

THE PLACE OF SENSE PERCEPTION IN THIRTEENTH-CENTURY ENCYCLOPAEDIAS: TWO DIFFERENT READINGS OF ARISTOTLE*

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Abstract

Several studies have approached sense perception in the encyclopaedias of Thomas of Cantimpré, Bartholomew the Englishman and Vincent of Beauvais. Yet a systematic overview and comparison of the arrangement of sense perception in these encyclopaedias is still lacking. The overview offered here shows that all encyclopaedias place sense perception beside expositions on psychology and anatomy. There are, however, significant differences in how they treat the objects of sensation. In the case of Bartholomew and Vincent, I argue, these differences reflect two different readings of Aristotle.

Keywords

13th-Century Encyclopaedias; Sense Perception; Objects of Sensation; Aristotle's Reception

One of the texts on the five senses from the encyclopaedias that is perhaps cited the most is a short passage by Thomas of Cantimpré that deals with the superior sense abilities of animals compared with human beings. Eagles and lynxes have clearer vision, monkeys keener taste, vultures more acute olfaction, spiders swifter touch, boars finer hearing¹.

In this paper, I am concerned not with sense imagery but rather with sense perception as a process in the encyclopaedias of the Franciscan Bartholomew the Englishman (before 1202–1272), and the Dominicans Thomas of Cantimpré (1201–1270/2) and Vincent of Beauvais (c. 1184/94–c. 1264).

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¹ Thomas of Cantimpré, *Liber de natura rerum, Teil 1: Text*, ed. H. Boese, Berlin, de Gruyter, 1973, IV.1.190-194: «Homo in quinque sensibus superatur a multis: aquile et lince clarius cernunt, vultures sagacius odorantur, simia subtilius gustat, aranea citius tangit; liquidius audiunt talpe vel aper silvaticus: Nos aper auditu, linx visu, simia gustu, vultur odoratu preceedit, aranea tactu». For the habits of animals in general, and an image of the mural of the Longthorpe tower, see Vinge, L., *The Five Senses. Studies in a Literary Tradition*, Lund, Gleerup, 1975, pp. 50-51; Casagrande, G., and Kleinhenz, C., «Literary and Philosophical Perspectives on the Wheel of the Five Senses in Longthorpe Tower», *Traditio*, 41 (1985), pp. 311-327, at pp. 311-312; Woolgar, C. M., *The Senses in Late Medieval England*, London, Yale University Press, 2006, pp. 25-26.

Although there has been some interest in the treatment of sense perception in these encyclopaedias², a systematic, comparative overview of the arrangement of this subject is still lacking. My principal aim here is to offer this overview. For that reason, I will first consider succinctly the arrangement of subjects and then in some detail the discussions on sensation in each encyclopaedia. I will focus particularly on the sense faculties or (five) outer senses, the sense organs and the objects of the senses. The following comparison will reveal significant differences, primarily in dealing with the objects of the senses and specifically in their different placement in Bartholomew's *De proprietatibus rerum* and Vincent's *Speculum naturale*. I intend to show that these differences reflect different interpretations of the (ultimately) Aristotelian explanation of the notion of «accident».

The Place of the Senses in the Encyclopaedias³

Liber de natura rerum

The first version of Thomas of Cantimpré's *De natura rerum* was completed around 1240. It was later enhanced with additions and interpolations made by Thomas himself. This version, usually labelled «Thomas II», comprises twenty books⁴. The first three examine human beings. They deal with human anatomy, the human soul and kinds of men («Book of Monstrous Men of the Orient»). Thomas then turns from human beings to the animal (IV-IX), vegetable (X-XII), and mineral kingdoms (XIV-XV). Between the sections dedicated to plants and to minerals, he inserts a book about «streams, rivers, and seas» (XIII). The books XVI to XX consider not earthly forms of life and objects but heavenly elements. These include the «seven regions of the air», the seven planets and phenomena such as thunder. Within these subjects, Thomas also discusses the four elements.

Only few passages of *De natura rerum* deal with sense perception (see Appendix 1). Martin Roch, in his study of odour in Thomas's work, incidentally identified the books in which sense perception is treated: with the exception of the books on trees (comprising aromatic trees and herbs), information about odour can be found in the book on anatomy (I) and, to a lesser extent, that on the soul (II)⁵. Accordingly, considerations of sensation in general and about sense organs in particular are to be found in these first two books.

The book on human anatomy (I) describes the human body according to the schema *de capite ad calcem*: it begins with the head and ends with the soles of the feet. This exposition is complemented by an excursus on the generation of the body and soul and the different ages of man. In the depiction of the head there is already a paragraph on the disposition of the eyes and different kinds of eyes. In this chapter, Thomas explicitly associates the three chambers of the brain to three interior powers of the soul, namely, the fantastic or imaginative, the

2 The pertinent literature is quoted in the following discussion. The terms «sense perception» and «sensation» are used interchangeably.

3 For the numbering of the encyclopaedias I have used the following format: the books are identified by Roman numerals, the chapters by Arabic numerals (such as in III.1).

4 Ventura, I., «Enzyklopädie», in F. Knapp (ed.), *Die Rezeption lateinischer Wissenschaft, Spiritualität, Bildung und Dichtung aus Frankreich*, Berlin i. a., de Gruyter, 2014, pp. 161-200, at pp. 180-181.

5 Roch, M., «La culture olfactive de Thomas de Cantimpré: Savoir et expérience au XIIIe s.», *L'Émoi de l'histoire*, 34 (2012), pp. 55-75.

intellectual and the memorative (2). The ensuing description of the brain explains in a few words that the brain does not have the sense of touch (3). Here, there is also a very brief reference to a theory of certain natural philosophers (*phisici*), according to which sensation is brought about through destruction and not through alteration. Different chapters approach the eyes (6), ears (8), nose (9), mouth (11), tongue (13), arms and hands (21; 23). The organs of the senses are understood as «instruments», and their treatment considers their physiological characteristics, the diseases that can affect them and their cures. This instrument condition is evident above all in the treatment of arms and hands: Thomas concentrates on their ability to accomplish different actions. Although there are no further references to the hierarchy of the senses, vision is thought of as *very subtle* (7). The mouth is referred to as the organ of taste; the tongue is instead associated with voice and the formation of words. The short treatment of voice itself regards it as beaten air and as such as the object of hearing (14). Similarly, the uvula, and particularly the throat, are examined inasmuch as they help to bring voice into being (15; 18).

In the book on the soul, Thomas does not consider each sense faculty or sense organ. However, several passages mention sensation and the five senses: sensation (*sensus*; sometimes *sensificatio*) is often described as the first step towards knowledge of God or the «higher life» (4-5; 10). In some passages sensation is examined as a means between soul and body (6; 10), as a task of the soul and specifically as a power of the soul – together with imagination, reason, memory, intellect and intelligence (9). Also present in this book is the dichotomy between sensation and reason (8) or between sensation and intellect (10). Furthermore, sensation (*sensus*) is treated in its function of perceiving bodies and exterior things (5). One passage specifies that the soul is fed by the sight of the eyes, delighted in the hearing of sound, amused by sweet odours, restored through copious feasting (10). Another briefly enumerates several objects of sensation (hard and soft, warm and cold, white and black) (8). In this book we find as well a recurrent explanation of sensation in terms of the doctrine of the three «pneumata» or spirits (*naturalis, vitalis, animalis*): a fiery force (that is, the vital spirit) resides in the heart, from where it ascends to the brain. In the brain it is purified and cleansed (that is, is transformed in the animal spirit), and travels outwards through the eyes, ears, nose and other instruments of the senses. Once it has entered into contact with exterior things, it constitutes the five senses of the body. This doctrine also regards the working of the senses together with other powers of the soul, since the information brought by them is further processed by imagination and reason in the chambers or ventricles of the brain (15).

As can be appreciated, Thomas deals at some length with the organs of the senses in the book on anatomy and presents many views relating to sense perception in the book on the soul. Sensation is somewhat diffusely treated as a power of the soul that is often at the bottom of a ladder that leads to God. The most refined treatment of sensation relates to the theory of *pneuma*, which in its contemporary version includes, besides the three spirits, the operation of different cognitive faculties in the brain ventricles. Excepting a brief commentary on voice in the book on anatomy and two short enumerations in the book on the soul, the objects of sensation are absent from Thomas's *De natura rerum*.

De proprietatibus rerum

Bartholomew the Englishman finished his *De proprietatibus rerum* in the 1240s⁶. This work comprises nineteen books. The first two present the divine realm: God and the angels (I-II). The third is dedicated to the human soul. The following books present different aspects of the human body and life (IV-VII): Bartholomew first investigates the four elementary qualities (warm, cold, moist and dry) and the four humours (blood, phlegm, yellow bile and black bile or «melancholy») that make up the body. He then turns to human anatomy according to the schema *de capite ad calcem*, and to the different ages of human beings, different social roles and practices, and daily activities such as sleep and wakefulness. This section on «man» closes with a book on the diverse diseases that affect human beings. The next two books (VIII-IX) are concerned with the heavenly bodies and time, which depends on these bodies. The remainder of the book uses the four elements as an ordering pattern (X-XVIII). THEREFORE, at the start we find a short description of *form* and *element* followed by a reflection on fire and its different manifestations. The discussion of air and water also considers phenomena that occur in them and the animals associated with them. Thus, when treating air, the encyclopaedist compiles a book on, e.g., winds, thunder and snow, and another on birds. In the case of earth, Bartholomew examines in addition the *provinces* (continents, countries, islands, etc.) of the earth; minerals, metals and precious stones that are beneath the earth; and animals and plants that are on its surface. This volume closes with a sort of appendix on *accidents*. Under accidents are diverse subjects such as colours, flavours, kinds of eggs and milk, etc⁷.

Many of Bartholomew the Englishman's views on each sense (considering speech or voice too, as a «sense of the mouth»), and on some objects of the senses such as colour and sound, were summarised almost ten years ago by Chris M. Woolgar⁸. Raymond J. Long also remarked that his book on the soul includes a chapter on each sense⁹. Recently, Florence Bouchet enumerated the sections in which a discussion of the five senses can be found in the *De proprietatibus rerum*: in the third book (On the soul); in the second chapter of book V (On anatomy); and in the last book (XIX), where «colours, odours, flavours, and liquors» are treated¹⁰. Deserving of special attention are the views of Bartholomew on odour as a *smoky*

6 Van den Abeele, B., «Introduction Générale», in Bartholomaeus Anglicus, *De proprietatibus rerum*, vol. I., ed. B. van den Abeele, H. Meyer, M. Twomey, B. Roling, and J.R. Long, Turnhout, Brepols, 2007, pp. 1-34, at p. 4.

7 For descriptions of this encyclopaedia, see Meyer, H., *Die Enzyklopädie des Bartholomäus Anglicus. Untersuchungen zur Überlieferungs- und Rezeptionsgeschichte von «De proprietatibus rerum»*, München, Fink, 2000, pp. 37-40; Draelants, I., «Le 'siècle de l'encyclopédisme': Conditions et critères de définition d'un genre», in A. Zucker (ed.), *Encyclopédire: Formes de l'ambition encyclopédique dans l'Antiquité et au Moyen Âge*, Turnhout, Brepols, 2013, pp. 81-106, at p. 95.

8 Woolgar, *The Senses in Late Medieval England*, op. cit., pp. 14-16, 29-30, 64, 81, 84, 105, 147-148, 156, 172. He examines this though the English version by John Trevisa, produced in 1389. Particularly concerned with terms for visual impairment in the translation by John Trevisa are: Busse, B. and Kern-Stähler, A., «Bleary Eyes: Middle English Constructions of Visual Disabilities», in A. Kern-Stähler, B. Busse, and W. de Boer (eds.), *The Five Senses in Medieval and Early Modern England*, Leiden – Boston, Brill, 2016, pp. 69-95, at pp. 70-71, 78.

9 Long, R., «The Contribution of the Books on the Soul and the Body to the Dissemination of Greco-Arabic Learning», in B. van den Abeele and H. Meyer (eds.), *De proprietatibus rerum: Texte latin et réception vernaculaire*, Turnhout, Brepols, 2005, pp. 137-149, at p. 142.

10 Bouchet, F., «Introduction: D'un sens l'autre», in F. Bouchet and A.-H. Klinger-Dollé (eds.), *Penser les cinq sens au Moyen Âge: Poétique, esthétique, éthique*, Paris, Brill, 2015, pp. 11-19, at pp. 14-15.

vapour¹¹, on its association with humoral theory¹² and its capacity to transmit diseases, and on the perception of two contrary odours at once¹³.

As Bouchet and Long observed, thorough considerations of sensation in general and the five senses in particular are to be found in the book on the soul (III; see appendix 2)¹⁴. Here, the «five senses» are explicitly treated as corresponding to the sensitive soul of the Aristotelian distinction between souls or parts of the soul (nutritive, sensitive and rational) and referred to as exterior apprehensive powers of the soul (9). Sensation is often associated with the doctrine of the *pneuma*. As Bartholomew indicates, there are natural, vital and animal powers (*virtutes*) or spirits (*spiritus*): natural power is responsible for the movements of the humours; vital power for the movement of the spirits from the heart; and animal power, for sensation and voluntary movement. This *animal motive power* resides in the ventricles of the brain (12; 14; 22), advancing through certain nerves, which are very soft, to form sensation (*sensus*). Depending on where this spirit is directed to, it generates sight, olfaction, etc. The encyclopaedist also describes in detail the elementary nature of each sense and further expounds on the hierarchy of the senses in terms of «subtlety»: sight is subtler because of its fiery nature, air is associated with audition, «fume» to olfaction, water to taste, and touch, «thicker» than all the other elements, to earth. Every single sense has its function, as changed and informed by its objects. What they sense, they subsequently present to the intellect (16; see also chapter 9). At the close of the section on the five senses, Bartholomew draws particularly on the relationship between the specific exterior senses and the interior or common sense (21). The proper treatment of each sense is to be found in chapters 17 to 21. Here, each is examined according to the following pattern: efficient cause, organ, medium and intention of the soul (*intentio animae*). The efficient cause is always the animal spirit.

De proprietatibus rerum expounds further on the activity of the sense organs in the book dedicated to anatomy (V)¹⁵. The disposition of the organs of the senses, the seat of the animal power and the many nerves that enable sensation and movement are examined in the chapter on the head (2). In his exposition on the brain, Bartholomew specifies that the anterior part of the brain is apt to contain many sensible nerves and also comprises three ventricles. The first of these ventricles is the seat of fantasy or imagination, which receives the impressions of the senses (3). Three chapters analyse the eyes, the pupils and their position as it relates to their physiology (5-7). The sections on the ears and the nose examine their etymology, composition and aptness to receive their particular impression (sounds or smells) (12-13). The mouth and tongue have the function both of helping digestion by distinguishing flavours and of composing words (19-21). The most important role of the lips seems to be their help in generating voice (17). Bartholomew also examines saliva in its role in digestion and very briefly as the medium for taste (22). «Voice» is considered an additional organ (23); the throat is also

11 Woolgar, *The Senses in Late Medieval England*, op. cit., pp. 15-16.

12 Kemp, S., «A Medieval Controversy about Odor», *Journal of the History of the Behavioral Sciences*, 33/3 (1997), pp. 211-219, at p. 214; Palmer, R., «In Bad Odour: Smell and its Significance in Medicine from Antiquity to the Seventeenth Century», in W.F. Bynum and R. Porter (eds.), *Medicine and the Five Senses*, Cambridge, Cambridge University Press, 2004, pp. 61-68, at p. 63.

13 Palmer, *ibid.*, pp. 62-63, 65-66.

14 Bartholomaeus Anglicus, *De proprietatibus rerum*, op. cit., III.16-22.

15 Bartholomaeus Anglicus, *De genuinis rerum coelestium, terrestrium et inferarum proprietatibus, libri XVIII ...: cui accessit liber XIX de variarum rerum accidentibus*, Frankfurt a. M., Minerva, 1964 (Facsimile of the edition of G. B. Braitenberg, Frankfurt a.M., Stein, 1601).

described in some extent as it helps to produce voice (24). The arms and hands are clearly related to their voluntary movement and are also associated with touch (27-28).

Bartholomew deals with «accidents» in the last book of his encyclopaedia (XIX). These accidents include the objects of sensation, such as colours (1-36)¹⁶, odours (37-39) and flavours (40-50). He also discusses music in several chapters; nevertheless, these refer to the sounds produced by diverse musical instruments and not properly to sound as the object of hearing (132-146). In addition, this book examines fluids (including honey, wax, different kinds of wine and milk), different milk products (serum, cheese and butter), properties inherent to liquids, the eggs of different animals, and numbers, weights and measures.

On the whole, *De proprietatibus* favours a view of the senses and their operation that is grounded in medical sources. The physiological remarks about the working of each sense, the underlying doctrine of the spirits and the placement of some inner faculties in the brain ventricles are typical characteristics of such sources. As a result, Bartholomew's view of sensation is neither utterly active nor passive: he explains each sense faculty according to the organ and the medium, as in the Aristotelian (and Peripatetic) passive account of sense perception. Nevertheless, the Augustinian *intentio animae* as well as the efficient cause, defined as the animal spirit (and not as the sense object), seem to be fundamental in explaining how perception occurs. The sense objects do not constitute an aspect in themselves in his exposition on the working of the five senses. They are only briefly alluded to in the organ descriptions in the book on anatomy. Their proper place is, however, separate from sensation and from the sense organs, in the book on accidents.

Speculum naturale

The *Speculum naturale*, one of the original three books of the major work *Speculum maius* by Vincent of Beauvais, is thought to have been composed in two main stages: a first version comprising two books (*bifaria*; written in 1244) was substantially expanded and turned into a three-book version (*trifaria*; written around 1260)¹⁷. This final version presents a hexameral arrangement of its thirty-two books; that is, the phenomena and objects of the world follow the order of creation. Consequently, the first book is about the creator and the angels. The second corresponds to the first day, and deals with light, darkness and the fall of the devil. The firmament, heaven and the upper parts of the world are also considered in relation to the works of the second day (III-IV). The books relating to the third day handle water, earth and things that are beneath (minerals, metals and stones) and on the surface (plants and herbs, different kinds of trees) of the earth (V-XIV). Among the works covering the fourth day, Vincent considers the stars, the different heavenly signs and time (XV). A discussion of birds, fishes and sea monsters complements the fifth day (XVI-XVII). Then, corresponding to the sixth

16 For colours, see Salvat, M., «Le traité des couleurs de Barthélemy L'Anglais (XIIIe s.)», in Presses universitaires de Provence (ed.), *Les couleurs au Moyen Âge*, Aix-en-Provence, Publ. du CUERMA, 1988, pp. 359-385.

17 Paulmier-Foucart, M., «L'évolution du traitement des cinq sens dans le *Speculum maius* de Vincent de Beauvais», in L. Callebaut and O. Desbordes (eds.), *Science antique Science médiévale*, Hildesheim, Olms-Weidmann, 2000, pp. 273-295, at pp. 273-274; see also Weigand, R., *Vinzenz von Beauvais. Scholastische Universalchronistik als Quelle volkssprachiger Geschichtsschreibung*, Hildesheim, Olms, 1991, pp. 31-32. For a further composition stage (version Bruges), see Albrecht, E., «Summary of PhD: De ontstaansgeschiedenis en de compilatie van het *Speculum naturale* van Vincent van Beauvais († 1264) (The Genesis and Compilation of the *Speculum naturale* of Vincent of Beauvais (†1264))», *Vincent of Beauvais Newsletter*, 34/3 (2009), pp. 3-9.

day, the encyclopaedist expounds on terrestrial animals (XVIII-XXII) and human beings (XXIII-XXVIII). The discussion on animals is closed with considerations on their anatomy and nutrition, movement, generation and humoral constitution (XXI-XXII). The subject of «human beings», for its part, is distributed over five books on the soul (XXIII-XXVII) and one on human anatomy (XXVIII). A reflection on God as creator of the universe closes the hexameral exposition (XXIX). The two following books consider the human condition in paradise and after the fall, examining in particular the institution of marriage, and then human conception, generation, nutrition, composition and the ages of man (XXX-XXI). The last book recapitulates human history, and serves as an introduction to the third volume of the *Speculum maius*, the *Speculum historiale*¹⁸.

The treatment of the five senses in the *Speculum naturale* was briefly commented on in 1975 by Louise Vinge¹⁹. Twenty-five years later, Monique Paulmier-Foucart offered a comprehensive description of this treatment and its transformation in the final version of the *Speculum maius*. In this version, the discussion on the soul was expanded the most, and within it the section devoted to the soul's potencies²⁰. In particular, the description of the actual senses, and not the discussion on the activity of the senses in general, was extended.

General considerations on sensation are scattered throughout the books on the soul²¹. Sense perception has, however, its proper place in book XXV. Its treatment here is rather extensive; therefore, I will concern myself with a general outline and the most important ideas and sources (for an outline of the following analysis, see Appendix 3).

This book begins with a general account of the apprehensive and motive powers of the soul (1-7), an overall explanation of sense perception – understood as the *outer sensitive apprehensive power* (8-27) – followed by a discussion of each of the five senses (28-83) and then by a consideration of the inner senses (84-100). The treatment of the outer senses follows the order of Aristotle's *De anima*: sight (28-49), hearing (50-60), smell (61-69), taste (70-75) and touch (76-83). As regards the distribution of the sense organs in the head, this answers to the reception of their specific impressions (22). The distribution reflects their hierarchy: vision is able to perceive faster than the other senses and from a longer distance (22; 24). Furthermore, arguments for the superiority of sight or touch are presented in a typical scholastic manner (23)²². Several chapters ponder the relationship between the sense organs, or the five senses, and the four elements. Thus, eyes are associated with fire, ears with air, smell and taste with water, touch with earth (10; see also 9). A similar connection is built upon the notion that from the nature of the four elements it is possible to determine the kind of knowledge of the senses (20) and in a passage that correlates the number of the senses to the determination of sense objects by the five elements (the fifth being the quintessence) (17). Ideas about physiology are often connected to explanations of the working of the sense faculties: the conformation of sensation in the different organs is explicated as being the action

18 See Meyer, *Die Enzyklopädie des Bartholomäus Anglicus*, op. cit., pp. 37-40.

19 Vinge, *The Five Senses*, op. cit., pp. 68-70. For a very brief description, see also Palmer, «In Bad Odour: Smell and its Significance in Medicine from Antiquity to the Seventeenth century», op. cit., pp. 67-68.

20 Paulmier-Foucart, «L'évolution du traitement des cinq sens dans le *Speculum maius* de Vincent de Beauvais», op. cit., at p. 277.

21 See, for instance, Vincentius Belvacensis, *Speculum naturale*, Online edition of the Version Trifaria of the *Speculum Maius* based on the reprint of 1964 (Graz, Akademische Druck- u. Verlagsanstalt) of the Douai edition of 1624, retrieved on 28 July 2017 from: <http://sourcencyme.irht.cnrs.fr/encyclopedie/voir/133, XXIII.5-8; 64>.

22 For passages affirming the necessity of touch for animals, see *Ibid.*, XXV.9; 17.

of sensible spirits that act at the end of nerves descending from the anterior part of the brain (24). Also present is the Augustinian view, according to which sensation is a result of fire, *the most subtle body*. Thus, a certain bright quality of fire reaches from the anterior part of the brain through fine tubes to the organs of the brain, causing sensation. Three ventricles in the brain are responsible for sensation, movement and memory (10-11)²³. A brief notification indicates that the instrument of all senses is, conversely, a certain airy substance, which must be changed into the nature of the thing sensed in order for sensation to occur (12).

The notion of sensation as a passive phenomenon deserves some further consideration, since it is extensively developed in this book. Certain quotations from Aristotle define sensation as the reception of sensible forms without matter (12). The «sensible» itself – the visible, olfactible, etc. – is an active principle that exists outside of the senses (9). This view is largely rendered according to the interpretation by Albert the Great in *De homine*: sensation is «a passive power that suffers not physical change, but is changed in the sensible form with regard to its intention» – as revealed in chapters 12-16. Passages from the anonymous tract *De anima et potenciis eius* and from John of La Rochelle's *Summa de anima* also endorse a view of the five senses as passive powers of the soul. Nevertheless, the action of a «spirit» that carries the object of sensation from the organ to the brain is also mentioned (17). The distinction between an object, a medium and an organ of sensation is referred to very often (18; 19; 26). This distinction is also at work in the exposition of each sense: all these sections include a definition of the sense in question, a description of its organ (sometimes also of its nature according to the four elements), object and medium²⁴.

The ability to sense, sense organs and the five senses are also studied in the books on anatomy. The first book on animal anatomy (XXI) delineates in an Aristotelian manner that an animal is such inasmuch as it has sense, and above all senses, touch (1). Sense is one of the powers of animals, together with motion and appetite (4), while the brain is the «instrument of the senses» (6). The exposition of the ears, eyes, nose, mouth, tongue and arms refers only parenthetically to their function as sense organs – Vincent is much more interested in depicting the organs of various animals and their differences. In typical manner, the tongue (not mouth) is connected to both taste and voice while the arms and hands are considered, briefly, as instruments. Animal voices and their origin have their proper place in the next book, in which there is a three-chapter exposition on animal senses (XXII). The description of human anatomy (XXVIII) considers the brain and its three ventricles as the seat of the animal spirit and, therefore, as the source of sensation and movement (40-44; 85). The skin, most of all human skin, is adapted to the sense of touch (30). Descriptions of the eyes, ears, nose and mouth are also contained in this book. The mouth, together with the tongue, the uvula and the throat are considered in terms of their ability to taste and to produce sound (53-57).

As Monique Paulmier-Foucart previously stated, Vincent tears asunder the «psychology» of the senses from their objects. Hence, the treatment of these objects is scattered over several books²⁵. What is seen – light, colours and forms in mirrors – is approached in the second book. Colour is examined here as the object of vision by light. Sounds and odours are encompassed in the exposition on the «airy heaven» in the fourth book. Flavours are dealt with together with

23 For another active account of the senses, see the quote from the Etymologies of Isidore in *Ibid.*, XXV.17.

24 See Paulmier-Foucart, «L'évolution du traitement des cinq sens dans le *Speculum maius* de Vincent de Beauvais», op. cit., at pp. 287-289.

25 *Ibid.*, pp. 292-294.

water(s) (V)²⁶. There is no treatment of touch. These chapters rely for the greater part on Albert the Great's *De homine*²⁷.

In the books on psychology, Vincent favours a passive account of the operation of the senses, along the lines of the (ultimately) Aristotelian account of sense perception. Thus, he distinguishes precisely between objects, media and organs of sensation. Interestingly, he also chooses extracts that emphasise the role of the animal spirit as carrier of the information of the senses to the brain. The importance of this spirit seems to increase in the books on anatomy, probably because of the use of medical sources. A salient characteristic of Vincent's treatment of sense perception is undoubtedly the separation of the objects of the senses from psychological and anatomical discussions of perception.

Some Differences and Similarities among the three Encyclopaedias

As the above analysis shows, the subject «sense perception» is to be found in the encyclopaedias along three main themes: psychology, animal and human anatomy, and the objects of the senses.

Sensation is considered in all encyclopaedias as a faculty of the soul; therefore, it is treated in the books on psychology. An account of sense perception associated with the doctrine of the *pneuma* is present in all encyclopaedias. The apprehension of the exterior powers, sensation, is thus explained by the existence of nerves going from the brain to the organ of the senses and by the action of a sensible or animal spirit that spreads through these nerves, subsequently carrying information from the organ of the senses to the brain. This latter account is best illustrated in *De proprietatibus rerum*. A properly passive explanation of sensation is put forward only by Vincent, and predominates in his *Speculum*: the active principle of sensation is the sensible object; therefore, sensation is a passive process. Even so, within the passive account of sensation some passages refer to the work of the animal spirit.

The organs of the senses are treated by all encyclopaedists. They all reflect upon how sense perception is brought about in their descriptions of the head and the brain. These descriptions contain in *De proprietatibus*, but principally in *De natura rerum*, expositions on the illnesses that affect the sense organs. The sense organs include the voice²⁸.

De proprietatibus and the *Speculum naturale* show some common features that are not present in *De natura rerum*, probably because sensation and the working of the sense organs does not constitute a subject on its own in Thomas's encyclopaedia. One of these features is the exploration of the correspondence between four or five elements and the five senses: frequently, fire is associated with sight, air with audition, fume or misty air with olfaction, water with taste and touch with earth. On this association and on the disposition of the senses in the head is based the hierarchy of the senses, which typically considers vision as the first.

26 For the treatment of the sense of taste and the incorporation of the teachings of Albert the Great, see *ibid.*, pp. 289-293. For a short introduction and a French translation of the book on flavours, see Paulmier-Foucart, M., *Vincent de Beauvais et le grand miroir du monde*, Turnhout, Brepols, 2004, pp. 200-206.

27 Cf. Albrecht, «Summary of PhD: De ontstaansgeschiedenis en de compilatie van het *Speculum naturale* van Vincent van Beauvais († 1264)» (The Genesis and Compilation of the *Speculum naturale* of Vincent of Beauvais (†1264)), op. cit., pp. 5-6.

28 For the consideration of voice as another «sense of the mouth», see Woolgar, *The Senses in Late Medieval England*, op. cit., pp. 84-116; Ortúzar Escudero, M. J., *Die Sinne in den Schriften Hildegards von Bingen. Ein Beitrag zur Geschichte der Sinneswahrnehmung*, Stuttgart, Hiersemann, 2016, pp. 183-185.

Still, the *Speculum* considers touch (and then taste) as the more important of the senses, given its involvement in living. Additionally, Bartholomew and Vincent explicitly make use of a schema of sensation for explaining each sense (sight, hearing, smell, taste and touch). The medium and the sense organ have a place in both schemata. Vincent further considers the sensible object as the efficient cause of sense perception (more accurately, as the cause of non-material change in the organ of perception). Bartholomew, for his part, seems to regard the animal spirit as the cause of sensation, while Thomas makes no use of such a schema.

It could be argued that the most outstanding difference regarding the subject «sense perception» in the encyclopaedias is their treatment of the objects of the senses. Vincent treats them separately in association with the different elements of the world. Bartholomew considers them together in the book devoted to the «accidents». In *De natura rerum* they are almost completely absent. I will return to this point later.

Aristotle, Sense Perception and the Notion of «Accident» in the Encyclopaedias

The Writings of Aristotle in the Encyclopaedias

An approximate depiction of the use of Aristotle as a direct source in the chapters on the senses gives an impression of how significant the Aristotelian account of sense perception was in the outline of the encyclopaedias. Evidence of the zoological anatomy of Aristotle has recently been studied by Iolanda Ventura, primarily in Bartholomew's *De proprietatibus*, but also in the works of Thomas and Vincent²⁹. Interestingly, the corpus *De animalibus* (comprising the *Historia animalium*, *De partibus animalium* and *De generatione animalium*) plays an important role in the expositions on anatomy and, therefore, in the description of the organs of the senses³⁰. Ventura also notes that in his anatomical descriptions, Thomas makes use of Aristotle to accentuate the instrumental character of the different organs (not merely the organs of sense perception)³¹.

In the first part of Bartholomew's book on the soul (III.1-13), Michael C. Seymour identifies quotations from Aristotle's *De anima*. In the second part of the same book (III.13-24), which mainly follows the *Pantegni* of Constantine the African, excerpts from other Aristotelian writings have been documented (*Meteorologica*, *De generatione animalium*, *De partibus animalibus*)³². Besides quoting *De animalibus* (and to a minor extent, *De anima*) in the book on anatomy, Thomas refers explicitly to Aristotle's *De anima* in his account of the soul – while essentially dwelling on the Pseudo-Augustinian treatise *De spiritu et anima*. Vincent's account of sense perception, contained within his discussion on the animal soul (XXV), contains a number of quotations from *De anima* and *De sensu et sensato* as well, as shown by the references identified by the project «Sources des Encyclopédies Médiévales»

29 Ventura, I., «Bartolomeo Anglico e la cultura filosofica e scientifica dei frati nel XIII secolo: Aristotelismo e medicina nel *De proprietatibus rerum*», in Società Internazionale di Studi Francescani (ed.), *I francescani e le scienze*, Spoleto, Fondazione Centro italiano di studi sull'Alto Medioevo, 2012, pp. 49-140, at pp. 63-79.

30 For the role of Aristotle's quotations in book V of *De proprietatibus*, see *ibid.*, p. 81. For passages from the corpus *De animalibus*, see Seymour, M., *Bartholomaeus Anglicus and his Encyclopaedia*, Aldershot, Variorum, 1992, pp. 59-60. For citations of Aristotle in the zoological books of *Speculum naturale* (XVI-XXII), see also Ventura, *ibid.*, pp. 101-102.

31 Ventura, *ibid.*, pp. 95-96.

32 Seymour, *Bartholomaeus Anglicus and his Encyclopaedia*, op. cit., pp. 49-50.

(SourcEncyMe). In this book, many of the quotations from Albert the Great's *De homine* also refer to these two Aristotelian volumes (see Appendix 3).

A few quotations from *De sensu et sensato* appear in Vincent's exposition on odours and flavours. Nevertheless, in these descriptions, as well as in those concerning the objects of sight and hearing there is a crucial, indirect contribution from Aristotle: the description cites for the most part the account of the senses in Albert's *De homine*, which explicitly addresses several Aristotelian dicta and their commentaries by some Peripatetic authors. Bartholomew's book on accidents (XIX), in which he approaches the objects of sensation, refers at large to *De sensu et sensato*³³, also quoting from *De anima* and *De animalibus*³⁴. For this reason, authors such as Michael C. Seymour and Christel Meier-Staubach affirm that this last book is the most dependent on Aristotle in its intellectual scope and organisation³⁵. Nonetheless, it has also been alleged that Bartholomew's reading of Aristotle (basically, of *De sensu et sensato*) is somewhat superficial³⁶.

This characterisation demonstrates that, notwithstanding mentions of other Aristotelian works, these encyclopaedists are referring for their expositions on perception primarily to the corpus *De animalibus* and to the writings *De anima* and *De sensu et sensato*. The corpus on animals seems up to the task of providing descriptions of sense organs and certain other bodily parts involved in the working of sensation. *De anima* is, correspondingly, used to explain sensation as a power of the soul (and to a lesser degree it also finds its way into the chapters on anatomy). In the chapters on the object of the senses there is a discernible bias towards *De sensu et sensato*. The latter is rather striking since, as we have seen, these objects are treated in completely different parts of each encyclopaedia or are totally lacking (*De natura rerum*). At this point, the following questions suggest themselves: what do Bartholomew and Vincent consider to be the objects of the five senses? And, is it possible to find an answer in the writings of Aristotle (or, more precisely, in their contemporary Latin translations and explanations)? For a possible answer, what these two encyclopaedists understand by «accident» must be examined.

The Objects of Perception and the Notion of «Accident»

The Aristotelian account of the objects of sense perception, such as can be found in his *De anima* (II.6), is rendered by Vincent in his book on the animal soul by means of quotes from Albert the Great *De homine* (XXV.14). In accordance with this account, the «sensibilia», the objects of sensation, can be perceived «per se» and «per accidens». The objects of the senses «per se» are two: the proper sensibles (*sensibile proprium*), sensible characteristics that actualise one and just one sense faculty (in the way that colour and flavour actualise vision and taste, respectively); and the common sensibles (*sensibilia communia*),

33 Ventura, «Bartolomeo Anglico e la cultura filosofica e scientifica dei frati nel XIII secolo: Aristotelismo e medicina nel *De proprietatibus rerum*», op. cit., p. 72.

34 Seymour, *Bartholomaeus Anglicus and his Encyclopedia*, op. cit., pp. 232,238. In the book on colours, Bartholomew also uses «subsidiary material» from *Meteorologica*, *Metaphysica*, and *De generatione et corruptione*, cf. *ibid.*, p. 237.

35 *Ibid.*, p. 232; Meier-Staubach, «La matérialité et l'immatérialité des couleurs: A propos du traité 'De coloribus' d'Avranches 235», in L. Callebaut and O. Desbordes (eds.), *Science antique – Science médiévale*, Hildesheim, Olms-Weidmann, 2000, pp. 451-469; Ill. 1-11, at pp. 458-459.

36 Ventura, «Bartolomeo Anglico e la cultura filosofica e scientifica dei frati nel XIII secolo: Aristotelismo e medicina nel *De proprietatibus rerum*», op. cit., pp. 71-72.

which are perceived simultaneously by several senses (perceptual quantities such as motion, repose, number, shape and size). There are also characteristics of perception that are perceived «accidentally» (*per accidens*). This refers to the perception of other contents when we perceive the proper sensibles. Thus, when we perceive «white» we also accidentally perceive other contents, such as the son of Diares³⁷.

Vincent also quotes Albert when explaining the being of the sensible object in the object, the sense organ and the medium (XXV.15). For the three senses that have an external medium (vision, audition and olfaction): in the object, this being is according to nature (= material being); in the sense organ, this being is according to the «intention» or the «form» (= spiritual being); and in the medium, it is according to the same medium (= sensible being). In this way, colour – the proper sensible or the object of vision – exists in the coloured thing so as in matter, and in air so as in medium. The fact that the sensible object is not in the same way in the object as it is in the medium is shown by the fact that the medium does not adopt the characteristic of the sensible object: to continue our example, it does not turn coloured. It is also the action of the medium, and not of matter, that has its effect on the sense organ. Colours, sounds and odours are in their medium, the air, as in transit or in via. Not «in via», but «in act» is the perceptible characteristic in the object and the sense organ. The two senses that have an intrinsic medium do have *sensibilia* that are the same in the object, the medium and the sense organ. Their *sensibilia* acquire their spiritual being (*esse spirituale*) by means of the animal spirit that attracts and conveys to the brain the intentions of these *sensibilia*³⁸.

The view of perception according to Aristotle and Albert indicates that the objects of perception are ultimately grounded in the features of the world. This realistic approach is also underscored by the distinction of the proper objects of perception: colour, odour, sound and flavour are able to actualise a sense faculty³⁹. This understanding corresponds to the ordering of the objects of the senses in Vincent's *Speculum naturale*: they are examined together with the sensible world and the things that are in it. The discussion of colour as a phenomenon that depends on light, points to a conception of the objects of the senses as regards their corporeal, material being⁴⁰. Since air (and also water) is both the matter and the medium for sounds and odours, the objects of hearing and smell are encompassed in the exposition on the firmament (more accurately, on the «airy heaven»). As the matter and medium of taste have to do with the «wet», flavours are dealt with together with water(s). In this manner, Vincent arranges the *sensibilia* according to their being in the object (their material being)⁴¹. Thus, Vincent is

37 Vincentius Belvacentis, *Speculum naturale*, op. cit., XXV.14. See Tellkamp, J., *Sinne, Gegenstände und Sensibilia. Zur Wahrnehmungslehre des Thomas von Aquin*, Leiden, Brill, 1999, pp. 16-17.

38 Vincentius Belvacentis, *Speculum naturale*, op. cit., XXV.15. Cf. Dewan, L., «St. Albert, the Sensibles, and Spiritual Being», in J. Weisheipl (ed.), *Albertus Magnus and the Sciences: Commemorative Essays*, Toronto, Pontifical Institute of Mediaeval Studies, 1980, pp. 291–320, at p. 301; Anzulewicz, H., «Konzeptionen und Perspektiven der Sinneswahrnehmung im System Alberts des Grossen», *Micrologus*, 10 (2002), pp. 199-238, at 220-221.

39 In contrast to the other senses, the objects of touch are manifold: it is possible to distinguish between cold and warm, hard and soft, rough and smooth, dry and moist. These are not presented individually in the encyclopaedias.

40 For the ontology of colours in the *Speculum naturale*, see also Schmidt, H.-J., «Was sind Farben? Fragen und Antworten in der Enzyklopädie von Vinzenz von Beauvais», in I. Bennewitz and A. Schindler (eds.), *Farbe im Mittelalter*, Berlin, Akademie, 2011, pp. 1035-1045, at pp. 1039-1041.

41 The characterisation of the proper object and medium of hearing, smell and taste follows the account of Albert's *De homine*, as interpreted by Dewan, «St. Albert, the Sensibles, and Spiritual Being», op. cit., pp.

resorting to Aristotelian epistemology and its ontology of the objects of perception for the organisation of his encyclopaedia.

The place of the objects of the senses in *De proprietatibus* is somewhat at odds with the Aristotelian account of perception and his ontology of the objects of perception: according to this account, the objects of the senses are «accidents» only if they are not regarded «per se», that is, only if they refer to other individual objects.

Regarding the last books of Bartholomew's encyclopaedia (XVI-XVIII), Christel Meier has argued that to some extent they follow an Aristotelian-Stoic «existence-grading»: they deal first with minerals, then with plants and finally with animals that are able to perceive through the senses⁴². In a way, the book on accidents concludes this exposition, handling the qualities that accompany things but which, outside of the objects, produce sensations that animals are capable of sensing⁴³.

Notwithstanding Christel Meier's explanation, the order chosen by Bartholomew seems to be grounded more fundamentally in the distinction between substances and accidents considered from an ontological point of view. Accidents, writes Aristotle in his *Metaphysics*, «are attributes and they attach to subjects»⁴⁴. Furthermore, in his *Categories* accidents are considered non-substances, as characteristics that are in the substances and inhere them. These non-substances (or things that are in a subject) have an ontological dependence on the subjects in which they inhere⁴⁵.

This meaning of accident is precisely what Bartholomew seems to have in mind. At the opening of his encyclopaedia, he states that the distinction and order of the substances is followed by their properties⁴⁶. His work, therefore, handles the properties that can be attributed to the substances. Eighteen books of his encyclopaedia regard the properties of bodily and spiritual things: things such as God, angels, human beings, elements, animals, plants, stones and minerals. These are the substances that can undergo changes. In the opening of this last book, he explicitly writes that he has already considered the spiritual and corporeal properties of things, and that his last book attends to «some accidents of the corporeal things that come along with the substances»⁴⁷. These accidents, he affirms, are the colours, odours, flavours

297-300. Further investigation will contribute to a more accurate understanding of the notion of objects and media of perception in the *Speculum naturale*.

42 Meier, C., «Text und Kontext: Steine und Farben bei Bartholomäus Anglicus in ihren Werk- und Diskurszusammenhängen», in B. van den Abeele and H. Meyer (eds.), *De proprietatibus rerum*, op. cit., pp. 151-184, at p. 152.

43 Meier-Staubach, C., «La matérialité et l'immatérialité des couleurs: A propos du traité 'De coloribus' d'Avranches 235», op. cit., at pp. 458-459.

44 Aristóteles, *Metafísica*, ed. V. García Yebra, Madrid, Gredos, 1982, Δ 30.

45 See Cohen, S. M., «Accidental Beings in Aristotle's Ontology», in G. Anagnostopoulos and F. D. Miller Jr. (eds.), *Reason and Analysis in Ancient Greek Philosophy. Essays in Honor of David Keyt*, Dordrecht, Springer, 2013, pp. 231-242.

46 Bartholomaeus Anglicus, *De proprietatibus rerum*, op. cit., Prohemium: «Cum proprietates rerum sequantur substantias, secundum distinctionem et ordinem substantiarum erit ordo et distinctio proprietatum, de quibus adiutorio divino est presens opusculum compilatum [...]; see *Ibid.*: [...] In quo [opusculo] agitur de quibusdam proprietatibus rerum naturalium, quarum alia est incorporea, alia corporea».

47 Bartholomaeus Anglicus, *De genuinis rerum coelestium, terrestrium et inferarum proprietatibus*, op. cit., XIX. Proemium: «Descriptis proprietatibus rerum spiritualium & corporalium, tam simplicium quam compositarum, prout ad manus nostras pervenire poterunt. Nunc postremo de quibusdam accidentibus corporalium rerum substantias concomitantibus (cooperante diuina gratia) et hic attendendum. Primo de colore: secundo de odore: tertio de sapore: vltimo de liquore».

and fluids. These objects of the senses are clearly considered as non-substances; as characteristics that are in the substances but not inherent to them. Their classification as accidents, together with types of milk and eggs (qualities of things) and with number, weight and measures (quantities of things), corroborates this interpretation. Therefore, it is safe to maintain that Bartholomew regards the objects of perception not as existing in themselves but as referring to other objects⁴⁸.

Conclusion

As we have seen, Vincent explicitly quotes the Aristotelian account of sense perception and sticks to the conception of the *sensibilia* as having a material being in their objects. In contrast, Bartholomew does not address the question of the ontology of the objects of perception. The arrangement of *De proprietatibus* reveals that he instead considers the ontology of the things as such. This permits him to treat the objects of sensation, in the first place, as accompanying features of the objects and not as objects in their own right. Whereas Vincent incorporates into his discussion of the *sensibilia* the features of the world, Bartholomew is concerned with them as qualities (and quantities) that are not inherent in things. The difference between both authors is based on this: while Vincent resorts to Aristotelian epistemology for understanding the being of the objects of the senses, Bartholomew departs from his ontology.

Appendix 1

Sense Perception in Thomas's *De rerum natura*

Anatomy (Book I)

Organs related to sensation

I.2 Head (mention of the eyes)

I.3 Brain (mention of touch; and short discussion of sensation as destruction)

I.6 Eyes

I.8 Ears

I.9 Nose

I.11 Mouth

I.13 Tongue

I.14 Voice

I.15 Uvula

I.18 Throat

I.21 Arms

I.23 Hands

48 This appears to have a correlate in contemporary medical texts, where «accidens» often means symptom. See, for instance, the term «accidens» in *Mittellateinisches Wörterbuch bis zum ausgehenden 13. Jahrhundert*, vol. I, ed. O. Prinz, München, C.H. Beck, 1967, col. 56. I thank Alasdair Watson for pointing out to me this meaning in the Arabic medical literature. Katelynn Robinson also provided me with some examples of odour taken to be a symptom. The medical term for emotions, *accidentia anime*, is also understood as a «non-natural», as Naama Cohen-Hanegbi and Nicole Archambeau pointed out to me.

Psychology (Book II)*Remarks on senses and sensation*

- II.4 «Sensus» as the first step towards knowledge of God
- II.5 «Sensus» as perceiving bodies and exterior things; as the first step towards knowledge of God
- II.6 Relationship between the rational and the sensitive soul
- II.9 Soul is called «sense» when it senses; «sense» as a potency of the soul
- II.10 Relationship between soul and body
- II.11 Dependence of touch and taste on the heart, and of sight, hearing and smell on the brain
- II.13 Augustinian division (*visio corporalis, spiritualis, intellectualis*)
- II.15 Doctrine of the *pneuma* and the origin of the senses

Appendix 2**Sense Perception in Bartholomew's *De proprietatibus rerum*****Psychology (Book III)***Diverse mentions of sense and sensation*

- III.5 On the various names of the soul
- III.6 «Sense» as a power when considering the relation between the soul and the body
- III.9 On the sensitive soul, the apprehensive virtues and the five senses
- III.12 On the medical distinction: the animal power as the cause of the operation of the senses
- III.14 On sense as one of the operations of the animal power

Proper treatment of the senses

- III.16 On the animal virtue; hierarchy of the senses
- III.17 On the visual virtue
- III.18 On the hearing virtue
- III.19 On the sense of smell
- III.20 On the sense of taste
- III.21 On the sense of touch
- III.22 Sensation as a result of the animal spirit

Anatomy (Book V)*Organs related to sensation*

- (V.1 Passage on sensation)
- (V.2 Passage on sensation)
- V.3 On the brain
- V.5 On eyes

- V.6 On the position of the eyes
- V.7 On pupils
- V.12 On ears
- V.13 On nose
- V.17 On lips
- V.19 On mouth
- V.21 On tongue
- V.22 On saliva
- V.23 On voice
- V.24 On throat
- V.27 On arms
- V.28 On hands

Accidents (Book XIX)

On «accidents»

XIX.Prooemium

On colour

- XIX.1 On the substance of colour
- XIX.2 On the substance of the colour black
- XIX.3 On the generation of the colour white
- XIX.4 The degrees between white and black
- XIX.5 On the action of warm and cold
- XIX.6 On the manifold *species* of colour
- XIX.7 On the opinion of some, according to which the light is the substance of colours
- XIX.8 On change of colour
- XIX.9 On colour in the eyes
- XIX.10 On particular colours
- XIX.11 On the colours blue (or blue-green; *glaucus*) and yellow
- XIX.12 On the colour yellow-green (*pallidus*)
- XIX.13 On the colour red
- XIX.14 On yellow (saffron-coloured; *croceus*)
- XIX.15 On yellow (saffron-coloured; *croceus*)
- XIX.16 On the colour cinnabar-red (*minius*)
- XIX.17 On the colour crimson-red (*puniceus*)
- XIX.18 On the colour green
- XIX.19 On bluish colour (*liuidus*)
- XIX.20 On bluish colour (*liuidus*)
- XIX.21 On the colour indigo (*indicus*)
- XIX.22 On blackness

- XIX.23 On red ochre (*sinopis*)
 XIX.24 On «Scyric» ochre
 XIX.25 On cinnabar-red (*minium*)
 XIX.26 On the 'pigment obtained from the gum of the dragon's-blood tree' (*cinnabaris*)
 XIX.27 On leek-green (*prasinus*)
 XIX.28 On Sandarach (a red colouring matter; *sandaracha*)
 XIX.29 On orpiment (*arsenicum*)
 XIX.30 On yellow ochre (*ochra*)
 XIX.31 On indigo (*indicum*)
 XIX.32 On black liquid / ink (*atramentum*)
 XIX.33 On quince-yellow colour (*melinus*)
 XIX.34 On antimony [powder] (*stibium*)
 XIX.35 On ceruse (*cerussa*)
 XIX.36 On purple (*purpurea*)

On odour

- XIX.37 On odour
 XIX.38 On the effects of odour
 XIX.39 On stench

On flavour

- XIX.40. On flavour
 XIX.41. On pure sweetness and its effect
 XIX.42. On sweet flavour
 XIX.43. On greasy flavour
 XIX.44. On salty flavour
 XIX.45. On bitter flavour
 XIX.46. On sharp (*acutus*) flavour
 XIX.47. On acid flavour
 XIX.48. On brackish (*ponticus*) flavour
 XIX.49. On astringent flavour
 XIX.50. On tasteless flavour

Appendix 3
Sense Perception in Vincent's *Speculum naturale*⁴⁹

Psychology (Book XXV)

General considerations

Chapter	Quotation	Quotation	Quotation	Quotation
8. Sensitive apprehensive power	Hugo (Ps. Alcher of Clairvaux)	John of La Rochelle		
9. Outer sensitive apprehensive power	Haly Abbas	Aristotle, <i>De sensu et sensato</i>	Aristotle, <i>De anima</i>	
10. Organ or medium	Augustine			
11. The brain as commanding the senses and voluntary movement	Augustine			
12. Receptivity of the senses	Aristotle, <i>De anima</i>	William of Conches	Albert	
13. Sense: sensitive and not sensitive	Albert			
14. Sensible: «per se» and «per accidens»	Albert			
15. Being of the <i>sensibilia</i> in the object, in the medium and in the sense	Albert			
16. Ability of the senses to perceive forms	Albert			
17. Number and name of the senses	Isidore	Aristotle, <i>De anima</i>	Aristotle, <i>De animalibus</i>	Philosopher, (<i>De anima et potenciis eius</i>)
18. There are only five senses	Albert			
19. On the same	Albert			

⁴⁹ The sources are systematically named in the *Speculum naturale*. In the case of habitual misattributions, I have added the actual authors in parenthesis. As regards the Aristotelian writings, I follow (where specified) the citations identified by the project SourceEncyMe (Sources des Encyclopédies Médiévales; <http://sourcenency.me.irht.cnrs.fr/>).

20. Other reasons	John of La Rochelle			
21. Another reason	John of La Rochelle			
22. Disposition of the five senses in the body	Isidore	Aristotle, <i>De animalibus</i>	Actor	<i>De natura rerum</i>
23. Order of the senses	Albert			
24. Sense organs	John of La Rochelle	William of Conches		
25. Medium of the senses	John of La Rochelle	Avicenna		
26. Object of the senses	Philosopher (<i>De anima et potenciis eius</i>)			
27. Inclination of the senses towards their objects	Haly Abbas			

Sight

Chapter	Quotation	Quotation	Quotation	Quotation
28. Definition	John of Damascus	Gregor of Nizza (Nemesius of Emesa)	Avicenna	Actor
29. Organ	Haly Abbas	William of Conches		
30. Velocity	William of Conches	Haly Abbas		
31. «Extramission»	William of Conches			
32. «Extramission»	William of Conches			
33. Eyes' humid nature	Albert			
34. Vision hindered	Albert	William of Conches		
35. Animals' night vision	William of Conches	Albert		
36. Eyes' fiery nature	Albert			
37. Against eyes' fiery nature	Albert			
38. Against eyes' fiery nature	Albert			
39. Object	Albert	Aristotle, <i>De anima</i>	Actor	
40. Object	Albert			

41. Medium	Albert			
42. Species	Albert			
43. Ways of seeing	Aulus Gellius	Helinand of Froidmont	Albert	
44. Medium	Albert			
45. Medium	Albert			
46. Against the extramission theory	Albert			
47. Refutation of arguments pro «extramission»	Albert			
48. Refutation of arguments pro «extramission»	Albert			
49. Double-Seeing	Albert			

Hearing

Chapter	Quotation	Quotation	Quotation	Quotation
50. Definition	Avicenna	Albert		
51. Second sense	Aristotle, <i>De sensu et sensato</i>	Albert		
52. Organ	Albert	Haly Abbas		
53. Ears' form and mobility	Albert			
54. Object (Sound)	Algazel	Augustine	Aristotle, <i>De anima</i>	
55. Definition of Sound	Algazel	Albert		
56. Voice	Albert			
57. Meaning of voice	Albert			
58. Hearing of voice	William of Conches			
59. Sound as more penetrating	William of Conches			
60. Medium	Albert			

Smell

Chapter	Quotation	Quotation	Quotation	Quotation
61. Definition	[Albert]			
62. Organ	William of Conches	Haly Abbas		
63. Organ nature	Albert			
64. Object	John of Damascus	Aristotle, <i>De anima</i>	Aristotle, <i>De sensu et sensato</i>	Actor
65. Medium	Albert			
66. Medium	Albert			
67. Respiration and Smell	Albert			
68. Humans' lesser sense of smell	Albert			
69. Delight in smell	Albert			

Taste

Chapter	Quotation	Quotation	Quotation	Quotation
70. Definition	Avicenna	Albert		
71. Organ	William of Conches	Haly Abbas		
72. Object	Aristotle, <i>De sensu et sensato</i>	Aristotle, <i>De anima</i>	Aristotle, <i>De sensu et sensato</i>	Actor
73. Medium	Albert			
74. Similarity to touch	Albert			
75. Instrument of taste and touch	Aristotle, <i>De sensu et sensato</i>	Albert		

Touch

Chapter	Quotation	Quotation	Quotation	Quotation
76. Definition	Avicenna	Algazel	John of Damascus	Albert
77. Merely one sense	Albert			
78. Characteristics	Aristotle, <i>De anima</i>	Aristotle, <i>De anima</i>		
79. Organ	Haly Abbas	William of Conches		
80. Object	Albert			
81. Medium	Albert			
82. Pain and pleasure	Albert			
83. Some «questions»	Albert			

Anatomy*Sense perception and sense organs in all animals (Book XXI)*

Chapter	Quot.	Quotation	Quot.	Quot.	Quot.
1. Universal nature of animals	Actor	Aristotle			
4. Members of animals	Aristotle	Constantine			
5. On the head	Plinius	Aristotle			
6. Brain	Plinius	Aristotle			
10. Ears	Aristotle	Albert	Plinius		
12. Eyes	Aristotle				
13. Eyelids	Aristotle	<i>De naturis rerum</i>			
14. Different eyes of various animals	Plinius				
15. Eyes	Aristotle	<i>De naturis rerum</i>			
16. Cheeks and nose	Plinius	Aristotle	Isaac		
17. Mouth	Aristotle	Plinius	Isaac		
18. Tongue	Aristotle	Plinius	Isaac	Aristotle	
23. Arms, chest, ribs	Actor	Aristotle	Plinius	Aristotle	Plinius

Voice and senses in animals (Book XXII)

Chapter	Quotation	Quotation
4. Animals' voices	Aristotle	
5. Animals' voices	Plinius	
6. Variety of voices	Papias	
7. Senses of animals	Aristotle	Plinius
8. Sight and touch	Aristotle, <i>De animalibus</i>	<i>De natura rerum</i>
9. Other three senses	Aristotle, <i>De animalibus</i>	

Sense organs and organs that help sensation in human anatomy (Book XXVIII)

Chapter	Quotation	Quotation	Quotation	Quotation	Quot.	Quot.
26. Flesh	Isidore	Aristotle, <i>De animalibus</i>	Constantine	<i>De natura rerum</i>	Rhazes	
30. Skin	Constantine	Isidore	Aristotle, <i>De animalibus</i>	<i>De natura rerum</i>		
40. Brain	<i>De anatomia</i>	Constantine	Avicenna	Rhazes		
41. Brain ventricles	Constantine	<i>De anatomia</i>				
43. Brain	<i>De anatomia</i>					
44. Neck, sensation and movement	<i>De anatomia</i>	Rhazes				
46. Eyes	Isidore	Rhazes				
47. Eyes' characteristics	<i>De natura rerum</i>	Aristoteles, <i>De animalibus</i>	Plinius			
48. Eyes' position	Avicenna	Constantine	Constantine			
49. Eyes' composition	Constantine					
50. On eyes' physiognomy	Rhazes					
51. Ears	Isidore	Constantine	Avicenna	Aristotle, <i>De animalibus</i>	Rhazes	Avicenna
52. Nose	Isidore	Constantine	Avicenna	Rhazes		
53. Mouth and lips	Isidore	Avicenna	Rhazes	Aristotle, <i>De animalibus</i>	<i>De natura rerum</i>	Rhazes
54. Tongue	Isidore	Rhazes	Constantine	Avicenna		
55. Tasks of tongue	Aristotle, <i>De animalibus</i>	<i>De anatomia</i>	<i>De natura rerum</i>			

56. Uvula and amygdala	Constantine	Avicenna				
57. Throat	Constantine	Constantine	<i>De natura rerum</i>			
65. Voice's instruments	Actor	Isidore	<i>De anatomia</i>	<i>De natura rerum</i>		
85. Head and Sensation	Actor	Isidore	Aristotle, <i>De animalibus</i>	Avicenna	Isidore	

Objects of Sensation (*sensibilia*)

Of Sight (Book II)

Light and Darkness

Chapter	Quot.	Quot.	Quotation	Quotation	Quotation
[32–47 on light, many aspects]					
48. Illumination as transformation	Albert				
49. How do we see light?	Albert				
50. Warm or cold?	Albert				
751. Difference between light of fire and the light of celestial bodies	Albert				
752. Fire does not consume mixed bodies	Albert				
53. Animals who see in the darkness	Albert				
54. Animals who see in the darkness	Albert				
55. Things that are seen by day and night	Albert				
82. Light as the hypostasis of colours	Nicolas Peripatet.				
83. Light and shadow	Alexander	Augustine	Philosopher (Aristotle)	Hugo (Ps. Alcher)	Philosopher (Aristotle)

Object of vision by light: Colour

Chapter	Quotation
56. As object of vision	Albert
57. Nature	Albert
58. Visibility of colours after Averroes	Albert
59. About this definition	Albert
60. Definition of colour after Aristotle	Albert
61. Argument against Aristotle	Albert
62. Conformation	Albert
63. Conformation in the bodies	Albert
64. Humours and conformation	Albert
65. Medium for their conformation	Albert
66. Different kinds and number	Albert
67. Different colours and number	Albert
68. Transformation of one colour into another	Albert
69. Properties of black	Albert
70. Conformation of colours in clouds	Albert
71. As object of vision	Albert

Forms in mirrors

Chapter	Quotation	Quotation
72. Mirror	Albert	
73. Generation of forms in mirrors	Albert	
74. Forms' generation in mirrors and in the subject	Albert	
75. As habit or disposition	Albert	
76. Reception	Albert	
77. Reception after Euclides	Albert	
78. «Receptible» nature of the mirror	Albert	
79. Metallic mirrors	Albert	
80. Variation of the image in the mirror	Albert	
81. Flat mirrors	Albert	Actor

Of Hearing: Sound (Book IV)

Chapter	Quotation
15. Composition of different sounds	Albert
16. Air as «receptible» of sounds	Albert
17. Echo	Albert
18. Simultaneous sounds interfering between themselves	Albert
19. Different kinds	Albert
20. Twofold medium (air and water)	Albert
21. Twofold medium	Albert

Of Smell: Odour (Book IV)

Chapter	Quotation	Quotation
100. On odour	Actor	William of Conches
101. A simple or composite quality?	Albert	
102. Favourable: warm and dry vapour	Albert	
103. Change through evaporations	Albert	
104. Odour and Flavour	Albert	
105. «Odourable» bodies after Aristotle	Albert	
106. Odour of some metals	Aristotle, <i>De sensu et sensato</i>	Albert
107. Odour of food and medicines	Rhazes	Avicenna
108. Different odours	Albert	

Of Taste: Flavours (Book V)

Chapter	Quot.	Quotation	Quotation	Quotation	Quotation	Quot.
56. Kinds	Seneca	Aristotle, <i>De sensu et sensato</i>	Constantine	Avicenna	Constantine	Isaac
57. Kinds	Actor	Albert				
58. Causes	Albert					
59. Generation from first qualities	Albert					
60. Simple or composite?	Albert					
61. On the same	Albert					
62. Food composition	Haly Abbas					
63. Number	Avicenna					
64. Operation and effect	Avicenna	Haly Abbas				
65. Operation and effect	Rhazes					
66. Humoral basis	Rhazes					
67. Humoral basis	Rhazes					

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