KATJA KRAUSE

Chapter 11. Source Mining

Arabic Natural Philosophy and experientia *in Albert the Great's Scientific Practices*

The exact ways in which Albert followed the lead of his Arabic sources as he adopted and reworked the natural philosophical insights they offered for each particular doctrine has been an ongoing concern in the literature. In most cases, the question has been approached from the perspective of a reception history, asking predominantly whether and how far Albert remained truthful to the original teachings contained in his sources.[1] In this chapter, I wish to complement that approach with a different one that underscores Albert's own expressed purposes and the ways he pursues them in the specifics of his natural philosophy. Keeping in mind Albert's own presentation of evidence, definitions, and explanations — his 'intellectual practices', to cite Lorraine Daston,[2] or 'scientific practices' to use a more common term — my aim is to investigate when Albert incorporated

1 There are many very fine studies on Albert's appropriation of Arabic thought, with a particular emphasis on the *Physics* and *Metaphysics*. Among the most important recent ones are Bertolacci, '"Subtilias speculando"'; Bertolacci, 'Le citazioni implicite testuali'; Bertolacci, 'The Reception of Avicenna's *Philosophia prima*'; Bertolacci, 'Albert the Great'; Bertolacci, 'A New Phase of the Reception of Aristotle'; Bertolacci, 'Albert's Use of Avicenna and Islamic Philosophy'; Bertolacci, 'Avicenna's and Averroes's Interpretations'; Bertolacci, '"Averroes ubique Avicennam persequitur"'; Burger, 'Albertus Magnus'; Caminada, 'A Latin Translation?'; Donati, 'Is Celestial Motion a Natural Motion?'; Endress, *Der arabische Aristoteles*; Hasse, 'The Early Albert Magnus'; Hasse, 'Der mutmaßliche arabische Einfluss'; Hasse, 'Avicenna's "Giver of Forms"'; Lizzini, 'Flusso, preparazione appropriata e *inchoatio formae*'; López-Farjeat, 'Albert the Great'; Müller, 'Der Einfluss der arabischen Intellektspekulation'; Schwartz, 'Celestial Motion'; Schwartz, 'Divine Space'; Tellkamp, 'Why Does Albert the Great Criticize Averroes?'; Wéber, 'Un thème de la philosophie arabe'.

2 I draw on Lorraine Daston's distinction between 'intellectual practices', which she identifies as including 'the presentation of evidence and arguments', from 'cognitive practices', which indicate 'a

Katja Krause (kkrause@mpiwg-berlin.mpg.de) is professor of the history of science at the Technical University Berlin and leads a research group at the Max Planck Institute for the History of Science.

Albert the Great and his Arabic Sources, ed. by Katja Krause and Richard C. Taylor, Philosophy in the Abrahamic Traditions of the Middle Ages, 5 (Turnhout: Brepols, 2024), pp. 311–334
BREPOLS PUBLISHERS 10.1484/M.PATMA-EB.5.136491

certain insights from Arabic natural philosophers, how he reworked them, and why he mined these sources to establish the contours of his own natural scientific enterprise and defend its truth.[3]

By turning from the general meaning of Arabic authorities in Albert's comprehensive science (*scientia*) to the meaning of one particular aspect these sources gave him, that of experience (*experientia*, *experimentum*), we do not much narrow down the multiplicity of purposes he had in mind. Usually uninhibited by the original intentions of the Arabic sources, Albert's mining of particular experiences from them followed its own epistemic concerns.

To show what these concerns were, and how they differed from those of the original sources, I focus on two cases drawn from Albert's vast natural philosophical corpus. In the first, I show how he 'transhistoricizes' empirical evidence contained in Avicenna's medical *Canon* — by which I mean that he focuses on its epistemic rather than its authoritative value, as will become clear below. In the second, I show how he establishes his mature doctrine of taste in reliance on Averroes's principle of form-matter relations as the best possible explanation of the particular taste of saltiness.

Although this choice of cases is highly selective, and although it neither draws on his own direct experience nor includes experience used to verify or falsify a given scientific theory — as we would perhaps expect its epistemic relevance to be from a post-Scientific Revolution perspective — I nonetheless wish to show that Albert's scientific practices encompassed cases of mining his sources that went far beyond those particular epistemic concerns, which became fixed much later in history.

My aim here is twofold. First, I suggest that Albert's references to experience relied upon an epistemic value utterly different from those familiar to us — one that concerned more the hearer of the science than the scientific object or

---

learned (and learnèd) habitus, which has bodily, mental, and ethical components'. Daston, 'Taking Note(s)', p. 446.

3 See, for instance, Albertus Magnus, *De animalibus*, IX.2.3, ed. by Stadler, vol. 1, p. 714, vv. 18–20: 'In omnibus autem inductis non intendimus, nisi quod ratio dicti Galieni non est sufficiens, sed de ipsa positione eius nichil omnino diximus, an vera sit vel falsa per rationem probantem'; ibid., XI.1.1, vol. 1, p. 761, vv. 1–7: 'Omnibus hiis diversitatibus animalium habitis oportet modo aliud ordiri principium circa causas inveniendas eorum quae diximus. Differentias autem substantiales animalium supra posuimus et differentias membrorum et partium omnium substantiales exsequuti sumus: et insuper posuimus differentias eorum quae accidunt eis tam communiter quam proprie: et oportet utrorumque istorum, prout possumus, invenire causas naturales et veras'; Albertus Magnus, *De anima*, I.1.2, ed. by Stroick, p. 4, v. 54–p. 5, v. 8: 'Utilitas *autem* eius praecipua est, quod *ad omnium* scibilium *veritatem cognoscendam maxime proficit*, et praecipue *ad* notitiam veritatis rerum *naturalium*, cum ipsa sit *principium* formale et essentiale *animalium*, et non nisi per notitiam animae poterunt cognosci corpora animatorum. In corporibus autem animatorum et commixtio est simplicium et ipsa simplicia, et sic ulterius scientia animae proficit ad notitiam omnium corporum naturalium. Ad veritatem autem omnium proficit praeter modum, quem diximus superius, quo videlicet apud se habet lumen, quod est omnis veritatis examen, tribus modis, non simul, sed divisis. Quorum unus est, quia proficit ad naturalem veritatem, eo quod ipsa pars nobilissima est scientiae naturalis'.

approach under scrutiny. Second, I wish my focus on Albert's 'mined experience' to show that his natural science followed an epistemic purpose going beyond the purposes thus far identified by the literature, namely truthfulness to the original, amassing encyclopaedic knowledge of as many sources as possible, avoiding the danger of the double-truth, or responding to his Latin interlocutors.[4] This epistemic purpose was one that Albert himself identified as crucial to his overarching science and that is very familiar to scholarship: the combination of truth with certainty and epistemic comprehensiveness to the extent that these can be achieved through the intellectual practices of defining and explaining.

Transhistoricizing Empirical Evidence

Probably during the second decade of the 1200s, Michael Scot concluded his Latin translation of Aristotle's *De animalibus* from the Arabic language. Like his Arabic template, the translation comprised three of Aristotle's works, *Historia animalium* (Books I–X), *De partibus animalium* (Books XI–XIV), and *De generatione animalium* (Books XV–XIX). Before Albert's long commentary on the *De animalibus* and his subsequent *Quaestiones super De animalibus*, two other Latin thinkers wrote commentaries on Michael Scot's translation: Peter of Spain (Petrus Hispanus *medicus*), whose commentary, composed around 1240, is still extant in two manuscripts, and Roger Bacon, whose commentary, possibly composed somewhat earlier, is lost to us.[5] Following Peter of Spain's lead, but in his own comprehensive and innovative ways, Albert incorporated large amounts of Avicenna's *Canon* into his *scientia de animalibus*, particularly as regards human anatomy and physiology.[6]

Avicenna's *Canon* is a medical work in five volumes, originally composed in Arabic and translated into Latin in the twelfth century by Gerard of Cremona. It was utilized by thirteenth- and fourteenth-century Latin physicians predominantly for the ideas in Book I, where — among many other anatomical matters

4 On these concerns, see, for instance, Donati, 'Alberts des Großen Konzept der *scientiae naturales*'; Tracey in this volume.

5 On the history of Peter of Spain's commentary, see Navarro Sanchez, *Peter of Spain*. Important studies on insights of the *De animalibus* tradition in the thirteenth century include Pouchet, *Histoire des sciences naturelles au Moyen Âge*; Zaunick, 'Albertus Magnus'; Wingate, *Mediaeval Latin Versions*; Pelster, 'Die beiden ersten Kapitel der Erklärung Alberts des Großen'; Gerhardt, 'Zoologie médiévale'; Hünemörder, 'Die Zoologie des Albertus Magnus'; Asúa, 'Organization of Discourse on Animals'; Asúa, 'El Comentario de Pedro Hispano'; Asúa, 'Peter of Spain'; Dold, 'What is Zoology About?'.

6 On Albert's medical learning, see especially Kopp, 'Psychiatrisches bei Albertus Magnus'; Killermann, 'Die somatische Anthropologie'; Shaw, 'Scientific Empiricism in the Middle Ages'; Schipperges, 'Das medizinische Denken'; Schipperges, 'Eine *summa medicinae*'; Demaitre and Travil, 'Human Embryology and Development'; Siraisi, 'Medical Learning of Albertus Magnus'; Asúa, 'Organization of Discourse on Animals'; Asúa, 'Albert the Great'; Theiss, *Die Wahrnehmungspsychologie und Sinnespsychologie*.

— Avicenna discusses the question of sensation in teeth, showing that teeth form the exception to the general Galenic anatomical rule that 'no bone […] has sensation':[7]

> For Galen said [*dixit*] that experience [*experimentum*] has shown us that they [i.e., teeth] have sensation, about which nature was very careful and produced it with a power that originates in the brain, so that, for this reason, they may also discern between hot and cold.[8]

Presenting Galen's testimony of his experience, probably derived from his *De ossibus ad tirones*,[9] Avicenna emphasizes the great spatio-temporal distance between the two thinkers. Using the past tense, *dixit Galenus*, he locates Galen's experience in a deep history that took place centuries before it was retold in the *Canon*. Avicenna thus creates three separate historical moments, dividing Galen's *experimentum* from his report of his *experimentum* and both of these from Avicenna's own testimony on Galen's report. But the temporal gaps he thus creates are also epistemic gaps. Avicenna provides no report of testing Galen's experience, no account of his own sensation in his teeth in everyday circumstances, no case of his patients' toothache. Instead, Avicenna summons Galen's authoritative *experimentum* to validate the scientific conclusion that teeth are the exception to the rule. In keeping with his own definition of medicine as *scientia*, on a par with philosophy, Avicenna's intellectual practice thus privileges the authoritative value over the evidentiary value of *experimentum*, and incorporates it into the intellectual activity of argument for a conclusion.[10] In short, Galen's *experimentum* is inscribed into Avicenna's *Canon* with an authoritative value.

In contrast, when Albert extracted these insights from Avicenna's *Canon* and incorporated them into his *De animalibus* commentary, he transformed the authoritative value of *experimentum* into an evidentiary value. In his account, Albert no longer emphasizes the spatial, temporal, and epistemic gaps as Avicenna did, but stresses instead the epistemic warrant that *experimentum* supplies for the rational conclusion:

> No bone apart from teeth, as Galen and Avicenna say [*dicunt*], has sensation. For concerning teeth, they say [*dicunt*] that experience shows [*experimentum demonstrat*] that teeth have sensation. And this is decreed by the sagacity of nature, for it has supplied them with sensation together with a sensory power,

---

7 Avicenna, *Liber canonis*, I.1.5, ed. Venetiis, fol. 10ra: 'Nullum preterea ossium ullo modo sentit preter dentes'.

8 Ibid.: 'Galenus enim dixit, quod experimentum nobis demonstrauit eos [sc. dentes] sensum habere: de quo natura sollicita fuit: et fecit ipsum cum uirtute que a cerebro prouenit, idcirco ut ipsi etiam inter calidum et frigidum discernant'.

9 For Galen's report of his own experience, see Claudius Galenus, *De ossibus ad tirones*, ed. by Kühn, vol. 2, p. 754, vv. 13–15: 'Participes vero sunt nervorum mollium, qui a cerebro, dentes soli e reliquis ossibus; unde et soli manifeste sentiunt'.

10 On this distinction, see the Introduction to this volume.

> which descends from the brain, so that they may also discern between hot and cold.[11]

Despite striking similarities in content, Albert's report appears to move away from Avicenna's emphasis on experience as evidence that has been reported and towards experience as evidence that warrants or secures the truth.[12] That reading is supported by his use of the present tense (*dicunt*), his conflation of the two *experimenta* of Galen and Avicenna, and his separation between reporting on the subjects of the *experimentum* (*dicunt*) and on its evidentiary function. Rather than emphasizing an authoritative inheritance, Albert puts Galen's and Avicenna's experience at the service of empirically verifying the conclusion that teeth are the exception to the rule. In this way, he privileges the evidentiary value of experience over its authoritative value (regardless of the fact that it is testimonial experience only), and integrates it into the predominant intellectual practices of defining and explaining in his works. Likewise, Albert grants 'the sagacity of nature' the ontological warrant of truth, giving nature an intrinsic authority: an authority of final causality, a wise decree, for the sake of physiological function. This, too, confirms that Albert shifts the epistemic weight away from the transmitted *inheritance* of this piece of knowledge to a natural scientific *explanation* of it.

For present-day tastes, granting evidentiary status to the *experimentum* of Galen and Avicenna to the extent that Albert does seems like an inequitable handling of the evidence and a potential distortion of the conclusion. But Albert was not prey to our epistemic fears. His epistemology was an optimistic one, culminating in a deeply held conviction that 'all activities that arise from nature [*a natura*] are uniform in all things that possess this nature'.[13]

Here, let me stress once again that for Albert, this principle applies not only to the scientific object under investigation — the sagacity of nature for sensation in teeth — but also, and most importantly, to the scientist who is pursuing the investigation. Encompassing natural activities and actions carried out to realize the human 'desire to know by nature', as Albert puts it, elaborating on Aristotle's *Metaphysics*, sense perceptions and the ability to build truthful universals follow 'the nature of the species'.[14] Albert believed this uniformity of nature was true for

---

11 Albertus Magnus, *De animalibus*, I.2.6, ed. by Stadler, vol. 1, p. 71, vv. 1–6: 'Nullum autem ossium, ut dicunt Galienus et Avicenna, praeter dentes habet sensum. De dentibus enim dicunt, quod experimentum demonstrat, dentes habere sensum: et hoc sagacitate naturae factum est: fecit enim eis sensum cum virtute sensus quae a cerebro descendit, ut ipsi etiam inter calidum et frigidum discernant'.

12 On premodern experience more generally, see Krause with Auxent and Weil, 'Making Sense of Nature in the Premodern World', and the literature quoted there.

13 Albertus Magnus, *Super Ethica*, I.2, ed. by Kübel, p. 12, vv. 32–33: 'Operationes omnes quae sunt a natura, sunt uniformes in omnibus habentibus naturam'.

14 Albertus Magnus, *Metaphysica*, I.1.5, ed. by Geyer, p. 7, vv. 36–40: 'omnes homines natura scire desiderant. Cum enim hoc desiderium sit omnium quorum in specie determinata est natura una, erit hoc desiderium naturale et naturam speciei consequens'.

all individuals (that is, all philosophically trained ones) across space and time.[15] His principled belief in the uniformity of natural being and activities explains to us why Albert found himself able to integrate Avicenna's reference to Galen's *experientia* into his *scientia de animalibus* in the way that he did. His reworking reveals a potential to participate in Galen's act of experiencing, as testified in Avicenna, not experientially but in a conceptual way that transcends linguistic, spatial, and temporal boundaries — precisely because Albert took concepts derived from experience to be, in most cases, universally true as well. The grounds for this sharing lay not in a testing or repetition of experience of the kind demanded by later epistemic ideals, but in the firm belief in the correct and shared workings of the human soul, which ensured a continued and universally human epistemology even for the experiencing of particulars.[16]

Albert's inheritance of Avicenna's testimony to Galen's *experimentum* was not a simple assumption or adoption. It was, rather, a matter of reworking epistemic values, of shifting from authoritative to evidentiary values, grounded in a firm belief that the activities of the soul, at least those of the sensitive and vegetative parts, are universally shared across humanity and have a common goal: they assist the perfection of the human intellect. This reworking was no accident. Albert's intellectual motivation, his scientific program, leaves no doubt that *experimentum* in conjunction with *ratio* leads to specific definitions of animals, the backbone of his *scientia perfecta de animalibus*:

> From all that has been put forth, it is evident that whoever wishes to narrate and convey through teaching what they have cognized by reason and seen by experience of the natures of animals must be in possession of definitions known per se, by which the intention of the one speaking about the natures of the animals is guided according to those definitions. For these definitions are the means to prove everything else that is sought in the natures [of animals], and through them, it must be judged whether what is said to belong to animals by common or proper accidents (1) might be true with certainty, if it can be demonstrated, or (2) might be close to or approach the truth, if it is gathered from probable things, since knowledge by demonstration cannot be had of

15 This is not to say that, for Albert, humans cannot engage in diverse activities on an individual level. It is also not to say that they do not have different epistemic dispositions, potencies, or capabilities. In Albert's eyes, all these arise on the physiological level of complexion — an ontological explanation of individual differences in material features. But this applied neither to the level of specific characteristics, nor to the scope of different human activities or actions. Albert's concentration on human nature *as* human enabled him to trust that any activity, be it external sense perception or experience in its technical sense, is uniform, at least for the most part, across the species. Albert supposed his own sensation in his teeth, therefore, to be no different from the sensation that Galen and Avicenna had. On these individual conditions, see Anzulewicz, 'Psychophysiology, Natural Spaces and Climata'; Cadden, 'Albertus Magnus' Universal Physiology'.

16 See also Lorraine Daston's observations on Aristotle in her thought-provoking article on the epistemic fear of error in the early modern and Enlightenment periods. Daston, 'Scientific Error', esp. her discussion of Aristotle on p. 5.

> all things. But concerning some things it is necessary to conjecture, and we believe that the things that do not oppose the natures of animals belong to them with probability.[17]

Albert's reworking of epistemic values, and its scientific goals in specific definitional knowledge of all animals (which equals the truth about them), was an epistemic constant across his incorporations of Avicenna's empirical evidence in his *De animalibus* and in his other works, where he referenced this evidence explicitly.[18]

The specific practice of reworking authoritative experience into experience as warrant cannot, however, be generalized across his oeuvre. Quite different uses of experience — such as the notion that a given teaching results in the best possible explanation of experiential knowledge — appear in Albert's treatments on the five external senses. Ultimately, though, they are grounded in the same overarching epistemic value.

---

17 Albertus Magnus, *De animalibus*, XI.1.1, ed. by Stadler, vol. 1, p. 763, vv. 6–18: 'Ex omnibus igitur inductis manifestum est, quod quicumque vult docendo narrare et tradere quod per rationem cognovit et quod per experimentum vidit de naturis animalium, debet habere diffinitiones notas per se, per quas dirigatur intentio loquentis de naturis animalium secundum illas diffinitiones, quia ipsae sunt medium ad probandum omne aliud quod quaeritur in naturis, et per eas debet iudicari utrum hoc quod dicitur inesse animalibus de accidentibus communibus aut propriis, sit certitudinaliter verum si demonstrari potest: aut sit circa vel prope verum, si ex probabilibus colligitur, quoniam non in omnibus haberi potest per demonstrationem scientia, sed in quibusdam coniecturare oportet, et quae non repugnant animalium naturis, probabiliter haec eis credimus inesse'.

18 For instance, Albertus Magnus, *De homine*, ed. by Anzulewicz and Söder, p. 206, vv. 32–39: 'Praeterea, quaecumque duo sic se habent quod unum percipitur sine altero, illorum unum non est aliud; motus et sonus sic se habent; ergo unum illorum non est aliud. Prima patet per se. Secunda probatur per experimentum, quia multotiens percipimus sonum non percipientes motum. Cum igitur "idem non possit simul sciri et ignorari", ut dicit Avicenna, verum est, quoniam sonus non erit motus aëris'; ibid., p. 269, vv. 17–48; Albertus Magnus, *De anima*, II.3.6, ed. by Stroick, p. 106, vv. 5–9: 'Et ideo ventus non aufert vel affert colores, sed bene obtundit auferendo sonos in parte et non in toto; odores autem et affert et aufert in toto, sicut dicit Avicenna et veritas per experimenta attestatur'; ibid., II.3.29, p. 140, v. 63–67: 'Et ideo si forte Galenus et Avicenna experimentis probant amarum universaliter operari calorem in homine, non erit per hoc probatum, quod amarum in se et simpliciter sit calidum vel cuilibet sit calidum'; Albertus Magnus, *De animalibus*, VI.1.1, ed. by Stadler, vol. 1, p. 444, vv. 6–16: 'Dicit autem Aristoteles, quod ova longa acuti capitis producunt mares avium, rotunda vero et habentia in loco acuti anguli rotunditatem producunt feminas. Et hoc est falsum omnino et vitium fuit ex scriptura perversa, et non ex dictis philosophi: propter quod dicit Avicenna, quod ex rotundis et brevibus ovis producuntur mares et galli: ex longis autem et acutis ovis producuntur gallinae: et hoc concordat cum experientia, quam nos in ovis experti sumus, et cum ratione, quoniam perfectio virtutis in ovo masculino aequaliter ambit et continet extrema: sed eiusdem imperfectio in feminino causa est, quare materia diffluit longius a centro'; ibid., VII.1.6, p. 522, vv. 27–43: 'Similiter autem dicit Avicenna, quod iam expertus est in terra sua, quod aves quaedam aquaticae veniunt in vere ad Mare Mortuum, quod salsius et calidius est alio mari quod Magnum vocatur, et hoc mare aput Arabes vocatur Ihemene, et abinde recedunt ad lacus, qui Demore vocantur: et deinde pertranseunt Nilum et vadunt ad lacum dictum Decaurisme: et quaedam etiam earum perveniunt ad lacum dictum de Trabestem: et quaedam perveniunt ad lacus alios, qui sunt in locis illis'.

Doctrine of Taste as the Best Explanation of Particular Sensations

The correct workings of the soul across humanity (or at least among philosophers), their power to ensure a universally shared epistemology, required doctrinal reflection. Albert chose to set out that reflection mainly in his commentary on Aristotle's *De anima*, but not only there. Before a solid tradition of commentaries on Aristotle's *De anima* was established, Albert favoured other locations, rooted in the *summa* tradition of the twelfth century. His *Summa de creaturis*, comprising the two autonomous books *De quattuor coaequaevis* and *De homine*, attests to this practice. Indeed, it is in his *De homine* that Albert gives his first coherent and sovereign theoretical account of humans in their nature and activities; in his *De anima*, *Parva naturalia*, and *De natura et origine animae*, he complements, perfects, and reworks many of these early teachings.[19]

These general considerations also apply to Albert's particular doctrines, and his teaching of the sense of taste in its relation to and demarcation from the sense of touch is no exception. In *De homine*, Albert describes the sense of taste as falling under what seem to be two strictly separate, merely conceptual articulations: taste is divided into a sense of alimentation (*sensus alimenti*) and a sense of judgment of flavours (*iudicium saporum*). In its first meaning, as a sense of alimentation, Albert takes taste to be a part of the sense of touch,[20] whereas in the second, as a sense of judgment, he takes it to be distinct from touch.[21] Taste shares with touch its generic object of sensation (the four qualities of hot, cold, wet, and dry), its medium (the tangible, watery, tasteless moisture), and its modality of activity (direct contact between object and subject of sensation), and it overlaps as regards organic location (the tongue and palate, both in the mouth).[22] Yet taste does not

19 See also Anzulewicz, 'Die Denkstruktur des Albertus Magnus'; Anzulewicz, '*Memoria* und *reminiscentia*'; Anzulewicz, '*Solus homo est nexus Dei et mundi*'; Anzulewicz, 'Hervorgang – Verwirklichung – Rückkehr'; Anzulewicz, 'Zum anthropologischen Verständnis'; Anzulewicz and Rigo, '*Reductio ad esse divinum*'.

20 Albertus Magnus, *De homine*, ed. by Anzulewicz and Söder, p. 239, vv. 42–45: 'Dicendum quod gustus accipitur duobus modis, scilicet secundum quod est sensus alimenti, ut in multis locis dicit Philosophus, et sic gustus est quidam tactus quadruplici ratione'.

21 Ibid., p. 240, vv. 13–18: 'Accipitur etiam gustus secundum quod est iudicium saporum, et secundum hoc gustus nullo modo tactus est, ut probatum est in obiectione. Et quia per obiectum quod est diffiniens sensum sic distinguitur a tactu, ideo ponitur gustus unus quinque sensuum e diverso a tactu divisus'.

22 Ibid., p. 239, v. 42–p. 240, v. 12: 'Dicendum quod gustus accipitur duobus modis, scilicet secundum quod est sensus alimenti, ut in multis locis dicit Philosophus, et sic gustus est quidam tactus quadruplici ratione. Quarum prima sumpta est ex parte obiecti, quod est alimentum. Cum enim alimentum non nutriat nisi per substantiam, sicut dicitur in primo De generatione et corruptione, oportet quod substantia alimenti tangat id quod nutritur. Cum vero non nutriat nos nisi id ex quo sumus, oportet quod ipsum sit commixtum ex calido, frigido, humido et sicco, sicut et nos commixti sumus, sicut dicitur in secundo De generatione et corruptione. Cum ergo sic tangat per substantiam sine medio extrinseco et immutet per calidum, frigidum, humidum et siccum, quae sunt qualitates tangibiles, patet quod ex parte obiecti gustus quidam tactus est. Secunda ratio sumitur ex parte

share with touch the targeted activity of judging the 'object that defines the sense', of discriminating between the five different flavours of sweet, fat, sour, bitter, and salty.[23]

Framing these early reflections on taste as sense of alimentation and judgment of flavours, Albert's articulations remained solely within the horizon of the Aristotelian corpus. Albert explicitly anchored his considerations in philosophical principles and conclusions derived from Aristotle's *Ethica*, *De anima*, *De sensu et sensato*, *De animalibus*, *De generatione et corruptione*, and *Physica*. First and foremost, he promotes Aristotle's passing statement in the *Ethica* that 'taste is the judgment of flavour' to the distinguishing criterion of taste from touch; no other criterion served this purpose.[24] In his solution, Albert adduces Aristotle's repeated identification of taste as 'a certain touch' (*quidam tactus*) in the *De anima* and *De sensu et sensato*, though only as regards taste as a sense of alimentation. Stipulating the first reason for this partial identification of taste and touch, Albert relies on two principles from Aristotle's *De generatione et corruptione*: 'alimentation only nourishes through a substance', and taste requires the four elements of hot, cold, wet, and dry alike to be present in our body and in the alimentation. As the third reason for the partial identification, Albert employs Aristotle's insight, in the *Physica*, that 'the termini of these are identical in kind' to explain that the tongue, as one terminus, and the tasted object, as another, must physically touch one another in order to produce the sensation of taste.

The wide range of these borrowings from Aristotle's works was doubtlessly intended as much to display the young Albert's erudition (well before the Stagirite's corpus was officially read at Paris in 1255) as to demonstrate his remarkable

---

materiae, quae est medium gustabilium; hoc enim est humidum aqueum quod est insipidum, et cum hoc sit unum tangibilium, erit gustus secundum hoc quidam tactus. Tertia ratio sumitur ex parte modi gustandi: Non enim gustatur aliquid nisi habendo ultimum linguae coniunctum cum ultimo rei gustatae. Cum ergo illa se tangant, ut dicitur in V Physicorum, "quorum ultima sunt simul", patet quod ex modo gustandi gustus quidam tactus est. Quarta ratio est, quia gustus est tactus in quibusdam membris, sicut in lingua et palato; tactus autem est in omnibus membris corporis; et ideo dicitur quidam tactus quasi tactus particularis'.

23 Ibid., p. 243, vv. 40–49: 'Generatio vero saporis in specie ut a causa efficiente est, secundum quod a calido sufficienter digerente humidum generatur sapor dulcis; a calido autem digerente et subtiliante aqueum humidum in humidum aëreum generatur sapor pinguis; a calido vero non digerente sed adurente secundum aliquem modum, si est quidem cum humido, generatur acidum; et si est cum sicco, generatur amarum vel salsum, si minus adurat. Et secundum hanc generationem loquitur Aristoteles in libro De plantis'. Albert's teaching of the sense of taste covers many more aspects, but these are not our concern here. The five flavours are inspired by pseudo-Aristotle's *De plantis* and not by Avicenna's *Liber de anima* or *Canon*. See also Panarelli, 'Scientific Tasting'.

24 Aristotle, *Ethica Nicomachea*, III.12, 1118a26–1118b1, ed. Gauthier, trans. lincolniensis, p. 197, v. 28–p. 198, v. 4: 'Videntur utique et gustu in parum vel nihil uti. Gustus enim, est iudicium saporum; quod faciunt qui vina probant, et pulmenta condiunt. Non multum autem gaudent hiis, vel non, intemperati, sed usu, qui fit omnis per tactum et in cibis et potibus et venereis dictis. Propter quod et oravit Philoxenus Erixius, pulmentivorax existens, guttur ipsius longius gruis, fieri; ut delectatus, tactu'. See also Albertus Magnus, *Super Ethica*, III.13, ed. by Kübel, p. 208, vv. 13–39; Albertus Magnus, *Ethicorum libri X*, III.3.4, ed. by Borgnet, pp. 258a–259a.

mastery of the particular material. Only half of his borrowings come from contexts in which Aristotle focused on the subject matter of taste, and all of them are brought together to form a well-supported account of the proximity of the two senses on the basis of their shared relational and material properties.

None of Albert's early borrowings make explicit reference to direct or indirect experiences. Nor do they engage with ideas derived from parallel discussions on taste by Arabic-speaking scholars, despite the availability of these authors in Latin and Albert's familiarity with their works at the time.[25] Albert's initial demarcation of taste from touch pursues the goal of structuring explanations by way of relational, anatomical, and physiological criteria, and he mines Aristotle's corpus accordingly. By the time Albert composed his commentary on Aristotle's *De anima*, this simple and merely conceptual distinction of taste as a sense of alimentation and as judgment of flavours was no longer acceptable to him.

Albert's urge to seek a more careful theoretical demarcation of taste from touch, one that could account for alimentation as the special property of taste alone, emerged in his commentary on Aristotle's *De anima*, composed between 1254 and 1257. Considering the criteria by which to distinguish taste from the remaining four senses, he initially classified the object of taste as 'something tastable among the number of things that can be touched',[26] and subsequently turned to Aristotle's well-known distinction between internal and external media. Media played a significant role in both Aristotle's and Albert's theories of sensation, helping to explain how sense objects interact with the environment when they affect the senses. External media, such as air or water, were important in explaining how sense objects become capable of being seen, heard, or smelled. In contrast, the internal medium of 'the moist body of saliva in the mouth and on the tongue', as Albert calls the medium of taste, was important to establish how sense objects become tastable.[27] The definition of the medium of taste as a 'moist body' alone had the disadvantage of suggesting that taste is reducible to touch. For Albert, its material nature as a medium, as opposed to a spiritual or intentional nature, and its moist quality, as opposed to a dry quality, both implied that 'what is tastable is also tangible'.[28] Yet this reference to the moist quality prefigured Albert's theoretical solution to the difficulty, one that turned on a formal difference between taste and touch:

---

25 In *De homine*, Albert references Avicenna's *Liber de anima* as far as I have been able to establish 345 times and Averroes's *Long Commentary on the De anima* fifty-five times, counting the references that Anzulewicz and Söder list. See Albertus Magnus, *De homine*, ed. by Anzulewicz and Söder, pp. 609–10.

26 Albertus Magnus, *De anima*, II.3.27, ed. by Stroick, p. 137, vv. 85–86: '*gustabile quiddam est* de numero *tangibilium*'.

27 Ibid., p. 138, vv. 2–5: 'Est autem hoc corpus umor salivalis in ore et lingua. Cum enim gustabile sit tangibile, sicut *tactus non* potest *esse* per medium extrinsecum, ita neque gustus'.

28 Ibid., vv. 5–30.

> the moisture in the tastable object is material only, and the flavour in [the object] is the form acting on taste. And therefore, taste is not a part of touch, but a certain species of sensation, just as touch is. [...] moisture is the proper matter of flavour in which it [i.e., flavour] is diffused, and this is in accordance with its material being.[29]

The substructure of form-matter composition aided Albert in differentiating flavour, the active agent, from moisture, its material carrier, in their causality on the sense of taste. The application of this structure to the theme can already be found in Averroes's *Long Commentary on the De anima*: 'the body in which flavour exists is not tastable except insofar as that flavour exists in in a moisture whose relation to this flavour is as [the relation of] matter to form'.[30] But while Averroes anticipated Albert's commitment to a form-matter relationship between flavour and moisture in a tastable body, he did not draw the same conclusion as Albert. Albert suggested independently that only the material part in taste is tangible, whereas the formal part properly distinguishes taste from touch. In this way, he also departed from his earlier demarcation line, the conceptual distinction between taste as a sense of alimentation and as a sense of judgment of flavour, in favour of a realist distinction grounded in the object of taste itself and coupled to taste as a sense of alimentation.[31]

The new realist demarcation inspired by Averroes's insight was nonetheless capable of embracing Albert's previous identification of taste as a sense of judgment of flavour. As the active form of moisture and as that which is subject to change, Albert now suggested, this flavour of alimentation is likewise subject to the judgment of taste:

> But if someone might have wondered how, then, taste is distinguished from touch, it should be answered as before: that flavour in moisture touches according to actuality, yet inasmuch as it is moist, moisture nonetheless does not change taste inasmuch as it is taste, but rather, [it changes] the flavoured inasmuch as it is flavoured. Because of this, taste, in that it is taste, passes

---

29 Ibid., vv. 9–12 and 19–20: 'umidum in gustabili materiale tantum est, et sapor in eo est forma agens in gustum; et ideo non est pars tactus gustus, sed species quaedam sensus sicut et tactus [...] umidum est propria materia saporis, in qua diffunditur, et est secundum esse materiale ipsius'.

30 Averroes, *Commentarium magnum in Aristotelis De anima libros*, II.101, ed. by Crawford, p. 285, vv. 38–41 (trans. by Taylor and Druart, p. 220, considerably emended): 'Corpus enim in quo existit sapor non est gustabile nisi secundum quod ille sapor existit in eo in humore cuius proportio ad illum saporem est sicut materie ad formam'.

31 Equally important to Albert was the fit between the active form of flavour and the specific matter of moisture, a fit which qualified moisture as the only material carrier of flavour and thus distinguished it from all other material carriers of touchable nature. Flavour could be received by the sense of taste in or with the medium of moisture, and not from the medium, as Albert envisioned it for the more spiritual or intentional media of air and water that enabled sight, hearing, and smell.

> judgment upon flavour, and in this way is distinguished from touch, and is not a certain part of touch.[32]

The judgment that taste exerts over flavour as the active formal constituent of the tastable body here acquires an immediate connection to taste as alimentation. The two contexts which stood side by side in Albert's earlier *De homine* are now connected through the form-matter relation that Albert borrowed from Averroes. Together, they account for the demarcation of taste from touch.[33] Judgment of flavour remains a decisive aspect of distinguishing between taste and touch, but it does so within one encompassing teaching rather than two separate doctrinal aspects.

This embracive understanding of a realist distinction, writes Albert as a self-corrective, is also what 'the three authorities, Aristotle, Averroes, and Avicenna, agree upon'.[34] It seems to pose no problem that neither judgment of flavour, nor flavour as formal aspect of a tastable object, nor the combination of the two occurs in this form in the three authorities. At stake in Albert's final summary of his new realist demarcation is how explanation relates to experience, or in this case, how well the explanation just sketched accounts for the experience of any given flavour:

> And in this way, by saying so, it should be clear that taste has no extrinsic medium, but rather, just as colour is visible and properly acts on sight, so flavour is tastable and acts on taste per se. But it does not act and perfect the sense of flavour by taste without actual humidity, as we have said, just as it can be experienced [*experiri*] when something salty acts on taste. For it does not act without moisture because saltiness is well liquefied, and, touched by moisture, it is dissolved and liquefies on the tongue, and, mixed with that moisture in a corporeal way, it acts on taste, and not otherwise.[35]

---

32 Albertus Magnus, *De anima*, II.3.27, ed. by Stroick, p. 138, vv. 58–65: 'Si autem aliquis quaesiverit, qualiter ergo gustus dividitur a tactu, dicendum sicut prius, quoniam sapor in umido secundum actum tangit, tamen umidum, inquantum umidum, gustum, inquantum gustus est, non immutat, sed potius sapidum, inquantum est sapidum. Propter quod gustus, in eo quod gustus, iudicium saporis est et sic a tactu discernitur et non est pars quaedam tactus'.

33 Thomas Aquinas found a different way, possibly inspired by Avicenna's *Liber de anima*, II.4, where he repeatedly refers to *humor* (rather than the qualities) and its *commixtio* with the tongue to distinguish taste from touch. Thomas Aquinas, *Sentencia libri De anima*, II.21.4, ed. Leonina, p. 155, vv. 49–59: 'alio modo quantum ad obiectum; et sic oportet dicere quod, sicut se habet obiectum gustus ad obiectum tactus, ita se habet sensus gustus ad sensum tactus; manifestum est autem quod sapor, qui est obiectum gustus, non est aliqua de qualitatibus simplicium corporum ex quibus animal constituitur que sunt propria obiecta sensus tactus, set causatur ab eis et fundatur in aliqua earum sicut in materia, scilicet in humido; unde manifestum est quod gustus non est idem quod sensus tactus, set quodam modo radicatur in eo'.

34 Albertus Magnus, *De anima*, II.3.27, ed. by Stroick, p. 138, vv. 65–67: 'Et in hac sententia tres auctores concordant Aristoteles et Averroes et Avicenna'.

35 Ibid., p. 138, vv. 68–76: 'Et *sic* dicendo patet, quod gustus *nullum medium est* extrinsecum, *sed* tamen *sicut color* est *visibilis* et proprie agit in visum, *sic sapor* est *gustabilis et* per se agit in gustum, sed *non*

Albert introduces the experience of the action of the salty quality (saltiness) on taste as a pertinent example within the theoretical context of flavour as a formal agent that is tastable in itself if in moisture and moisture as a material medium that activates the formal agency of flavour. Saltiness, this application of the general teaching to the particular experience reveals, is the formal agent in moisture, which is the material medium. Saltiness acts on taste and, as such, elicits the judgment of taste, whereas moisture is just its carrier.

How saltiness is experienced as salty, and how this particular judgment is passed by taste upon the experience of saltiness, are the two epistemic moments that Albert can now explain together, and thus much better, by way of his new form-matter doctrine. Saltiness is not simply experienced as salty and judged to be such as salty alone, but is experienced as an active form dissolved in a material moisture, and on that basis is judged by way of its elemental commixture. Earlier in Albert's *De homine*, the judgment of taste upon any salty flavour had no explanatory roots in the formality of the object: this theoretical aspect was not bound up with taste as a sense of alimentation and its whole explanatory apparatus.

Albert's explicit appeal to *experiri* in this passage of his *De anima* — to the experiential value of the taste of salt — therefore carries tremendous epistemic weight. The example of saltiness as a transhistorical experience, that is, experience with evidentiary rather than authoritative value, formulated much in the manner of the example of sensation in teeth, enabled Albert to apply the general teaching to the particular experience. It helped him to establish and validate his new-found teaching as the best possible or most plausible explanation of the experience of saltiness. Whether this best possible explanation was grasped universally by Albert and extended to other particular flavours, and how exactly he reached the insight that this is the best possible explanation, remains, to the best of my knowledge, hidden in his own thoughts and never put down on parchment.

None of these facets — the experiential value of saltiness, the matching of the general to the particular, establishing and validating the new teaching in application, and that doctrine's ontological value for demarcating taste from touch — was on the radar of Albert's Greek and Arabic sources. Avicenna, unlike Aristotle and Averroes, did not even include saltiness among the eight specific flavours in his *Liber de anima* II.4, though he added a reference to it in his *Canon*.[36] Aristotle, along with Averroes (who remained particularly close to Aristotle's template), focused on the requirement of a moist inclination in the different

---

agit et *perficit sensum saporis* in gustu *sine umiditate* actuali, sicut diximus; *sicut* enim experiri potest, cum *salsum* agit in gustum; *illud enim* non agit sine umiditate, quia salsum *est bene liquidum* et tactum umido dissolvitur *et liquefacit linguam* et commixtum corporaliter illi umido agit in gustum, et non aliter'.

36 Avicenna, *Liber canonis*, II.1.3, ed. Venetiis, fol. 83va: 'Sapores autem sunt octo quos ipsi dicunt qui sunt vere sapores post insipidum. Et sunt dulcedo amaritudo acuitas salsedo acetositas ponticitas stipticitas et unctuositas'.

flavours. For both, the example of saltiness simply served as a prime example of such inclinations. They write:

> [Aristoteles Latinus:] In this way, however, there is no medium. But in whatever way colour is visible, in the same way, flavour is tastable. And nothing receives the sensation of flavour without moisture, but moisture in it is either in actuality or in potency. Take something salty, for instance: for it dissolves swiftly and with [moisture], it dissolves on the tongue.
>
> [Averroes Latinus:] That is, things only receive the sensation of flavour, which is called taste, if flavour is in moisture and if moisture is imbued with flavour either in act or in potency. Take something salty, for instance, which is in proximate potency to moisture, because it is dissolved swiftly and it dissolves moistures on the tongue. And therefore, nature has provided saliva in the mouth and she has provided glands in humans for gathering this moisture, so that dry things may be tasted by its facilitation. This is why we say that flavour is flavour in actuality only in a body that is moist in actuality.[37]

The case of saltiness, then, is yet another indication that Albert trusted his authorities, though only insofar as he could mine their insights to establish the truth on flavour that he himself advocated, improve its explanatory value in distinguishing it formally from touch, and emphasize the usefulness of experience as a transhistorical fact. This does not mean he followed his sources to the letter or adopted the epistemic value that they accorded to the example of saltiness. Rather, it means that his reference to the experience of saltiness, whoever its experiential subject may be, could pertinently explain why Albert's doctrine distinguished taste from touch on formal rather than material grounds, and thus on grounds theoretically superior to those of Aristotle, Avicenna, and Averroes together. For us, this example of saltiness might seem like an excellent candidate for a theory of verification. But it seems that Albert did not see its true or ultimate epistemic value in such an objective goal.

---

37 Aristotle, *De anima*, 422a15–422a19, as quoted in *Averroes, Commentarium magnum in Aristotelis De anima libros*, ed. by Crawford, p. 286, vv. 1–7 (trans. by Taylor and Druart, p. 221, considerably emended): 'Secundum autem hunc modum non est medium; sed quemadmodum color est visibile, sic sapor est gustabile. Et nichil recipit sensum saporis absque humiditate, sed in eo est in actu aut potentia humiditas; v. g. salsum; est enim velocis dissolutionis, et cum hoc dissolvit linguam'; Averroes, *Commentarium magnum in Aristotelis De anima libros*, II.102, ed. by Crawford, p. 286, vv. 14–22 (trans. by Taylor and Druart, p. 221, considerably emended): 'Idest, et nichil recipit sensum saporis, qui dicitur gustus, nisi sapor sit in humore, et humor est in saporoso aut in actu aut in potentia, v. g. salsum, quod est humidum in potentia propinqua, cum velociter dissolvitur et dissolvit humores qui sunt in lingua. Et ideo preparavit Natura salivam in ore, et preparavit brancos in homine ad congregandum istam humiditatem, ut ea mediante gustaretur sicca. Unde dicimus quod sapor non est sapor in actu nisi in corpore humido in actu'.

Mining the Sources for Cognitive Experience

Albert continually weighed the options of thought available to him at any given place and time, and on that basis decided the scientific truth of each matter. His criteria for determining that truth concerning any specific natural scientific teaching derived not from human authoritative or theological parameters, but from his own scientific and anthropological standards.[38] Authority was, as I have shown, instrumental to truth-making, but reworked in its arrangement and design so as to fit the scientific goal. The scientific and anthropological criteria that anchored Albert's truth-making in the specifics of natural scientific teachings were derived from elsewhere. Space does not permit a comprehensive discussion of this point, but there are two clues that attest to Albert's procedures.

In his initial considerations on sensation in his *De anima*, Albert composed one of his famous digressions, a self-standing insertion to fill scientific lacunae in Aristotle's work. Albert's digression on Book II focuses on the grades and modes of abstraction in *scientia*. He presents this with a clear cognitive purpose, one whose content is itself dependent on the science of the soul that he is in the midst of explicating:

> Before we speak of the sensible things one by one, it is necessary for us to speak of the sensible thing in general, because, as we have said, according to reason, objects are prior to acts and acts to powers. And because in the natural sciences [*in physicis*], theorizing of the common things is also prior with regard to us — since in these [sciences] common things are confused in the singulars and are prior with regard to us — we must speak, first of all, of the sensible thing in common. But for an easier understanding of those things of which we shall speak, we shall provide a brief chapter on the mode of apprehension that all apprehensive powers have. For this will be very useful for an easier knowledge of all that follows.[39]

In this introductory passage to a whole book section, as in many others of its kind, Albert unhesitatingly turns epistemic principles to cognitive purposes. The Aristotelian insight that human knowledge of common things is confused but prior with respect to us as human knowers found its application in the order of study for all future natural philosophers under his wing, an order that always proceeded from the common thing to its specific definition. Yet this movement could only occur once the different modes of abstraction available to humans

38 Krause and Anzulewicz, 'Albert the Great's *Interpretatio*'.

39 Albertus Magnus, *De anima*, II.3.4, ed. by Stroick, p. 101, vv. 50–61: 'Antequam nos loquamur de sensibilibus singulariter, oportet nos loqui de sensibili generaliter, quia, sicut diximus, obiecta sunt priora actibus et actus potentiis secundum rationem. Et quia de communibus etiam quoad nos prior est speculatio in physicis, eo quod in illis communia confusa sunt in singularibus et priora quoad nos: debemus primo loqui de sensibili in communi. Sed ad faciliorem intellectum eorum quae dicturi sumus, faciemus capitulum breve de modo apprehensionis potentiarum apprehensivarum omnium; hoc enim perutile erit ad omnium sequentium notitiam faciliorem'.

were known to the students of the science of the soul and potentially experienced, practised, and exercised by them in their acquisition and mastery of *scientia*.

For Albert, then, sensation, imagination, estimation, cogitation, and understanding were not just distinct grades of apprehension, but grades that he assigned to order his science of the soul: it was 'by these grades of abstraction and separation [that] the powers of apprehension will be distinguished below'.[40] Principles determined in the science of the soul found their immediate application in its explanations; their truth, in other words, was validated not just in the theories of the science, but in its practices, in its very formulation and articulation through the cognitive processes he had just described. The habit of *scientia*, the practices of hearing, seeing, commenting, studying, analysing, weighing, and reworking ideas and arguments enabled Albert to shape and determine these scientific truths. Conversely, these practices were themselves informed by the doctrines he established; they entered into a feedback loop of a cognitive *scientia*.

It was these scientific and anthropological criteria of truth that, as principles and grounding standards, determined Albert's choices regarding his use of sources, their usefulness, their *locus*, their shape, and their meaning in Albert's work. But they also fixed these sources within Albert's overarching scientific teleology. His practice of science in general, but also in its particulars, was governed by his goals of comprehensiveness, expressed in specific definitional knowledge of all things natural,[41] and pursued for the sake of leading the listener's intellect to its *telos* of perfect knowledge and completion:

> We must investigate the natures of any given sentient being and know that there is a certain noble natural and divine cause in all of them, because none of them was brought into being naturally in vain or without purpose. Rather, whatever, however many, and however much they proceed from the work of nature, they will only be because of that which is the end. And everything that was, is, and will be, was not, is not, and will not be except because of something that is its completion, and because of this, it has a place among things natural, and a wondrous and noble rank. If, therefore, someone should hold the opinion that the cognition of some of these things is base, they had better blame themselves, because their affective cognition is base and corrupt, because they themselves do not take into account the things out of which the human being is composed without the deformity of affection, as when they

40 Ibid., p. 102, vv. 25–27: 'Secundum autem hos gradus abstractionis sive separationis distinguentur inferius vires apprehensivae'.

41 Albertus Magnus, *De animalibus*, XI.1.3, ed. by Stadler, vol. 1, p. 773, v. 34–p. 774, v. 2: 'naturalis debet diffiniendo in scientia animalium dicere et docere de dispositione animae et partium eius quanto magis poterit, quia anima principium est animalium, sicut in libro primo de Anima diximus: et debet narrare assignando dispositionem cuiuslibet animae et dispositionem cuiuslibet modi in partibus animae et diffinire, quid sit animal, et ostendere utrum sit anima pars animalis aut non: et deinde narrare debet accidentia quae accidunt animali et substantiae animae, quae est talis aut talis'.

> cogitate flesh, bone, blood, vein, and similar things. For it is these accidents of their souls that are base, but not the cognition itself.[42]

Explaining sensation in teeth, and doing so by appealing to experience in its evidentiary value without attention to a historical subject that guaranteed its authority, added one universal truth to the comprehensive scientific knowledge of sentient beings, and consequently to the listener's intellectual growth, the ultimate epistemic value that Albert always kept in mind. The study of particular and ignoble matters — such as the body of sentient beings, its members, and their causes — was worth everyone's time, because of the noble and divine teleology inscribed both in these matters and, equally, in the knowing subjects.

Albert's intellectual practices of mining his Arabic natural philosophical sources were thus pursued with the *telos* of gaining the truth, which he saw expressed in definitional knowledge and wished to acquire for the sake of intellectual perfection. The two cases I have presented, the transhistorization of empirical evidence and independent teaching as the best possible explanation of the particular experience of saltiness, were subject to just these epistemic ultimates.

To conclude, Albert's efforts to mine his sources were rooted in the conviction of a shared nature, shared activities, and shared teleology among all capable humans, but particularly among those who had already embarked on the study of the *scientiae naturales* and of the corpus of his philosophy as a whole. They each held *within* them the truth of science, which came about through scientific practices that explicitly included what I have explored here: a kind of 'cognitive empiricism'.[43] Surprisingly for the modern reader, this scientific truth amounted to a universal truth.

All this is reason enough to say that Albert the Great challenges our conventional understanding of empiricism and science. I have tried to show that in order to understand his *experientia*, we must adopt a much broader, more inclusive perspective that values experience as integral to a trained human cognition, which

---

42 Ibid., XI.2.3, p. 794, vv. 6–20: 'debemus inquirere naturas cuiuslibet animalis et scire quod in omnibus animalibus quaedam est causa naturalis nobilis et divina, eo quod nullum omnino naturalium fuit naturatum casualiter aut otiose sive frusta, sed quaecumque et quotcumque et quantumcumque procedunt de opere naturae, non erunt nisi propter hoc quod est finis: et omne quod fuit, est et erit, non fuit neque est neque erit, nisi propter aliquid quod est complementum et propter hoc habet locum in naturalibus et ordinem mirabilem et nobilem. Si ergo aliquis opinetur cognitionem aliquorum ignobilem esse, culpet seipsum potius, eo quod sua affectiva cognitio ignobilis est et vitiosa, eo quod ipse non concipit res ex quibus homo componitur sine turpitudine affectus, sicut quando cogitat carnem et os et sanguinem et venam et hiis similia: accidentia enim animae suae sunt vilia, et non cognitio ipsa'.

43 As this chapter will already have made clear, I do not follow the narrow definition of cognitive empiricism found in Dawes, 'Ancient and Medieval Empiricism', but apply a much broader understanding of scientific practices in which Albert also labelled certain kinds of cognition as empirical.

in turn is expressed in his scientific practices of defining and explaining. Such a perspective not only enriches our understanding of premodern scientific practices, but also invites us to reconsider the epistemic value we place on different forms of scientific experience.

Works Cited

Primary Sources

Albertus Magnus, *Commentarii in II Sententiarum*, ed. by Auguste Borgnet, Editio Parisiensis, 27 (Paris: Vivès, 1893)

———, *De anima*, ed. by Clemens Stroick, Editio Coloniensis, 7/1 (Münster: Aschendorff, 1968)

———, *De animalibus libri XXVI. Nach der Cölner Urschrift*, ed. by Hermann Stadler, 2 vols, Beiträge zur Geschichte der Philosophie des Mittelalters, 15–16 (Münster: Aschendorff, 1916–20)

———, *De homine*, ed. by Henryk Anzulewicz and Joachim R. Söder, Editio Coloniensis, 27/2 (Münster: Aschendorff, 2008)

———, *De somno et vigilia*, ed. by Auguste Borgnet, Editio Parisiensis, 9 (Paris: Vivès, 1890)

———, *Ethicorum lib. X*, ed. by Auguste Borgnet, Editio Parisiensis, 7 (Paris: Vivès, 1891)

———, *Metaphysica, libri I–V*, ed. by Bernhard Geyer, Editio Coloniensis, 16/1 (Münster: Aschendorff, 1960)

———, *Physica, libri I–IV*, ed. by Paul Hossfeld, Editio Coloniensis, 4/1 (Münster: Aschendorff, 1987)

———, *Quaestiones super libri De animalibus*, ed. by Ephrem Filthaut, Editio Coloniensis, 12 (Münster: Aschendorff, 1955)

———, *Super Ethica, libri I–V*, ed. by Wilhelm Kübel, Editio Coloniensis, 14/1 (Münster: Aschendorff, 1968–72)

———, *Super I librum Sententiarum, distinctiones 1–3*, ed. by Maria Burger, Editio Coloniensis, 29/1 (Münster: Aschendorff, 2015)

Aristotle, *Ethica Nicomachea*, ed. by René Antoine Gauthier, Aristoteles Latinus, 26/1–3 (Leiden: Brill, 1974)

Averroes, *Commentarium magnum in Aristotelis De anima libros*, ed. by F. Stuart Crawford, Corpus Commentariorum Averrois in Aristotelem, 6/1 (Cambridge, MA: The Mediaeval Academy of America, 1953)

———, *Long Commentary on the 'De Anima' of Aristotle*, trans. with an introduction and notes by Richard C. Taylor, with Thérèse-Anne Druart (New Haven, CT: Yale University Press, 2009)

Avicenna, *Liber canonis* (Venice, 1507; repr. Hildesheim: Olms, 2003)

Claudius Galenus, *Claudii Galeni opera omnia*, ed. by Carl Gottlieb Kühn, 2 vols (Leipzig: Knobloch, 1821)

Thomas Aquinas, *Sentencia libri De anima*, ed. by Commissio Leonina, Sancti Thomae de Aquino Opera omnia, 45/1 (Rome: Commissio Leonina, 1984)

Secondary Works

Anzulewicz, Henryk, 'Die Denkstruktur des Albertus Magnus: Ihre Dekodierung und ihre Relevanz für die Begrifflichkeit und Terminologie', in *L'élaboration du vocabulaire philosophique au Moyen Âge*, ed. by Jacqueline Hamesse and Carlos Steel (Turnhout: Brepols, 2000), pp. 369–96

———, 'Die Emanationslehre des Albertus Magnus: Genese, Gestalt und Bedeutung', in *Via Alberti: Texte – Quellen – Interpretationen*, ed. by Ludger Honnefelder, Hannes Möhle, and Susana Bullido del Barrio (Münster: Aschendorff, 2009), pp. 219–42

———, 'Hervorgang – Verwirklichung – Rückkehr: Eine neuplatonische Struktur im Denken Alberts des Großen und Dietrichs von Freiberg', in *Die Gedankenwelt Dietrichs von Freiberg im Kontext seiner Zeitgenossen*, ed. by Karl-Hermann Kandler, Burkhard Mojsisch, and Norman Pohl (Freiberg: Technische Universität Bergakademie Freiberg, 2013), pp. 229–44

———, '*Memoria* und *reminiscentia* bei Albertus Magnus', in *La mémoire du temps au Moyen Âge*, ed. by Agostino Paravicini Bagliani (Florence: SISMEL, Edizioni del Galluzzo, 2005), pp. 163–200

———, 'Psychophysiology, Natural Spaces and Climata: Albert the Great on the Natural Preconditions of Epistemic Abilities in Humans', forthcoming

———, '*Solus homo est nexus Dei et mundi*: Albertus Magnus über den Menschen', in *Multifariam: Homenaje a los profesores Annelies Meis, Antonio Bentué y Sergio Silva*, ed. by Samuel Fernández Fernández, Juan Noemi, and Sergio Silva (Santiago de Chile: Pontificia Universidad Católica de Chile, 2010), pp. 321–35

———, 'The Systematic Theology of Albert the Great', in *A Companion to Albert the Great*, ed. by Irven M. Resnick (Leiden: Brill, 2013), pp. 15–67

———, 'Zum anthropologischen Verständnis der *Perfectio* bei Albertus Magnus', *Documenti e studi sulla tradizione filosofica medievale*, 30 (2019), 339–69

———, 'Zwischen Faszination und Ablehnung: Theologie und Philosophie im 13. Jh. in ihrem Verhältnis zueinander', in *What Is 'Theology' in the Middle Ages?*, ed. by Mikołaj Olszewski (Münster: Aschendorff, 2007), pp. 129–56

———, and Caterina Rigo, '*Reductio ad esse divinum*: Zur Vollendung des Menschen nach Albertus Magnus', in *Ende und Vollendung: Eschatologische Perspektiven im Mittelalter*, ed. by Jan Aertsen and Martin Pickavé (Berlin: De Gruyter, 2002), pp. 388–416

Asúa, Miguel de, 'Albert the Great and the *Controversia inter Medicos et Philosophos*', *Proceedings of the PMR Conference*, 19/20 (1994–96), 143–56

———, 'El Comentario de Pedro Hispano sobre el *De animalibus*: Transcripcion de las *Quaestiones* sobre la controversia entre medicos y filosofos', *Patristica et Mediaevalia*, 16 (1995), 45–66

———, 'The Organization of Discourse on Animals in the Thirteenth Century: Peter of Spain, Albert the Great, and the Commentaries on *De animalibus*' (unpublished doctoral dissertation, University of Notre Dame, 1991)

———, 'Peter of Spain, Albert the Great and the *Quaestiones De animalibus*', *Physis: Rivista internazionale di storia della scienza*, 34 (1997), 1–30

Bertolacci, Amos, 'Albert's Use of Avicenna and Islamic Philosophy', in *A Companion to Albert the Great*, ed. by Irven M. Resnick (Leiden: Brill, 2013), pp. 601–11

———, 'Albert the Great and the Preface of Avicenna's *Kitab al-Sifa*', in *Avicenna and His Heritage*, ed. by Jules Janssens and Daniel de Smedt (Leuven: Leuven University Press, 2002), pp. 131–52

———, '"Averroes ubique Avicennam persequitur": Albert the Great's Approach to the Physics of the *Šifā'* in the Light of Averroes' Criticisms', in *The Arabic, Hebrew and Latin Reception of Avicenna's Physics and Cosmology*, ed. by Dag Nikolaus Hasse and Amos Bertolacci (Berlin: De Gruyter, 2018), pp. 397–431

———, 'Avicenna's and Averroes's Interpretations and Their Influence in Albertus Magnus', in *A Companion to the Latin Medieval Commentaries on Aristotle's Metaphysics*, ed. by Fabrizio Amerini and Gabriele Galluzzo (Leiden: Brill, 2014), pp. 95–135

———, 'Le citazioni implicite testuali della *Philosophia prima* di Avicenna nel Commento alla *Metafisica* di Alberto Magno: analisi tipologica', *Documenti e studi sulla tradizione filosofica medievale*, 12 (2001), 179–274

———, 'A New Phase of the Reception of Aristotle in the Latin West: Albertus Magnus and His Use of Arabic Sources in the Commentaries on Aristotle', in *Albertus Magnus und der Ursprung der Universitätsidee: Die Begegnung der Wissenschaftskulturen im 13. Jahrhundert und die Entdeckung des Konzepts der Bildung durch Wissenschaft*, ed. by Ludger Honnefelder (Berlin: Berlin University Press, 2011), pp. 259–76 and 491–500

———, 'The Reception of Avicenna's *Philosophia Prima* in Albert the Great's Commentary on the *Metaphysics*: The Case of the Doctrine of Unity', in *Albertus Magnus: Zum Gedenken nach 800 Jahren*, ed. by Walter Senner (Berlin: Akademie-Verlag, 2001), pp. 67–78

———, '"Subtilius speculando": Le citazioni della *Philosophia prima* di Avicenna nel Commento alla *Metafisica* di Alberto Magno', *Documenti e studi sulla tradizione filosofica medievale*, 9 (1998), 261–339

Burger, Maria, 'Albertus Magnus Theologie als Wissenschaft unter der Herausforderung aristotelisch-arabischer Wissenschaftstheorie', in *Albertus Magnus und der Ursprung der Universitätsidee: Die Begegnung der Wissenschaftskulturen im 13. Jahrhundert und die Entdeckung des Konzepts der Bildung durch Wissenschaft*, ed. by Ludger Honnefelder (Berlin: Berlin University Press, 2011), pp. 97–114

Cadden, Joan, 'Albertus Magnus' Universal Physiology: The Example of Nutrition', in *Albertus Magnus and the Sciences: Commemorative Essays 1980*, ed. by James A. Weisheipl (Toronto: Pontifical Institute of Mediaeval Studies, 1980), pp. 321–39

Caminada, Niccolò, 'A Latin Translation? The Reception of Avicenna in Albert the Great's *De praedicamentis*', *Documenti e studi sulla tradizione filosofica medievale*, 28 (2017), 71–104

Daston, Lorraine, 'Scientific Error and the Ethos of Belief', *Social Research* 72 (2005), 1–28

———, 'Taking Note(s)', *Isis*, 95 (2004), 443–48

Dawes, Gregory W., 'Ancient and Medieval Empiricism', *The Stanford Encyclopedia of Philosophy* (Summer 2023 Edition), ed. by Edward N. Zalta and Uri Nodelman, https://plato.stanford.edu/archives/sum2023/entries/empiricism-ancient-medieval/

Demaitre, Luke, and Anthony A. Travil, 'Human Embryology and Development in the Works of Albertus Magnus', in *Albertus Magnus and the Sciences: Commemorative Essays 1980*, ed. by James A. Weisheipl (Toronto: Pontifical Institute of Mediaeval Studies, 1980), pp. 405–40

Dold, Dominic Nicolas, 'What is Zoology About? The Philosophical Foundations of Albert the Great's Science of Animals' (unpublished doctoral dissertation, Technische Universität Berlin, 2023)

Donati, Silvia, 'Alberts des Großen Konzept der *scientiae naturales*: Zur Konstitution einer peripatetischen Enzyklopädie der Naturwissenschaften', in *Albertus Magnus und der Ursprung der Universitätsidee: Die Begegnung der Wissenschaftskulturen im 13. Jahrhundert und die Entdeckung des Konzepts der Bildung durch Wissenschaft*, ed. by Ludger Honnefelder (Berlin: Berlin University Press, 2011), pp. 354–81

———, 'Is Celestial Motion a Natural Motion? Averroes' Position and Its Reception in the Thirteenth- and Early Fourteenth-Century Commentary Tradition of the Physics', in *Averroes' Natural Philosophy and Its Reception in the Latin West*, ed. by Paul J. J. M. Bakker (Leuven: Leuven University Press, 2015), pp. 89–126

Endress, Gerhard, *Der arabische Aristoteles und sein Leser: Physik und Theologie im Weltbild Alberts des Großen* (Münster: Aschendorff, 2004)

Gerhardt, Mia I., 'Zoologie médiévale: préoccupations et procédés', in *Methoden in Wissenschaft und Kunst des Mittelalters*, ed. by Albert Zimmermann and Rudolf Hoffmann (Berlin: De Gruyter, 1970), pp. 231–48

Hasse, Dag Nikolaus, 'Avicenna's "Giver of Forms" in Latin Philosophy, Especially in the Works of Albertus Magnus', in *The Arabic, Hebrew and Latin Reception of Avicenna's Metaphysics*, ed. by Dag Nikolaus Hasse and Amos Bertolacci (Berlin: De Gruyter, 2012), pp. 225–49

———, 'The Early Albertus Magnus and His Arabic Sources on the Theology of the Soul', *Vivarium*, 46 (2008), 232–52

———, 'Der mutmaßliche arabische Einfluss auf die literarische Form der Universitätsliteratur des 13. Jahrhunderts', in *Albertus Magnus und der Ursprung der Universitätsidee: Die Begegnung der Wissenschaftskulturen im 13. Jahrhundert und die Entdeckung des Konzepts der Bildung durch Wissenschaft*, ed. by Ludger Honnefelder (Berlin: Berlin University Press, 2011), pp. 241–58

Hossfeld, Paul, *Albertus Magnus als Naturphilosoph und Naturwissenschaftler* (Bonn: Albertus-Magnus-Institut, 1983)

Hünemörder, Christian, 'Die Zoologie des Albertus Magnus', in *Albertus Magnus Doctor Universalis 1280/1980*, ed. by Gerbert Meyer and Albert Zimmermann (Mainz: Grünewald, 1980), pp. 235–48

Jacquart, Danielle, 'La place d'Isaac Israeli dans la médecine médiévale', *Vesalius*, 4 (1998), 19–27

Killermann, Sebastian, 'Die somatische Anthropologie bei Albertus Magnus', *Angelicum*, 21 (1944), 224–69

Kopp, Paul, 'Psychiatrisches bei Albertus Magnus', *Zeitschrift für die gesamte Neurologie und Psychiatrie*, 147 (1993), 50–60

Krause, Katja, and Henryk Anzulewicz, 'Albert the Great's *Interpretatio*: Converting Libraries into a Scientific System', in *Premodern Translation: Comparative Approaches to Cross-Cultural Transformations*, ed. by Sonja Brentjes and Alexander Fidora (Turnhout: Brepols, 2021), pp. 89–132

———, with Maria Auxent and Dror Weil, 'Introduction: Making Sense of Nature in the Premodern World', in *Premodern Experience of the Natural World in Translation*, ed. by Katja Krause, Maria Auxent, and Dror Weil (New York: Routledge, 2022), pp. 7–19

Lizzini, Olga, 'Flusso, preparazione appropriata e *inchoatio formae*: brevi osservazioni su Avicenna e Alberto Magno', in *Medioevo e filosofia: Per Alfonso Maierú*, ed. by Massimiliano Lenzi, Cesare A. Musatti, and Luisa Valente (Rome: Viella, 2013), pp. 129–50

López-Farjeat, Luis, 'Albert the Great between Avempace and Averroes on the Knowledge of Seperate Forms', *Proceedings of the American Catholic Philosophical Association*, 86 (2013), 89–102

Müller, Jörn, 'Der Einfluss der arabischen Intellektspekulation auf die Ethik des Albertus Magnus', in *Wissen über Grenzen*, ed. by Andreas Speer and Lydia Wegener (Berlin: De Gruyter, 2006), pp. 545–68

Navarro-Sanchez, Francisca, *Peter of Spain, 'Questiones super libro De Animalibus Aristoteles': Critical Edition with Introduction* (London: Routledge, 2016)

Panarelli, Marilena, 'Scientific Tasting: Flavors in the Investigation of Plants and Medicines from Aristotle to Albert the Great', in *Premodern Experience of the Natural World in Translation*, ed. by Katja Krause, Maria Auxent, and Dror Weil (New York: Routledge, 2022), pp. 74–89

Pelster, F., 'Die beiden ersten Kapitel der Erklärung Alberts des Großen zu *De animalibus* in ihrer ursprünglichen Fassung', *Scholastik*, 10 (1935), 229–40

Pouchet, Félix A., *Histoire des sciences naturelles au Moyen Âge: ou Albert le Grand et son époque considérés comme point de depart de l'école expérimentale* (Paris: J. B. Baillière, 1853)

Schipperges, Heinrich, 'Das medizinische Denken bei Albertus Magnus', in *Albertus Magnus, Doctor universalis: 1280/1980*, ed. by Gerbert Meyer and Albert Zimmermann (Mainz: Grünewald, 1980), pp. 279–94

———, 'Eine *summa medicinae* bei Albertus Magnus', *Jahres- und Tagungsberichte der Görresgesellschaft 1981* (1981), 5–24

Schwartz, Yossef, 'Celestial Motion, Immaterial Causality and the Latin Encounter with Arabic Aristotelian Cosmology', in *Albertus Magnus und der Ursprung der Universitätsidee: Die Begegnung der Wissenschaftskulturen im 13. Jahrhundert und die Entdeckung des Konzepts der Bildung durch Wissenschaft*, ed. by Ludger Honnefelder (Berlin: Berlin University Press, 2011), pp. 277–98

———, 'Divine Space and the Space of the Divine: On the Scholastic Rejection of Arab Cosmology', in *Représentations et conceptions de l'espace dans la culture médiévale / Repräsentationsformen und Konzeptionen des Raums in der Kultur des Mittelalters*, ed. by Tiziana Suarez-Nani and Martin Rohde (Berlin: De Gruyter, 2011), pp. 89–119

Shaw, James Rochester, 'Scientific Empiricism in the Middle Ages: Albertus Magnus on Sexual Anatomy and Physiology', *Clio medica*, 10 (1975), 53–64

Siraisi, Nancy G., 'The Medical Learning of Albertus Magnus', in *Albertus Magnus and the Sciences: Commemorative Essays 1980*, ed. by James A. Weisheipl (Toronto: Pontifical Institute of Mediaeval Studies, 1980), pp. 379–404

Tellkamp, Jörg Alejandro, 'Why Does Albert the Great Criticize Averroes' Theory of the Possible Intellect?', in *Via Alberti: Texte – Quellen – Interpretationen*, ed. by Ludger Honnefelder, Hannes Möhle, and Susana Bullido del Barrio (Münster: Aschendorff, 2009), pp. 61–78

Theiss, Peter, *Die Wahrnehmungspsychologie und Sinnesphysiologie des Albertus Magnus: Ein Modell der Sinnes- und Hirnfunktion aus der Zeit des Mittelalters* (Frankfurt: Lang, 1993)

Wéber, Édouard-Henri, 'Un thème de la philosophie arabe interpreté par Albert le Grand', in *Albertus Magnus: Zum Gedenken nach 800 Jahren*, ed. by Walter Senner (Berlin: Akademie-Verlag, 2001), pp. 79–90

Wingate, S. D., *The Mediaeval Latin Versions of the Aristotelian Scientific Corpus, with Special Reference to the Biological Works* (London: The Courier Press, 1931)

Zaunick, R., 'Albertus Magnus, der Prerenaissance-Zoologe', *Ostdeutsche Naturwart*, 2 (1924), 124–28