

STUDYING THE ARTS IN LATE MEDIEVAL BOHEMIA

STUDIA ARTISTARUM
ÉTUDES SUR LA FACULTÉ DES ARTS DANS LES UNIVERSITÉS MÉDIÉVALES

48

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Studying the Arts in Late Medieval Bohemia

Production, Reception and Transmission of Knowledge

Edited by

OTA PAVLÍČEK

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Abbreviations

| | |
|-------|--|
| BAV | Biblioteca Apostolica Vaticana |
| BJ | Biblioteka Jagiellońska |
| GP | [MOSES MAIMONIDES] <i>Guide of the Perplexed</i> |
| IMHM | Institute of Microfilmed Hebrew Manuscripts |
| KMK | Knihovna pražské metropolitní kapituly |
| NK ČR | Národní knihovna České republiky |
| ÖNB | Österreichische Nationalbibliothek |

Studying and Discussing Optics at the Prague Faculty of Arts: Optical Topics and Authorities in Prague Quodlibets and John of Borotín's *Quaestio* on Extramission*

Introduction

This paper aims to consider the extent to which the medieval optical tradition (*perspectiva*), its texts, issues and terminology were known to, assimilated by and further investigated by arts masters at Prague University in the late fourteenth and early fifteenth centuries. At first sight, the prospects of such an endeavor appear rather dim. If the numbers of the manuscripts including optical texts extant in Prague libraries are considered, Prague seems anything but a center of optical studies. Nowadays, there are only two copies of Roger Bacon's *Perspectiva* (MS Prague, NK ČR, VIII E 27; MS Prague, NK ČR, VIII G 19) and three copies of John Peckham's textbook *Perspectiva communis* (MS Prague, KMK, L 29; MS Prague, KMK, L 41; MS Prague, NK ČR, adlig. 44 E 8), i.e. rather elementary renderings of optical science; while the scientifically more rigorous Alhacen, Witelo or Euclid are entirely lacking¹. The situation was probably no better in medieval times – according to the catalogs of the late medieval libraries of Prague University colleges, recently published by F. Šma-

* Work on this study received financial support from the Czech Science Foundation (GA ČR) project "Philosophy at the University of Prague around 1409: Matěj of Knín's *Quodlibet* as a Crossroads of European Medieval Knowledge", grant n. 19–16793S, carried out at the Institute of Philosophy of the Czech Academy of Sciences.

¹ See D. C. LINDBERG, *A Catalogue of Medieval and Renaissance Optical Manuscripts*, Toronto, Pontifical Institute of Mediaeval Studies, 1975, *passim*. Codices kept in Prague Metropolitan Chapter Library are described by A. PATERA, A. PODLAHA, *Soupis rukopisů knihovny metropolitní kapitoly pražské* [Catalog of Manuscripts of the Prague Metropolitan Chapter Library], 2 vols, Prague, Česká akademie věd a umění, 1910–1922, codices in the National Library by J. TRUHLÁŘ, *Catalogus codicum manu scriptorum latinorum qui in C. R. Bibliotheca publica atque Universitatis Pragensis asservantur*, 2 vols, Praha, Regiae Societatis Scientiarum Bohemicae, 1905–1906.

There is also a fragment on pinhole images copied from Peckham's *Perspectiva communis* (I. prop. 5) in MS Prague, NK ČR, VIII G 19, fol. 41r. See the new description of the codex MS Prague, NK ČR, VIII G 19 prepared by D. A. Di Liscia and S. Rommevaux-Tani in the forthcoming Brill volume (D. A. Di LISCIA, E. D. SYLLA (eds.), *Quantifying Aristotle. The Impact, Spread and Decline of the Calculatores Tradition*).

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hel and Z. Silagiová, there were only three copies of optical textbooks in these libraries (one of Bacon and two of Peckham)². Further, no commentary (or even glosses) to any optical text of Prague origin has been discovered to date³.

The small number of Prague optical manuscripts is particularly notable if manuscripts from the same period kept in other Central European university centers (mainly Cracow and Vienna) are considered: there are eight extant copies of Peckham's *Perspectiva communis* from the fourteenth to fifteenth centuries in Cracow and seven copies in Vienna⁴. Additionally, several commentaries on Peckham originated at Cracow University⁵, and Vienna University benefited from the presence of one of the most famous late medieval commentators on *perspectiva*, Henry of Langenstein⁶.

It may seem that there is nothing to investigate in Prague, that the extant sources are too scarce to evaluate the role of optical science at the Prague Faculty of Arts. After all, this is the honest surrender taken by Polish science historian Grażyna Rosińska in her book on optics in the fifteenth century: she admits that in the absence of manuscripts, she was not able to investigate the optical tradition at Prague University, no matter how significant it might be⁷.

2 See *Catalogi librorum vetustissimi Universitatis Pragensis / Die ältesten Bücherkataloge der Prager Universität*, eds. Z. SILAGIOVÁ, F. ŠMAHEL, Turnhout, Brepols, 2015, p. 51 (shelfmark R II: Q7), 146–147 (shelfmark N II: O10).

3 It might be objected that there is a disputed question on visual perception in MS Prague, NK ČR, VIII E 27, fols 1r–3v (called *Quaestio de apprehensione rerum per visum disputata Erfordie* in TRUHLÁŘ, *Catalogus*, vol. I, p. 573 and LINDBERG, *A Catalogue*, p. 31). However, this codex was most likely written in Erfurt and the question itself was disputed there around 1350 by a disciple of Themo Judaei. See J. PINBORG, “The 14th Century schools of Erfurt. Repertorium Erfordienese”, in *Cahiers de l’Institut du Moyen-Âge Grec et Latin*, 41 (1982), p. 186. Although the copy of *Sphaera materialis* included in the same codex was used by the later owner of the codex, Petrus de Dwekaczowicz called Bibat, in his lectures on the same subject in 1448 and 1450 (see TRUHLÁŘ, *Catalogus*, vol. I, p. 573), the perspectivist *quaestio*, as far as I know, had no significant influence on the Prague intellectual milieu. An edition of this *quaestio* is under preparation by Jean Celeyrette, see J. CELEYRETTE, “Une question de perspective disputée à Erfurt partiellement copiée sur une question d’Oresme”, in *Noctua*, 5 (2019), p. 125–179.

Further, I discovered hitherto unknown anonymous questions on *perspectiva* in MS Prague, KMK, M 100, fols 69rb–72rb (I am preparing a new description of the codex and edition of the questions). Nevertheless, the codex seems to have been assembled outside Prague (probably in Paris), and there is no indication of any kind of reception of these questions in Prague.

4 Cf. LINDBERG, *A Catalogue*, p. 69, 71.

5 Grażyna Rosińska identified and scrutinized four Cracovian commentaries – an anonymous lecture reported by John of Ludzisko (1421), a commentary by Sędziwój of Czechel (1430) and two anonymous lectures by students of Marcin Król (Martinus Rex) of Żurawica (1444 and 1454). See G. ROSIŃSKA, *Optyka w XV wieku. Między nauką średniowieczną a nowożytną* [Fifteenth-Century Optics. Between Medieval and Modern Science], Wrocław, Ossolineum, 1986, p. 51–109, 182–184 (English summary). See also mentions of Sędziwój made by D. C. LINDBERG, *John Peckham and the Science of Optics. Perspectiva communis. Edited with an introduction, English Translation, and Critical Notes*, Madison / Milwaukee / London, University of Wisconsin Press, 1970, p. 13–14, 30–31.

6 It ought to be said that Henry of Langenstein wrote his *quaestiones* on Peckham's *Perspectiva communis* early in his career as a regent master in Paris, probably as early as in the 1360s (for Henry's life and the dates of his works see N. H. STENECK, *Science and Creation in the Middle Ages: Henry of Langenstein (d. 1397) on Genesis, Notre Dame*, University of Notre Dame Press, 1976, p. 9–22, for his tenets in optics and theory of light see p. 42–52.

7 ROSIŃSKA, *Optyka w XV wieku*, p. 17–18.

The main aim of the present paper is to point out that efforts to investigate *perspectiva* in the context of late medieval Prague University are not so vain. As counting optical manuscripts kept in a local library is now neither the only nor the best way to judge the dissemination of *perspectiva* in this place in the later Middle Ages, I suggest other ways to deal with the issue and argue that there are other types of sources to be considered. Therefore, section I inquires into studying optics at the Prague Faculty of Arts, highlighting both the faculty statutes and students' lists of the lectures actually attended. Also, it argues for a certain knowledge of optics among a considerable number of university members at least since the 1370s, by pointing to two lectures or commentaries (a philosophical one by Jenek of Prague and a theological one by Conrad of Soltau) whose authors assumed an acquaintance with *perspectiva* among their listeners. Section II draws attention to a type of source which – despite its arguable fruitfulness – has been under-investigated by historians of science: Prague quodlibetal disputations (1390s – 1410s), or the handbooks prepared by masters presiding over the quodlibets (*quodlibetarii*) and the elaborated *positiones* of the responding masters. Even a brief look at these texts reveals the acquaintance of the participants with optical *auctoritates* (e.g. the preparation of Simon of Tišnov [Šimon z Tišnova in Czech]). Finally, section III, the most extensive, represents the core of the paper and brings a thorough analysis of the question on the mechanism of vision (*Utrum sensationes fiunt per extramissiones virtutum ab organis sensitivis*) disputed by the Bohemian master John of Borotín (Iohannes de Borotin, 1378 – after 1458) in John Hus's *quodlibet* in 1411. The manuscript preservation of the question and its formal structure, as well as Borotín's sources and doctrinal position, are scrutinized. Borotín's question evinces that its author mastered John Peckham's textbook *Perspectiva communis* and adopted Peckham's view on the mechanism of vision, proposing a position intromissionist in general but also involving a kind of extramission. The paper also has two appendices – the first provides a description of part of MS Prague, NK ČR, X H 18 preserving Borotín's question, while Appendix II is a critical edition of the question.

1. Studying Optics at the Prague Faculty of Arts

First, it is worth premising what medieval optics is about. A marginal gloss in one of the Prague manuscripts of Peckham's *Perspectiva communis* introduces a brief definition of the discipline: "Optics is a doctrinal science about light, colors and 'aspects'⁸." First, *perspectiva* is called a "doctrinal science". In the Middle Ages, "doctrinal sciences" are those abstracting away from the specific physical realization of the object under consideration; roughly, mathematical studies – besides optics, arithmetic, geometry, or astronomy – are counted among them⁹. They investigate

8 IOHANNES PECKHAM, *Perspectiva communis*, MS Prague, KMK, L 29, fol. 21r, in *mg. sup.*: "Perspectiva est lucium, colorum et aspectuum doctrinalis sciencia."

9 See, e.g., ISIDORUS HISPALENSIS, *Etymologiarum sive Originum libri XX*, 2 vols, ed. W. M. LINDSAY, Oxford, Clarendon Press, 1911, III. Prol.; sometimes, the term "scientia disciplinalis" is used; see DOMINI-

some features of nature (such as the propagation of light, its reflection or refraction in optics), but only insofar as they can be described using geometry. More Aristotelian classifications subsume optics (along with astronomy and harmonics) under the so-called “middle sciences” (*scientiae mediae*) belonging both to mathematics and natural philosophy¹⁰. Second, the gloss determines the object of optics – it studies not only light and colors but also *aspectus*, i.e. the appearances of things (hence, some optical texts and the whole science are sometimes called “de aspectibus”). In other words, medieval optics is not only a physics of the propagation of light but also an investigation of the physiological and even psychological processes behind visual acts. Hence, the scope of medieval *perspectiva* is considerably larger than that of present-day optics: whereas nowadays optics is a *physical* science about light and its properties, medieval optics is a conglomerate of physical, geometrical, physiological and even psychological inquiries¹¹.

The blossoming of the *perspectiva* in Latin Europe came in the thirteenth century. Then, optics was one of the new sciences and was, as Roger Bacon says, both seminal for a knowledge of nature and neglected by his contemporaries¹². Indeed, a full-fledged mastering of the optical science was scarce until the mid-thirteenth century. By that time, all of the important Greek and Arabic renderings of the discipline (i.e. works by Euclid, Ptolemy, Al-Kindi and especially Ibn al-Haytham, or Alhacen) had already been translated into Latin, and the discipline was assimilated and rendered into the context of Latin learning thanks to figures such as Roger Bacon, John Peckham and Witelo, who all authored textbooks or compendia of the optical science¹³.

Thereafter, *perspectiva* was gradually incorporated into the curriculum of philosophy studies at the *studia* of some religious orders and faculties of arts¹⁴.

CUS GUNDISSALINUS, *De divisione philosophiae*, ed. L. BAUR, Münster, Aschendorff, 1903, prol., p. 15. The opposite of “doctrinal” is a “natural science”.

- 10 See, e.g., BENEDICTUS HESSE DE CRACOVIA, *Quaestiones disputatae super tres libros De anima Aristotelis* (written in c. 1420s), MS Cracow, BJ, 2013, fols 8v–9r, cited by M. MARKOWSKI, *Burydanizm w Polsce w okresie przedkopernikańskim*, Wrocław, Ossolineum, 1971, p. 86: “[...] astronomia, perspectiva, musica [...] aequaliter participant de mathematica et aequaliter de philosophia naturali, et ergo dicuntur scientie medie inter mathematicam et philosophiam naturalem sicut [...] perspectiva considerat de linea visuali, modo linea pertinet ad mathematicam sed visus ad naturalem.” For Hesse’s sophisticated division of the sciences, see MARKOWSKI, *Burydanizm w Polsce w okresie przedkopernikańskim*, p. 53–56.
- 11 See A. M. SMITH, “What is the History of Medieval Optics Really About?,” in *Proceedings of the American Philosophical Society*, 148–2 (2004), p. 180–194, who argues that whereas modern optics is “luminocentric”, the pre-modern one was rather “oculocentric”.
- 12 ROGERIUS BACON, “Opus tertium,” in *Fr. Rogeri Bacon Opera quaedam hactenus inedita*, vol. II, ed. J. S. BREWER, London, Longman, Green, Longman, and Roberts, 1859, p. 36–38.
- 13 On the contributions of these three authors see D. C. LINDBERG, *Theories of Vision from al-Kindi to Kepler*, Chicago, University of Chicago Press, 1976, p. 107–121 or A. M. SMITH, *From Sight to Light: The Passage from Ancient to Modern Optics*, Chicago / London, The University of Chicago Press, 2015, p. 260–277.
- 14 Although it is neglected in this paper, the domain of *perspectiva* is not restricted only to the university milieu. As early as the late thirteenth century, *perspectiva* became a popular source for preachers. The moral dimensions of optical science are epitomized in the famous preaching manual *De oculo morali* by Peter of Limoges (written around 1280). This treatise was based on a careful study of Roger Bacon’s *Per-*

Interestingly, historians of science often mention that the earliest record in any university statutes to obligatory lectures on optics is, in fact, from Prague¹⁵. In the dean's book (*Liber decanorum*) of the Arts faculty, there is a statute enumerating which lectures a bachelor of arts must attend to be eligible for the master's exam. Lectures on *Perspectiva communis* (which is the most suitable for beginners of all the perspectivist texts) are included among other works from the fields of mathematics and astronomy¹⁶. This prescription is often dated 1390, like the entire *Liber*

spectiva and original deduction of moral analogies and instructions from optical issues. On the place of *De oculo morali* in the perspectivist tradition see R. NEWHAUSER, "Inter Scientiam et Populum: Roger Bacon, Pierre de Limoges and the Tractatus moralis de oculo", in J. A. AERTSEN, K. EMERY, A. SPEER (eds.), *After the Condemnation of 1277. Philosophy and Theology at the University of Paris in the Last Quarter of the Thirteenth Century*, Berlin / New York, De Gruyter, 2001, p. 682–703 or D. G. DENERY, *Seeing and Being Seen in the Later Medieval World. Optics, Theology and Religious Life*, Cambridge, Cambridge University Press, 2005, p. 75–115.

Although written at the University of Paris, it soon gained widespread dissemination outside universities and became a true medieval bestseller: there are more than 200 extant manuscripts of this text (NEWHAUSER, "Inter Scientiam et Populum", p. 688–689). It was obviously also read in the Bohemian lands. Even a quick look into the catalogs reveals a considerable number of copies of *De oculo morali* – e.g. in MSS Prague, NK ČR, I B 15; IV C 1; V C 10; VIII E 25; X B 24; XI C 8; XIV E 25; Prague, KMK, F 115; MSS Olomouc, Sbirka rukopisů Metropolitní kapituly u sv. Václava v Olomouci, CO 215; Olomouc, Vědecká knihovna, M II 79. There is also a copy of Bohemian origin now kept in Uppsala (MS Uppsala, Universitetsbiblioteket, C 641) which, according to its explicit, was written in Prague in the 1370s (note that the scribe was uncertain about the authorship and ascribed it to Thomas Bradwardine): "Explicit tractatus de oculo morali a doctore profundo magistro thoma Brabdradbardeyn ut fertur finitus prage anno domini MCCC septuagesimo 4." (MS Uppsala, Universitetsbiblioteket, C 641, fol. 57r, cited by M. ANDERSSON-SCHMITT, H. HALLBERG, M. HEDLUND, *Mittelalterliche Handschriften der Universitätsbibliothek Uppsala. Katalog über die C-Sammlung*, 6 vols, Stockholm, Almqvist & Wiksell International, 1988–1993, vol. 6, p. 192, where the codex is also described.) It is highly probable that a future edition of Prague homiletical works will uncover at least some optical hints in the sermons, likely influenced by Peter of Limoges.

15 See LINDBERG, *Theories of Vision*, p. 121; SMITH, *From Sight to Light*, p. 280–281.

16 *Statuta et Acta rectorum Universitatis Carolinae Pragensis 1360–1614*, ed. F. ŠMAHEL, G. SILAGI, Praha, Karolinum, 2018, p. 243 (II. 27): "Statutum fuit [...] quod nullus magistrorum de facultate nostra, qui pro examinatore magistrandorum fuerit deputatus, aliquem ad tentamen admittat, nisi complete audiverit libros infra scriptos, videlicet omnes libros Maioris physice, logicam Aristotelis, Ethicorum, Politicorum, Economicorum, sex libros Euclidis, [Iohannis de Sacrobosco] Spheram, [Campani Novariensis] Theoricam [planetarum], aliquid in musica et arismetica, Perspectivam communem [Iohannis de Peckham], De sensu et sensato, De somno et vigilia." I split the phrase "Spheram theoricam" into the two different astronomical works. See also *Statuta et Acta rectorum Universitatis Carolinae Pragensis*, p. 256 (V. 29), where it is stated that the lectures on *Perspectiva communis* should be conducted weekly for at least three months, but no longer than 14 weeks; and *Statuta et Acta rectorum Universitatis Carolinae Pragensis*, p. 260 (V. 40), where *Perspectiva communis* is listed among books that ought not to be taught on feast days.

Interestingly, the Prague statutes are much more specific regarding mathematical (or quadrivial) disciplines than, e. g., the Parisian ones. A Parisian statute from 1366 includes only a general mention that a student striving for the license is required to attend lectures on "some mathematical books" (*Chartularium Universitatis Parisiensis*, 4 vols, eds. H. DENIFLE, A. CHATELAIN, Paris, Delalain, 1889–1897, vol. III, p. 145). In an older prescription, it is given more precisely that the bachelor should have attended "at least a hundred lectures on maths" which means, e. g., "one entire mathematical book, such as the treatise On sphere" completed and "another book in progress" (*Chartularium*, vol. II, p. 678).

decanorum; however, what is called *Liber decanorum* today is actually a “new” book created by then dean Matthias of Legnica, who also included older materials there¹⁷. As F. Šmahel points out, the statute article prescribing obligatory lectures on *perspectiva* is actually from the earliest stratum of the *Liber decanorum*, and its *terminus ante quem* is 1366¹⁸.

Hence, *perspectiva* might have been taught in Prague from at least the 1360s. Does a statute as a normative statement, though, entitle us to infer anything about actual practice? Obviously, further evidence is needed. A proof that attending optical lectures was common practice among bachelors of arts can be gained from two lists of lectures attended by Prague students in the late 1380s¹⁹. According to these, both students attended lectures on Peckham’s *Perspectiva communis* delivered by Frederick of Drosendorf. The first student attended lectures on *Perspectiva* concurrently with lectures on Euclid and *Theorica planetarum* (all three delivered by Drosendorf)²⁰. The second student first heard lectures on the 2nd and 3rd books of *Perspectiva communis* (on seeing by reflection and refraction, mirrors, lenses and some atmospheric phenomena), and only later lectures on the 1st book (on light, anatomy and physiology of the visual organ, visual process and its condition and illusions)²¹. Again, Drosendorf delivered all the lectures. However, since Drosendorf earned his master’s degree in 1387 (and his performance at the exams was not particularly compelling), the quality and originality of his lectures on *perspectiva* delivered a year or two later is doubtful at best²².

Another testimony to Prague lectures on *perspectiva* is more than a decade older (and arguably the oldest one known today) – in a manuscript once kept in Halberstadt, a copy of Peckham’s *Perspectiva communis* was accompanied by an explicit

17 See Lindberg and Smith cited above (n. 15); on replacing the oldest book by *Liber decanorum* see F. ŠMAHEL, *Die Prager Universität im Mittelalter / The Charles University in the Middle Ages. Gesammelte Aufsätze / Selected Studies*, Leiden / Boston, Brill, 2007, p. 223–224.

18 ŠMAHEL, *Die Prager Universität im Mittelalter*, p. 308.

19 These two lists are extant in MS Cracow, BJ, 659, fol. 102v and MS Vatican, BAV, Pal. lat. 1353, fol. 119v and edited and analyzed by F. Šmahel – see ŠMAHEL, *Die Prager Universität im Mittelalter*, p. 316–335.

20 ŠMAHEL, *Die Prager Universität im Mittelalter*, p. 324, 331.

21 ŠMAHEL, *Die Prager Universität im Mittelalter*, p. 326–327, 334–335. Possibly, the second student wanted to combine his classes thematically – he attended lectures on Aristotle’s *Meteorology* concurrently with the lectures on *Perspectiva communis* II–III (at least partially) and on Aristotle’s *De sensu et sensato* simultaneously with the lecture on *Perspectiva communis* I.

22 See ŠMAHEL, *Die Prager Universität im Mittelalter*, p. 325; for Drosendorf in Prague see also J. TRÍŠKA, “Přispěvky k středověké literární universitě I [Contributions to the Medieval Literary University I]”, in *Acta Universitatis Carolinae – Historia Universitatis Carolinae Pragensis*, 9–1 (1968), p. 21. In the 1390s, we find Drosendorf in Vienna, studying medicine and teaching mathematical disciplines at the local university. He lectured on *Perspectiva communis* twice and on *Proporiones breves*, the abbreviation of Bradwardine’s *De proportionibus*. See S. GÜNTHER, *Geschichte des mathematischen Unterrichts im deutschen Mittelalter bis zum Jahre 1525*, Berlin, A. Hofmann & Comp., 1887, p. 198–199. Later, he gained fame as the “astrologer of Austria” and organized a disputation upon the appearance of the comet in 1402. He died in 1404. See M. H. SHANK, “Academic Consulting in Fifteenth-Century Vienna: The Case of Astrology”, in E. SYLLA, M. McVAUGH (eds.), *Texts and Contexts in Ancient and Medieval Science*, Leiden / New York / Köln, Brill, 1997, p. 253–254.

stating that it was taught at Prague University in the royal doctor's house in 1374²³. The codex also included an optical treatise on the rainbow, but unfortunately, it is most likely lost today²⁴.

Another, more indirect proof that Prague masters (and their students) were acquainted with optics in this early period are references to perspectivist texts made by them in lectures or commentaries on other works. The assumption here is that if a master refers to a perspectivist work or doctrine, he must know it, and it is also understandable to, and easily traceable and verifiable by, his listeners (as they have access to these texts in a library or have attended lectures on the issue). Two examples of such references can be introduced here – both texts are from the 1370s, to which the earliest evidence of optical lectures can be dated.

The first example is found in the commentary on *De anima* by Jenek of Prague (Jenco Wenceslai de Praga), usually dated 1375²⁵. The references to optics are in the exposition of a passage in *De anima* II where Aristotle mentions kinds of objects which do not have any specific color in light, but which still appear luminous in darkness (he gives the examples of fungi or the scales or eyes of fish)²⁶. This claim, however, seems to contradict the common Aristotelian conviction that what is seen is primarily the color and not the light. Commenting on this passage, Jenko first states that the issue pertains to the practitioners of *perspectiva* (*ad perspectivos pertinet*). He refers to Alhacen, whose explanation is that a more intense light somehow “covers” the less intense one. A consequence is that a remote candle or stars are not visible in the daylight, but they are easily visible at night²⁷. Jenek here evidently

23 MS Halberstadt, Domgymnasium, MS 217; the explicit, cited by the catalog (G. SCHMIDT, “Die Handschriften der Gymnasial-Bibliothek II”, in *Königliches Dom-Gymnasium zu Halberstadt. Oster-Programm 1881*, Halberstadt, 1881, p. 20), is as follows: “Finita est hec perspectiva communis magistri Johannis de Pysa anno Domini m.xxx.lxxiiij, in die s. Frederici imperatoris in honoranda universitate Pragensi, in domo medici imperatoris, per Allexium de Wratislavia, hora quinta decima.” This explicit has already been used by ŠMAHEL, *Die Prager Universität im Mittelalter*, p. 107–108, 136 as proof that the lectures of the Prague Faculty of Medicine might initially have been delivered in the houses of royal doctors.

24 The likely loss of the codex was suggested by Dr. Patrizia Carmassi (Herzog August Bibliothek, Wolfenbüttel) who was responsible for new cataloging of Halberstadt manuscripts, in an e-mail conversation from April 2017.

25 On Jenek see P. SPUNAR, *Repertorium auctorum Bohemorum provectorum idearum post Universitatem Pragensem conditam illustrans*, 2 vols, Wrocław, Ossolineum, 1985–1995, vol. I, p. 51–53 or C. H. LOHR, “Medieval Latin Aristotle Commentaries Authors: Johannes de Kanthi – Myngodus”, in *Traditio*, 27 (1971), p. 301–302; on his *De anima* commentary see M. MRÁZ, “Commentarium magistri Johannis Wenceslai de Praga super De anima Aristotelis (Der gegenwärtige Zustand der Forschungsarbeit)”, in *Mediaevalia Philosophica Polonorum*, 26 (1982), p. 79–91. The date (or, at least, a *terminus ante quem*) is based on the explicit of the commentary in MS Prague, NK ČR, VIII G 30, fol. 109r.

26 ARISTOTELES, *De anima* II, 7, 419a1–7, cf. also AVERROES, *Commentarium magnum in Aristotelis de anima libros*, ed. F. S. CRAWFORD, Cambridge, MA, The Mediaeval Academy of America, 1953, II, 72, p. 239–240.

27 JENCO WENCESLAI DE PRAGA, *Commentarius in I–III libros De Anima Aristotelis*, MS Prague, NK ČR, VIII G 30, fol. 70v: “[...] non omnes res sunt visibiles mediante aere illuminato [...]. Quaedam enim visibilia in lumine non videntur, sed in tenebra sub ratione lucis, ut illa corpora que satis habent de igne in sua compositione, videntur in tenebris et sub ratione qua lucent [...] propter quam causam

refers to the second chapter of Alhacen's *De aspectibus*, book I, which is devoted to these kinds of situations²⁸.

Another example may be found in a theological text – the commentary on *Sentences* by Conrad of Soltau, who lectured on *Sentences* in Prague around 1380²⁹. Perspectivist influences are usually concentrated in one particular place in *Sentences* commentaries – the thirteenth distinction of book II, devoted to the issue of creation of light. Theologians had here an opportunity to show their proficiency in optics, dealing with such issues as the nature of light, its propagation, colors and so on³⁰. In his rather brief treatment of the question, Soltau refers four times to optical science or directly to Peckham's *Perspectiva communis* (in one case, he even makes an exact reference to a specific proposition of Peckham's)³¹.

However, does Soltau not borrow these references from another source? After all, his commentary is significantly influenced by the corresponding work of Thom-

hec in tenebris sunt visibilia alia ratio est, i.e. ad perspectivos pertinet, qui dicunt, quia sunt luminosa unde generaliter vel videntur tamquam proprium sensibile a visu nisi color et lumen, de die autem non videntur, quia lumen maius occultat multa visibilia que minus lucent, oportet per Alacen. Eciam lumen minus non videtur in lumine maiori secundum perspectivos. Est causa: sicut sonus maior occultat minorem, sic lumen maius occultat minus. Hec eciam est causa, quare candela de nocte accensa videtur a remotis et non de die et quare stelle apparent de nocte et non de die."

28 Cf. ALHACEN, "De aspectibus, I–III", ed. A. M. SMITH, in A. M. SMITH, *Alhacen's Theory of Visual Perception*, Philadelphia, American Philosophical Society, 2001, I. 2, §4. 8 and 4. 10, p. 5–6. A similar solution was also proposed in the Buridianian tradition of *De anima* commentaries. See (PSEUDO-)IOHANNES BURIDANUS, "Expositio De anima", ed. B. PATAR, in B. PATAR, *Le Traité de l'âme de Jean Buridan [De prima lectura]. Édition, étude critique et doctrinale*, Louvain-la-Neuve / Longueil (Québec), Editions de l'Institut supérieur de philosophie / Editions du Prémabule, 1991, II. 4, 1, p. 82–83 or NICOLAUS ORESMIUS, "Expositio in Aristotelis De anima", in B. PATAR, *Nicolai Oresme Expositio et quaestiones in Aristotelis De anima*, Louvain / Paris, Éditions Peeters, 1995, II. 4, 1, p. 42–43; however, none of them mentions *perspectiva* in this passage, which renders the possibility that Jenek just borrowed the reference from another commentary unlikely. Note that Buridan's authorship of the exposition of *De anima* edited and ascribed to him by B. Patar has recently been seriously contested – see S. W. DE BOER, P. J. J. BAKKER, "Is John Buridan the Author of the Anonymous *Traité de l'âme* Edited by Benoît Patar?", in *Bulletin de philosophie médiévale*, 53 (2011), p. 283–332. I therefore refer to the text as by *pseudo-Buridan*.

29 On Conrad of Soltau see TŘÍŠKA, "Přispěvky I", p. 14; J. TŘÍŠKA, "Přispěvky k středověké literární universitě III [Contributions to the Medieval Literary University III]", in *Acta Universitatis Carolinae – Historia Universitatis Carolinae Pragensis*, 10–1 (1969), p. 26–27 and most recently C. SCHABEL, M. BRINZEL, M. MAGA, "A Golden Age of Theology at Prague: Prague *Sentences* Commentaries from 1375 to 1385, the terminus post quem for Evidence of Wycliffism in Bohemia", in *Acta Universitatis Carolinae – Historia Universitatis Carolinae Pragensis*, 55–1 (2015), p. 30–33 (where the date of Soltau's lectures is also deduced).

30 On the distinction and its importance for historians of philosophy and science see K. H. TACHAU, "Some Aspects of the Notion of Intentional Existence at Paris, 1250–1320", in S. EBBESEN, R. L. FRIEDMAN (eds.), *Medieval Analyses in Language and Cognition*, Copenhagen, Kgl. Danske Videnskabernes Selskab, 1999, p. 333–343.

31 CONRADUS DE SOLTAV, *Questiones in IV libros Sententiarum*, MS Prague, NK ČR, I D 23, II. 13, fols 72rb–73ra: "(72rb) Utrum lumen in medio sit forma realis [...]. (72vb) [...] colores [...] non videntur sine lumine, ut patet 2° De anima et ex prima parte Communis perspective. [...] (73ra) [...] lumen multiplicatur a corpore luminoso ad medium, ut patet per multas propositiones perspective et per experientiam [...] in eodem medio possunt esse duo lumina inpermixte, ut dicit VII^a propositio prime partis Communis perspective. [...] 4^{us} articulus, qui solet hic tractari, est expeditus in perspectiva, quia species colorum distinctorum simul multiplicantur per medium et iste species sunt forme intentionales."

as of Strasbourg, as a recent paper suggests³². On the one hand, Conrad evidently draws his inspiration from Thomas of Strasbourg in dividing the distinction into four *articuli*³³; he also shares Thomas's stance in all four cases (in one instance with an explicit reference to him)³⁴. Nevertheless, with one exception (different from Conrad), Thomas does *not* refer to optics or Peckham. Even if Conrad's rendering of the question was a mere abbreviation of the one by Thomas, then, Conrad's perspectivist hints would be his own³⁵. It may thus be concluded that writing his commentary on *Sentences*, Conrad of Soltau was equipped with certain optical knowledge and might count on the same among his listeners.

To summarize, the optical texts (chiefly Peckham, but perhaps also Alhacen) were known to Prague masters and students as early as in the 1370s – lectures on optics were delivered then, and the tenets of the discipline were referred to in both philosophical and theological texts.

2. Discussing Optics in Prague Quodlibets (c. 1394–1417)

Although acquaintance with *perspectiva* among the members of Prague University is already attested in the 1370s, there is substantially richer evidence of optical knowledge in Prague from the 1390s to the beginning of the Hussite Wars – namely, Prague quodlibetal disputations that took place at the Faculty of Arts³⁶. As the questions on optics-related issues are rather numerous, this section is selective³⁷. It lists the optical questions disputed in the quodlibets, briefly summarizes their topics, and focuses on how this kind of source can be utilized as evidence for the dissemination of *perspectiva* in the Prague University milieu (on the example of a question included in the *quodlibet* by Simon of Tišnov). As the rest of the paper is devoted to the question on vision disputed by John of Borotín in the 1411 *quodlibet* chaired by John Hus, Hus's preparation for the disputation with Borotín is briefly considered here, and its Wycliffian source is uncovered.

32 SCHABEL, BRINZEI, MAGA, "A Golden Age of Theology at Prague", p. 32.

33 Compare Conrad's text with THOMAS DE ARGENTINA, *Commentaria in IV libros Sententiarum*, Venice, Iordanus Ziletti, 1564, II. 13, fols 155rb–156va.

34 CONRADUS DE SOLTAU, *Sent.* II. 13, MS Prague, NK ČR, I D 23, fols 72vb–73ra: "Quantum ad 2^m articulum dicit Tomas de Argentina quod non sunt eiusdem nature lumen vel lux corporum celestium et istorum inferiorum [...]."

35 E.g. Conrad's solution of the 4th article is (contrary to that of Thomas) a mere statement that the issue is already solved in *perspectiva*.

36 The fact that *perspectiva* remained an obligatory part of the university curriculum even after the secession of the German masters in 1409 is attested by a brief mention made by John Hus in his *Quodlibet*. Hus, introducing the young master Elias de Tyn (who had earned his master's degree in 1410), stresses that Elias had devoted himself to study of *perspectiva* recently. See IOHANNES HUS, *Quodlibet*, ed. B. RYBA, Turnhout, Brepols, 2006, q. 52, p. 240–241: "[...] Magister E<lias> de T<yn> [...] illi sciencie [scil. perspective] hoc anno specialiter in leccione deditus, scolas nostras in hac materia clarissime informabit."

37 The author of this paper is preparing another study devoted precisely to the issue of *perspectiva* in Prague quodlibets.

First, it is worth emphasizing that the Prague quodlibets differ substantially from the traditional ones in several aspects³⁸. The traditional quodlibets (from the thirteenth and early fourteenth centuries) were organized at *theological* faculties or the *studia* of different religious orders. A prominent theologian (deputized by his bachelor) had to answer whatever question was put by any member of the academic community, and then face counter-arguments to his solution. After this first part of the disputation, the master reorganized the questions according to similarities in their topics, summarized the discussions and stated his position on each of the questions (this elaborated version of his positions was called the *determinatio*), and introduced it to the community several days later. After that, he sometimes refined his text into a final version intended for distribution (*ordinatio*)³⁹. Thus, traditional quodlibets are often original and profound texts produced by the best scholars at the peak of their careers.

By contrast, the Prague quodlibets were instead a collaborative enterprise. The quodlibets we have evidence for were held at the *Faculty of Arts*. The role of the master organizing the session was radically different: he did not answer the questions, but put them. The *quodlibetarius* had to prepare a question for each master of the faculty (often regarding the field of expertise of the latter) and then present counter-arguments against the latter's solution. Thus, the *quodlibetarius* prepared a handbook of these questions, including several counter-arguments against both positive and negative solutions to each question (as he did not know which of the options the responding master would choose, the *quodlibetarius* had to prepare for any of them). Since *positiones* of the responding masters are rather rarely extant, the actual handbooks of the *quodlibetarii* (or rather copies of them) are the best source we have for the study of the Prague quodlibets. Obviously, in this case, we confront a specific kind of source. These preparations often do not include any con-

38 For quodlibets (both as specific disputation sessions organized at medieval universities and *studia* and as a special kind of written sources) in general see J. W. WIPPEL, "Quodlibetal Questions, Chiefly in Theology Faculties", in B. C. BAZÀN, G. FRANSEN, J. W. WIPPEL, D. JACQUART (eds.), *Les questions disputées et les questions quodlibétiques dans les facultés de théologie, de droit et de médecine*, Turnhout, Brepols, 1985, p. 151–222 or J. HAMESSE, "Theological Quaestiones Quodlibetales", in C. SCHABEL (ed.), *Theological Quodlibeta in the Middle Ages: The Thirteenth Century*, Leiden / Boston, Brill, 2006, p. 17–48. On the quodlibets at the Prague Arts Faculty see esp. J. KEJŘ, *Kvodlibetní disputace na pražské univerzitě* [Quodlibetal Disputations at Prague University], Praha, Universita Karlova, 1971 and ŠMAHEL, *Die Prager Universität im Mittelalter*, p. 336–386. The traditional theological quodlibets and the quodlibetal sessions in the newly founded Central European universities (mainly Prague) are compared in KEJŘ, *Kvodlibetní disputace*, p. 23–41; WIPPEL, "Quodlibetal Questions", p. 205–214; O. WEIJERS, *La 'disputatio' dans les Facultés des arts au Moyen Âge*, Turnhout, Brepols, 2002, p. 298–312 and O. PAVLÍČEK, "Parisian and Prague Quodlibeta Compared: The Transfer of the Quodlibetal Disputation between the Faculties and Jerome of Prague's Struggle against the Thematic Limitations Imposed on the Faculty of Arts", in E. JUNG (ed.), *What is New in the New Universities? Learning in Central Europe in the Late Middle Ages (1348–1500)*, Warszawa, Wydawnictwo IFiS PAN, 2018, p. 325–356. See also B. KOCÁNOVÁ, "The Sublunary Phaenomena as a Subject of Medieval Academic Discussion: Meteorology and the Prague University Disputationes de Quolibet", in *Early Science and Medicine*, 22–1 (2017), p. 72–102 who analyzes meteorological issues as represented in the Prague quodlibets.

39 On the course of the disputation see HAMESSE, "Theological Quaestiones Quodlibetales", p. 32–38.

clusions but merely counter-arguments for both possible solutions. Moreover, the *quodlibetarius* might help himself by copying the preparation from another kind of source (see Hus below). However, when the preparation is not copied down word for word, it may still reveal what sources the *quodlibetarius* had at his disposal when he was preparing for the disputation (see Simon of Tišnov below).

Today, no less than fourteen *quodlibetarii* from the period between 1394 and 1417 are known at least by name⁴⁰. Further, there are extant handbooks by seven of them: Henry of Ribenice (1394?), Matthias of Legnica (1399?), John Arsen of Langenfeld (1400?), Matthias of Knín (1409), John Hus (1411), Simon of Tišnov (1416) and Prokop of Kladruby (1417). Each of their handbooks is preserved in a single manuscript, and they have not yet been edited except for the handbook by Hus edited by Bohumil Ryba.

When the lists of questions from all of these quodlibets are examined⁴¹, no less than 13 questions relating explicitly to optics may be identified. All the *quodlibetarii* (except Arsen) included at least one perspectivist question in their handbooks:

Henry of Ribenice (MS Leipzig, Universitätsbibliothek, Ms 1414)

- (1) q. 48: *Utrum radius visualis frangatur in occursu medii rarioris seu densioris*

Matthias of Legnica (MS Stralsund, Stadtarchiv, Hs 1067, fols 207r–279r)

- (2) q. 85: *Utrum visio facta sub pyramide radiosa fiat extra mittendo vel recipiendo*

Matthias of Knín (MS Prague, KMK, L 45)

- (3) q. 37: *Utrum species qualitatium per se sensibilibus existat in medio realiter et subjective*
 (4) q. 72 (73): *Utrum demonstrabile est iridem tantum tricolore peripheriam circuli apparere*
 (5) q. 114 (116): *Utrum visio facta sub pyramide radiosa fiat intus suscipiendo vel extramittendo*
 (6) q. 137 (140): *Utrum multiplicatio luminis per medium uniforme sit uniformiter difformis*

40 The list of all known quodlibets, extant manuscripts and literature on each of them is in ŠMAHEL, *Die Prager Universität im Mittelalter*, p. 377–381. Besides the quodlibets listed by Šmahel, I found what seems to be another Prague quodlibet in two Cracow manuscripts – in MS Cracow, BJ, 649 and (slightly abbreviated) in MS Cracow, BJ, 624 (which also preserves several abbreviated questions from Ribenice's *quodlibet*). Arguably, both codices are of Prague origin, include a set of questions on various topics with *problemata* and a discussion on the *quaestio principalis*. Both codices can be dated to before 1400 on the basis of watermarks. They are described in M. KOWALCZYK et al., *Catalogus codicum manusccriptorum medii aevi latinorum qui in Bibliotheca Jagellonica Cracoviae asservantur*, 9 vols, Wrocław, Ossolineum, 1980–2008, vol. IV, p. 338–343, 398–406.

41 For lists of questions see KEJŘ, *Kvodlibetní disputace*, p. 116–169 (Knín, Hus, Tišnov, Prokop of Kladruby); J. TRÍŠKA, *Starší pražská univerzitní literatura a karlovska tradice*, Praha, Universita Karlova, 1978, p. 141–146 (Matthias of Legnica); and ŠMAHEL, *Die Prager Universität im Mittelalter*, p. 354–358 (John Arsen), 384–386 (Henry of Ribenice).

**John Hus (MS Prague, Knihovna Národního muzea,
V C 42, fols 1r–54v; ed. B. RYBA 1948, repr. 2006)**

- (7) q. 28: *Utrum oculus, existens luminosus intrinsece, sit coloratus* (question proposed to Wenceslas Beran (Wenceslaus Beran de Praga); but not disputed)
- (8) q. 52: *Utrum necesse est in omni illuminatione naturali lumen multiplicari et radios reflecti* (question disputed by Elias of Týn [Elias de Tyn,], nicknamed “Witelo” by Hus; his position is not extant)
- (9) q. 56: *Utrum sensationes fiunt per extramissiones virtutum ab organis sensitivis* (question disputed by John of Borotín, nicknamed “Avicenna” by Hus; his position is analyzed and edited below)

**Simon of Tišnov (MS Prague, Knihovna Národního muzea,
V C 42, fols 55r–145v)**

- (10) q. 46: *Utrum oculis ex quatuor tunicis et tribus humoribus compositus pro visione sine fallacia exigit remotiorem, oppositionem, lucem proportionalem, quantitatem, medii diaphaneitatem, corporis densitatem, tempus ac sui ipsius sanitatem*

Prokop of Kladruby (MS Prague, KMK, L 27)

- (11) q. 28 (29): *Utrum lumen sit actus diaphani manens idem in numero per tempus in ipso medio subiective* (disputed by Wenceslaus Mirowecz, his position is not extant)
- (12) q. 36 (37): *Utrum formae sive imagines apparentes in speculis videantur per impressionem factam in ipsis* (disputed by John of Hradec [Iohannes Grecz], his position is not extant)
- (13) q. 63 (65): *Utrum omnem visionem sensualem necesse est partim extramittendo fieri partim autem intus suscipiendo*

As for the topics of these quodlibetal preparations, there are several questions on light, its metaphysical nature, its propagation through a medium and even about the refraction of its rays (nos. 1, 3, 6, 8, and 11). Two questions are dedicated to specific optical phenomena, namely the rainbow and mirror images (nos. 4 and 12). Whereas Knín prepared a question on whether there can be demonstrative science about the rainbow⁴², Prokop of Kladruby deals with the metaphysical nature of the images appearing in mirrors. Both gather arguments about the metaphysical nature of these phenomena: are they qualities existing in a full-fledged way, or mere appearances with somewhat diminished extramental existence?

Other questions deal with human vision and the eyes (no. 7 and 10): Hus wanted to discuss the Aristotelian definition of vision; Tišnov prepared a fascinating question on the conditions of vision, apparently deeply influenced by perspectivist authors (see below). Finally, the mechanism of vision – i.e. whether an observer sees by intromission (receiving stimuli) or extramission (emitting something from

42. Of all the questions listed above, Knín's seems to be the only one which has been studied by a modern scholar. See KOCÁNOVÁ, “The Sublunary Phaenomena”, p. 77–78.

his eyes) – figures prominently in four of these six handbooks (nos. 2, 5, 9, and 13.) The question disputed by Borotin is one of them.

Some of these questions are Aristotelian both by their topic and the sources quoted in them⁴³. As for the perspectivist authors, the most quoted is, unsurprisingly, John Peckham; some *quodlibetarii* also refer to Alhacen. Nevertheless, in the context of tracing perspectivist influences, there is one interesting preparation with no counterpart in any known Prague *quodlibet* – that proposed by Simon of Tišnov (no. 10)⁴⁴.

The question's title already reveals an apparent familiarity with *perspectiva*. It asks whether there are eight conditions to be met for vision to be veridical – a standard issue in perspectivist literature⁴⁵. When introducing these conditions, Simon of Tišnov even refers directly to Alhacen's *De aspectibus* and enumerates that for vision to be veridical, the object must be remote from and opposite the eyes, illuminated, and of a proper quantity and density, while the air must be transparent and the eye healthy, and a moment of time is needed⁴⁶.

Furthermore, Tišnov's preparation includes the most significant number of references to perspectivist texts of all the quodlibetal questions mentioned. I have counted 31 references in total; not only to the Peckham's textbook but also to texts known rather to specialists in optical science:

| | | | |
|--------------------------------------|----|--------------------------------|---|
| Peckham, <i>Perspectiva communis</i> | 17 | Bacon, <i>Perspectiva</i> | 2 |
| Alhacen, <i>De aspectibus</i> | 8 | Euclid, <i>De visu</i> | 1 |
| Witelo, <i>Perspectiva</i> | 2 | Al-Kindi, <i>De aspectibus</i> | 1 |

References to Peckham⁴⁷ and Alhacen are direct – to a concrete proposition or chapter, which may indicate that Tišnov had these texts in front of his eyes. Two references to Bacon are interesting: the first is very vague (Bacon is just a name in a list of perspectivists)⁴⁸, while the second comprises two pieces of text quoted by Tišnov and ascribed to “someone writing about natural philosophy” (*quidam naturaliter*

43 As further research will probably reveal, some of them are derived from Aristotelian commentaries on, e.g., *De sensu et sensato* or *Meteorologica*.

44 SIMON DE TISSNOW, *Quodlibet*, MS Prague, Knihovna Národního muzea, V C 42, q. 46, fols 131v–133v.

45 See ALHACEN, *De aspectibus* III, 3, §3.1–3, p. 285; ROGERIUS BACON, “*Perspectiva*”, in D. C. LINDBERG (ed.), *Roger Bacon and the Origins of Perspectiva in the Middle Ages*, Oxford, Oxford University Press, 1996, I. 8–9, p. 108–144; IOHANNES PECKHAM, “*Perspectiva communis*”, in D. C. LINDBERG (ed.), *John Peckham and the Science of Optics*, Madison / Milwaukee / London, University of Wisconsin Press, 1970, I. 47 (50) – 54 (57), p. 130–134.

46 SIMON DE TISSNOW, *Quodlibet*, q. 46, MS Prague, Knihovna Národního muzea, V C 42, fol. 131v: “*Quod questio sit vera pro quesito, arguitur auctoritate Alhacen 3° libro sue Perspectivae, capitulo 3 quod intitulatur ‘capitulum de causis, quibus visui accidit deceptio’, sic dicentis: quibus completur comprehensio visui, secundum quod est, sunt octo: remotio, oppositio, lux, quantitas, corporis densitas, dyafa-neitas aeris, tempus, sanitas visus. Hiis ergo omnibus aggregatis visum comprehenditur vera visione.*”

47 Peckham is cited as “Pisanus”, which is a common mistake in late medieval manuscripts.

48 SIMON DE TISSNOW, *Quodlibet*, q. 46, MS Prague, Knihovna Národního muzea, V C 42, fol. 132r: “[...] maior patet ex primo *Perspectivae* Alhacen et Pisani et omnium Perspectivistarum, Bacon<is> et Vitello-nis etc.”

scribens)⁴⁹. Al-Kindi is quoted once as a proponent of an Aristotelian position unusual among the perspectivists – that light spreads out in an instant and hence what we see, we see immediately⁵⁰. As for the arguments, the preparation seems to be written by somebody well-versed in state-of-the-art perspectivist works⁵¹.

Despite poor manuscript evidence, as stated in the introduction, some of the Prague quodlibetal questions – and primarily that by Simon of Tišnov – testify to not negligible degrees of knowledge of *perspectiva*⁵². Tišnov's question, though, – no matter how interesting – remains a *preparation* for discussion (and it is not even certain that it was really discussed during the quodlibetal session). As mentioned, the only optics-related question where both the preparation by the *quodlibetarius* and the *positio* by the responding master are extant is Borotín's question on the mechanism of vision proposed to him by John Hus. Since the rest of the paper is devoted to Borotín's *positio*, this section ends with a brief look at Hus's preparation for this question and its sources⁵³.

Hus's preparation for the question of whether sensations are by sensory powers being emitted is rather brief and sketchy. Although several arguments both *neganti* and *concedenti* are gathered, all the arguments are ultimately *for* extramission. The first group of arguments is designed for a situation in which Borotín denies extramission (*neganti*) and defend a kind of syncretic account combining extramission with intromission. The second group is prepared for the case that Borotín accepts intromission (*concedenti, quod fit intus suscipiendo*) – and is thus *against* intromission, defending extramission again. Obviously, Hus counted on Borotín's acceptance of the much more common intromissionist view⁵⁴.

As Hus's preparation is strongly derivative, it is interesting to trace his sources. Although one expects a commentary on *De sensu* or a perspectivist work as a chief

49 SIMON DE TISSNOW, *Quodlibet*, q. 46, MS Prague, Knihovna Národního muzea, V C 42, fol. 132v: "In oppositum arguitur et primo contra supposita et primo, quia questio supponit quod oculus componitur ex quattuor tunicis. Contra hoc arguitur sic: non est compositus oculus ex quattuor tunicis, igitur illud primum suppositum questionis est falsum. [...] Hoc idem patet auctoritate cuiusdam naturaliter scribentis circa materiam de oculis, questione 2^e capitulo 2^o, sic dicentis: 'Oculus autem habet tres tunicas seu panniculos et tres humores et unam telam ad modum tele aranee [= BACON, *Perspectiva* I, 2, 2, p. 26] : Et in eodem capitulo circa finem dicit: 'Aliqui etiam VII tunicas posuerunt, sed falsum est, quia telam araneam pro tunica computaverunt [= BACON, *Perspectiva* I. 2, 2, p. 28].'"

50 On the context of the medieval debate see D. C. LINDBERG, "Medieval Latin Theories of the Speed of Light", in R. TATON (ed.), *Roemer et la vitesse de la lumière*, Paris, Vrin, 1978, p. 45–72.

51 The profundity and originality of this preparation are also surprising, as Tišnov's quodlibet is traditionally supposed to be heavily influenced by earlier quodlibetal handbooks. Cf. KEJŘ, *Quodlibetní disputace*, p. 97–101; ŠMAHEL, *Die Prager Universität im Mittelalter*, p. 369 counts 15 questions copied from Knín's quodlibet by Tišnov.

52 Besides optics-oriented questions, references to perspectivist authorities also appear in other questions on different topics. For example, Zdeněk of Labouň (Zdenko de Labun) in the question debated in Hus's *quodlibet* explains some optical phenomena such as the rainbow or halo as a result of refraction of sunlight in the atmosphere and refers several times to the *Perspectiva* by Witelo, i.e. to a highly technical compendium of optics. Unlike Tišnov's vague reference to Witelo, Labouň refers to specific propositions, which may indicate that he has the text before his eyes. See ZDENKO DE LABUN, "Questio astronomicalis", ed. B. KOCÁNOVÁ, in ead., "Questio astronomicalis Zdeňka z Labouně: Kritická edice [Questio astronomicalis by Zdeněk of Labouň: A Critical Edition]", in *Listy filologické*, 139 (2016), §3.7, p. 158–159.

53 The preparation is edited in IOHANNES HUS, *Quodlibet*, q. 56, p. 254–256.

54 As will be scrutinized below, Borotín accepted a syncretic account in the end.

source for such a question, Hus is faithful to his favorite thinker John Wyclif even here and borrows a considerable portion of the text from Wyclif's theological masterpiece *Triologus*, namely from a chapter on sensation in the first anthropological part of the work⁵⁵. On the other hand, it is not so surprising if one takes into consideration both Wyclif's intense interest in the science of *perspectiva*⁵⁶ and the popularity of Wyclif's works among reformist Bohemian masters (concentrated around John Hus and Jerome of Prague)⁵⁷.

Thus, even the title of Hus's question prepared for Borotín is borrowed from Wyclif:

| IOHANNES HUS, <i>Quodlibet</i> , q. 56 ⁵⁸ | IOHANNES WYCLIF, <i>Triologus</i> , II, 7 ⁵⁹ |
|--|---|
| [...] Hanc autem difficultatem [...] Magister Io<hannes> de B<orotin> [...] nostro auditorio declarabit. Unde proponitur sibi questio sub hac forma: Utrum sensaciones fiunt per extramissiones virtutum ab organis sensitivis. | <i>Pseustis</i> . Istam materiam nec tractas philosophice neque fundas, imo difficultas utrum autem sensaciones fiunt per extramissiones virtutum ab organis , cum aliis difficultatibus, praetermittis [...]. |

In the *neganti* section, Hus then utilizes Wyclif's chapter on sensation, where the evangelical doctor defends a middle position between intromission and extramission. Hus's first argument (inspired by the second part of Wyclif's text) asserts that vision itself is on the intersection of an extension of the (imaginary) visual ray and *catetus*, i.e., a line drawn through the object perpendicular to the surface of the mirror (The perspectivist *dictum* used here pertains to the issue of the location of the mirror images; unlike Wyclif, Hus mentions the context of mirror perception only at the very end of the argument). As the intersection is (usually) behind the mirror and hence *outside* the eyes, Hus's concludes that vision must be by extramission⁶⁰.

55 IOHANNES WYCLIF, *Triologus, cum Supplemento Trialogi*, ed. G. LECHLER, Oxford, Clarendon, 1869, II, 7, p. 97–98. Note that although Hus's dependence on *Triologus* in q. 56 is unnoticed by editor B. Ryba, he identifies several borrowings from Wyclif's *Opus evangelicum* in q. 52 (on the multiplication of light). See IOHANNES HUS, *Quodlibet*, q. 52, p. 240–246.

56 Copious evidence is provided by H. PHILLIPS, "John Wyclif and the Optics of the Eucharist", in A. HUDSON, M. WILKS (eds.), *From Ockham to Wyclif*, Oxford / New York, Basil Blackwell, 1987, p. 245–258.

57 On the dissemination of Wyclif's works in Bohemia in the late fourteenth and early fifteenth centuries and his influence on Prague University masters see V. HEROLD, *Pražská univerzita a Wyclif* [Prague University and Wyclif], Praha, Univerzita Karlova, 1985; ŠMAHEL, *Die Prager Universität im Mittelalter*, p. 467–489 (chapter on "Wyclif's Fortune in Hussite Bohemia"); or O. PAVLÍČEK, "Wyclif's Early Reception in Bohemia and His Influence on the Thought of Jerome of Prague", in P. HORNBECK, M. VAN DUSSEN (eds.), *Europe after Wyclif*, New York, Fordham University Press, 2017, p. 89–114. According to his own testimony, Wyclif's *Triologus* was copied in Oxford and brought back to Bohemia by Jerome of Prague himself. See PAVLÍČEK, "Wyclif's Early Reception", p. 94. F. ŠMAHEL, *Verzeichnis der Quellen zum Prager Universalienstreit 1348–1500*, Wrocław, Ossolineum, 1980, p. 16–17 lists five copies of Wyclif's *Triologus* of Bohemian origin; all of them are today in Vienna (MSS Vienna, ÖNB, Cod. 1387; 3930; 3932; 4505; 4516). There is also evidence – although questionable – that *Triologus* was translated into Czech by John Hus himself. See F. M. BARTOŠ, *Literární činnost M. J. Husi* [Literary Activities of Master Jan Hus], Praha, Česká akademie věd a umění, 1948, p. 123.

58 IOHANNES HUS, *Quodlibet*, q. 56, p. 255.

59 IOHANNES WYCLIF, *Triologus* II, 7, p. 97.

60 Notice also that Wyclif speaks about a "judgment of vision" (*iudicium visionis*), i.e. where the thing seen appears/is judged to be; whereas Hus intentionally reinterprets it as a location of the vision itself (which move enables him to argue for extramission).

| IOHANNES HUS, <i>Quodlibet</i> , q. 56 ⁶¹ | IOHANNES WYCLIF, <i>Dialogus</i> , II, 7 ⁶² |
|--|---|
| <p>Neganti: Visio fit per extramissionem virtutis ab organo; igitur questio vera. Assumptum probatur: Si visio fit sub piramide radiosa, ubi radius visualis concurrat cum catheto, ipsa visio fit per extramissionem virtutis ab organo; sed sic est, quod ipsa visio fit sub piramide radiosa, ubi radius visualis concurrat cum catheto; igitur etc.</p> <p>Secunda pars patet per experientiam. Sed consequentia prima probatur: Nam in concurrentia (p. 256) radii visualis et catheti res videtur; sed planum est, quod nullum corpus exit ab ipso visibili penetrans ipsum speculum, nec ipsa res visa est ibi realiter; igitur oportet, quod aliqua virtus ab ipso organo multiplicetur usque ad concurrentiam visualis radii et catheti.</p> | <p>[...] perspectivi vere intelligunt, quod sit visionis iudicium, ubi radius visualis concurrat cum catheto; ut videndo aquam suppositam vel quodcumque aliud speculum, apparet communiter rem visam ibi situari, ubi linea recta exiens a re visa per speculum, et linea perpendicularis in extremo ejus concurrent, sicut invincibilis experientia satis docet;</p> <p>non quod corpus exit ab ipso visibili penetrans ipsum speculum et etiam sphaeram terrae lacerans, sed quod in illis sitibus sunt habitudines, secundum quas fit iudicium de situatione visibilis, ubi lineae imaginariae sic concurrunt [...].</p> |

Hus's second argument against denying extramission is developed along the same lines. It argues for a syncretic account, and appeals to the authority of Augustine and Grosseteste. In fact, Hus copies it *verbatim* from the first part of the chapter on sensation in Wyclif's *Dialogus*:

| IOHANNES HUS, <i>Quodlibet</i> , q. 56 ⁶³ | IOHANNES WYCLIF, <i>Dialogus</i> , II, 7 ⁶⁴ |
|--|--|
| <p>Augustinus, Linconiensis et quam plures tenent, quod fit sensacio mixtim per extramissionem virtutis ab organo sciendi et intus recipiendi speciei sensibilis, cum sicut organum virtutis visive recipit lumen speciei coloris ab obiecto sensibili, sic organa aliorum sensuum species ab obiectis requirunt.</p> <p>Et in primo est error notabilis, cum quidam grossi concipiunt, quod a sensu exit virtus cum corpore et organo sciendi, et sic in brevi consumeretur totum organum; non autem sic debet concipi, sed quod habitus sciendi in finibus talium actuum limitatur et ad tantum extendit se huiusmodi aptitudo vel habitus, quod perspectivi vere intelligunt, quod sit visionis iudicium⁶⁵, ubi radius visualis concurrit cum catheto.</p> | <p>Phronesis. [...] Quantum tamen ad difficultatem quam tangis, teneo cum Augustino, Lincolniensi et ceteris, quod fit sensatio mixtim per extramissionem virtutis ab organo, et per intus susceptionem speciei in organo sentiendi. Secundum vero istorum est patulum, cum sicut organum virtutis visivae recipit lumen vel speciem coloris ab obiecto sensibili, sic organa aliorum sensuum species ab obiectis suis recipiunt. Et in primo est error notabilis, cum quidam grossi concipiunt, quod a sensu exit virtus cum corpore de organo sentiendi, et sic infra breve ex lapsu talis corporis consumeretur organum sentiendi; non autem sic concipio, sed quod aptitudo sive habitus sentiendi in finibus talium situum limitatur, et ad tantum ac taliter se extendit huiusmodi aptitudo, ut perspectivi vere intelligunt, quod sit visionis iudicium, ubi radius visualis concurrat cum catheto [...].</p> |

Finally, Hus briefly divides authorities into two groups according to their stance on the issue. Whereas Peripatetics (Aristotle, Averroes, Alexander of Aphrodisias,

61 IOHANNES HUS, *Quodlibet*, q. 56, p. 255–256.

62 IOHANNES WYCLIF, *Dialogus* II. 7, p. 98.

63 IOHANNES HUS, *Quodlibet*, q. 56, p. 256.

64 IOHANNES WYCLIF, *Dialogus* II. 7, p. 97–98.

65 iudicium] indicium *ed. Ryba*

Avicenna and Albert the Great) favor intromission, extramission combined with intromission is proposed by Empedocles and Plato. This doxography may be inspired by the question on a similar topic included in the *quodlibet* by Matthias of Knín two years before, as Knín mentions the very same names in the *propositio* of his preparation⁶⁶:

| IOHANNES HUS, <i>Quodlibet</i> , q. 56 ⁶⁷ | MATTHIAS DE KNIN, <i>Quodlibet</i> , q. 114 (116) ⁶⁸ |
|---|---|
| <p>Aristotiles in <i>De sensu et sensato</i>, Comentator, Allexander, Albertus et Avicenna tenent, quod fit intus susci<pi>endo et non extramittendo.</p> <p>Empedocles, Plato et eorum multi sequaces tenent, quod fit intus suscipiendo et extramittendo.</p> | <p>Utrum visio facta sub piramide radiosa fiat intus suscipiendo vel extramittendo.</p> <p>Arguitur quod [...] primum quesitum sit falsum, quia si visio sit extramittendo, igitur non intus suscipiendo. Antecedens patet <per> Empedoclem et Platonem et suos sequaces qui recitantur super libro de sensu et sensato [...].</p> <p>In oppositum [...] pro veritate primi quesiti sunt Aristoteles in <i>De sensu et sensato</i>, Commentator, <Alexander, Albertus, Avicenna>⁶⁹ – igitur questio quantum ad suppositum et primum quesitum est vera.</p> |

Finally, Hus also prepared two brief arguments against the response agreeing with intromission. The second is apparently borrowed from Knín, who, in turn, renders an argument presented by Albert the Great. Comparison of these three variants of the same argument reveals how Albert's argument becomes more and more abbreviated (and less clear):

| IOHANNES HUS, <i>Quodlibet</i> , q. 56 ⁷⁰ | MATTHIAS DE KNIN, <i>Quodlibet</i> , q. 114 (116) ⁷¹ | ALBERTUS MAGNUS, <i>De sensu et sensato</i> , I, 6 ⁷² |
|--|---|--|
| <p>Concedenti, quod fit intus suscipiendo: [...].</p> <p>Item: Ad hoc, quod fiat visio, oportet, aut quod visus aliquid emittat agendo in visibile, aut quod visibile agat in visum; sed visibile non agit in visum; igitur etc.</p> | <p>Item ad hoc quod fiat visio, oportet aut quod visus aliquid emittat agendo in visibile aut quod visibile agat in visum. Sed visibile non agit in visum, nec in aliquid alterum, quia color est</p> | <p>Alia autem est ratio eorum quia viderunt quod color non est qualitas activa et immutativa per seipsam alicuius corporis, nec aliqua alia natura in visibile agit ad hoc quod per colorem immutet corpora se tangentia, quia si aliqua alia natura ageret in res</p> |

66 Knín might be inspired by Albert the Great's careful examination of the issue. See ALBERTUS MAGNUS, "De sensu et sensato", in *Alberti Magni Opera Omnia*, vol. VII. 2a, ed. S. DONATI, Münster, Aschendorff, 2017, I. 5, p. 26b–28b. Incidentally, the doxographical part of Hus's question was incorporated (almost word for word) into a later Prague question on the mechanism of vision (see ANONYMUS, *Utrum visio fit intus suscipiendo et non extra mittendo*, MS Prague, NK ČR, V H 13, fol. 236r).

67 IOHANNES HUS, *Quodlibet*, q. 56, p. 256.

68 MATTHIAS DE KNIN, *Quodlibet*, MS Prague, KMK, L 45, q. 114 (116), fol. 123r.

69 Alexander, Albertus, Avicenna] *coni. Alexandri, Alberti, Avicenne cod.* (For the meaning of the editorial abbreviations see the introduction to the edition below in Appendix II.)

70 IOHANNES HUS, *Quodlibet*, q. 56, p. 256.

71 MATTHIAS DE KNIN, *Quodlibet*, MS Prague, KMK, L 45, q. 114 (116), fol. 123r.

72 ALBERTUS MAGNUS, *De sensu et sensato* I. 6, p. 29a.

| | | |
|--|---|--|
| | visibile et omne quod videtur, sub colore videtur, sed color non est qualitas ⁷³ activa – alias corpora colorata, videlicet album et nigrum, tangentia se , ut fiunt colorata se intransmutarent – quod est falsum. Igitur visus emittendo agit in visibile. | visibiles, tunc transmutarentur ab esse suo, sicut faciunt ea quae transmutant calidum et frigidum. Color igitur secundum quod est color non agit in aliquid, nec medium igitur patitur ab eo nec organum visus. Non ergo fit visus intussuscipiendo actionem colorati visibilis, sed potius extramittendo radios [...]. |
|--|---|--|

A more extensive examination of the optical issues discussed in the Prague quodlibets is beyond the range of this paper. Even the present sketch, however, reveals that perspectivist issues were quite popular in the quodlibets, and that in their preparations the *quodlibetarii* utilized not only almost all the important perspectivist texts (Simon of Tišnov), but also unexpected theological and philosophical sources popular among Bohemian masters (Wyclif used by Hus). Finally, the *quodlibetarii* also apparently exploited quodlibetal preparations by their former colleagues (as Hus's use of Knín suggests).

3. John of Borotín's *Quaestio* on the Mechanism of Vision

As already noted, the main problem one must face investigating the presence of optical issues in the Prague quodlibets is the specific nature of the extant written sources – almost all the optical questions are preserved only in the form of preparations gathered in the handbooks by *quodlibetarii* before the disputations themselves. This kind of source cannot reveal what the discussion was like, or which position the responding master held. There is however one exception – a *positio* (elaborated response to the question in written form) by the Czech master John of Borotín, who disputed a question on the mechanism of vision in the quodlibet by John Hus in 1411. The rest of this paper is devoted to Borotín, and to analysis of his question, which is also edited below (see Appendix II).

3.1 Borotín's Life and Works

John of Borotín was born in 1378, studied the arts at Prague University, and earned his bachelor's degree there in 1400 and master's in 1410. He then lectured and held several positions at the university for almost half of a century until his death (after 1458)⁷⁴. As a fresh master of arts, he had still been attending university lectures in

73 *qualitas*] *coni. quans cod.*

74 Borotín was *dispensator* (1414 and 1416), dean of the Faculty of Arts (1415 and again 1432), examiner of bachelors (1417 and again 1450) and rector of the whole university (1425–1426). Initially, he was also *rector* of a minor school in Zderaz (in 1412). On his life and service to the university see J. TRÍŠKA, *Literární činnost předhusitské university* [Literary Work of the Pre-Hussite University], Praha, Universita Karlova, 1967, p. 166, 173; K. BERÁNEK, "O počátcích pražské lékařské fakulty 1348–1622 [On the

the 1410s. This part of his career is well documented because he wrote down a series of lectures that he attended in his personal codex (today MS Prague, KMK, O 1), which is also useful for identifying Borotín's hand⁷⁵. Evidently, he had a special interest in the astronomical disciplines. From the lecture reports and several dated first-person glosses it can be surmised that he attended a number of introductory lectures on astronomy in 1411: MS Prague, KMK, O 1 preserves an introductory text on *De utilitatibus astrolabii* by Christian of Prachatic (Křišťan z Prachatic in Czech, fols 37r–37v), an introduction to astronomy with a division of astronomical and astrological disciplines (38r–39r) and commentaries on *Sphaera materialis* (39v–45v) and *Theorica planetarum* (46r–47v, 49r–65r)⁷⁶. Borotín then attended lectures on Thabit ibn Qurra's introduction to Ptolemy's *Almagest* (in 1412, fols 126r–129r) given by John Šindel (Iohannes Andreae Schindel), and Šindel's lectures on the *Almagest* itself (in 1413, fols 138r–161v)⁷⁷, as well as lectures on Alcabitus (in 1413, fols 72r–89v) and Alfraganus's *De differentiis* (in 1414, fols 181v–222r). Marginal glosses and introductory notes written in Borotín's hand indicate that he used these *reportationes* and excerpts several decades later when he was lecturing these texts⁷⁸.

Beginnings of the Prague Faculty of Medicine]], in *Acta Universitatis Carolinae – Historia Universitatis Carolinae Pragensis*, 9–2 (1968), p. 79; ŠMAHEL, *Die Prager Universität im Mittelalter*, p. 146, 303–306; and esp. C. BURNETT, “Teaching the Science of the Stars in Prague University in the Early Fifteenth Century: Master Johannes Borotín”, in *Aithér*, 8 (2014), p. 19–24. On Borotín's works, see esp. SPUNAR, *Repertorium*, vol. I, p. 141–142 and BURNETT, “Teaching”; also C. H. LOHR, “Medieval Latin Aristotle Commentaries Authors: Jacobus – Johannes Juff”, in *Traditio*, 26 (1970), p. 158. The following passage includes several precisions and additions to Borotín's bibliography.

- 75 On the contents of the codex, see PATERA, PODLAHA, *Soupis rukopisů*, vol. II, p. 452–453; A. HADRAVOVÁ, P. HADRAVA, *Křišťan z Prachatic: Stavba a užití astrolábu* [Christian of Prachatic: Composition and Use of the Astrolabe], Praha, Filosofia, 2001, p. 77–78; and BURNETT, “Teaching”, p. 10–15. David Juste is preparing a new description of the codex. The codex is in large part Borotín's autograph, as recently argued by BURNETT, “Teaching”, esp. p. 11–13 (the main arguments are the notes in the first person, some of them including Borotín's name). Borotín's hand is idiosyncratic – wide, very cursive and not easy to read.
- 76 Traditionally, it was surmised that the text on fols 37r–65r is a copy of a text on the astrolabe (perhaps by Christian), because of a gloss on fol. 37r (“Principium in tractatum C[ristiani] De utilitatibus astrolabii 1411 [...]”) and a gloss on fol. 66r following this part of the codex (“1452 incepti legere Alkabicium fer<ia> tertia ante Ascensionem Domini ego M. Io<hannes de> Bo<rotin>”), where “Alkabicium” was read as “Astrolabium”. See PATERA, PODLAHA, *Soupis rukopisů*, vol. II, p. 452; BURNETT, “Teaching”, p. 13–14 also seems to incline to it. This surmise was refuted by HADRAVOVÁ, HADRAVA, *Křišťan z Prachatic*, p. 77–78; who prepared editions of both *Compositio astrolabii* and *Usus astrolabii* by Christian (see HADRAVOVÁ, HADRAVA, *Křišťan z Prachatic*, p. 133–171, 201–281). A closer look at these passages reveals that the text is actually a series of different commentaries, as stated above.
- 77 On these texts, see D. JUSTE, “Johannes Andree Schindel, Lectures on Thebit Bencora's *De hiis que indigent expositione antequam legatur Almagesti*” (update: 30.03.2017), *Ptolemaeus Arabus et Latinus. Works*, accessible from: <https://ptolemaeus.badw.de/work/120>, and D. JUSTE, “Johannes Andree Schindel, Lectures on the *Almagest*” (update: 21.03.2017), *Ptolemaeus Arabus et Latinus. Works*, accessible from: <https://ptolemaeus.badw.de/work/77>. On Schindel (1370s – between 1455 and 1458), the famous Bohemian astronomer and probable designer of the Prague astronomical clock, see, e.g., SPUNAR, *Repertorium*, vol. I, p. 133–140 and the study by Alena Hadravová and Petr Hadrava in this volume.
- 78 This was pointed out by BURNETT, “Teaching”, for Borotín's lectures on Alcabitus.

In the 1410s, Borotín also participated as one of the responding masters in three quodlibetal disputations. He responded to a question on extramission and the mechanism of vision in John Hus's *quodlibet* in 1411⁷⁹, a question on mathematical disciplines and their principles in a *quodlibet* organized by Michael of Malenice called Čížek in 1412⁸⁰, and a question on the generation of stones and metals in Prokop of Kladruby's *quodlibet* in 1417⁸¹.

Later, during his long career as a teacher, Borotín lectured on several books of natural philosophy, astronomy and medicine. Some of his commentaries are preserved – either as his own preparations for lectures or as marginal glosses in copies of the texts he lectured on, written down as *reportationes* by his students. In the 1420s he lectured on medical texts – on Hippocrates's *Aphorisms* (1424, Borotín's brief introduction is preserved in MS Prague, NK ČR, X H 23, fol. 49r) and *Isagoge Iohannitii* (1430, glosses in MS Prague, NK ČR, X H 16, fols 15r–20r) and later, on Aristotle's *Meteorology* (1433, glosses in MS Prague, NK ČR, VII E 9, fols 107r–174v)⁸². In the final part of his life, he focused mainly on astronomy and astrology, giving lectures on Ptolemy's *Quadripartitum* (1444, glosses in MS Cracow, BJ, 593)⁸³, Campanus of Novara's *Theorica planetarum* (1449, introductory notes in MS Prague, KMK, O 1, fols 129v–130r), Alfraganus's *De differentiis* (1450)⁸⁴ and on Alcabitiu's *Introduction to Astrology* (in 1452 and 1454)⁸⁵. Besides that, there are two undated commentaries written in Borotín's hand – a continuation of an exposition on the *Alfonsine tables* (MS Prague, KMK, O 1, fols 114r–115v) and a commentary on Euclid's *Elements* (MS

79 *Utrum sensationes fiunt per extramissiones virtutum ab organis sensitivis*, preserved in MS Prague, NK ČR, X H 18, fols 58r–61r and analyzed and edited below.

80 *Utrum omne principium mathematicae, cuius obiectum primum est quantitas, sit necessarium*, preserved also in MS Prague, NK ČR, X H 18, fols 94v–101v.

81 *Utrum lapides et metalla generari in nubibus sit possibile quemadmodum in visceribus terre* – Borotín's position is not extant, there is only the *quodlibetarius* Prokop's preparation in MS Prague, KMK, L 27, fols 40v–41r (on which see also KOCÁNOVÁ, "The Sublunary Phaenomena", p. 94–95).

82 There is also a note in MS Prague, KMK, O 1, fol. 222v (basically several paragraphs on the issue of why some regions are uninhabitable), the title of which suggests Borotín lectured on *Meteorology* as early as 1420: "1420 circa leccionem *Meteororum* M<agistri> J<ohannis de> B<orotin>."

83 The codex is described by M. KOWALCZYK et al., *Catalogus*, vol. IV, p. 144–148 and D. JUSTE, "MS Cracow, Biblioteka Jagiellońska, 593" (update: 25.02.2017), *Ptolemaeus Arabus et Latinus. Manuscripts*, accessible from: <https://ptolemaeus.badw.de/ms/182>.

84 There is testimony that Borotín lectured on Alfraganus in a list of university lectures preserved in the rear endpaper in MS Prague, KMK, L 43 (and transcribed in Trška, *Literární činnost*, p. 173): "Item Iohannes Borotin eodem anno [=1450] legit Alfraganum De differentiis; incepit f. III^a ante Zophie." No commentary is extant; however, Borotín might have based his teaching on the lectures he attended in 1414 and wrote down in MS Prague, KMK, O 1.

85 Borotín started to lecture on Alcabitiu in 1452 (see MS Prague, KMK, O 1, fol. 66r) but apparently changed his mind – see MS Prague, KMK, O 1, fol. 66r: "Et dicenda minori<bu>s sunt minora verba divi – dicamus igitur aliquid minori pro intelligendo isto libro [...]. Et quia iste liber subservit astronomie, cum sit introductorius in iudicia astrorum, aliquid igitur pro noticia astronomie hic dicemus ante omnia et post hoc incipiemus istum librum dei auxilio." He then lectured on Alcabitiu again in 1454. See his preamble in O.1, fols 130r–v (edited by BURNETT, "Teaching", p. 26–27), where he mentions that he had lectured on the book before but stopped (BURNETT, "Teaching", p. 26, §3). The preamble ends with a cross-reference to fol. 72r, where the commentary written in 1413 starts, indicating that Borotín lectured on Alcabitiu in 1454 according to his student notes from 1413.

Prague, KMK, O 1, fols 165r–178r; with a long borrowing from Alan of Lille’s *Anticlaudianus* III on geometry in the introduction). There are also mentions of Borotín’s lectures on plague (*de pestilentia*) and of him as an expert on *computus*⁸⁶.

Borotín was evidently engaged in the quadrivium or mathematical disciplines in the broad sense, mainly in astronomy. However, does *perspectiva* have a special place in his thinking? It does not seem so. E.g. in the commentary glosses to *Meteorology* ascribed to him, the glosses to book III (a traditional place for investigating optical phenomena, such as the rainbow) are rare and short, and serve merely as explanations of difficult expressions⁸⁷. Although he presented several methodological remarks about *perspectiva* in the question on mathematical principles disputed in Čížek’s *quodlibet*⁸⁸, the most evident influence of the optical tradition is to be found in his earliest text, the question on the mechanism of vision disputed in Hus’s *quodlibet*.

3.2 *Utrum sensationes*: Two Versions of the Text

The final redaction of Borotín’s question *Utrum sensationes* (preserved in Prague, NK ČR, X H 18 and edited below in Appendix II)⁸⁹ consists of a brief *propositio* (§1–3) with basic arguments *pro* and *contra* and *problema*, a section including *notabilia* where Borotín investigates all the terms included in the title of the question (§5–28), and finally a section with conclusions and corollaries where Borotín’s stance is presented (§29–39). The text itself does not contain any information concerning its authorship. Nevertheless, the title of the question matches the one included in John Hus’s handbook, and the *propositio* section is copied from Hus’s preparation *verbatim*. Moreover, since Hus ascribes the question to John of Borotín and calls him “a new Avicenna,” referring to Borotín’s skills in medicine and optics⁹⁰, there is no doubt that the author of the position in MS Prague, NK ČR, X H 18 is John of Borotín.

The text as preserved in MS Prague, NK ČR, X H 18 has a slightly more complicated structure. In the first place, the part of the codex under discussion includes *two* versions of Borotín’s question. The first redaction is shorter and sketchier, con-

86 See SPUNAR, *Repertorium*, vol. I, p. 42.

87 See IOHANNES DE BOROTÍN, *Epitome Meteorologicorum Aristotelis*, MS Prague, NK ČR, VII E 9, fols 152v–161r (book III) and especially tractatus 2 on fols 154r–161r which is “de passionibus causatis ex refraccione radorum solis aut lune” (fol. 152v, in mg.). Glosses explain terms for optical atmospheric phenomena such as the halo, parhelia etc. On fol. 157r a gloss points out that Aristotle speaks about vision as if it were by extramission (“Perloquitur de visu quod sit extramittendo.” See also note 124 below.). Several diagrams are included, e.g. the origin of the halo (155v), the colors of rainbow (158r) and its origin (159r, 159v, 160r).

88 Here, Borotín explains in what sense *perspectiva* is subordinated to geometry. See IOHANNES DE BOROTÍN, *Utrum omne principium*, MS Prague, NK ČR, X H 18, fol. 97v.

89 For reference, I use the paragraph numbers of the edition.

90 IOHANNES HUS, *Quodlibet*, q. 56, p. 255: “Hanc autem difficultatem venerandus Magister noster, Magister Io<hannes> de B<orotín>, cum sit preclarus perspectivus et medicus, velud Avicenna alius, nostro auditorio declarabit.”; IOHANNES HUS, *Quodlibet*, p. 281: “Illic Iohannes Borotyng, ut Avicenna, sensationes, qualiter fiunt intus suscipiendo et extramittendo, cum ceteris difficultatibus compendiosissime declarabat.”

taining many crossed phrases, interlinear and marginal glosses, and consisting only of *notabilia*. It is written on a single bifolio; however, due to binding, the text is on the folios both before and after the second version (fols 57r–57v, 62r–62v)⁹¹. The second version seems complete, as it includes not only *notabilia* but also conclusions and corollaries. There are also fewer cross-outs and glosses. After the text of the second version, there are several notes in the manuscript. As they relate to the main text (as argued below), I involve them in the edition (§40–43). The hand of the scribe is very cursive and, importantly, is the same for all the texts mentioned.

There are several indications which suggest that the exemplar of Borotín's question preserved in MS Prague, NK ČR, X H 18 is an autograph. The first (albeit not particularly persuasive) indication is that the hand of the scribe of *Utrum sensationes* is very similar to Borotín's handwriting preserved in MS Prague, KMK, O 1. Secondly, another question *Utrum omne principium mathematicae*, disputed by Borotín in the following year, is preserved in the same codex and shares both the idiosyncratic hand and complicated structure typical of *Utrum sensationes*. It also includes the beginning of the question, with *propositio* and first *notabile* (Prague, NK ČR, X H 18, fol. 94v) and then another version of the beginning with an additional division (95r). Further, there are *notabilia*, conclusions and corollaries (95r–99v); and the final version of the question is again followed by what can be considered preparatory notes that mirror the structure of the question itself (100r–101v). It is possible that two quires with Borotín's personal writings were bound (with many other disputed questions) into this collected volume.

The most persuasive reason for declaring *Utrum sensationes* an autograph, however, is a comparison of the two versions of the question. This comparison suggests that the scribe had worked extensively on the text, adding new parts and rearranging the old ones, refining the style, etc. Sometimes, too, a marginal gloss in the first version is extended and becomes a part of the main text in the second. All of this suggests that the scribe is identical to the author. The comparison reveals that the first version functions as preparatory notes for the second version, which is in turn carefully constructed as a final version of the text.

Sometimes Borotín changes the preparatory text because he finds a more suitable authority. For example, defining the term *virtus* (the soul's capacity to perform an action, e.g. a cognitive one), the preparatory version refers to Aristotle's definition of *virtus* as a habit that perfects and renders good both its bearer and his deeds, and identifies *virtus* with *spiritus*, understood physiologically with Avicenna as a "subtle vapour" (fol. 57v). These are not, however, particularly convenient definitions when the *virtus* in dispute is a power of soul as Aristotle's definition relates rather to a moral or intellectual virtue, whereas Avicenna is talking about the physiological vehicle which is behind the workings of the power. Borotín was aware of this unsuitability, and in the final version, he proposes an entirely different definition which he borrowed from Bartholomaeus Anglicus: power is an essential attri-

91 For a more detailed description of this part of MS Prague, NK ČR, X H 18 and more information about the gatherings see Appendix I.

bute of the soul by means of which the soul performs its actions in the body (§14). Nevertheless, Borotín still found Aristotle's definition worth mentioning, and thus he put it after the final version of the question as an additional remark (§40), where he applies Aristotle's definition of virtue to the case of the soul's power, stressing that sensory power renders the workings of body perfect and good.

| Preparatory notes fol. 57v | Final version fol. 58v = §14 | Additional note fol. 61r = §40 |
|--|---|---|
| <p>Dixi 3^o quod ad sensationem requiritur virtus.</p> <p>Unde virtus⁹² – licet apud philosophos multipliciter accipitur, tamen pro presenti materia</p> <p>potest sic describi: “virtus naturalis⁹³ est habitus⁹⁴, que habentem se perficit et opus eius bonum reddit,⁹⁵” ut dicit Philosophus <i>Ethicorum</i>; vel potest dici spiritus, qui – ut dicit Avicenna I^o <i>Canonis</i>, fen I^a – est vapor subtilis ex sanguine resolutus ad totum corpus multiplicatus⁹⁶.</p> | <p>Dixi 3^o quod ad sensationem requiritur virtus que est causa efficiens sensationis, ut dicit Constantinus in <i>Pantegni</i>.</p> <p>Unde ly “virtus” apud philosophos multipliciter accipitur; in presenti tamen materia summitur virtus pro quadam potencia anime per quam ipsa suas operationes exercet in corpore et describendum sic: “Virtus est potencia anime ei essentialiter attributa ad suas peragendas in corpore acciones, nam mediante hac virtute anima corpus vivificat, cor et arterias constringit continue et dilatat, sensum et motum voluntarium omni animato corpori administrat, ut dicit idem Constantinus libro 13 in <i>Pantegni</i>”⁹⁷.</p> | <p>Virtus, ut dicit Philosophus 2^o <i>Ethicorum</i>, est que habentem se perficit et opus eius [...] bonum reddit; [...]. Sic eque virtus sensitivi corporis opus corporis sensitivi perficit et reddit bonum in suo genere; talis autem virtus est triplex – scilicet naturalis, vitalis et animalis. Vide in questione, si placet.</p> |

Extensive borrowing from Bartholomaeus Anglicus's *De proprietatibus rerum* is a distinctive feature of the final version of Borotín's question in general. The definitions of *virtutes* (see below) in Borotín's preparatory notes, for example, are rather brief (fol. 57v), while the same passage in the final version is detailed and consists above all of borrowings from Bartholomaeus (see §15–21). It seems that Borotín discovered the usefulness of Bartholomaeus's encyclopedia for his purposes after he had already written the major part of his preparatory notes. Tacit borrowings from Bartholomaeus, although numerous in the final version, are completely absent from the preparatory notes. Sometimes it seems that Borotín realized he could improve his text with a quotation from Bartholomaeus while finalizing it. For ex-

92 virtus] sic describitur *add. sed del.*

93 naturalis] *suprascr.*

94 habitus] *suprascr.*

95 ARISTOTELES, *Ethica Nicomachea* II, 5, 1106a15–24.

96 Possibly AVICENNA, *Liber canonis*, Basel, Johannes Herwagen, 1556, I. 1, 6, 4, fols 49–50.

97 BARTHOLOMAEUS ANGLICUS, *De proprietatibus rerum*, vol. I: Prohemium, Libri I–IV, eds. B. VAN DEN ABEELE, H. MEYER, M. W. TWOMEY, B. ROLING, R. J. LONG, Turhnout, Brepols, 2007 [hereafter abbreviated as *DPR I–IV*], III, 14, p. 162.

ample, he excerpted a short passage on saliva and its role in the sense of taste from Bartholomaeus and placed it after the whole text of the preparatory notes (fol. 62v). Then, writing the final version and discussing the object of taste, he notes that what is perceptible to the sense of taste must be humid and adds a quotation from Aristotle's *De anima*. He might, however, have recollected the excerpt on saliva, crossed out Aristotle's saying, added these several lines on saliva from Bartholomaeus and, finally, added Aristotle's *dictum* again after that (see §25).

The claim that the scribe of the text may be the author himself is further confirmed by notes appended to the final version of the text (§40–43). At least some of these seem to be an outcome of a rereading and rethinking of the final version carried out by the author himself. The corollary to the first conclusion (§30), for example, states that the sensible *per se* does not bring about the sensation. To give precision to this statement, he later adds what “per se” means here: he superscribed “secundum esse reale”, making clear that the statement pertains only to the sensible in its real being. Nevertheless, the distinction between the real and intentional being of the sensible, no matter how common in the medieval philosophical literature, had not previously been introduced in the text. He therefore adds a marginal gloss “hic nota” to this place, which is most likely a cross-reference to one of the notes after the text (see §43). Here, on fol. 61v, the marginal “hic” appears again next to the text that begins “nota [...]”, and explains the distinction between *esse reale* and *esse intentionale*.

In the corollary to the fourth conclusion (§37), Borotín introduces the notion of the visual cone. He says that there is both a cone constituted by *species* multiplied from the sensible object and a cone constituted by *species* of the eye emitted from the eye (on the doctrine, see below). At the end of the corollary, however, Borotín speaks about *three* cones. This seeming mistake can be explained if one has Bartholomaeus's text in mind. In his discussion of vision, Bartholomaeus introduced the third cone. Besides the two cones from the object and the eye, there is a further cone of light. Borotín also had this passage on the necessity of light for vision in mind, which is proven by the fact that he includes it among the notes after the question (see §42).

These examples reveal that the question *Utrum sensationes*, as preserved in MS Prague, NK ČR, X H 18, is a genuine work-in-progress, its two versions representing two stages of the text formation, as the former includes many notes which in the latter were carefully elaborated, edited and refined by a scribe who, in all probability, is to be identified with the author himself.

3.3 *Utrum sensationes*: Borotín's Sources

At first sight, Borotín's question appears to be quite revealing regarding its sources. There are numerous explicit references, mainly to Aristotle (10×), Constantine the African and his *Pantegni* (8×), and Peckham (or “auctor *Perspective communis*” – 6×). It is however unclear to what extent, or even whether, Borotín worked with the actual texts of these authors (at least in the case of Aristotle and Constantine). Tracing Borotín's references reveals a considerable discrepancy between who is explicitly referred to, and from whom the passage is borrowed (see the table below). When the actual borrowings are considered, Borotín's most prominent source is –

perhaps surprisingly – Bartholomaeus Anglicus and his encyclopedia *De proprietatibus rerum* (especially book III on human psychology)⁹⁸. Although almost never indicated, there are no less than twenty-three borrowings from Bartholomaeus, some of them quite extensive⁹⁹.

Sometimes Borotín uses Bartholomaeus as a source for other authors' positions. It is highly probable that Borotín did *not* work with Constantine's *Pantegni*, Calcidius's commentary to Plato's *Timaeus*, or Aristotle's *De animalibus*. Although he names these works several times, in all cases either the reference to them is a part of a literal borrowing from Bartholomaeus (hence, it seems as if he quoted from these authors themselves – see, e.g., §14, 15, 20, 38)¹⁰⁰, or Borotín deliberately ascribes quotations from Bartholomaeus to another, perhaps more eminent authority (especially to Constantine, as in §19, 25, or 27)¹⁰¹.

Nevertheless, it is very likely that Borotín had copies of two other sources before his eyes – Peckham's optical textbook *Perspectiva communis* and Galen's compendium *De locis affectis* (referred to by him as *De interioribus*). In the case of Peckham, Borotín refers to specific propositions using correct numbering, and often quotes them literally (see §8, 10, 36, 41); sometimes he also accepts and rephrases Peckham's doctrine (see §32). The three quotations of Galen's *De interioribus* are less accurate, but at least one of them is still traceable (see §18)¹⁰².

98 Bartholomaeus's encyclopedia (finished about 1240 in Saxony) was apparently popular in the Bohemian Lands. H. MEYER, *Die Enzyklopädie des Bartholomäus Anglicus: Untersuchungen zur Überlieferungs- und Rezeptionsgeschichte von 'De Proprietatibus Rerum'*, München, Wilhelm Fink Verlag, 2000, lists six codices which preserve an original Latin version (p. 99–101) and two other redactions or compilations (p. 171, 177) now kept in Prague libraries, all from the fourteenth or fifteenth century and most of them of Czech origin. Two copies of Bartholomaeus are also mentioned in late medieval catalogs of Prague University libraries. See *Catalogi librorum vetustissimi Universitatis Pragensis*, p. 127 (N I: Q48, Q49). Later in the fifteenth century, Paul Židek used Bartholomaeus for his own encyclopedia. See A. HADRAVOVÁ, *Kniha dvacatera umění mistra Pavla Židka: část přírodovědná* [Master Paul Židek's Book of Twenty Arts. The Natural Sciences Part], Praha, Academia, 2008, p. 47–48.

99 There is one unwitting reference to Bartholomaeus's text in §21 of Borotín's *quaestio*. Borotín, introducing three kinds of bodily spirit, compiles this paragraph out of excerpts from chapter III, 22 of Bartholomaeus's encyclopedia. Having tacitly borrowed Bartholomaeus's claim that the spirit is generated in the liver, Borotín avoids summarizing Bartholomaeus's scrupulous exposition of the propagation of *spiritus* through other organs by reference (where "post presentem" means "after the just quoted passage from Bartholomaeus") to his source: "Quaere post presentem de generatione huius spiritus."

100 Hence, Borotín's reference to Calcidius in §20 cannot unfortunately be used as further evidence for the dissemination and popularity of his commentary to Plato's *Timaeus* among Bohemian masters around 1400. On Platonist influences on Prague University masters see, e.g., E. JEAUNEAU, "Plato apud Bohemos", in *Mediaeval Studies*, 41 (1979), p. 161–214, esp. p. 162–168; HEROLD, *Pražská univerzita a Wyclif*, p. 230–231; or PAVLÍČEK, "Wyclif's Early Reception", who listed numerous borrowings in the works by Borotín's contemporary Jerome of Prague (p. 100, 113).

101 Such a practice might have been common among Bohemian scholars. Use of Bartholomaeus's encyclopedia is proven in the Czech lexicographer Claret (Bartholomaeus de Solencia in Latin, Bartoloměj z Chlumce in Czech) a half-century before Borotín. See, e.g., A. VIDMANOVÁ, "Mistr Klaret a jeho spisy [Master Claret and His Writings]", in *Listy filologické*, 103–4 (1980), p. 221.

102 Borotín probably used a copy of Galen when working on his preparatory notes, whereas he prepared the final version without further reference to it. When discussing the faculty of movement (*virtus*

| Source | Explicit references | Actual borrowings (as identified in the edition below) |
|---|---------------------|--|
| Bartholomaeus Anglicus, <i>De proprietatibus rerum</i> | – | 23 |
| Aristotle (various works) | 10 | 8 |
| Peckham, <i>Perspectiva communis</i> | 6 | 6 |
| Averroes (various works) | 2 | 3 |
| Galenus, <i>De interioribus</i> | 3 | 3 (?) |
| Constantinus Africanus (<i>Pantegni</i> or unspecified work) | 8 | 1 (?) |
| Calcidius, <i>Super Timaeum</i> | 1 | – |

Sometimes Borotín uses terminology or phrases from Buridianian *De anima* commentaries; this terminology, however, was so common that it is impossible to trace his exact sources (see, e.g., §27, 35). Further, he introduces an argument very similar to one proposed by John of Jandun in his *De sensu* commentary (see §35 and the respective note). Borotín might have had access to Jandun's works¹⁰³, although Jandun's argument might also have become a part of later tradition and Borotín could have encounter it in another work. Also, the definition of sensation that Borotín incidentally added in the margin at the beginning of the *notabilia* section may be borrowed from 10th-century Jewish philosopher Isaac Israeli (see §7).

Finally, there is no link between the quodlibetal preparation by Hus and Borotín's *propositio* except the fact that the *propositio* of Hus's preparation and Borotín's question (in both preliminary and final versions) are identical¹⁰⁴. Borotín, however, neither addresses any of Hus's arguments nor makes any indication that he was acquainted with Hus's preparation for disputation. The explanation suggesting itself is that Borotín received the *propositio* before the quodlibetal disputation, prepared a written determination of the question which he then presented during the ses-

motiva), Borotín mentions Galen's example of a patient hit in his spine, whose three fingers lost the capability to move while they remained able to feel (see §18). Nevertheless, Galen described precisely the opposite case: the patient lost the sense in his fingers, but could move them (GALENUS, "De interioribus", in *Quarta impressio ornattissima continens omnes Galeni libros*, ed. RUSTICUS PLACENTINUS, Pavia, De Burgofranco, 1515, I. 6, vol. II, fol. 27rb: "[...] dixit sensum digitorum a triginta diebus esse ablatum, motus vero digitorum permansit [...]"). Interestingly, Borotín rephrased Galen correctly in the preparatory notes (see fol. 62r: "[...] narrat Galenus 1° *De interioribus* de quodam homine, qui amiserat sensum in tribus digitis, motum tamen non amisit.") but adjusted this example in the final version. Borotín's acquaintance with the so-called "new Galen" may be considered a further proof of his connection to the Faculty of Medicine, which is sometimes suggested but founded only on indirect evidence. See BERÁNEK, "O počátcích", p. 79; ŠMAHEL, *Die Prager Universität im Mittelalter*, p. 146.

103 The notes on *De anima* written in Borotín's hand preceding the *quaestio* encompass a variant of Jandun's theory of two substantial forms of the human being, namely, cognitive and intellectual soul. Compare MS Prague, NK ČR, X H 18, fol. 56v with IOHANNES DE IANDUNO, *Super libros Aristotelis de Anima subtilissimae quaestiones*, Venice, Hieronymus Scotus, 1552, fol. 71ra. On Borotín's notes on the human intellect, see Appendix I. Jandun's commentary on *De anima* is also mentioned in the catalogs of Prague University libraries; see *Catalogi librorum vetustissimi Universitatis Pragensis*, p. 40 (shelfmark R II: G27), p. 139 (shelfmark N II: D18).

104 Compare §1–3 in the edition (and the beginning of Borotín's preparatory notes in MS Prague, NK ČR, X H 18, fol. 57r) with Hus's preparation in Hus, *Quodlibet*, q. 56, p. 255.

sion. His question as preserved in MS Prague, NK ČR, X H 18 originated *before* the session itself, as it does not seem to reflect either Hus's preparation or the discussion that probably followed Borotín's performance¹⁰⁵. Further, it is also uncertain whether Borotín read his *positio* in its entirety during the session, as it is quite long (and a little tedious in its *notabilia* section) and 54 masters were responding to a question in Hus's *quodlibet* that lasted only a couple of days¹⁰⁶. Hus noted at the end of his handbook that Borotín responded very concisely (*conpendiosissime*)¹⁰⁷.

Nevertheless, another interpretation is possible. Borotín might have presented his preliminary version of the text, which includes merely the *notabilia*; in other words, he might just have explained the meanings of all the words employed in the title of the question. Only after the discussion with Hus, might he have prepared the final version of the question intended for distribution, where he takes the syncretic position connecting intromissionist and extramissionist accounts of perception, paying homage not only to Peckham but also to Wyclif, the source of Hus's preparation. The issue of the exact shape of the Prague quodlibetal disputations remains undecided¹⁰⁸.

3.4 Borotín's Position in the Dispute over the Mechanism of Vision

Once textual issues and Borotín's sources have been investigated, the doctrinal aspects of the question can be scrutinized. The question asks "whether sensations occur by the [sensory] powers being emitted out of the sensitive organs" (*Utrum sensationes fiunt per extramissiones virtutum ab organis sensitivis*) and is thus devoted to the issue of what the mechanism of vision is. This issue arose even in Ancient philosophy and science, and was still popular in the Latin Middle Ages. As pre-modern optics concerned not only the physics of light but also the physiology and psychology of seeing, it became one of the crucial questions investigated in optical science. The history of pre-modern optics is often narrated as a clash between two competing answers to this issue, i.e. intromission and extramission. Some authors (such as Democritus or Aristotle) proposed an intromissionist explanation of the visual mechanism as they claimed that we see by receiving an entity in our sight. For Aristotle, for example, such an entity is a causal effect of the quality (color) of the external object (*eidōs* or *species*) that first actualizes the medium between the object and the observer, and then the observer's power of sight. Other authors (such as Plato, Euclid or Galen) favoured the extramissionist explanation of vision: our sight must issue forth or emit an entity in order to see. Such an entity is a visual

105 In his pivotal book on Prague quodlibets, Jiří Kejř argues that such was a common practice. According to *Liber decanorum*, the *quodlibetarius* had to deliver the topic of the question to every responding master three or four days before the session (see KEJŘ, *Kvodlibetní disputace*, p. 28); extant *positiones* of various masters reflect neither the actual discussion (KEJŘ, *Kvodlibetní disputace*, p. 62–63) nor the *quodlibetarius*'s preparation (except in just one case, see KEJŘ, *Kvodlibetní disputace*, p. 67–68).

106 KEJŘ, *Kvodlibetní disputace*, p. 92.

107 See quotation in note 90.

108 I thank Ota Pavlíček, who prepares an up-to-date study on the processual aspect of Prague quodlibetal disputations, for his insights into the matter.

ray of fire or light nature for Platonists or Euclidians; for Galenists, it is a visual spirit or *pneuma*¹⁰⁹.

Sometimes historians argue that the dispute was settled as early as in the eleventh century by the Muslim scientist Alhacen, who united all the traditions and elaborated a powerful explanatory optical paradigm based on intromission and denying extramission¹¹⁰. Nevertheless, some Latin perspectivists of the thirteenth century (esp. Roger Bacon and John Peckham), although heavily influenced by Alhacen and proposing intromission, still made room for extramission¹¹¹. The question of intromission and extramission had therefore not been answered once and for all for Latin medieval scholars. It has the status of a *problema* (an unsettled issue where both positions are equally attractive), and was thus ideal for quodlibetal disputations – and as pointed out above, a question on extramission vs intromission was included in almost every Prague *quodlibet*.

Responding to the question given to him by Hus, Borotín chooses what is called by his contemporary Zdeněk of Labouň the “ancient way” (*modus antiquus*), i.e. to first define all of the terms included in the title of the question (rather than to divide the response into a series of articles, which is the *modus modernus*)¹¹². In terms of word count, this *notabilia* section is the longest as it occupies c. 58% of the text (whereas the section with conclusions occupies only c. 26% and the additional notes only 14%). Further, Borotín is sometimes verbose in the *notabilia*. He seems to forget that the question is restricted only to the *visual* power and adds more information about faculty psychology in general, or organs and media of all the senses, which eventually turns the *notabilia* section into a general introduction to the theory of the sensitive soul and its operations.

In the *notabilia* section, there is a palpable tension between Aristotelian influence and the more Platonizing tendencies delivered by Bartholomaeus Anglicus (whose encyclopedia predates the broad dissemination of Aristotle’s psychology after c. 1240s and hence still bears the seal of the twelfth-century Platonic- and Galenic-oriented philosophy)¹¹³. Sometimes, Borotín tries to assume a compromise position; sometimes he sides with Bartholomew. For example, Borotín follows Aristotle’s lead when he defines what sensory perception (*sensatio*) amounts to be. The sensation is a kind of apprehension realized when a *species* (i.e. a similitude) of the object is impressed on a sense (§5). The *species* is a sensible accidental form of the object (e.g. color); however, it is abstracted from the material realization that it has when inhering in the object. In this frame, Borotín also introduces the famous Aristotelian analogy with wax and

109 For the dispute among Ancient thinkers, see LINDBERG, *Theories of Vision*, p. 1–17 and SMITH, *From Sight to Light*, p. 23–75.

110 E.g. LINDBERG, *Theories of Vision*, p. 58–86, esp. 85–86.

111 See LINDBERG, *Theories of Vision*, p. 107–121 or SMITH, *From Sight to Light*, p. 256–273.

112 ZDENKO DE LABUN, *Questio astronomicalis*, §3, p. 135 : “[...] respondeatur secundum modum antiquum, videlicet simpliciter declarando ea, que ponuntur in titulo questionis, sine hoc, quod questio ipsa in multos articulos distingwatur, qui est modus modernus.”

113 R. J. Long, the editor of book III of DPR, stresses the influence of the pseudo-Augustinian work *De spiritu et anima* and also medical tradition, esp. Constantine the African. See BARTHOLOMAEUS, DPR, p. 139–142.

seal (§7). He does not, though, seem to agree with more Aristotelian-minded thinkers in reducing the sensation to a passive reception of *species* (although he mentions this Aristotelian position in §7). Influenced by Bartholomew, he acknowledges the more Platonic view that the efficient cause of the sensory act is the sensory soul (or its power) itself (§12, 14)¹¹⁴. An apparent conflict between these two views is resolved by distinguishing between (principal) efficient causality and an instrumental one. The sensation is apprehension effectuated by *both* the *species* (as the instrumental cause) *and* the sensory power (as the efficient cause) (§5).

Another example is the issue of the nature of eye, concerning which there was a debate between Aristotelians and Platonists. On the one hand, Aristotelians proposing intromission stressed the ability of the eye-jelly to receive impressions, inferred that it must be easily malleable and concluded that eyes are of a watery nature¹¹⁵. On the other hand, Platonists surmised that eyes are of an igneous nature and that their inner light or spirit may emit forth. A fiery nature is also ascribed to the eyes by Bartholomaeus Anglicus¹¹⁶. Borotín admits that – insofar as its ability to receive impressions is considered – the eye may be called watery, but its proper nature is different. Borotín wants to assign one element to each of the senses – and as the organ of hearing is airy, that of taste is watery, that of smell is fiery, and that of touch is dominated by the element earth (§9), the element which remains for vision is the aether¹¹⁷. Borotín's statement is not to be pushed too far (and read as an ascription of a special celestial nature to the eyes); he simply wants to emphasize that the eyes have a sort of natural light which participates somehow (see below) in the visual process. He supports this claim by reference to Peckham's *Perspectiva communis* (§8)¹¹⁸. Later in the additional notes (§41), Borotín repeats that eyes are of an aethereal nature and compares them to celestial bodies. Just as some stars are warmer and have stronger rays while others have only diminished light, so various animals have visual powers of different strengths. Borotín concludes that some animals have eyes with more natural light than humans, and are able to emit stronger visual rays, which is supported by popular extramissionist anecdotes (also mentioned by Peckham) – cats or wolves allegedly see in darkness, and the lynx is even able to see through walls¹¹⁹.

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- 114 See esp. BARTHOLOMAEUS, *DPR* III, 17, p. 167 (for vision); 18, p. 172 (hearing); 19, p. 174 (smell); 20, p. 176 (taste); 21, p. 178 (touch). The ascription of a causal role to the soul's power is typical of the Platonic and Galenic tradition. See, e.g., WILLIAM OF CONCHES, *Glosae super Platonem*, ed. E. A. JEAUNEAU, Turnhout, Brepols, 2006, II, 148, p. 267 or CONSTANTINUS AFRICANUS, "Pantegni", in YSAAC, *Omnia opera*, 2 vols, Lyon, 1515, vol. II, fols 1ra–144ra, here *Theorica* IV. 10, fol. 17ra.
- 115 See ARISTOTELES, *De sensu* 2 where he criticizes his predecessors and states his position.
- 116 BARTHOLOMAEUS, *DPR* III, 17, p. 167: "Sensus igitur visus, cum sit igneus, est simplicissimus [...]"
- 117 Such a matching of elements and sensory organs has a long tradition in pre-modern philosophy. See, e.g., AUGUSTINUS, *De Genesi ad litteram libri duodecim*, ed. J. ZYCHA, Prag / Wien / Leipzig, F. Tempsky, 1894, III. 4, p. 66–67 who, however, assigns a fiery nature to sight. Aether was regarded as a special fifth element of a very subtle, fiery and crystalline nature, located above normal air and a constituent of celestial spheres.
- 118 PECKHAM, *Perspectiva communis* I, 46 (49), p. 128–130. However, Peckham does not explicitly assign an aethereal nature to the eyes; he seems to accept the Aristotelian position about their watery nature. Cf. PECKHAM, *Perspectiva communis* I, 31 (34), p. 112.
- 119 Cf. PECKHAM, *Perspectiva communis* I, 46 (49), p. 128–130; 51 (54), p. 132.

Another example from the *notabilia* section of Borotín siding with medical authors rather than Aristotelians is his classification of the soul's powers (*virtutes*). While the fundamental division for Aristotelians is into vegetative, sensory and rational faculties, Borotín introduces a Galenic division which can be found in Constantinus, and which he borrows from Bartholomaeus Anglicus. There are three basic powers (§14–20): (1) natural power (*virtus naturalis*), responsible for the vegetative functions of the body; (2) vital power (*virtus vitalis*) which brings life to the individual body; and animal power (*virtus animalis*), responsible for cognitive functions and locomotion. All of these powers are embodied. Natural power originates from the liver, vital power has its seat in the heart and is diffused by the arteries throughout the body, and animal power is seated in the brain. Borotín also borrows the medical notion of *spiritus* (§21) which is a subtle matter diffused through the body which, in Platonic thinking, plays the role of mediator between the immaterial soul and material body. There are three kinds of *spiritus* corresponding to the three powers (natural, vital and animal).

In a brief but important remark closing his exposition of powers and *spiritus* (§21), Borotín qualifies the meaning of the term “extramission” included in the title of the question. In his view, what is emitted is not a body of a luminous or fiery nature (e.g. a ray of inner light, as Platonists would maintain), but precisely these powers, namely, the sensitive ones. As will become obvious in the conclusions, such a qualification enables Borotín to hold a compromise position between intromission and extramission.

The influences of the three sources quoted most frequently by Borotín – Bartholomew's encyclopedia, Aristotle, and Peckham's *Perspectiva communis* – are not present equally in all the sections. As pointed out, Bartholomew's domain is the *notabilia* section, whereas Aristotle's and Peckham's influences are more evident in the section with conclusions. Responding to the central issue of the text – whether vision is by extramission – Borotín continues to balance between opposing authorities.

Initially, he proposes a version of an Aristotelian intromissionist account of vision. He begins with an evident intuition that every sensation is *in* its proper sensory organ (conclusion 1, §29) and not outside of it, as the extramissionists seem to imply. This intuition is corroborated not only by Aristotle's authority in *De sensu* but also by reasoning: if the efficient cause of the sensory act is the sensory power – and Borotín (under Bartholomew's influence) agrees with this – then since the power is in the organ, its effect is in the same place.

However, the sensible object *itself* is not present and efficacious in the sensory organ as seeing a green color, the eye does not actually become green. Borotín states this in the corollary (§30), and solves the problem by the Aristotelian distinction between the real and intentional being of the sensible (he adds the proper expression of the distinction as an additional note after the text, as pointed out above – see §43). Every sensible object can thus replicate (or, in perspectivist terminology, “multiply”) its causal effects through the medium. These effects are the so-called *species*, i.e. similitudes having mere intentional being (concl. 2, §31).

The question remains as to how the presence of the seen object in the eyes (*it's repraesentatio*) is provided. Does it occur by extramission of the powers towards

the objects or by receiving their *species* in the senses? Borotín uses this dilemma to argue against extramission in a way influenced by Peckham¹²⁰. If extramission were the case, then the power would not only issue from the eye, reach the object and stop there. As the sensation occurs *in* the organs, the power would have to return to the eye and “announce” the object to it. Such a conception is however absurd. Emitted powers would have to be animated, even rational and capable of voluntary movements, as they would go forth and return. Therefore, intromission appears to be a better option. Sensation occurs by *species* of the objects, multiplied through the medium and impressed in the eyes, which in turn cause the acts of sensation (concl. 3, §34). Additionally, every power whose operation is immanent (i.e. which produces nothing besides itself) is actualized only if it receives something from outside. The extramissionist explanation of vision would lead to a counter-intuitive conception of vision: the visual power would always be actualized (and never in potentiality), and its operation would not be immanent (§35). Intromission is thus a more plausible way to explain the mechanism of vision.

Borotín’s response could end right after conclusion 3. In that case, his position would amount to an Aristotelian intromissionist account of vision. However, he adds another conclusion which – perhaps surprisingly – rehabilitates extramission. Such a move would be unexpected, if it were not anticipated by the perspectivists of the thirteenth century, namely by John Peckham who is Borotín’s direct source here. Extramission is introduced not as a single explanation of vision but in a way trying to make it compatible with intromission. In other words, Borotín (like Peckham) does not want to assert that extramission is the *primary* mechanism of vision, although it is somehow involved in a process which is generally intromissionist.

Borotín implies two reasons why extramission may be appealing. Firstly, there is an ontological gap between crude material objects and the visual power which is, after all, a part of the sensory soul and thus subtler (albeit not as completely immaterial as intellect). The *species* of the material object must therefore be refined and rendered proportionate to the visual power in order to be able to act upon it. This demand is met precisely by extramission – the power is emitted from the eyes (in the form of a cone) and makes the *species* proportionate to itself. The *species* are “moderated” (*contemperantur*) and made suitable to enter the eye. If they were not moderated, sight would gradually be disintegrated by them (concl. 4, §36)¹²¹.

Secondly, sometimes extramission of the “natural light” of the eyes can substitute for external light when it is lacking. As commonly accepted, vision requires ordinary light – the color of objects cannot multiply their *species* without being mingled with the light¹²². However, as some ancient anecdotes allege, some animals

120 Compare §32 with PECKHAM, *Perspectiva communis* I, 45 (48), p. 128 (quoted in the edition).

121 Borotín’s source is PECKHAM, *Perspectiva communis* I, 46 (49), p. 128–130. Cf. also ROGERIUS BACON, *Perspectiva* I. 7, 4, p. 104–106 and L. LIČKA, “The Visual Process: Immediate or Successive? Approaches to the Extramission Postulate in 13th-Century Theories of Vision”, in E. BALTUTA (ed.), *Medieval Perceptual Puzzles: Theories of Sense-Perception in the 13th and 14th Centuries*, Leiden, Brill, 2020, p. 89–94.

122 See, e.g., PECKHAM, *Perspectiva communis* I, 47 (50), p. 130.

can see in darkness. Borotín (again following Peckham) explains this precisely by advocating extramission: The visual powers of some animals are so strong that they can replace the outer light and give a “power to multiply” (*virtus multiplicativa*) even to color in darkness (§41)¹²³.

Borotín therefore combines both competing positions. The primary mechanism is intromission (the eyes receive *species* both of colors and light), but extramission is also involved in the process (the powers are emitted forth towards the objects in order to moderate and sometimes corroborate the *species*). All three movements (the multiplication of *species* of colors and light, and the emission of powers) constitute three visual cones, with the apex in the eye and the base on the visible object – all occupying the same place (§37). Whereas perspectivists postulated only two cones (of *species* and of emitted power), Borotín adopts three cones from Bartholomaeus Anglicus.

To sum up, Borotín presents a compromise position. On the one hand, his answer to the question given to him by Hus is negative. In his view, sensations do not occur through extramission of the sensory power but rather by receiving the *species* of the object. The primary mechanism behind vision is not extramission but intromission. On the other hand, although he denies a robust conception of extramission, Borotín still argues for involving extramission (of visual power) in the visual process as important for “refining” *species* coming from the outside to the eye. Is this an eclectic position, a superficial mixing of different sources without real understanding? It is worth noting that such a combination of intromission and extramission was quite common among medieval thinkers. Even Aristotle – although read as a strict intromissionist by thinkers like Albert the Great or Thomas Aquinas – was sometimes interpreted as conceding extramission¹²⁴. Stressing the extramissionist hints in Aristotle was common in the thirteenth century, especially among Franciscan thinkers (e.g. Bartholomaeus Anglicus, Bacon and Peckham). Not surprisingly, these authors also want to integrate extramission into their general account of perception. Thus, the compromise view presented by Borotín is derived directly from Peckham, but one may also find it in Bartholomew or Bacon¹²⁵. The popularity of this position is also manifested by the fact that later in the fourteenth century it was held by John Wyclif who proposes it at least in his *Trialogus*¹²⁶,

123 See also PECKHAM, *Perspectiva communis* I, 46 (49), p. 128–130.

124 Especially some parts of his *Meteorology* (where he uses the notion of the visual ray to account for some meteorological phenomena), *De animalibus* (see §38 of Borotín’s question), or *De somno*, where he mentions a case of a menstruating woman whose gaze allegedly clouds a mirror (2, 459b24–460a23). The last passage (in Latin translation) is referred to in the excerpts from various texts on dreams written in Borotín’s hand in his personal codex and interpreted as proposing extramission. See MS Prague, KMK, O 1, fol. 10r: “[...] facile hic videtur quod visus fiat extramittendo, ut per totum 3^m *Meteororum* videtur velle Aristoteles, ubi loquitur de refraccione visus.”

125 BARTHOLOMAEUS ANGLICUS, *DPR* III. 17, p. 168, 169–170; ROGERIUS BACON, *Perspectiva* I. 7, 2–4, p. 100–106.

126 As mentioned in section II above, the evangelic doctor also ascribes this position to Augustine and Robert Grosseteste (IOHANNES WYCLIF, *Trialogus* II. 7, p. 97); see also PHILLIPS, “John Wyclif”, p. 258.

which in turn inspired Hus in his preparation for discussion with Borotín. Thus, Borotín's conclusion was likely in consonance to what was regarded as the correct opinion among his peers during the quodlibetal session.

4. Conclusions

This paper aimed to investigate the dissemination of perspectivist texts and knowledge of the discipline among Prague University masters around 1400. Despite the lack of optical manuscripts extant in Prague today, it has been documented that *perspectiva* was taught at the Prague Faculty of Arts at least from the 1370s and – on the examples of Jenek of Prague and Conrad of Soltau – that it was also referred to in philosophical and theological lectures. The main source for such investigation, however, is the Prague quodlibets organized from the 1390s to the 1410s. There are 13 questions explicitly dealing with optical topics included in the extant handbooks by Prague masters that organized a *quodlibet*. Some attest a considerable knowledge of perspectivist texts (Simon of Tišnov), while some are derived from other, more philosophical sources (namely from Wyclif, in the case of John Hus).

The only extant *positio* is the question on the mechanism of vision by John of Borotín. As it is a juvenile work by a fresh master of arts, expectations should not be too high. Borotín borrows extensively from *De proprietatibus rerum* by Bartholomaeus Anglicus in the *notabilia* section (on sensory powers and organs), but his position is influenced rather by John Peckham's textbook *Perspectiva communis*. He uses Peckham's arguments against extramission, but in the end proposes a compromise intromissionist account with some extramissionist features in a manner similar to Peckham. Nevertheless, Borotín's question is rather a cognate of Aristotelian psychological works than a full-fledged perspectivist text (e.g. Borotín includes nothing at all from geometrical optics)¹²⁷.

127 I am indebted to Ota Pavlíček and Pavel Blažek for discussions on the subject of this paper, and their valuable comments on the edition. My thanks also go to David Juste for sharing his copy of Borotín's codex with me, to Matyáš Havrda for his help in identifying the citations from Galen, and to Alena Hadravová for her hints on the dissemination of *De proprietatibus rerum* in Bohemia.

Appendix I

Borotín's Notes in MS Prague, NK ČR, X H 18

The final redaction of Borotín's *quaestio* is preserved in MS Prague, NK ČR, X H 18 on fols 58r–61r among several different texts written in the same hand. All these texts constitute a part of the codex (55r–62v) which is – in terms of its handwriting – independent of adjacent parts. This part is also separated by blank folios (54 bis r – 54 ter v; 62 bis r – 62 bis v)¹²⁸. As was argued above, this part of the codex may comprise folios Borotín himself used for recording notes, excerpts or preparing his own texts, and which were later bound together with other gatherings into one codex. A brief description of the contents of the passages written by what can be considered Borotín's hand follows:

55r–56v: Notes on *quaestiones* on (human) intellect

Inc.: *Sicud habet se sensus ad sensibilia, sic intellectus ad intelligibilia.*

Nota: *duplex est passio [...]*

Expl.: [...] *ex 2° Metaphysice Buridani questione.*

This passage includes rather short *quaestiones* dealing with intellect. These notes or excerpts are of different lengths (some of them gather several arguments and notabilia, others a few sentences). The titles are: *Utrum intellectus sit virtus passiva vel activa*; *U. intellectus possibilis sit intelligibilis*; *U. intellectus sit separatus ab intelligibili*; *U. intellectus potest intelligere sine phantasmate*; *U. calidum consumat ipsum humidum radicale* (a mere title without text); *U. indivisibile est intelligibile*; *U. intellectus possibilis sit ens in pura potencia*; *U. intellectiva anima sit forma substantialis*.

The topics of all these questions belong to the tradition of commentaries on Aristotle's *De anima* III; the reference in the explicit indicates that they may be of a Buridanian origin. If written by Borotín himself, they may represent his *reportationes* of lectures on *De anima* or preparations for an exam.

The text seems to be written on a single independent bifolio.

57r–57v: Shorter redaction of Borotín's *Utrum sensationes* [...] – first part

Inc.: *Utrum sensationes fiunt per extramissionem virtutum ab organis sensitivis. Arguitur sic [...]*

Expl.: [...] *et ista instrumenta iam ...* | in marg. inf.: *Qui ergo leditur in puppi amittit motum, qui in prora, sensum.*

128 The composition of this part of the codex is not entirely clear at first sight, as the binding is very tight and the quires are mostly irregular. However, an inspection *in situ* revealed that fols 55–56 seem to represent an independent bifolio attached to a *ternio* (fols 57–62). All these folios are yellowed and timeworn, which contrasts with the brighter bifolio (54 ter + 62 bis) into which both the bifolio and *ternio* seem to be inserted. Such a quiring scheme (1+[1+1]+[3+3]+1) accords with the textual content of the gathering: while the bifolio includes Borotín's notes on *De anima*, the *ternio* preserves two versions of his *quodlibetal positio*.

As argued above, this part presents a preliminary, shorter but highly glossed version of Borotín's *quaestio*. It continues on fols 62r–62v. Note that fols 57 and 62 constitute a bifolio.

58r–61r: **Longer redaction of Borotín's *Utrum sensationes* [...]**

Inc.: *Utrum sensationes [...]*.

Expl.: [...] *questio, ut proponitur, est falsa.*

Edited below, see §§1–39.

61r–v: **Several notes connected to the main text of the *quaestio***

Inc.: *Virtus, ut dicit Philosophus [...]*

Expl.: [...] *qua sentiri debet sicuti est.*

Edited below, see §§40–43. Together with the preceding item, these texts are written on two bifolios (58–61).

62r–62v: **Shorter redaction of Borotín's *Utrum sensationes* [...] – second part**

Inc.: | ... *sunt sicut canalía que si obstruuntur per aliquam viscosum vel grossum humorem, cessat motus et sensus [...]*

Expl.: *Item ergo stantibus concurrentibus sensu, organo eius, virtute, obiecto et medio et intentione actuali sensus super sensibile, causatur sensacio.*

62v: **An excerpt on saliva from Bartholomaeus Anglicus**

Inc.: *Saliva in sapore est insipida [...]*

Expl.: [...] *secundum qualitatem saporis rei gustate immutatur; hoc Constantinus.*

This passage is not part of the preliminary version of the *quaestio*; however, Borotín included it in the final one. See §25 in the edition.

Appendix II

Critical Edition of John of Borotín's *Quaestio utrum sensationes fiunt per extramissiones virtutum ab organis sensitivis*

Ratio edendi

The question edited below is extant in a single manuscript (MS Prague, NK ČR, X H 18, fols 58r–61v). As argued above, the text preserved in the manuscript is written by the author himself in two versions. The aim of the present edition is more doctrinal than philological; thus, only the version the author considered final is edited here and the variants between both versions are not recorded. A full comparison of these two versions (merely indicated above) is beyond the scope of the present paper and may perhaps be the subject of future work on Borotín. Further, since the text is autograph, the additions, corrections and glosses, both marginal and interlinear (all of which are written in the same hand as the main text) are regarded as integral to the text itself and, consequently, are involved in the main edited text (the fact that they are later additions by the author is always indicated in the apparatus)¹²⁹.

I decided not to classicize the orthography, and the spelling of the manuscript is preserved even if it varies throughout the text (e.g. *olofactus* x *ollofactus*). The only exception is a systematic distinction between the vowel letter *u* and the consonant *v*. Admittedly, this strategy of adhering to the manuscript's orthography does not free the editor from having to make a choice from time to time, especially when a medieval scribe's abbreviation enables different spellings. In such cases, I resort to the reading which is, to my best knowledge, more common in late medieval Bohemian manuscripts¹³⁰.

Upper-case letters are used in the edition to mark the beginning of a sentence, proper names, generic names used in reference to an individual person (*Philosophus*, *Commentator*), or titles of texts. The titles are italicized. Abbreviations of the numerals are preserved (e.g. 3^o). Roman numerals are not substituted by Arabic numerals and vice versa. The text is divided into sentences according to its meaning, the interpunctuation follows the logical order of the text rather than the punctuation in the manuscript, which is only occasional and often insufficient. The division into paragraphs preserves the original division in the manuscript

129 I omit only the one-word glosses signaling the contents of the respective paragraph (e.g. the words *vitalis* and *animalis* on fol. 59r pointing to the parts of the text on the vital and animal power; see § 16, and 17.)

130 A special case is the Latin word for “corollary” since medieval scribes used not only the correct variant *corollarium*, but also (and perhaps preferably) the incorrect variant *correlarium*. The present text includes seven instances of the abbreviation “cor^m”, which may be expanded in both ways (see § 30 [twice], 31, 35 [twice], 37, and 39). However, § 37 includes the derived adverb *corollarie* abbreviated as “cor^e”, which permits only the “incorrect” reading *correlarie*. Hence, I resort to the incorrect variant *correlarium* instead of the correct variant *corollarium*.

only partially: longer paragraphs are divided according to their sense. The paragraphs are numbered mainly to facilitate references. Quotation marks (“...”) are used (i) to mark a piece of text that the author obviously intended as a quotation (usually, such a part of the text is preceded by an explicit reference to a particular author and/or his text); (ii) to indicate a tacit *verbatim* borrowing from another text by another author; and (iii) to mark an expression which is intended to refer to itself and not to its meaning (often preceded by *ly* in medieval Latin text). Square brackets ([...]) enclose words that I think should be deleted. Angle brackets (<...>) enclose words that I added, mainly headings and the numbers of the paragraphs. Editorial conjectures are indicated only in the apparatus by the abbreviation *coni*.

CONSPECTUS AUCTORITATUM

ALBERTUS, *Mineralia* = ALBERTUS MAGNUS, *Mineralia*. Opera omnia, vol. V, ed. A. BORGNET, Paris, Vivès, 1890, p. 1–116.

ARISTOTELES, *De anima* = ARISTOTELES LATINUS, *De anima: Recensio Guillelmi de Morbeka*, ed. R.-A. GAUTHIER, in THOMAS DE AQUINO, *Sentencia libri De anima*, Opera omnia, tom. XLV, 1, Roma, Commissio Leonina, 1984, p. 3–258 *passim*.

ARISTOTELES, *De sensu* = ARISTOTELES LATINUS, *De sensu et sensato: Recensio Guillelmi de Morbeka*, ed. R.-A. GAUTHIER, in THOMAS DE AQUINO, *Sentencia libri De sensu et sensato*, Opera omnia, tom. XLV, 2, Roma, Commissio Leonina, 1985, p. 3–96 *passim*.

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BARTH. ANGL., *DPR I–IV* = BARTHOLOMAEUS ANGLICUS, *De proprietatibus rerum*, vol. I: Prohemium, Libri I–IV, ed. B. VAN DEN ABEELE, H. MEYER, M. W. TWOMEY, B. ROLING, R. J. LONG, Turnhout, Brepols, 2007.

BARTH. ANGL., *DPR* = BARTHOLOMAEUS ANGLICUS, *De proprietatibus rerum*, Frankfurt, Wolfgang Richter, 1601.

CONSTANTINUS, *Pantegni* = CONSTANTINUS AFRICANUS, *Pantegni*, in YSAAC, *Omnia opera*, 2 vols, Lyon, 1515, vol. II, fols 11a–144ra.

GALENUS, *De interioribus* = GALENUS, *De interioribus*. In *Quarta impressio ornatissima continens omnes Galeni libros*, ed. RUSTICUS PLACENTINUS, Pavia, De Burgofranco, 1515, vol. II, fols 24ra–47rb.

HUS, *Quodlibet* = IOHANNES HUS, *Quodlibet*, ed. B. RYBA, Turnhout, Brepols, 2006.

IOHANNES DE GANDUNO, *Qq. De sensu* = IOHANNES DE GANDUNO, *Quaestiones super librum De sensu et sensato*, in IOHANNES DE GANDUNO, *Quaestiones super Parvis Naturalibus*, ed. ALBRATIUS APULUS, Venice, Hieronymus Scotus, 1557, fols 11a–22ra.

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PECKHAM, *Persp. comm.* = JOHN PECKHAM, *Perspectiva communis*, ed. D. C. LINDBERG, in D. C. LINDBERG, *John Pecham and the Science of Optics*, Madison / Milwaukee / London, University of Wisconsin Press, 1970.

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CONSPECTUS SIGLORUM

H MS Prague, NK ČR, X H 18, fols 58r–61v

<...> *addenda censui*

[...] *secludenda censui*

CONSPECTUS ABBREVIATIONUM

a.c. = *ante correctionem* (scribal correction)

add. = *addidit*

cf. = *confer*

cod. = *codex manu scriptus*

coni. = *conieci* (editor's conjecture)

del. = *delevit*

in mg. dext. = *in margine dextro*

in mg. infer. = *in margine inferiori*

in mg. sin. = *in margine sinistro*

iter. = *iteravit*

lect. inc. = *lectio incerta*

subscr. = *subscriptum*

suprascr. = *suprascriptum*

<IOHANNES DE BOROTIN>
<QUAESTIO>
<UTRUM SENSACIONES FIUNT PER EXTRAMISIONES
VIRTUTUM AB ORGANIS SENSITIVIS>

5 | Utrum sensaciones fiunt per extramisiones virtutum ab organis sensitivis H58r

<1> Arguitur sic, nam impossibile est quod fiat visio nisi vis viva sensibili, quod est visibile, assit presens; sed cum intus in oculo non fiat visio sed extra, oportet quod fiat per extramissionem ab oculo ad ipsum
10 sensibile quod movit ipsam visivam potenciam ad egressum; igitur questio vera.

<2> In oppositum est Philosophus *De sensu et sensato* et Commentator et alii philosophi.

<3> <Problema:> Quare, ut ait Avicenna in suo libro *Mineralium*,
15 loca circa centrum terre sunt magis auro, argento et aliis metallis consita et conferta?

<Notabilia>

<4> Pro decisione huius questionis primo necessarium est terminos in titulo questionis repositos declarare.

<5> Noto ergo primo quod “sensacio”, cum sit nomen verbale terminatum in “-cio”, significat tria, ut vult Philosophus. Primo scilicet rei sensantis accionem, secundo sensate rei passionem, tercio rem sensatam. Et potest sic describi: Sensacio est sensibilis – per species sciendi sensui impressas sine materia – apprehensio. Vel sic: Sensacio est sensibilis per
25 virtutem sensitivam apprehensio. Prima est per causam instrumentalem, secunda datur per causam efficientem.

<6> Noto 2^o quod ad sensacionem requiritur primo sensus, secundo organum eius, tercio virtus sensitiva, que tria exprimantur in titulo questionis, cum dicitur “utrum sensaciones fiunt etc. Requiritur eciam
30 obiectum, medium et actualis intencio anime; similiter sensibile que non exprimitur, sed innuitur in titulo questionis.

7/16 Arguitur sic ... aliis metallis consita et conferta.] *Hus, Quodlibet*, q. 56, p. 255. | 12/13 *ARISTOTELES, De sensu* 2–3, p. 16, 22 (437b10–438a5, 438a25–b2); cf. *AVERROES, De sensu*, p. 25–36. | 14/16 *Locum non inveni*; cf. *ALBERTUS, Mineralia* III. 1. 10, p. 72b. | 20/22 Cf. *Auct. Arist. XXXVI. 84*, p. 328: “Ductio et commensuratio sunt aequivoca, ex quo habetur communiter quod omne nomen verbale in -tio est aequivocum, videlicet quod tria significat, scilicet agentis actionem, rei passae passionem et ipsam rem passam, sive actum intermedium.”; cf. *ARISTOTELES, Topica* VI. 2, p. 115 (139b21–22).

8 intus] *suprascr.*

<7> Sensus sic describitur: Sensus est virtus passiva rerum sensibilium per species sciendi sine materia receptiva. Sicut enim cera recipit formam sigilli sine materia, sic sensus speciem sensibilis sine materia, ut vult Philosophus 2° *De anima*. Species autem sciendi est similitudo materialis et propria rei, qua res materialiter cognosci habet sicuti est. Sunt autem sensus quidam interiores, quidam exteriores, sed dimissis interioribus, restringetur sermo pro exterioribus, de quibus magis videtur eodem questionis intencio.

<8> Sunt autem sensus exteriores quinque – sensus visus, auditus, olfactus, gustus et tactus – quibus fit sensacio, quarum eciam sunt organa quinque distincta secundum quinque corpora sensibilia principalissima mundi corporei. Primum est organum visus quod est quodammodo nature etheree ex eo quod est diafanum et lumen est sibi connatum, ut dicit auctor *Perspective communis* 46^a proposicione primi: “Lumen oculi naturale radiositati sua conferre visui”. Sed quia organum visus facilliter recipit species et conservat, dicitur aquee nature.

<9> Organum olfactus est ignee, cum sit calidius et siccus. Auditus aeree: nam organum auditus mediante aere quodam in tortuositate auris complantato recipit species sui sensibilis et conservat. Organum gustus aquee, tactus autem terree. Omnis enim res corporea substantialis est nature alicuius illorum corporum. Similiter et organum. Dico igitur quod quilibet sensus habet suum organum, in quo suum exercet officium.

<10> Organum visus est humor glacialis vel cristalinus, ut dicit 36^a *Communis perspective*: “Visum vigere in glaciali humore”. Et similiter Constantinus in *Pantegni*, quod experimento cognoscitur, nam si alicui humori vel tunice lesio accidit, per medicinam curacionem recipit; corrupto vero glaciali visus irrevocabiliter corrumpetur.

H58v

32/35 ARISTOTELES, *De anima* II. 24, p. 168 (424a17–24); cf. *Auct. Arist.* VI. 103, p. 182: “Omnis sensus est susceptivus omnium specierum sensibilium sine materia, sicut cera suscipit figuram sigilli auri sine auro.” | 45/46 PECKHAM, *Persp. comm.* I. 46 (49), p. 128–130. | 46/47 Cf. ARISTOTELES, *De sensu* 3, p. 22 (438a12–16); cf. etiam *Auct. Arist.* VII. 9, p. 196 (Thomas de Aquino): “Visus attribuitur aquae, quia aqua, ratione quae est perspicua, est potens recipere species coloris.” | 54/55 PECKHAM, *Persp. comm.* I. 36 (39), p. 120. | 55/56 Cf. CONSTANTINUS, *Pantegni* (*Theorica*) III. 14, fol. 11rb: “Est autem solum instrumentum visus: scilicet humor non ex toto rotundus quia in superficie aliquantulum est planus atque clarus sicut crystallus. Hic humor grece vocatur crystalloidos [...]”; cf. BARTH. ANGL., *DPR V.5, fol. 128*: “[...] unum solum est visus instrumentum, scilicet humor crystallinus [...] Est igitur crystallinus humor, secundum Constantinum, albus, lucidus, clarus [...]” | 56/58 experimento cognoscitur ... irrevocabiliter corrumpetur] Cf. PECKHAM, *Persp. comm.* I. 36 (39), p. 120: “[Propositio] 36 [...] Visum vigere in glaciali humore. Hoc experimento docetur, quoniam si alii cuicumque

32 Sensus est virtus] Sensus est sigilaccio apprehensionis forme sensate in senciente. *add. in mg. dext.*; cf. ISAAC, *Def.*, p. 324: “[...] sensus est sigillacio impressionis sensati in senciente [...]” | 35 sciendi a.c. | 45 46^a] lxxv^a a.c. | proposicione] communis perspective primi *add. sed del.* | 51 res] est nature illorum corporum *add. sed del.*

60 <11> Oculus enim in sui compositione habet tres humores, VII tunicas et tres orbes. Tres sunt tunice interiores et 4 exteriores. Et semper due tunice (una interior cum una exteriori) claudunt unum humorem et perficiunt orbem, in quorum medio est – tanquam centro oculi – crystallinus vel glacialis, quod idem est, tunica rethina et tela aranee conclusus, in quo est spiritus visibilis. Que tunica si rumpitur, ita quod humor ille

65 crystallinus effluit, visus corrumpitur, unde dicit Galienus I° *De interioribus*, quando quidam puer prefixit sibi humorem albugineum ita quod aliquot gutte eius eximit et tamen virtus viva non fuit lesa, differens tamen est humor ille. De compositione oculi plene vide post questionem.

70 <12> Organum auditus est quedam miringa in ossibus petrosis aurium fixa, in qua aer est complantatus. Organum olfactus sunt due caruncule prope cerebrum in nauribus situate ad modum mamillarum dependentes in complexione calida et sicca, ut per recepcionem sui sensibilis contemperent cerebrum in qualitatibus suis. Organum gustus est quidam nervus a cerebro ad lingue medium ductus ad extremitates lingue ramificatus. Organum tactus est quidam nervus per totum corpus ramificatus et expansus sicut rethe. Et omnes isti nervi habent ortum de ventriculi cerebri a prora, i.e. anteriori parte cerebri. Dicti quidem sunt nervi sensitivi, nam per eos virtus animalis sensitiva, que est causa efficiens sensacionis, dirigitur a cerebro ad organa sensitiva ad sensacionem

80 faciendum.

<13> Propter quod contingit – ut videtur ad experientiam que est rerum magistra – quod si aliquis offenditur in prora, amittit sensum. Si quidem transitus virtutum animalium impeditur aliquando ad organa sensitiva, ut quia nervi sunt per grossum humorem et viscosum [sunt]

tunice vel humori lesio accidat, salva glaciali, per medicinam recipit curationem et sanatur, ac restituitur visus. Ipsa vero corrupta, corrumpitur visus irrecuperabiliter.” | 59/60 Cf. BARTH. ANGL., DPR V. 5, fol. 128: “Sunt autem oculi decem causae ipsius substantiam componentes, scilicet septem tunicae et tres humores.”; CONSTANTINUS, *Pantegni (Theorica)* III. 14, fol. 11r: “Sunt autem uniuscuiusque efficientes cause decem: tres scilicet humores et septem tunice.” Cf. etiam TIŠNOV, *Quodlibet*, q. 46, fol. 131v, 132v. | 65/68 Cf. GALENUS, *De interioribus* I. 2, fol. 25rb (locus incertus). | 68 Cf. §41 (?). | 70/72 Organum olfactus ... mamillarum dependentes] Cf. BARTH. ANGL., DPR III. 19, p. 174: “Necessarium autem est organum expediens, scilicet narium perfecta dispositio, in quibus sunt caruncule ad modum mamillarum dependentes, que sunt propria organa odoratus, et recipient spiritum animale per quosdam nervos a cerebro descendentes.” | 73/75 Organum gustus ... ramificatus] Cf. BARTH. ANGL., DPR III. 20, p. 176–177: “Fit autem gustus hoc modo: duo nervi in medio lingue infinguntur, qui postmodum in multos ramos in extremitatibus lateralibus lingue disperguntur, et per eos spiritus animalis ad linguam defertur.” | 77 a prora ... cerebri] Cf. BARTH. ANGL., DPR V. 3, fol. 124: “Cognominatur autem pars anterior [cerebri] prora, posterior pars puppis vocitatur.” | 78/80 Cf. §14.

67 differens] lect. inc. | 69 est] suprascr. | 74 a cerebro] ac a.c. | 83/84 ad organa sensitiva] add. in mg. sin.

85 obstructi vel alia de causa quacunque, cessat sensus in organo. Eciam videmus, quando quidam clausos habentes oculos, bene quidem dispositos, nihil tamen vident, quia virtus visiva in humore glaciali non compareret. Similiter quidam habent organum olfactus, scilicet illas carunculas bene dispositas, non odorantur tamen, hoc contingit vel a natura vel ab
90 eventu vel ex mala complexione cerebri, aut mala dispositione vasorum ad organum olfactus directorum etc.

<14> Dixi 3^o quod ad sensationem requiritur virtus que est causa efficiens sensationis, ut dicit Constantinus in *Pantegni*. Unde ly “virtus” apud philosophos multipliciter accipitur; in presenti tamen materia
95 summitur virtus pro quadam potencia anime per quam ipsa suas operationes exercet in corpore et describendum sic: “Virtus est potencia anime ei essentialiter attributa ad suas peragendas in corpore acciones, nam mediante hac virtute anima corpus vivificat, cor et arterias constringit continue et dilatat, sensum et motum voluntarium omni animato corpori administrat, ut dicit idem Constantinus libro 13 in *Pantegni*.”
100

<15> Hoc autem virtus est triplex, scilicet naturalis, vitalis et animalis. Virtus naturalis habet ortum ab epate cui, ut | dicit Galienus I^o *De interioribus*, capitulo 8^{vo}, ista virtus communicatur; cuius multe sunt species – scilicet generativa, nutritiva, augmentativa, attractiva, retentiva, digestiva, expulsiva etc. – de quibus tractant medici. Et accio huius virtutis communis <est> in animalibus et plantis, ut dicit idem Constantinus. Et hec virtus dependet ab anima vel potencia vegetativa, huius vasa sive canalialia sunt vene ab epate generate, per qua vasa mediante spiritu naturali tanquam suo vehiculo deportatur ad nutriendum totum corpus.
105

<16> Alia dicitur virtus vitalis, eo quod anima per eam vitam toti ministrat corpori, cuius proprium domicilium est cor, vasa vero eius sunt arterie a corde genite. Huius virtutis operationi cooperatur virtus voluntarie motiva qua cor et arterie dilatantur et constringuntur. Et dicitur hec
110

H59r

92/93 Potius Bartholomaeus Anglicus; cf. BARTH. ANGL., DPR III. 17, p. 167; 18, p. 172; 19, p. 174; 20, p. 176; 21, p. 178. | 96/100 Virtus est potencia ... in *Pantegni*] BARTH. ANGL., DPR III. 14, p. 162; cf. CONSTANTINUS, *Pantegni (Theorica)* IV. 1, fol. 14vb: “[...] necesse est nature atque anime quandam virtutem inexistentem qua operationem suam valeat complere. [...] Virtus vero anime solum vivificat, i.e. cor et arterias constringit et dilatat, memoriam dans et intellectum sensum quocunque et voluntarium motum.” | 102/103 *Locus incertus*; cf. e. g. IOHANNICIUS, *Isagoge*, §17, p. 155: “Spiritus igitur tres sunt: primus, naturalis, sumit principium ab epate [...]”; CONSTANTINUS, *Pantegni (Theorica)* IV. 19, fol. 17va: “Naturalis spiritus in epate nascitur [...]” | 105/106 accio huius ... Constantinus] Recte BARTH. ANGL., DPR III. 14, p. 162: “Actio igitur virtutis naturalis in animalibus et in plantis communis est, que generat, nutrit et augmentat, ut idem dicit Constantinus.”

85 de] *suprascr.* | 89 odorantur] *coni. odorant cod.* | 102 cui, ut] *iter.* | 107 vel potencia] *add. in mg. dext.* | vasa] *sunt add. sed del.* | 112 operationi] *coni. operatione cod., cf. BARTH. ANGL., DPR III. 15, p. 164.*

115 dilatatio motus a cordis medio in omnes extremitates, sicut e contrario
 120 constrictio dicitur motus ab extremitatibus ad cor, ut potest videri in fa-
 brorum follibus. Huius subiectum sive vehiculum est spiritus vitalis per
 totum corpus diffusus.

<17> Tertia virtus est animalis, que sedem habet in subtilissimis ce-
 120 rebri ventriculis; et hec est triplex: Quedam dicitur ordinativa que per
 se solum explet cerebrum: nam in prima parte sive in anteriori cellula
 ordinat fantasiam sive ymaginacionem; in media ordinat estimativam et
 racionem; in posteriori perficit memoriam et memorativam accionem.
 Nam virtus ymaginativa illud quod format et ymaginatur, transmittit ad
 iudicium racionis, ratio vero, quod ab ymaginativa recipit et quasi iudex
 125 iudicat et diffinit, ad memoriam transmittit, memoria vero ea recipiens
 conservat.

<18> Secunda virtus animalis dicitur motiva, cuius vasa sive cana-
 lia sunt nervi motivi, a posteriori parte cerebri orti, transeuntes per nu-
 cham, i.e. medullam spinalem spondilium dorsi, ramificati ulterius per
 130 totum corpus; cuius vehiculum est spiritus animalis qui decurrens per
 hos nervos movet omnia membra – primo enim movet nervos, musculos
 et lacertos qui moti movent alia membra in omnem partem voluntarie
 motu. Unde si aliquis vulneratur ad puppim vel si offenditur ad aliquam
 spinam dorsi, ut aliquando illi nervi vel ex cicatrice aut aliquo humore
 viscoso fiant obstructi, cessabit motus in talibus membris, ut declarat

110/116 Alia dicitur ... fabrorum follibus] Cf. BARTH. ANGL., DPR III. 15, p. 163–164: “[...] virtus vitalis, que vivificat, cuius fundamentum sive proprium domicilium est cor, a quo procedit vita ad omnia membra vivificanda. Istius virtutis operationi cooperatur vis voluntarie motiva, qua cor et arterie dilatantur et constringuntur. Et dicitur hic dilatatio motus a cordis medio in omnes extremitates; sicut e contrario constrictio dicitur motus ab extremitatibus ad ipsum medium, sicut est in fabrorum follibus videre.” | 118/125 Tertia virtus ... recipiens conservat] Cf. BARTH. ANGL., DPR III. 16, p. 166: “Virtus animalis sedem et locum habet in superiori parte hominis, scilicet in cerebro, et hec est triplex, scilicet ordinativa, sensitiva et motiva. Ordinativa per se solum explet cerebrum. Nam in prima parte sive in anteriori cellula ordinat phantasiam sive imaginationem. In media cellula ordinat estimativam et racionem. Et iterum in posteriori cellula perficit memoriam et memorativam accionem. Nam virtus imaginativa illud quod format et imaginatur transmittit ad iudicium racionis. Ratio vero quod ab imaginativa recipit et quasi iudex iudicat et definit ad memoriam transmittit. Memoria ea que fuerunt in intellectu posita recipit et, donec illa ad actum reducat, conservat firmiter et custodit.” | 126/132 Secunda virtus ... voluntarie motu.] Cf. BARTH. ANGL., DPR III. 12, p. 158: “Virtus autem animalis motiva, que principaliter sedem habet in ventriculis cerebri, a quo oriuntur omnes nervi mediante nucha, id est medulla spinali, que est in spondilibus dorsi, movet omnia membra. Primo enim movet nervos, musculos et lacertos, qui moti movent et alia membra motu voluntario in omnem partem.”

118 habet] *suprascr.* | 120 solum] solet *a.c.* | 122 memoriam] *coni. meditativam cod.*, cf. BARTH. ANGL., DPR III. 16, p. 166. | 128/129 per totum corpus] in quibus per spiritum animale motum *add. sed del.*

135 Galienus I^o *De interioribus* quod quidam homo ex vulnere facto in uno
spondili et cicatrice demum indurata, amiserat motum in tribus digitis
manus sensu permanente, unde cum quidam medicus per multos dies
sibi emplastrum super hos tres digitos posuisset, nihil sensit. Post Ga-
lienus, considerans ora nervorum motivorum, qui dirigebantur ad illos
140 tres digitos, fuisse obstructa per cicatricem in uno spondili dorsi factam,
deposito emplastro de digitis, imponit super unum spondile et curant
eum. Ex quo patet quod aliquando nervi sensitivi tantum obstruuntur
et tunc cessat tantum sensus in illo membro, aliquando tantum motivi
et cessat tantum motus, aliquando utrique et cessat uterque, ut ostendit
145 ibi Galienus.

<19> 3^a virtus animalis dicitur virtus sensitiva, cuius officium est ut
toti corpori prebeat sensum. Sensitiva virtus est potencia qua anima de
coloribus, saporibus et aliis sensuum obiectis iudicat et discernit, cuius
vasa sive canalia sunt nervi sensitivi a prora, ut dictum est, orti, per quos
150 virtus animalis sensitiva ad quinque organa sensuum a cerebro deporta-
tur ad sensationem peragendam. Et ista virtus sensitiva dependet ab ani-
ma sensitiva que est “quedam spiritualis substantia vegetativa nobilior
et dignior, rationali vero longe ignobilior et indignior, nam eius esse et
operacio dependet a materia sive subiecto cuius est perfectiva, unde pe-
reunte corpore periiit ipsius essentia et operacio nec permanet a corpore
155 separata,” dicit Constantinus.

<20> | Sic igitur anima mediantibus hiis virtutibus suas in corpore
exercet actiones; non tamen per dimensionem aut loci spacium extendi-
tur, sed eius virtute corpus undique regitur et movetur. Cuius exemplum
160 ponit Calcidius in commento *Super Thimeum* de aranea que in medio
tele sue residens sentit qualemcumque motum sive exterius sive interi-
us factum: sic anima in centro cordis residens sine sui distensione to-
tum corpus vivificat et omnium membrorum sensum et motum dirigit
et gubernat mediantibus istis tribus virtutibus, scilicet naturali, vitali et
165 animali.

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134/142 Cf. GALENUS, *De interioribus* I. 6, fol. 277b. | 149 Cf. §12. | 152/156 quedam spiri-
tualis ... corpore separata] *Recte BARTH. ANGL., DPR III. 12, p. 159.* | 158/164 non ta-
men per dimensionem ... dirigit et gubernat] Cf. BARTH. ANGL., DPR III. 3, p. 151: “[...]”
anima in corpore regendo non per dimensionem et loci spatium in corpore extenditur,
sed eius virtute corpus undique regitur et movetur. Sicut ponit Calcidius exemplum in
Commento super Timeum de aranea que in medio sue tele residens sentit qualemcum-
que motum interius sive exterius factum, sic et anima in centro cordis residens sine sui
distensione totum corpus vivificat et omnium membrorum motus dirigit et gubernat.”

139 ora nervorum motivorum] nervos a.c. | 147/148 sensitiva virtus ... discernit] *add.*
in mg. dext. et infer., cf. BARTH. ANGL., DPR III. 11, p. 158. | 157 hiis] *lect. inc.* | 162 cordis]
coni. corporis cod.; cf. BARTH. ANGL., DPR III. 3, p. 151.

170 <21> Et sicut tres sunt virtutes, sic tres sunt spiritus, scilicet natura-
 lis, vitalis et animalis, qui sunt quasi vehicula illarum trium virtutum de-
 ferentes eas per totum corpus. Spiritus autem est “quedam substantia
 subtilis aerea, virtutes corporis excitans ad suas peragendas acciones”,
 175 cuius “beneficio et motu continuo tam sensus quam virtutes in animalibus
 moderantur, ut suas peragant acciones.” Qui sic generatur: “Dum
 per calorem fortem agentem in sanguinem in epate fit ebullitio, quidam
 fumus resolvitur qui ex venis epatis subtiliatur et depuratur in quandam
 180 spiritualem et subtilem substantiam sive aeream naturam commutatur
 etc.” Quere post presentem de generatione huius spiritus. Videlicet acci-
 pit autem sibi diversa nomina, cum sit unus et idem spiritus corporeus,
 subtilis tamen et aereus propter diversa officia que in diversis peragit
 membris. Spiritus igitur isti animales deportant virtutem animalem sensi-
 tivam a cerebro ad organa sensuum quinque ad sensationem faciendam que
 185 veniens ad organum dirigitur et depuratur in suo organo secundum exigen-
 dam qualitatem et naturam organi. Et isti in aliquibus sunt multi, in aliquibus
 pauci, in aliquibus nulli, sicut dictum est ante. Et sic queritur, utrum
 per extramissionem talium virtutum, scilicet sensitivarum, fiat sensatio.

185 <22> Dixi quarto quod ad sensationem etiam requiritur obiectum
 et medium. Quilibet enim sensus habet suum obiectum adequatum et
 proprium, similiter et medium, que obiecta multiplicant suas species per
 medium intencionaliter vel spiritualiter in organum sensus et sic faciunt
 sensationem.

190 <23> Obiectum visus est lux vel color. Lux per se primo, color per se
 secundo. Unde dicit Commentator: Color est visibilis sicut homo risi-
 bilis. Vel, uno nomine, “visibile” est obiectum visus. Medium eius est aer
 et aqua in quantum diafana, nam medium et organum dicuntur esse ei-
 usdem nature, unde dicit Aristoteles: Aer secundum quod aer non recipit
 species, nec aqua secundum quod aqua, sed secundum quod diafana.

168/169 BARTH. ANGL., DPR III. 22, p. 181. | 170/171 BARTH. ANGL., DPR III. 22, p. 180–181.
 | 171/175 Cf. BARTH. ANGL., DPR III. 22, p. 181. | 175 Cf. BARTH. ANGL., DPR III. 22,
 p. 181–182. | 175/178 Accipit autem ... peragit membris.] Cf. BARTH. ANGL., DPR III. 22, p. 182:
 “Unus igitur et idem spiritus corporeus, subtilis tamen et aereus propter diversa officia, in diversis
 membris diversis nominibus est vocatus.” | 182 Cf. §13. | 190/191 Cf. AVERROES, *De anima*
 II. 67, p. 233: “Aristoteles enim posuit principium quod color est visibilis per se, et quod simile
 est dicere colorem visibilem et hominem risibilem, scilicet de genere propositionis essentialis
 in qua subiectum est causa predicate non predicatum causa subiecti ut cum dicitur: homo est
 rationalis.” | 193/194 aer secundum quod ... secundum quod diafana] *Potius AVERROES, De*
anima II. 97, p. 276–277: “Et quod dixit de visione, quod natura media que servit visui non est
aer secundum quod est aer, aut aqua secundum quod est aqua, sed natura communis, ita est
intelligendum hic in natura que est media, scilicet quia est natura communis aque et aeris [...].”

175 Videlicet] *lect. inc.* | 178 virtutem animalem] virtutes animales *a.c.* | 178/179 sensi-
 tivam] *suprascr.* | 179 sensationem] *sa seu fa a.c.* | 187 spiritualiter] usque ad ipsum
 sen<sum> *add. sed del.*

195 <24> Obiectum auditus est sonus, medium est aer vel aqua inquantum sunt canalia.

<25> Obiectum gustus est sapor vel gustabile quod consistit in humido, ut Philosophus 2^o *De anima*. Medium gustus est caro spongiosa lingue, vel et melius, ut dicunt physici, saliva est medium gustandi.
200 Nichil enim sensu gustus percipitur nisi cuius sapor mediante saliva gustus organo presentatur. Unde ipsa secundum qualitatem saporis rei gustate immutatur. Et propter hoc saliva in sapore est insipida, quia potencialiter est omnium saporum in se receptiva. Si enim esset alicuius saporis determinati, non esset alterius susceptiva, ut dicit Constantinus.
205 Eciam dicit Philosophus: Impossibile est aliquid movere gustum nisi sit actu humidum.

<26> | Obiectum tactus potest dici compositio primarum qualitatum et quedam consequentia ad illas, ut asperum, lene, durum, molle, etc. Vel, uno nomine, obiectum eius est “tangibile”, sive sit calidum, frigidum, humidum, vel siccum. Unde si tangibile est calidum et humidum, tunc organum tactus non debet esse actualiter calidum et humidum, sed in potentia, ut possit recipere qualitates ipsius tangibilis, quia recipiens debet esse denudatum a natura recepti. Item non debet esse equaliter calidum cum tangibili, quia ut sic, non faceret sensationem, nam a proportione equalitatis non fit motus, nec debet esse calidius, quia a proportione minoris inequalitatis non fit motus.
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<27> Medium tactus “est caro, in qua nervi involuti sunt et infixi, per quos virtus tangibilis operatur, nam ipsi mediantibus species rei tangibilis anime iudicio deportatur”, ut dicit idem Constantinus. Unde in tactu “necessarium est, ut res tangenda organo tactus appropinquet; ex cuius appropinquacione spiritus animalis in nervis existens et in carne immutetur et immutatus proprietatem rei tacte representet”, ut dicit Constantinus. In istis enim duobus sensibus – gustus et tactus – medium
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200/204 Nichil enim ... alterius susceptiva] Cf. BARTH. ANGL., DPR V. 22, fol. 156: “Est autem saliva naturaliter humida [...] in sapore insipida, quia potencialiter est omnium saporum in se receptiva. Si enim esset alicuius saporis determinati, non esset alterius susceptiva. Est enim secundum eundem Constantinum saliva inter gustum et eius obiectum media, nihil enim sensu gustus percipitur, nisi cuius sapor mediante saliva gustus organo praesentatur. Unde etiam ipsa secundum qualitatem saporis rei gustatae immutatur.” | 205/206 Cf. ARISTOTELES, *De anima*, II. 21, p. 154 (422a34–b10). | 207/209 Obiectum tactus ... molle, etc.] Cf. BARTH. ANGL., DPR III. 21, p. 178: “Obiectum itaque sive sensatum tactus dici potest composition primarum qualitatum et quedam consequentia ad illas, ut asperum, lene, durum, molle.” | 212/213 recipiens ... recepti] AVERROES, *De anima* III. 4, p. 385 (= *Auct. Arist.* VI, 122, p. 184); cf. AVERROES, *De anima* II. 118, p. 314. | 217/219 Recte BARTH. ANGL., DPR III. 21, p. 178. | 220/223 Recte BARTH. ANGL., DPR III. 21, p. 178.

198 *De anima*] Impossibile est aliquid movere gustum nisi sit actu humidum *add. sed del. et iteravit infra post* Eciam dicit Philosophus [...]. | 204 ut dicit Constantinus] *add. in mg. sin.*

est organo coniunctum; in aliis vero tribus est extraneum, in quibus sensibile primo movet medium, medium vero motum movet organum; sed sensibilia gustus et tactus movent simul medium et organum, ut fiat sensacio.

<28> Istis ergo concurrentibus – sensu, organo eius, virtute, obiecto, medio et intencione anime – causatur sensacio.

230 <Conclusio prima>

<29> Conclusio 1^a: Omnis sensacio fit in organo sensitivo.

Ista conclusio est de mente Philosophi *De sensu et sensato*, ubi loquens de visione dicit sic: “Non enim in ultimo oculi anime sensitivum est, sed manifestum quoniam interius.” Si igitur sensacio que est visio, non est in ultimo oculi, a fortiori non est extra oculum. Et si hoc verum est de visione, per locum a fortiori verum etiam de qualibet alia sensacione. Et probatur racione sic: Omnis sensacio fit per virtutem animatam sensitivam, omnis autem virtus animata sensitiva est in organo sensitivo, ut dixit notabile secundum, igitur conclusio “omnis sensacio est intus animata sensitiva” vera. Consequencia est bona, quia ex opposito consequentis omnis; sed prima pars antecedentis patet per Constantinum in *Pantegni* qui dicit quod virtus animata sensitiva est causa efficiens sensationis, et similiter per experientiam, ut dictum est, nam absente virtute sensitiva non est possibile fieri sensationem.

245 <Corollarium>

<30> Correlarium: Sensibile per se secundum esse reale non facit sensationem.

Patet, quia sensibile per se quod debet sentiri illo sensu, ut dixit notabile ultimum, non est in organo sensitivo. Igitur correlarium verum.

250 <Conclusio secunda>

<31> Conclusio 2^a: Omne sensibile aptum natum est multiplicare suas species intencionaliter in medio.

Probatur: Omne sensibile aptum natum est se representare sensui, ut a sensu cognoscatur ex quid nominis, quod est “sensibile” quod aptum

223/227 Cf. ARISTOTELES, *De anima* II. 23, p. 163 (423b12–17); PSEUDO-BURIDAN, *Exp. De an.* II. 4, 6, p. 107. | 232/234 Cf. ARISTOTELES, *De sensu* 4, p. 27 (438b8–10): “Non enim in ultimo oculi anima aut anime sensitivum est, set manifestum quoniam interius.”; cf. etiam *Auct. Arist. VII. 10, p. 196*: “Visiva virtus non est in extremitate oculi sita, sed infra oculum circa cerebrum.” | 239 Cf. § 12, 14. | 242/243 Cf. § 14.

231 Conclusio 1^a] in mg. dext. | 239/240 omnis ... sensitiva] *suprascr.* | 242 efficiens] *add. in mg. dext.* | 246 Correlarium] in mg. dext. | secundum esse reale] *suprascr.* | 248/249 quod debet ... notabile ultimum] *subscr.* | 249 in organo sensitivo] hic nota *add. in mg. dext., cf. fol. 61v (§43)* | 251 Conclusio 2^a] in mg. dext.

255 natum est sentiri; “sentiri” vero est a sensu cognosci. Vel igitur talis re-
 presentacio erit per se, vel per aliud a se. | Non per se eo quod ipsum per
 se non ingreditur organum sensus, ut dixit correlarium precedens; etiam
 quia sensibile positum supra sensum non facit sensationem; etiam quia
 sic oporteret nos omnia sensibilia applicare sensui in sensatione, quod
 260 est inconueniens.

<32> Oportet igitur quod fiat per aliud a sensibili: vel ergo talis repre-
 sentacio fiet per extramissionem virtutum talium ab organis sensitivis
 ad ipsum sensibile, vel per species sensibiles multiplicatas ad organum
 sensus. Non primum, quia sic fieret sensacio extra organum et non in
 265 organo, quod est contra conclusionem primam. Item etiam quia vel ta-
 les virtutes extramisse ab organo ad sensibile renuntiantur ad organum
 sensus, vel non. Si non, nihil representabit sensui, eo quod anima cum
 eis non egreditur a corpore, et per consequens per eas non erit sensacio.
 Si vero renuntiantur tanquam nuncii, sequitur vel videtur quod sunt ani-
 270 mati et rationales eo quod voluntarie exeunt et renuntiantur, quod est
 inconueniens. Relinquitur igitur quod talis representacio fiat per species
 a sensibili per medium multiplicatas, quod est propositum.

<33> Potest etiam illa conclusio sic probari: Omne sensibile aptum
 natum est offerre suam similitudinem materialem et propriam intencio-
 275 naliter in medio; igitur conclusio vera. Tenet consequencia, quia species
 rei non est aliud nisi similitudo materialis rei; et antecedens pro prima
 parte patet ex quid nominis “sensibile”.

<Conclusio tertia>

280 <34> Conclusio 3^a: Species sensibiles multiplicatae per medium impres-
 seque sensui causant sensationem.

Probatur: Tales species notificant sensui sensibile, igitur causant sen-
 sationem. Tenet consequencia ex descriptione sensationis; nam sensacio
 est sensibilis per species sensui impressas apprehensio et per consequens

257 Cf. §30. | 258 sensibile ... sensationem] Cf. *Auct. Arist. VI. 73, p. 180*: “Sensibile posi-
 tum extra sensum non facit sensationem.” | 264/265 Cf. §29. | 265/271 vel tales virtutes
 ... est inconveniens] Cf. *PECKHAM, Persp. comm. I. 45 (48), p. 128*: “Radios quoscumque ab
 oculo micantes et orientes super visibile ad visionem impossibile est sufficere. Quod si
 ponantur radii ab oculo exire super rem visibilem quasi contingendam, aut redeunt ad
 oculum aut non. Si non redeunt visio per eos non fit, cum anima a corpore non exeat. Si
 redeunt, qualiter? Numquid animati sunt? Numquid omnia visibilia specula sunt radios
 reflectendo? Amplius si redeunt cum forma rei visibilis ad oculum frustra exeunt, quo-
 niam lux ipsa vel forma visibilis virtute lucis in totum medium se diffundit. Ergo non est
 necesse ut radiis quasi nuntiis requiratur. Amplius quomodo aliqua virtus oculi usque ad
 sidera protendetur etiam si corpus totum in spiritus resolveretur?” | 282 Cf. §5.

265 etiam] *suprascr.* | 274 materialem et propriam] *add. in mg. sin.* | 275 igitur] *iq*
a.c. | 279 Conclusio 3^a] *in mg. sin.*

285 notificacio. Antecedens probatur, quia tales species deportant sensui similitudinem materialem et propriam sensibilis; igitur conclusio vera.

<Corollarium>

<35> Correlarium: Sensacio fit intus aliquid suscipiendo.

290 Probatur, quia fit per species susceptas in sensu, igitur correlarium verum. Item potest sic probari aliter: Omnis virtus, cuius operacio est immanens et que est quandoque in potencia et quandoque in actu, non fit in actu nisi aliquid intus suscipiendo; sed operacio sensus est immanens et eciam aliquando est in actu, aliquando vero in potencia; igitur etc. Consequencia tenet in DARII. Antecedens probatur, nam si sensus sentiret extramittendo et non intus suscipiendo, operacio eius non esset
295 immanens et semper esset in actu et nunquam in potencia, quia semper extramitteret. Minor probatur, nam operacio sensus est sentire, sentire autem est immanens, ut patet 9^o *Methaphysice*; eciam sensus quandoque est in potencia, quandoque in actu, ex 2^o *De anima*; igitur etc.

<Conclusio quarta>

300 <36> | Conclusio 4^a: Quamvis sensacio fit per species sensibiles sensui impressas, nichilominus tamen virtutes egressae a sensu iuvant ad sensationem.

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305 Probatur, quia alterant species sensibiles et faciunt eas proporcionatas virtuti sensitive, igitur etc. Assumptum patet de visione, in qua radii ab oculo pyramidaliter emissi alterant species visibiles et faciunt eas proporcionatas virtuti visive, nam ex luce solari diffunduntur species visibilium, sed ex lumine oculi naturali oculo contemperantur; aliter enim non contemperate corrumpent visum, ut habetur 46 *Perspective*.

289/291 Omnis virtus ... suscipiendo] Cf. IOHANNES DE GANDUNO, *Qq. De sensu*, q. 13, fol. 7va: "Omnis virtus, quae quandoque est in actu, quandoque in potentia, et sua actio est immanens: oportet quod aliquid recipiat si suam operationem debet exercere. Si enim nihil recipiatur, tunc qua ratione non egit prius, nunc etiam non aget. Visus autem est huiusmodi, ergo etc." | 296/297 Cf. Aristoteles, *Met. IX. 8*, pp 189–191 (1050a–b). | 297/298 Cf. ARISTOTELES, *De anima II. 10*, p. 107 (417a9–14); cf. etiam PSEUDO-BURIDAN, *Exp. De an. II*, 3. 1, p. 73: "[...] aliquis dicitur quandoque sentire in actu, sicut quando actu operatur secundum sensum, et est in actu secundo, sicut quando actu audit; quandoque vero dicitur sentire in potentia, sicut quando dormit." | 304/308 Cf. PECKHAM, *Persp. comm. I. 46* (49), p. 128–130: "Lumen oculi naturale radiositate sua visui conferre. Oculus enim, ut dicit Aristoteles, non solum patitur, sed agit quemadmodum splendida. Lumen igitur naturale necessarium est oculo ad alterandum species visibiles et efficiendum proportionatas virtuti visive, quoniam ex luce solari diffunduntur sed ex lumine oculi connaturali oculo contemperantur. [...] Sic ergo patet quoniam aliquo modo fit emissio radorum, sed non modo Platónico, ut radii ab oculo emissi quasi in forma visibili immergantur et intincti revertantur oculo nuntiantes."

287 Correlarium] in *mg. sin.* | 289 Omnis] *coni.* | 300 Conclusio 4^a] in *mg. dext.* | 305 pyramidaliter] *add. in mg. dext.*

310 <37> Sequitur ex predictis correlarie quod sensacio que est visio sit per
tales pyramides radiosas, quarum conus est in oculo, basis vero in re visa.

Probatur, quia fit per species visibiles visui impressas, ut dixit conclusio tertia. Et quia duplex est visibile, scilicet per se primum et per se secundum, ut dixit notabile tertium, sequitur quod ab utroque illorum species directe ad oculum facient diversas pyramides, eo quod ille species
315 a superficie lata visibilis egressa intrant conaliter ad glaciale, ubi est visio, sicque faciunt pyramides. Et quia virtutes sive radii (quod idem est) egressi ab oculo iuvant ad visionem, ut dixit secunda pars conclusionis ultime, que virtutes seu radii sic se habent quod exeunt a glaciale, dilatantur usque ad superficiem rei vise; sicque etiam faciunt pyramidem.
320 Per istas igitur tres pyramides, quarum omnium conus est in oculo, basis vero in re visa, fiet visio; igitur correlarium verum.

<38> Unde dicit Philosophus in *De animalibus*: Non solum venit species rei ad visum secundum pyramidem visualem, sed species visus ad rem secundum consimilem extensam. Unde idem libro X^o et XI^o *De animalibus* dicit: A re visa nichil venit nisi species eius, neque a visu ad rem visam venit aliud quam species visus; nihil enim exit de substantia oculi, quia corrumperetur, sed exit ab oculo conus pyramidis et dilatatur eius basis super totam superficiem rei vise.
325

<Corollarium responsale>

330 <39> Correlarium: Questio, ut proponitur, est falsa.

<Notae variae quaestioni adiunctae>

<40> Virtus, ut dicit Philosophus 2^o *Ethicorum*, est que habentem se perficit et opus eius omne bonum reddit; sic virtus equi ad currendum reddit cursum bonum etc. Secundo, contracte ad precedentem questio-

309/310 Cf. e.g. BARTH. ANGL., DPR III, 17, p. 168: "[...] visus [...] non videt nisi rem illam cuius partibus venit species super lineas rectas cadentes in centrum oculi, que omnes linee ducte a singulis partibus rei faciunt unam pyramidem, cuius conus est in pupilla et basis in re visa [...]" | 311/312 Cf. §34. | 312/313 Cf. §23. | 320/321 Cf. BARTH. ANGL., DPR III, 17, p. 170 et §42 infra. | 322/328 Unde dicit ... rei vise] Recte BARTH. ANGL., DPR III, 17, p. 169–170: "Preterea secundum philosophum non solum venit species rei ad visum secundum pyramidem visualem, sed species visus ad rem super consimilem pyramidem extensam in eodem loco. Dicit etiam Aristoteles in XIX libro De animalibus quod nihil aliud est visum videre quam quod visus quod exeat ad rem visam. Et ideo vult Augustinus I libro Super Genesim et VI Musice. A re autem visa nihil venit nisi species eius, neque a visu ad rem venit aliud quam species eius; nihil enim exit de oculi substantia, quia corrumperetur, sed exit ab oculo conus pyramidis, et dilatatur eius basis super totam superficiem rei vise." | 332/333 ARISTOTELES, *Eth. Nic. II*, 5, p. 402 (1106a15–24); cf. *Auct. Arist. XII*, 37, p. 235: "Virtus est habitus, quia habentem se perficit et opus ejus laudabile reddit."

319 faciunt] *suprascr.* | 324 idem] *ib a.c.* | 333 omne] *coni. o cod.*

335 nem, virtus corporis sensitivi est que corpus ipsum perficit et opus eius
 bonum reddit; virtus enim est ut ultimum et optimum qualitativum rei;
 igitur perficit rem. Et quia perficit ut qualitativum et per consequens ut
 dispositivum optime ad actum proprium, igitur opus eius bonum reddit.
 Sicque virtus sensitivi corporis opus corporis sensitivi perficit et reddit
 340 bonum in suo genere. Talis autem virtus est triplex, scilicet naturalis, vi-
 talis et animalis. Vide in questione, si placet.

<41> | De lince qui videt per parietem vidi ymaginacionem; si habes
 meliorem, bene; hec michi placet. Nota: Paries, licet sit corpus densum
 et compactum, tamen nihilominus est porosum; nec omnino caret per-
 345 spicuitate, cum nullum corpus careat omnino perspicuitate, licet nos
 lateat, ut habetur ex 51^a *Perspective communis*, ubi etiam dicitur quod
 nulla densitas prohibet omnino transitum virtutum et specierum, ut
 patet de influencias celi, quas suscipit omne corpus. Et – cum oculus sit
 nature etheree, ut dicit notabile primum questionis predictae, eo quod
 350 lumen est sibi connatum, ut habetur ex *Perspectiva* – sicut igitur ether
 diversum est in natura in partibus suis (i.e. in stellis, nam alie sunt ca-
 lide, alie frigide, alie lucide fortes habentes radios, alie vero debiles, ut
 patet de sole, mercurio etc.), sic et oculi diversam, ut ita dicam, habent
 naturam in diversis animalibus. Quaedam enim animalia habent oculos
 355 multi et fortis luminis connati, ut sunt catti, lupi etc., qui etiam radios
 sensibiles ignitos quasi ex oculis suis emittunt qui in nocte videntur, qui
 radii fluentes ab oculis eorum sufficiunt dare virtutem multiplicativam
 coloribus, ut ab eis in nocte videri possint, ut habetur ex 46 *Perspective*.
 Quaedam vero animalia habent lumen oculorum debile, propter quod
 360 debiles radii fluunt ex eorum oculis et talia in nocte non vident. Modo
 linx pre aliis animalibus habet lumen oculi multum et fortem et radii ab
 eius oculis emissi sunt valde fortes qui pertranseuntes parietem usque
 ad obiectum visibile parant viam speciebus visibilibus, ut confortentur

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341 Cf. §14. | 345/348 nullum corpus ... omne corpus] Cf. PECKHAM, *Persp. comm. I. 51* (54), p. 132: "Visum non fieri nisi per medium dyaphonum. Cuius ratio est quia species non multiplicantur nisi per corpora dyaphona [...]. Quia tamen omne corpus est susceptivum influentie celestis, certum est nullum corpus omnino carere perspicuitate, cum sit communis superiori et inferiori corpori. Hinc est quod nulla densitas prohibet omnino transitum virtutum et specierum, quamvis nos lateat. Hinc lince videre dicuntur per medium parietem." Cf. etiam TIŠNOV, *Quodlibet*, q. 46, fol. 133r: | 348/349 Cf. §8. | 357/358 radii fluentes ... *Perspective*] Cf. PECKHAM, *Persp. comm. I. 46* (49), p. 128–130: "Aliquid tamen operantur radii [visuales ex oculo] in visu modo predicto, quod etiam patet quoniam visus in omnibus animalibus est unius rationis cum igitur quedam animalia per lumen oculorum suorum sufficiant coloribus virtutem multiplicativam dare ut ab eis nocte videri possint, sequitur ut lumen oculi aliquid in lumine operetur."

339 corporis'] sensitivi bonum *add. sed del.* | 342 parietem] *coni. pietem cod.* | 349 questionis] *coni. conclusionis cod.* | 351 alie] *aliam a.c.*

365 et multiplicare pervenire possint ad oculum; sic quidem pervenientes ad oculum lincis faciunt sui visionem etc.

<42> Et sic auctor I^o *Perspective* probat quod nihil videtur nisi per lucem orientem super rem visam ab eadem usque ad oculum multiplicatam. Unde necessario exigitur 3^a piramis, scilicet ipsius lucis. Et omnium istarum pyramidum bases sunt in re visa, coni vero in oculis. Quando 370 igitur visus habet species venientes super has 3^s piramides, tunc transit species lucis et coloris per medium tunicarum et humorum oculi ad humorem oculi etc.

<43> Nota: Obiectum sensibile per se habet duplex esse. Unum reale, secundum quod est in suo subiecto et corporaliter distat a sensu quo 375 sentitur, et secundum hoc non multiplicat se in sensum. Aliud habet esse intentionale seu rationis, secundum quod est in sensu et multiplicat se in sensum. "Multiplicat" dico secundum speciem suam que est eius essentialis similitudo qua sentiri debet sicuti est.

366/372 Et sic auctor ... oculi etc.] Cf. BARTH. ANGL., DPR III. 17, p. 170: "Item, probat auctor *Perspective* in libro I quod nihil videtur nisi per lucem orientem super rem visam ab eadem usque ad oculum multiplicatam. Unde necessario exigitur tertia piramis, scilicet ipsius lucis; et omnium istorum trium pyramidum coni sunt in oculis, et bases in re visa. Quando ergo visus habet species venientes super has tres piramides, tunc transit species lucis et coloris per medium tunicarum et humorum oculi usque ad humorem cristallinum."

369 coni] *suprascr.*, conus a.c. | 373 Nota] hic in *mg. sin.*, cf. fol. 60r (§30). | 374/375 quo sentitur] *suprascr.*