

Lecture 21

Bacon on the State of Science

Patrick Maher

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Signs that science is in a bad state

Bacon believed that science in his day was in a bad state. Some reasons he gives for believing that are the following.

Most current science comes from the Greeks

The sciences which we possess come for the most part from the Greeks. For what has been added by Roman, Arabic, or later writers is not much nor of much importance; and whatever it is, it is built on the foundation of Greek discoveries. Now the wisdom of the Greeks was professorial and much given to disputations, a kind of wisdom most adverse to the inquisition of truth. [71]

and a time when men knew little of history or the world

Nor does the character of the time and age yield much better signs than the character of the country and nation. For at that period there was but a narrow and meager knowledge either of time or place, which is the worst thing that can be, especially for those who rest all on experience. [72]

No practical applications

Of all signs there is none more certain or more noble than that taken from fruits. For fruits and works are as it were sponsors and sureties for the truth of philosophies. Now, from all these systems of the Greeks, and their ramifications through particular sciences, there can hardly after the lapse of so many years be adduced a single experiment which tends to relieve and benefit the condition of man, and which can with truth be referred to the speculations and theories of philosophy. [73]

Causes of this bad state

The shortness of the favorable periods of time

Out of the five and twenty centuries over which the memory and learning of men extends, you can hardly pick out six that were fertile in sciences or favorable to their development. In times no less than in regions there are wastes and deserts. For only three revolutions and periods of learning can properly be reckoned: one among the Greeks, the second among the Romans, and the last among us, that is to say, the nations of Western Europe. And to each of these hardly two centuries can justly be assigned. The intervening ages of the world, in respect of any rich or flourishing growth of the sciences, were unprosperous. [78]

Small part of men's efforts spent on science in favorable periods

During those very ages in which the wits and learning of men have flourished most, or indeed flourished at all, the least part of their diligence was given to natural philosophy. [79]

- In the era of Western Europe, most outstanding minds devoted themselves to theology, which was given the largest rewards.
- In the Roman era, the best minds applied themselves to civic matters. Those who did philosophize were mainly concerned with moral philosophy.
- In the Greek era, again most of the effort in philosophy was spent on moral philosophy rather than natural philosophy.

The methods used are bad

As men have misplaced the end and goal of the sciences, so again, even if they had placed it right, yet they have chosen a way to it which is altogether erroneous and impassable. And an astonishing thing it is to one who rightly considers the matter, that no mortal should have seriously applied himself to the opening and laying out of a road for the human understanding direct from the sense, by a course of experiment orderly conducted and well built up, but that all has been left either to the mist of tradition, or the whirl and eddy of argument, or the fluctuations and mazes of chance and of vague and ill-digested experience. [82]

We can collect better data

No search has been made to collect a store of particular observations sufficient either in number, or in kind, or in certainty, to inform the understanding, or in any way adequate . . . Nothing duly investigated, nothing verified, nothing counted, weighed, or measured, is to be found in natural history; and what in observation is loose and vague, is in information deceptive and treacherous . . . Good hopes may therefore be conceived of natural philosophy, when natural history, which is the basis and foundation of it, has been drawn up on a better plan. [98]

We can use better methods of reasoning

- Abandon method of anticipation of nature.
 - *The understanding must not . . . be allowed to jump and fly from particulars to axioms remote and of almost the highest generality . . . But then, and then only, may we hope well of the sciences when in a just scale of ascent, and by successive steps not interrupted or broken, we rise from particulars to lesser axioms; and then to middle axioms, one above the other; and last of all to the most general. [104]*
- Replace induction by simple enumeration with a better form of induction.
 - Induction by simple enumeration is inferring that what has been true in all observed cases is true in all cases, e.g., “All observed swans have been white, so all swans are white.”
 - *The induction which proceeds by simple enumeration is childish; its conclusions are precarious and exposed to peril from a contradictory instance; and it generally decides on too small a number of facts, and on those only which are at hand. [105]*

Errors in natural history

There will be found, no doubt, when my history and tables of discovery are read, some things in the experiments themselves that are not quite certain, or perhaps that are quite false, which may make a man think that the foundations and principles upon which my discoveries rest are false and doubtful. But this is of no consequence, for such things must needs happen at first. It is only like the occurrence in a written or printed page of a letter or two mistaken or misplaced, which does not much hinder the reader, because such errors are easily corrected by the sense. So likewise may there occur in my natural history many experiments which are mistaken and falsely set down, and yet they will presently, by the discovery of causes and axioms, be easily expunged and rejected.

[118]

So Bacon's methodology isn't completely bottom-up.

Excellence of the goal

Inventors perform a greater service than others

The introduction of famous discoveries appears to hold by far the first place among human actions; and this was the judgment of the former ages. For to the authors of inventions they awarded divine honors, while to those who did good service in the state (such as founders of cities and empires, legislators, saviors of their country from long endured evils, quellers of tyrannies, and the like) they decreed no higher honors than heroic. And certainly if a man rightly compare the two, he will find that this judgment of antiquity was just. For the benefits of discoveries may extend to the whole race of man, civil benefits only to particular places; the latter last not beyond a few ages, the former through all time. [129]

Knowledge is worth even more

The very contemplation of things as they are, without superstition or imposture, error or confusion, is in itself more worthy than all the fruit of inventions. [129]

Questions

- 1 State three reasons Bacon gives for thinking that the sciences in his day were in a poor state.
- 2 State three causes that Bacon gives for the poor state of science in his day.
- 3 State two reasons that Bacon gives for being hopeful that science can be improved.
- 4 What is induction by simple enumeration? What does Bacon think of this kind of induction?
- 5 Does Bacon believe that a natural history must be completely accurate? How does he support his position on this point?
- 6 Why is science valuable, according to Bacon? What is its greatest value?



Francis Bacon.

Novum Organum.

London, 1620.

English translation on the web; quotations are from this.

Numbers in brackets are aphorism numbers from Book I.