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Same Spirit, Different Structure: Francis Bacon on Inanimate and Animate Matter

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Abstract

This article argues that for Francis Bacon there is only one type of spiritual matter, which acquires different qualities and performs different functions within bodies depending on the structure it has. In order to prove this hypothesis, the paper takes as a case study the process of spontaneous generation, where there is no pre-existent spirit, as contrary to the case of the generation out of seed. For Bacon, tangible matter is prepared to produce certain species, leaving to the spirits the function of shaping what lies in matter in potency.

Keywords

Francis Bacon – vital spirit – animate and inanimate matter – spontaneous generation

1 Introduction

In recent years, Bacon scholarship has changed its focus from the *Novum organum* and the *De augmentis scientiarum*, seen as the theoretical works in which Bacon exposes his method, to the natural and experimental histories and his matter theory. Several studies have argued that these latter works are crucial for understanding Bacon's methodological writings, and that there is no tension between his speculative ideas about matter theory, his methodological

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advice, and the collections of experiments. For example, Graham Rees has argued that matter theory is a unifying factor of Bacon's philosophy; while Dana Jalobeanu has shown that Bacon's experiments are searching for the sources of causation that lie behind all the phenomena, that is, the activity of spiritual matter.¹

As causal agents, spirits are responsible for both the visible phenomena we observe, and for the qualities of all the bodies. However, with few exceptions, scholars have referred to spirits without a thorough analysis of their functions in Bacon's natural philosophy. For instance, Bacon's distinctions between animate and inanimate bodies, and between non-living and living bodies (which are the two branches of the animate), are explained in terms of differences of the spirits they contain.² In the *Historia vitae et mortis* and *De vijs mortis* Bacon distinguishes spirits between "mortuales" and "vitales";³ the former being in all bodies and leading to their dissolution, and the latter in charge of the vital function of plants and animals. Several scholars, such as Daniel Paul Walker, Graham Rees or Silvia Manzo, have taken them to be two different classes of spiritual matter, and have in their brief analyses emphasised their differences.⁴ However, none of them has attempted to explain the relation between the two 'classes' of spirits and how they are responsible for three types of beings – inanimate, animate but non-living, and animate and living.⁵

My aim in this paper is to show that, for Bacon, the differences between inanimate and animate beings (and further between non-living and living) are the result not of different classes of spirits, but of different structures in the

1 Graham Rees, "Matter Theory: A Unifying Factor in Bacon's Natural Philosophy," *Ambix*, 24 (1977), 110-125; Dana Jalobeanu, *The Art of Experimental Natural History: Francis Bacon in Context* (Bucharest, 2015), 256-263.

2 Individual bodies are composed of tangible and pneumatic matter. The former is dense, heavy and inert, the latter is rare, light and highly active. Spirits are a particular kind of pneumatic matter, a composition of airy and fiery pneumatics. Thus, in what follows, when I use the term 'spirits' I refer to these specific pneumatics, and when I use the term 'matter' I refer to tangible matter, even if spirits are, for Bacon, also material, but very subtle.

3 See the *Historia vitae et mortis* in Graham Rees, ed., *The Oxford Francis Bacon XII* (Oxford, 2007) [hereafter OFB XII], and the *De vijs mortis* in Graham Rees, ed., *The Oxford Francis Bacon VI* (Oxford 1996).

4 See Daniel Paul Walker, *Music, Spirit and Language in the Renaissance* (London, 1985), ch. "Francis Bacon and *Spiritus*," 121-130; Graham Rees, "Introduction," in Francis Bacon, *Francis Bacon's Natural Philosophy: A New Source. A Transcription of Manuscript Hardwick 72A with Translation and Commentary* (Oxford, 1984); Silvia Manzo, *Entre el atomismo y la alquimia: La teoría de la materia de Francis Bacon* (Buenos Aires, 2006), 32-43.

5 Inanimate bodies for Bacon are stones and minerals, animate and non-living bodies are plants, and living beings are animals, including humans. I will discuss these differences in detail in section 3.

same spirit. These different structures make spirits acquire different qualities, primarily inflammability, which, in turn, allows them to perform additional functions, in this way making the bodies in which they reside more complex.

In order to support this hypothesis, I will focus on spontaneous generation and its comparison to the generation out of seed. Spontaneous generation represents a paradigmatic case, for two main reasons. First, the spirit of the new being is not contained in the seed, but it is originating in other beings, which means it cannot be responsible for the species the new being pertains to. Second, sometimes spontaneous generation creates species that even cross the genera: earth, which is inanimate, creates plants, which are animate. As Bacon explains in the *Sylva Sylvarum*:

we see that in living creatures coming out of putrefaction, there is much transmutation of one into another; as caterpillars turn into flies; etc. And it should seem probable that whatever creature, having life, is generated without seed, that creature will change out of one species into another. For it is the seed, and the nature of it which locketh and boundeth in the creature, that it doth not expatiate. So as we may well conclude, that seeing the earth of itself doth put forth plants without seed, therefore plants may well have a transmigration of species.⁶

Spontaneous generation is thus used as a proof that the transmutation of species is possible. Because there is no seed to 'lock' the new individual, it can change its species, and sometimes it can even remain in between two species, having characteristics of both. I will focus on the generation of plants because, generally showing a great interest in plants, Bacon dedicates a full section of the *Sylva* to those that are generated spontaneously.⁷ Moreover, given that they

6 Francis Bacon, *Sylva Sylvarum*, intro to exp. 526, in James Spedding, Robert Leslie Ellis and Douglas Denon Heath, eds., *The Works of Francis Bacon, Baron of Verulam, Viscount of St. Alban, and Lord High Chancellor of England*, 14 vols., (London, 1857-1874) (facsimile reprint Stuttgart-Bad Cannstatt, 1961-1963) [hereafter SEH], vol. II, 507-508. The status of the *Sylva* among Bacon's writing has been challenged, given the mysteries surrounding its publication. In any case, even if it was a notebook not meant for publication, the *Sylva* is very telling of Bacon's ideas and his methodology of compiling natural histories (on this see Doina-Cristina Rusu and Christoph Lüthy, "Extracts from a Paper Laboratory: The Nature of Francis Bacon's *Sylva Sylvarum*," *Intellectual History Review*, 27 (2017), 171-202).

7 Because of their special position between inanimate beings, such as stones and animate beings, animals and humans, Bacon uses plants as a model for different processes, which can be further translated for the case of animals. On the central position of the study of plants in Bacon's philosophy, see Doina-Cristina Rusu, "Rethinking *Sylva Sylvarum*: Francis Bacon's Use of Giambattista Della Porta's *Magia Naturalis*," *Perspectives on Science*, 25 (2017), 1-35, and Dana

are simpler than animals, plants are produced spontaneously more often than animals.

In the following section I will compare spontaneous generation to the generation out of seed. This will elucidate the role played by tangible matter in binding the species, and the way in which the qualities of matter are responsible for the type of being created. In the third part, I will analyse the activity of the spirits and the processes leading to the production of life. In this way, I will explain why I think that, for Bacon, there is only one spirit, which acquires different qualities and more complex functions when structured in a specific way.

2 Spontaneous Generation and Generation out of Seed

For Bacon, there are four elements needed for vivifying: “an enclosed spirit, heat attenuating and dilating the spirit, soft and sticky matter, and a matrix closed up for the right length of time.”⁸ These requirements are the same for beings – plants and animals – generated spontaneously by putrefaction and those generated out of seed. Beings generated out of a seed are in general more complex than those generated spontaneously. In the *Sylva Sylvarum*, Bacon compares the two types of generation in order to account for their respective complexity:

The first [difference] is that creatures which have a definite and exact shape (as those have which are produced by copulation,) cannot be produced by a weak and casual heat; nor out of matter which is not exactly prepared according to the species. The second is, for there is a greater time required for maturation of perfect creatures; for if the time required in vivification be of any length, then the spirit will exhale before the creature be mature; except it be enclosed in a place where it may have continuance of the heat, access of some nourishment to maintain it, and closeness that may keep it from exhaling: and such places are the wombs and matrices of the females.⁹

Jalobeanu's article in this issue. Jalobeanu argues that for Bacon plants are “alchemical laboratories,” where several chemical transformations can be investigated.

8 Francis Bacon, *Historia et inquisitio de animato et inanimato*, in Graham Rees, ed., *The Oxford Francis Bacon XIII* (Oxford, 2000) [hereafter OFB XIII]. Vivification is for Bacon the process through which matter becomes animated and a new individual is produced. Both spontaneous generation and the generation out of seed are instances of vivification, and the aim of this paper is to show that they are more similar than they may seem.

9 Bacon, *Sylva Sylvarum*, exp. 900, SEH II, 638-639.

A first observation to be made is that Bacon does not mention any difference regarding the spirit. Spirits 'figurate' the new creatures, as they are the causal agents of any process, and thus vivification is defined as a result of their motion, and yet they are not mentioned in this list of differences. I will return to this problem in the third section, but for the rest of this section I will focus on the differences Bacon does mention.

I will start with the second of the differences, the matrix. The matrix provides heat, nourishment and closeness. What is interesting is that in the definition of vivification in the *Sylva*, the matrix is not mentioned.¹⁰ This means that vivification is possible without a matrix. The matrix is compulsory for the growth and development of perfect creatures, because more time is required for the 'figuration' of their parts and organs, but it is not necessary for their generation. Contrary to this, spontaneous generation happens immediately, which means that the matrix is not needed, and, as a consequence of this absence, that these imperfect creatures have no distinct parts or internal organs, because the spirit did not have the necessary time to shape them.¹¹

The first difference contains two elements, heat and matter. This heat seems to be different from that other heat mentioned in relation to the matrix, because it concerns only the exact moment of generation, while the heat of the matrix concerns the entire process of the development of the foetus. The spirit itself has the capacity to shape a new individual through its figurative motions, but unless it is excited or set in motion by the right kind of heat, the process will not begin.

Let's now turn to the second element of the first difference, matter. Bacon's affirmation that matter has to be "prepared according to the species" clarifies not only why beings produced out of seed are more complex, but also his theory regarding the continuation of species.¹² In the *Historia et inquisitio de animato et inanimato*, Bacon makes it clear that "the earth puts forth from itself plants many and various without seed or the equivalent of seed from

10 "There must be heat to dilate the spirit of the body; an active spirit to be dilated; matter viscous or tenacious to hold in the spirit; and that matter to be put forth and figured." Ibid., exp. 696, SEH II, 559.

11 Plants, as we will see further, can be perfect or imperfect. But the case of animals is even more interesting, because animals are generally more complex than plants. In experiment 696 of the *Sylva* Bacon mentions that animals bred by putrefaction, especially insects, are bloodless, and moreover, that the juices of their bodies are a compacted mass, and not separated into blood, flesh, skin, and bone, as the juices of perfect creatures. Ibid., 559-560.

12 Bacon's account of species is a complex one and exceeds the scope of this paper. However, because it is connected with vivification and the generation of new individuals, it is worth mentioning that tangible matter has a central role in the stability of species.

aggregations of juices within the earth.”¹³ The tangible matter of the seed has the function to bind the spirit and constrain it to shape one species or another. But in the case of the aggregation of juices the constrain is very weak and leads to the apparition of monsters and individuals without any stability, which change from one species into another, as we have seen in Bacon’s introduction to experiment 526 of the *Sylva*. However, even if matter is not prepared for a certain species, there is a strong connection between the type of matter upon which a creature appears and the type of creature it is. Several instances in the *Sylva Sylvarum* are designed precisely to investigate the relationship between types of earth, or any other substance that can produce life, and the species that grow in it without a seed.¹⁴ This is relevant, because in this way Bacon establishes a hierarchy of plants which, as we will see below, is relevant for the way in which he describes the ‘chain’ of being.

Among the plants that are generated spontaneously Bacon distinguishes between rudiments of plants and excrescences on the one hand, and perfect plants on the other. The first are not proper plants with a root, stalk and leaves, but some kind of vegetative life without a proper figure. In this first category he places moss, mushrooms, prickles of trees and mistletoe. Moss, for instance, is a rudiment of plants, which means that it is inferior to other plants which are bred of putrefaction and which are ‘more specific and figured.’ Particular to moss is that it appears in dried substances, which do not have enough moisture “to put forth a plant” and thus “do practice germination by putting forth moss.”¹⁵

Next, mushrooms are of a fat and concocted moisture, and they can only grow in a kind of earth which possesses the same qualities. Further, the plants that are excrescences, such as prickles, are caused by the desire of spirits to bring forth new boughs, which, however, is prevented by the closeness of the bark.¹⁶ In order to produce a bough, the spirit needs a large quantity of nourishment, which cannot get out if the bark is too closed, and thus the little

13 Bacon, *Historia et inquisitio de animato et inanimato*, OFB XIII, 229.

14 In experiments 547-562 of the *Sylva*, on rudiments, excrescences and super-plants, many of them study not only the type of earth that creates mushrooms and other plants without seed, but also the question of what substances can be added to increase the production. Further, experiments 563-573 investigate the production of perfect plants without seeds, by connecting types of earth with certain species that grow in it; see Bacon, *Sylva Sylvarum*, SEH II, 512-518.

15 Ibid., exp. 537, SEH II, 511. Bacon suggests here that the earth itself has a desire to put forth plants, and even when the conditions are not favourable, there is one species of plants, the simplest one, that can be produced. The substances that produce moss are dried earth (including tiles and walls), old earth and old trees; *ibid.*, exp. 537-546, SEH II, 510-512.

16 On trees creating other forms of life see Dana Jalobeanu’s article in this issue.

quantity of nourishment or sap transforms into a prickle.¹⁷ The mistletoe is a special case, because it is the only super-plant that is 'figured,' and it grows because there is an abundance of sap which the tree cannot assimilate, so that the sap becomes the tangible matter of another plant.¹⁸ We can conclude that moisture is needed for the generation of plants, and plants are more complex when this moisture is of an oily and less watery nature. In order to understand this hierarchy of plants, we have to introduce some further elements of Bacon's matter theory.

Bacon's universe is not divided only into tangible and pneumatic, but also into sulphurous and mercurial.¹⁹ While it is not the aim of this paper to enter into details regarding these "two families of things,"²⁰ as Bacon calls them, I would simply like to mention that the difference between the two consists in the degree of concoction or digestion. Those things that pertain to the sulphurous family are more concocted than the others, which is to say that, in the case of tangible matter, they are more oily than watery, and in the case of pneumatics, they are more fiery than airy. Most of the bodies are a mixture of the two, so, for example, plants are formed of tangible matter, which is both watery and oily, and of pneumatic matter, which is both airy and fiery. I will return to pneumatic matter in the last section. For the moment, let us look at the tangible matter.

17 "The cause must be, hasty putting forth, want of moisture, and the closeness of the bark; for the haste of the spirit to put forth, and the want of nourishment to put forth a bough, and the closeness of the bark, cause pickles in boughs; and therefore they are ever like a pyramis, for that moisture spendeth after a little putting forth." Bacon, *Sylva Sylvarum*, exp. 559, SEH II, 515.

18 A super-plant is a plant that grows not in soil or water, but on another plant. 'Figured' means that its parts are distinguishable into roots, stalk, leaves, flowers, etc., while 'non-figured' plants are confused, such as moss. In animals the situation is different, though. While perfect plants can be produced through spontaneous generation, perfect animals are mostly the result of copulation. Those produced by putrefaction will be imperfect. As we have seen, this is not the case with plants. Some plants that grow out of putrefaction are imperfect or rudiments of plants, but some can also be perfect plants. One possible explanation might be that animals, being more complex than plants in general, need a lot of time to develop, and this can only happen in a womb, which cannot be easily 'imitated' by putrefaction; while even the complex plants are still much simpler than animals because they do not have organs, which means that spontaneous generation can sometimes produce the same species as the generation out of seed.

19 On Bacon's families of things and Paracelsus' influence on his matter theory, see especially Graham Rees "Francis Bacon's Semi-Paracelsian Cosmology," *Ambix*, 22 (1975), 81-101; and idem, "Francis Bacon's Semi-Paracelsian Cosmology and the *Great Instauration*," *Ambix*, 22 (1975), 163-173.

20 See Bacon, *Sylva Sylvarum*, exp. 355, SEH II, 459.

For Bacon the transformation of watery substances into oily ones is one of the most difficult processes in nature. There are, according to him, few instances in which this happens, and one of them is spontaneous generation: “the mixture of earth and water; which mingled by the help of the sun, gather a nitrous fatness, more than either of them have severally; as we see in that they put forth plants, which need both juices.”²¹ This is done “by many passages and percolations, and by continuance of soft heats, and by circuits of the time.”²² Compared with the assimilation of nourishment (another instance of this transformation), where the body transforms the nourishment into itself (in that water becomes the body of the plant through a motion of imitation), in this case more fatness is acquired simply because water and earth are mingled with the help of the sun. The same happens when water putrefies by itself and produces plants.

Thus, for Bacon there are three main situations in which new individual plants are formed: one is the generation out of seed, a process that creates fewer problems than the others. Another option is the generation of plants (or animals) out of putrefaction, whereby the tenacious substance is already present (for example in the putrefied body of a plant or animal, or in the substance of a tree). A final case is the generation of plants in which the substance has to become oily first, and only then can produce a new individual (spontaneous generation in earth or water). Very important about these three different situations is the fact that the complexity of the being produced is dependent on the qualities of matter. Water and earth without a seed can only produce very simple plants. Concocted matter, such as trees and putrefied bodies can produce more complex plants and even animals, but again very simple animals, such as flies and snakes. By contrast, seeds can produce all kinds of perfect plants and animals.

I would like to conclude this section by emphasising here what I consider to be one of the principle characteristics of Bacon's comparison between the two types of generation. Bacon establishes three differences regarding the four elements needed for vivification: heat has to be stronger to produce a more complex being, while the matrix, which is inexistent in the animals produced out of spontaneous generation, is more closely related to the later development of the creature than to its generation. Matter needs certain qualities, which are found in the seed or *menstruum*, but sometimes the same qualities appear in other materials, and in this way they can become the tangible matter of an

²¹ Ibid., 559–560.

²² Ibid., 560. On the phenomenon of concoction as fundamental in Bacon's natural and experimental philosophy, see Jalobeanu's article in this issue.

individual produced by putrefaction. Depending on these qualities, the new individual can pertain to a specific genus and species. But as we have seen in the introduction, Bacon classifies genera according to the spirits they contain. In the following section, I will discuss in more detail Bacon's 'chain of being,' and the connection between the qualities of tangible matter and the spirit they contain.

3 Same Spirit, Different Structure

Individual bodies, as we find them in the sublunary realm, are composed of tangible and pneumatic matter, both of them a mixture of the sulphurous and mercurial families. That is to say, the salts and juices of plants and animals (which are tangible) are watery and oily, and they have spirits attached that are airy and fiery. According to Bacon, there exists a hierarchy of individuals. Bodies can be inanimate (metals and stones) or animate, and the animate bodies are, again, differentiated into non-living (plants) and living (animals, including humans). As they advance on this scale of beings they become more complex, and their organs are capable of more functions. The distinctions between these three main genera are based on the organisation of spirits inside the given bodies. In brief, in inanimate beings, spirits are cut off and not inflamed and kindled, while in animate ones, they are 'continued with themselves' and branched into veins and canals, and moreover, they are kindled and inflamed. Their continuation and inflammation leads to a series of secondary differences, one of them being the capacity of plants and animals to nourish and grow.²³ Further, in living bodies, besides being branched as in the inanimate non-living beings, spirits also have a 'cell,' and they "hold more of flame than spirits of plants do."²⁴ This main cell, the head, is responsible for other faculties – imagination, memory and reason; and for a series of other secondary differences.²⁵

In the works dealing with the prolongation of life, the *De vijs mortis* (written around 1611, but left in manuscript form) and the *Historia vitae et mortis* (1622),

23 The other secondary differences are the following: plants are "figurate" and "determinate," have a period of life, and have succession and propagation of their kind; while the inanimate beings have none of these characteristics. Ibid., 529.

24 Ibid., exp. 607, SEH II, 530.

25 (1) Plants are fixed in the earth, while living creatures are severed; (2) living creatures have local motion, plants do not; (3) living creatures nourish themselves from their upper parts, plants from their bottom parts; (4) plants have seminal parts in the upper parts, living creatures in the lower ones; living creatures have (5) more exact figures; (6) a greater diversity of organs; (7) organs of senses; and (8) voluntary motion. Ibid., 530.

Bacon draws a distinction between two types of spirits, *mortuales* and *vitalis*. *Mortuales* are the cut-off spirits (found in inanimate beings) and *vitalis* the connected ones (those of animate beings, both non-living and living). Bacon considers animate bodies to contain both types of spirits: besides the principal spirit (the super-added vital spirit) of the body, there are also other spirits (*mortuales*) spread out within the parts of the body, with the characteristics of those found in inanimate beings. Nevertheless, except for mentioning their particular functions and how each affects the processes through which a body passes, Bacon does not explain the relation between them, whether they interact or not, and how it is possible that they are attached to the same body without mingling with one another. Curiously enough, this topic is never discussed in the secondary literature either, beyond the mention that Bacon has two types of spirits. But are they different kinds? And what is the role of tangible matter whose importance I have underlined in the previous section? In order to answer this question, I will now move on to the processes that lead to the production of new individuals.

Spontaneous generation is the result of putrefaction. But, as we will see, this process is fundamental for understanding other phenomena, too, including the generation out of seed. Bacon defines putrefaction in the *Sylva* in the following way:

Putrefaction is the work of the spirits of bodies, which ever are unquiet to get forth and congregate with the air, and to enjoy the sun-beams. The getting forth, or spreading of the spirits (which is a degree of getting forth), have five differing operations. If the spirits be detained within the body, and move more violently, there followeth colliquation; as in metals, etc.; if more mildly, there followeth digestion or maturation; as in drinks and fruits. If the spirits be not merely detained, but protrude a little, and that motion be confused and inordinate, there followeth putrefaction; which ever dissolveth the consistence of the body into much inequality; as in flesh, rotten fruits, shining wood, etc., and also in the rust of metals. But if that motion be in certain order, there followeth vivification and figuration; as both in living creatures bred of putrefaction, and in living creatures perfect. But if the spirits issue out of the body, there followeth desiccation, induration, consumption, etc., as in brick, evaporation of bodies liquid, etc.²⁶

26 Ibid., intro to exp. 329, SEH II, 45.

In their desire to leave the bodies within which they are entangled, and to unite with other pneumatic matter which is their 'connatural,' spirits start to move. This motion, confused and chaotic in the beginning, destroys the previous form, i.e., the seed or the equivalent gathering of matter (this is the process of putrefaction). If it continues confused, then the body decays and, in the end, disappears. If the motion becomes ordered it can create a new individual by shaping ('figurating') its parts (the process becomes vivification). The difference between putrefaction and germination is given by the duration of this ordered motion: if it is instantaneous then we can call the product "beings coming out of putrefaction"; if the motion lasts long enough to shape the individual, then this is proper generation.²⁷ What is relevant is that putrefaction always precedes generation, because the old form has to be destroyed, and nature cannot leap from this destruction to the ordered motion which shapes the new individual.

This double nature of putrefaction as both decay and germination, which is to say, as the point of intersection between life and death, is emphasised by Bacon in all the instances in which he discusses certain aspects of putrefaction.²⁸ But how is the decision made whether the body decays or forms a new individual? In the *Novum organum*, Bacon gives an answer to this question:

27 "Generation is propagation from seed, or from a *menstruum* or gathering of matter which may be equivalent to seed, things from which a specific body is gradually formed by a series of simple motions." Francis Bacon, *Abecedarium novum naturae*, OFB XIII, 204-205. This definition covers all the materials by means of which a new being is brought into existence. The term 'menstruum' refers to the matter out of which metals are produced, which is not a seed, but something similar to it; see Francis Bacon, *Novum organum* II, in Graham Rees and Maria Wakley, eds., OFB XI (Oxford, 2004), aph. 2, 200-203. By contrast, the gatherings of matter similar to the seed (*collatione materiae quae sit instar seminis*) are those portions of matter which take the functions of seed in the spontaneous generation. In this way, the definition refers to metals, plants and animals.

28 In the *Abecedarium novum naturae*, putrefaction is "the superinduction of a new form, and sum of various simple motions which belong in part to the dissolution of an old nature, and in part to certain tentative efforts of a new." Bacon, *Abecedarium novum naturae*, OFB XIII, 205-206. The body in this precise moment of the process has a name. In a continuation of the discussion on digestion and the transformation of what is watery into what is oily, Bacon says that "in versions, or main alterations of bodies, there is a medium between the body as it is at first, and the body resulting; which medium of *corpus imperfecte mistum*, and is transitory, and not durable; as mists, smokes, vapours, chylus in the stomach, living creatures in the first vivification: and the middle action which produceth such imperfect bodies, is fitly called (by some ancients) iniquation, or inconcoction, which is a kind of putrefaction; for the parts are in confusion, till they settle one way or another." Bacon, *Sylva Sylvarum*, exp. 837, SEH II, 613. Sophie Weeks has also noticed this privileged role of putrefaction: Sophie Weeks, "Francis Bacon and the Art-Nature Distinction," *Ambix*, 54 (2007), 262-266; but she only focussed on putrefaction as decay and

For dissolution of the old form, i.e. that very coming together of like to like, precedes the putrefaction which paves the way for generation of the new. Now if nothing gets in the way of the process simple dissolution occurs; but if different obstacles are encountered putrefactions set in and these are the rudiments of new generation.²⁹

Germination occurs thus when the process of dissolution is compelled by some “different obstacles.” Otherwise, as mentioned above, spirits will unite with their connaturals and the tangible parts with theirs. These obstacles which keep the spirits in the body are the qualities of the tangible matter in the seed, or its replacement in the case of spontaneous generation, namely viscosity and tenacity. Since spirits have a very active nature, they will move within that matter and shape it. We can, therefore, imagine that in Bacon’s universe, without the tangible matter behaving as an obstacle, the motion of spirits will eventually lead to the dissolution of the entire world.

Let us sum up the previous conclusions. Tangible matter has the function of keeping the spirit in the body, so that its motion can generate a new individual. Tangible matter is also responsible for the species to which the individual pertains. The spirit is also a necessary condition for the creation of the new individual, it is, after all, the active agent in all bodies. But if spiritual matter is of two types, then where does the vital spirit come from in the case of spontaneous generation? Bacon talks about plants and animals produced in water, earth, putrefied plants and animals, and cheese. Cheese is, of course, an inanimate being, since it does not have any animate functions such as growth or nourishment. And yet, the flies produced out of it are animate and living beings. In fact, this is also the case with the seed. Seeds do not have any animate functions, but the bodies produced from them do.

My theory is that for Bacon, spirits are not of two different kinds, but only one. Depending on their organisation, they attain different qualities: when they are cut-off, they are not very inflamed, but once they are continuous, they become more inflamed; and even more so when they have a cell. Graham Rees has suggested that the ascent through the chain of beings is marked by an “increasing quantity and ‘inflammation’ of the vital spirit.”³⁰ Though inflammation seems to be important, I consider the capacity of spirit to become continuous, and the resulting structure of this continuous spirit, to be more

chaos, while it seems to me that, at least in certain places, Bacon is emphasising the reorganisation of matter as the second part of this process.

29 Bacon, *Novum organum* II, OFB XI, 379.

30 Rees, *Francis Bacon’s Natural Philosophy*, 37.

important. The way in which Bacon describes the differences between the structure of the spirit within different genera seems to suggest that inflammation is secondary, while the branched structure is necessary to account for the animate functions of the body. As for the quantity of spirit, its role is less important than Rees has suggested. Bacon does not mention quantity as a difference, and moreover, he discusses the fact that some metals, which are inanimate, have a large quantity of spirits.³¹ It is true that the vital spirit, as Bacon explains in the *De vijs mortis* and the *Historia vitae et mortis*, enjoys itself as a result of being connected (this is to say that its appetite for uniting with connaturals is satisfied), and does not prey on tangible matter in order to increase its quantity. By contrast, the spirit that has remained cut-off within tangible matter is the spirit that consumes the matter around it with the aim of increasing its quantity and being able to enjoy its nature. This also explains how the two spirits can exist inside the same body, following different activities: the 'vital spirit' is invested in prolonging the life of the body, while the 'inanimate spirit' wants to leave it and thus consumes and destroys it.

If this is so, and the spirit is of only one kind, and moreover has the potency of becoming vital, then it is clear why the matter in which the spirit is enclosed plays such a crucial role in the generation of the new individual: because it must have certain qualities in order to permit a certain organisation. Put differently, spirits are all vital in potency, but their vitality is activated only when they are enclosed in the right kind of matter which allows for their continuity, and in the case of animals, also the existence of the main cell. Once continuous, they become more inflamed and able to perform their vital functions. And in the same way, spirits from putrefied animals or plants can become the vital spirits of a new being once they find the right viscous and tenacious matter.

The fact that, in some writings, Bacon uses different terms to designate the continuous and the non-continuous spirit does not present a counter-argument to my claim, even more so as, for example, in the *Sylva* he draws a distinction between different kinds of composed beings, not between spirits: beings are inanimate or animate and non-living or living. And this does not mean he changed his mind regarding spirits, either. Of course, spirit is what causes a creature to have those functions that are considered vital, and thus, by extension, this spirit can be called 'vital,' in distinction from the other spirit, which does not perform any vital functions (the 'non-living' spirit). Once a spirit is capable of being in charge of vital functions, it becomes 'vital' itself, and this distinction is very useful in explaining a series of natural phenomena.

31 See for example *Sylva*, exp. 73, where Bacon discusses the fact that quicksilver is full of spirits, and very heavy and cold. Bacon, *Sylva Sylvarum*, SEH II, 371.

This interpretation also solves the problem of the existence of two spirits in the body of animate beings, each with different functions. While moving within the seed or another *menstruum* some parts of the spirit become connected, while others do not and thus remain scattered within the tangible matter. These latter (*mortuales*) are airy and want to unite with the air, so their only aim is to get out of the body, and this is why they prey upon the tangible matter. The connected spirit (*vitalis*) is more fiery, and is already surrounded by con-naturals, so its desire to leave is not that strong, and it prefers to preserve the unity of the body in which it is enclosed. This also explains why, variously in the *Sylva*, Bacon talks about spirits without further specifying whether he means the inanimate or the vital. It only makes sense to talk about ‘vital spirit’ if it is a connected one: if a flower is broken from its stalk, the spirit it contains stops being vital because it has been separated from the continuous spirit of the plant. The flower will start desiccating or putrefying, whereas the plant, while still has a continuous spirit, will continue to live.

There is one objection that could be raised here: for Bacon spirits are combinations of airy and fiery pneumatic matter. When discussing gunpowder, Bacon says that it is very difficult to find combinations of airy and fiery matter, except for the spirits of plants and animals. One of these exceptions is gunpowder, where the two substances separate very quickly, in an explosion. In the spirits of vegetables and animals, though no explosion takes place, the same kind of force is responsible for the fact that a small quantity of subtle and light spirits is capable of moving such a big mass of tangible and gross matter. Moreover, the explosion does not occur because there is tangible matter to prevent it and keep air and flame together within itself: “and though air and flame being free will not very well mingle; yet bound in by a body that hath some fixing, they will.”³² So if the airy and the fiery do not mingle, where do the spirits come from in the case of generation out of earth and out of water? For the putrefied plants and animals, trees, and even cheese and other individual bodies, it is clear that they contain inanimate spirits. Though Bacon does not address this problem (whereas he does address its counterpart, i.e., the necessity of a combination of both watery and oily substance in the tangible matter), we can assume that, for Bacon, attached spirits leaving dead bodies can be found in earth or water before separating into free pneumatic matter, air and flame.

³² Ibid., exp. 30, SEH II, 352.

4 Conclusion

The aim of this paper was to demonstrate that, for Bacon, there exists only one kind of spirit which changes its qualities when it is possible to acquire a more complex structure, and in this sense we may talk about a non-living and a vital spirit. The different qualities of the spirit will create the differences we can observe between the three natural genres of beings: inanimate, animate but non-living, and living. The possibility for the spirit to change its structure is dependent on the qualities of the portion of tangible matter, which is shaped into the new being. At the same time, tangible matter is dependent on the spirit which shapes it. This interdependency might look circular. And indeed, it might be so to a certain extent: processes do not start by shaping prime matter, but a matter which already has its shapes and qualities.

I have focussed on spontaneous generation as the process that provides the best support for my claim because, even though I argued that the spirit of a seed is not 'vital' and it becomes so only when finding the proper conditions to 'figure' an animate being, this is more evident in the case of spontaneous generation, where the spirit of the bodies upon which the new individual is produced does not have any vital functions. Bacon himself mentions that spontaneous generation is proof for the transmutation of species pertaining to different genres.

Trapped inside tangible matter, the spirit tries to get out or unite with con-naturals. Trying to become connected is a main appetite of spirits. But only when tangible matter offers the proper conditions, which include not allowing the spirit to leave the body, it becomes properly connected, and its desire to go out is diminished, which means it starts performing the vital functions of the body and ensures the preservation of that individual.