

4 Roger Bacon on the conceivability of matter

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The notions of matter and prime matter are among the most debated points in medieval philosophy. As an explanatory device, matter was supposed to carry out central functions in both the analysis of being as such (metaphysics) and the study of corporeal beings and their change (natural philosophy). Because of this centrality, ramifications of the ontological problem concerning the nature of matter (its potency and otherness from both form and composite) touched a large number of additional questions – from the status of spiritual substances to the emergence of three-dimensionality. Intertwined with a wide range of metaphysical and natural problems, Bacon’s theory of matter is marked by a profound originality, as Michela Pereira has shown earlier in this volume. Alongside its originality, Bacon’s theory of matter is remarkably complex. His inclination to distinguish between different considerations of matter, as well as his extreme realism and radical reading of the matter-form correspondence, significantly affected his theory. In this contribution, I want to examine one particularly problematic point of Bacon’s theory: how can we have knowledge of prime matter?

The problem concerning the epistemology of prime matter is old and intricate. It has been addressed by both Plato and Aristotle and would mark abundant aspects of early-modern criticism against Aristotelianism. During the Middle Ages, different solutions were elaborated in order to resolve the conundrum of how to grasp something that is mostly potential and formless. Roger Bacon’s discussion of this problem reflects many of the complexities of his ontological examination of the status of matter and prime matter.

In his *Questions on Aristotle’s Physics*, Bacon claims that matter can only be known by analogy to the form, a strategy he shares with most medieval philosophers. Analogy, however, can be used only in relation to a consideration of matter as a metaphysical part of the substance – using Robert Pasnau’s distinction between a consideration of matter as either a metaphysical or an integral part or ingredient of the composite.¹ Bacon’s formal pluralism and extreme realism seem to imply an additional procedure in order to unveil the existence of an original

1 See Robert Pasnau, *Metaphysical Themes: 1274–1671* (Oxford: Oxford University Press, 2011), 6–11.

substrate (prime matter) which would be inconceivable by recourse to analogy alone. This second epistemic strategy is based on abstraction. I intend to show that both procedures are required in order to conceive prime matter, although they rely on rather different considerations of matter.

Analogy to the form

In his *Questions on Physics* (*Questiones supra octo libros Physicorum*), Bacon dedicates four questions to the problem of how matter can be known (book I, qq. 67–70).² The first question of this set (q. 67) asks whether matter can be intellected. Literally, it asks whether matter can be known by analogy, but the answer to this methodological question is given only at question 70.³ Bacon's procedure is gradual and starts by asking if matter can be a general object of cognition. How can it be so? Indeed, (i) things made of matter are said to hinder cognition, and (ii) only what is immaterial can be intellected. According to Bacon, these stances correspond to a misunderstanding of the problem. On the one hand (vs i), it is true that matter makes cognition feebler, yet this does not imply that material things are unknowable. On the other hand (vs ii), one should not confuse ontological and gnoseological lack of matter. For a thing to be apprehended, it is necessary for its intellected notion to be immaterial so that it can be intellected. In this process, however, the ontological materiality of the intellected object remains unaffected. Therefore, claiming that matter must be (ontologically) immaterial in order to be known is false. To the contrary, since whatever has some being also has some truth which can be known, it is clear that the existence of matter implies its knowability, as Bacon observes, referring back to Aristotle.⁴

Bacon's argumentative strategy evidently aims to provide a preliminary grounding of the general possibility of the knowability of matter. Bacon rejects a first *scolium* based on the opposition between the materiality of the object to be known (matter) and the formality of the cognitive process. Objects of intellection and intellected notions are mediated by the species, and the correspondence between object and intellection is purely epistemological, not ontological. As a

2 Written in the 1240s, Bacon's *Questiones supra libros octo Physicorum* are a fundamental example of the early Scholastic discussion on *Physics* in Paris. Following Silvia Donati's analysis of the works contained in the *Opus hactenus inedita*, this text comprises the only questions on the *Physics* that were surely authored by Bacon. Following the structure of Aristotle's *Physics*, whose first book discusses matter, form, and privation as principles of nature, Bacon dedicates an impressive number of questions to the problem of matter – 17, from question 56 to question 73 of the first book of the *Physics*. See Donati, "Pseudoepigrapha in the *Opera hactenus inedita Rogeri Baconi?*," 153–203.

3 This reference to analogy must be considered following Aristotle's reference in *Physics* I, 7 to analogy as the only way to know matter (see 191a7–191a12) and Bacon's acceptance of analogy as the (main) epistemic access to matter available to humans. In fact, even though the first question does not discuss analogy, that strategy will be examined in the fourth and final question dedicated to matter's conceivability (q. 70).

4 See Bacon, *Questiones supra libros octo Physicorum*, 53–54.

consequence, the materiality of matter does not imply any cognitive inaccessibility per se. Bacon does not clarify what kind of matter he is referring to in this process. On the one hand, it seems clear that he is considering the case of the proximate matter of a composite, his line of reasoning being developed through the consideration of how material things are apprehended. On the other hand, Bacon's reference to the connection between ontology and epistemology (whatever exists, it has some truth) appears to be applicable to any instances of matter, both proximate and prime. By claiming that the existence of something implies its possibility to be known, Bacon establishes that matter can be known because it does exist, although in a rather minimal way.

Before passing to the next question, it is worth clarifying some terminological aspects of my analysis. Even excluding all non-technical meanings of the term as generic substance, *matter* can indicate two different classes of entities:

- 1 *Metaphysical matter* as the component of the hylomorphic union, which, joined to a form, produces the composite. This is the metaphysical meaning of matter. Depending on the inventory of a philosopher, the number of metaphysical matters can vary noticeably. In Aquinas's ontology, there is only one matter of this kind – prime matter. In turn, according to Bacon, there is a plurality of metaphysical matters among which is also prime matter. As we are going to see, Bacon maintains that this plurality of matters is hierarchically disposed into a set of more specific matters whose specification is not caused by a form. The metaphysical matter of any primary substance (the apple I have in front of me) is its proximate matter, which should not be confused with its secondary matter.
- 2 *Physical matter* as the material of which something is made and expressing the generic potency of that thing to become something else. This is a purely functional meaning of matter, as Jeffrey Brower has pointed out in relation to Aquinas's hylomorphism.⁵ This matter carries out the functions of substrate that Aristotle ascribes to "matter" without being properly matter. Indeed, it is a hylomorphic composite made of form and matter (as the wood of a bench is said to be its matter although it is a hylomorphic composite). The functional consideration of matter evidently implies some mereological tensions which escape the present discussion. Matter considered according to its functional meaning can be called secondary matter and expresses the generic feature of the considered thing.

As we shall see, this distinction is fundamental in order to understand Bacon's line of reasoning. In fact, while most medieval philosophers address the problem of matter's knowability by the distinction between two classes of matter (prime

5 See Jeffrey Brower, *Aquinas's Ontology of the Material World: Change, Hylomorphism, and Material Objects* (Oxford: Oxford University Press, 2014), especially 80–86.

and secondary), with Bacon we have to deal with a wider number of entities – noticeably prime matter, proximate matter, and secondary matter.

Coming back to the *Questions on Physics*, after having established that matter can be known, Bacon has to address the problem of how such knowledge can happen. Accordingly, he has to distinguish between two very different cases: the kinds of knowledge of matter that God and humans are able to gain. These cognitive agents have different abilities and ontological statuses, which imply a different way in which they can know matter. Bacon starts by discussing the case of God (q. 68). How can God know prime matter, considering that the divine mind is replenished with forms, and there is no potency in His being? This is a rather delicate point, as Thomas Aquinas's famous denial of this possibility and later criticism against this stance display.⁶ In this case, Bacon does not refer to proximate matter but to its ontological root, prime matter. He does so explicitly and asks whether God can know this original entity. His answer moves through various considerations. On the one hand, God is a voluntary agent who knows both the effects and the instruments (like prime matter) which He used in creating the universe. On the other hand, as the creature has some knowledge of God, He must have even more knowledge of His creation, matter included. The main point of Bacon's answer, however, is remarkably Platonic. He distinguishes between immanent forms (= the Aristotelian forms joined to matter in the composite) and the transcendent exemplar forms (= the Platonic ideas) that correspond to the ideas that God has of the essences of things. Prime matter is opposite only to immanent forms, not to exemplar forms. Because prime matter has an essence, there must be an idea of it in God's mind. Through this idea, God has direct knowledge of the prime matter He created.⁷

God, therefore, has a direct eidetic knowledge of prime matter. What about humans? Can we have knowledge of prime matter? The final two questions (q. 69 and q. 70) discuss this central problem. However, Bacon shifts back to "matter" generally considered, leaving aside the special case of prime matter. More precisely, the matter Bacon seems to have in mind as an object of human knowledge is the matter of a thing whatever that I have in front of me: the proximate matter of any considered thing. Prime matter re-emerges only on the first argument of question 69, pointing out that prime matter, being insensible, cannot be perceived.⁸ Prime matter, indeed, lacks any dimension and, therefore, corporeity. As a

6 On this point, see Christine König-Pralong, *Avènement de l'aristotélisme en terre chrétienne: L'essence et la matière: entre Thomas d'Aquin et Guillaume d'Ockham* (Paris: Vrin, 2005), 137–151.

7 Besides its Platonic nuance, Bacon's solution evidently implies a break in the correspondence between forms and ideas. God has ideas not only of forms, but also of what is opposite to the form: that is, prime matter. In this way, Bacon is able to ascribe to God a complete and direct knowledge of all His creation, a completeness which would be drastically limited if God did not have a direct epistemic access also to prime matter, for the primary role it plays in the establishment of the universe.

8 See Bacon, *Questiones supra libros octo Physicorum*, 54.

consequence, prime matter cannot stand properly as object of cognition, whereas that process starts with sensory experience. Bacon's reply claims that matter (not prime, but proximate matter) is incidentally sensible after it has received its three-dimensionality – which means, within the hylomorphic composite.⁹

The second argument against human conceivability of matter discussed at question 69 is focused on abstraction. In fact, it seems that we abstract formal features from matter, and, if that is the case, evidently, we cannot abstract matter from matter. Bacon's reply is intriguing. An eminent strategy to conceive matter was indeed centred on the abstraction of "matter" from the qualifications of the considered thing. This abstractive procedure was adopted by many medieval philosophers (from Calcidius to Bonaventure), and Bacon was surely aware of it. For instance, I can consider a bench and abstract the benchness from it, focusing on the timber. I can proceed further and abstract the woodness from the timber, keeping its "matter," the elemental mixture. This abstractive procedure focuses on the "matter" of something – yet that matter is its secondary matter, a hylomorphic composite. Indeed, abstraction needs to grasp a formal aspect expressing some epistemic content. Therefore, it can only be applied to forms and composites.¹⁰

Perhaps by reason of this crucial limitation, Bacon does not refer to that kind of abstraction in this context. To the contrary, Bacon underlines that the matter we remove when we abstract qualifications from a considered thing *x* corresponds to the individuality of *x*. In other words, the qualifications we abstract are generic features which, instantiated by *x*, are conserved in our cognitive process while we prescind from the individuality of *x*. This is the kind of abstraction that is used by mathematics, when the "triangle" is abstracted from any triangular thing. Bacon observes that, in this case, matter is not considered according to its substance, but as the individuality of *x*.¹¹ The "matter" entailed by this process is one of the equivocal meanings of matter that Bacon discusses in his *Communia naturalium*. There, he presents a list of six definitions of matter.¹² The second definition (def₂) claims that matter is said "of the individual in relation to the universal . . . because the universal is grounded on its individual as in the material principle."¹³ Evidently, (def₂) coincides with the matter from which universals are abstracted, discussed at question 69. This matter is neither prime nor proximate matter and not

9 See Bacon, *Questiones supra libros octo Physicorum*, 55. Bacon does not expand on this point, which leaves some questions open. What kind of incidental perception of matter is envisioned by Bacon? This seems to be an implicit reference to the procedure of incidental perception described in the *Timaeus* and in Calcidius's commentary on it, yet Bacon does not clarify this point further. See Nicola Polloni, "Conceiving Prime Matter in the Middle Ages: Perception, Abstraction, and Analogy," forthcoming.

10 See Polloni, "Conceiving Prime Matter in the Middle Ages."

11 See Bacon, *Questiones supra libros octo Physicorum*, 55.

12 On Bacon's six definitions, see Rodolfi, "Dicitur materia propriissime et strictissime," 83–102; Pereira, "Remarks on *materia naturalis*," 103–138.

13 Bacon, *Communia naturalium*, bk. 1, part 2, 61: "Dicitur materia pro individuo respectu universalis, secundum Aristotelem VII *Methaphysice*, quia universale fundatur in suo individuo sicut principio materiali."

even the genus which remains once the *differentiae* are abstracted. It is merely the substrate of individuality in which universals are predicated. Therefore, “according to its being a substance” (*secundum quod est substantia*), matter cannot be known in this way.

After having excluded from the picture both prime matter and the equivocal meaning of matter, Bacon makes the first move toward his solution to how humans can know matter. Matter and form are essentially different – in fact, they are opposites. Being essentially different, matter can be known as “other” than the form since we can and do distinguish between matter and form. As Bacon observes, “the human intellect distinguishes matter from form by distinguishing the essence of matter from the essence of the form, as it is said in the seventh book of *Metaphysics*. Therefore, [the human intellect] knows matter and form.”¹⁴ For Bacon, the key to unlocking the conceivability of matter is the ontological correlation between matter and form.

Both relevance and implications of this point can be appreciated by considering the three non-equivocal definitions of matter that Bacon gives in the *Communia naturalium*. They all refer to the hylomorphic correlation from which the composite emerges and claim, respectively, that matter is the substrate of alteration (*def*₄), the substrate of generation and corruption (*def*₅), and one of the constituents of the composite (*def*₆).¹⁵ Bacon points out that the most proper definition of matter is given by (*def*₆). Indeed, it expresses the reciprocal functionality of matter and form within the hylomorphic composite, which, following Bacon’s universal hylomorphism, in turn corresponds to created being as such.

According to Bacon, the path we have to follow to gain knowledge of matter is the consideration of the hylomorphic correspondence, consistent with (*def*₆). The procedure by which humans can do so is finally presented at question 70.¹⁶ After having clarified that a complete cognition of matter is impossible, Bacon claims that matter “is known by the form, like privation [is known] by the form, and potency [is known] by the act.”¹⁷ Consistent with what he stated at question 69,

14 See Bacon, *Questiones supra libros octo Physicorum*, 55 “intellectus distinguit humanus materiam a forma, distinguens essentiam materie ab essentia forme, ut dicitur in VII *Methaphysice*, ergo cognoscit materiam et formam.”

15 See Bacon, *Communia naturalium*, bk. 1, part 2, 61 (*def*₄): “Dicitur materia aliquid constitutum in esse specifico, quod est in potencia ad accidentia contraria, ut ad calidum et frigidum, et bonum et malum, et hoc vocatur subjectum alterationis.” (*def*₅): “Dicitur materia specialiter in usu naturalium pro subjecto generacionis, cujus proprietas est ut sit res incompleta in potencia ad esse specificum, et hoc principaliter est compositum aliquod in potencia ad esse compositi complementum.” (*def*₆): “dicitur materia propriissime et strictissime et sic est essentia quedam alia a forma, que cum ea constituit compositum, ut materia ignis et forma ejus constituunt ipsum et sic est in omni substantia creata.”

16 It should be noted that, unfortunately, the text of question 70 is rather convoluted, and the arguments in favour of and against Bacon’s position are dispersed throughout the text.

17 Bacon, *Questiones supra libros octo Physicorum*, 56: “per formam cognoscitur sicut privatio per formam et potentia per actum.”

the only way by which we can know matter is by its consideration as analogous to the form.

In *Physics* I, 7 Aristotle claims that matter can be known by analogy. However, Aristotle characterises this analogy as analogy to the composite rather than to the form. The same procedure is presented again in relation to the analogical knowledge of potency by means of the act in *Metaphysics* IX, 6, a passage which is echoed by Bacon.¹⁸ Notwithstanding the letter of Aristotle's works, and probably inspired by Averroes, many thirteenth-century philosophers interpreted the passage as presenting an analogy to the form of the composite.¹⁹ This is what Bacon claims. However, what does it mean that matter can be known by analogy to the form?

It seems to me that two options are possible. A first interpretation would consider the analogy to "the form" as a specification of the analogy to "the composite" claimed by Aristotle, following the assumption that the composite is shaped by the form and, accordingly, any analogy to the composite is implicitly an analogy to the form. According to this weak interpretation, the analogy can be referred to as how "formal qualifications" of something *x* are related to their material, shaping it. Evidently, this interpretation of the analogy would imply that the analogical relation is established primarily between (i) the metaphysical form and the formal aspects that we perceive and know of a thing and that make the wooden material that bench and (ii) metaphysical matter and secondary matter. In that case, we would have the following scheme:

<i>Source domain</i>		<i>Target domain</i>	
<i>Secondary matter</i>	<i>Formal qualification</i>	<i>Metaphysical matter</i>	<i>Metaphysical form</i>
Material aspects of the bench (wood)	Formal aspects of the bench	Matter of the form of the bench	Form of the matter of the bench

According to this interpretation, the analogy to the form should be considered an analogy between two different kinds of relation: one between secondary matter and its formal qualification and another between proximate matter and its form. Indeed, by a consideration of different cases of secondary matters (the timber and the form of the bed and so on), at a physical level, we can analogically uncover that there is a matter corresponding to its form also at a metaphysical level (the

18 See Aristotle, *Metaphysics*, IX, 6, 1048a35–1048b6, which is recalled by Bacon's reference that potency is known by analogy to the act.

19 See Polloni, "Conceiving Prime Matter in the Middle Ages." As for Averroes's position, see for instance Averroes, *Commentarium magnum in Metaphysicam*, VII, 10, *Aristotelis opera cum Averrois commentariis*, VIII vols. (Venice: Apud Junctas, 1562–1574), 188.

matter and form of each secondary matter).²⁰ This interpretation is close to the “analogy to the form” discussed by Thomas Aquinas, among others.²¹ However, according to this interpretation, the analogy is primarily an analogy to the composite (secondary matter) and only mediatedly an analogy to the form. As I said, this interpretation of the analogy follows the assumption that the analogy to the composite can be read as an analogy to the form because the form is the main ontological aspect qualifying the composite.

A second option is to consider matter and form only, focusing on their correlation and without considering the composite. Bacon repeatedly claims that matter requires form and form requires matter. Matter is “other” than the form and needs it to be completed. The form also requires matter in order to produce the composite. Characterising both hylomorphic partners, this ontological correlation can be cracked analogically. Accordingly, by considering the form as analogous to matter (yet opposite to it), one can see that, as the form requires something to be borne and to actualise, so matter requires something to bear and by which to be actualised. This strong interpretation seems to be what Richard Rufus implies in his *Commentary on Physics*, when he claims that matter “is known by form.”²² Although the cognitive gains of this procedure are questionable, it is nonetheless able to provide some knowledge of matter focusing only on the form, without requiring any analogical reference to the composite and secondary matter.

Bacon does not make clear which interpretation of the analogy to the form he is following. As we shall see, the strong interpretation is closer to his ontological discussion. Yet that discussion does not exclude the fact that he was adhering to a weak interpretation of the analogical procedure. In both cases, Bacon is clear in his claim that the analogy between matter and form provides some insights into what matter is.

The analogical procedure follows closely the three definitions of matter from *Communia naturalium*. Indeed, the correlation to the form which is required by this procedure is established by (def₆) and implied by both (def₄) and (def₅). One can appreciate the hylomorphic correlation by considering cases of natural change – either incidental (alteration) or substantial (generation and corruption) – such as the example of a wooden table becoming a wooden bench in which the latter’s timber is preserved. However, (def₄) and (def₅) are directed to a different kind

20 From this point of view, it should be noted that without PPHC, it would have been possible to use the analogy to the form to get to prime matter. In fact, if prime matter is differentiated by the reception of specific forms, an analogy to the forms of different things would lead to admit that there is a substrate for those forms, and, being unspecified, that substrate is prime matter. This is Thomas Aquinas’s position. See Thomas Aquinas, *In Physicam*, I, 13, 9.

21 See Thomas Aquinas, *In octo libros Physicorum Aristotelis expositio*, edited by P.M. Maggiolo (Rome: Marietti, 1965), I, 118 [9], 59.

22 See Richard Rufus, *In Physicam Aristotelis*, edited by R. Wood (Oxford: Oxford University Press, 2004), II, III, 3.

of matter carrying out the function of substrate of natural change, natural matter.²³ In turn, (def₆) refers to a more general consideration of matter in its ontological correlation to the form, since every matter requires a form. That is why Bacon himself claims that (def₆) is the most properly philosophical definition of matter. Considered as a component of the hylomorphic composite, the matter defined by (def₆) can surely be the object of the epistemic strategy presented in *Questions on Physics*. Matter can be known by analogy to the form only because it is ontologically bound to the form.

According to Bacon, matter can be known by analogy to the form, and this analogy is established within the ontological realm of the hylomorphic composite. In other words, matter x is known in analogy to the form x to which it is joined in the composite x – at the same ontological level. This means that the matter which is known by analogy is the proximate matter of an hylomorphic composite. In this regard, it seems that, at least theoretically, the analogical strategy can be applied also to the knowledge of prime matter. The correlation to the form in each considered domain is indeed horizontal. (The form of a table is related to the matter of a table as prime matter is related to the first form.) However, what kind of matter is that? And what is the composite of which it is a component? In fact, one could even challenge the idea that there is such an entity as prime matter. Or suppose that there is only prime matter, as the proximate matter of every hylomorphic composite. Would it not be more convenient to assume that the matter of the table and the apple is prime matter or that there is no prime matter at all, but only natural or individual matters? The key to addressing these questions is a consideration of how specific matters (among which, prime matter is its first and most generic member) and secondary matters (whose first and most generic entity is the composite of prime matter and first form) are interrelated in Bacon's ontology. Accordingly, we need a brief excursus into Roger Bacon's ontology of matter and form.

Perfect hylomorphic correspondence

In examining the nature of the universe, Bacon's ontology is far from parsimonious. His metaphysics is based on three main assumptions. First, the being of every creature is characterised by a purely hylomorphic structure (universal hylomorphism). Second, the hylomorphic structure is not monomorphic (= one substantial form joining matter) but organised into a plurality of non-incident forms qualifying the composite (= formal pluralism). Third, the universal features we reason about, like "animal" generically considered (not *that* animal) exist *in re*: that is, have real existence within each and every hylomorphic

23 On Bacon's distinction between matter, prime matter, and natural matter, see Pereira, "Remarks on *materia naturalis*."

composite expressing them (extreme realism).²⁴ Bacon's generous ontology makes clear how distant was his perspective from that of Albert the Great and Thomas Aquinas, who rejected and criticised Bacon's three main ontological assumptions.

Bacon's adherence to universal hylomorphism entails a grounding role for matter (in general) and prime matter (in particular). If creation as a whole is hylomorphically constituted, prime matter and the first form are the starting point, both logically and ontologically, of the long chain of created beings that ends with the first substances (us and our world of objects of interaction, broadly meant). According to Bacon, angels and souls, complex bodies and elements are all – generally speaking – made of matter and form. They are all hylomorphic composites. Accordingly, hylomorphic composition corresponds to the ontological structure of the created substance as such.

However, not every substance is made of the same matter and the same form. If that were the case, the universe would either be a single thing (one and the same composite) or a mere instantiation of accidents (inhering to a single substance). The richness of individuals and species that characterises the universe requires a plurality of forms. These forms, however, are organised both horizontally and vertically. The existence of a horizontal plurality of forms is easy to assess. In my desk, I have an apple, a book, and a laptop, and they are all composites having different forms (the form of an apple, a book, and a laptop, respectively). Yet that apple is also a fruit, which is also a body: these features are vertical features since they correspond to a series of qualifications within a single considered composite. If we consider these qualifications to be forms which, for the role they play, are not accidental to the composite (after all, how could it be accidental for an apple to be a fruit?), we can envision a plurality of forms within the hylomorphic composite beside the last substantial form – the form of the apple, which corresponds to the most special species (*species specialissima*) of the apple.

Formal pluralism implies a vertical structure of hierarchical forms within the composite, usually referred to as “Porphyryan tree,” following Porphyry's *Isagoge*.²⁵ A most influential version of the Porphyryan tree, close to the text of *Isagoge*, can be appreciated in Figure 4.1.

Bacon emends the traditional version of the Porphyryan tree, updating it to his own ontological perspective.²⁶ However, the main point to consider here

24 See Thomas S. Maloney, “The Extreme Realism of Roger Bacon,” *The Review of Metaphysics* 38/4 (1985): 807–37.

25 On Porphyry's theory and influence, see Christos Evangelou, *Aristotle's Categories and Porphyry* (Leiden: Brill, 1988).

26 Similar adaptations of Porphyry's tree can be found in Gundissalinus and, partially, Ibn Gabirol. Both are the source of generous hylomorphic systems like Bacon's. See Nicola Polloni, *The Twelfth-Century Renewal of Latin Metaphysics: Gundissalinus's Ontology of Matter and Form* (Toronto: PIMS, 2020), 177–209.

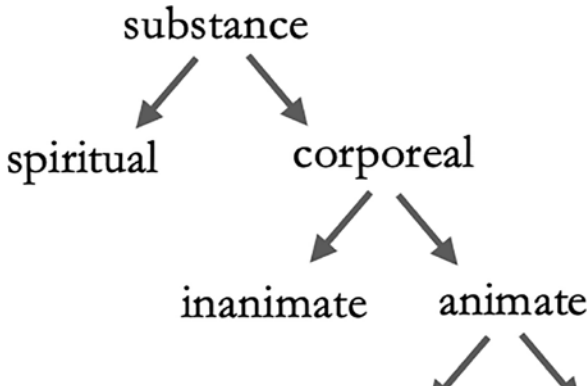


Figure 4.1

is that Bacon's formal pluralism implies a vertical structure of forms within one and the same composite. This scheme is made more complex by Bacon's extreme realism, which implies the presence *in re* of a dual ontological structure of universal and individual features of any considered thing *x*. Again, if we contemplate the case of the apple on my desk, there are two different considerations we can make: on the one hand, *that* apple is *that* fruit and is *that* body (speaking of that individual apple); on the other, *an* apple is *a* fruit and is *a* body (speaking generically of all apples). The assertions of both lines are true and, in order to be so, their trueness must be embedded into the ontology of their object. Therefore, in order for the apple in front of me to be both *that* apple and *an* apple, *that* fruit and *a* fruit, *that* body and *a* body, we must admit that the apple has both individual and universal qualifications in its ontological structure. This is the core of Bacon's realism.

As a consequence, the duality established by individual and universal qualifications entails a duality of vertical structures of forms within the same composite. In other words, one Porphyrian tree is not enough, and there must be two. Of them, one is required by the vertical formal qualifications of the thing as individual, the other by the vertical formal qualifications of the thing as universal, as can be observed by the scheme in Figure 4.2.

Summarily, Bacon envisions a plurality of formal qualifications within the ontological structure of every created being. This ontological complexity is evidently the main feature characterising the creatures in opposition to God's simplicity. At the same time, we have seen that this plurality of forms is organised into two series of vertical chains from the most generic formal feature to its most special one.

Bacon, however, further complicates this already generous picture. Indeed, he accepts a crucial metaphysical principle, which has fundamental implications

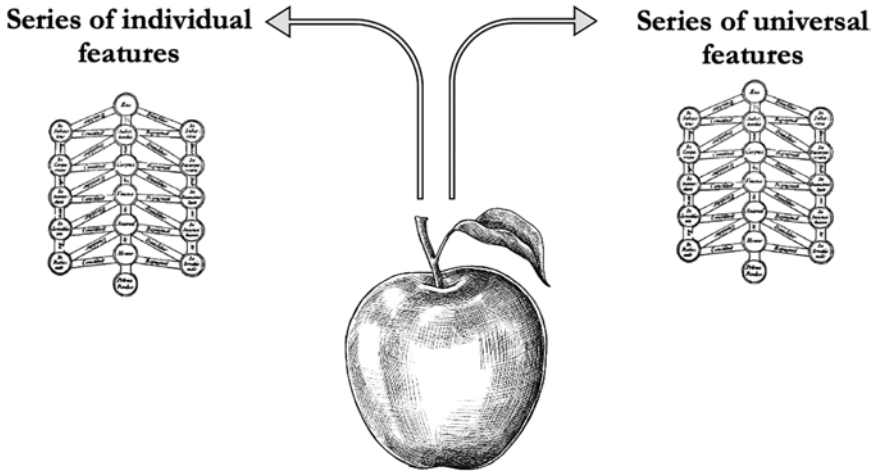


Figure 4.2

for his ontology. This is the principle of perfect hylomorphic correspondence (PPHC), claiming that:

Principle of perfect hylomorphic correspondence (PPHC): *for every level (z) of the specification of a substance x , the form $F_{(z)}$ can be joined to and only to the corresponding matter $M_{(z)}$ of the same level (z).²⁷*

PPHC can be summarised by a simple claim: every form must have a matter apt to it. Following Aristotle, this claim was very common in the Middle Ages. This claim can be contrasted with another very common claim that considered prime matter as able to receive any form. Being completely potential and the substrate of the created universe (considered as either corporeal or as a whole), prime matter must be able to receive the forms of every substance, especially if one considers prime matter as the proximate matter of first substances (this apple, that squirrel) and substrate to one substantial form at a time t_x . From the second claim, some questions seem to arise: if they partake in the same matter, how does it happen that the form of an apple can be joined only to the chunk of matter of that apple and not to the chunk of matter of a squirrel? Why does the apple in

27 For instance, see Bacon, *Communia naturalium*, bk. 1, part 2, 54, ll. 6–13: “Et additur quod si materia propria appropriat formam et e converso, ut Aristoteles sepe dicit, tunc materia communis respondebit forme communi et e converso, et ideo sicut est una forma communissima ad omnes formas substantiarum compositarum, sic erit una materia communissima ad omnes materias substantiarum compositarum, et specialis materia sive specifica, forme specificæ.”

front of me not occasionally become a squirrel? In that case, evidently PPHC must be complemented by additional explanatory tools specifying the intentionality of the acquisition of forms during natural change. Roger Bacon's solution takes another direction.

According to Bacon, without PPHC the natural world would be marked by an ontological anarchy according to which anything could randomly become anything else – something that God can supernaturally make but which does not happen in nature. In addition, Bacon's ontology is marked by some peculiar aspects, as we have seen. He assumes that every composite is not a composite of matter and one substantial form, but many substantial forms. In relation to formal pluralism, we have two possible interpretations of PPHC, depending on what we consider the substrate of this plurality of forms to be.

- 1 *Weak interpretation of PPHC.* A good example of weak interpretation of PPHC is offered by Gundissalinus.²⁸ He claims that every form must be joined to its own matter, but that matter can also be secondary matter. Crucially, secondary matter is not properly matter (as metaphysical entity), but a hylomorphic composite (matter and form) which carries out the function of material cause for the considered thing x (for instance, the timber of a wooden bed). We can evidently say that the matter of the bed is its timber, yet the timber is in itself a composite of matter and form, not just matter. Therefore, we can challenge Gundissalinus's perspective by claiming that secondary matter is not matter (metaphysically speaking), and, accordingly, he is not following PPHC properly. Gundissalinus and many other thinkers accepting the weak interpretation of PPHC could easily reply that matter is characterised functionally by its role of material cause. Therefore, PPHC can be applied to both matter per se (i.e. only prime matter) and secondary matter. Moreover, upholders of a weak interpretation of PPHC could also claim that all forms join prime matter either directly (in the case of the first form) or indirectly (all the other forms, which are united to secondary matter: i.e. composites). In that case, all forms would be joined to their matters, but some matters are hylomorphic composites – that is, first form aside, the matter to which all vertical forms would be joined is secondary matter – without this implying that secondary forms are accidents.
- 2 *Strong interpretation of PPHC.* Bacon does not accept the weak interpretation exemplified by Gundissalinus. According to Bacon, the claim that a form must be joined to a matter proper to it entails that every form is joined to its own metaphysical matter (matter as metaphysical ingredient) and not to a secondary matter (physical matter as a composite). According to Bacon, PPHC describes the ontological correlation between form and matter established by (def₆). Therefore, it must be referred to the relationship between true matter and form, not to the hylomorphic composite and a form. If that

28 See Polloni, *The Twelfth-Century Renewal of Latin Metaphysics*, 54–76.

were the case, all other forms following the first hylomorphic union would be accidents, not substantial forms.²⁹ As a consequence, one has to admit that every substantial form has its own matter and that the matter they join is truly and not equivocally matter.³⁰

As we have seen, Bacon locates within every composite two vertical series of forms, one individual, the other universal. Should we assume that every form of each series has its own matter? According to Bacon, they do. The perfect correspondence of form and matter is required at each level of the specification of a substance. The substantial union of the composite entails this correspondence. Therefore, as the first form must be joined to prime matter at level (z), also the form of corporeity must be joined to its correspondent corporeal matter at level ($z+1$). This requirement has two central implications:

- 1 There is a plurality of matters vertically ordered to mirror the vertical order of their corresponding forms.³¹
- 2 These matters are specified independently from the forms since otherwise they would be hylomorphic composites.³²

Because of his strong interpretation of PPHC, Bacon triples his Porphyrian trees in the renowned illustrations accompanying the *Communia naturalium*.³³ Because each level requires both specified forms and matters, Bacon has to include a tree for the specification of both form and matter, together with the main tree presenting the specification of the composite. They are then doubled, since there is one series for the individual features and one for the universal features. Accordingly, the picture is much more complicated than the one presented in Figure 4.2, and we now have six trees for one apple, as it can be seen in Figure 4.3.

This is not the right place to further dive into the ontology elaborated by Bacon, and I will dedicate another contribution to this specific point of his metaphysical thought. Before going back to the problem of matter's conceivability, I want to stress two final points. First, although all Bacon's trees are required by PPHC, he appears to prioritise ontologically the tree of

29 In Gundissalinus's weak interpretation of PPHC, all the vertical forms following the first form are not accidents because they do not follow temporarily the formation of the substance. They are all joined to prime matter in a single moment and cannot be separated from it. His account is nonetheless untenable from an Aristotelian perspective.

30 See Bacon, *Communia naturalium* bk. 1, part 2, 58.

31 See Bacon, *Communia naturalium*, bk. 1, part 2, 57: "Set diferencie substanciales sunt specifice, ergo diferencie specifice materiales adduntur ad materiam, quare habet diferencias substanciales especificas per quas dividitur et specificatur, sicut forma et compositum."

32 See Bacon, *Communia naturalium*, bk. 1, part 2, 57–58. Bacon does not elaborate a proper justification of how matter can be specified without a form, and, as we shall see, he often dismisses the problem by appealing to the specification of the form, which is assumed yet not properly justified. A comprehensive examination of Bacon's ontology of matter will be discussed elsewhere.

33 See Bacon, *Communia naturalium*, bk. 1, part 2, 8–89.

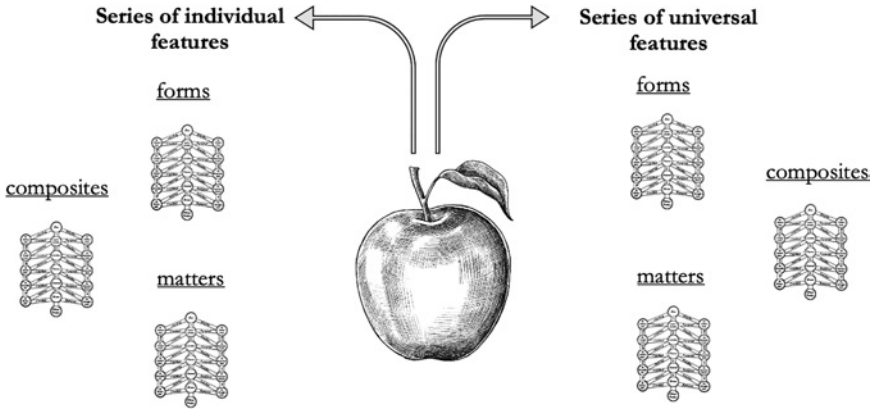


Figure 4.3

individual composite. Indeed, that tree presents the hylomorphic structure of the first substances we interact with, which are subject to natural change and human manipulation.

The second point I want to stress is connected to the priority of the individual tree of the composite in relation to the tree of matter. Bacon's distinction between the two allows us to properly locate in two different trees the references to matter considered metaphysically (specific matter) and functionally (secondary matter). Indeed, Bacon's theory distinguished between:

- 1 *Specific matter*, which is matter considered as a metaphysical constituent of the composite, together with its form. Following the requirements of Bacon's strong interpretation of PPHC, matter is differentiated into a plurality of specific matters which are the members of the tree of matter;
- 2 *Secondary matter*, which is matter considered as the material of the composite (its functional matter, like the timber of a wooden bed). It is not properly matter but another (potential) level of hylomorphic composite indicated by the tree of the composite.

Following this brief examination of the main coordinates of Bacon's ontology, it seems that his strong interpretation of PPHC is much consistent with the analogical strategy discussed in *Questions on Physics*. In fact, the strict correspondence established by PPHC appears to imply that matter can be known only by the form – each matter by its own corresponding form. Nonetheless, the problem of how prime matter can be conceived still needs something more than this. The analogical relation is established by the consideration of the hylomorphic correlation

within a composite. However, under what circumstances can we gain knowledge of the most generic of these specific matters, prime matter?

One matter, many matters

Bacon criticises harshly and repeatedly any stance claiming that there is only *one* matter – namely, prime matter – common to everything. This position is evidently opposed to Bacon’s strong interpretation of PPHC and its distinction among different species of matter vertically positioned in the Porphyrian tree of matter, at different degrees. Bacon discusses the problem of the unicity of matter at length in his *Opus tertium*.³⁴ If matter were numerically one by essence, as supposedly some “students of theology and philosophy” claim, a series of inadmissible consequences would follow.³⁵ The differences among things would disappear as everything would essentially be matter. Natural generation would consist of the generation of forms only, while in nature, both matter and form are generated.³⁶ Even more, one should admit that if matter were one and the same for everything, there would be nothing else apart from the *genus generalissimum*, the most general of all genera and the top of the Porphyrian tree of the composite. Its matter, which is prime matter, is indeed completed by the first form, and, therefore, it cannot be joined to any other form by reason of PPHC.³⁷

Upholders of matter’s unicity, however, could still claim that matter, if it is not maintained as numerically one, would be considered as a genus or a universal.³⁸ According to Bacon, the error implied by this claim is originated by the bad Latin translations of Aristotle’s works. Following those mistaken translations, Bacon’s opponents reckon that only the form is able to divide a genus into its species. As we have seen, this cannot be the case: PPHC implies that matters are specified without any recourse to the form. In the *Communia naturalium*, Bacon repeatedly refers to the intrinsic distinction of matter into species as a given. In the *Opus tertium*, he engages with this problem in a slightly different way. Within this discussion of matter as species and genus, Bacon observes that:

Indeed, they say this: “Let us remove by intellect the form from a star and a stone and whatever else. Since the form divides and distinguishes – because, as Aristotle says, the act divides – as a consequence this matter (the matter of the star) will not have any feature by which it can be different from that

34 See Bacon, *Opus tertium*, part 1, 248–278. In the *Opus tertium*, Bacon goes back to the treatment of the problem of the unicity of matter, which he also addresses in the *Opus maius*. See Bacon, *Opus maius*, part 5, 143–148.

35 See Bacon, *Opus tertium*, part 1, 250.

36 See Bacon, *Opus tertium*, part 1, 250–254.

37 See Bacon, *Opus tertium*, part 1, 254–256.

38 See Bacon, *Opus tertium*, part 1, 256–258. In his reply, Bacon observes that matter cannot be considered as predicable and that the claim does not follow Aristotle’s *Metaphysics*, also because of the bad translations that were available at that time.

matter (the matter of the stone), for which reason it will be one and the same [matter].” This is infinite foolishness.³⁹

In order to prove that matter is one, Bacon’s opponents argue for an abridged account of negative abstraction. First, we consider two or more things of different species – in Bacon’s passage, a star and a stone. Second, we abstract from them their form: namely, the form of the star and the form of the stone. Third, we compare what is left: supposedly, the matter of the star and that of the stone, which are joined to their respective forms. Since these matters are distinguished only by the form of the star and the stone, respectively, we cannot distinguish between them, and it should be conceded that they are one and the same matter. Therefore, matter is one. Bacon calls this argument an “infinite foolishness.”

A few central considerations need to be stressed here. It should be noted that negative abstraction usually corresponds to a mental removal of qualifications from a considered thing *x*. When considered ontologically, these epistemic qualifications (from the redness of an apple to its corporeity) can evidently be either incidental or substantial. And when substantial qualifications are considered, they can correspond to one or many substantial forms, depending on the ontological inventory of the author. Although the abstractive procedure can be applied in both monomorphist and pluralist accounts of substantial form, Bacon’s account only mentions one substantial form for each case: respectively, the form of the star and the form of the stone. Accordingly, we may suppose that the hylomorphic relation assumed by Bacon’s rivals is monomorphic – that is to say, one substantial form for one chunk of (prime) matter. It is only by reason of this ontological point that the removal of the substantial form from the star and the stone would unveil one undifferentiated and unqualified substrate which, as such, must be the same for both the star and the stone.

Evidently, Bacon’s ontology is radically opposed to the parsimonious hylomorphism entailed by monomorphic accounts of this sort. His main concern seems to be the complete lack of graduality maintained by these positions. The universe, and the knowledge we can have of it, are intrinsically characterised by different degrees of ontological and epistemological qualifications.⁴⁰ As we have seen, many of these qualifications depend on forms that are vertically ordered in the

39 Bacon, *Opus tertium*, part 1, 260: “Nam arguunt sic: ‘Excludamus per intellectum formam a stella, et a lapide, et a quocunque. Cum igitur forma dividit et distinguit, quia actus dividit, ut Aristoteles dicit, ergo materia hinc inde non habebit quo secundum se differat: quare erit una eadem.’ Hic est stultitia infinita.”

40 The truth of an assertion depends on its being ontologically grounded in the things it judges in a process mediated by the species. The species proceed from the intellected thing to our intellect, ensuring the correspondence between the external world and its mental representation. The process is based on what David C. Lindberg has called the “principle of homogeneity,” claiming that the ontological structure of the thing is represented by the species of that thing and represented in our mind. See Lindberg, *Roger Bacon’s Philosophy of Nature*, lvi–lxi. For an overview of the application in natural philosophy of the theory of species in the thirteenth century, see Donati, “Tra psicologia e filosofia della natura,” 277–336.

Porphyrian tree of the form, from the most generic to the most specific form. Nonetheless, this vertical order also requires a plurality of matters mirroring the same order of the forms because of Bacon's strong interpretation of PPHC. It is from the encounter of matter and form at each level of these series that a third order originates. This is the Porphyrian tree of the composite, which is ontologically and epistemologically prior to the other trees because it deals with substances (i.e. the composites). In order to have this series, which corresponds to the order of secondary matters for each considered thing *x*, one has nonetheless to admit a material plurality able to meet the formal plurality of the considered thing *x*.

According to this ontological perspective, Bacon's reply to the argument from negative abstraction in the *Opus tertium* is based on a distinction among species of matter. Echoing his discussion of the same topic in the *Communia naturalium*, Bacon clarifies that the specification of matter into genus and species is not caused by the form. On the contrary, it is an *essential difference*, which is, therefore, intrinsic to the being of specific matters and distinguishes them, similarly to how a specific form is distinguished from another in reason of its essential difference.⁴¹

Yet a possible contradiction seems to arise here. If there is an order of matters which originates from a most general matter, this appears to entail there indeed being a common matter – supposedly, prime matter – shared by all created beings. In other words, it seems that Bacon should admit what he wants to exclude. The contradiction, however, is only apparent. Bacon never challenged the existence of prime matter, which is the matter of the *genus generalissimum*. What he challenges is that prime matter is the proximate matter of the first substances – the matter of an apple and a table, a squirrel and a bench. As we have seen, this cannot be the case because any substance has two “matters,” so to say, one of which is its metaphysical component and the other its functional substrate. The latter is connoted as physical and corporeal, in the case of bodies, and spiritual in the case of incorporeal being – yet, in both cases, it corresponds to their potency. Therefore, in every created being after the first genus, we can distinguish between:

- 1 Its *proximate* or *most specific matter*, which is the matter required by the most specific form (the form of the *species specialissima*) and corresponds to the metaphysical part of the composite *x*;
- 2 Its *secondary matter*, which is the hylomorphic composite providing the material of the considered thing and corresponds to the functional matter of the thing *x*.

According to Bacon, prime matter is the hylomorphic component of the *genus generalissimum* only and nothing more than that. In fact, prime matter cannot even be the secondary matter of corporeal and spiritual substance as such, the first

41 A thorough discussion of this point will be presented elsewhere.

species of the *genus generalissimum*. Their secondary matter is the *genus generalissimum* itself, the generic matter of the universe: the tree of secondary matters, indeed, is the tree of the composite, not that of matter. As a consequence, prime matter cannot even be the substrate of natural change, which is natural matter, a hylomorphic composite at the third level of the tree of composite.⁴² Accordingly, prime matter is only the metaphysical part of the *genus generalissimum*, following the tree of matter.

Being so remote from us, as a metaphysical component of the *genus generalissimum*, how can prime matter be known? The only available path seems to be negative abstraction, by which we can go “below” what we see in the first substances.⁴³ The abstractive procedure, however, cannot get to know prime matter or any specific matters directly. As we have seen, matter considered as a metaphysical component can only be known by analogy to the form. Nonetheless, abstraction allows us to move upwards in the tree of the composite, from a more special secondary matter to one less so. In fact, we can proceed with the removal of all qualifications until we find their common substrate. According to this process, we can even get to conceive the generic matter of the universe, which is the *genus generalissimum* – not prime matter:

If we compare everything with the most general of all genera, [we see that] everything is one in it and it is the matter which is in potency to everything. And if we talk only about natural things, then all of them are one according to natural matter, which is the third genus – that is, the non-celestial corporeal substance – because that is common to all natural things and in potency to and is divided into all of them. And this is what Aristotle meant.⁴⁴

Nonetheless, this epistemic strategy is only able to gain knowledge of matter considered as secondary matter. The removal of qualifications can only provide

42 See Bacon, *Communia naturalium*, bk. 1, part 2, 78.

43 See Bacon, *Opus tertium*, part 1, 266–268. It should be noted that a simplified version of the same procedure is discussed by Geoffrey of Aspill in his *Questions on Aristotle's Physics*. See Geoffrey of Aspill, *Questions on Aristotle's Physics*, edited by S. Donati and C. Trifogli (Oxford: Oxford University Press, 2017), I, 43, 194. There, Aspill uses negative abstraction to conceive prime matter directly rather than indirectly, as Bacon does. At the same time, Aspill requires the abstraction of both form and matter when abstracting the *differentiae* – a probable consequence of his adherence to PPHC. Differently from Bacon, however, Aspill tries to justify how matter can be differentiated intrinsically by the position of *potentiae minutae*. On this point, see Cecilia Trifogli, “Geoffrey of Aspill on Matter,” in *Materia: Nouvelle perspectives de recherche dans la pensée et la culture médiévales (XIIe–XVIe siècles)*, edited by T. Suarez-Nani and A. Paravicini Bagliani (Florence: SISMEL, 2017), 99–122.

44 Bacon, *Opus tertium*, part 1, 268: “Et similiter, si omnia comparantur ad genus generalissimum, omnia sunt unum in eo, et ipsum est materia, quae est in potentia ad omnia. Et si de naturalibus rebus loquamur solum, tunc omnia sunt unum secundum materiam naturalem, quae est tertium genus, scilicet substantia corporea non coelestis; quia istud est commune omnibus naturalibus, et est in potentia ad omnia, et dividitur in omnia; et sic intendit Aristoteles.”

knowledge of the substrate below what we see. Yet that substrate is a composite (it is secondary matter), not matter properly considered. Therefore, the mistake that Bacon's opponent made was to apply the abstractive method to the consideration of matter as a metaphysical rather than a functional aspect of the composite. As Bacon observes,

In this way we do not consider matter like in the said error. There, indeed, matter is considered as (a.) the other part of the composite, which is a simple substance essentially different from the form. Here, in turn, we consider matter as (b.) some incomplete composite, which is the essence of some genus that is in potency to the species following it. And matter is always interpreted in this way according to natural philosophy as a whole and when we talk about the subject of generation, which is matter. On the contrary, the metaphysician mainly examines that simple matter, because in the seventh book of *Metaphysics* it is ascertained that matter is other than the essence of whatever predicable, and much more.⁴⁵

By removing qualifications, we can climb up the tree of the composite and acknowledge that there is a generic composite matter which is the potential substrate of every existing thing: the generic matter conceived by negative abstraction. It is the most general substance, the *genus generalissimum* – the composite of prime matter and the first form. This entity is both the peak of the tree of the composite and the remote potency of every hylomorphic composite. By abstraction, indeed, we can grasp matter “as some incomplete composite” (*pro quodam composito incompleto*) – the generic matter which is the remotest hylomorphic substrate of the thing we abstract from. In turn, metaphysics is primarily engaged with another notion of matter, “as the other part of the composite” (*materia quae est altera pars compositi*). This matter corresponds to the sixth definition of matter given in the *Communia naturalium* and cannot be known in this way. As we have seen, the only way that matter can be known is by analogy.

Conclusions

Given this context, it is now possible to answer the question of how prime matter can be known. Bacon's dual consideration of matter led him to consider negative abstraction as the means to get vertically through the tree of the composite until the prime composite (the *genus generalissimum*) is met. The abstractive procedure

45 Bacon, *Opus tertium*, part 1, 268: “Et in his modis non sumitur materia sicut in errore dicto. Nam ibi sumitur pro materia quae est altera pars compositi, quae est substantia simplex, diversa in essentia a forma: sed hic sumitur materia pro quodam composito incompleto, quod est essentia aliqujus generis, quae est in potentia ad species consequentes. Et hoc modo semper accipitur materia per totam naturalem philosophiam, et quando loquimur de subjecto generationis, quod est materia. Metaphysicus vero considerat principalius de illa materia simplici, quia de illa verificatur illud in septimo Metaphysicae, quod materia alia est ab essentia cujuslibet praedicabilis; et multa alia.”

is not able to get to prime matter, differently from what Calcidius, Bonaventure, or the *Summa Halensis* maintained.⁴⁶ Any abstraction focuses on a more generic form, leaving aside the other qualifications. In prime matter, however, there are neither forms nor qualifications that can be kept. Accordingly, the only way to know it is by analogy. Only the analogical procedure is able to get to the metaphysical matter of the composite by examining its correlation to the form horizontally. Although Bacon does not answer this question directly, it seems plausible to suppose that, following his line of thought, prime matter can be known by a combination of these methods, in two steps:

- 1 By abstraction, one can get to the prime composite, the *genus generalissimum*;
- 2 By analogy, one can consider the hylomorphic components of the prime composite: prime matter and the first form.

As we have seen, Bacon's ontology of matter is very generous. He crucially distinguishes between two different considerations of matter. On the one hand and properly speaking, matter is the metaphysical component of the composite, which can be known by analogy to the form. On the other hand, matter is the functional substrate of the composite, which can be known by abstraction or *resolutio*.

Evidently, the distinction between secondary matter and metaphysical matter is not original to Bacon. However, his ontology accomplishes a strict distinction between these two meanings of matter, privileging the former to the latter. Proper matter is only the hylomorphic partner of the form within the composite. Accordingly, prime matter carries out a rather minor role in Bacon's ontology in comparison with other authors of his time, often positing prime matter as the direct ingredient of first substances – a position famously held by Aquinas. In turn, Bacon entrusts prime matter with a function that is ontologically prior because prime matter is the ingredient of the first genus. However, the function carried out by prime matter is also epistemologically minimal since it does not play any central role as explanatory device in either metaphysics or natural philosophy.

The function of the central explanatory device is indeed carried out by secondary matters. Only this kind of matter – a hylomorphic composite – is able to express the central characteristics of Aristotelian matter as (i) potency of the composite and (ii) substrate of change. It is now clear why Bacon claims that only (def_6) is the proper definition of matter, metaphysically considered. In fact, the definitions of matter as substrate of alteration (def_4) and of generation and corruption (def_5) correspond to functional definitions of matter as secondary matter and, more specifically, of natural matter, the first substrate of natural change and itself a hylomorphic composite.

46 For instance, see Bonaventure, *Commentarius in secundum librum Sententiarum* (Quaracchi: Ex Typographia Collegii S. Bonaventurae, 1882), dist. XII, art. 1, q. 1. See also Polloni, "Conceiving Prime Matter in the Middle Ages."

If a potency is always the potency of a thing x to become its opposite y , then the potency of $(x \rightarrow y)$ to happen must be expressed by a substrate in which the contrariety between x and y is resolved. Yet Bacon considers a contrariety primarily as the opposition within the same genus k that is divided into two opposite species x and y . Therefore, the matter expressing the potentiality to change cannot be the specific matter but the secondary matter expressing the proximate genus of the *species specialissima* that is in potency within it. Similarly, when natural change occurs, there must be an enduring substrate z which persists when $(x \rightarrow y)$ happens; otherwise, the process would correspond to an annihilation of x and a creation of y rather than to natural substantial change. That substrate z cannot be proper matter because matter is correlated to the specific form, and, according to Bacon, when $(x \rightarrow y)$ happens, necessarily also $(Fx \rightarrow Fy)$ and $(Mx \rightarrow My)$ happens.⁴⁷ As a consequence, the matter of neither x nor y can endure substantial change. Therefore, the substrate of natural change must be a hylomorphic composite: natural matter, the third degree of specification of the tree of the composite. Change happens on that natural substrate by means of species which, consistently, are hylomorphic composites as well.⁴⁸

We can appreciate here the fundamental difference that Bacon establishes between natural philosophy and metaphysics. Change happens by contact, and contact implies a dimensionality which is proper to the composites only. Therefore, Bacon envisions natural philosophy as the realm of interactions among composites at different levels. Metaphysics, in turn, examines how the composite is, and only within its disciplinary boundaries can we distinguish between matter and form, as aspects or ingredients of the composite.

It is by reason of this epistemological and ontological distinction that, according to Bacon, prime matter has not the relevance and pervasiveness it shows in other metaphysical systems, like Richard Rufus's or Aquinas's. His account of universal hylomorphism implies a plurality of matters and forms following the assumption that no form can be without matter. The common substrate implied by Bacon's universal hylomorphism, however, is not prime matter but the *genus generalissimum*.

47 See Bacon, *Opus tertium*, part 1, 250–254.

48 See Bacon, *De multiplicatione specierum*, part 1, 28–30.