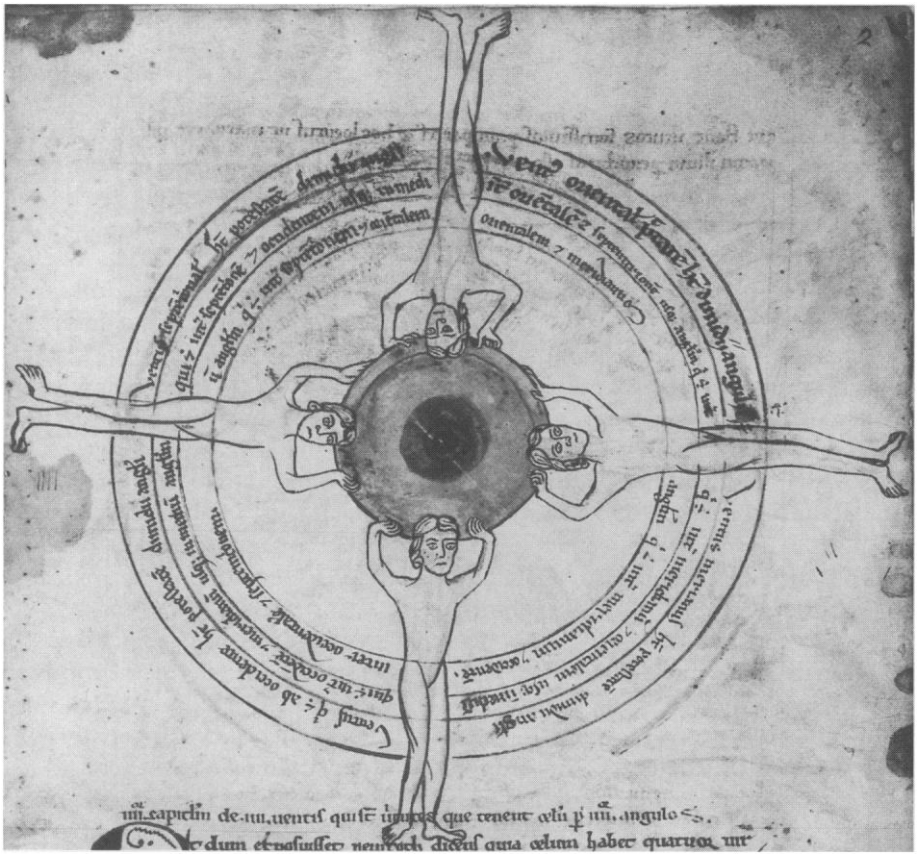
[175] Fritz Saxl, *Verzeichnis astrologischer und mythologischer illustrierter Handschriften des lateinischen Mittelalters in römischen Bibliotheken* (Vienna, 1915), pp. 30–31.

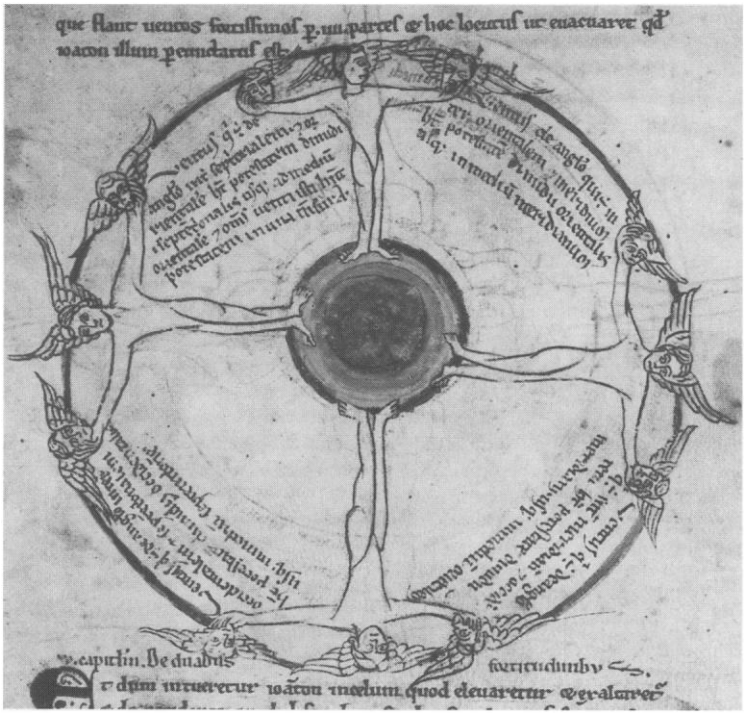
[176] Patrick McGurk, *Catalogue of Astrological and Mythological Illuminated Manuscripts of the Latin Middle Ages: Astrological Manuscripts in Italian Libraries (Other than Rome)* (London, 1966), pp. 84–85.

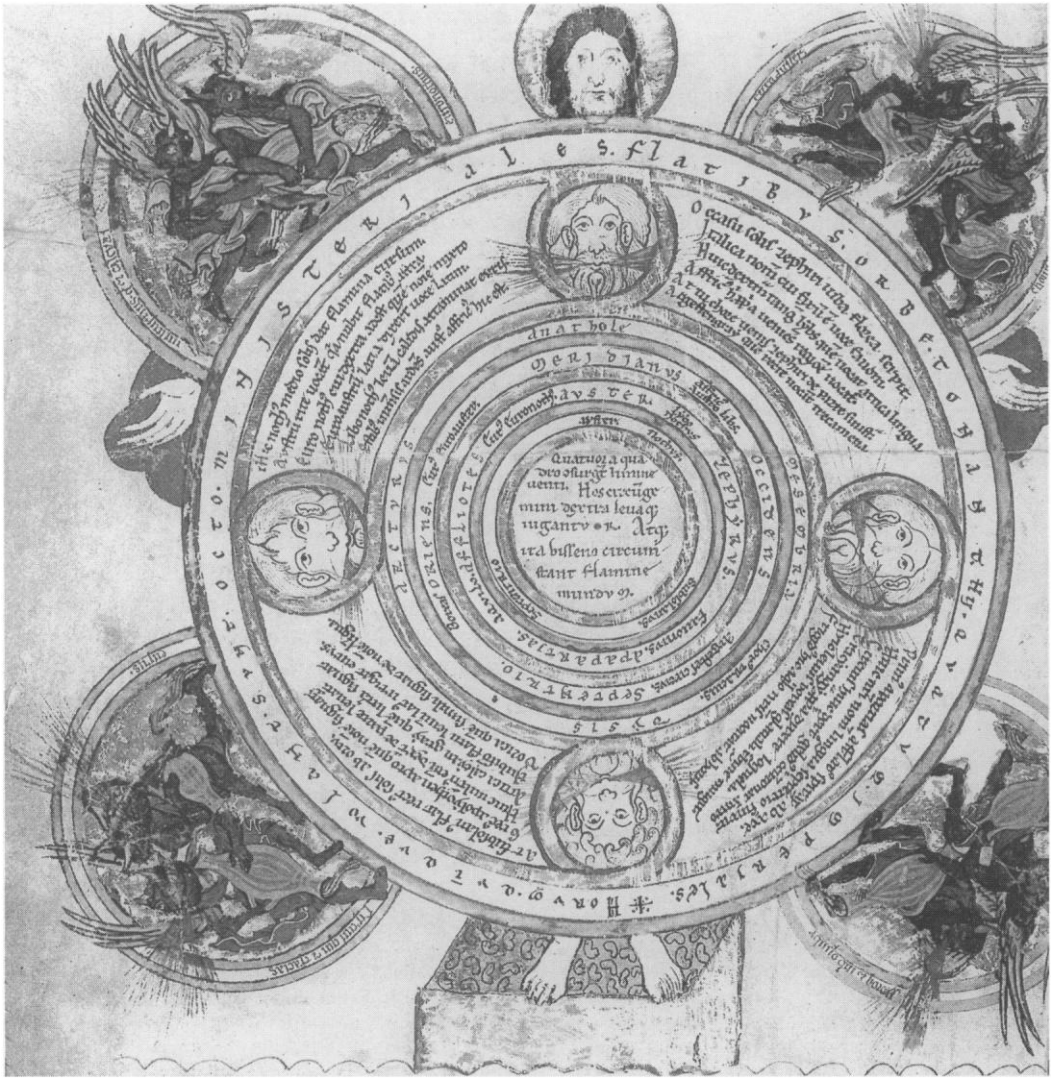
[177] ". . . et mandavit [Deus] super ipsum [celum] postea xii virtutibus que eum volverent de oriente in occidentem desuper et subter et depinxit eas Nemroth quomodo flant omnes in unam partem ad firmandum quod locutus est . . ." (Venice, MS lat. 2760, fol. 3r). On the planets, ibid.

[178] "Cum vidisset Nemroth formam celi et commotionem ipsius, miratus est in virtute creatoris, et dixit quia istud celum oportunum est ut a quatuor virtutibus regatur, et non moveatur de loco in alium. Disposuitque in scripturis suis dicens, quia celum sustinetur a quatuor partibus per ordinationem creatoris, ne commoveatur. Et non dixit de ipsis virtutibus ut sint sicut columne que sustinent edificia, set quasi ligamentum in edificio per partes coequales, et istos ventos nominavit Nemroth per loca ventos, et in locis, virtutes" (following the transcription by Dronke, *Dante,* p. 118, no. 2).

[179] R. H. C. Litt, *The Apocrypha and Pseudoepigrapha of the Old Testament in English,* 2 vols. (Oxford, 1913), 2:199–200, chap. 18; and H. F. D. Sparks, ed., *The Apocryphal Old Testament* (Oxford, 1984), pp. 257 ff. In late antiquity and the early Middle Ages, documents circulated in which similar ideas are expressed: M. A. Kugener, "Un traité astronomique syriaque attribué à Denys l'Aréopagite," in *Actes du XIV Congrès des Orientalistes* (Paris, 1907), 2:137–98, esp. pp. 173–74; and Obrist, "Les vents dans l'Astronomie de Nemrot," pp. 73–74.







34. Peter of Poitiers, *Epitome historiae sacrae,* beginning of the thirteenth century. Vienna, Österreichische Nationalbibliothek, MS 378, fol. 1v.

32. *(Facing page, top) Astronomy of Nemrod,* ca. 1200. Venice, Biblioteca Marciana, MS lat. 2760, fol. 2r (detail).

33. *(Facing page, bottom) Astronomy of Nemrod,* ca. 1200. Venice, Biblioteca Marciana, MS lat. 2760, fol. 2v (detail).

2760, fol. 2r; Fig. 32), the naked cardinal winds support the heavenly vault by holding it up over their heads, following a long-established cosmological tradition. The winds have no attributes and might be interpreted as angels[180] or as mere personifications of the cosmic axes, atlases,[181] did not the accompanying texts specify that they are indeed to be understood as winds. Here they have the function of maintaining the stability of the universe so that it does not move from one place to another.[182]

In the second diagram (fol. 2v; Fig. 33), the cardinal winds, naked as in the first diagram but here provided with wings attached to their heads, stand on the airy (blue) stratum of the central concentric rings around the earth, above the watery and beneath the fiery layer; in their outstretched hands they hold the heads of the collateral winds. As explained in the accompanying text, they blow from the four parts of the world.[183] In the third diagram (fol. 3r) nine of the now completely dressed winds blow horns in the direction of the polar serpent,[184] and the text indicates that they are to be understood as moving agents of the celestial axis and sphere.[185]

The unknown compiler and author of this work chose to bring out the diverse cosmic functions of winds, moving and at the same time stabilizing, by including and glossing several well-established types of wind illustrations. Throughout the Nemrod text, winds are direct agents of divine will. In other words, the nature of the winds undergoes a spiritualization, and, implicitly, winds are promoted to divine entities. Angelic creatures, which are generally considered to be superior in the scale of being, do not govern over the winds here, as they do in the illustrations cited above to Rev. 7.1. The *Liber introductorius* of Michael Scot (d. ca. 1235) testifies to the awareness of a problem of conflation between the diverse spiritual beings. Scot, who mentions the *Astronomy of Nemrod* and its pictures,[186] reports

[180] Cf. the apse in San Vitale, Ravenna (540s): K. Lehmann, "The Dome of Heaven," *Art Bulletin* 27 (1945), 1–27, illus. 45. See also the chapel of St. Zeno in Santa Prassede, Rome (ca. 830): R. Wisskirchen, *Die Mosaiken der Kirche Santa Prassede in Rom,* in *Antike Welt,* Sondernummer 23 (1992), illus. 9, p. 48. Here, however, they are dressed.

[181] In the Venice manuscript of the *Astronomy of Nemrod,* the figure of Atlas is on fol. 1v. In the text, the one sustaining force, *fortitudo,* is then divided into four forces, which are in turn identified with the winds (Venice, MS lat. 2760, fols. 1v–2r). For parallel material, see H. Bietenhard, *Die himmlische Welt im Urchristentum and Spätjudentum* (Tübingen, 1951), p. 35.

[182] The chapter heading of the text underneath the diagram reads, "Quatuor capitulum de quatuor ventis qui sunt virtutes que tenent celum per quatuor angulos." It is followed by "Et dum exposuisset Nemroth dicens quia celum habet quatuor virtutes que eum regunt per quatuor partes, dicit ei Ioanton discipulus eius: 'Magister meus et doctor. Nunquid tres venti si concordes fuerint et adversantur contra unum ventum exuperant et pellunt celum in alium locum longinquum?' Et respondit ei Nemroth dicens: 'Non ita putas, discipule, quia celum habet alios quatuor ventos qui eum regunt per quatuor angulos in virtutem magnam et non potest alius adversus alium quia omnes regunt celum ab uno directum ad alium.' Ideo exposuit Nemroth quatuor ventos per quatuor angulos et dixit: 'Quia isti venti habent capita xii per que flant ventos fortissimos per quatuor partes . . .' " (Venice, MS lat. 2760, fol. 2r–v).

[183] See the preceding note.

[184] McGurk, *Catalogue of Astrological Manuscripts,* pl. VIIIC.

[185] The corresponding text begins on fol. 2v of Venice, MS lat. 2760.

[186] G. M. Edwards, "The *Liber introductorius* of Michael Scot," Ph.D. diss., University of Southern California, 1978, p. 227; Livesey and Rouse, "Nemrot the Astronomer," pp. 243–44.

that many philosophers teach that the heavens are ruled in a natural way by divine forces, the cardinal winds.[187]

At the beginning of the thirteenth century, the theme of the direct association of cosmic winds with the all-embracing Divine Spirit is given forceful pictorial expression in a beautifully colored wind diagram prefacing Peter of Poitiers's *Epitome historiae sacrae* (Vienna, Österreischische Nationalbibliothek, cod. 378, fol. 1v; Fig. 34).[188] The Vienna diagram contains the text of the short wind poem that had circulated from the early Middle Ages. Its incipit, "Quatuor a quadro consurgunt limine venti," is placed in the central medallion, and the passages related to the cardinal winds are written between their heads. The diagram is oriented to the south, as the headings *anatole/meridianus/auster* placed underneath the heads of Christ and of the upper wind indicate; east is to the left, while the feet of the Godhead, placed on the green *mundus quadratus,* are associated with the north.

The theme of the cardinal winds as ordering and structuring principles within the universe is brought out much more forcefully here than in the pre-twelfth-century wind diagrams. Here the cardinal winds are directly related to the Godhead, especially to its head and feet. The hands of Christ protruding from either side of the circular wind diagram are enclosed in red trefoils, and the lines representing the breath coming sideways out of the mouths of the four cardinal winds are likewise colored in red, indicating the fiery nature of the Divine Spirit and of the physical spirit permeating the universe.[189] Between the cardinal winds and the secondary winds is established a radical dichotomy: while before, the latter were wild natural phenomena contained within the cosmos, depicted as potentially threatening factors, they are now conceived as altogether contrary to the divinely ordered cosmic circle and accordingly are pushed out of it. Iconographically, the dark brown wind devils at the four outside corners resemble personifications of rivers.[190] However, what they hold are not urns, but wind bags.[191] That this assim-

[187] "Dicunt multi phylosophorum quod quatuor sunt virtutes divinae, que naturaliter ipsum celum regunt. . . . Et iste quatuor virtutes dicuntur a sapientibus multis esse quatuor venti cardinales, qui etiam dicuntur divini esse per quaternarium. . . . Nos vero dicimus quod septem planetae . . . impelluntur ire a septem virtutibus, que sunt virtutes que regunt planetas in celo et non perfecte cognoscuntur ab hominibus . . . tamen dicimus quod rectores planetarum ut certarum creaturarum infra se venti vel angeli sunt existimati esse a phylosophis . . ." (Munich, clm 10268, fols. 21r–22r, in Hans Liebeschütz, *Das allegorische Weltbild der Hildegard von Bingen* [Leipzig and Berlin, 1930; repr. Hildesheim, 1964], p. 82, n. 2).

[188] H. J. Hermann, *Die deutschen romanischen Handschriften,* Beschreibendes Verzeichnis der illuminierten Handschriften in Österreich 8/2 (Leipzig, 1926), no. 223, pl. XXXVII; Otto Mazal, *Himmels- und Weltenbilder: Kleinodien der Österreichischen Nationalbibliothek* (Vienna, 1973), pl. 20; and Raff, "Die Ikonographie," p. 150, illus. 120.

[189] In his *De unione spiritus* Hugh of Saint-Victor emphasizes that fire is of a more spiritual nature than air and therefore apt to vivify the body (A. M. Piazzoni, ed., in *Studi medievali,* 3rd ser., 21 [1980], 861–88, esp. pp. 885 and 887).

[190] In the twelfth century even personifications of the rivers of Paradise did not escape being diabolized, as in Munich, Bayerische Staatsbibliothek, clm 7785, fol. 2v (ca. 1180). See Elisabeth Klemm, *Die romanischen Handschriften der Bayerischen Staatsbibliothek,* 3/2 (Stuttgart, 1988), cat. no. 94, illus. 325.

[191] They may be compared to the winds sitting on their bags and blowing the horn at the four corners of the world map of the ca. 1100 Beatus manuscript in Turin, Biblioteca Nazionale, MS I. II. 1, fols. 38v–39r. See Ernst Kitzinger, "World-Map and Fortune's Wheel: A Medieval Floor-Mosaic in Turin,"

ilation is not a mere fantasy of the illuminator is clear from the fact that the formation of winds was frequently explained on the analogy of water being pressed into narrow passages.[192]

Wind diagrams of the seventh to early thirteenth centuries, and the texts associated with them, reveal manifold facets of medieval ideas about the nature of the universe. A close examination of the role of winds gives insight not only into conceptions of the structure and the functioning of the sublunary and corporeal part of the world but also into its relation to divinity. Indeed, paradoxical as it may appear at first, the main role of the cardinal winds in the medieval view was to contribute to the coherence and stability of the universe, as well as to establish a transition to the Divine Spirit.

Throughout this period the relation between the Isidorian and poetic texts on winds was a close and dynamic one: not only wind names but supplementary textual information was arranged in meaningful patterns inside and outside of the basic circle of the horizon and its subdivisions. With or without figurative elements, wind diagrams are to be found in a variety of forms: independently, as part of astronomical and cosmographic schemata, and accompanying the Isidorian chapter on winds and the shorter wind poem. It is to state the obvious that wind diagrams had a mnemonic function, but their study from this point of view would be of a particular interest because of the close and continually varied relation between textual passages and diagrammatic representations.

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in *Proceedings of the American Philosophical Society* 117 (1973), 344–73, esp. p. 357, fig. 12. See also the Creation tapestry of Gerona cathedral, dated to the beginning of the twelfth century (Pedro de Palol and Max Hirmer, *Spanien: Kunst des frühen Mittelalters vom Westgotenreich bis zum Ende der Romanik* [Munich, 1965], pl. XXXI).

[192] Cf. Aristotle, *Meteorologica* 2.4 (361b 2–5): ". . . winds are formed by the gradual collection of such quantities of exhalations, in the same way that rivers form. . . ."

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