I believe that Descartes used a variant of the ancient method of analysis and synthesis in his scientific and philosophical works. Some have argued this general interpretive point before, but there has been little agreement about what this method involves. I hope to make a contribution here. A considerable amount of evidence exists supporting the general thesis. Some of it is indirect, displaying that Descartes sought just the sort of axiomatically structured scientific theories that the ancients used the method of analysis and synthesis to establish. Some of it is more direct, to be found in his explicit descriptions of his method, usually in the philosophical works, and in some striking accounts of his own scientific reasoning.

This method was exceptionally well-suited to aiding scientists develop axiomatically structured theories in ancient times. The ideal of a theory was, perhaps, that described by Aristotle in *Posterior Analytics* and illustrated by Euclid's *Elements*. A scientific theory consisted of two main parts, the undemonstrable principles and the propositions demonstrated from these. The fundamental principles, whose epistemic credentials were unquestioned, were of two sorts: principles common to all sciences no matter what their subject matter, which were called common notions or axioms; and principles that were specific to the science in which they appeared. These were called theses and included definitions which made no existence claims and hypotheses which did make existence claims. Hypotheses were in some cases rather suspect and were given the name 'postulate', as in Euclid's fifth postulate about parallel lines. The suspicious were asked to suspend their doubts, however, because the results demonstrated using these postulates would be so secure and valuable as to finally convince the doubter that they must be true despite initial appearances. The remaining propositions of the science were to be demonstrated from these principles. The truth of the demonstrated propositions was secured because the truth of the principles was assumed and the inferences used in the demonstrations were all non-ampliative and therefore truth-preserving. Thus, if a science could be put into axiomatic form, its epistemic integrity was assured.
The method of analysis and synthesis was a tremendously effective tool for developing sciences in this form. The difficulty in doing so with logic alone is easy to see. If one possesses a set of fundamental principles, an infinite number of valid strings can be deduced from them, but most will be irrelevant or trivial. Further, the time consumed in generating these deductive strings would be extraordinary. This method is to assist the deductive work. The description from Pappus of Alexandria remains very helpful. This is taken from the *Collection* of 340 A.D.:

Now, analysis is the path from what one is seeking, as if it were established, by way of its consequences, to something that is established by synthesis. That is to say, in analysis we assume what is sought as if it has been achieved, and look for the thing from which it follows, and again what comes before that, until by regressing in this way we come upon some one of the things that are already known, or that occupy the rank of first principle. We call this kind of method 'analysis', as if to say reduction backward. In synthesis, by reversal, we assume what was attained last in the analysis to have been achieved already, and, setting now in natural order, as precedents, what before were following, and fitting them to each other, we attain the end of the construction of what was sought. This is what we call 'synthesis'.3

There is some scholarly disagreement over how to interpret this passage, but the general idea is clear enough and is all that we need for understanding Descartes' methodology.4 Analysis and synthesis differ most noticeably in the 'logical direction' of the reasoning, analysis proceeding backwards and synthesis proceeding forwards, the direction most natural to us. Synthetical reasoning is more familiar and is what most of us think of when we think of what proofs look like: the deduction of a theorem from a set of accepted premises. But as every mundane student of logic and mathematics knows, finding the appropriate logical pathway from premises to theorem is a difficult task indeed. Herein lies one of the values of analysis.

In analysis, one begins with a conjecture that a proposition is demonstrable from the established set of first principles; again, these principles are unprovable, and analysis plays no role in determining them. One then asks what are the presuppositions of the conjecture, from what could this proposition be deduced? The presuppositions are traced backwards until one reaches a proposition known to be true, for example, a first principle or previously proven theorem, or until one reaches a proposition known to be false, the negation of a first principle or previously proven theorem. This step signals that the analysis is