I. According to the ‘early Gassendi’ of the Dissertations in the Form of Paradoxes Against the Aristotelians (Book I published in 1624; Book II published posthumously in 1658), “it could be allowed that a kind of knowledge, which is experimental and related to the appearances of things, should be called science seeing that I am said to know that, at this actual moment, I am sitting rather than standing, that it is daytime rather than night, that I am fasting rather than eating, at home and not in the public square. Similarly I know that honey appears sweet to me rather than bitter, fire hot rather than cold, snow white rather than black. . . . 

“[However], if you will maintain consistently that science is a certain and evident knowledge of something, obtained by means of necessary causes or demonstration, then this knowledge, experimental or relating to appearances, does not deserve the name ‘science’. . . . [W]e will go on to show that it is impossible for us to know . . . and to affirm surely and infallibly that something is by nature and itself, and as a result of basic, necessary, and infallible causes, constituted in a certain way.”

II. Science in the only legitimate sense of the term, according to the ‘early Gassendi’–a ‘science of appearances’–**cannot**

(a) give “certain and evident knowledge of something, obtained by means of necessary causes or demonstrations.”
(b) “penetrate to the inner nature of the slightest thing.”
(c) “pronounce on what is internally and in itself the nature of the slightest thing.”
(d) “reveal absolute causes or inner natures.”

III. Science, in the legitimate sense of the term according to the ‘early Gassendi’, **can**

(a) systematize, through observation and experiment, ‘appearances’.
(b) discern patterns and regularities in experience.
(c) and, indeed, **must** submit its conclusions to the ‘check’ of further experience.
(d) cope with the ‘Problem of Induction’, since its ‘informative’ claims are **contingent** propositions.

IV. The ‘Problem of Induction’: **general or universal** contingent propositions are susceptible to a future falsifying instance. So, from the fact that we always in the past have found phenomenon X occurring in conjunction with phenomenon Y, it does not follow that we will always find them so conjoined in the future.

V. Consequently, Gassendi evidently does not hold that the [informative or ampliative] propositions of a ‘true’ science are **necessary** propositions.
VI. What about, e. g., mathematical propositions ‘about’ natural phenomena, which appear to be necessary? Gassendi admits that they are necessary. But he maintains that there is an important sense in which they are not informative or ampliative—they do not increase our stock of knowledge. Rather, they are analytic propositions. That is, they merely explicitly spell out what is already implicitly present in certain ‘appearances’ (later in certain ‘ideas’; still later, in certain terms or meanings). Hence, Gassendi’s conception of a science is not that of a heavily mathematical body of knowledge. His conception leads, rather, to the idea of ‘natural history’.

VII. The ‘late Gassendi’ (of the Syntagma Philosophicum, published posthumously in 1658) entertained a sort of ‘hypothetical atomism’, which led him into the “occupational vice of mechanical philosophers, the imaginary [and imaginative] construction of invisible mechanisms to account for [observable] phenomena” (Westfall, p. 41).

VIII. Note that, in addition to their disagreement about atomism (Gassendi was a ‘hypothetical atomist’, Descartes simply a ‘corpuscularian’), Descartes and Gassendi disagreed about the role of mathematics in natural philosophy/science: Gassendi advocated a ‘non-mathematical mechanical natural philosophy’, Descartes a ‘mathematical mechanical natural philosophy’.

Robert Boyle (1627-1691)

I. Influenced by Galileo, Descartes, and Gassendi, Boyle developed the idea of the two ‘catholic principles’ of matter and (local) motion as foundational for all natural philosophy or natural science:

“I next observe that there cannot be fewer principles that the two grand ones of our philosophy, matter and motion; for matter alone, unless it be moved, is wholly unactive; and, whilst all the parts of a body continue in one state, without [local] motion, that body will not exercise any action, or suffer any alteration; though it may, perhaps, modify the action of other bodies that move against it.

“Nor can we conceive any principles more primary that matter and motion; . . . .

“There cannot be any physical principles more simple than matter and motion; neither of them being resoluble into any other thing” (Matthews, p. 113).

II. Boyle’s corpuscularianism (or corpuscularism): All of the macro-properties-and-processes that can be observed in nature ‘reduce to’ and are explicable in terms of the micro-properties-and-processes of the ‘insensible’ corpuscles of matter out of which the macro-properties-and-processes are constituted. These insensible corpuscles have only ‘primary properties’ (basically, size, shape, spatial relations to each other, and motion).