VIRTUES AND COLLABORATIVE RESEARCH IN SOLOMON'S HOUSE

VIRTUȚI ŞI CERCETARE COMUNĂ ÎN CASA LUI SOLOMON

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Abstract
Francis Bacon's New Atlantis *seems to be the place where man regained dominion over nature and at the center of this island we find Solomon's House, a scientific society, effecting 'all possible things'. But this unfinished work tells us very little about the composition, structure and selection procedure Bacon had in mind for his ideal society. Equally unclear is the reason why the projected advancement of learning depended so much on the existence of such a 'scientific' community. My aim is to show, by reading the* New Atlantis *in conjunction with other writings, that the collaborative research among the members of this society is needed for the progress of human knowledge. And because it is impossible to separate moral and natural philosophy, the moral character is the criterion for the selection of those who can make natural philosophy.*

Key words: *Bacon, New Atlantis, experimental philosophy, scientific community, therapy of idols.*
Cuvinte cheie: *Bacon, Noua Atlantidă, filosofie experimentală, comunitate ştiinţifică, terapia idolilor.*

Introduction

Francis Bacon's *New Atlantis* contains a good number of the recurrent themes present in Bacon's project of the *Great Instauration.* One central issue of the text is, for example, the possibility that humans regain some of the capacities and powers lost at the Fall. The theme of the Fall and Salvation features explicitly or implicitly in all Bacon's writings. After the Fall, man lost his place as the king of creation and at the same time, he lost his bodily and mental powers. One of Bacon's claims seems to be that his new philosophy brings hope for the future restoration of (some of) the lost powers. [1] *New Atlantis*, his posthumous writing, firstly published in 1627, is the description of a perfect society, where the members of Solomon's House regained dominion over nature. The fact that Bacon planned this writing as the final part of his *Sylva Sylvarum* [2] makes us believe that it was not a mere literary text, but that Solomon's House represents a model of how experimental philosophy should be practiced, in order to reestablish the lost condition of man.

To subjugate nature, Bacon suggests, we first have to know it, and this is only possible by making the human mind a mirror which can reflect nature. This is possible after eliminating idols, errors and the passions that affect the mind. My aim in this paper is to show how a 'scientific' society, structured as the one in the *New Atlantis*, is the means for the advancement of human knowledge. In order to do this, I will situate my approach between the scientific and the moral readings of this text, showing the strong connection we can find between them. As will be seen, the moral character of a person is the criterion of selection to become a member of Solomon's House. At the same time, the experimental philosophy pursued within the 'scientific' society, together with the cultivation of the virtues, improve the philosopher's character and establish the structure of Solomon's House.

My paper has three parts. In the first, I will present Bacon's arguments for the need of a 'scientific' society, where the collaboration among researchers is the means to producing knowledge. In the second part I will try to show how the members of such a community are selected among the vulgar people, emphasizing the fact that moral virtues represent the characteristics required to be elected. Finally, in the last section, I will argue that natural philosophy has an important therapeutic aspect, which was both essential and instrumental in the projected composition, structure and selection procedure Bacon envisaged in his ideal 'scientific' society. More precisely, I will try to show that for Bacon, what was essential in the selection of the members of Solomon's House was the capacity of purging the mind before starting to make experimental philosophy, and that the therapeutic character of this enterprise establishes a hierarchy among those who have already been selected to become members of Solomon's House.

Even though I am using the term 'science' to refer to Bacon's natural philosophy, I don't mean 'science' in its modern sense. Rather, I use it as the translation of the Latin term 'scientia', meaning 'knowledge in general'. Magic or alchemy, ethics or metaphysics, medicine, all were considered 'scientia' in the same sense as natural philosophy was. As Daniel Garber pointed out, at the beginning of the seventeenth century, 'philosophia' and 'scientia' were synonymous, referring to knowledge in the strong sense: "certain, general, and grounded in the knowledge of causes". [3] In order to avoid confusion with the modern terminology, from now on I will use it in inverted comas.

The characteristics of the 'scientific' community

Some commentators have contended that Bacon's 'scientific' community was inspired by already existing groups of collaborative researchers and that in *New Atlantis* he projected a 'scientific' community not because he had a vision of what future research would look like, but because he witnessed these practices in some scholars of his days, such as those in Magdeburg or Oxford. [4] Other contemporaries of Bacon's have been equally identified as possible sources for Bacon's utopia, such as Cornelius Drebbel and Salomon de Caus. [5] My approach in this paper is not to deny such cultural influences; rather, it is to highlight the critical role played by a community such as the one pictured in the famous image of Solomon's House in Bacon's overall project. My claim is that for the purpose of building his grand scale *Instauratio Magna*, a group of 'scientists' engaged in a project of common research is really needed. As I will show further, there is ample evidence in Bacon's writings to support this point of view.

In his paper "Bacon's Idea of Science", Paolo Rossi considers that Bacon offered an alternative view of science which "had a public, democratic, and collaborative character, individual efforts contributing to its general success". [6] In what follows, I will focus on these three characteristics pointed out by Rossi. In doing so, I will emphasize the importance of the collaborative element in Baconian 'science', while showing that, contrary to Rossi's view, 'public' and 'democratic' cannot be used to characterize the society in the *New Atlantis*. As a matter of fact, this 'scientific' community was formed by carefully selected individuals, with certain intellectual and moral virtues, with the capacity of reforming their person in order to be able to see the laws of nature and, moreover, there was a very strict hierarchy within the structure of the society, in the absence of which the advancement of knowledge comes to an end.

I will begin with the last of the three features established by Rossi. It is worth emphasizing that Bacon wrote explicitly about the necessity of collaboration among scientists in *De Augmentis Scientiarum*, criticizing the state of learning in his time: "For as the progress of learning consists not a little in the wise ordering and institutions of each several university; so it would be yet much more advanced if there were a closer connection and relationship between all the different universities of Europe than now there is. For we see there are many orders and societies which, though they be divided under distant sovereignties and territories, yet enter into and maintain

among themselves a kind of contract and fraternity, insomuch that they have governors (both provincial and general) whom they all obey. And surely as nature creates brotherhood in families, and arts mechanical contract brotherhoods in societies, and the anointment of God superinduces a brotherhood in kings and bishops, and vows and regulations make a brotherhood in religious orders; so in like manner there cannot but be a noble and generous brotherhood contracted among men by learning and illumination, seeing that God himself is called 'the Father of Lights'". [7]

Thus, according to Bacon, the progress of knowledge depends, on the one side, on the ordering of the institutions, and on the other, on the communication of knowledge among them. Knowledge is not advanced in Europe because there is no relation and connection among the universities. Moreover, these should be organized, Bacon suggests, on the example of the religious orders, which includes a very strict hierarchy, a vow, and a bishop. But Bacon's dream doesn't stop here; what he wants for Europe is a special relation among all these institutions. All the features he envisages for European universities are materialized in Solomon's House, not only the collaborative aspect but also, as we will see further on, the hierarchy and the vow.

Another argument for the necessity of collaboration is given by one consequence of the Fall: the fact that human life is very short and we cannot achieve truth during a lifetime. As a result, the investigation of nature is a long-term project, involving multiple generations. And due to the complexity and multiple faces of nature, we also need a multitude of people to perform this research, which is not a chaotic collaboration, but it has a very strict order, starting with natural histories, passing through physics and ascending to metaphysics. [8]

In my view, the other two characteristics in Rossi's list, 'public' and 'democratic' are less convincing. Can we use them to characterize the production and organization of knowledge, as depicted in the *New Atlantis*? We can consider the production of 'science' to be 'public' only in the sense that it was opposed to the private research of magicians and alchemists, repeatedly criticized by Bacon as a wrong approach, because there was no circulation of ideas among them and the language used was occult to such a degree that communication, collaboration and the cumulative aspect of research became almost impossible. Yet, the society proposed in the *New Atlantis* is still very much a secret one: all the members of Solomon's House take "an oath of secrecy, for the concealing of those which we think fit to keep secret; though some of those we do reveal sometimes to the state, and some not". [9]

There are three aspects of secrecy in this imagined society. One is the secrecy in relation to the rest of the world, which may be seen as an influence of the secret societies arising in the seventeenth century. [10] But what I consider more important is its secrecy in relation to the State and the rest of the Bensalemite people, to whom they disclose only some of their inventions, which they consider useful for them, since, as Bacon puts it in the *New Organon*, the vulgar cannot apprehend the core of philosophy, but only its utility and effects, [11] which they can use for the benefit of their own lives.

As we have seen, for Bacon there is fruitfulness to the existence of an order within an institution, and such ordered hierarchy is found in the *New Atlantis*. There were several attempts to correlate Bacon's method in the *New Organon* with distinct aspects of the *New Atlantis*. The one that I consider most relevant to our purpose is Serjeantson's statement that the fellows of Solomon's House are the institutional embodiment of the art of discovery presented in the *New Organon*, starting with the three 'Depredators', who gather 'learned experience' and going up gradually to the 'Interpreters of nature', who make higher-level observations and establish axioms and aphorisms. [12]

I will go further with this correlation and show the importance of a 'scientific' community that mirrors the structure of knowledge itself and in which each level of the hierarchy corresponds to a specific step toward the true interpretation of nature. This means that if one does not respect the hierarchy, he does not respect the method and he commits one of the worst errors in natural philosophy – the 'anticipation of nature'. For Bacon this is a process of knowledge going from the

senses and the particulars directly to the most general axioms, while the true interpretation of nature starts with the senses and the particulars, rising by a gradual and unbroken ascent and arrives to the general axioms at last. [13] The former can also happen if one person tries to do the entire research on his own, because, as we know from Bacon's analysis of the idols, the temptation to skip necessary stages and to go straight to generalities is very well impressed on the human intellect. So, in order to acquire knowledge, we have to be very strict with the order of the investigation. In the same sense in which there is a strict order in investigation, there is no democracy in the structure of Solomon's House.

I consider it significant that the institution producing knowledge has a structure that mirrors the method for acquiring knowledge. As Dana Jalobeanu observes, the theme of the 'mirror' is very important in Bacon's writings, and she emphasizes the correlation between the human intellect and nature: to be able to see nature, the mind is 'a distorted mirror requiring improvement'. [14] But this is not the only mirror in Bacon and not even the only mirror of mind. Another type of mirror represents the congruity between the human mind and knowledge, in the sense that the structure of the mind (memory, imagination, reason) is the mirror of the structure of knowledge (natural history corresponding to memory, poesy to imagination, and natural philosophy corresponding to reason). [15]

But in talking about the structure of Solomon's House, an important question emerges: is there collaboration among the members of Solomon's House in the realization and quantification of the experiments? Some scholars have attempted to show that such collaboration does not exist. But here I will argue the contrary, and will start by emphasizing the fact that more than one person works in connection with the same experiment. Again, Bacon is not clear about whether the three 'scientists' at any level work together in order to realize an experiment. Such communal work could protect the mind against the idols, given that each mind is prone to distinct types of idols, and the others could see if one is attacked by them. What is clear is the fact that they work together *between* levels, for the same purpose: "We have three that try new experiments, such as themselves think good. These we call Pioners or Miners. We have three that draw the experiments of the former four into titles and tables, to give the better light for the drawing of observations and axioms out of them. Those we call Compilers. We have three that bend themselves, looking into the experiments of their fellows, and cast about how to draw out of them things of use and practice for man's life, and knowledge (…). These we call Dowry-men or Benefactors". [16] The main idea is that the 'Compilers' record the results of the experiments carried out by the 'Miners' and in the same experiments, the 'Benefactors' search for practical results.

The same happens at the last level: the 'Lamps' direct new experiments, the 'Inoculators' execute the experiments directed by the former, and report the results, and the 'Interpreters of nature' turn the discoveries into observations, axioms and aphorisms. Here we have two examples of activities in common, in the sense of working together, not only of the communication of some results.

Another central argument for my thesis concerning the need of a collaborative research to produce knowledge is the fact that, before reaching the last level – the level of the experiments which penetrate more into nature and from which the last aphorisms and axioms are drawn – the members of Solomon's House have "divers meetings and consults of our whole number, to consider of the former labours and collections". [17] Is this a method of verifying if the attained knowledge is accurate, not affected by the idols, or is it a method for the superior members of the society to control others? There is no textual evidence to support any of the two readings, but it does not make much sense to consider these meetings as a way of control, because only the interpreters of nature know the very last axioms, and, besides that, all the others already had made the oath of secrecy. And if it is a way of controlling, it is only in the sense of a verification, because the superior members of Solomon's House have a mind more purged and their capacity to investigate nature is greater, making it is easier to find the errors.

In my view, both the realization of some experiments in common and the meetings for consulting about the results represent a weapon against the idols and against the anticipation of nature. These aspects, along with the shortness of life induced by the Fall, are precisely what makes the collaborative aspect of scientific research a necessary one. In this sense, Solomon's House in the *New Atlantis* represents the materialization of Bacon's project.

The transmission of knowledge

Communicating knowledge between the members of Solomon's House is not the whole story. Equally important is the need to transmit knowledge from one generation to another. This issue appears in the *New Atlantis*, when Bacon tells us that there are, besides the members of Solomon's House, a lot of novices and apprentices, so "that the succession of the former employed men do not fail". But again, there are no clues about the way in which knowledge is transmitted, or, in other words, how the masters teach the novices in order to make them philosophers of nature. Once more, we can find the answer in other writings. The problem of the transmission of knowledge appears quite frequently in Bacon's writings and it is of the utmost importance if we are to understand the overall intention of Bacon's project. [18] In *De Augmentis Scientiarum*, in the chapter dedicated to rhetoric, Bacon has an entire section about the transmission of knowledge. The general method for communicating knowledge is called the 'Wisdom of Transmission'. There are several methods for communicating knowledge, paired in couples.

The first pair comprises the *Magistral* and the *Initiative* methods. The first teaches, the second one intimates, meaning that it 'discloses and lays bare the very mysterious of the sciences' [19]; the *Magistral* requires unquestioning belief and transmits knowledge to the vulgar [20], the *Initiative* requires to be examined and it is addressed to the *sons of science*; "the end of the one is to use the knowledges as they now are, of the other the continuation and further progression of them" [21] and this is the method of Delivery to Posterity or Handing on the Lamp. Another pair is one which separates the vulgar from the select among the auditors; the first is an *Exoteric* Method, the second is an *Acroamatic* and the latter addresses only to those who 'have either received the interpretation of enigmas through the hands of the teachers, or have wits of such sharpness and discernment as can pierce the veil'. [22]

The next distinction, very important for science, concerns the delivery of knowledge, which can be by *aphorisms* or by *methods*. Unlike the method-based delivery, the aphorism tries if the knowledge of his writer is superficial or solid, because they are made of the pith and heart of science. [23] Moreover, the method-based delivery wins belief, while the aphorism requires to be examined. The third characteristic of the aphorism is that it invites others to contribute and add something, while the method-based delivery seems to be complete knowledge, even though it is not.

There are three more distinctions [24] made by Bacon. However, only the three presented above are important for this paper. It is evident that the road to science is selective: it is not for everyone to become a philosopher. All these distinctions are used to make a separation between the vulgar and the true sons of knowledge. For the vulgar there is a *Magistral*, exoteric and methodical transmission, and for the 'true sons of knowledge', an *Initiative*, *Acromatic* and aphoristic transmission. The method transmits knowledge that should be believed, as the *Magistral* transmission does, while the aphorism requires the reader to continue the investigation, in the same way the *Initiative* does. In other words, we might say that the *Initiative* method is transmitted by aphorisms [25], and the *Magistral* one by methods.

The main distinction consists in the relation of these methods with knowledge. On the one hand, there are those who, believing the knowledge received can use it, but they do not know how to produce it, while the knowledge transmitted by aphorisms requires further investigation into nature. For the vulgar, we need to use examples and to teach them how to use knowledge, in the

same way in which the people from Bensalem know how to use the inventions of Solomon's House only if they are instructed in their use, but they will never be able to produce these inventions by themselves, or to create others.

As we will see further, the distinction between the selected and the vulgar is that the latter do not know how to descent into themselves or how to call themselves to account, in the sense that they have not developed self-knowledge, and moreover, they will use their good parts only to hide their errors, not to correct them, while the learned man intermixes the correction of his mind with the use of it. And it is because they know how to correct their minds that the 'sons of knowledge' are elected to be in Solomon's House since they already started the therapy of their mind and they understand the aphorisms, meaning that their prepared minds are able to pierce the veil of nature.

The distinction becomes clearer if we read the following passage from the *New Organon,* where Bacon makes again the distinction between the vulgar and those to whom he addresses his doctrine: "Let there be therefore (and it may be for the benefit of both) two streams and two dispensations of knowledge; and in like manner two tribes or kindreds of students in philosophy – tribes not hostile or alien to each other, but bound together by mutual services; – let there in short be one method for the cultivation, another for the invention, of knowledge (…). But if any man there be who, not content to the rest in and use the knowledge which has already been discovered, aspire to penetrate further, to overcome, not an adversary in argument, but nature in action; to seek pretty and probably conjectures, but certain and demonstrable knowledge; – I invite all such to join themselves, as true sons of knowledge, with me, that passing by the outer courts of nature, which numbers have trodden, we may find a way at length into inner chambers". [26]

We now understand that the *New Organon* is not written for the vulgar, because it is not a book to use knowledge, but it gives, in the form of aphorisms, directions for further investigation. Bacon says about his doctrine: "I in like manner would have my doctrine enter quietly into the minds that are fit and capable of receiving it ;(…)". [27] But what does Bacon mean with 'capable mind'? In *The Advancement of Learning*, he said that a learned man is one that "disposeth the constitution of the mind not to be settled in the defects thereof, but still to be capable and susceptible of growth and reformation". [28] In other words, Bacon's philosophy is for those who do not let the errors of the mind influence them and, in my view, this is essential for the Baconian program. Bacon's philosopher is that person who cultivates and reforms his mind in order to make it a mirror of nature and a 'receptacle for knowledge'. [29]

As a way for the transmission of knowledge, the aphorisms are used in the *Initiative* method, which requires to be examined, and not be believed before putting it to a test. In the first book of the *New Organon,* Bacon exposes the four classes of idols, describing the situations in which they appear, and how they corrupt our minds. Keeping in mind what Bacon tells us here, we are able to identify them and to try to diminish their damages. I think it is adequate to make a comparison with the short formulas of Hellenistic philosophy, the maxims: they are short in order to be easily memorized, so any person can repeat them when he/she is in a certain situation. What other role could Bacon's aphorisms concerning the idols have, if not to be remembered in the exact moment one is about to corrupt the processes of his mind?

Secondly, in natural philosophy the aphorisms have the role to invite the reader to repeat the experiment. It does not make any sense to repeat an experiment or a group of experiments if the axioms are drawn from them by others. Every man should repeat the experiment because its execution uses certain faculties of the human soul, making it better. If the philosophy of nature is only a body of knowledge, a new philosopher takes for granted all the discoveries realized by his predecessors, but this would lead us to what Bacon calls *Magistral* transmission, not to the *Initiative* one.

The therapeutic program of natural experimental philosophy

In the previous section I claimed that the separation of the vulgar from the philosophers rests on in the latter's capacity to understand the aphorisms and to investigate nature, which means that their mind is already prepared to do 'science'. I also introduced the theme of the therapy, because the 'scientific' investigation requires a mind which already has started the purging process. It will be shown that experimental philosophy is the culmination of the therapeutic program required for the Salvation of Man, apart from the cultivation of the virtues in other activities.

In order to understand the therapeutic program of experimental philosophy, I will shortly explain why it is superior to speculative natural philosophy in Bacon's view and in the second part of this section I will present my arguments to sustain the connection between moral and natural philosophy, emphasizing the way in which the moral character is the criterion of selection, both at the beginning of the investigation and during the research, up to the level of the 'Interpreters of nature'. I will try to show that the acquisition of knowledge for the members of Solomon's House is not 'irrespective of their moral status' [30], but is exactly this moral status what makes the mind capable of seeing into Nature.

There are two books written by God's finger, *Scripture* and *Nature*. In the *Scripture* God expressed his will and in *Nature* his power. Humans are incapable of knowing God's nature, therefore, if we are not theologians, we can know God only by studying *Nature*, his creation, and we can do either speculative or experimental natural philosophy. Speculative natural philosophy is 'the development of natural phenomena without prior recourse to systematic observation and experiment', while 'experimental natural philosophy involves the collection and ordering of observations and experimental reports with a view to the development of explanations of natural phenomena based on these observations and experiments'. [31]

For Bacon speculative natural philosophy leads to the 'adoration of the human mind', a state of mind which hinders any possibility of knowledge, because the thinker sees nothing more than his own ideas, it is not nature reflecting in his mind, and the product will be the invention of his imagination. But through experiments, the mind is always in contact with nature, making possible its reflection in the mind. Moreover, making experiments, the human mind releases itself from dogmatism and skepticism, two of the most dangerous attitudes, which make progress of knowledge impossible. The first is dangerous because the dogmas represent a class of idols – those of the Theater, and are "stage-plays, representing worlds of their own creation after an unreal and scenic fashion". [32] At the same time, a skeptic attitude destroys the 'scientific' enterprise from the beginning, assuming that there is no way for humans to achieve knowledge. On the contrary, Bacon's philosophy is an optimist one; man can and should know nature for his own Salvation.

Given that Bacon rejects speculative natural philosophy [33], for him there is only one way to study nature – experimental philosophy, because the experiment brings nature to its limits, makes it unveil its secrets, if the experiments are appropriate: "All the truer kind of interpretation of nature is effected by instances and experiments fit and apposite; wherein the sense decides touching the experiment only, and the experiment touching the point in nature and the thing itself". [34]

To argue the connection between moral and natural philosophy, I will introduce again in the discussion the theme of the Fall of man. This, says Bacon in the *Preface* to the *Insrauratio Magna* and in the first book of *The Advancement of Learning*, was caused by an 'ambitious and proud desire of moral knowledge to judge of good and evil, to the end that man may revolt from God and give laws to himself, which was the form and manner of the temptation'. [35] The knowledge which induced the Fall was not the natural knowledge of the creatures, but the moral one: man tried to be a god for himself, in order to be independent from God. The main effect of the Fall can be seen in the field of morals in the fact that man is now subjugated to senses, passions and pleasure. As a result, this affects the field of knowledge: reason is constantly under the attack of the idols,

passions, and affections. Moreover, given that will is interfering in the activity of reason, ethics and epistemology can not be really separated.

The 'scientific' research should be, according to Bacon, the work of reason. But given that the will is constantly interfering with the activity of reason, 'science' deals with both of them. As a consequence, science has an epistemic and a moral part at the same time, because man can achieve truth only after being capable of purging his mind of passions, affections and emotions, in other words, when the will is subjugated to reason, and not to passions. In conclusion, a moral character is needed in order to produce knowledge and, at the same time, the scientific discoveries help the improvement of character.

Here I will rely on Dana Jalobeanu's thesis that Bacon's solution to eliminate the affection of the human mind is different from the traditional solutions and consists in 'connecting moral and natural philosophy'. [36] In what follows I want to further analyze this view and bring more arguments to support it. For her, in Bacon, there is a preliminary level, where self-knowledge and precise spiritual exercises prepare the mind for the last level, where experimental philosophy and the very fact of building up natural histories represent the therapy, having 'a formative role on the mind'. [37] However, as I argued in the previous section, I believe that the therapeutic process of purging the mind begins *before* experimental philosophy, because the mind has to be already prepared; in other words, there is a sense in which previous self-knowledge and the spiritual exercises, together with the cultivation of virtues [38], already represent an initial stage. Moreover, those spiritual exercises must be realized during the entire process of producing knowledge, because experimental philosophy alone is not enough to protect the mind from its errors. There is also in Bacon a special importance given to the cultivation of the virtues in other activities.

To support my point of view, I will start with Bacon's affirmation in the Preface to the *New Organon*: "the entire work of the understanding be commenced afresh, and the mind itself be from the very outset not left to take its own curse, but guided at every step, and the business be done as if by machinery". [39] Bacon's method involves the idea that the mind should not be let to work by itself at any moment, but to be verified constantly, in the same way as a machine needs the supervision of an operator. But talking about the mind, what seems to be peculiar is the fact that this guidance of the mind is also the work of the 'scientist', the help does not come from without, as in the example of a *machine*. Nature should be reflected in man's mind, but this is all the time affected by idols and other errors and apparently there is no way to decide if the result is a good reflection or a distorted one. This is not a problem if the research is done within the community and this is the sense in which the mind is like a *machine* receiving help from outside. There is no doubt that the biggest part of the process of purging the mind is the work of the 'scientist'. But for the accurateness of results, a society is needed.

In other words, in experimental philosophy, in order to find the secrets of nature, we must not only constrain nature, but the same must be done with the intellect, because leaving it alone, it will commit the error of the anticipation of nature. And how can we constrain the intellect? Using Bacon's method, and thus keeping the intellect in a vigilant state at all times. In the Preface to the *New Organon*, Bacon makes a comparison between moving an obelisk with the naked hand and making knowledge with the intellect left to itself and "it is by instruments and helps that the work is done, which are as much wanted for the understanding as for the hand. And as the instruments of the hand either give motion or guide it, so the instruments of the mind supply either suggestions for the understanding or cautions" [40]

This aphorism gives us a clue why the title of this book is *New "Organon"*. The instruments of the mind are used to give cautions in order to keep away the idols (as much as it is possible) and "the formation of ideas and axioms by true induction is no doubt the proper remedy for keeping off and cleaning away the idols. To point them out, however, is of great use (…)". [41]

The method proposed by Bacon for the elimination of idols and for the discovery of the laws of nature is Induction. Moreover, the method is something that requires to be interiorized in order to

function in the elimination of idols. It keeps the mind in a vigilant state and it does not permit it to do only what it wants, so the method can be seen as a type of ancient exercise. But to keep the mind in a vigilant state all the time, as Bacon requires, we need *attention*, which is one of the dispositions of the mind Bacon mentions in several of his works. In the *New Atlantis*, the two preliminary attributes of those who study nature are attention and piety. Attention was a fundamental stoic attitude, it represented "a continuous vigilance and presence of the mind, self consciousness which never sleeps, and a constant tension of the spirit". [42] Attention is the key of the spiritual exercises, because it frees us from passions. Again, in order to let the experimental philosophy accomplish its therapeutic program, attention is required during all the experimentation, without it, experimental philosophy will not have the power to urge the mind, because the research will be chaotic.

Bellow I will bring more arguments to show the strong connection between ethics and knowledge, emphasizing the importance of the virtues for Bacon's 'scientist'. My aim is to show what kinds of virtues are induced by the 'scientific' knowledge, emphasizing the fact that, as it was claimed so far, the true investigation is done within a community of researchers. Moreover, the 'scientist' has to cultivate these virtues in all the aspects of life, because it is enough that one vice enters the mind for it to be weakened, giving the opportunity for other idols to enter it and to stop the mirroring of nature into the mind.

The first book of *The Advancement of Learning* is a eulogy of the learned man, more exactly, of the natural philosopher. First, Bacon presents some criticisms of natural knowledge coming from theologians, politics and learned men themselves. And it is in order to reply to these objections, that he presents his apology of knowledge. To the theologians, who consider that learned men become heretics and atheists because they search into second causes, Bacon responds that the knowledge of second causes (through philosophy) induces the existence of a final cause, so a learned man should be more religious than the others. Bacon concludes that human learning conduces to faith and religion and this is where it takes its dignity from. First it induces the exaltation of God's glory and secondly, it protects against disbelief and error. [43]

Among other critics of politics, one is that learned men are disposed to leisure and slothfulness and Bacon's reply is that "it were a strange thing if that which accustometh the mind to a perpetual motion and agitation should induce slothfulness; whereas contrariwise it may be truly affirmed that no kind of men love business for itself but those that are learned" [44] and he concludes: "only learned men love business as an action according to nature, as agreeable to health of mind as exercise is to health of body, taking pleasure in the action itself, and not in the purchase: so that of all men they are the most indefatigable, if it be towards any business which can hold or detain their mind". [45]

Moreover, learning makes men's mind gentle, generous and pliant to government, while ignorant men are churlish, thwart, and mutinous. Besides the protection against idleness, one of the worst sins, learning is a way of working upon one's own character. There is no doubt that in the field of politics we deal with the moral character of people, and I would like to emphasize that for Bacon knowledge of nature is the key for ethics too, because it gives the laws for living in a society and for the correct cohabitation with the others. In other words, learning teaches man how to live according to nature.

The third 'diminution of credit' comes from learned men themselves and it is either from fortune, or from manners or from the nature or their study. Fortune is not something that depends on man. About the manners, Bacon says that 'studies have an influence and operation upon the manners of those that are conversant in them'. [46] The Latin translation is very interesting, because Bacon adds that these influences are positive, in the sense that learning corrects natural dispositions and changes them for the better. [47] Again, knowledge corrects natural dispositions and makes men more moral.

Within the nature of study, the greatest error is a mistaken end of knowledge. The desire of learning comes from a natural curiosity and inquisitive appetite, sometimes only to entertain the

mind, for ornament and reputation, sometimes for the victory of wit and contradiction, or for profession. But the true end of knowledge is "to give a true account of their gift of reason, to the benefit and use of men" [48], or in other words, for the glory of the Creator and for the relief of man's state. We see this in the *New Atlantis*, where the most important virtue is charity; the inventions resulting from experiments are given to Bensalem's people: "Lastly, we have circuits or visits of divers principal cities of the kingdom; where, as it cometh to pass, we do publish such new profitable inventions as we think good". [49]

In *The Advancement of Learning*, charity is the virtue that protects the mind from the dangers of the venom and malignity of too much knowledge, making this a virtue. The theologians use Solomon's and Saint Paul's ideas to make the claim that too much knowledge is dangerous and it leads to heresy and atheism. To this, Bacon answers that it is not the quantity of knowledge that represents a danger, but the quality. If the 'scientist' aims to help the others with his discoveries, knowledge is a virtue. [50]

At the same time, in the field of moral and private virtue, human learning takes away levity, temerity and insolence, vain admirations of anything, the fear of death and of adverse fortune (considered as one of the greatest impediments of virtue and imperfections of manners), all these named "remedies which learning doth minister to all diseases of the mind, sometimes purging the ill humours, sometimes opening the obstructions, sometimes helping digestion, sometimes increasing appetite, sometimes healing the wounds and exulcerations". [51]

This kind of medical imagery, found in all Hellenistic philosophy, is more than a merely rhetorical process, being an "attempt to heal the human condition and that it accomplishes this not only through specific discoveries and inventions, but also through the very process of investigation itself". [52] Moreover, I want to emphasize that the idea of curing the fear of death and adverse fortune, realizing that they are not in our power, is a very important feature in Hellenistic philosophy, an imperative one in order to acquire happiness. For the stoics, the only thing in our power is the moral character and it is also the only one which can bring happiness if we have a virtuous life. Bacon's ethics starts with the inquiry into what is in our powers and what is not, into what kinds of affections and perturbations are able to produce damages in the mind, and what remedies we can find. [53]

Another virtue mentioned in *New Atlantis* is *chastity*. Talking about the chastity of the body, Bacon says that there is nothing more admirable than the chaste minds of Bensalem's people, making an obvious connection between the chastity of body and that of mind. The underlining thought is that both represent a sign of the elimination of the passions, and a chaste mind works in the conformity with method. Chastity is the first step to self-respect, and self-respect, together with religion, is an obstacle for the vices. [54]

Because God shows his goodness in illuminating the actions of Solomon's House, another important virtue of its members is *piety*. In fact, all the activities are a way of honoring God by studying his creation; and we find in the realization of experiments a special care for the thing itself, providing that the natural histories must "be compiled with a most religious care, as if every particular were stated upon oath; seeing that it is the book of God's works". [55]

The portrait of Bacon's 'scientist' cannot be realized by unique reference to his capacity of purging and purifying his intellect from idols. Natural philosophy is also important to eliminate errors, passions, and temptation; it thus improves the moral character. But the reformation of character starts before engaging in natural philosophy, and it seems very important to connect its therapeutic program with the cultivation of the virtues in all the activities the philosopher performs, given that man is a compound of body, sensitive and rational soul. The natural philosopher's virtues, besides 'a chaste patience, a natural modesty, grave and composed manners, a smiling pity' [56], are faith and religiosity, generosity and gentleness, unconditional charity and the absolute chastity of mind and body.

Conclusion

The goal of the human life should be to regain dominion over nature, by means of natural philosophy. But this is not an easy enterprise; it requires the transformation of the human being in order to be a mirror of nature. The 'scientific' community described in the *New Atlantis* is necessary in order to have a progress of knowledge and it represents a weapon against the idols and other errors of the human mind. The other weapon is the reformation and the purging of the mind during the investigation of nature through experimental philosophy. At the same time, the elimination of the idols and the cultivation of the moral virtues are required to prepare the mind for natural philosophy, and are essential during its program. Even though it seems to fall into circularity, Bacon's solution is to start with self-knowledge and with some spiritual exercises before going to the last level, the one of experimental philosophy. Equally important is the cultivation of the virtues, which fortifies the mind. And it is within a community that the scientist receives the necessary help from his collaborators to purge his own mind, while at the same time participating in the advancement of knowledge and learning to cultivate the virtues.

References

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[2] About the continuations and the reading of the *New Atlantis*, and the relation between *Sylva Sylvarum* and *New Atlantis*, see Jalobeanu, D., 'Bacon's Brotherhood and Its Classical Sources: Producing and Communicating Knowledge in the Project of the Great Instauration', in *Intersections*, 11 (2008), Brill, vol. I, pp. 201-204; Jalobeanu, D., 'The Fascination of Solomon's House in Seventeenth-Century England: Baconianism Revisited', in Alexandrescu, V., ed., *Branching off*, Zeta Books, Bucharest, 2010, pp. 225-233; Rees, G., 'An Unpublished Manuscript by Francis Bacon: Sylva Sylvarum drafts and other working notes' in *Annals of Science*, 38, (1981), pp. 377-412.
[3] Garber, D., 'Philosophia, Historia, Mathematica: Shifting Sands in the Disciplinary Geography', in Sorell, T., Rogers, G.A.J., Kraye, J., eds., *Scientia in Early Modern Philosophy*, Springer, London, 2010, p. 16.
[4] Grafton, A., 'Libraries and lecture halls', in Park, C., Daston, L., eds., *Cambridge History of Science*, Vol. III, Cambridge University Press, Cambridge, 2006, p. 249.
[5] Cornelius Drebbel (1572-1633) was the inventor of the first navigable submarine, and he also designed and built telescopes and microscopes at the court of James I. He also presented at the court experiments about cold and heat. Salomon de Caus (1576-1626) was the inventor of the steam engine. He lived in France, Germany and England, as well as at the court of James I. For more information, see Colie, R., 'Cornelius Drebbel and Salomon de Caus: Two Jacobean Models for Salomon's House,' in *Huntington Library Quarterly*, 18, (1955), pp. 245-260.
[6] Rossi, P., 'Bacon's Idea of Science', in *Cambridge Companion to Bacon*, Cambridge University Press, Cambridge, 2006, p. 32.
[7] Bacon, F., *De Augmentis Scientiarum*, Book II, Bacon, F., *Works*, ed. by Spedding, J., Ellis, R.L. and Heath, D.D., 15 vols, Longman, London, 1857-1874, vol IV, p. 289.
[8] See Bacon, F., *De Augmentis Scientiarum*, Book III, Chap. IV, WFB IV, pp. 344-365.
[9] Bacon, F., *New Atlantis*, WFB III, p. 165.
[10] About the relation between Bacon and secret societies, see Yates, F., *The Rosicrucian Enlightenment*, Routledge Classics, London and New York, 2003, pp. 155-169.
[11] Bacon, F., *New Organon*, Preface, WFB IV, p. 42.
[12] "The three "Depredators", who "collect the experiments which are in all books", seem to be engaged in gathering what in *De Augmentis* Bacon calls "learned experience" (*experientia literata*).

The "Pioneers or Miners" who "try new experiments, such as themselves think good", are performing the first stage in the process of discovery laid down in the *Novum Organum*: preparing the "Natural and Experimental history" that is the foundation of everything that follows. The "Compilers", who draw experiments "into titles and tables, to give the better light for the drawing of observations and axioms out of them" are likewise carrying out the next stage of investigation in the *Novum Organum*: forming the "Tables and Coordinations of Instances" that arrange the information in the natural history. The "Dowry-men or Benefactors" seem to relate to the task, which Bacon never fully explained in the unfinished *Novum Organum*, of "*Leading forth to Practice*, or to that which relates to men". The "Lamps", who "direct new experiments" developed from the ones already conducted, are "deducing or deriving new experiments from the axioms" generated by their fellows. Finally, and most importantly, there are the three "Interpreters of Nature" (…), those who arrive at the higher goal of philosophical understanding: they "raise" the discoveries made by all the other fellows into "greater observations, axioms, and aphorisms". Serjeantson, R., 'Natural knowledge in the New Atlantis', in Prince, B., ed., *Francis Bacon's New Atlantis, New interdisciplinary essays*, Manchester University Press, Manchester, 2002, pp. 96-97.

[13] Bacon, F., *New Organon*, Book I, Aphorism XIX, WFB IV, p. 50.

[14] Jalobeanu, D., Introductory study to Bacon, F., *Noua Atlantidă*, trans. Jalobeanu, D., ed. by Jalobeanu, D., Nemira, Bucureşti, 2007, footnote 200, p. 125.

[15] Bacon, F., *De Augmentis Scientiarum*, Book II, WFB IV, pp. 292-293.

[16] Bacon, F., *New Atlantis*, WFB III, pp. 164-165.

[17] Bacon, F., *New Atlantis*, WFB III, p. 165.

[18] Dana Jalobeanu claims that in the later writings, the transmission of knowledge became more important than its production. 'Bacon's Brotherhood and Its Classical Sources: Producing and Communicating Knowledge in the Project of Great Instauration', in *Intersections*, 11 (2008), Brill, vol. I, pp. 211-214.

[19] Bacon, F., *De Augmentis Scientiarum*, book VI, Chap. II, WFB IV, p 449.

[20] In the English translation of *De Augmentis Scientiarum* the Latin term 'vulgo' is translated 'crowd of learners'.

[21] Bacon, F., *De Augmentis Scientiarum*, book VI, Chap. II, WFB IV, p. 449.

[22] Bacon, F., *De Augmentis Scientiarum*, book VI, Chap. II, WFB IV, p. 449.

[23] In aphorisms, illustration and excursion are cut off, deductions and connections, descriptions of practice, all are cut off and we have in the aphorisms only a good quantity of observation. Bacon, F., *De Augmentis Scientiarum*, book VI, Chap. II, WFB IV, p. 451.

[24] Another diversity of delivery is "by assertion with proofs" or by "questions with determinations"; the latter should be followed with moderation, because in the transmission of knowledge the confutation should be employed only to remove strong preoccupations and prejudgments, and not to excite and provoke the lighter kind of doubts. The next diversity is the one according to the subject-matter which is researched, because the matter has a multitude of forms and the method should be compatible with each form. The last one has to do with the idols of the human mind and the new information should be delivered in another form than what is already in the mind, but they need to be understood and proved and "it is a rule in the art of transmission, that all knowledge which is not agreeable to anticipations or presuppositions must seek assistance from similitudes and comparisons." Bacon, F., *De Augmentis Scientiarum*, Book VI, Chap. II, WFB IV, p. 451-452.

[25] For example, Dana Jalobeanu sees the aphorism as a seed of knowledge, and as an appeal to curiosity, wonder and joy, but at the same time, because it stimulates the imagination, it represents only the first step of the process of transmitting knowledge. 'Bacon's Brotherhood and Its Classical Sources: Producing and Communicating Knowledge in the Project of Great Instauration', in *Intersections*, 11, (2008), Brill, vol I, pp. 214-215. In my view, the aphorism is a vehicle of

transmitting knowledge at the last level, because it is used by the "true sons of knowledge". Moreover, in the *New Organon*, the aphorism is the way through which the induction is delivered.
[26] Bacon, F., *New Organon*, Preface, WFB IV, p. 42.
[27] Bacon, F., *New Organon* , Book I, aphorism XXXV, WFB IV, p. 53.
[28] Bacon, F., *The Advancement of Learning*, Book I, WFB III, p. 315.
[29] Harrison, P., *The fall of man and the foundation of new science*, Cambridge University Press, 2007, p. 256.
[30] Harrison, P., 'The natural philosopher and the virtues', in Condren,C., Gaukroger, S. and Hunter, I., ed., *The Philosopher in Early Modern Europe*, Cambridge University Press, Cambridge, 2006, pp 202-203.
[31] See Anstey, P., 'Experimental versus Speculative Natural Philosophy', in Anstey, P., Schuster, J.A.,eds., *The Science of Nature in the Seventeenth Century*, Springer, Dordrecht, 2005, p. 215.
[32] Bacon, F.,*New Organon*, Book I, Aphorism XLIV, WFB IV, p. 55.
[33] I must add that Bacon also uses the term "speculative philosophy" in a positive sense, not as something opposed to experimental philosophy, but as a part of it, besides the operative part, being the science which search the causes, while the operative science is applying the causes in order to produce effects and artifacts.
[34] Bacon, F., *New Organon*, Book I, aphorism L, WFB IV, p. 58.
[35] Bacon, F., *Instauratio Magna*, WFB IV, p. 20.
[36] Jalobeanu, D., 'Experimental philosophers and doctors of the mind: the appropriation of a philosophical tradition', in Theis, R., ed., *Naturel et surnaturel en XVIIeme siecle,* Olms, Hildesheim, Zurich, New York 2010, p. 51.
[37] Jalobeanu, D., 'Experimental philosophers and doctors of the mind: the appropriation of a philosophical tradition', in Theis, R., ed., *Naturel et surnaturel en XVIIeme siecle,* Olms, Hildesheim, Zurich, New York, 2010, p. 57.
[38] For example, Stephen McKnight emphasized the importance of religious virtues for the members of Solomon's House. See McKnight, S., *The Religious Foundation of Francis Bacon's Thought*, University of Missouri Press, Columbia, 2006.
[39] Bacon, F., *New Organon*, Preface, WFB IV, p. 40.
[40] Bacon, F., *New Organon*, Book I, aphorism II, WFB IV, p. 47.
[41] Bacon, F., *New Organon*, Book I, aphorism XL, WFB IV, p. 54.
[42] Hadot, P., *Spiritual Exercises*, Blackwell Publishers, Oxford, 1995, p. 84.
[43] "Laying before us two books or volumes to study, if we will be secured from error; first the Scriptures, revealing the will of God, and then the creatures expressing his power; whereof the latter is a key unto the former; not only opening our understanding to conceive the true sense of the Scriptures, by the general notions of reason and rules of speech; but chiefly opening our belief, in drawing us into a due meditation of the omnipotency of God, which is chiefly signed and engraven upon his works.", Bacon, F., *The Advancement of Learning*, Book I, WFB III, p. 301.
[44] Bacon, F., *The Advancement of Learning*, Book I, WFB III, pp. 300-301.
[45] Bacon, F., *The Advancement of Learning*, Book I, WFB III, p. 272.
[46] Bacon, F., *The Advancement of Learning*, Book I, WFB III, p. 277.
[47] Bacon, F., *De Augmentis Scientiarum*, Book I, WFB I, p. 445, "atque literas, nisi incidant in ingenia admodum depravata, corrigere prorsus naturam et mutare in melius".
[48] Bacon, F., *The Advancement of Learning*, Book I, WFB III, p. 294.
[49] Bacon, F., *New Atlantis*, WFB, V, p. 412.
[50] Bacon, F., *The Advancement of Learning*, Book I, WFB III, 442 ("If then such be the capacity and receit of the mind of man, it is manifest that there is no danger at all in the proportion or quantity of knowledge, how large so ever, lest it should make it swell or out-compass itself; no, but it is merely the quality of knowledge, which be it in quantity more or less, if it be taken without the true corrective thereof, hath in it some nature of venom or malignity, and some effects of that

venom, which is ventosity or swelling. This corrective spice, the mixture whereof maketh knowledge so sovereign, is Charity (…)".Charity is the bond of perfection, because it "comprehendeth and fasteneth al the virtues together").

[51] Bacon, F., *The Advancement of Learning,* I, WFB, III, 315. Dana Jalobeanu, in her paper *Experimental philosophers and doctors of the mind: the appropriation of a philosophical tradition* says about the members of Solomon's House: "For Bacon, the philosopher is not only a high priest of nature, or an equivalent of the Persian Magus, philosopher-king and priest, but also a teacher and a doctor, providing medicines for the intellect, proposing experiments for the prolongation of life, diagnosing the illnesses and working upon the purging of the mind as a surgeon in his anatomical theatre." Jalobeanu, D., 'Experimental philosophers and doctors of the mind: the appropriation of a philosophical tradition', in Theis, R., ed., *Naturel et surnaturel en XVIIeme siecle,* Olms, Hildesheim, Zurich, New York 2010, p. 45.

[52] Box, I., 'Bacon's moral philosophy', in *Cambridge companion to Bacon*, Cambridge University Press, Cambridge, 2006, p. 279.

[53] Jalobeanu, D., 'Experimental philosophers and doctors of the mind: the appropriation of a philosophical tradition' in R. Theis, ed., *Naturel et surnaturel en XVIIeme siecle,* Olms, 2010, pp.49-57.

[54] Bacon, F., *New Atlantis*, WFB III, p. 394. For the stoics, self-respect is the starting point for the elimination of the vices; sexual appetites were seen as unnatural necessities and that which allowed vices enter the human mind.

[55] Bacon, F., *Preparative towards a natural and experimental history*, WFB, VIII, p. 369.

[56] Rossi, P., 'Bacon's Idea of Science', in *Cambridge Companion to Bacon*, Cambridge University Press, Cambridge, 2006, p. 33.

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