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THE JOY OF REPETITION. THE PROBLEM OF THE COMPOSITION OF BODIES IN FOUR SCHOLASTIC COMMENTARIES ON *DE GENERATIONE*

After the introduction of Aristotle's works into the of natural philosophy curriculum of the 13th c. universities, the problem of the composition of sublunary bodies became a question discussed again and again by generations of teachers and students. It became one of the most popular issues in the commentaries on *De generatione et corruptione*.¹ The heart of the problem is the question of whether the mixing of the elements results in their destruction and, if not, what might be the form in which they are preserved.

When presenting the problem Aristotle stated that in a composite body elements do not exist actually, for that would mean that the body is only an aggregate of elements, no matter whether their particles are finitely or infinitely small,² but they are not destroyed either, because they can be separated when the body itself is destroyed. This means that they must exist potentially. Such potentiality is related to the primary qualities that constitute elements and those qualities are contrary to one another in two ways: either in the absolute sense (*opposita*), or in a way which allows them to be transformed into one another (*contraria*).³

Aristotle's solution was far from definitive: first of all, it did not provide a sufficient explanation of the status of elements in potency. Secondly the distinction between the two types of opposition in primary qualities suggested that there

¹ On the 'digression' from the *De generatione et corruptione* paraphrasis of Albert the Great and later medieval discussions on the issue, see S. Caroti, *Note sulla parafrasi del 'De generatione et corruptione' di Alberto Magno*, in: F. CHENEVAL, R. IMBACH, T. RICKLIN (eds), *Albert le Grand et sa réception au moyen âge. Hommage à Zénon Kaluza*, Fribourg 1998, p. 6–11.

² Cf. ARISTOTELES, *De generatione et corruptione*, 327b 31 – 328a 18.

³ Cf. *Ibidem*, 334b 10–30; cf. also N. KRETZMANN, *Continuity, Contrariety, Contradiction and Change*, w: Idem (ed.), *Infinity and Continuity in Ancient and Medieval Thought*, Ithaca and London 1982, p. 270–272.

are two types of change: instantaneous — substantial and successive — qualitative. This encouraged later interpreters to put forward their own readings of this vague passage.⁴ Proclus and Simplicius divided the problem into two parts, separately analyzing the status of elementary forms and primary qualities in a generated composite. In their opinions — and contrary to Aristotle — forms of elements must exist actually in the composite, otherwise their later separation would be impossible. The composite is, consequently, an aggregate of elementary particles⁵. The situation is different with primary qualities: since qualities in various elements are opposite, they cannot coexist in the highest degree, and thus they are conserved in a remiss degree of actuality. The solution of Proclus and Simplicius was adopted by Avicenna, whose understanding of Aristotle was strongly influenced by neo-Platonism.⁶ Avicenna's position, however, was unacceptable for Averroes, who thought it to be a deformation of the teaching of Aristotle. He preferred the solution presented by Alexander of Aphrodisias, according to which forms of elements in a real composite have a different character from the forms of elements in aggregates. *Mixtio* is a special kind of change that is intermediary between generation and alteration, in which both elementary forms and primary qualities lose the perfection that they had in act and persist in a remiss degree.⁷ This means that, contrary to Aristotle, not only qualities but also elementary forms can assume various degrees of intensity.⁸

⁴Cf. F.A.J. DE HAAS, *Mixture in Philoponus*, w: J.M.M.H. THIJSSSEN, H.A.G. BRAAKHUIS (eds), *The Commentary Tradition on Aristotle's 'De generatione et corruptione'*. "Studia Aritistarum. Etudes sur la Faculté des Arts dans les Universités médiévales," 7, Paris – La Haye 1997, p. 21–30.

⁵Cf. F.A.J. DE HAAS, *Op. cit.*, p. 40–44.

⁶Cf. *Ibidem*, p. 45.

⁷Cf. *Ibidem*, p. 38–40.

⁸Cf. THOMAS DE AQUINO, *Summa Theologiae (Traktat o człowieku)*, ed. and transl. S. Swieżawski, Kęty 1998), I, 76, 4, ad 4, p. 122–124: "Dicendum quod Avicenna posuit formas substantiales elementorum integras remanere in mixto: mixtionem autem fieri secundum quod contrariae qualitates elementorum reducuntur ad medium. Sed hoc est impossibile, quia diversae formae elementorum non possunt esse nisi in diversis partibus materiae. Ad quarum diversitatem oportet intelligi dimensiones, sine quibus materia divisibilis esse non potest. Materia autem dimensionibus subiecta non invenitur nisi in corpore. Diversa autem corpora non possunt esse in eodem loco. Unde sequitur quod elementa sint in mixto distincta secundum situm. Et ita non erit vera mixtio, quae est secundum totum, sed mixtio ad sensum, quae est secundum minima iuxta se posita. Averroes autem posuit, in 3 *De caelo*, quod formae elementorum, propter sui imperfectionem, sunt mediae inter formas accidentales et substantiales; et ideo recipiunt magis et minus; et ideo remittuntur in mixtione et ad medium reducuntur, et conflatur ex eis una forma. Sed hoc est etiam magis impossibile. Nam esse substantiale cuiuslibet rei in indivisibili consistit; et omnis additio et subtractio variat speciem, sicut in numeris, ut dicitur in 8 *Metaphysicae*. Unde impossibile est quod forma substantialis quaecumque recipiat magis et minus. Nec minus est impossibile aliquid esse medium inter substantiam et accidens."

The Latin masters, who started discussing the problem of *mixtio* after the translation of *De generatione* at the turn of the 13th c., knew the opinions of both Avicenna and Averroes. Somewhat surprisingly, they considered neither to be satisfactory.⁹ Instead, it was the solution of a late Ancient Greek commentator of Aristotle, John Philoponus, that succeeded in convincing Aquinas and many other philosophers after him. For Philoponus, elements which are components of the *mixtum* are in potency in such a way that they can become actualized again not as the same individual forms but only as specific ones, which means that only their essences are preserved in potency, while their contingent individual forms perish in the process of mixing with other elementary forms. This is because the forms of elements possess primary qualities in the highest degrees of intensity, which are incompatible with one another. In distinction to elementary forms, for which destruction of the most intense degree of a quality is tantamount to their substantial and irreversible destruction, primary qualities can undergo reduction of their intensity, but for them this is an alteration that can be reversed when elements are separated again. Such alterations were discussed under the general name of *latitudo formarum*.¹⁰ In writing about the existence of elementary forms in a composite, Aquinas introduced a new technical term to describe their status: forms of elements are virtually (*virtute*) contained in the composite.¹¹

An entirely original solution was presented only at the turn of the 14th century by John Duns Scotus, a thinker who often dared to oppose the *communis opinio doctorum*. Even though he agrees with Aquinas that the forms of elements are virtually present in the composite, Scotus opposes Aquinas's idea that primary qualities are merely debilitated in the creation of a *mixtum*. In his opinion, both elementary forms and primary qualities are destroyed in such a case. What appears in their place is a new substance with new qualities, which only somewhat resemble the original forms and qualities.¹² This resemblance results from a kind of mediation between the opposing components thanks to the

⁹ Some Latin masters, not all of them Latin Averroists, accepted these solutions (and not all Latin Averroists accepted Averroes's solution, as can be seen below). For instance, Scotus's pupil, Antonius Andreae favored Averroes over his teacher on this issue. Cf. A. MAIER, *Die 'moderne' Richtung*, in: *An der Grenze von Scholastik und Naturwissenschaft*, Roma 1952, p. 108–109, and M. GENSLER, *Antonius Andreae's 'De tribus principiis naturae. The Spanish handbook of Scotism, "Anuari de la Societat Catalana de Filosofia," VIII (1996), p. 75–76.*

¹⁰ Cf. F.A.J. DE HAAS, *Op. cit.*, p. 31–37.

¹¹ Cf. THOMAS DE AQUINO, *Op. cit.*, p. 124: "Dicendum est, secundum Philosophum in 1 *De generatione*, quod formae elementorum manent in mixto non actu sed virtute. Manent enim qualitates propriae elementorum, licet remissae, in quibus est virtus formarum elementarium. Et huiusmodi qualitas mixtionis est propria dispositio ad formam substantialem corporis mixti, puta formam lapidis vel animae cuiuscumque."

¹² Cf. F.A.J. DE HAAS, *Op. cit.*, p. 22.

natural convenience (*naturalis convenientia*) characteristic of every composite body which enables it to endure for a period of time.¹³

The solutions of Aquinas and Scotus, though popular, were by no means the only ones proposed by scholastics. In fact, almost every author who commented on *De generatione* tried to address this problem. Out of the long list of masters who discussed the question of whether elements remain in the *mixtum*, four scholars, all of whom taught in Paris (although one composed his *De generatione* commentary in Oxford), are particularly worthy of our attention. They shall serve here as study cases. We have selected two representatives of the *via antiqua*, Giles of Orleans and Walter Burley, and two modernists, John Buridan and Nicolas of Oresme. They represent, roughly, three generations, from the last quarter of the 13th century, which is approximately the time of Scotus, to the end of the second quarter of the 14th century, when the Plague arrested the development of philosophy. An analysis of their opinions of this issue can provide insight into the way it was treated over this important period.

Giles of Orleans is the oldest of the four scholars. His questions to *De generatione et corruptione*, discussed in Paris during his regency, are preserved in two versions, which is a clear sign that he was interested in the problem of change. In both versions, he discussed the question *Utrum elementa secundum suas formas substantiales remanent in mixto* and, moreover, he considerably expanded the revised version.¹⁴ As becomes a Latin Averroist Giles presents Avicenna's opinion only so that he can quote Averroes' critique of it. Giles states that the changes undergone by the elements involve their active and passive qualities and sometimes result in the production of another element, which becomes another component in the production of a *mixtum*. In the former case the change is from one extreme to another (because elements are seen as contrary to one another), in the latter, it is a change from an extreme into something intermediary (*medium*). The quality which characterizes a composite (*qualitas media*) is different from the qualities of elements and is proper to a particular composite.¹⁵ When *qualitas media* is generated from the qualities of elements, they are debilitated in

¹³ Cf. A. MAIER, *Op. cit.*, p. 105–106.

¹⁴ The revised version, edited by Z. KUKSEWICZ was published in 1993 as vol. 18 of *Bochumer Studien zur Philosophie: Aegidius Aurelianensis, Quaestiones super De generatione et corruptione*, B.R. Gruener, Amsterdam – Philadelphia. The earlier version was edited by M. Olszewski and M. Gensler but has not been published yet. With over 9 pages, the revised version is more than twice as long as the early one. All following quotations come from the earlier version.

¹⁵ AEGIDIUS AURELIANENSIS, *Quaestiones super De generatione et corruptione*, q. 20: "Elementa tunc alterantur per quantitates suas activas et passivas, et aliquando fit alteratio a qualitativus unius elementi ad qualitates alterius elementi, et tunc generatur alterum elementorum et non aliquod mixtum. Aliquando autem contingit, quod elementa alterant se sic mutuo, quod non fit transmutatio a qualitate unius elementi ad qualitatem alterius elementi, sed ad aliquod medium inter haec, quia motus non solum fit ab extremo per medium in extremum, sed fit ab aliquo

such a way that they acquire a new, remiss degree of intensity. This allows the powers of elements to remain in the composite and act through it. The elements themselves, however, do not remain in the *mixtum* in their substantial forms or even in potency.¹⁶ They are not destroyed, but various composites are generated from them corresponding to various proportions of elements in the *mixtum*.¹⁷

Giles states that the qualities of elements are not their substantial forms, because they are apprehended by senses rather than the intellect, which is cognizable through the intellect. Moreover, substantial forms do not admit of more and less and do not have contraries, which are the properties of elementary qualities. Because elements are not substances in the strict sense, however, it is possible to accept elementary qualities as essential forms for elements understood in their proper sense.¹⁸

extremorum in medium. Et tunc ista qualitas media, ad quam fuit facta talis transmutatio, differt ab extremis, quia medium differt ab extremis, et ideo illa qualitas media differt a qualitatibus elementorum. Nec est propria alicui elementorum, sed est propria alicui alteri substantiae a substantia elementorum.”

¹⁶ *Ibidem*: “Modo quando ex qualitatibus elementorum generatur aliqua qualitas media, remittuntur qualitates elementorum et corrumpuntur sub illo gradu, sub quo erant proprii effectus elementorum, quia erant passiones elementorum in suis excellentiis; modo ut sic corrumpuntur in mixto. Ideo elementa non remanent in mixto secundum suas formas substantiales, nec etiam remanent in mixto in potentia, sicut in materia prima, vel sicut unum ipsorum est in alio, quia unum elementorum est in alio in potentia sicut in materia prima, quia materia unius elementorum bene potest esse sub forma alterius elementorum. Modo elementa non sic remanent in mixto, sed virtutes eorum reservantur in mixto, quia ista qualitas media, quae est generata ex transmutatione elementorum ad invicem, remanet in mixto et est propria dispositio mixti. Modo extrema aliquo modo reservantur in medio, et non in potentia pura. Ideo qualitates elementorum extremae sint in ista qualitate media, quae est in mixto, vel aliquo modo ibi reservatur. Sed qualitates elementorum sunt eorum virtutes, quia virtus alicuius est, per quam agit et patitur, quia substantia agit per suam virtutem; ergo illud est virtus alicuius, per quod operatur; sed elementa operantur per suas qualitates, ergo qualitates elementorum sunt eorum virtutes. Et quia istae qualitates elementorum remanent in illa qualitate media, quae est in mixto, ideo virtutes elementorum remanent in mixto.”

¹⁷ *Ibidem*: “Et sic nec elementa corrumpuntur in mixto, nec ambo, nec alterum, nec totaliter ibi remanent, sed salvantur solum virtutes eorum in mixto, ut dictum est. Et generabuntur diversa mixta ex ipsis elementis secundum diversas proportioniones mixtionis, quia contingit calidum permisceri cum humido secundum talem et talem proportionem.”

¹⁸ *Ibidem*, q. 21, *Utrum qualitates elementorum sint formae substantiales eorum*: “Qualitates elementorum non sunt formae substantiales ipsorum, quia forma substantialis non apprehenditur nisi intellectu, quia est principalis pars ipsius quidquid est rei naturalis, quod est obiectum intellectus. Modo qualitates elementorum per se apprehenduntur sensu, sicut calidum, frigidum, humidum et siccum, ergo etc. Item, ad hoc faciunt rationes adductae ad oppositum. Quia forma substantialis non recipit [f. 155va] magis nec minus, nec habet contrarium. Sed qualitates elementorum intenduntur et remittuntur et contrariantur adinvicem, et ideo qualitates elementorum non sunt formae substantiales ipsorum. Et hoc est verum accipiendo elementa ut sunt substantiae quaedam. Sed accipiendo elementa secundum quod elementa, sic qualitates elementorum

The second scholar in our group is Walter Burley. He wrote his commentary on *De generatione* in Oxford, shortly before moving to Paris in 1308. The fact that this is the only well-developed question in Burley's commentary probably shows that the problem *Utrum elementa maneat actu in mixto* was, for its author, the most important issue in the text.¹⁹ Burley observes that, because of their nature, elements are transformed in a way that is somehow between a substantial and a qualitative change.²⁰ This does not blur the distinction between generation and alteration, but underlines the specific status of elements as the basis for the bodies of the sublunary world. Further analysis of the process of elementary change shows the difference between the successive character of qualitative change and the total character of substantial change. From the point of view of the object of change (*patiens*), substantial change has no natural order of parts which would make it possible to say that one part undergoes the change before another. That any part can be the object of change at a given time does not mean, however, that all parts undergo change at the same time, since they are only accidentally parts of change.²¹ In the case of qualitative change, on the other hand, parts of the object of change undergo change part by part, and the change can occur only gradually, since it is mediated by secondary causes, i.e., the division of the object into extensive parts.²² Even though a substantial change is always accompanied by a qualitative one and they refer to the object, this does not mean that we can speak of a single process that would include the properties of both types of change here.

sunt formae essentiales ipsorum, quia elementa secundum quod elementa sunt miscibilia et activa et passiva adinvicem, sed non sunt activa et passiva adinvicem nec miscibilia nisi per qualitates suas.”

¹⁹In Burley's commentary, the question *Utrum elementa maneat actu in mixto* (the only one given that name rather than *dubium*) is placed after the commentary to the whole book I of *De generatione* and, with more than 140 lines of text, it constitutes the largest part of the commentary. Cf. GUALTERUS BURLAEUS, *Commentarius in libros De generatione et corruptione*, in: M. GENSLER, *Kłopotliwa zmiana czyli Waltera Burleya zmagania ze zmiennością rzeczy*, Łódź 2007.

²⁰Cf. ARISTOTELES, *De generatione et corruptione*, 331b, 25–30 – 332a, 1–3

²¹Cf. GUALTERUS BURLAEUS, *De generatione...*, I, “Utrum illud quod patitur per se ab aliquo, patiatitur secundum quamlibet partem sui,” p. 309–310: “Dicendum quod passum est in potentia ad formam agentis, est tamen in actu per formam propriam. Verbi gratia, si calidum agat in frigidum, frigidum est in actu per formam frigiditatis, et est in potentia ad formam caliditatis. Et sic non est inconueniens quod eadem pars est in actu et in potentia respectu diversarum formarum. [...] Ad aliud dicendum quod ista propositio: ‘Agens agit per contactum’ est intelligenda de proximo agente et de primo passo. Oportet enim quod primum agens tangat primum passum, sed non oportet quod tangat quamlibet partem primi passi.”

²²Cf. *Ibidem*, I, p. 309: “Dicendum quod aliquod est passum primum et aliquod est passum secundum partem, sicut patet: Ignis potest agere in aliquam aquam totam simul, potest etiam agere in unam partem absque hoc quod agat in aliam. Dico tunc quod primum passum patitur secundum quamlibet partem quantitativam eius.”

In the generation of one element from another, Burley specifies two types of change in relation to the kind of element that is generated, i.e., whether it is similar to or different from the active element. The former case is best illustrated by the process of burning, in which fire causes the transformation of other elements into fire. An illustration of the latter can be found in the generation of elements, e.g. fire, in the earth's crust under the influence of the stars. Burley calls both of these types of changes 'simple' ones, for their result is related to the cause in a simple way, either through the relation of similarity, as in the case of fire generating fire, or dissimilarity, as in the case of earth generating fire.²³ Although elements are a kind of substance, their changes cannot properly be called substantial. Why? According to Burley substantial change requires a total transformation of the object that takes place on the first substrate, i.e., in the prime matter, which is a being in potency. The generation of elements is not a total transformation, however, because one of the primary qualities must remain the same; moreover, the substrate is not a being in potency, since it is a corrupted element. Substantial generation thus refers in the strict sense only to composite beings, while the generation of elements as well as the generation of qualities is only generation with respect to something, *generatio simplex respectiva* and *quaedam respectiva*.²⁴

Writing on the problem of *mixtio*, Burley says that the product of this change is not unequivocally similar to or dissimilar from the elements that make it up, since the *mixtum* retains the properties of the various elements and yet remains a homogenous body. This must mean that the forms of the elements are neither totally preserved nor totally destroyed and that they have the potential to be separated again.²⁵ The form of a composite is, therefore, something intermediary that includes elementary forms devoid of their proper acts of being

²³ Cf. *Ibidem*, I, "Utrum elementa maneant actu in mixto," p. 325–326: "Dicendum quod ex uno elemento tamquam ex termino a quo bene potest generari mixtum. Nam in materiam unius elementi potest induci forma mixti per actionem alicuius mixti, et erit generatio univoca. Unde minerae generatae iuxta centrum terrae generantur ex uno elemento tamquam ex termino a quo. Tamen ex uno elemento tamquam ex efficiente non potest generari mixtum; unum enim elementum non sufficit ad producendum mixtum."

²⁴ Cf. *Ibidem*, I, "De punctis in continuo," p. 231: "Unde breviter ista generatio dicitur simplex respectiva in qua generatur ens nobilius, et illa dicitur generatio quaedam in qua generatur ens vilis. Verbi gratia, quia substantia est ens nobilius quam accidens, ideo generatio substantiae dicitur generatio simplex respectu generationis accidentis, et generatio accidentis dicitur generatio quaedam."

²⁵ Cf. *Ibidem*, I, p. 313: "Miscibilia, postquam miscbantur, possunt separari et per se existere; et hoc est signum quod nec sunt per se existentia sub formis propriis in mixto, nec omnino corrupta, nec unum corruptum et reliquum manens, sed aliquo modo manent et aliquo modo sunt corrupta: Non manent actu, sicut corpus et album, nec corrumpuntur totaliter, sed salvatur virtus eorum. Unde manent in virtute, sed non in actu."

(*non in actu*), yet not devoid of the power to act (*in virtute*). Though intermediary, this composite is something more perfect than any particular element, because it contains the powers (*virtutes*) of its constitutive elements. The elementary qualities preserved in the *mixtum* are of the same kind as the properties of pure elements but differ in their intensity. This is because the composite contains opposite properties of all four elements, which means that these properties have to be reduced (*remissa*) in their intensity, since coldness is opposite to hotness and humidity, to dryness. Burley notes that, for a composite to be generated, its components (*miscibilia*) must remain in an equilibrium that is not perfectly balanced but that does not allow for the total domination of a single property lest the composite be destroyed. This equilibrium is particular to every composite and every primary quality contained within it possesses a certain latitude of intensity that allows for differences in expression of the properties of the composite body.²⁶ The body therefore obtains its quality (*qualitas mixta*) as an intermediary between the extreme qualities of elements. Debilitation of a quality does not mean the debilitation of its power, since the latter is not the same as the former: as a cause of action it has a quasi-substantial function. Consequently, the generation of a *mixtum* is a change, in which generation is not accompanied by corruption, since the elements are not fully subject to it.²⁷

²⁶ Cf. *Ibidem*, I, p. 316: "Intelligendum quod ad hoc quod fiat mixtio, non oportet miscibilia omnino adaequari, sed illa adaequatio, de qua loquitur Philosophus, consistit in quadam latitudine. Unde ad hoc quod fiat mixtio, oportet miscibilia sic esse adaequata, quod nullum illorum ad plenum dominetur super alterum."

²⁷ Cf. *Ibidem*, I, "Utrum elementa maneat actu in mixto," p. 322–323: "Quando mixtum generatur ex elementis, non est tanta corruptio, sicut est quando unum elementum generatur ex alio. Mixtio enim differt a generatione simplici, scilicet a generatione unius elementi ex alio. Nam in aliis generationibus simplicibus generans vel producit sibi simile simpliciter, ut si sit generans univocum, vel dissimile simpliciter, ut si sit generans aequivocum. Sed in generatione mixti ex elementis non generatur aliquid simile simpliciter, nec dissimile simpliciter, sed generatur aliquid quod est aliquo modo simile elementis. Et ideo nec totaliter corrumpuntur elementa, nec totaliter manent, sed manent in effectu communi illis. Mixtum enim generatur ex elementis adaequatis in potentiis. Quando igitur nullum elementum ad plenum dominatur alteri ita, quod inducat dispositiones omnino convenientes suae formae, sic sunt in quadam dispositione media quae non est ad plenum proportionata formae alicuius elementi, et ista forma media continet formas elementorum in virtute. Unde intelligendum quod, sicut corporis simplicis est aliqua qualitas simplex, ita proportionaliter corporis mixti debet esse qualitas mixta. Unde caliditas, quae est in corpore mixto, non est caliditas simplex, sed est caliditas remissa. Remissa autem non est nisi per frigiditatem; et ita in mixto manet calidum ut frigidum et frigidum ut calidum, et ita remanet ibi quaedam qualitas media quae ita se habet ad corpus mixtum, sicut qualitas simplex ad corpus simplex. Et ita, sicut qualitas media continet qualitates extremas in virtute, sic forma mixti continet formas elementorum in virtute. Et illa qualitas media sic continet qualitates extremas, quod non continet istas sub actibus propriis; et ideo forma mixti continet formas elementorum non sub actibus propriis."

The champion of the *via moderna*, John Buridan was a generation younger than Burley. He may have lectured on *De generatione* twice, for there are two versions of his commentary. Regrettably, as with Giles's questions, we do not know anything about the dates of Buridan's texts except that they must have been composed during Buridan's long regency at the Arts.²⁸ His question on the *mixtio* of elements is not long, but it gives a good overview of the issue. Buridan argues that substantial forms of elements do not remain in the *mixtum* either in their perfect or in their reduced being, and he presents several reasons for this.²⁹ Being a nominalist, Buridan does not care much about metaphysical distinctions and declares that to mix elements is to destroy them. He states, however, that a *mixtum* retains the powers of the elements from which it is generated as well as the qualities and their powers.³⁰ Substantially, a *mixtum* is as simple as are elements, because its matter receives its form as immediately as does the matter of elements.³¹ The status of elements is thus no different from that of a *mixtum*, because the only true element is matter, whereas fire, air, water and earth are merely called elements, because — as Buridan remarks somewhat caustically — some people are unable to understand the concept of prime matter. Buridan concludes that there are earlier and more important agents in the generation of a *mixtum* than elements, namely celestial powers and semen, and that, together with prime matter, they are responsible for the generation of composite bodies with their individual, accidental properties.³² In this way, Ockham's razor helps

²⁸ Cf. JOHN BURIDAN, *Quaestiones super De generatione et corruptione libros Aristotelis. A Critical Edition with an Introduction*, eds. Micheil Streijger, Paul J.J.M. Bakker, Johannes M.M.H. Thijssen, Brill, Leiden – Boston 2010 (History of Science and Medicine Library, vol. 27, Medieval and Early Modern Science).

²⁹ Cf. *Ibidem*, I, q. 22 “Utrum formae substantiales elementorum maneant in mixto,” p. 166: “Sit conclusio prima quod formae substantiales elementorum non maneant in mixto, quia, sicut prius argutum est, nec manent sub esse perfecto nec sub esse remisso.”

³⁰ Cf. *Ibidem*, p. 168: “Mixtum ex eo dicitur mixtum quod ex pluribus habentibus ad invicem contrarietatem, ex ipsis est genitum, et quia retinet aliquas virtutes eorum et habet etiam qualitates et virtutes provenientes ex actionibus et passionibus istorum miscibilium ad invicem. Et non dicitur mixtum ex eis quia formae substantiales eorum maneant. Nota quod non sequitur ‘talia sunt mixta substantialiter, igitur sunt’, sicut non sequitur ‘haec sunt corrupta substantialiter, igitur haec sunt’, quoniam elementa misceri est ea corrumpi et ex eis aliam substantiam generari participantem et recipientem virtutes eorum.”

³¹ Cf. *Ibidem*, p. 169: “Materia aequae immediate recipit formam mixti sicut formam elementi loquendo de immediatione per privationem medii substantialis, tamen non aequae immediate loquendo de immediatione per privationem medii accidentalis.”

³² Cf. *Ibidem*, p. 170: “Solum materia prima est proprie elementum generabilem. Sed ignis, aer, aqua, terra non sunt proprie elementa, sed vocata sunt elementa, quia vulgares non percipiunt compositionem eorum per ignorantiam materiae. [...] Dico quod in generatione mixti sunt agentia priora et principaliora quam sunt elementa, sicut sunt semina vel virtutes caelestes.”

Buridan to eliminate a kind of being whose dubious status was a philosophical nuisance.

Nicolas Oresme, the youngest of our authors, commented on *De generatione* in Paris after Buridan but before the year 1349.³³ His question *Utrum formae elementorum maneant in mixto* is probably the longest of the four. Oresme arranges it in the form of a discussion of the opinions of Averroes, Avicenna and Aquinas. Their views are analyzed successively following a very brief presentation, in which Oresme uses the three thinkers' names as labels for three possible solutions: one that claims that elements remain in composite with reduced forms, one that states that they remain with reduced qualities, and a third, according to which elements do not remain in the composite at all. Oresme rejects the first, Averroean, solution by invoking the authority of none other than Averroes himself. He argues that, if elementary forms could admit of more and less, the composite would have the same property — which is not the case — and substantial generation would ultimately be reduced to alteration.³⁴ Avicenna's solution is called "more probable," yet it is also criticized: like Averroes, Nicolas is convinced that this would make a composite a kind of aggregate. In an interesting thought experiment, Oresme introduces a scale of reduction of a quality and makes quantitative comparisons to show that this solution would allow elements to exist in an impossibly low degree of intensity.³⁵ It is the third solution that meets with Nicolas's approval as the "most probable and in the best agreement with Aristotle." Oresme not only claims that neither elements nor their qualities remain in the *mixtum*, but also asserts that the composites formed through a *mixtio* possess only one active *qualitas media*, which characterizes the

³³ Cf. NICOLE ORESME, *Quaestiones super De generatione et corruptione*, ed. Stefano Caroti, Muenchen 1996, p. 68*.

³⁴ Cf. *Ibidem*, p. 33: "Prima igitur opinio ponit quod forme manent sub esse remisso. Et quod manent probatur multipliciter per rationes factas contra tertiam opinionem que ponebitur; et potissima ratio est quia aliter sequitur quod mixtum non esset mixtum, sed eque simplex sicut elementum. Sed non possunt manere intense et sub esse perfecto, igitur remanent remisse et sub esse imperfecto vel refracto. Et ita arguit Commentator tertio *Celi* etc. Contra istam viam potest argui: [...] Si forme elementorum remitterentur, sequitur quod forme mixtorum remitterentur. Consequens est contra Commentatorem [...], qui dicit quod forme perfecte mixtorum non sunt contrarie nec intenduntur; et patet, quia unus asinus non dicitur magis asinus quam alter [...]. Probatur consequentia, quia nulla ratione probatur formas elementorum remitti quin similiter probaretur de formis mixtorum, quia, sicut proprie qualitates elementorum remittuntur, ita propria complexio mixti potest intendi et remitti et etiam mutari."

³⁵ Cf. *Ibidem*, p. 34–35: "Nunc sequitur secunda via que est probabilior, scilicet quod forme manent non remisse, quia non possunt intendi nec remitti, tamen stant sub qualitatibus remissis. Quod forme maneant probant rationibus [...] et quod qualitates maneant, hoc est inconveniens. Quod forme non sint remisse probant per rationes prius factas, et quod qualitates sint remisse patet ad sensum. Contra istam viam arguitur rationibus, quia sequitur quod in eodem supposito essent plures forme substantiales, sicut forme elementorum in mixto."

individual intermediary stage for each of the opposing qualities that make up the characteristics of the composite.³⁶ This is evident, he says, because accidents denominate subjects, so it is impossible for two contrary qualities to be in the same subject at the same time. Consequently, if one says that elements remain in the composite, that simply means that the composite is somehow similar to the elements and that the *qualitas media* is similar in its effects to the effects produced by the primary qualities.

A composite is called *mixtum* because none of its qualities is present in the most intense degree, because the *qualitas media* is in a proportion particular for a given body, and because it possesses secondary qualities, such as taste, smell and colour, which are not present in simple elements but follow the primary ones in composite bodies. Oresme supports his views not only with the authority of Aristotle and Averroes and rational arguments but also with arguments from experience. He reiterates the opinion of Buridan that a composite does not have more essential parts than does an element.³⁷

This short overview of four opinions on the problem of mixture of elements shows that even though this issue was well-known and thoroughly discussed long before their time, the scholastics found it fascinating. Like their ancient and Arab predecessors, the scholastics detected deficiencies in the Aristotelian solution and tried to remedy its weaknesses. It is surprising that, despite the serious doctrinal differences between them, all four scholars agreed that the best of the existing hypotheses was the one presented by Aquinas. Like Scotus, who is also an important inspiration for Buridan and Oresme, they take it as a reference point. The four commentators differ on the details and put different emphasis on certain points. They use different forms of argumentation. Yet all

³⁶ Cf. *Ibidem*, p. 38–39: “Tunc sequitur tertia via que inter omnes est probabilior et faciliior et magis consona Philosopho. Et sit prima conclusio quod forme elementorum non manent in mixto. Secunda conclusio: quod nec qualitates elementorum manent in mixto. Tertia conclusio: quod in mixto est una sola qualitas de genere activarum, media inter caliditatem et frigiditatem; et ita de aliis qualitatibus, et cum hoc sunt qualitates secunde.”

³⁷ Cf. *Ibidem*, p. 42–43. 41: “Elementa dicuntur esse in mixto dupliciter. Primo modo similitudinarie quantum ad qualitates, quia [...] qualitates mixti quoddammodo sunt similes qualitatibus elementorum, quia sunt medie. Secundo, etiam virtualiter qualitates mixti possunt in consimiles effectus et habent adhuc virtutes sicut qualitates elementorum, licet non ita intense, quia ille qualitates calefaciunt et assimilantur illis quantum possunt. [...] Aliquid dicitur esse mixtum propter tri. Primo, quia non habet aliquam qualitatem in summo, sed habet qualitates remissas et medias, et per hoc differt a simplici elemento existente in natura propria. Secundo, quia habet illam qualitatem mediam secundum proportionem, et sic mediam secundum naturam ipsius mixti, quod, si tendet ad summum, erit sibi violenta et iret ad corruptionem. Et propter hoc differt ab elemento substantialiter [...]. Tertio, quia mixtum habet duas qualitates non tangibiles cuiusmodi sunt sapor, odor et color, que sequuntur alias primas, tamen non in summo, et elementum simplex non.”

four adhere to the opinion that the forms of elements are not preserved when elements are mixed together. It is worth noting that the two nominalists in our group accept John Duns Scotus's additional postulate that the *qualitas media* is not merely a mixture of contrary elementary qualities but a new entity. Yet they give this idea a novel, nominalist understanding, which stresses simplicity as one of the most important criteria of philosophical-scientific explanation. Oresme does not go as far as Buridan, who was ready to dispose entirely of the concept of elements as a distinct type of substance, but Oresme shares Buridan's belief that there is no need to assume that the essences of elements and composites differ with respect to their simplicity.

Taken together, the efforts of these four scholastics to solve the problem of the mixture of elements seem to corroborate the wisdom of the old adage: *repetitio est mater studiorum*. It is the joy these scholars found in considering the same question over and over that allowed them to advance our understanding of the limitations of Aristotelian physics. Gradually and by almost imperceptible steps, the scholastics prepared the ground for the modern replacement of a classical system.

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RADOŚĆ POWTARZANIA.
PROBLEM ZŁOŻENIA CIAŁ W CZTERECH
SCHOLASTYCZNYCH KOMENTARZACH
DO *DE GENERATIONE*

S T R E S Z C Z E N I E

Praca przedstawia krótki przegląd poglądów czterech scholastycznych filozofów: Idziego z Orleanu, Waltera Burleya, Jana Buridana i Mikołaja z Oresme, na zagadnienie złożenia ciał z elementów. Historia zagadnienia sięga starożytności: już greccy komentatorzy byli świadomi pewnych braków w rozwiązaniu zaprezentowanym przez Arystotelesa i próbowali je uzupełniać. Poznając tekst *O powstawaniu i ginięciu*, łaciniscy filozofowie XIII wieku mogli zaznajomić się także z grecką i arabską tradycją jego interpretacji. Wśród wczesnych scholastycznych opinii na temat złożenia z elementów największą popularność zyskał pogląd Tomasza z Akwinu i do tego poglądu odwołują się wszyscy czterej omawiani myśliciele, uważając go za najlepszą z istniejących hipotez. Twierdzą więc

zgodnie — różnią się jedynie w szczegółowych sformułowaniach i sposobie argumentacji — że formy elementów nie trwają w ciele złożonym. Dla dwóch późniejszych z nich, Buridana i Mikołaja z Oresme, reprezentujących *via moderna*, ważnym źródłem inspiracji jest także rozwiązanie Jana Dunsza Szkota. Przyjmują za nim, że *qualitas media* nie jest jedynie mieszaniną przeciwstawnych jakości elementarnych, ale nową jakością. Dają jednak temu pomysłowi nowe, nominalistyczne rozumienie, akcentujące prostotę jako ważne kryterium filozoficznej analizy. Buridan w swym radykalizmie odrzuca pogląd, że elementy są substancjami szczególnego rodzaju.