

INTERPRETATION

A Journal of Political Philosophy

Volume 7/1

January, 1978

page

1

Laurence Berns

Frances Bacon and
the Conquest of Nature

27

Mieczyslaw Maneli

Three Concepts of Freedom:
Kant—Hegel—Marx

52

George Anastaplo

Notes from Charles Dickens's
Christmas Carol

74

George Schwab

Legality and Illegality as
Instruments of Revolutionaries
in Their Quest for Power:
Remarks Occasioned by the
Outlook of Herbert Marcuse

90

Chaninah Maschler

The Seven-Day Story



QUEENS COLLEGE PRESS

INTERPRETATION

A Journal of Political Philosophy

Volume 7

Issue 1

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INTERPRETATION is a journal devoted to the study of Political Philosophy.

It appears three times a year.

Its editors welcome contributions from all those who take a serious interest in Political Philosophy regardless of their orientation.

All manuscripts and editorial correspondence should be addressed to the Editor-in-Chief.

INTERPRETATION

Building G 101 - Queens College - Flushing, N.Y. 11367 - U.S.A.

Subscription Price

For institutions and libraries \$12 - For individuals \$10.

Subscriptions and correspondence in connection therewith should be sent to:

INTERPRETATION, G 101, Queens College, Flushing, New York 11367

QUEENS COLLEGE PRESS, FLUSHING, N.Y. 11367

FRANCIS BACON AND THE CONQUEST OF NATURE*

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The whole prospect and outlook of mankind grew immeasurably larger, and the multitude of ideas also proceeded at an incredible rate. This vast expansion was unhappily not accompanied by any noticeable advance in the stature of man, either in his mental faculties or his moral character, but it buzzed the more. The scale of events around him assumed gigantic proportions while he remained about the same size.

By comparison therefore he actually became much smaller. We no longer had great men directing manageable affairs. Our need was to discipline an array of gigantic and turbulent facts.

To this task we have so far proved unequal. Science bestowed immense new powers on man and at the same time created conditions which were largely beyond his control. While he nursed the illusion of growing mastery and exulted in his new trappings, he became the sport and presently the victim of tides and currents of whirlpools and tornadoes amid which he was far more helpless than he had been for a long time.

—Winston S. Churchill¹

The so-called conquest of nature by modern science, the science associated with the names of Bacon, Descartes, Galileo and Newton, has transformed human life almost beyond description. The new dependency of human life upon science, or its product, technology, pervades our thinking as well as our practical lives. It might even seem, from the recent suggestion to replace the term technology with the term “technetronics,” that *logos* too had become outdated. Our awareness of the depth of this fundamental dependency should help us to avoid the hypocrisy of indulging in loose anti-scientific talk. Yet the threat of nuclear war, overpopulation, environmental pollution, the imbalance and disappearance of nature in the wild, self-perpetuating nature, and so forth, have all made the problematic character of the great project for the conquest of nature increasingly evident, even to non-philosophic thought.

But dangerous consequences can be dealt with in more than one way. If the conception of nature underlying the conquest of nature by science is sound, the remedies for the ills consequent upon the so-called conquest of nature are to be found not in less, but more

*Based on a lecture given at St. John's College, Annapolis, April 25, 1975.

science, or in a fuller use of science to solve the problems inherent in the application of science to practice. If, on the other hand, the dangers brought on by modern science are natural consequences of fundamental defects in the understanding of nature presupposed by the project, we are directed not only to the correction or reform of modern science, but to a consideration of the fundamental alternatives to it. In either case the fundamental problem turns out to be not only the problem of dangerous consequences, but rather understanding the truth, or adequacy, of the conception of nature underlying the notion of the conquest of nature.

The modern project, especially with Bacon and Descartes, was worked out in explicit opposition to classical philosophy and science. This is not simply historical accident. The meaning of the conquest of nature cannot be adequately understood without understanding the reasons for rejecting the view of nature it was formed explicitly to oppose, the classical or Platonic-Aristotelian idea of nature.² The idea of the conquest of nature cannot itself be adequately understood apart from an understanding of the fundamental alternatives to it.

I

The first word of the first aphorism of Bacon's *New Organon* is "Man", the second "nature": "*Homo, naturae minister et interpres, . . .*"; "Man, the servant and interpreter of nature, does just so much and understands just so much of the order of nature as he has observed in the thing or in the mind: he neither knows nor is able to know more." Man is the servant of nature in so far as he can do or make nothing except by obeying the hidden chain of causes. Man is the interpreter of nature in so far as he does not accept what he receives as if it were self-evident, but rather as being results and signs only of the hidden chain of causes. Signs must be interpreted. Man should distrust both his natural faculties for judgement and the signs which nature on her own provides him.

It is in the third aphorism that we find the decisive phrase: "For nature is not conquered, except by being obeyed."³ The phrase is on its face absurd, or self-contradictory: the same thing cannot both be conquered and obeyed. Bacon too solicits interpretation. The word

nature here is being used in two senses. In his discussions of natural history Bacon provides us with the distinctions which resolve the contradiction. Natural history is divided according to the three conditions in which nature is found. There is (1) nature in its ordinary course, free and left to itself, as it presents itself to the ordinary understanding in the normal movements of heavenly and terrestrial bodies, the normal generations of plants and animals; then (2) there is nature wandering, or in error, when prodigies and monstrosities are produced; and finally (3) nature constrained and vexed, forced out of her "natural" state, pressed and moulded by the art and hand of man. It is from this third kind of history that Bacon expects most. "For just as in civil affairs a man's disposition and the secret sense of his mind and affections are better discovered when he is troubled than at other times, so likewise the secrets of nature bring themselves forward through the vexations of art more than when they go their own way."⁴ The nature to be conquered is nature in its ordinary course. The conquest is to be accomplished through the discovery of and obedience to the secret chain of causes hidden within and operative throughout nature, which are to be revealed by experimental history and true interpretation.

What is given to human cognition in its ordinary course, by nature in its ordinary course, does not provide the clue to the discovery of nature's fundamental structures and laws. We cannot assume, as the ancients did, that there is a natural harmony between the mind of man and the world, that science and philosophy are the refinement and perfection of the natural understanding working on what is given to human cognition by nature. On the contrary, what is given by nature to ordinary cognition obscures and obfuscates man's way to the discovery of the fundamental course of nature, to nature's fundamental laws. The first part, then, of the way to the conquest of nature is the "refutation of the natural human understanding." This culminates in the refutation of those philosophies that have been based upon this understanding. These are, most notably, the philosophies of Plato and Aristotle, which take as their fundamental task thinking through the presuppositions and implications of the orientation of the natural human understanding.⁵

The refutation of the natural human understanding is set forward most fully by Bacon in his discussion of the Idols of the Mind in aphorisms 38 to 67.⁶ The idols are first mentioned in aphorism 23 as

“certain empty dogmas” in contrast to “the ideas of the divine mind” which are “the true signatures and impressions made on creatures, as they are discovered.” What Bacon intends by “ideas of the divine mind” is not at first altogether clear. The next aphorism, as if in answer to the question, How is one to know what kind of principles to seek?, remarks that principles constituted by arguments are not to be relied upon, since the subtlety of nature is greater many times over than the subtlety of argument. Rather, principles that lead to the discovery of new works, new particulars, that render the sciences active, are to be sought. In the search for those true signatures and impressions of the divine mind one is to look not for the divine ideas themselves, as ideas, but as forces and laws, as it were, impressed in and shaping and governing creatures. This is not because Bacon was more interested in practice, power or useful inventions than he was in theoretical truth, but because he thought that the active principles governing nature are to be discovered primarily by determining what, how, and under what conditions things can be *done*, or produced. A theory is not confirmed as true simply because it leads to the production of new works, but new works are signs or pledges that one is at least on the track of truth. Bacon’s emphasis is on light-bearing over fruit-bearing experiments, that is on discovering causes rather than on immediate usefulness. He was fond of recalling “the divine procedure, which in its first day’s work created light only and assigned to it one entire day, on which it produced no material work.”⁷ Those who confine themselves too closely to practical utility, he argues, defeat their own purposes in the long run; for from the right kind of light-bearing experiments and theories, not just occasional and isolated inventions will result, but whole “troops” of inventions. The right kind of theory and inventions, or works, go together.⁸

Human reason as ordinarily used in the study of nature is called by Bacon “Anticipations of Nature, (as a thing rash and premature).” Anticipations of nature are contrasted with what he calls Interpretations of Nature, human reason rightly used. For gaining assent, that is, for rhetorical purposes, anticipations and the “sciences” and dialectic,⁹ or logic, based upon them are far more powerful than Bacon’s art of interpretation. They are more powerful as rhetoric precisely because they base themselves on and merely refine those universally shared delusions, or radical errors, inherent in

the primary experiences and notions of the native human understanding. The analogies by which new things are related to old in philosophies based on anticipations, like the philosophies of Plato and Aristotle, lie in every man's common experience; the way of interpretation, on the other hand, must at first sight seem forbidding and uncongenial. It requires an initial suspension of belief about common experience itself, and its expositors must supply their own similitudes and comparisons in order to gain passage to men's minds. What they must rely on most, however, is leading men to particular things, or facts, themselves, or to those new experiences based on experiment which the understanding left to its natural inclinations would never come to.

The first class of idols, or false notions, which are rooted in the common nature of the human mind itself, Bacon calls Idols of the Tribe, that is the tribe or race of men. The human intellect is prone to suppose there is more order and regularity in things than it finds there. It is more moved and excited by whatever agrees with and affirms opinions already adopted than by what negates them. It is permeated by infusions from the will and affections, and especially those wants that foster superstition. Without warrant it restlessly presses on beyond all ends or limits, on to the unconditioned, as Kant would say. "But by far the greatest impediment and aberration of the human intellect," Bacon says in aphorism 50, "proceeds from the dullness, incompetency and deceptions of the senses." In his less popular natural history, *Sylva Sylvarum*, (paragraph 98), there is an interesting discussion of the subject of this aphorism, given as "touching the secret processes of nature."

The knowledge of man hitherto hath been determined by the view or sight; so that whatsoever is invisible, either in respect of the fineness of the body itself, or the smallness of its parts, or of the subtilty of the motion, is little inquired. And yet these be the things that govern nature principally; and without which you cannot make any true analysis and indication of the proceedings of nature. The spirits or pneumatics, that are in all tangible bodies, are scarce known. Sometimes they take them for *vacuum*; whereas they are the most active of bodies. Sometimes they take them for air; from which they differ exceedingly, as much as wine from water; and as wood from earth. Sometimes they will have them to be natural heat, or a portion of the element of fire; whereas some of them are crude and cold. And sometimes they will have them to be the *virtues* and *qualities* of the tangible parts which they see; whereas they are things by themselves. And then, when they come to plants and living

creatures, they call them souls. And such superficial speculations they have; like prospectives, that shew things inward, when they are but paintings. Neither is this a question of words, but infinitely material in nature. For spirits are nothing else but a natural body, rarified to a proportion, and included in the tangible parts of bodies, as in an integument. And they be no less differing one from the other, than the dense or tangible parts; and they are in all tangible bodies whatsoever, more or less; and they are never almost at rest: and from them, and their motions, principally proceed arefaction, colliquation, concoction, maturation, putrefaction, vivification, and most of the effects of nature. . . .

Aphorism 50 in the *Novum Organon* goes on:

For the sense by itself is a thing infirm and erring; neither can instruments for enlarging or sharpening the sense do much; but all the truer kind of interpretation of nature is effected by instances and by experiments fit and apposite wherein the sense judges the experiment only, and the experiment nature and the thing itself.

Distrusting ordinary sense experience, one must by careful thinking and planning subject the things of nature to conditions of all kinds: pressures, forces, mixtures, and so on, which would never be found in the ordinary course of nature, in order that nature's normally secret operations "which are too subtle for the sense" are forced to produce "some effect comprehensible by the sense."¹⁰ Given nature is contorted and transformed under the guidance of the notions the experiment is devised to confirm, disconfirm or illuminate, in order to produce the kind of experience the experiment aims at. And it is still the senses, but the senses lawfully married to the rational faculty, that are our sources for evidence about the nature of things. Bacon's refutation of the natural human reason is not meant simply to disparage the intellect. The controlled experiment is to judge "nature and the thing itself." And the controlled experiment is the product of mind, duly warned and chastened, but also instructed and even inspired. "A complete separation and solution, therefore, of nature must be made; not by fire indeed, but by the mind, as if by a divine fire."¹¹ In his preface to the second edition of the *Critique of Pure Reason* Kant speaks of this "intellectual revolution" in natural science partly discovered by and partly inspired by Bacon and carried on by men like Galileo, Torricelli and Stahl.

They learned that reason has insight only into that which it produces

according to a project of its own, and that it must not allow itself to be kept, as it were, in nature's leading-strings, but must itself show the way. . . constraining nature to give answers to questions of reason's own determining. . . [like] an appointed judge who compels the witnesses to answer questions which he has himself formulated.

Bacon takes the name of the next class of idols, Idols of the Cave, from what he once speaks of as Plato's exquisitely subtle allegory. But he speaks of our spirits being confined within "the caves of our bodies" and restricts these idols to those innate tendencies to error rising from the special nature of individuals, and their special habits, education and accidental circumstances. Plato's image of the cave, on the other hand, could be thought of as encompassing the subject matter of all of Bacon's first three classes of idols, idols of the tribe, of the cave, and of the forum.

The idols of the forum, or market-place, being partly innate and partly acquired from without, are placed between idols that are innate (those of the tribe and the cave) and those which are not innate (the idols of the theater). The idols of the forum are most troublesome of all, for they stem from the way words and names are formed. Words, being for the most part framed according to the capacity of the vulgar, draw the intellect along the lines and divisions that seem most evident to vulgar intellects. More acute and diligent observers find words standing in the way of communication of what they have seen in nature. The prudence of the mathematicians in beginning with carefully framed definitions is good, but cannot cure the evil in dealing with natural and material things. What is required there are methodical and orderly arrangements of individual instances. Men form names for things which do not exist, like Fortune or Prime Mover; and they form confused names on the basis of hasty and unskillful abstractions from things.¹²

The last of the four classes of idols, the idols of the theater, are from the dogmas, or fables, or plays of philosophy. They are not themselves innate, that is, they depend upon the acquisition or acceptance of some philosophy; yet like everything else they have a natural basis. The peculiarities of the different idols of the theater are to be traced back to different special combinations of effects derived from the workings of the innate idols of the tribe and cave. The idols of the forum affect all the philosophies.

Bacon speaks of three prominent types among the idols of the

theater. The first is the sophistical, which, to ensnare the assent of the greater number, bases itself upon common experience and common notions. The most conspicuous example is Aristotle, who led by the idol of the cave mentioned in aphorism 44 corrupted his natural philosophy and his metaphysics with his favorite study, dialectic, or what Bacon also calls the vulgar, or common, logic, the logic of the "Old" Organon. Aristotle fashioned the world out of categories, he tried to account for sensible differences and substances with words like entelechy and act which are words describing certain kinds of thoughts rather than things. Even when he did resort to experiment in his more specialized physical and biological works Aristotle framed his questions in such a way that his resort to experience was bound to confirm the positions he had decided upon in advance, a procedure warned against in aphorism 49 of the idols of the tribe.

The second class of idols of the theater is the empirical school of philosophy, those who on a narrow basis of certain experiments and experience fly or leap up to universal principles and try to explain everything else on the basis of the principles observed in their experiments. With great foresight Bacon warns that if his admonitions are heeded and men begin to leave sophistical philosophy, by which he means Aristotelianism, to devote themselves seriously to experiments, this kind of idol could become a much greater hindrance to sound inquiry.

The third class of idols of the theater, superstitious philosophy, the corruption of philosophy by admixture of theology and superstition, is far more widespread, in his times, at any rate, Bacon claims. While contentious Aristotelian, sophistic philosophy ensnares the intellect, this more poetical, more fanciful philosophy misleads it by flattery. The natural ambition of the intellect to fly beyond all limits, warned against in aphorism 48, and the susceptibility of the intellect to influences from the affections and imagination, warned against in aphorism 49, are catered to and flattered by this kind of philosophy. All idols are not of equal rank, and, Bacon explains, this kind of idol is keyed to the natural dispositions of more noble and lofty spirits. The most important example here is "Plato and his school";¹³ but this "apotheosis of error" shows itself in scholastic Aristotelianism as well, in the introduction of abstract forms, final causes and first causes. This unwholesome mixture of religion and

philosophy must be stopped, Bacon said, not only because it makes for fantastic philosophy, but also because it leads to heretical religion. Effecting this separation seems to be one of the most incontrovertibly successful parts of Bacon's project.

The great failure of ancient philosophy, however, a failing even of the Atomists whom Bacon praises as superior to Plato and Aristotle in natural philosophy, is that they investigated the quiescent principles of things *out of which* they are produced rather than the moving principles *through which* things are produced. The six received Aristotelian, or vulgar, distinctions of motion are merely popular and make no penetration into nature. Bacon gives fifteen and, later, nineteen different motions in his own published accounts of the simple motions.¹⁴

The ultimate or natural causes of these failures are dealt with in the last of the particular idols of the tribe in aphorism 51: "The human intellect is carried to abstractions according to its own nature; and things which are in flux it feigns to be constant." The fault of abstractions is that they feign things in flux to be constant. In aphorism 52 Bacon provides a further clue to his meaning where he speaks of this idol arising from "the mode of the impression." What he seems to have in mind is that the moving thing makes an impression or impressions which remain constant in what is impressed, that is, in the sense, memory and intellect, thereby suggesting that what caused it in the thing itself is also fixed, whereas it is really in motion. The aphorism continues: "But it is better to dissect nature than to abstract; as the school of Democritus did, which penetrated into nature more than the rest. Matter ought rather to be considered both in its schematisms and meta-schematisms, and pure act, and law of action or motion: for forms are figments of the human spirit, unless you are willing to call those laws of action, forms."

Bacon uses the word form to describe the ultimate objects of science because that word had become so venerable for so many of those he wanted to lead down the path of his new science; what he means are laws of motion.¹⁵ The intellect in dealing with things in flux moves towards the constant, but "in nature nothing truly exists besides individual bodies producing pure individual acts according to law."¹⁶ The given compounded bodies of nature are to be dissected down to the latent schematisms of more fundamental bodies constituting them, the schematisms, or meta-schematisms of the

more fundamental simple natures constituting them are to be studied especially with a view to the laws of action inseparable from their existence. The natural appetite of the intellect for constancy is to be satisfied by fixed modes, orders, or laws of change.

Beginning with natural history and the naturally given forms of the ordinary course of nature, like lions, oaks, men and water, physics studies their material and efficient causes, that is, their latent schematisms and latent processes, with a view to discover the truly simple natures and motions out of which they are compounded. What simple natures are is not yet determinable, says Bacon, but he speaks of them as being more abstract and general natures like heat and spontaneous rotation, attraction and magnetism.¹⁷ The suggestion may be that in the simple natures material configuration and simple motion coalesce as two inherently connected factors of what we might call unitary ordered material dynamisms.¹⁸ However that may be, the simple natures constitute the "alphabet of nature." Metaphysics, in the literal sense of "meta," after-physics, begins with the alphabet and studies its "grammar," that is how the simple natures are collected, compounded and combined to form the bodies and to produce the operations of the ordinary course of nature. Metaphysics studies formal causes, that is the laws of action of the simple natures, the laws which order and constitute any simple nature in any subject matter susceptible of that nature. The operative part of metaphysics Bacon calls "magic" suggesting by the term that on the basis of the new natural science men will be able to generate things never before seen in nature and of such a character as to rival in power, fineness and durability the things produced by nature in its regular course. The term also suggests that such things being alien to the ordinary course of nature could seem to be of supernatural origin. Bacon's use of the term metaphysics, like his use of the term form, cannot be understood apart from considerations of his philosophic rhetoric, for it seems to have been designed first to appeal to those who might still be attracted by the traditional name, but only in order to lead them toward a very different notion of the thing. "All physics," Bacon wrote, "lies in a mean between natural history and metaphysics." Metaphysics is "itself a part of physics or of the doctrine concerning nature."¹⁹ That is, physics, in the broad sense of the word, begins with natural history and ends in

metaphysics, with the laws of action of the simple natures. Bacon knew that there would be little left of traditional metaphysics, if his way were followed. A private letter of 1622, to a Father Baranzano in Italy, reveals his intention in part: "Be not troubled about Metaphysics. When the true Physics have been discovered there will be no Metaphysics. Beyond true Physics is Divinity only." "The human intellect," he wrote in the *Novum Organum*, "must not be supplied with wings, but rather with lead and weights."²⁰

Are Bacon's "forms," his laws of motion, forerunners of the mathematical formulas of Newtonian physics? It is difficult to be certain. He did say that physics should end in mathematics. He did not seem to appreciate what might be accomplished by framing one's initial hypotheses in terms that are representable by mathematical symbols.²¹ One might say that he foresaw what the goals of mathematical physics were to be, without being clear about the mathematical means to those goals.²²

"Inquiries into nature have the best result when they begin with physics and end in mathematics." The nearer one approaches simple natures, he said, the easier and plainer everything becomes, as one moves from the incommensurable to the commensurable, from surds to rational quantities. Again, "everything relating both to bodies and virtues in nature [should] be set forth (as far as possible) numbered, weighed, measured and determined. For we pursue works not speculations, and physics and mathematics well mixed generate practice." And most interestingly, we must "measure virtues, [forces], according to the quantity of the bodies in which they subsist and show how far the mode of the virtue depends upon the quantity of the body. . . we must proceed to inquire what proportion the quantity of a body bears to the mode of its virtue."²³

However, the technique of representing physical entities by mathematical symbols, so as to allow what one already knows from mathematics to suggest undiscovered relationships between the represented physical entities, was evidently not known to him. Mathematics, he said, "should terminate natural philosophy, not generate or give it birth."²⁴ He does not seem to have been very well informed about the history of mathematics or mathematical advances being made during his own times.²⁵ Yet the Baconian experiment seems to lend itself to combination with the approach of

symbolic mathematical physics. Both methods approach nature with a view to discovering the extent to which nature is subject to laws devised in advance by human reason. Both the Baconian experimenter and the mathematical physicist, in the Kantian phrase, "prescribe to nature its laws." Baconian influence can, of course, be seen in other approaches to physics, and also in other sciences, like chemistry and biology. However this may be, we now turn our attention to an area where the extent of Bacon's influence is less questionable: the new relation which was to be established between science and society.

II

The "Great Instauration," great renewal, of the sciences called for a radical change in the way science and philosophy were to carry on their affairs.

And then let them consider what may be expected (after the way has been thus indicated) from men abounding in leisure, and from association of labors, and from succession of ages. . . in which the labors and industries of men (especially as regards the collecting of experience) may with the best effect be first distributed and then combined. ²⁶

Bacon's way was "not a way over which only one man can pass at a time (as is the case with reasoning)." His way required a vast new institutionalized science, coordinating the efforts of many men in a complex, hierarchical organization, that was meant to outlast any of the individuals who were parts of it; that is, as we say, it was to become "historical" and progressive. This vast enterprise would require far greater support from society at large than science and philosophy had ever received before. There would come a time, Bacon hoped and expected, when society's dependence on science would be extensive and obvious; but before that time came about, and if that time were to come about, the powers that be, "who are but in very few cases even moderately learned,"²⁷ would have to be won over to the new cause. He devoted a considerable amount of thought and writing to this, his rhetorical task.

To the extent that his project has succeeded, the need for, and the understanding of, his rhetoric has diminished. Yet without some understanding of that philosophic rhetoric, what Bacon accom-

plished, both theoretically and practically, cannot be appreciated. He regretted that it was necessary for him, the architect of the new edifice of science, to become herald, recruiter, and even ordinary workman as well.

We have already seen some of the consequences of his need to recruit new men of science in an atmosphere dominated by Aristotelian, Platonic and Scholastic learning in his use of the terms "form" and "metaphysics." In one of his interesting unpublished writings, which are often more open and less colored by classical terminology, he speaks about how his plans must be communicated and transmitted:

inveterate errors like deliriums of the insane must be subdued by art and by wit, and are aggravated by violence and opposition. We must, therefore, use prudence and humor them (as far as we can with simplicity and candor), that contradictions may be extinguished before they are inflamed.²⁸

Jonathan Swift in his *Full and True Account of the Battel Fought Last Friday, Between the Antient and the Modern Books in Saint James's Library* pays a certain tribute to Bacon in this regard: "Then Aristotle, observing Bacon advance with a furious Mien, drew his Bow to the head, and let fly his Arrow, which mist the valiant Modern and went hizzing over his Head; but Des Cartes it hit. . ." ²⁹

Evidently Bacon ducked.

In addition to those whom he called "true sons of science," to whom "the lamp" is to be handed on, a new army of assistants, managers and administrators had to be recruited. Appeals had to be made to men who never before would have been connected with science, to induce them to forsake their green fields, humble workshops and profitable businesses to become partners in the hitherto too fastidious, or too exalted, quest for truth. Bacon encouraged them with the partial truth that "our way of discovering sciences almost levels men's wits and leaves but little to individual excellence," just as a man with a compass can draw a more perfect circle than anyone else, no matter how excellent, who uses his hand and eye alone. There will be a vast array of new technical and mechanical activities that will leave little to special intellectual excellence; but Bacon was more aware of the difference between ordinary men and men of talent and genius than are those who criticize him for ignoring it. Some four pages after his statements

about levelling in the *Novum Organum*, he remarks that what he is attempting "cannot be brought down to the apprehension of the vulgar except by effects and works only."³⁰ This should be considered also in connection with the question about the relative importance of fruit, works, or power, on the one hand, and light and truth, on the other, for the Baconian philosophy.

The new institutionalized science of the future, Bacon saw, required a new relation between science and political life. Throughout his long and eminent political career he tried to gain official support for his projects. He was much more successful after his death, as Abraham Cowley's ode "To the Royal Society" of science, written in the middle 1600s, indicates.

From these and all long Errors of the Way
 In which our wandering Predecessors went,
 And like th' old *Hebrews* many Years did stray,
 In Desarts but of small Extent,
Bacon, like *Moses*, led us forth at last,
 The barren Wilderness he past,
 Did on the very Border stand,
 Of the bless'd promis'd Land
 And from the Mountains Top of his exalted Wit,
 Saw it himself, and shew'd us it.³¹

Bacon's success (and its having been taken for granted) has made it more difficult for us to see the problem as he saw it. The relation between political society and science and philosophy is always a delicate one: for, he wrote, there is no form of polity or society that does not have "some point of contrariety towards human knowledge." And conversely, the arts and sciences are always somewhat suspect from the point of view of civil society:

For surely there is a great distinction between civil affairs and the arts: for the danger from new motion and new light is not the same. In civil affairs, truly, even a change for the better is suspected as likely to bring on disturbances; for civil affairs rest on authority, consensus, fame and opinion, not demonstration. But in the arts and sciences, like metal mines, there should be a clamor of new operations and further progress.³²

Although Bacon wrote extensively on political subjects and working one's way through the labyrinth of his political thought can

be a fascinating enterprise,³³ we must confine ourselves here to his specifically scientific politics. A most important part of his treatment of that subject is found in one small book, the fable, or scientific utopia, entitled the *New Atlantis*. But there too Bacon's ideas are not simply exposed to view, but become accessible only to a certain art of interpretation. For as he says in the *Advancement of Learning* beginning his treatment of government: "it is a part of knowledge secret and retired, in both those respects in which things are deemed secret: for some things are secret because they are hard to know, and some because they are not fit to utter." And in the expanded Latin version of this book he begins his discussion of civil or political science by telling an old story:

that many philosophers being met together in the presence of the ambassador of a foreign prince, each endeavoring to give a sample of his wisdom, that the ambassador might be able to make a report of the wonderful wisdom of Greece; one of them remained silent. . . the ambassador turning to him, said, "What have you to say for me to report?" To whom he answered, "Tell your king that you have found a man in Greece who knew how to hold his tongue."

Bacon goes on to speak of an "art," even an "eloquence in silence" on these matters. There is also a simpler reason for the indirectness of the political discussion in the *New Atlantis*. If it is the case that the scientists control politics in the New Atlantis, Bacon is in effect asking the great political men of his own times to contribute to the founding and support of institutions which were intended eventually to deprive them, or men like them, of any real political power. Bacon had surely read, but did not need, the advice tendered by Machiavelli, that if you intend to kill a man and you want his weapons, you should not say, "Give me your weapons, I want to kill you." It is sufficient to say, "Give me your weapons."³⁴

Bacon's *New Atlantis* is written in explicit correction of Plato's *Critias*; both works are formally incomplete.³⁵ The old Atlantis in the *Critias*, a luxurious, technological, or mathematically organized, society was destroyed by earthquakes; the New Atlantis goes back as far, but thanks to its science does not fall prey to cycles of natural catastrophe as do all societies in Plato's account. The *Critias* ends just as Zeus is about to speak; what formally corresponds to Zeus's speech is the completed speech of the Father from Salomon's House,

the great new scientific institute of the future, "the noblest foundation. . . that ever was upon the earth; and the lanthorn [or as elsewhere, "the very eye"] of this kingdom." The speech is a description of Salomon's House, or as they also call it, the College of the Six Days Works. The society of Bensalem, for so it is called³⁶ in the language of the natives, enjoys prosperity, all kinds of health-producing fruits and foods, good health and medicines surpassing anything in Europe; and most natural, most chaste and most pious customs. Salomon's House, it seems, is the source of all their greatest blessings. Science is devoted to the twin aims of finding out the true nature of things, to the greater glory of God, and the relief and prospering of man's estate. The island is Christian, having received both Old and New Testaments through a special revelation, which was confirmed by a witnessing Father from Salomon's House as a true miracle. But Jews, Persians, Arabs, Chaldeans and Indians also live there and are left to their own religions, and they too love and respect the ways of the nation of Bensalem.³⁷

It is a Jew with the interesting name of Joabin who arranges the meeting of Bacon's narrator with the Father from Salomon's House. Salomon's House itself was founded by Solamona, the great law-giver of Bensalem, who reigned about 300 B.C. Although the founding of Salomon's House depends upon the political act of a great king, and Bensalem is called a kingdom still, by the time Salomon's House has come into its own the power of the king is scarcely visible. Orders are given to the visitors not in the name of the king, but in the name of the "state." When the Father from Salomon's House makes his procession into the city, the first such visit in twelve years, his chariot, described in detail, reminds one of the Ark of the Covenant in the Old Testament. He, as Jesus is often characterized, "had an aspect as if he pitied men." Fifty attendants of his own precede his chariot, and two others directly preceding bear, one a cross, the other a pastoral staff like a sheephook. All political and other officials walk behind his chariot. "He held up his hand as he went, as blessing the people, but in silence." In some of the factories of Salomon's House, the Father reports in a private meeting with the narrator, they have all kinds of ordnance and instruments of war, flying machines of a sort and submarines. There are thirty-six Fellows of the College, under them are novices and apprentices and "a great number of servants and attendants, men and women." The

Fellows decide which of their inventions and experiences should be published and which not. They “take all 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.”

What all this indicates is that the ultimate rule both of the state and religion, (“which has most power over men’s minds”³⁸), is in the hands of the Fellows of Salomon’s House, the philosopher-scientists.

Bacon envisaged a vast expansion of human power as a consequence of science’s conquest of nature. He evidently thought that these powers, powers for evil as well as for good, were not to be put into the hands of mere statesmen; control was to be kept in the hands of those who would be expected to comprehend them, the most powerful and highly trained philosophic and scientific minds. While the arrangement of a marriage between science and society clearly forecasts a new era of mutual interest and concern between the parties, rule by the wise was regarded as the condition for success. The leaders of science apparently were also meant to become masters of statecraft, of human philosophy, to guarantee that the newly discovered powers would fall into hands fit to use them well. In aphorisms 127 and 80 of Book One of the *Novum Organum* Bacon makes clear that he is speaking about perfecting not only natural philosophy in the narrow sense, but the sciences of logic, ethics and politics as well; they were all to be nourished by, and brought to perfection along with, natural philosophy. The new science, in its inception, was meant to be a universal science.³⁹

The failure to develop the expected human philosophy would seem to be the most conspicuous failure of Baconian philosophy. Can any philosophy or science which does not take the orientation of pre-scientific and pre-philosophic cognition seriously ever be adequate for understanding human things?⁴⁰

However this may be, Baconian science wins the support of society and the people at large by catering to their fears and desires, as they understand those desires, that is, by providing them with protection against injury from man and especially from nature, with prosperity, with comforts and new pleasures and especially with stronger and healthier bodies. The latent, and not always latent, antagonism between science and philosophy, on the one hand, and society, on the other, is not to be bridged by mere words, by the flimsy art of the *Gorgias*, by the consolations of philosophy, by

exhortations to virtue, but rather by the tangible comforts of Baconian charity. Consolation for and bowing to the ravages of fortune are not as good as conquering fortune; for in truth, Bacon says, fortune is a name for something which does not exist, just as the theoretical presupposition of the notion of fortune, variable and unstable matter, does not exist. The Ancients produced theoretical excuses, blaming their failure to radically improve the estate of man on the nature of things, rather than on their own ignorance, especially their ignorance of the forms, or fixed laws governing all matter.⁴¹

The depreciation of nature, at least of given nature, or nature in its ordinary course, implicit in the idea of the conquest of nature is a, or the, common theme of modern philosophy. In Kant and Hegel it culminates in a thorough disqualification of nature for the provision of ethical and political standards. Or, in other words, Kant and Hegel found the nature uncovered by modern science, the nature which Bacon said is to be obeyed, altogether incapable of supplying man with ethical and political standards. As a consequence, for Kant and Hegel moral and political principles must be traced to some other non-natural sources: freedom, pure practical reason, spirit and history. Something which anticipates, or corresponds to, the later development occurs also in Bacon, as can be seen by considering the following difficulty. Men, like lions and oaks, are not fundamental, but rather compounded forms of nature in its ordinary course. But one of these ordinary, compounded forms is to become the conqueror and master of all the forms of nature in its ordinary course. There must be something special, or fundamental about this one of all the non-fundamental forms, man. Bacon's division of all philosophy (apart from natural theology) into natural and human is a kind of tacit acknowledgement, insufficient though it may be, of the new special status of man in his philosophy. Yet, unlike Kant and Hegel, Bacon still looked to nature and its fundamental laws in order to discern the principles of morality.⁴²

Sometimes he claimed to share the ethical goals of the ancient philosophers, adding only the teaching they neglected about how to attain those goals; but that position is not long maintained. The discourses of the ancients on morals and politics, he said, are beautiful and lofty, like "the stars, which give little light because

they are so high.”⁴³ Bacon, following Machiavelli (*The Prince*, chapter 15), lowered his goals in order to guarantee actualization. This is one way to understand the so-called conquest of fortune. A Baconian might reply that goals which can almost never be put into practice cannot be regarded as serious practical goals. In his widely read *Advancement of Learning* Bacon divides the “Platform of the Good” into two basic divisions, Individual or Self Good, which concerns itself with virtue, and the Good of Communion, or Social Good, which concerns itself with duty. Individual Good is subdivided into Passive Good and Active Good, and Passive Good is subdivided finally into Conservative Good and Perfective Good. The first division is explained as an appetite imprinted in everything toward a twofold nature of good, the one as everything is a totality in itself, the other as it is a part of another body: Iron moves toward the lodestone in individual sympathy, but if it exceeds a certain quantity, like a good patriot, it moves to the earth, the country of its connaturals. The conservation of the more general form, the good of communion, controls all the lesser inclinations, as is emphasized by the Christian Faith, which more than any other sect or philosophy exalted the good of communion and depressed the private or particular good. “All other excellences . . . are subject to excess; only charity admitteth no excess.” This also decides the question concerning whether the contemplative or the active life is to be preferred, against Aristotle. For all the reasons he brings forth in favor of the contemplative life are private. As far as the private pleasure and dignity of a man’s self is concerned, Aristotle is right. “But men must know that in this theater of man’s life it is reserved only for God and angels to be lookers on . . . for contemplation which should be finished in itself, without casting beams upon society, assuredly divinity knoweth it not.” In his much less reserved and unpublished, but privately circulated, *Valerius Terminus*, these same divisions of good are discussed with no admixture of Christian theology or classical terminology, as appetites, desires, and motions operating throughout material nature. Bacon begins this discussion with the remark, that “if the moral philosophers that have spent such an infinite quantity of debate touching Good, and the highest good, had cast their eye abroad upon nature,” to see the “quaternion of good” which he presents as laws of motion, then they might have

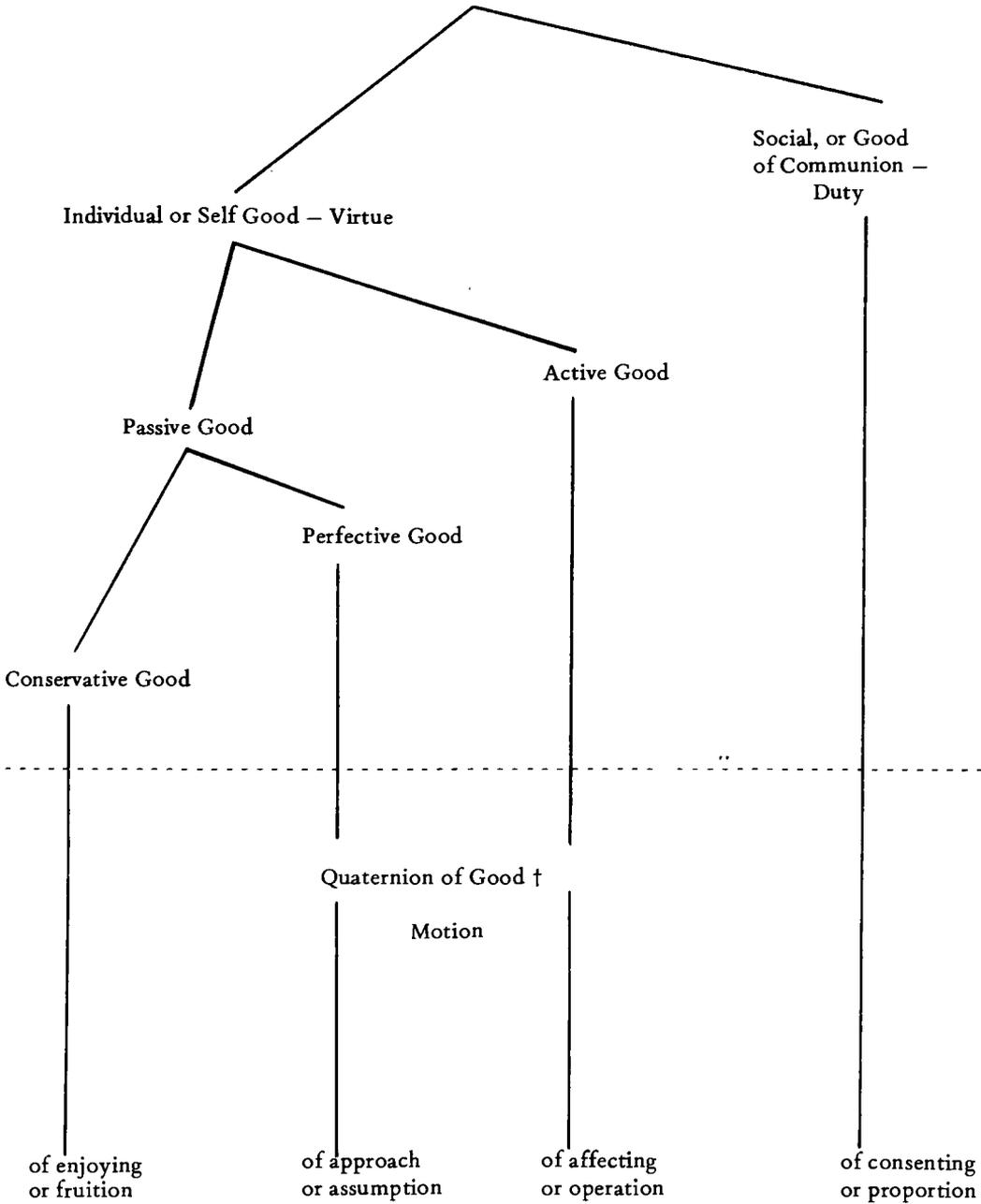
“saved and abridged much of their long and wandering discourses of pleasure, virtue, duty and religion.” (See Figure 1.) In the expanded version of the *Advancement of Learning*, the *De Augmentis*. . . , the section on physics, in the discussion of simple or elementary motions, these same motions with still different names and no obvious connection to morality show up in the central places. Morality, it seems, is to be reduced to physics. It is in Bacon’s thought rather than Hobbes’ that those two great powers of modern thought, Machiavellian political morality and modern natural science, are first brought together. The Machiavellian principles, however modified, are found by Bacon to be operative not only in human nature, but throughout nature as a whole.

But let us try to understand how this works out in human terms by trying to see what the best, or highest, way of life would be for Bacon. The Active Good of extending and multiplying oneself, in conformity with the Social or Communal Good takes precedence over the Perfective Good and the Preservative Good, that is, pleasure. Internal perfection, contrary to Plato and Aristotle, is secondary to acting upon and relating to others in and for society. Foreign policy, as it were, takes precedence over domestic policy. In his most popular book, the *Essays*, (No. 55) Bacon assigns the highest place of honor to founders of empires, states and commonwealths, like Romulus, Cyrus, Caesar, Ottoman and Ismael. In the *Novum Organum*, however, in distinguishing three grades of ambition, the highest political ambition is assigned the second place. The first place goes to him who would “endeavor to instaurate and extend the power and empire of the human race itself over the universe of things” through the sciences and the arts. “And yet, to speak the whole truth,” Bacon says later in the same aphorism “. . . the very beholding of the light is itself a more excellent and fairer thing than its many uses: so surely the very contemplation of things as they are without superstition or imposture, error or confusion, is in itself more worthy than all the fruits of inventions.” And at the end of the First Book of the *Advancement of Learning*:

We see then how far the monuments of wit and learning are more durable than the monuments of power, or of the hands. . . the images of men’s wits and knowledges remain in books, exempted from the wrong of time and capable of perpetual renovation. Neither are they fitly to be called images,

Figure 1

Platform or Exemplar of the Good*



* From *Advancement of Learning*, 1605, and *De Augmentis Scientiarum*, 1623.

† From *Valarius Terminus*, estimated 1603.

because they generate still and cast their seeds in the minds of others, provoking and causing infinite actions and opinions in succeeding ages. . . . letters . . . as ships pass through the vast seas of time, and make ages so distant to participate of the wisdom, illuminations, and inventions, the one of the other. . . .

Apparently Bacon did conceive of contemplation as the highest perfection of man, but a kind of politic contemplation, contemplation of the most far-seeing practice, or action, the theory which discloses knowledge of "all possible operations," the theory productive of the most long-range practice. He evidently envisaged a complete coincidence of private and social good on the highest level. Ambition in the highest sense, the ambition of the founder of the empire of man over nature, who is that founder *because he is the first discoverer of the cosmological truth*, becomes at the same time the performance of the highest of duties. The ambition of the founder of the greatest of all empires is the highest form of the active or extensive good; it is realized by means of the highest perfective good, contemplation. Since it is aimed at securing the maximum of relief, comfort, and power for mankind as a whole, it also constitutes the highest of all duties, as Bacon defined duty, the action of an individual with regard to the well-being of society. In the very last entry of his natural history it is difficult not to think that Bacon had himself in mind:

The delight which men have in popularity, fame, honour, submission and subjection of other men's minds, wills, or affections (although these things may be desired for other ends), seemeth to be a thing in itself, without contemplation of consequence, grateful and agreeable to the nature of man. This thing (surely) is not without some signification, as if all spirits and souls of men came forth out of one divine limbus; else why should men be so much affected with that which others think or say? The best temper of minds desireth good name and true honour: the lighter, popularity and applause: the more depraved, subjection and tyranny; as is seen in great conquerors and troublers of the world; and yet more in arch-heretics; for the introducing of new doctrines is likewise an affection of tyranny over the understandings and beliefs of men.

As this quote indicates, the lowest of Bacon's classes of good, the conservative good, or good of enjoyment, will also be fulfilled for the founder of the empire of man over nature, through the pure delight men have in fame, honor and the subjection of other men's minds.

The Father from Salomon's House "had an aspect as if he pitied men." As Bacon says elsewhere:

There is implanted in man by nature itself a noble and excellent spirit of compassion, that extends itself even to the brutes which by the divine ordinance are subject to his command. This compassion, therefore, has a certain analogy with that of a prince towards his subjects. Moreover it is most true, that the more worthy a soul is, the more objects of compassion it has.⁴⁴

The true temper of Baconian charity, of the Baconian scientist, evidently must combine the spirit of compassion with the spirit of domination. A synthesis of these qualities along with Herculean, Promethean courage⁴⁵ would seem to constitute something like the grand passion of generosity discussed by Descartes in his *Passions of the Soul*.

Both Bacon and Descartes believed that the vast expansion of powers to be wrought by the new science would have to be matched by correspondingly great resources of courage in the souls of those men who were to release and administer those powers. But moderation, the ancients tell us, is the core of almost all the virtues. And courage without moderation is rashness. The beneficence of the project for the conquest of nature seems increasingly to be matched, or perhaps even more than matched, by its rashness. An open-minded reconsideration of the principles underlying the project and the alternatives to it would seem to be called for.⁴⁶

¹Speech at the Massachusetts Institute of Technology, April 1, 1949. Cf. *The Gathering Storm*, (Boston, Houghton Mifflin Co., 1948), pp. 38-42; "Mass Effects in Modern Life" and "Fifty Years Hence" in *Thoughts and Adventures*, 1932.

²The common, Socratic, element in the philosophies of Plato and Aristotle is discussed in my "Socratic and Non-Socratic Philosophy: a Note on Xenophon's *Memorabilia* 1.1.13 and 14," *The Review of Metaphysics*, September, 1974, pp. 85-88.

³Unfortunately, in the most widely read English translation, Spedding's, among other inaccuracies, *vincitur*, "conquered," is usually translated as "commanded." Spedding was probably misled by the *imperatur* of aph. 129. See Library of Liberal Arts Ed., *The New Organon*, ed. F. H. Anderson, p. 19, lines 18 and 19; p. 29, line 8; and p. 39, aph. 3.

⁴*New Organon*, (hereafter designated as *N.O.*), I, aph. 98.

⁵The refutation, or rejection of the natural human understanding has been

tried in different ways. Cf. Descartes' "*genium aliquem malignum*" in Meditation I and Meditation VI, 76 and 77; Hobbes' "feigning the world to be annihilated" in *De Corpore*, chap. 7; and *Leviathan*, chap. 13, where it is shown why the "condition of nature" is intolerable: John Locke, *Essay Concerning Human Understanding*, Book I; and *Essay Concerning Civil Government*, chap. v, where the part which nature (compared with labor) contributes to the value of things shifts from 1/10th to 1/100th to 1/1000th to "the almost worthless materials": Spinoza, *Ethics*, Part I, Appendix; and G. W. F. Hegel, *Phänomenologie des Geistes*, Hoffmeister ed., 1952, Einleitung, pp. 66-68; Baillie trans., pp. 135-37. Cf. Jacob Klein, *Greek Mathematical Thought and the Origin of Algebra* (M.I.T. Press, 1968) pp. 72-74 and 117-21; Leo Strauss, *What is Political Philosophy?* (Free Press, 1959), "Political Philosophy and History" and "On Classical Political Philosophy"; and Laurence Berns, "Rational Animal—Political Animal: Nature and Convention in Human Speech and Politics," *Essays in Honor of Jacob Klein* (St. John's College Press, Annapolis, 1976).

⁶Aphorisms, Bacon wrote in *De Augmentis*. . . , Book vi, chap. 2, represent knowledge as fragmentary and incomplete, thereby inviting the reader to contribute and supply what is missing.

⁷*The Great Instauration*, Preface; and *N.O.*, Book I, aph. 70.

⁸Cf. Paolo Rossi, "Truth and Utility in the Science of Francis Bacon" in *Philosophy, Technology and the Arts in the Early Modern Era* (Harper Torchbooks, 1970), pp. 146-73; and Hans Jonas, "The Practical Uses of Theory," in *The Phenomenon of Life* (Harper & Row, 1966), pp. 188-210, esp. section v.

⁹Bacon's usual term for Aristotelian logic is dialectic, usually rendered by Spedding as "logic."

¹⁰*The Works of Francis Bacon*, (hereafter designated *Works*), Spedding, Ellis and Heath, eds. (London, 1875, seven volumes), vol. iv, p. 412.

¹¹*N.O.*, Book II, aphs. 16 and 7.

¹²In aphorisms 60 and 15 Bacon condemns the use of certain generally accepted names and notions. He seems to have Aristotle's categories in mind. But names and notions from the category of quantity are not among those condemned.

¹³Cf. Plutarch's *Lives*. . . , Nicias, XXIII.

¹⁴In Book III, chap. 4 of the *De Augmentis*. . . , and aph. 48 of *N.O.*, Book II. These aphorisms dealing with superstitious philosophy and the failure to search out the moving principles of things are at the center of Book I (*N.O.*).

¹⁵In the *Valerius Terminus*, which was never published by Bacon, but evidently circulated privately, the equivalent, or corresponding term is "direction." *Works*, vol. III, pp. 235-41. Cf. Ellis' Preface, *ibid.*, pp. 201-05. This may be the best place to study what Bacon means by the remark "that which in contemplation is as the cause is in operation as the rule." (*N.O.*, I, aph. 3.) Cf. Paolo Rossi, *Francis Bacon, from Magic to Science* (London: Routledge and Kegan Paul, 1968), pp. 193-201; and Mary B. Hesse, "Francis Bacon," in *A Critical History of Western Philosophy*, ed. D. J. O'Conner (Free Press of Glencoe, 1964), chap. 8.

¹⁶N.O., Book II, aph. 2.

¹⁷Cf. on "simple natures," N.O., Book II, aph. 5 and Descartes, *Rules for the Direction of the Mind (Ingenii)*, Rule 12. For Bacon's influence on Descartes see A. Lalande, "Sur quelques textes de Bacon et de Descartes," *Revue de Métaphysique et de Morale*, May, 1911, pp. 296-311.

¹⁸Cf. *De Augmentis* . . . , Book III, chap. 4, on "Abstract Physics." Cf. Laurence Berns, *An Introduction to the Political Philosophy of Francis Bacon*, . . . , Ph.D. Dissertation, University of Chicago, 1957, Appendix and pp. 175-78 and pp. 193-94. Cf. Rossi, *op. cit.*, p. 202.

¹⁹*De Augmentis* . . . , Book III, chap. 4, and Book IV, end; in *Works*, vol. IV, pp. 347 and 404.

²⁰Book I, aph. 104.

²¹Cf. Jacob Klein, *op. cit.*, note 5, above, Part I, Introduction, and Part II.

²²But cf. Lalande, *op. cit.*, note 17, above, pp. 309-11, where Lalande speaks of Descartes' announcement (in *Rules* . . . , no. 12) of the method of geometrical interpretation of sensible phenomena in words which "reproduce nearly word for word a passage from the *Valerius Terminus*."

²³N.O., Book II, aphs. 8, 45, 46, and esp. 47; Book I, aphs. 96 and 98; and *Preparative [Parasceve] to a Natural and Experimental History*, aph. vii. Cf. Hans Jonas, "The Scientific and Technological Revolution," in *Philosophical Essays: From Ancient Creed to Technological Man* (Prentice-Hall, 1974), pp. 63-65. Cf. Henry Pemberton, (editor of the third edition of Newton's *Principia* . . .), *A View of Sir Isaac Newton's Philosophy* (London, 1728), Introduction, where the importance for Newtonian science of Bacon's critique of the prejudices and obstructions impeding knowledge and his treatment of induction are stressed.

²⁴N.O., Book I, aphs. 96 and 80; and *De Augmentis* . . . , Book III, chap. 6.

²⁵See *ibid.*, and Ellis' notes to the same in *Works*, vol. I, p. 577.

²⁶N.O., Book I, aph. 113.

²⁷N.O., Book I, aph. 91.

²⁸*Thoughts and Observations, (Cogitata et Visa)*, translated in the Montagu American Edition of *Bacon's Works* (Philadelphia, 1855, vol. I), p. 434; original in *Works*, vol. III, p. 589 ff. Cf. F.H. Anderson, *The Philosophy of Francis Bacon* (University of Chicago Press, 1948), p. 38. The translation in Montagu is more literal than the recent translation in *The Philosophy of Francis Bacon*, Benjamin Farrington (Liverpool University Press, 1964), which also contains translations of "The Masculine Birth of Time" and "Refutation of the Philosophies."

²⁹See *A Tale of a Tub, With Other Early Works, 1696-1707*, ed. Herbert Davis (Oxford: Basil Blackwell, 1965), p. 156. Although Swift is, in general, a partisan of the ancients, he seems to have accepted, in this book at least, Bacon's characterization of Aristotle's philosophy as "contentious." Swift may have regarded Bacon as "valiant" because he dared to challenge the ruling "despot" of philosophy, Aristotle, who, according to Swift, had usurped (*ibid.*, p. 144) Plato's place as "Prince of Philosophers" (*Gulliver's Travels*, Part IV, chap. 8; cf. also Part III, chap. 8).

³⁰ N.O., Book I, aph. 128.

³¹ *The Works of Mr. Abraham Cowley* (London, 1721).

³² *Valerius Terminus*, cap. 26, in *Works*, vol. III, p. 252; and N.O., Book I, aph. 90. Cf. Aristotle's *Politics*, Book II, chap. 8; Thomas Aquinas, S.T., I-II, Q. 97, A. 2; and Strauss, *op. cit.*, note 5, above, pp. 221-22; *et al.*

³³ See Berns, *op. cit.*, n. 18, above; and Howard B. White, *Peace Among the Willows: The Political Philosophy of Francis Bacon*, (The Hague, Nijhoff, 1968).

³⁴ *Discourses . . .*, Book I, chap. 44. Cf. Rossi, *op. cit.*, pp. 109-16.

³⁵ Cf. White, *op. cit.*, note 32, above, the chaps. entitled, "Of Island Utopias," esp. for the comparison with *The Tempest*, and "The Old and the New Atlantis"; see also White's chap., "Francis Bacon" in *History of Political Philosophy*, eds. Leo Strauss and Joseph Cropsey, (Rand McNally, 1972).

³⁶ Is it in contrast to Hierusalem, (the way Jerusalem is spelled in the *New Atlantis*), the good-peace in contrast to the holy-peace (from the Greek *hieros*)?

³⁷ These things are said explicitly only of the Jews.

³⁸ N.O., Book I, aph. 89.

³⁹ More than 350 years after the publication of the *Novum Organum*, Maxwell's and Rutherford's successor, the Cavendish Professor of Physics, writes, "Physics, indeed, should recognise that it is not in any useful sense the fundamental science, since that peculiarity which makes it fundamental, the fact that its laws are, we believe, applicable in principle to the systems which other sciences investigate, is achieved by adopting an attitude of exclusive concentration on certain approved aspects of the phenomena, such as prevents the development of a scheme by which principle can be translated into practice." Indeed, the claim of fundamental physics that it is "seeking out the Basic Truth of the Universe" is found to be "slightly pretentious." See A.B. Pippard, F.R.S., *Reconciling Physics with Reality*, an Inaugural Lecture (Cambridge University Press, 1972), pp. 35 and 37.

Old questions seem to be opening again. Is the very quest for a fundamental science now even more than "slightly pretentious"? (Cf. F. Nietzsche, *Beyond Good and Evil*, aph. 205.) Or is the way opening for new, and, perhaps, even old contenders?

⁴⁰ Cf. Leo Strauss, *op. cit.*, note 5, above, pp. 23-25 and "An Epilogue" in *Liberalism Ancient and Modern* (Basic Books, 1968).

⁴¹ Cf. Bacon's use of the ambiguity of the word fortune in his "architecture of fortune," (*Advancement of Learning*, Book II), and his attack on the classical subordination of art to nature, its breeding a "premature despair in human enterprises." *Works*, vol. IV, pp. 294-95. Cf. also N.O., Book I, aphs. 75 and 78.

⁴² Cf. also *De Augmentis . . .*, Book IV, chap. 1.

⁴³ *Advancement of Learning*, Book II.

⁴⁴ *Works*, vol. I, p. 758.

⁴⁵ See Bacon's *Wisdom of the Ancients*, no. 26.

⁴⁶ See notes 5 and 40, above.