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The Selected Works of Pierre Gassendi

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Introduction to The Selected Works of Pierre Gassendi

Pierre Gassendi? Wasn't he a libertine, or something? Didn't he teach Molière, or someone? The two most often repeated "facts" about Gassendi, that he was a libertine and that he taught Molière, both stand a good chance of being untrue. Today he is a very little known figure, although in his own time he was accounted one of the three greatest living philosophers, Descartes and Hobbes being the other two. He is gradually receiving the attention he deserves and has been the subject of research and study in recent years.

He was born January 22, 1592 near Digne, a town in the foothills of the Alps, seventy miles northeast of Aix-en-Provence. A brilliant student, he studied at Aix, was teaching in his home town before the age of twenty, received his doctorate in 1614, and took priestly orders two years later. For the next six years he taught philosophy at the University of Aix, while living in the home of Joseph Gaultier, Sieur de la Valette, who stimulated his interest in astronomy. He also became fast friends with the learned and distinguished Peiresc, widely respected intellectual leader of the South of France. He left Aix and returned to Digne for a two-year stay during which he prepared his first work for publication, the Exercises in the Form of Paradoxes Against the Aristotelians, *which appeared in 1624 in Grenoble.*

Directly thereafter he went to Paris, where his engaging friendliness and genuine capacities soon introduced him to the intellectual elite of the capital. The remaining thirty years of his life were to be divided almost half-and-half between Paris and Provence, never with a home of his own really, constantly at the houses of patrons or protectors, of whom he found many. All he demanded was absolute liberty to continue his studies and experiments. A vegetarian and nondrinker, his principal pleasures seem to have been scholarly, as were his closest associates. He, Gabriel Naudé, François La Mothe le Vayer, and Elia Diodati (later Guy Patin) made up the "tetrade" of young "erudite libertines," men of various shades of free thought, determined to liberate themselves and the world from the shackles of ignorance and superstition. Their goal was to become déniaisés, *to put up with no nonsense. From 1626 on he made it clear that he meant to rehabilitate the name of Epicurus, defending him against attacks upon his character and philosophy. Since Epicurus stood for hedonism in ethics and materialist atheism in philosophy, this was a sizable undertaking. More than twenty years passed before Gassendi published his first work in this direction, the short* Eight Books on the Life and Manners of Epicurus (*1647*). *In the meantime he kept doggedly at his researches (trimming his beard as he studied to save time), constantly informing the intellectual world of his progress as he moved from Paris to Provence and back. In 1631 he published some papers on his astronomical observations that helped establish his reputation abroad and began his wide scientific correspondence. In 1634 he composed a critique of Herbert of Cherbury's* De veritate *that was circulated in Paris, but not published until after his death. He spent most of the 1640's in Paris where he published several scientific papers, including the* De motu (*1642*), *and was named to the chair of mathematics, that is astronomy, in the Collège Royal in 1645. He later published the course he taught there. In 1648, shortly after his good friend Father Mersenne, the moving spirit of much of the scientific activity in Paris, died, the advent of a lung ailment forced Gassendi to give up teaching and to retire to the healthier climate of the South. There he put the finishing touches on the greatest work of his to leave the press during his lifetime, the* Animadversiones, *or* Remarks on the Tenth Book of Diogenes Laertius (*Lyons,*

1649). *This was a three-volume work, the first hundred pages of which were the text of Diogenes, liberally edited and followed by almost seventeen hundred pages of commentary of all sorts ranging as far afield as descriptions of Pascal's recent experiments on air pressure.*

The final years of his life were spent in Paris under the patronage of Henri-Louis Habert de Montmor composing his magnum opus, *the* Syntagma, *with the help of his disciple Samuel Sorbière and his secretary La Poterie. Intermittent illnesses from the end of 1654 finally put him to bed in August 1655, where after frequent bleedings by his good friend and doctor Guy Patin he died on October 24th.*

Gassendi was significant both as a scientist and as a philosopher. As a scientist he made no major discovery, found no law that bears his name, formulated no great advances. However, he consistently associated himself with the most forward-looking thinking, especially in astronomy. All his life he lost hours and hours of sleep making telescopic observations, the most important of which were of the passage of Mercury before the sun according to Kepler's somewhat neglected predictions. An early convert to Copernicus, he worked ceaselessly, if cautiously, to disseminate and validate his theory. He was an inveterate dissecter and experimenter, though not very original in his investigations. His greatest achievement is the first publication of the law of inertia in the De motu. *Two years later Descartes would publish the same law, though derived from different considerations and applied in different ways. The contrast between Gassendi and the great Descartes is illuminating, for each was in the vanguard of scientific thought and in the latter half of the century their schools of physics were the two most significant in French circles—until Newton was popularized by Voltaire. Descartes virtually identified natural science with mathematics, to the point of reducing matter to mere extension, a purely geometrical quality. He derived his physics from strictly deductive principles, formulating the law of inertia and seven laws of impact, of which six were inaccurate. Even his errors were provocative, often stimulating creative refutations in men like Huygens, Locke, or Newton. In general, measurement and mathematical formulas derived from observation were of no interest to him, for he was mathematical in the sense of being*

axiomatic, systematic, and deductive. It was analytical geometry, not the calculus, that he discovered. Christian Huygens was the first great Cartesian who was also an experimenter and measurer.

In contrast to this, Gassendi's scientific thought was never axiomatic or deductive, always departing from observation and experience and seldom rising to mathematical expression or controlled experimentation. His concept of space, which corresponded to Archimedean geometrical space, was the nearest he came to a truly mathematical concept. An inept and untrained mathematician, he relied upon his friend Fermat to supply him with the calculations and formulas that might be necessary for some of his publications.

Somewhat paradoxically, he and Descartes are in agreement on some major points. They both reject Aristotelian qualitative physics in their preference for a strictly mechanistic theory in which all causation is reduced to motion. In fact Gassendi is less than rigorous on this point, allowing qualitative considerations to enter his physics when he considers the differing shapes of his atoms. Secondly, though Descartes denied the existence of the void, his division of extension into three types of matter allowed him to develop a corpuscular physics that in many ways resembled Gassendi's void and atoms, which were, however, distinguished by their solidity.

If modern developments do not make Gassendi appear a particularly brilliant or original scientist, his influence was second to none in his own day, particularly in the propagation of mechanist and atomist ideas. Five years after the publication of the unwieldy Animadversiones, *and four years before the* Syntagma, *an English royalist physician Walter Charleton published a sizable* Physiologica Epicuro-Gassendo-Charltoniana, *much of which was no more than translations from the various works of his French "master." It was an immediate success. In France Gassendi's thought was widely circulated among the intellectual elite, but had to wait until two decades after his death to be disseminated in French by the influential* Abrégé *published by François Bernier briefly in 1674 and greatly augmented in 1678 and 1684, when it reached seven volumes. Opponents of Descartes almost invariably found themselves drawn to the Gassendist camp, which included men like Chapelle and Saint Evremonde, many of them more than tinged with libertinism.*[1] *Antoine Adam concluded that at the turn of the century the cultivated Frenchman was more likely to be a Gassendist than a Cartesian.*

As a philosopher, Gassendi represents better than anyone else the healthy skepticism that discarded the traditional Aristotelian categories and the metaphysical excesses of the Middle Ages. In the first part of his career all his significant declarations show his allegiance to skepticism, from his letter of 1621 to Pibrac, the earliest letter to be published, through the Exercises, *and his critiques of the philosophies of Fludd and Cherbury. Any sort of dogmatism, particularly any claim that man can know the natures or essences of physical things, was subjected to searching skeptical criticism. At the same time, Gassendi never took the extreme Academic position that man can know nothing, except that he knows nothing. In his manuscripts of the thirties and in later works we find him making increasing concessions to the fact that man is capable of achieving some brands of knowledge. In his debate with Descartes, he declares that skepticism is compatible with knowledge of a purely pragmatic nature, with knowledge founded on appearances, with scientific predictions based on these same appearances (but not with scientific hypotheses), with mathematical and geometrical proofs, and finally with revelation. After such a list one wonders what there remains to be skeptical about. In fact, Gassendi's final pronouncement, in the* Syntagma, *attempts to set out a "middle way" between skepticism and dogmatism by defining in general terms what man may never know and by what means he may hope to move cautiously beyond mere appearances. It is a declaration marked by sobriety and good sense, precisely the kind of basis that a pragmatic scientist might well be willing to rely upon, in fact the only significant philosophy of empiricism in France. As usual he is particularly weak in his failure to recognize the crucial role of mathematical abstractions, hence he would be unable to inspire a Galileo or a Newton.*

[1] René Pintard counted Gassendi among the libertines, albeit a disappointingly timid one. Bernard Rochot finds little conclusive evidence of any personal irreligion on Gassendi's part. After all, he was a dignitary of the church and one who performed his functions at Digne with genuine concern and diligence. That many of the libertines were also Epicureans cannot be denied. This appears to be a case of a philosopher exercising an influence he would have disavowed.

The reasons for Gassendi's relatively rapid decline into obscurity are clear. He wrote a dying language, Latin, in a style that often lacked liveliness and sometimes clarity. The very quality most admired by his contemporaries, his erudition, most offends modern taste. He felt sure that his readers would be as interested in learning what Democritus said about the void as in learning what he personally thought, or more so. Hence his works are laden with cumbersome learning that he delighted in. As a scholar writing for scholars, he shared the taste of his times, one derived from as far back as the medieval system of sic et non *controversies, for all-out debate in which no detail is too insignificant to be argued in full, in which therefore the salient tends to be drowned in the trivial. Readers of this volume will surely feel on more than one occasion that he antagonizes the modern mind by dwelling on minutiae as he engages a new topic, and only slowly reaches the fundamentals, where his argument is penetrating and sound. Again the contrast with Descartes, only four years his junior, is telling. Descartes is the first modern master of the pithy, concise philosophical treatise; Gassendi seems ages behind him.*

In fact he represents the spirit of sixteenth-century humanism and exemplifies how its brand of exegesis could contribute to the development of modern science and philosophy. He chose to expound the theories of a classical atomist and to a lesser extent those of a classical skeptic and often did not seek to find new arguments, new proofs, or up-to-date applications for them. Even if his audience was more often among men of letters than practicing scientists, he succeeded in making current concepts ideally suited for his time and long neglected. The grand nephew of Guillaume Budé, one of the first great French humanists, he was himself perhaps the last of the great French humanists.

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Acknowledgments

Most Gassendi texts have not yet been edited in critical form. The 1658 Lyons Opera omnia, *as reprinted by F. Frommann (Stuttgart, 1964), provided the text used here for the* Syntagma, *the* De motu, *and the Latin letters. The errata for this edition are available only in volume one of the 1727 Florentine publication of the* Opera. *Bernard Rochot's modern bilingual editions of the* Dissertations en forme de paradoxe contre les Aristotéliens *and the* Disquisitio metaphysica *furnish not only an accurate Latin text, but also a French translation with incisive scholarship and much helpful information. The few English translations of Gassendi, primarily in volume two of Elizabeth S. Haldane and G. R. T. Ross's* The Philosophical Works of Descartes, *have also been consulted.*

Professor Richard H. Popkin, who first suggested this book to me, has also contributed comments that have made the text and notes more readable and accurate. My knowledge of the history of science being rudimentary, I required preliminary guidance in that field, which was generously offered by Professor Vincent E. Smith. The principal debt of any student of Gassendi must be to Bernard Rochot, the dean of Gassendi scholars, whose lifetime of study has established the major part of what we now know about the seventeenth-century philosopher. His books and articles have been consulted and reconsulted in the preparation of this book, but most of all I am delighted to be able to thank Doctor Rochot for his generosity in answering my questions about difficult or obscure passages that presented problems in translation. Wherever I knew there was a question, he knew the answer.

The Selected Works of Pierre Gassendi

faintheartedness that I became depressed here below the clouds while you scorned the deep thunder which threatened you. You are extraordinarily composed, as becomes your sublime soul, and consequently you retained your admirable peace of mind (*ataraxia*); but I had to do without it as one who strives to have, but has not yet achieved, the imperturbable breadth of mind of the wise man. For although I have always been convinced, as seemed only right after your departure, that the rule of fortune is totally blind and that what we least hope will happen we must fear the most, especially in the great darkness of these times, still my mind was not yet so thoroughly Pyrrhonist that it did not incline toward assenting to the opposite opinion because it wanted to believe it. In fact only one thing, experience (*emperia*), was lacking to make me a disciple (*æmulus*) of Sextus Empiricus. Indeed formerly I used to strive toward that goal, but now my concern is more to live entirely from day to day, and never to be severe with myself. What may unfold I entrust to the gods; besides, I always gladly follow my guardian spirit. I used to be afraid in advance of what happened; and after it happened, I could not help being unsettled by it. Now I am almost disgusted by my own wishes every time I repeat to myself mentally that your wishes were contrary to mine and that as this was the case, it would have been self-centered not to agree to seek what was due to your worth; and that perhaps greater things awaited you in a happier world, and most important, that it was perhaps better to wish you that tranquil solitude which your most illustrious uncle once chose at an advanced age and which your very wise parent so ardently longed for. Henceforth then, far be it from me to ask anxiously what end the gods may have in store for you or for me. They will measure out what is fitting for us and is useful for our affairs; perhaps they will grant everything most desired according to the joy it brings. But enough of that.

Really I cannot say how much I appreciate that you were kind enough to remember me and send me that token of your love for me from such a long distance (I mean the Christian

Treatises of Charron that you knew I had not seen).[2] But truly that is your concern for learning (*humanitas*), that singular love for letters and those who cultivate them. What is more, I devoured those little works avidly, for you were not wrong to guess that an author of his talents and disposition would please me. However, to confess quite freely to you what I feel, although they all please me mightily, yet nothing charms me as much as the wisdom which he declares in his preface he set as the goal of his studies. Also you advised me quite rightly to take this author with myself into solitude, for Philosophy is content with the judgment of a few men and deliberately shuns the multitudes. But what sounder judge is there than Charron, especially if those from whose labors he has derived profit are the ones to assess his worth, Montaigne, Lipsius, Seneca, M. Tullius [Cicero]? I mention these and a few others as his companions, for such authors appear to me to be exceedingly rare in so vast a sea [of writers]. Sometimes I substitute Lucretius, Horace, or Juvenal for these; sometimes Lucian, or Erasmus.[3] Immortal God, how these unsubstantial fancies delight me! How sweet it is when the winds are raging on the sea to behold the great travails of others from the shore! How I contemplate and how I laugh at the artificial histrionics the entire universe presents! How I seem to foresee petty quibblings before me which you hint at, for I am not so ignorant, especially of the history of France, that I do not

[2] Pierre Charron (1541–1603), a distinguished churchman, whose most significant works *La Sagesse* (*Wisdom*) and *Les Trois Vérités* (*The Three Truths*) disseminated the Christian fideism of Montaigne, his close friend and mentor. Pibrac seems to have sent Gassendi the *Discours chrétiens de la divinité, création, rédemption et octaves du Sainct Sacrement* (Paris, 1604), a collection of short works, allegedly sermons (Gassendi calls them *opuscula*).

[3] The list of intellectual influences provided by this letter is most revealing: the greatest proponents of skepticism, classical and modern (Sextus Empiricus, Montaigne, Charron), the greatest source of information on Epicurean atomism (Lucretius), the classical moralists most favored by the humanist scholars (Cicero, Seneca, Plutarch), the satirists of the past (Juvenal, Horace, Lucian—the last considered audacious), and two humanists, the respectable Justus Lipsius and the urbane Erasmus.

have a presentiment where things are headed. There is no need to explain that; no need for a Helenus here,[4] but perhaps the Gods will grant better things.

You write in your letter that there are philosophers and mathematicians who care more about the sun and the moon of the chemists than of the astrologers and who do not observe or fear any eclipses other than the eclipses that touch their purses.[5] God, what faithless men! Are their souls so inclined toward the earth and void of heavenly concerns? I hoped there would be someone with whom I might communicate and from whom I might receive some observations in exchange. I had decided to write out for him descriptions of several lunar eclipses that I had observed closely, especially the one you deemed worthy of observing with your own eyes, and at the same time to forewarn him of a future solar eclipse this coming May. For if the weather is favorable, I intend to make careful observations, especially since the sun has not gone into an eclipse in these latitudes for nine full years. But since my hopes in that direction have deceived me, I shall gladly follow your advice. I shall philosophize in tune with those who lived in a better century and whose minds were steeped in gold, not in the lust for gold. But in the meantime, I enjoy the most pleasant intimacy with Joseph Gaultier, Lord and Prior of LaVallette,[6] whom I esteem hardly inferior to the ancient philosophers and mathematicians. Would that the genius of Plato was in me, for so help me God I find the genius of Socrates in him. You remember, I imagine, who he is. He begged me to greet you in his name, and so I send you our best on his behalf and on mine. Good health, no, the best of health to you, my du Faur;

[4] Hector's brother Helenus shared the gift of prophecy with his sister Cassandra.
[5] In chemistry the sun and the moon were symbols for gold and silver respectively.
[6] Joseph Gaultier (1564–1647). One of Gassendi's oldest friends, a jurist and astronomer, he introduced the future philosopher as well as Boulliau and Morin, who was to be a bitter enemy of his, to the science of astronomy. Gassendi lodged with him while in Aix and dedicated his *Exercises Against the Aristotelians* to Gaultier.

and continue to love me with the love you have always honored me with.

AIX, APRIL 8, 1621 A.D.

Postscript

Let me tell you by what fatality it happened, most illustrious du Faur, that this letter, whose date of composition you see, which I had given to someone to bring to you, could fall back into my hands after a month. The man who delivered it to Grenoble came back to stay a few days here. When it was returned to me, I almost began to curse my bad luck that I would seem forgetful of the duty and respect I owe you, as if lacking in gratitude I did not cherish the pleasant memory of your name with great affection. When I opened it and read it over (would you believe it, with tears almost rising in my eyes!), I decided without changing anything to add on this appendix as my only excuse, which you will accept as genuine, as it is genuine.

But to other matters. In very propitious weather I was able to observe very closely and thoroughly the solar eclipse I mentioned with the aid of the telescope through which you saw the sunspots we noted some time ago. The beginning of this eclipse occurred on the 21st of May at six minutes and thirty seconds after seven AM, the end was at thirty-one minutes and thirty seconds after nine, and so the midpoint was at eight nineteen. The greatest obscuration of the eclipse was 9 degrees and 23 minutes. I write these things to you since you have recently become eager to know about celestial phenomena. I would note down more carefully the particular things I observed if somebody in your area would give these studies professional attention.

You have heard, I imagine, how the fathers of the Society of Jesus have been admitted to this city. At the time I am writing this the councilmen are deliberating over the form of the contract. I do not yet know for sure whether I will be free next year from this course which I have prepared only up to the middle point. However that may turn out, before I return to the Church and

my native mountains, it is my wish to see all Italy. Would that Germany were pacified for a time then, so that I could also visit the great men there. In the meantime, if I can get a letter throngh to Kepler, which you once promised, if I remember rightly, would be easy through the emperor's courier, I would do so with great pleasnre. But I fear that that would be an inconvenience; for I would not dare in the least to be a bnrden to you in this matter.

For the rest, I am arranging my Paradoxes this year into a semblance of order; I am putting several sections on logic before the physics; and I will follow with the ethical and metaphysical matter if it will be possible to run the whole philosophical course I have nndertaken. I no longer cover np the errors, contradictions, tautologies, and extraneous subjects that abound in Aristotle. I now dare to shake up the accepted opinions quite vigorously. You will judge for yourself one day if I do this thoughtlessly or from the love of the truth. It will give me pleasnre to have the dictated notes of one of my auditors written ont and then to pass them on to you.[7] I remember well how you enjoyed these trifles of mine. But, gracious, what good is all this, and what sort of appendix is this? Good health, most noble and wise du Fanr; good health again, and again good health.

AIX, JUNE 10

[7] Courses were dictated word for word in Latin before being discussed and drilled over.

Exercises Against the Aristotelians (1624)

Introduction

In 1624, at the age of thirty-two, Gassendi published his first book anonymously in Grenoble with the title Seven Books of Exercises in the Form of Paradoxes against the Aristotelians, in which the Fundamental Principles of the Entire Peripatetic and Dialectical Doctrine are Overthrown While New Opinions, or Ones Fallen into Disuse Since Antiquity, are Solidly Established.—Book I. *The work was the outcome of six years of teaching in Aix-en-Provence, a post that he left when the Jesuits, who had recently been admitted to the city, took over the teaching positions. The book acquired for him a certain reputation, was even to be reprinted under a modified title in Amsterdam in 1649. It contained a series of condemnations of Aristotle and his doctrine as codified by the scholastics, a doctrine that provided the ground plan and terminology for all basic philosophy courses of the time (the word "paradox" in the title implies Gassendi is combating the establishment position). Gassendi accuses the Aristotelians of repellent jargon, quarrelsome dialectics, useless inquiries, and a slavish adherence to Aristotle which kept their minds closed, quite in contrast to their master, who practiced philosophy freely, with an original mind open to change. He claims that the Aristotelian canon contains works of unproven authorship and corrupt texts, many of which are obscure; moreover, Aristotle frequently cites an opinion without revealing whether it is his or another's, and in some cases he appears unable to make up his mind. Book by book, Gassendi lists first the deficiencies in the texts (e.g., essential definitions missing), then lists their superfluous matter (e.g., of the fourteen books of the* Metaphysics, *only the last five chapters of Book XII actually treat metaphysics), then their errors, and*

finally their contradictions. Though impressively documented, these lists soon become tedious for the modern reader, and the greatest interest of Book I lies in its preface, which gives quite summarily the conclusions of the seven projected books, and indicates how far Gassendi had gone in the development of his ideas at this early date. Clearly he has rejected traditional ways of thinking, accepted the Copernican theory, formulated in a general way his ideas of time, space, and the void. He does not speak of atoms by name, though his dismissal of the four classical elements may imply his belief in them (we must remember that his lifelong study of Epicurus was not to begin until two years later). He also declares himself on several matters that will be intimately associated with Cartesianism, namely that animals do have reason and that the intellect cannot function without the imagination, thirteen years before the publication of the Discourse on Method. *Finally he praises skepticism above all other schools of philosophy, at the same time declaring his orthodoxy and adhesion to Catholic doctrine. R. H. Popkin has shown conclusively that this involves no contradiction and in fact reflects one of the stronger currents of Catholic theology during the beginning of the Counter Reformation.*

Leaving Grenoble, Gassendi went on to Paris where the atmosphere was apparently somewhat oppressive, what with the violent denunciations of Father Garasse, the imprisonment of the poet Théophile de Viau on trumped-up charges, and the condemnation of Bitand, Villon, and Claves for defending anti-Aristotelian and atomist doctrines. A footnote appended to the manuscript of Book II in a handwriting other than Gassendi's explains why Book II was not published by alluding to the complaints against it from the Peripatetics and the discovery that Francisco Patrizzi had covered much the same material in a work Gassendi had recently come to know. The Patrizzi allegation can hardly be true, for Gassendi had borrowed freely from the work in Book I, and in fact much less in Book II. Perhaps the suppressions of the moment led his new friend Father Mersenne to discourage him from further publication. It is also possible that Gassendi simply realized that in the intellectual centers of France the battle against Aristotle had already been won by the work of men like Ramus and Patrizzi.

It is quite clear that he had prepared all but the final touches of Book

II on Dialectic. Although it was not to be published until 1658 in the posthumous Complete Works *(and then reprinted alone the following year in the Hague), it is alluded to in the original title and in letters of only a few years later in which Gassendi wonders if there may not be some way to publish it as an appendix to the other works he has in mind. Far richer and more provocative than its published companion, it provides the majority of the selections given here. It is the most thoroughly skeptical doctrine Gassendi ever wrote. Besides attacking the absurd pretensions of Aristotelian logic, its meaningless terminology, and its formalism, Gassendi denies the existence of any external verities, claims that no universal statement can be proven valid, and asserts that man never has achieved any truth about the inner nature or essence of things, that he will never be able to, neither of his own nature, nor of anything else. Properties and accidents he may know by experience, but all of man's ideas or concepts are no more than creations of his own. Mathematics is merely a special kind of truth based on appearances. Strong as these statements may be, they do not amount to total skepticism. Gassendi may deny that knowledge of essences is possible, but at the same time he explicitly accepts as genuine any knowledge based on either revelation or appearances. He makes clear that he is an empiricist (and a nominalist) in the sense that he thinks that all knowledge is a posteriori, that logic and formal categories are useless compared to practical experience, which provides us with our only legitimate form of human knowledge, namely the knowledge that things appear to us to be what they appear to be, not that they are what they appear to be. This he proves by a long analysis of the fallibility of the senses and sense data, based largely on his readings in Sextus Empiricus and the classics. If pressed to the logical consequences of his position, Gassendi would have to admit that all experience is both subjective and relative (see his argument on pp. 91–92). He would arrive at a sort of Pyrrhonist solipsism. But like the object of his attacks, Aristotle, Gassendi shies away from ultimate questions whenever possible and refuses to take extreme stands. He claims merely that experience can supply a brand of knowledge without examining what sort of knowledge that must be or what philosophical assumptions his position entails.*

Exercises in the Form of Paradoxes in Refutation of the Aristotelians

TO THE REVEREND AND LEARNED JOSEPH GAULTIER,[1] DOCTOR OF LETTERS AND SACRED THEOLOGY, PRIOR AND LORD OF LA VALETTE, A FRIEND BEFORE THE ALTARS OF GOD, THIS PREFACE TO THE EXERCISES IN THE FORM OF PARADOXES BY PIERRE GASSENDI

My dear Gaultier, will you be able to contain your laughter when this little book falls into your hands for the first time? You will say, "Can this be that stern censor of books who has so often complained to me about the uncontrollable itch to write in the men of our day? And now that mad passion which he has so often criticized has seized him too? Could my friend Gassendi be so different from himself, once back in his native hills? He who used to complain that in any century hardly a handful of learned men appeared among so great a multitude of scribblers, he who believed that authors striving to achieve some worth in letters would do well to wait until their sixtieth year before publishing works they had already completed some time earlier, this man hardly past his thirtieth year has now decided to throw something onto the pile as if Letters simply could not survive without it?" So it is, my dear Gaultier. And I recognize the inconstancy of youth in my conduct. That is why I grant you full leave to laugh, as Democritus did when he first saw Hippocrates,

[1] See footnote 6, in Letter to Henri du Faur de Pibrac.

or as Lucian's Damis did when he finally heard the ridiculous reasoning of Timocles.[2] Go ahead, laugh at me; you have my permission; for whenever I think about it, my own insides are shaken with laughter. Scoff at me if you wish; and I, the guilty one, shall make no effort to spare myself:

> You may well mock even at Latinus
> Still you may never relate such foolishness
> As I myself have said of me.[3]

Yet I ask you, in the name of the ties of friendship by which you are bound to me, to allow me to explain in a few words the reason for this untimely publication; and if you consider it a legitimate one, I do not claim that I will deserve your pardon, but surely it will seem that I could merit it.

First, ever since my paradoxes were debated in the most famous assemblies of all Provence, at which you were present, several people who approved of these trifles of mine began to take steps to have my public pronunciations put down in writing. It was a most laborious task as you may readily imagine. Requests came from all sides that I make an effort to have this work of my youth printed so that it could be more easily available and more widely distributed. How I protested against this! How little I esteemed my work! You, who know me, can well conceive how I laughed at both myself and those who urged me on. I only hope that my guardian spirit will come to my aid as generously as those voices rose in my behalf. More serious reproofs followed their prayers. And though for my part I upbraided them and made many objections, several of them spoke out, saying "Keep your notes for the worms and cockchaffers; but since many copies already exist in manuscript form, at least you cannot keep us from taking measures to have them published, even though you do not agree with us." Finally, one of them, whom you know, the famous

[2] For Hippocrates' meeting with Democritus see the former's Letter (spurious?) in the Littré edition, IX, 349 and 357. Damis and Timocles appear in Lucian's *Zeus Rants*.

[3] Martial, *Epigrams*, XIII, ii, 3–5. Latinus was a famous performer.

and learned Doctor Lautaret,[4] took the matter into his own hands; as he already possessed a copy of the work, he was ready to carry out his intention.

So I was quite vanquished on all sides and decided that I ought to give some attention to my reputation. Naturally, I could hardly let words that had been dictated largely from memory be published in my name, especially when I had suppressed many things in the interests of brevity. It seemed to me that I was indeed duty-bound to make some minor corrections by smoothing the rough edges of something that would have been better left in the vaults for nine times nine years. Therefore, I am undertaking a complete revision of the work. The job seemed almost on the point of fruition when our canons urged me against my better wishes to make this expedition to Grenoble on business of the Church and the Chapter. My friends from Digne thought that it would be convenient for me to finish the whole task here during my moments of leisure; and so they put my composition in my luggage with the idea that the noble and distinguished Seigneur Charles Tabaret du Chaffault,[5] first Lieutenant of the Senechal's court in the diocesan center of Digne, with whom they had made arrangements for me to share lodging in this city, would inspire me toward completion. In fact, it transpired that in his company no avenue of escape lay open, especially since everybody urged me to the same end, including our friend Valois[6] (whose recent observations on the variations of the weather on Mars I wished to compare with my own, not the least of my reasons for visiting this city) and many other learned men of distinguished minds who enhance the splendor of this city like glittering jewels. I had to obey and was not permitted to dally any longer. The only concession they granted me was that I might publish only this

[4] Physician of Digne, he wrote an account of the plague of 1629.

[5] The future President of Inquiries of the Parlement of Provence in 1642, and a friend of the influential scholar Nicolas Claude Fabri de Peiresc.

[6] Jacques de Valois (1582–1654), Scottish by birth, became a naturalized French citizen in 1612. He studied both astronomy and astrology, from which Gassendi tried in vain to dissuade him.

First Book. I readily persuaded them that it was only right before trying out the empty air as Daedalus had that I should condition myself with a short ascent, in the way another Icaromenippus had.[7] Such were the events that led me to publish these trifles of mine.

A few preliminary remarks are in order, both on the sort of philosophy that I have espoused and on the order and division of this work, even if all its parts are not to be given here. On the first point, then, I remember clearly that when I was indoctrinated in Peripatetic philosophy as a young man, it did not appeal to me in the slightest, I who had decided to devote myself to philosophy because during my course of study in humanities I had fixed this eulogy of Cicero's in my mind, "Philosophy can never be sufficiently praised: the man who obeys her counsels may live all the days of his life without vexation."[8] It seemed quite clear to me that this could not be expected of the philosophy taught in the Schools. Once I was on my own and began to examine the whole matter more deeply, I soon became aware how vain a discipline it was and how useless in the pursuit of happiness. And yet, the deadly shaft remained rooted in place, I mean the general prejudice in favor of Aristotle that was apparent in all the Orders. Reading Vives and my dear Charron roused my spirits and dispelled all my timidity; they taught me that there was nothing wrong in supposing that this sect was not necessarily correct in all matters just because most men approved of it. My strength grew greater as I read Ramus and Mirandola.[9] I mention them

[7] See Lucian's dialogue *Icaromenippus*.

[8] *De senectute*, ii, 2.

[9] Two more names to be added to the list of authors Gassendi particularly admired given on page 5. Ramus (Pierre de La Ramée, 1515–1572), grammarian, astronomer, logician, and above all critic of Aristotle, was one of the outstanding scholars of sixteenth-century France, and exercised considerable influence beyond its borders. Converted to Protestantism, he was killed during the Saint Bartholomew massacres. Gassendi is almost surely referring to Gian Francesco Pico della Mirandola (1470–1533), nephew of the famous Pico, whose *Examination of the Vanity of the Learning of the Pagans* uses skeptical arguments to refute various pagan theories and to defend the primacy of Christianity. This work was published along with the uncle's.

because I have always made a point of naming those from whom I have profited. From that time on I began to investigate the teachings of other sects in order to test whether they might have anything sounder to propose. On all sides I found difficulties of every degree, but one thing I confess frankly; of all the opinions, none ever pleased me so much as the *akatalêpsia* [incomprehensibility of things] extolled by the Academics and Pyrrhonists. Indeed, after I had been given to see how great a gulf divides the Spirit of Nature from the human mind, what else could I think but that the inner causes of natural effects totally elude human investigation? I began to be ashamed of and to pity the inanity and arrogance of dogmatic philosophers who are so very pleased with themselves and claim so gravely to give us knowledge of natural phenomena. Wouldn't they have to remain as stiff and silent as the rocks of Mapresia[10] if someone begged them to give a serious explanation of the ingenious instruments with which Mother Nature has assembled the limbs and organs of a single mite, the least of her works? Much wiser indeed are those philosophers just mentioned who arm themselves to be able to argue equally well for or against any position and in so doing prove the vanity as well as the uncertainty of human knowledge.

The outcome of all this was that when I was subsequently burdened with teaching philosophy, particularly Aristotle's, for six full years at the Academy of Aix, I always made it a point that my auditors should be able to defend Aristotle well; but as a kind of appendix to the course I also expounded those opinions which would totally undercut Aristotelian dogmas. Given the time, the place, and the people, it was more or less necessary to give him a certain preference; but an honest mind could not omit the second portion which expounded sound reasons for withholding assent. In this way my auditors were warned not to make rash pronouncements; for they saw that there is no proposition or opinion so thoroughly accepted or so attractive that its opposite cannot be shown equally probable, or even, in most cases, more probable. And so it seemed to me

[10] An allusion to Vergil, *The Aeneid*, VI, 471.

wiser in this matter to imitate Aristotle more faithfully than his most dedicated followers do. For they consider whatever Aristotle has declared on any subject undeniable and sink their teeth tenaciously into his doctrines. They think they are committing a sacrilege if they defend an opinion opposed to his or set forth both sides of a question fairly. But, as Cicero testifies in his *Orator*, "Aristotle trained his young students in their school exercises not to discuss subtly in the manner of philosophers, but with the richness of the rhetoricians, both for and against, so that they could speak more elegantly and more richly."[11] Let others judge whether I succeed in either objective.

One thing cannot be denied: that I was in no way required to make public any of the points I put forth in defense of Aristotle, for the voluminous works of the Aristotelians already fill the world. Therefore, it seemed sufficient to bring to light the considerations that I presented in opposition to him. Let no one believe that I am at all dogmatic on the grounds that I am here defending only one side as the dogmatics do; on the contrary, I have given notice that the other side has been omitted because it is upheld more than adequately by Aristotelian authors. Since I cannot really persuade myself that the truth of things can be perceived by mortal men, I am far from wishing to sell my wares; and the things that I appear to be asserting here are not meant to be taken as established facts. My thought is utterly different, and so is my intention. Indeed, as I am rather sure that many people would exert their utmost efforts to uncover the truth if they did not believe that they already held it securely in their grasp, I decided to struggle as best I could to blunt the edge of their great credulity and to see whether I might not reduce somewhat the presumption of the host of Aristotelians at the same time. For it is astounding how superciliously they proclaim their dogmas and how pompously they dispense them. They boast in public that the truth is contained in their dogmas so that whatever is proposed against them they denounce as a departure from the veriest truth. Although I knew well that I should arouse the anger of many against

[11] *Orator*, xiv, 46.

me, still I could not deter myself for such a reason since I meant to act out of zeal for the truth alone and I felt that the preconceived opinion of those men is so great an obstacle to it.

Let each man judge me as he will; my conscience will suffice for me. I may be permitted to declare as Cicero did in a similar case: "If I subscribed to that particular school of philosophy because I was attracted either by some desire to show off or by an eagerness to win in debates, I think that I should have to condemn not only my stupidity, but also my character and my nature."[12] He swore by Jove and the gods of the hearth; I would swear by the one true God and the sacred Gospel, "that I burn with the zeal to uncover the truth and that I believe the things I say, for how could I not desire to discover the truth when I rejoice if I discover something like the truth?" But since falsehood slips into the guise of the truth so slyly that, as Aristotle testifies, "many falsehoods appear more likely than many truths,"[13] who will object if I do not immediately snap up some opinion, if I do not take oaths rashly, if I resort to any means to see whether the opposite may not perhaps be closer to the truth? To be sure, as our author proceeds, "just as I consider believing the truth the most honorable thing, to approve of falsehoods as true is the most shameful." But how easily this may happen unless you exercise such great caution that no one can take exception to you.

Whatever the case may be, whether I maintain something dogmatically, or put something to the test in the manner of the skeptics, or if I present something as true, or if I say something is probable (for it is far from my intention ever to defend a falsehood), I always commit myself and all my goods to the judgment of the Church, One, Holy, Catholic, Apostolic, and Roman, whose child I am, and for whose faith I am ready to give my life and my blood. Indeed, I esteem that this entire work should be submitted to its censorship, so much so that should the Church, contrary to my hopes, object to any statement, then I would truly

[12] This and the two further quotations from Cicero are taken from the *Academica*, II, 65–66.

[13] The passage Gassendi has in mind has not yet been identified.

wish to be considered the first to execrate that statement. There is just one thing I would like to request: if certain somewhat free titles that I have given my Dissertations offend anyone, let him consider a little more attentively how I explain my meaning. If he will not do this, why should I strive to write to please someone who will read me only in order to raise objections, find fault, and pick me apart? If he will do this, I may hope that he will not condemn me since at all times, unless I am mistaken, I have defended the truth, authority, and majesty of the Scriptures, the Church Fathers, and the councils. Whatever happens, you may know that I am not so tender-minded or delicate that I believe that it belongs to just anybody to determine what is dogma, what an article of faith. I believe in the Church, but not in any of those would-be scholars who immediately invoke Holy Scripture and pronounce you a heretic when they find no other way to refute something that does not appeal to their taste. But that is enough about that.

Coming now to the second point: I have called these indigestible compositions of mine by the title of "Exercises" because I have used them to exercise my mettle and my intelligence. In the beginning it seemed to me that I would need great mettle to break free where so few have tried to stand on their own feet, to rid myself of so many habits contracted since childhood from exposure to common men, to shake off the shameful yoke of this prejudice, as deep as it is widespread, and—what seemed even more serious—all this when I found nobody who approved of my undertaking, indeed when I might be hissed offstage and pointed at with the finger of shame by nearly all men with a reputation for learning. Furthermore, it seemed that great strength of mind would have to be expended in the struggle either to reconcile authority to new opinions or to restore their charm to outmoded ones. Above all, since no Mercury presented himself to show me the way, no Ariadne to lead me forth from almost inescapable windings,[14] in this undertaking, since the traces of the ancients

[14] Hermes (Mercury) led Priam to Achilles' tent in *Iliad* XXIV. Ariadne's role helping Theseus in the labyrinth requires no note.

were almost obliterated, either I would have to guess what mentality and what reasoning stirred them or I would have to try out many new approaches to defend opinions of theirs that we consider unfounded. That is why I have called these Exercises "paradoxical," for they contain paradoxes, or opinions surpassing the comprehension of common men. Now by common men I do not mean men of the people (what could a jackass do with a lyre?), but the common run of philosophers, whose minds are so low that, like common men, they call barbaric anything that goes against the opinions they have become set in. And since I saw the Aristotelians far surpass all the others both in number and obstinacy, it is easy to see why I undertook my task "in refutation of the Aristotelians." Should anyone ask of me why I chose the title "in refutation of the Aristotelians," not "in refutation of Aristotle," whose teachings I seem to dispute expressly, I would like him to know that I was impelled by three very strong arguments. First, I do not believe that the works I am criticizing here are in fact Aristotle's, but are founded instead on the opinions of his followers. Aristotle was much too great a man to have such worthless works attributed to him. Second, these men may often be defending an idea that is not Aristotle's but their own, even one that is contrary to his clear meaning, for example when they maintain that semen and heavenly bodies lack souls, doctrines against which he has spoken out clearly. Last, every day they pile up inanities and questions on rubbish that could never have occurred to Aristotle. And so, when I am denouncing such nonsense, why should I condemn Aristotle, whom I have always respected greatly, instead of those Aristotelians who embrace him without previous examination and who do not distinguish between what he could and could not know, or between ideas of his that have come down to us in their correct form and those which have come in adulterated form.

To continue, philosophy is commonly treated under four topics, and the topic of physics is subdivided into three headings, so that you have the well-known six parts of philosophy, which are preceded by some introductory chapters commonly called

prolegomena. In accordance with this practice, I have divided the philosophical *Exercises* which follow into seven books which correspond to the entirety of Aristotelian philosophy.

Book I is entitled "Against the Teachings of the Aristotelians" because it contains some general exercises. In it I argue against the way of philosophizing that obtains among them and I scold them at some length in the name of philosophical freedom, which they have trampled down. And I maintain that the Aristotelian sect and its teachings do not merit any preference and prove this on a great many grounds, especially because of the omissions, superfluous passages, errors, and contradictions in the body of texts generally attributed to Aristotle.

Book II is directed against Aristotle's Logic. In it I state first that there is neither necessity nor utility in this logic. Then I argue against universals, categories, and Aristotelian propositions and following that debate Aristotle's concepts of knowledge and proof. Next comes the main point—I argue that learning and human knowledge are weak and uncertain. Then the fundamentals of Pyrrhonism are confirmed, above all the maxim *nihil sciri* [nothing is known] is established.[15]

Book III is devoted to an account of physics. The number of primary elements of the Aristotelians is attacked—among other things it is proven that the forms are accidental. I show that natural motion is not what it is commonly thought to be. Aristotelian place is replaced by the space of the ancients, reinstated from its exile. The void is established, or rather reintroduced, in the universe. Time is demonstrated to be different from the definition Aristotle gives of it, and a great many other allied subjects are touched upon as well.

Book IV is addressed to the books on simple corporeal substance. In it I set to rest the sun and the fixed stars and impute

[15] The most famous usage of this frequently repeated expression occurs in the title of the Portuguese philosopher Francisco Sanchez' greatest work *Quod nihil scitur*. Gassendi uses it again (see page 97). Rochot remarks that to say that nothing is known does not preclude further search for the truth, as would the position that nothing can be known.

motion to the earth as one of the planets. Then the multiplicity, or rather the immensity, of the world is shown to be probable; in addition there are a great many theses about the celestial bodies presented in the form of paradoxes concerning the causes of motion, light, phenomena, generation, and corruption in them. After this comes a refutation of the Aristotelians' elements, their number, their qualities in regard to both movement and change, their reciprocal transmutations, and their compounds in mixed substances.

Book V attacks the treatises that are generally concerned with mixed substances. In this section I trace the movement of the comets across ethereal spaces, and show they are no less continuous than the planets (*sidera*) that are always in view. Further, I disclose a new and different route from the Mesaraic veins for the passage of bile from the stomach to the liver. I distinguish between more than three types of living animals; I give a soul to semen; I restore reason to animals; I find no distinction between the understanding and the imagination.[16] Finally, I urgently exhort man to refuse to believe in things that are not so.

Book VI is directed against the *Metaphysics*. In it I reject the greater part of the eulogies made of metaphysics and attack as strongly as I can its well-known principles and those famous properties of Being: oneness, truth, and goodness. Then whatever knowledge we have concerning intelligent spirits and thrice great God is attributed solely to orthodox faith, for I show clearly how vain are the arguments with which men usually philosophize about separate substances according to the natural light of reason.

Finally, Book VII deals with moral philosophy. It hardly requires a lengthy recapitulation. In one word, it teaches Epicurus' doctrine of pleasure by showing in what way the greatest good consists of pleasure and how the reward of human deeds and virtues is based upon this principle.

[16] It is somewhat surprising to see Gassendi give so much importance to this distinction before the publication of Descartes's philosophy. For his views of the topic, see pages 94–95.

These then are the main subjects which I intend to discuss in the following books. Obviously, I have left out many topics, but I did not deem it worthwhile to examine every single opinion of the Aristotelians. For they are all but infinite and growing daily. It seemed better to me to follow the practice of those who make rich catches of game with nets and stakes rather than those who follow the tracks of a single wild beast, who fish with a light rod, or who hunt with a bow and arrow. I thought it best to select just those opinions which were, so to speak, the foundation doctrines of the Aristotelians; for when they cave in, they cause the total collapse of the others at the same time. Therefore, I appear to be imitating those who dig out underneath the foundations when they are besieging a city; when they fall in, the whole defensive system of walls and towers collapses.

Concerning the particular order of these *Exercises*, I have more or less followed the most usual arrangement of subjects set down for me by the Aristotelian philosophers. On the other hand, if I had decided to construct a philosophy of my own from whole cloth, I might have, indeed I would have had to, set up a new order; for today everything has been turned topsy-turvy as far as the very natnre of things considered in philosophy is concerned.[17] Bnt since I am not philosophizing here on my own, but rather in comparison with others and am attacking a doctrine that has already been established, it is fitting to keep to the prescribed arrangement of subjects, like a hunter after a wild beast, who may follow a straight route, or branch off right and left in all directions. Although the order within the individual Exercises in which I comment on first one matter and then another is not totally random, I have not taken great pains to be thoroughly methodical, for I would rather leave something out for more scrupulous men to find than to chew my fingernails to the bone. Nor am I the kind to hammer out over and over again for nine

[17] Gassendi is probably thinking of the attacks against Aristotle by Ramus and others; the real revolution in philosophy appears to modern historians to date from Descartes's writings, after which the new thinkers referred to themselves as the *recentiores*.

full years a work that had once appeared to me not entirely unworthy. Whatever I undertake or contemplate, I follow the pace set by my mind without letting it get tangled up in so many snares. Let that be understood from now on, and also that the other defects which will undoubtedly be pointed out by those who will strive to show that I have not given enough care to that piece of advice "A man who is prepared to speak against another must not have any faults himself."[18] Indeed, if I were seized by the folly of wishing to be the leader of a sect or of making myself a great name in some sect, I would have to make an effort to assure that everything I proposed held together most elegantly and was most perfect in every respect. But my intention here is only to publish some fancies of mine and to put before your eyes simply and in good faith the reasons that have moved me to abandon Aristotle. Why shouldn't I prefer to continue to appear inane and lazy instead of showing my teeth and appearing smart, instead, I say, of putting myself to a lot of trouble only to find, for example, that I must leave no stone unturned to excuse myself because I have proposed something in the first Exercises or Books which I might appear to contradict in subsequent Books? Why should I worry about such a possibility unless perhaps being a man and therefore naturally shrouded in obscurity (as I am only too aware), I was the sort who held some wrong opinion today and then did not dare to recant tomorrow when I knew better? But I have let myself display too much liberty to fear such a reproach. For if I cannot philosophize with freedom, I would rather not commit myself fully to any philosophy at all. Lastly, as concerns my style and manner of expression, I am neither Ciceronian, nor the least bit scholastic. I favor an unaffected prose style which flows spontaneously, for I am no more painstaking with words than with other things. There are many who have heard me disconrse in public who will witness that I expounded my extemporaneous thonghts in precisely the same style as I set forth my considered thoughts here.

[18] Rochot gives the note "cf. *Pro Sulla*, 8."

If, moreover, this style sometimes may seem a little too biting, that is because the subject matter requires it. For in this matter it is especially difficult not to write satirically. Nevertheless, since all this proceeds from zeal for the truth, it is general in nature and does not attack anyone in particular. I hardly ever mention anyone by name for I hold every man's renown dear. Along this line, while most of the Aristotelian philosophers belong to some religious order, it is far from my intention to dare to weaken piety or religion. I am concentrating on the Aristotelians' philosophy alone, and I am considering it by itself without reference to either persons or states. This is really my intent. If anyone should believe otherwise, he would be unjustly insulting this open confession of mine and my sincerity.

So far I have spoken, my dear Gaultier, of my way of writing philosophy and the order of my work. It remains to say why I have dedicated this Preface to you. Why do I hesitate? You so love and cultivate legitimate philosophy that its two most illustrious qualities both shine forth brilliantly in you, an exact judgment of all things (because of your extraordinarily excellent knowledge of all things, especially of mathematics) and a rare integrity of character. It was you who nourished the seed in me of what true philosophy I possess (if indeed I possess any); and if I owed the grain to my guardian spirit, I owe its growth to you. Your affection for me is so great that there is none other to whom I am so attached. So why should I not offer this token as a testimony of my gratitude and affection? You know that whatever I hold dear is entirely yours. In truth

> One hundred mouths I could dare to desire
> To relate in pure tones how in the fold
> Of my breast I have fixed your love entire,
> That these words might tell all that lies untold
> In the hidden cords of my secret heart.[19]

If this book should have some friendly spirit which would keep it alive, I should wish that it would present you in the best light

[19] Persius, *Satires*, V, 26–29.

to posterity. But whether I may have such hopes or not, whatever hands this book may fall into, I will be satisfied if I have convinced my reader that you are one of the great men of our age among those I have been permitted to know. And I will be even more satisfied if I manage to provide some recreation for your old age as you read this, whatever it is worth. And perhaps you will not laugh too much at this little effort of mine if you derive some pleasure from the fact that I can converse with you in my absence through this book as I used to when I was there with you at your house and in the country on those sunny walks among the olive trees of Aix. O happy times! How we could laugh at the comedy that the whole world plays, wittingly or unwittingly, while we would often say as we philosophized, "We are alone, we may inquire about the truth away from the ill-will of others."[20] To be sure,

> What shame, what limit can there be in grief
> For so sweet a head?[21]

To return to this book, which must take my place at your side, you will read in it and recognize the spirit of your friend Gassendi. Indeed, if no one else read it or approved of it, I would not in the least regret my pains, for to you alone I have some reason to show my gratitude. It seems to me that I may best conclude as Epicurus did, who said according to Seneca when he was writing to a friend of his student days, "I send this not to the many, but to you, for we are a great enough audience for each other."[22] Farewell then, my dear Gaultier, and convey my regards to your noble nephew, your brother's son, Counsellor in the Supreme Royal Court of Aix, who is fond of me. Completed in Grenoble

[20] Quotation based on Cicero's *De divinatione*, II, xii, 28, with insignificant alterations. Pintard finds in this passage evidence of Gassendi's youthful libertine philosophy, though it is rather difficult to cast Gaultier, Gassendi's partner, in the role of a libertine, *Le Libertinage érudit dans la première moitié du XVII^e siècle* (Paris: Boivin, 1943), page 176.

[21] Horace, *Odes*, I, xxiv, 1–2.

[22] *Epistles*, VII, 11.

during my duties as Procuror, on the eve of the intercalary day of February in the year 1624 of the era of Dionysius.[23]

Book II: On the Aristotelians' Logic[24]

FIRST EXERCISE: THAT DIALECTICS HAS NO NECESSITY OR UTILITY

Article One: Artificial logic is not necessary either absolutely or relatively

Though logic is commonly distinguished into two sorts, the one "natural," and the other "artificial," we shall not speak here of "natural" logic, which is nothing other than reason itself, or that innate force and power of the understanding by which we reason and discourse. Now who could ever reason without having within him the faculty of reasoning? The entire debate, therefore, concerns only artificial logic or that fine art which confers the name "dialectician" on the man who possesses it thoroughly. To begin, I will not deny that a precept such as "Generalizations should be expressed in all their generality and

[23] Dionysius Exiguus (Denis the Little) established Christian chronology in the sixth century A.D. when he fixed the year of Christ's birth and set the beginning of the Christian era at the previous March 25th, the presumptive date of the annunciation.

[24] The term *dialectica* has two meanings, "artificial logic" or "the rules of philosophical debate." Gassendi attacks both forms of dialectics. In this translation, "dialectics" refers to the second meaning, and the first is rendered by "artificial logic," "formal logic," or simply "logic."

in the first mode"[25] and a few others like it do help somewhat and will profit someone inexperienced if he is informed of them. But then, when we see that our natural skill is so great that everyone does whatever is necessary easily, on his own, and without reflection (this is not surprising since reflection is posterior to the pageant that nature offers us), when we also see that once the gates to the art of reasoning are opened, it grows so wild that it produces a crop no less useless than difficult to harvest (it is so enormous), and when we see that there is never an end to the formulation and classification of its precepts, then we have good reason for taking up arms for the superiority of nature over the illusions of this dialectical art. However, if someone should be content with those few rules which can be expressed in a very few words, we would be far from discouraging him. For no matter how much they might seem useless to some people (even though they could not do any harm), they would not really cost any sacrifice of time that could be regretted. Therefore, our argument is more with that arrogant art whose mastery we see acquired at the expense of so many months, even years in many cases. If its destruction entails the fall of some other system, no matter how small, then the blame, if there is any, should be apportioned according to the significance of the arguments we present.

I make only this preliminary reminder: since something is said to be necessary in two ways, first totally and ntterly, or as they say "in essence, simply, and absolutely" (which is the proper usage of the term necessary); secondly, neither totally nor in all respects, but as they say "for purposes of improvement or relatively" (which should more properly be called useful), I must mention that the field would lie completely open without

[25] Abstraction in the first "mode" or "degree" refers to the sort of abstraction proper to the philosophy of nature and the natural sciences in which the mind disregards the individual matter of a substance (e.g., water as such, color as such); second degree abstraction includes mathematical concepts which have no sensible content. The Latin here might also refer to a statement in the first "form," i.e., general and affirmative (e.g., all men are rational).

challengers if we claimed to prove that artificial logic was not necessary totally and absolutely. Indeed, since there are several philosophers even among the Aristotelians who do not insist upon this strict necessity, we will have to direct our greatest efforts to the second half of the question, namely the proof that artificial logic is not even useful, for if we can prevail in this matter, then the absolute necessity will collapse all the more necessarily.

Article Two: Artificial logic is not useful

To begin then, I cannot see how the utility of artificial logic can be better or more clearly explained than it is in two passages of Cicero. In the *Tusculanes* he teaches that logic is the art "that defines the object, indicates its genera, points out consequences, guarantees the soundness of a conclusion, distinguishes between the true and the false; it is the method and science of proper reasoning."[26] In the *Brutus*, "it teaches to divide a subject into parts, to explain what is hidden by defining it, to make clear what is obscure by translating it into other terms, to see an ambiguity immediately, then to make distinctions, finally to present a rule for judging the true and the false and the consequences that do or do not follow from presuppositions."[27] I am surprised that one function should be missing from these passages —and the one that would seem to be the specialty of logic— namely, to supply an instrument for discovering the truth, in fact the whole enumeration seems to regard the method of making judgments (which is set forth in the *Topics* anyway). Be that as it may, all the functions of logic, or the principal ones, are: first, to define, as in the passage "to make clear what is obscure by translating it into other terms"; secondly, to divide, which amounts to the same as "to see an ambiguity and to make distinctions"; thirdly, to discern the true from the false, which is why it is often described as the arbiter between the true and the false;

[26] Book V, xxv, 72.
[27] *Brutus*, xli, 152.

fourthly, to show how one thing follows or does not follow from another, to which belongs the art of constructing an argument and of unraveling a sophism; fifthly, to discover the arguments appropriate to any question. On all these matters we will have occasion to say something specific in the following exercises.

Article Three: The uselessness of definition, as it is understood in artificial logic

Therefore, we shall first say something concerning definition. Whenever I seek knowledge of a thing, logic should make its nature clear, or explain what the thing itself is through definition. I ask first what advantage logic gives me in this matter. For example, I would like it to enlighten me concerning what the brightest thing of all, the sun, is. Do you think that logic will light some lamp by which I will see it better? I am indeed grateful to nature for providing me with the senses by which I perceive its brilliance, its heat, its shape, its size, and other characteristics. But not even Eudoxus would have hoped or demanded that logic should bring me to its very innermost substance.[28] And just what routes will logic produce to lead me to the complete knowledge of the nature of a flea, not to mention the sun? Is it truly the province of logic to examine, to uncover, and consequently to explain the nature of things, rather than the province of Physics and the other sciences instead? Supposing logic could do those things, wouldn't we have to devote all our efforts to logic and neglect the other sciences? You will say that the investigation of the nature of things belongs to the other sciences, but still that logic serves them like a crafty hunting dog with a fine sense of smell. But what olfactory sense is logic endowed with that it sniffs out and runs to ground the hidden nature of things? The very best it can do is to whisper into your ear to seek out the genus and difference of a thing. But how futile this advice is will be made clear in its own place.

[28] In the margin of his manuscript Gassendi refers to Plutarch's *Moralia*, but the figure has been lost in binding. Rochot suggests 1338, 1, 22.

In the meantime, if it does not present us with anything else, is this then all that it promised us? Then it does not reveal nature to us, but only does the same as the man who promised to discover a treasure and then says "Look where it is hidden and you will find it." For why else should we look for the genus and specific difference of a thing except to find out what it is? If the genus and specific difference do contain the nature of the thing, I expected you to reveal them to me, not to make fun of me in this way. You will say: But is it not enough to be forewarned by logic that these questions must be investigated if you are to be able to comprehend the nature of a thing? Is it really enough? For you were boasting that logic would define a thing for me, not that it would refer me to the parts of a definition that had to be determined. You will say that logic urges me to find out what is common to the thing itself and to things like it and then to strive to grasp what is most completely characteristic of it (*proprium*) by lopping off each common property, as if with a pruning knife. For by that method I will be able to get both the genus and the specific difference. But all that is just as if I had made no progress at all. That is precisely what I was going to do as I girded my loins to obtain knowledge of some thing. There is no one who desires to know something who would not search for the characteristics peculiar to it once what you call its genus was sufficiently clear to him. He probably will not call them genus and specific difference unless he happens to have been taught that that is what they should be called; but as long as he understands the principle, what does it matter if he uses one name or auother? Or perhaps you imagine that there is no knowledge of things in India because they are ignorant of your logic and all these terms?

Logic requires, you say, and what is more common sense requires, that all the parts and relations of each thing must be unraveled if its nature is to be peered into as deeply as possible; and then if you ask what the thing is, it is common sense which furnishes eveu the merest country bumpkin with words in abundauce to make it clear, and they are the equivalent of the genus

and the specific difference. On a thousand occasions I have asked children or rustics what they called this or that thing, and I never once failed to get a description accurate enough for anyone to recognize and understand the thing. Let everyone make the test; you will find that it is so. If it should happen that someone made an error in some matter, you will observe that the cause is not that he did not know logic, but he had not examined the thing thoroughly enough. And if he should perceive the object distinctly, I will stake my life that he explains it clearly to you. Consult a politician about the affairs of state with which he has been concerned for some time, consult a merchant about matters pertaining to his business, consult a farmer about farming, in one word, consult as many artisans as you wish who do not know what your logic or your genus or your specific difference is. Immortal God, how many excellent definitions of all sorts of things you will hear! Do you believe that for them to be acquainted with these or those matters they had to know beforehand what a genus and a specific difference is? How foolish aud laughable you are! But then you believe no doubt that because you know that a genus is what can be ascribed to the essence of several differeut species and that a specific difference is what can be ascribed to the quality of each, you are therefore better equipped to know the nature of fire or gold than is the chemist who has spent so mauy years and so much mouey on these things, and still does not know them?

Yet, you will say, once knowledge of some nature has beeu achieved, an expert logiciau will define it better than someoue untrained. But still I ask what that adds to the acquisition of knowledge of the thing, since it had already been achieved? Logic should help us with something that we do not yet kuow; but when it has already beeu discovered, what else can logic add but trifles?

You will say that at all eveuts it helps teach others about the same subject. But if you reflect, you will perceive that if the thing cau be clearly taught, that is uot the cousequence of logic but of our clear grasp of the subject; for however clearly a man

explains any subject, so clearly does he understand it. And is there anyone among us who would not prefer to have navigation explained to him by a man who has ranged over some coastline for a long period than by a man who would have woven together according to the rules of artificial logic a long and precise series, a tissue of genera and specific differences, applying to ships, the sea, cruises, and the like. And so consider painstaking experience the instrument for acquiring knowledge of things, or the trustworthy lessons of a man most familiar with them. But if you place your confidence in your fine logic, you will not come out any wiser. And if one day you should come across some man very precise and competent at explaining some thing, you must realize that this is to be attributed to habit and careful attention to useful and appropriate vocabulary, not certainly to logic or its impoverished and feeble precepts. We shall have more to say about definition and its uselessness later on.

Article Four: The same applies to division

Next we shall discuss division, or the distinction into parts. What is distinguished is either words or things. And it is obvious that distinguishing words according to the objects they designate pertains to grammar or to the skills which deal with the objects designated. Take for example an ambiguous word designating more than one thing: bull.[29] Is it the province of logic to explain the various usages of this word, or does it not rather belong to grammar or the study of languages to take note of its different meanings in various passages of different authors? The answer is generally admitted and need not be pursued further. At best logic may be said to warn us that ambiguous words must be distinguished. But what need is there for such a warning from logic when nature endowed every man with a desire to know the truth and at the same time inspired in him a hatred and aversion for ambiguity? Need I say that all this amounts to

[29] The Latin *taurus* has several meanings: the animal, the constellation, a kind of bird, a root, a beetle, a part of the body.

nothing and that at all events it does not fulfill the many promises that logic makes.

But let us proceed to things themselves, which the same logic claims it will distinguish. I ask you in what way will it assign the appropriate parts or forms to things? What? Is it a discipline that can look into all things, from which no part of any thing may remain hidden right down to the atoms themselves? Suppose for example that man is to be broken down into his component parts. Would you be demented enough to ask this of logic rather than of anatomy? If an army is to be divided into cohorts and sections, will you turn to a logician rather than to a general? What does logic have in common with these matters, or with any others? Believe me, it is for the man who has a profound knowledge of a thing to divide it correctly and not for the logician who has nothing to offer beyond some dry formulas. Where or how shall logic teach me that the heavens must be divided into zones, houses, or constellations, into circles, degrees, minutes, and so forth? Where or how shall it teach me to partition the state into provinces, classes, offices, and the like? For if it does not teach this, and cannot, why is it said that its characteristic is to divide and partition all things correctly?

You will say that it is not the function of logic itself to divide all things, but that where a division is to be made it admonishes us that the whole is to be divided into parts that are appropriate, closely related,[30] and complete. But wouldn't anyone have done that without any such admonition? Do you think that a builder who is about to design a house needs a logician to warn him to draw all the parts carefully? Do you think that a clockmaker cannot show you the parts of a clock precisely and methodically without being a confirmed logician? But, you say, logic shows how to set about making distinctions. For example, when the whole is an actual being, it should be put in the genitive singular thus: one part *of a man* is his body, another his soul; or else, one part is his head, another his breast, another his stomach,

[30] *Proximas*: Rochot—"easy to understand."

another his arm, another his leg. But when the whole is a potential or universal being, it should be placed in the genitive plural thus: *of the animals*, one flies, another swims, another crawls, another walks; or else, some are endowed with reason, and some not. Now what does this mean? Does logic teach this? No, common everyday language and usage does. Who would make the division in any other way, even if he did not think about it? I would expect logic to lead me to the finest articulations of every part; yet here it does nothing more than what a nurse could teach or at best what is more to be expected of grammar.

Furthermore, whenever division or methodical arrangement is highly praised for teaching a subject or planning an oration, remember how little either depends on any precept of logic, but on a thorough understanding of the thing to be taught or pleaded; indeed bringing your own natural judgment to bear will surpass any rules a thousand times over. That is why my opponents are forced to have recourse to a method of simple prudence, for in fact, there is no system more reliable than natural judgment or prudence. Besides, how many geometers are there who teach excellently and discourse upon the different kinds of angles, figures, or the art of measuring things above us, below us, off to one side of us, and other such things without the least skill in formal logic? How many orators, who never gave a fig for logic, still make excellent speeches on making war, establishing peace, and such topics, listing in order all their resources, needs, advantages, disadvantages, and other such considerations. So, if you truly and conscientiously wish to know what are the species of a genus, or the parts of a whole, you should not turn to logic, but to an investigation of reality; if you follow this method, your speech or your enumeration will surely come without effort.

Article Five: It is no use in distinguishing truth from falsehood

Next comes their promise to distinguish truth from falsehood, a promise that is all the more unpardonable because our desire to

know the truth is the more easily deceived by such a lure. For what is it but the promise of happiness and immortality which would bear us up to heights which the wisest of all mortals has never yet been able to attain? But these criticisms will be taken up later. In the meanwhile let us consider how logic helps detect the truth about things. For example, I wish to know whether it is true or false that the chord known as the octave is still sounded when the length of the string (*proportio*) is doubled; what help will logic be for me in determining this? If I wish to know whether it is true or false that a monarchy is preferable to other forms of government, how will it clear that up? Wouldn't you refer me to musicians, politicians, and other craftsmen rather than to logicians when I seek the truth on such questions? What? Will any other art but geometry show me that it is true that every triangle has three angles equal to two right angles, that it is false that the square of the side opposite the right angle is less than the sum of the squares of the two sides. Then does logic have no rule by which I may be shown how to distinguish the true from the false in these matters? What if I were to ask if there is a sphere of fire under the sphere of the moon?[31] Aristotelians maintain that there is; I cannot bring myself to believe it. I do not wish to be mistaken; and if it is true, I will gladly give my assent; therefore let logic bring forth its special device which allows it to fish out the truth. What does logic have in common with the existence or nonexistence of that fire? Let it pronounce its oracle; I am wavering between truth and falsehood; come forth, oh Dialectic, interpreter of mysteries; what do you offer to decide whether that is true or false? But why do I wait when it is obvious that if I desire to know the truth about some matters, I should apply

[31] The sphere of the moon designates the solid crystalline globe to which the moon was attached and which revolved in such a way as to account for the moon's motion. According to the Aristotelians all matter within this sphere was composed of the four elements fire, earth, water, and air; but beyond the moon's sphere only the fifth element, or quintessence, existed. *De caelo*, II, vii, 289a, 20 discusses the possibility that the motion of the sphere produces a domain of fire just underneath it.

to the crafts and sciences which treat them professedly, but not to logic. There is nothing surprising in this since each of them claims to have the truth as its goal inasmuch as each strives to illuminate its subject until its nature appears clearly.

I can predict what you will answer; you will say that logic's function is not to determine specifically if a particular statement is true or false, but to present some general method which all branches of knowledge may then utilize and which will enable them to discern the true from the false. To be sure, this is the reason why logic is called the scales, the balance, the indicator of truth, why it is the measure, the arbiter, the rule of the arts, why it is the courtyard, the portals, and the key to the sciences, why it is the sun, the beacon, and the eye of the mind. Dear God, what rubbish! Now I ask you in good faith, just what is this method? Or to use just one of the many metaphors, just what is this balance in which we can assess everything, both truth and falsehood? This is what I have been asking for a long time now: what can you produce that lies behind all these fine words you spout? If you should say that experience is the balance in which the truth of any matter is to be weighed, such as whether fire is hot or not, whether the sun is bright or dim, I would not disagree with you by very much. For this is the instrument of judgment, or as the Greeks say the *kritêrion*, which it seems must be preferred over all the other candidates. But experience belongs to the senses, or natural capacity, not to artificial logic; and you have been singing the praises of something else to us. In fact you say that the way to know, or judge the truth, is threefold, namely by definition, division, and argumentation. Fine words, provided that they make a triple-stranded rope and not a three-headed Cerberus. And how can anyone imagine a balance with three pans? But let that be; we have already spoken of the first two; of the last we shall speak soon. I will add this much: I wish to know whether the sun is a burning stone or a pumice boulder. What help can all of logic offer with its formulas for defining? The first definition, Anaxagoras', provides both the genus and the specific difference, and so does the second one, which is Epicurus'.

Each is formulated in a few, eminently clear words. Do you think that I shall get to know the true nature of the sun from either one or from both? I desire to know if it is true that every soul belongs to either a man or a beast. How will logic clear this up with its rules for dividing, especially since the Stoics stoutly defend this division concerning the soul? If I am told that Aristotle makes a different division, the matter becomes more open to doubt. If they both adhere to the rules of division, it becomes doubtful that the truth can be ferreted out by either of the divisions—especially when the Platonists add yet another soul to the world, and there are even some who think that stones and metals are alive. At least we require a method for determining which one of all the divisions was real and truest. Certainly formal logic, however much it may sputter, will not provide it. Finally, I desire to know if this Arian conclusion is true: we must believe that whatever Christ said is correct; now Christ said he did not know the date of the judgment day; therefore we must believe that Christ did not know the date of the judgment day. Now, I ask, isn't that an argument in logical form? And will I attain the truth by an argument of this sort which is more likely to lead me into a most damnable heresy?

These then are not the real means for knowing the truth since they do not open up the way to it in the least, and even block it. But believe me, as each science has its own truth to be learned, each has its own measures for knowing it. Geometry has its quadrant; arithmetic its calculations; physics the senses; theology its revelation; and other branches of learning different means by which the truth is to be distinguished from falsehood other than by any teachings of formal logic. All that logic can distinguish boils down to this: whether there are only four types of modal propositions according to Aristotle,[32] whether "all B is C" follows when "all A is C" and "all B is A," whether the substitution of terms is part of the interpretation or of the refutation, and so on with innumerable other inanities which they care for

[32] The necessary, the impossible, the possible, the contingent.

in the tribunals of logic. Within these subjects and on these questions it may be extolled and glorified, but outside them it should not strive for the truth any more than a cobbler should leave his shoes.

SECOND EXERCISE: THAT THERE ARE VARIOUS ERRORS IN THE DOCTRINE OF UNIVERSALS AND PREDICATES

Article Three: The many disputes over the knowledge of universals are in vain, for they are no more than what the grammarians call common nouns

Now if Porphyry was right to refrain in his Introduction or basic treatise from raising obscure and spiny questions such as whether universals may exist by themselves, whether they are only in the mind, whether they exist separate from things, or only with them, and other similar questions,[33] is it not quite astounding that the Aristotelians who have read their Porphyry know so much more than he did that they discourse on questions of this type and teach them to children just finished with their study of grammar and rhetoric. These logicians would do better to make this far more succinct Introduction their topic and expound upon it. Furthermore, to realize how far off the track the many disputes raised on this subject are, you need only reflect that these great universals are nothing more than what the grammarians call common nouns, or ones that can be applied to

[33] Porphyry's *Introduction* (*Isagoge*), written at the request of his pupil Chrysaorius, to help him over the difficulties of the *Categories*, was regularly placed at the head of Aristotle's *Organon*. It follows Plato's teachings, sometimes even his words, discussing genus and species rapidly and in detail. In the opening chapter, Porphyry devotes one sentence to universals in which he refuses to investigate the questions Gassendi lists as well as the one whether universals are corporeal or incorporeal.

more than one object, for example "man," or "horse." Likewise individuals are nothing more than proper nouns, or ones that are assigned to only one thing, such as Plato, or Bucephalus.[34] What! you say, do you agree with that mad opinion of the nominalists who recognize no universality outside of thoughts and names? Right, I do; but I believe that I agree with an opinion that is utterly sane. And I ask you, in the name of immortal God, you who admit universal natures and regard them as real, what do you see in the world that is not unique? God is the most unique being, all his works are unique, this angel, this man, this sun, this stone; in short, nothing can be found that is not a unique thing. Then where in the world will you show us that these nniversals dwell?

As your illustration you say that there exists a human nature that is universal. But where can this universal nature be seen? In fact I see this human nature, Plato's, and that one, Socrates', but they are both unique natures. If you are keener-sighted than Lynceus,[35] tell us where you perceive that other universal nature. As long as there are so many unique natures, you say, there must exist one common to them all.

So you say, but how do you prove it? It is enough for me to have my unique nature; and the same for you, whatever you say, a unique nature suffices. As far as I am concerned, I see nothing that is in you and in me that is identical and common to us. You have your body, your soul, your limbs, and your own qualities; I too have my own. Now what is this nature that is in you and me at the same time? Perhaps it is such that if I were on this side of a wall and you on the other side, the wall would not completely sever what lies between your nature and mine? Or if someone slashed a sword between you and me, he would not cut this common quality in two? To be sure, I wish I could conceive how you conceive a common quality of this sort. Is it some vault that includes us both, or a gas that either surrounds us

[34] Alexander the Great's horse.

[35] An Argonaut capable of seeing through walls, into the heavens, and down to Hades.

or penetrates us both? Just how do you imagine it? You ask, and with general approbation: is it not so that human nature is in many people even if none is aware of it? And if it actually exists in many people, is it not really universal? I grant that human nature is in many people even if none is aware of it, but I add that it is multiple. You wish to imply that it is single so that you may establish a universal, but I say it is multiple so that I may maintain that the natures are unique. Indeed, even if no one is aware of them, there exists a human nature for Plato, and one for Socrates, and so on for many others and for all other individual men. I can prove that no matter how many unique men there are, even if not one is aware of it, human nature is tripartite. Let us hear how you demonstrate and prove that one and the same human nature is in many men, or in all men. But, you will say, is it not said that all men are of the same nature or have the same nature? You must show me, in a few words, in what sense these terms and others of the same ilk are true and must be accepted.

Article Five: Human nature may appear to be one and the same by resemblance, but is not absolutely one

To come back to what you had proposed, when it is said that all men are of the same nature or have the same human nature, this cannot mean anything except that they are of a similar nature or have a similar nature, or more accurately natures similar to each other. Then why is it commonly said to be one and the same nature? Surely not because there is actually one and the same nature in men, but because this nature can be conceived by one and the same concept because of men's similarity, and it can be expressed in this same concept. But isn't similarity derived from unity? So Aristotle states. However, if you look closely, you will see the reverse, that unity is derived from similarity. For why are Plato and Socrates expressed by one idea and name, unless because of their similarity? In the same way friendship is a certain unity whose foundation is a certain similarity and sympathy, not

the other way around. But we will have more to say on this matter when we deal with relationships.

You will say, is it not so that human nature is predicated of many beings, and that being so predicated, it must be in them? We have already said that human nature is in many beings, but that it is multiple; therefore, it should be said that a multiple human nature is predicated of beings. I ask you, when Plato is called a man, is the "man" that is said of Plato Plato himself or someone else? Obviously he is not being said to be anyone but himself. Likewise when Socrates is called a man, that "man" is none other than Socrates himself. Consequently, seeing that human nature suits these two cases, it is not one, but double. But, you will say, in such a case the statement "Plato is a man" will be a futile tautology: we will be attributing his identity to him. I reply that any statement, if it is to be true, must be a tautology since obviously nothing may be predicated of a thing unless it is identical to that thing or in that thing. The only tautological statement that is called futile is the one whose predicate designates nothing else but its subject, for example if someone said that Plato is Plato or that whiteness is white. When the predicate designates something broader than the subject, then the statement is not futile. And so, whenever someone says that Plato is a man, by the first word, "Plato," I understand only that particular being; but by the second word, "man," I understand the same being inasmuch as it shares similarities with Socrates, etc. And if someone says he is an animal, by "animal" I understand some larger category, and so forth.

You will press further, saying that if universals are only words or concepts, then whenever a universal is predicated of a particular thing, for example if it is said that Plato is a man, it will mean that the word "Plato" is the word "man," or the concept "Plato" is the concept "man." Such, in fact, are the objections usually made against the nominalists. By Hercules, they are wrong! When we make a statement, we do not put the predicate in the brute object itself, neither do we use names without having some things in mind. What happens is that the understanding

forms a statement and a predication concerning things as it conceives and names them. It does not conceive things in only one way, but sometimes particularly and separately, at other times commonly and together. Once it has formed the universal concept of a man from having seen Plato, Socrates, and others, and has named them both with the same universal noun because of the properties they share, then it applies this name and this concept to Plato and likewise to Socrates. Therefore, when someone says that Plato is a man, he does not mean that the word "Plato" is the word "man," nor that the concept of the individual Plato is the concept of man in general; he merely means that this particular being, which is conceived according to its particular characteristics and is called Plato may also be conceived on a more universal level because of its similarity to other beings and then may be designated by a more universal word, namely "man" although it always remains a particular being. Hence, all universality lies in the domain of concepts or words; but it is not true that one concept is another, or that one word is another, for both the concepts and the words are applied to the thing, and the thing is sometimes conceived and named in one way, sometimes in another. From this then we may understand that the sciences, and definitions, and other things of that sort are not to be discarded, as is frequently objected, as if there were in fact no reality beneath concepts or words. Besides, we will have more to say on definition, science, etc., later on in the section on eternal verities when we demonstrate how apparently absurd it is to assert that universals are eternal, incorruptible, everywhere, and so forth. But that is already too much on this matter. Let us not seem to imitate those who raise questions that are as numerous and wordy as they are vain and complex. If we wanted to touch upon these matters, a full day would hardly be long enough.

THIRD EXERCISE: THAT IT IS FOOLISH TO DISTINGUISH TEN CATEGORIES AS SORTS OF REALITY

Article Two: Some Aristotelians would reject this number if the authority of the master did not restrain them, for they see that more than ten questions can be asked about reality

It is certainly admirable that even some Aristotelians are persuaded by the truth itself to confess frankly that they see no argument that will corroborate this figure demonstratively. If you ask them then why it is defended with such great pains, they answer, "The authority of Aristotle and the philosophers binds us." Let them be bound as long as they desire; but we who make no more of the authority of Aristotle and the Peripatetics than of Plato and the Platonists or of Zeno and the Stoics, who propose another number—let us get to work, since we have begun, and examine briefly how weighty the reasons are that some find conclusive and others very persuasive.

First, they say that there are as many categories as there are questions that can be asked about a prime substance, such as Socrates. In all there are ten such questions. Of Socrates it can be asked: first, what he is, that is to say his *substance*; second, how large he is, that is to say his *quantity*; third, what sort he is, that is to say his *quality*; fourth, what is he related to, that is to say his *relation*; fifth, what he does, that is to say his *action*; sixth, what is done to him, that is to say his *passion*; seventh, where he is, that is to say his *place*; eighth, how he is located, that is his *position* (or posture, *situs*); ninth, what time he is in, that is to say his *time*; and tenth, how he is circumstanced, that is to say his *condition* (or state, *habitus*). Now I ask, when they call themselves philosophers, how do they dare foist off such a deduction as if it were an argument? They claim that all the categories are to be distinguished by their relation to the first, substance. But how can

they be the classes of things that are totally distinct if they have so strong a connection with one thing? Whatever the distinction between them may be and whatever their relations to each other, how can we find them out by asking these questions? Explain to me why more questions cannot be asked about this prime substance? For why is it not permissible for me to ask further about Socrates whether he exists, through what agency he exists, what he is the cause of, what he exists with, and so on? . . .

Article Three: The division between substance and accident is not correct

To destroy all these theories with one sword stroke I will omit the many difficulties to be overcome if we demand that they explain what absolute, relative, and mixed are, and what portion of the two others goes to make up the mixed, what "stems from matter" means, what "bring form to its completion" means, what it means to be in substance, or outside it, or partly in and partly outside it, and other such things. I will concentrate on finding out how adequately all things are characterized by these particular divisions, why it would not be right to distinguish them in other ways, and finally what is the rationale for all this. I omit those other questions, I say, for to pursue them would take more than a day's time.

Therefore I ask this one question: why they do not stop once they have divided being into substance and accident so that there would be just two general categories of things, one substantial, the other accidental, as seemed best to Xenocrates according to Simplicius. If they tingle with such yearning to subdivide, why not come to a rest when they have created the three general branches of accident, the absolute, the relative, and the mixed, making that many categories? (I could say the same for the other classifications.) Undoubtedly they want to go on subdividing until they reach the number ten, and that only

because it has been prescribed for them, for whatever other number had been prescribed they would have stopped at.[36] Therefore I ask you why I am not to be allowed to go on np to a hundred categories.

How easily you divide absolute being into quality and quantity! Why can't I just as easily divide quantity into continuous and discontinuous, and quality into possession, potential, and so forth as far as I want? In the same way, when you divide accident, as is your right, what is to prevent me, exercising my right, from dividing substance into corporeal and incorporeal? Among the incorporeal I shall distinguish as many categories as there are orders and hierarchies;[37] again, I will divide the corporeal into animate and inanimate, and I shall go on indefinitely. This is a slippery path and just as happens with those who have embarked on a downhill course, it is difficult to find a foothold when you enter the broad and open way of subdivision refusing to call a halt at the double crest of substance and accident. For why should one stop at the tenth step rather than at the twentieth?

I see what you will answer. You will say that one should make a subdivision as long as one finds unambiguous (*univoca*) classes,[38] that these ten are the primary classes, that any others that may be given a place somewhere between being and the categories are only analogues of the primary classes. But first, why are these ten unambiguous rather than the others? What! If it is true that the term substance may be attributed to all substances because the same term is applied to them for the same reason, that they exist through themselves, might not the term accident also be attributed to all accidents because the same term is applied for the same reason, that they exist in other things? And if the way of existing in other things is not the same for all accidents, since as they say, "to be separated from" is not the same as "to

[36] Aristotle himself gives varying lists of categories, and not always ten of them. It was the scholastics who canonized the traditional ten.

[37] Of angels, or intelligences, that is.

[38] Aristotle discusses the concept of "univocal" (the opposite of "equivocal") in *Categories*, I, i, 1a, 1–12.

be around," neither is the way of existing through itself the same for all substances, since some subsist in the presence of matter and others without matter. Now, just as this diversity which produces different varieties [of substance] does not preclude unambiguousness [in the category of substance], so the diversity of accidents should not preclude unambiguousness [from the concept of accident] even if it does produce differences. Obviously, the same general concept of accident applies whether to relation, or action, or some other and also to quantity, quality, and the others.

Next, why shouldn't [the term] absolute accident be attributed unambiguously to all absolutes?[39] Why should it be attributed only by analogy to quality and quantity? Say what you will, I observe the same analogy when it comes to continuity and discontinuity in quantity. For these two characteristics can be attributed no less unambiguously to quantity than quality and quantity can be attributed to absolute. I can show beyond a doubt that the term quality cannot be attributed unambiguonsly to its four species [sub-classes]. Especially since you claim that any unambiguous genus can be divided into two opposite differences. Yet in this case [of quality] the differences are neither two nor opposite.

Finally, let us imagine the example of an accident analogous to all accidents: why shouldn't it be the general category of all accidents? Wouldn't it be able to include them all? Or do you imagine that this analogy is gaping with holes and cracks through which certain accidents leak out? You insist on the word "unambiguous" wherever a quality can be attributed to all the members of a genus. But is it not true that an analogy, whether resulting from a proportion or from a [common] attribute,

[39] An absolute accident is one inherent in its subject and not dependent on the subject's relationship with anything else, sometimes called an intrinsic accident. The analysis of the ten categories produced the following distinctions: the first category, substance, is in opposition to all nine others, which are accidents; among the accidents quantity (matter) and quality (form) are absolute accidents; relation, the fourth category, is a relative accident; and the remaining categories are all mixed accidents.

implies a similarity or connection and dependence among its elements which would be sufficient to constitute a certain specific domain, just like a category? But enough said about such arguments.[40]

Article Four: Substance itself would have every right to complain that it is made sterile, like the other categories which are not given any real extent

I shall not mention that substance has every right to complain that it is considered all but sterile, despite the fact that it is the principal being and the subject of all accidents. On the other hand, accident, whose nature is so meager and weak, is given such fertility that from itself it produces nine daughters just as the nine Muses were born from Mnemosine.[41] It is truly surprising that accident, which hardly deserved a place at the feet of snbstance, raised her head until she even surpassed substance by producing nine babes in one birthing as it were, none of whom give way before substance in rank, since they are all supreme principles, and like certain noblemen, do not recognize substance's royalty bnt make up a single aristocracy with it. What is missing

[40] Amen. Gassendi's reasoning is particularly condensed here, and assumes his reader's familiarity with the scholastic exposition of Aristotle's categories. Briefly stated, his arguments are: (1) there is no general criterion which determines what distinctions are so fundamental that they produce categories. Substance is not broken down into different categories, but accident is broken down into nine. Gassendi finds reasons for breaking up the category "substance," and other reasons for restoring "accident" to the rank of a single category. (2) The criterion usually alleged, "univocity" (unambiguousness), is useless. If the categories "quality" and "quantity" are univocal, so also are the subcategories of quantity "discrete" and "continuous." Besides, a univocal class should by definition be broken down into two opposed subclasses, but "quality," which is univocal, breaks down into four subclasses that are not opposed. (3) Technical terminology excludes the possibility that categories exist by analogy (they exist univocally). But Gassendi sees that an analogy shares all the properties of univocation.

[41] Memory.

except that accident should believe itself blessed by such great progeny or should be taken for the model of the universe, just like

> Niobe, of all women I know
> Most blest mother, had she not boasted so.[42]

Actually, though, if anyone became acquainted with the ample domain of substance and then proceeded to the category of position, time, or another, alas, what a hovel he would find instead of a palace! Where he looked for the immense riches of substance, nothing but some paltry straws! Let us see the very most that the category of position can produce from its stores. Nothing more than these few words: to be seated, to be standing, to be lying on your stomach, on your back, above, below, behind, backwards, to the right, to the left. And what about the category of time? Here is its entire estate: today, tomorrow, yesterday, day after tomorrow, day before yesterday. The category of condition would be a little richer if it could beg or steal something from the tailors or armorers.[43] What truly fine categories! What admirable repositories of reality! Doesn't the man who has a command of them seem to you worthy of being entrusted with an imperial command? As for me, I shall wait before I shall profess that these ten supreme principles or genera of things are any great theory of reality. I thought that everything was to be laid out in such a way that under any one of the genera I would reflect upon all sorts of marvelous things. And yet at first I find nothing greater than what I used to hear as a boy when they listed the adverbs of time for me, "now," "today," "tomorrow," or the adverbs of place, "here," "there," "yonder." In the others, nothing but terminology from two or three workshops.

Then I see that all these genera remain so mixed together that all the categories can be enclosed even in a mite, since substance,

[42] Ovid, *Metamorphoses*, VI [155–156]. Gassendi's references are skimpy, occasionally cryptic. I have supplied the necessary precisions in brackets.

[43] In the Latin there is a rather limp play on the word *habitus* which is the term for both the category "condition" and "clothing."

quantity, quality, relation, act, etc., exist in it. Really, is it not amazing that things crowded together in such a tiny body are distinct? How renowned a market would be that could display such a variety of goods in so small a space! But you must not imagine the categories are like hamlets, cities, or provinces which you can leave with the expectation that you will immediately come upon another where all sorts of different marvels will be displayed. Indeed, if the categories had been genuinely distinct from each other, if they were to eliminate completely confusion concerning all things, this differentiation of things would have been so carefully observed that nothing belonging to one thing would have overlapped another. The Stoics seem to have seen this better and to have kept it in mind when they divided basic matter into corporeal and incorporeal.[44] It was substance that had to be divided into various classes. As for accidents, they are nothing more than the satellites of a particular substance. Just as the various classes contained various substances, so they contained the accidents proper to them. Enough space can be found in great mansions for the domestics without building separate palaces for them.

You will say that the categories are not considered essentially distinct on the grounds that they contain totally distinct things, but because they are based on different modes of conceiving things. All right; but that is admitting that the categories are not groups or classes of things but only of concepts (although it is impossible to have a group of concepts that are totally distinct). In fact, how can you conceive of an accident without having conceived of substance, or how can you conceive position or shape, which is a quality, without having first conceived quantity? and so on for the others. Whatever the case, you see that it is wrong to call the categories classes of things, essentially distinct from each other. Their entities are supposed to be wholly one and the same, and yet they make action and passion into two categories.

[44] Seneca, *Epistles*, LVIII [14]. (G's. note.)

Article Six: It is wrong to exclude God from the category of substance

To avoid going on *ad infinitum* let us skip over the rest, and in order to touch upon this difficulty about substance, let us consider whether the general run of philosophers are right when they exclude God from the category of substance. First, if God does not have a place in this category, I do not see how he can be listed among the causes in the *Topics*, in the class of accidents by grammarians, in the chain of motions by the physicists, and so forth. Which theory is sounder? If indeed God is really a cause—in fact, the prime cause—and therefore is rightly counted among the causes, then he is really a substance and must be counted among the substances —and in fact even as the prime substance; for obviously it is more reasonable to call God a prime substance than Socrates, Bucephalus, or this stone. Then just what is a substance? Is it not customarily defined as a being that exists through itself? And that is an adequate enough definition, unless you intend to deny that its opposite, accident, is adequately defined as being that exists in something else. Whenever I hear the word substance, nothing else comes to mind but being which subsists, or exists, through itself. Moreover, does not God, the thrice great, truly and properly subsist? Is it not true that he exists through himself? What am I saying? Isn't it God alone who truly subsists through himself, since he alone is independent, absolute, and continues immutably from time immemorial? Indeed all other things have no subsistence except insofar as they are ruled by him, "with a strong hand with a stretched out arm," as the Scriptures say.[45] And this is so true that they do not have the power to subsist for even a moment, but would return to nothing, or to the chaos of the ancients, if he were to withdraw his hand from them in the slightest. And who may not be legitimately astonished that the very thing that deserves the first and principal place in the category of substance, or of entities existing through themselves, should be rejected from the class of such entities?

[45] Psalm 136:12.

You will say that substance in general and inasmuch as it is opposed to accident may be adequately defined as a being existing through itself, but the *category* substance you define by adding one more word: a finite being existing through itself. This obviously follows from your condition that whatever is to be classified as a category is finite. Be that as it may, everything is all right if the general definition of substance may apply to God, for it constitutes the true category of substances, whereas what you want to define as category is not category but a part or branch of it. In fact, when you say that substance is finite, you are merely robbing substance of one of its species. Tell me what reason impels you to attach the condition "finite" to the category of substance, unless it is to be able then to exclude God from the category of substance? But give up that condition, and immediately you include God in this category without any problem. Why do you prescribe such narrow limits to category? Instead you should allow it the greatest possible amplitude. Otherwise you will be forced either to leave a great many things excluded from the category or someone else might impose conditions with equal right that, once imposed, would permit him to reject this or that feature from the category. In the end the category would be stripped bare and give rise to laughter on many sides. Note that following your example one man might impose the condition of corporeality, another corruptibility. And then why could they not legitimately exclude the angels and the heavens since they construct their hypotheses with as much right as you do? And if someone else should wish to assume the condition that categorical being must be inanimate, on what grounds will you object to him that he is wrong to exclude living beings? For just as you say that categorical substance is a finite being existing through itself, the first man will say it is a finite corporeal being existing through itself, the next a finite corporeal corruptible being, and the last man a finite corporeal corruptible inanimate being. Why shouldn't you be allowed your condition and the others theirs? For the qualities of finitude or infinitude do not make any greater modification in the theory of substance than do corporeal-

ity, or incorporeality, or any of the other conditions. Now I know that you can make that hypothesis or any other one, for who does not have the right to? But it is absurd to make conditions that are not necessary.

Article Seven: It is rash to imagine the categories like shackles which cannot be worn without endangering liberty

You will say that it is necessarily true that infinite nature resists being restrained in a category. Obviously you regard a category as shackles which cannot be worn without detriment to liberty. Don't you see that a category is nothing but our intellect's attempt to put into one class everything that can be understood by some one general concept? Or is it true that the intellect therefore puts bonds as it were on the infinite nature of God and so detains it against its will in a category. Or do you perhaps believe that a category is like a net with which our mind, like a second Vulcan, seeks to ensnare great Mars and hold him up to ridicule. When the intellect puts God in the category of substance, it does nothing more than to conceive him as a being existing through himself in the same way other substances are said to exist. If the divine nature is also infinite, does a concept of this sort detract from its infinity? Certainly no more than it confers infinitude on a stone when it considers the stone a being existing through itself. But if you accept such logic, why do you also allow God to take a place among the causes; for it is to be feared that he might lose his infinite immensity if he is included among them and another Briareus would be needed to tear asunder the chains in which he is held fast. By the same reasoning you should not tolerate a grammarian to class God (*Deus*) among the nouns since it confines him within the bonds of four letters, just as four walls enclose a house. One would have to conclude that men must not dare to give a name to the infinite since infinitude would be forced into some few letters or syllables. You must realize, my good man, that things themselves are not contained

by the categories, but only the concepts and names of the things. And so, while things remain finite or infinite in their nature, still we always express them in finite names or concepts. On the other hand, if you believe that things themselves are contained by the categories, kindly show me just where they are. Point out to me just where that category of substance is which contains the entire circumference of the heavens. Show me it somewhere in the universe with its separate little compartments in which it keeps one thing distinct from others. Believe me you will not find these categories above the heavens, nor in the center of the earth, nor in the ether, nor anywhere else. They should be considered only as something conceived by the mind, or expressed in words, or plotted out in charts the way Porphyry's tree is commonly pictured.[46] Thus we need have no fears for the infinite nature of God unless you claim that we should fear to conceive it or give it a name or write it down.

But, you will say, whatever is in a category must be of a limited nature, for it is either something individual or some common property. If the latter, it may be reduced to individuals by differentiation; if an individual, by that very fact it is reduced and therefore limited in nature. To this I answer that whatever is in a category is not necessarily limited by the mere fact of being in a category, but always retains its own nature, whether limited or unlimited; nor does it undergo any transformation because of the intellect's act of fabricating a category, but is merely considered as a thing distinct from others by virtue of the characteristic of that category. For this reason I cannot accept that whatever is in a category is by its nature limited any more than it is unlimited.

[46] Porphyry's tree, based on his *Isagoge*, II, 12, is a predicamental line going from the *summum genus* (most general category) to the *infima species* (most specific class, which can be divided into individuals only). It starts with substance, which is divided into corporeal and incorporeal; body (corporeal substance) is then divided into animate and inanimate; living (animate) body is divided into sensible and insensible; animal (sensible) into rational and irrational; and man (rational) can be divided only into individuals such as Socrates, Plato, etc. Socrates then is a rational, sensible, animate, corporeal substance.

Moreover, I agree when you object that it must be either something individual or some common property; but at the same time I strongly deny your contention that neither of these can be infinite. First, many learned men of great reputation admit that an infinity both of number and of extent can exist through God's will. For can one not divide quantity into two species, as it were the finite and the infinite, and cannot the infinite subsequently be divided into infinite extent and infinite number, thereby giving us something that is common to both? Second, does it not follow from this that we can also discover in quantity something individual that is infinite, for example a certain infinite line? And do not say that this is not infinite according to its essence, but only according to its extension, since whatever the weight of your objection (of which more later), it is sufficient that we already understand that it is not inconceivable for something individual or some common property existing in a category to be infinite at the same time. Likewise, when you speak of something being reduced, we do not imagine a reduction of infinity, as if an infinite line relegated to a category were reduced to a point. No, all we mean is that our intellect conceives something infinite as distinct from other things. And to reduce a genus by differentiation is nothing but to conceive the species belonging to a genus already conceived. To reduce the genus of infinite quantity to infinite extent is nothing but to conceive this very infinite extent as totally distinct from infinite number which also falls under the genus "quautity." What other "reduction" takes place? Or what is that press by which you believe the genus is squeezed when it is reduced by differentiation?

Article Ten: The essence of quantity is external extension

To continue, let us now turn our attention to the famous difficulty concerning the essence of quantity. Our philosophers explain it so well that nothing could be more obscure, though

nothing would seem to be more obvious than quantity. However, I must confess that the mystery of the Encharist, as our faith conceives it, may cause some difficulty in this matter. But if we snceed in preserving the nnfathomable mystery intact and yet still retain a clear notion of qnantity, what reason would there be for not adopting such a theory? First then, since it is generally admitted that the essence of quantity lies in extension (the difficulty arises concerning continuous and corporeal quantity), it seems to me that this extension is nothing more than what our eyes behold, which is usually studied, measured, and divided in terms of length, width, and depth, and which, conversely, is of such a nature that an extended thing becomes commensurate with its place, so that for each of its parts there is an exactly corresponding part in its place. That is quite a mouthful; but if you want it in a few words, I shall say that the essence of quantity is nothing but its "external extension," as it is called.

To prove my point, I ask you just what else we have in mind when we hear the noun "quantity" except this sort of extension. Others geuerally distinguish it from another extension, called internal, which, they say, constitutes the essence of quantity. According to them, the sort of extension that we are championing here is no more than a property of their extension. But yet I ask, in the name of immortal god, what kind of thing is this internal extension? They say that it is the position of the parts in relation to each other and separate from each other; for example, in a man the head has its position separate from the neck, the neck separate from the breast, the breast separate from the arms, etc. Furthermore, from this relative position is derived the property, which consists of the position of the parts separate from each other in relation to place, which is what we call extensiou. Now when they posit these parts separate from each other, they also must admit that these parts either are or are not commensurate with location.

In the first case, the two concepts are equivalent, and that is our opinion. In the second case, they have no real extension and therefore no quantity. Here they make no excuses, they simply

state bluntly that these two extensions can be separated in such a way that external extension is eliminated and internal extension remains.

You might ask: is it not possible to strip a body as large, say, as a mountain of its external magnitude until the whole mountain becomes concentrated in a point and still retains its internal extension, hence also its quantity? This is just what they profess and defend as they would their gods and their homes. Truly now, I ask you in good faith, can you conceive of some sort of extension in a point? of some magnitude in something with no parts? You will say that there still remains an extension of the parts in relation to each other, but how can there be a relationship between the parts where there is no difference at all between up and down or any other position? The parts, you will say, have a relationship between themselves, but how is this more likely than that they are all jumbled together since they have been merged into so narrow a space? You will say that the top of the mountain is still separate from the middle and the middle from the base, but how can this be when the top, and the middle, and the base and all the other parts are all together in an atom?[47] You have no way to explain how you can say that the top is here rather than the base, or the middle rather than the top. You keep reverting to the argument that this is due to the fact that the mountain has no position of its parts in relation to location. But take my word for it, you cannot have any extension of parts in relation to each other without having the parts so arranged that one of them occupies this part of location and another occupies that part; and so if you removed that extension by position related to place, the parts could not retain any order among themselves, but would inevitably be thrown into complete disorder. You may seek other recourses all you want, and I will grant you the victory in that exercise; but whatever idle chatter you find, I doubt that you will persuade anyone who examines the question seriously that

[47] Here and in the next section the word "atom" is not used in the Democritean sense that Gassendi will adopt later; it designates a dimensionless point, not a physical atom.

it is possible to find any magnitude, extension, or quantity in a point.

Article Eleven: Our orthodox faith teaches us that the species of the Eucharist is not like this

You object: what are we to do if our sacred faith requires us to believe just that?[48] If it really does, then I will immediately and wholeheartedly maintain as much, not that I can perceive any shadow of quantity here with my natural faculties, but because I have steadfastly determined to cling to whatever orthodox faith dictates without dwelling on anything that may seem incredible or ridiculous. But otherwise, if the sacred faith has not prescribed this, why do you want me to burden myself with a yoke which it would be far preferable to remove? Why do you wish me to nail a cross on my intellect needlessly when it is enough to bear it in cases where belief is required? You say that we are obliged to believe that Christ's body exists under the species of the Eucharist with exactly the same quantity that it has in heaven, so that if it is five feet tall in heaven, it must be the same in the tiniest fragment of the host. Come now, how do you prove that? Do you have a

[48] On October 11, 1551, The Council of Trent made transubstantiation official Catholic dogma, thereby taking a stand strongly opposed to the various Protestant theories of the miracle of the Eucharist. The theological implications of this doctrine had been long since worked out by its supporters and opponents in the Middle Ages. The entire body of Christ is totally present at the same instant in heaven and in every smallest morsel of host on earth. Concepts such as "internal extension" and "entitative parts" had been created to account for this miraculous phenomenon. Gassendi does not deny the miracle, but he rejects the explanatory concepts as useless and unintelligible, and an actual hindrance to clear thinking outside of theology, especially in physics. Though not necessarily unorthodox, such a position was open to severe criticism. Later Descartes was to be frequently challenged on the basis that his definition of extension (not very different from Gassendi's) was incompatible with the dogma of transubstantiation. It is conceivable that the ideas expressed here led some of Gassendi's friends, like Mersenne, to caution him against publishing the second book of the *Exercises*. Pintard, of course, finds in them evidence of Gassendi's free thinking.

council, a decretal, or any other pronouncement of the Church at all with which you can persuade me that I am bound to believe that? There are councils which declare that the true body and blood of Christ is genuinely contained under the species of bread and wine in the sacrament on the altar, and which also pronounce anathema most explicitly on anyone who denies that the body and blood as well as the soul and divinity of Our Lord Jesus Christ is truly, really, and substantially contained in the sacrament of the most holy Eucharist.[49]

Accordingly, I subscribe and consent to these decrees. You may be sure that I confess that this sacrament contains the true and real substance of the body of our Lord, which the councils teach me is contained substantially and through transubstantiation. But why am I bound to believe that the true quantity of the body is also contained there when no council has said that it is contained quantitatively? On the contrary, I would maintain that we seem instead to be constrained to believe that there is no quantity of the body of Christ present there, that it has taken its position in an atom, that it is present just as invisibly and indivisibly as are purely spiritual, incorporeal beings lacking all quantity, that the difficulty and sublimity of this mystery lies most of all in our astonishment that the substance of such a body can be stripped of its extension and cease occupying a perceptible place. You will say that as long as the councils declare that the body is there substantively, we must infer that it is also there quantitatively since corporeal substance implies quantity as a corollary. Well now, if you are going to speak of implication and natural corollaries, must we not also infer the equally necessary presence of external extension and the occupation of space and the like? But since we must admit that supernatural power removes something which natural inference tells us would be necessarily present, why should that something be anything but quantity, especially when the substance does not have the extension of a body and quantity need not be considered the necessary con-

[49] See the Lateran Council under Innocent III, on the Catholic Faith, canon I, and the Council of Trent, Third Session, canon III. (G.'s note.)

comitant of the substance of such a body.[50] Indeed, the intellect is much less dismayed at believing that in this sacrament the substance of a large body has been reduced to an atom which being deprived of its quantity is also deprived of extension than at believing that while the substance retains its quantity, it continues to be sitnated in an indivisible point. You will object that one must not deny God the power to preserve quantity without external extension, but it is not a matter here of what is possible or impossible, but only of what actually happens. And since it is permissible to affirm, in agreement with a great many learned men, that substance can be preserved without quantity by divine act, why then shouldn't I make this assumption?

Again you will say that the body of Christ the Lord is not present in the Eucharist without a head, arms, and other limbs. How am I to understand these limbs without any extension and therefore without any quantity? How am I to maintain that this does not produce something totally homogeneous, wholly without distinct organs or an organization of its parts? How shall I imagine shape, color, and other such accidents that are associated with quantity? Fiually, how am I to conceive anything at all, except some preposterous and monstrous being? But these objections that are raised specifically against us must also be raised, it is generally agreed, against the coexistence of all parts of the glorious body in a tiny space which is exempt from any perceptible extension, differentiation, dependence, and organization.

I shall skip over what you might reply from the teachings of many philosophers, namely that beyond all this there are still the entitative parts which compose a substance without the aid of quantity and which can answer adequately all the difficulties raised above. I shall pass over the further claim that in them can be found all the genuine parts belonging to substance, but that

[50] Gassendi's argument is that as long as we know from dogma that extension is absent, why not admit that quantity is also absent? The miracle is then reduced to its simplest terms, namely that substance is present without its usual accidents. To insist that quantity is also present is to reduplicate the miraculous unnecessarily.

they do not have the extension, differentiation, and so forth which they have in heaven, that they are not precisely the same here as they are in heaven as far as their quantity and other such properties are concerned. Since this mystery surpasses the capacity of the human mind no matter how you consider it, it is best to refer anything miraculous and inconceivable in it to divine will and omnipotence. In fact, how could this sacrament be called wonderful if we could ferret out its mode of being? Do you suppose that using common sense will help you understand any better how there is no confusion of the parts of the body here when they are every one of them in every part of the host, just as if the head and the shinbone were in the same quarter? Now I do not see how that can be understood in either of these ways or in any other way, and so I believe that I ought merely to worship the incomprehensible power and majesty of God, the author, as I believe, of such great works which I am incapable of understanding and delving into. The body and blood of Christ the Lord is present in the mystery of the Eucharist; that is enough for me. Just how they are there, sitting or standing, doing what, etc.—this I confess I do not know and I do not wish to inquire into from reverence for the faith. I know only this, that the body of Christ is there, and in whatever way he wishes. How should I deny divine power the capacity to exist there in innumerable ways unknown to me? But, God willing, we shall have more to say on this subject elsewhere.

FOURTH EXERCISE: THAT MANY FUTILITIES ARE PROPOUNDED ABOUT PROPOSITIONS

Article Four: The same is true of the propositions called eternal verities

Now it is a fact that they teach that the statement "Man is an animal" is endowed with eternal truth because the verb, or the

copula, "is" joins man to animal with such necessity that the bond is insoluble even by divine power. Hence they also teach that this statement "Man is an animal" has been true not only from several thousand years before men inhabited the universe but even from eternity itself. I willingly grant that this belief can be pardoned in Aristotle, who believed the universe was eternal and likewise agreed that men had existed from eternity; but what legitimate excuse can there be for us, however, who believe that both the universe and mankind have existed for only about six thousand years and who profess that outside of God absolutely nothing has existed from eternity?

Besides, listen to this. Just how could the statement "Man is an animal" have been said to be true when no men existed? Indeed, if no men existed, then they were not animals either; for in order for them to be animals, the men also had to exist. Consequently, if it were false to say "man is" and therefore false to say "he is an animal," it would have been just as impossible to speak the truth by joining the two into "man is an animal."

First of all, you will say, in statements of the second order (*de secundo adjacente*) some existence is in fact being designated, for when we say "man is," our meaning is that man exists, or is in the universe *de facto*, produced so that he lives independent of his causes. But in statements of the third order (*de tertio adjacente*) no existence is being implied but only the coupling of an attribute with its subject, which may be either necessary as when we say "Man is an animal," or contingent as when we say "Man is just." However, it is just as true that statements of the third order assume the same form of existence or at least indicate it tacitly, as that statements of the second order clearly and distinctly imply the existence of the subject. Surely you cannot say that man is anything unless you assume that man exists; and every time you use the verb "is" to predicate an attribute of a subject, it is impossible at the same time not to indicate that predication is taking place, and therefore that there is existence present. Come now, if you do not assume and conceive the subject as existent,

just what will you say can be attributed to it in actuality? You say that the attribute is bound to it and applies to it, but how can anything be bound to or apply to a subject that is nothing? I grant that "is" is the copula, but how can it connect the terms if they do not exist? But as long as it is nothing else but the sign or mark of the copula, how could it designate something not present or not existent when by the very nature of its own meaning it is the sign of the presence of something?

Again, you will say that all that is indicated here is the inseparability of the subject and the attribute; hence, the meaning is no more than that whenever the subject exists, it will be true that the attribute is bound to it. Consequently, before the creation of the universe the statement "Man is an animal" was also true in that it indicated that man was so bound to animal that it would be impossible for any man to exist one day without his being an animal. But in that case it would have been necessary to wait for the subject, namely man, to exist for the statement to be true. Otherwise, one would have to say "man will be an animal," and not "man is an animal."

But this present tense is so endeared to the hearts of these men that they refuse to call statements about the future or the past true unless they can be resolved into a present. And in fact you will answer that they are not true unless they can be resolved into a present. And so, just as the statement "Plato taught" would be true only because it ouce was true to say "Plato teaches," so the statement "The Anti-Christ will be the son of perdition" is true because one day it will be possible to say "The Anti-Christ is the son of perdition." But then why should you be allowed to speak that way while I may not likewise claim that a statement in the present is only true because it can be resolved into one about the past? Actually, why can't it be said that the statement "Louis is king" is true only because one day it will be possible to say "Louis was king"? Do not tell me that the truth of a thing depends primarily on its actual existence, for I will object that it depends more on its possible existence since its possible existence is prior to its actual existence and since there are many possible

things which in fact lack existence whereas there is nothing that has existence which is not possible.

Let us grant you your resolution into the present tense; won't you then believe that you may conclude that as there are distinct times and as things belong to distinct times, so the term "will be," "is," or "was" must be chosen in order to establish the truth of a statement, and the statement "Adam is eating of the tree of life" is no less false than the statement "Plato will be Aristotle's teacher"?

Finally, you will ask, do we not ordinarily use the present tense whenever it is a matter of the essence or real property of a thing, even though the subject does not exist? For example, in the dead of winter, we would answer anyone asking what a rose is that it is a flower; or in the heat of summer we would answer anyone asking what snow is like that it is white. I certainly do not deny that such sentences are everyday occurrences; but still, their general meaning is nothing but that such things ordinarily have those qualities when they exist. For when someone says "a rose is a flower" at a time when no rose exists, it is tantamount to saying "a rose is a flower when it exists." And unless this was his meaning, the statements would be false. You will object that it makes no difference if common sense makes no other claim. I will reply that our debate then is over words, but yet I am afraid that common sense may not accept such a relationship to existence. For, on the one hand, individual existing things are not permitted in statements endowed with eternal truth; and on the other hand, it is claimed that the statement "a rose is a flower" is true whether any rose exists or not, and they declare that "man is an animal" was pronounced from absolute eternity and was true without any consideration of future existence. But I shall have more to say on these matters in the Metaphysics when I debate against the eternity of essences, for that subject is closely related to this.

FIFTH EXERCISE: THAT PROOF, AS IT IS COMMONLY DEFINED, DOES NOT EXIST

Article Four: Nor is there any "difference" in the Aristotelian sense of the word

Let us speak now of difference, and at the outset let us propose this paradox, that "if we knew the difference of the least little thing, we would have an intimate knowledge of everything in the whole universe." Some people will perhaps assume that everything can in fact be known with an intimate knowledge, but our concern will be to prove the cogency of the reasoning. Because of its difference, every single thing differs from every other thing in some way, either by reason of its specific difference, or by reason of its generic difference. But it is still always true that in every single thing there is something by which it is separated from everything else. Therefore, if we are to know the difference of a thing perfectly, we must know everything else perfectly. For if there is something we do not know, or if we do not know it that well, how shall we know whether the thing in question differs from it, and how it does. Might it not be true that the things which are concealed from us tend more to bring things together than to differentiate them? Surely we cannot say that such-and-such is the difference between this thing and that unless we know that there is something lacking in that thing which can be found in this. But how are we to know that something is lacking in that thing unless we have delved into its very most inner recesses? For example, take man; it is certain that he differs in some way from everything else in the universe. You designate the fact that he is rational as his specific and sufficient difference, and you say that man differs from all the other animals because of that fact. That may well be, but in order to distinguish him adequately from all the other animals you must know every animal intimately and perfectly. For if some qualities lie hidden from you, how can you know that that fact is the legitimate and sufficient difference?

You will say that you know it because all other things must be irrational. But must they really? and why must they? Could it be either that you are lazy or that you are groping blindly as you try to know them? Pray, is there any other reason? Unless, perhaps, you are an incompetent wretch absolutely without reason who goes about dogmatically prescribing what the nature of so many animals must be when you have not seen them, or heard them, or had even the slightest hint of acquaintance with the greater part of them. We shall examine elsewhere whether there is reason and thought in other animals besides man, and we will show that it is likely that they do in fact reason. At present it suffices to refer you to your own Aristotle, Book II of *On the Soul*.[51] There the famous statement is made that whoever posits the difference between any two things knows them both according to their own nature (as it is phrased in the schools). To apply this to you, when you name the difference between man and an animal that inhabits India you must know not only man but also that animal according to its own nature, that is, according to its inner special being.

But, whatever the case with animals, do you not admit that man differs from every plant, stone, metal, mineral, element, from the heavens, the angels, from all mighty God, indeed from every sort of accident, quality, quantity, relation, and the like, which are infinite in number? By the same reasoning, then, you must know all these things perfectly; for unless you penetrate the nature of each and every one of them, how will you know that there is something in man that differentiates him from them? Or will you perhaps make some hypothesis about the things that he shares in common with them?

But, not to linger too long over this, let me ask something else: how do men arrive at a knowledge of the differences? Obviously they cannot get to know them except by the intermediary of the senses, which may provide an account of the

[51] Text 146 in Latin. (G.'s note.) This is a reference to the 1560 Venetian edition of *On the Soul*. Rochot points out that Gassendi seems to have made an error here as the text in question is on a different subject.

common difference from an induction based upon the canvass of every single individual case. But besides the fact that every individual case cannot be passed in review and therefore no absolutely reliable universal statement can be made, as we shall make clear a little later,[52] and besides the fact that all knowledge derived from the senses is unreliable (as we suggested a little while ago)[53] and therefore obviously no certain knowledge of the difference can be achieved through their operation, besides these facts, is it not true, even according to Aristotle,[54] that the senses are limited to the perception of accidents only? How then will they be able to penetrate as far as the difference which is part of the inner essence?

Perhaps you will say that the differences between things are known by the understanding and not by the senses. But since according to the same Aristotle there is nothing in the understanding that has not first been in the senses,[55] just how will the understanding be able to peer into something that has not passed through the senses to it? And do not say that the essence slips in undetected underneath the accidents. For if it slips in secretly, then the understanding must subsequently unveil it in order to recognize it; for otherwise it would never lay hold of the difference, disguised as it is, except by the merest chance, as they say. But if, after dispelling all phantoms, the understanding is capable of knowing the differences between things, and therefore their essences, I ask you why either the difference or the essence of such things as the magnet, the electric eel, and the like remain unknown? Is it not true that that difference or essence, lying concealed under the accidents, very rarely makes its way into our senses? But why speak of those things? Have we yet learned the essence of any other natural being, even the most familiar ones,

[52] In the following article.

[53] In Article One of this Exercise, omitted here. This subject will be taken up at length in Articles Two and Five of the Sixth Exercise.

[54] Though this statement is not explicitly made in Aristotle, as far as I know, it may be deduced from passages such as *Metaphysics*, II, iv, 999b, 4 or *On the Soul*, II, xiii, 424a, 17.

[55] Again only deducible; see the *Posterior Analytics*, II, xix, 100a.

like the horse, the dog, the apple, the nut, iron, or a pebble despite the fact that their accidents have always been so well known? Just because you have often seen a horse running and whinnying, can you explain the principle of the act of running or whinnying? I am not asking how the whinny is formed, what provokes the act of running, how the internal power is applied to the organs, and why such an action results from such an application; I am merely asking what you imagine to be the nature of a horse's soul, or its substance. How thick or how rarefied is it? How does it reach and then penetrate so many different parts? How does it bear sensation to them? or images? In addition, why does this soul require a certain type of head, a certain type of feet? Why does it get along comfortably without kidneys, a bladder, and the like? Why does it prolong life just to this age, and not further? And a host of other questions which anyone may ask. I seek the same answers concerning an apple: namely, what is the force that first drives roots down from such a little seed and thrusts upwards a trunk and so many different branches, which then bears nourishment to the utmost branches with such great providence and distributes just enough to each of the parts with such great skill, which forms green leaves, and flowers, some red, some white, and all from the same uniform substance (so it would seem), which creates leaves always on the same model and with the same form and number in their venation, always shapes its flowers in the same pattern, produces fruit of the same form, with a certain skin, and so many seeds, with a pedicule attached in a manner quite different from that of pears, and an infinity of such things. Scan one by one all the works of nature, and I will stake my life that you will be seized with stupor before the great miracles you will find in the least little things. . . .

You will say that we are not ignorant of the differences of all things, for we know the difference of at least one thing, man, namely the fact that he is rational. But, in the first place, you will be right to say "at least," for you are reduced to such straits that you cannot assign a difference to any other thing, not to terrestrial animals, nor to birds, nor to fish, not to plants, or fruit, or trees,

or metals, or stones, or liquids, or meteors, or elements, or stars, or angels, or any single thing. To be sure, you cannot describe any other thing in any way except by its properties or accideuts, as when you say the horse is an animal that whinnies, that is born to run, and so forth. If you can give only man's definition in terms of essence and difference, how poorly furnished your mind is! And then do you believe that this difference of man will give you knowledge of the inner nature of man? First let me know what it means to be rational, other than to be able to reason and to make use of reason. Therefore, that rationality of yours is either no more than a capacity or a faculty and characteristic of man, like the faculty of laughing (or "risibility" as they say), or like the faculty of whinnying in a horse, and so forth. Consequently, it does not appear to be part of his inner nature.

But let us grant that it is in one way or another. Do you know what it is? Surely this rational principle or origin of reasoning is nothing but the soul. But do you know the inner nature of the rational soul? Do you know how it is created? what its substance is? what sort of existence something without corporeality can have? how it is joined to the body when it is a spirit? how it is affected by the body? how it gives rise to physical action? how it is spread throughout the body? how it is entirely present in the whole and in every part too? how it is not divided, but remains intact in the rest of the body when a member of the body is cut off? how something so insubstantial can move such a thick mass? how it stimulates certain parts rather than others? why a certain shape, size, number, or order rather than another? how does it give rise to vision, the most delightful of all things? in short, since it is incorporeal, how does it know corporeal things? how are those *species* formed which they say are transmitted to it, and what are they like?[56] how does it apply itself to them and make use of them? how does it understand things or give rise to the act of understanding? how does it know absent things? how does it

[56] The word *species* is being used here in the technical meaning given it by medieval Latin. It is the sensible image that emanates from an object to the sense organ that perceives it.

remember things from the past? and forget others? But why do I linger over these matters as if I thought you had some means of grasping them? Alas! such is the fate of our condition. That fine soul, which claims boastfully to know everything does not even know itself! But I will discuss that at length elsewhere.

Now, what is more to the point at present, I would ask you only this: how do you believe that man's nature could be made comprehensible to a simple man untrained in your philosophy merely by telling him in a few words that man is a rational animal? I shall pass over in silence the number of things that would have to be explained to him about the term "animal" since the nature of an animal is no more known than is man's. What great obscurity do you think lies waiting before him when he asks what you mean by "rational"? There will be so many words to unfold and so many questions on each one of them that a fnll day will not be enough for him, and the light will fail you.

And you must not tell me that once a definition has been arrived at there is nothing more to be sought. Since you might use some word, either unintentionally or because you have become accustomed to it, that I may not understand, why don't I have the right to ask you further about it so that I may understand the very same thing you understand? especially in this subject where it is so difficult to explain in one word or in several such abstruse matters as what kind of essence it is that remains the same, but mnst be recognized as the cause and the root of so many properties, among them reason which is the source of these properties or the base to which they cling, and so on.

Moreover, why should I think that those few words that are claimed to be necessary and sufficient for a definition are clear and comprehensible? Dialecticians insist that one of the rules of definition is that the definition must be clearer than the thing defined.[57] Let us see just how well they obey this precept. I shall choose one example. Let the subject to be defined be motion. Here is the Aristotelian definition that is usually given for

[57] Book VI of the *Topics* deals with definition; Chapter iv handles clarity of terms.

motion: "the act of a being in potentiality insofar as it is in potentiality."[58] Great god! Is there any stomach strong enough to digest that? The explanation of a rather familiar thing was requested, but this is so complicated that nothing is clear any more. What man, pray, no matter how unschooled, does not conjure up some intelligible idea of motion the minute he hears the word? Is there any man, no matter how acute or sharp a philosopher he may be, who could guess that this is the definition of motion—unless he was forewarned you would be speaking about motion? Need I say how outstandingly the nature of motion has been explained when "act," "being," "potentiality," "insofar as," and "in potentiality" are left in need of definition? And while you expound these particulars, there will be particular parts of the definitions requiring further explanation, from which will follow the need for giving more definitions *ad infinitum*. I shall add just this: in my opinion, when you want to reach a stopping point, it is far better to take your stand at the first, simple understanding of a word than to proceed into never-ending digressions and circles. When Democritus saw some philosophers arguing among themselves over the question what is man, he qnite rightly used this definition, which is found in Empiricus: "man is what we all know he is."[59] . . .

Article Five: No universal proposition can exist

Now, inasmuch as the foundations of proof are held to be universal propositions, our task is to show that it is impossible to demonstrate conclusively the universality of any proposition or to

[58] *Physics*, III, i, 201a, 10–12. This famous definition, frequently ridiculed by "new philosophers" such as Gassendi and Descartes, was intended by Aristotle to define change in general, not just local (physical) motion. Hence its intricacy and generality. The Loeb Classical Library translates "we can now define motion or change as the progress of the realizing of a potentiality *qua* potentiality."

[59] *Against the Mathematicians*. (G.'s note. See *Against the Logicians*, I, 265; also in the *Outlines of Pyrrhonism*, II, 23.)

regard any proposition as universal. First then, if there is any universal proposition, it cannot be arrived at by any other way than induction as is clear from the previously cited passage of Aristotle in Book I of the *Posterior Analytics*, from another in Book VI of the *Ethics*,[60] and from other passages. And besides, the point is obvious. But no universal proposition can be arrived at by induction because it is not possible to pass under review beforehand and enumerate every individual case, by reason of which the proposition may be called universal. The reason for this is simply that the individual cases are innumerable, which is why Porphyry teaches that it is futile to undertake enumerations of individual cases.[61] Hence, if you wished to establish by induction some proposition, for example "Every man is an animal," who would not realize that it is in fact impossible for you to pass under review and enumerate every individual man, not only all those that may exist now, but also all those of the past, of the future, and all those that could ever exist?

Do not reply that the individuals are not innumerable in all species, e.g., the sun, or the phoenix, and that consequently the task is not impossible in every case. Concerning the sun, since it is a unique case in the universe, you would be wrong to make a universal proposition, snch as "The sun is luminous." If you said that several suns could be made by divine power and that this proposition can be established in respect to these possible suns, you would fall back into the difficulty that you were attempting to avoid since the possible suns are numberless and you do not know how many different types of sun God could create just as he created individuals of other things in infinite diversity. As for the phoenix, if you assume that what is reported about it is true, inasmuch as there are several phoenixes, one after the other, their very nature makes an infinite number of them possible, since the universe could continue for an unending time in the

[60] Earlier Gassendi had referred to Chapter xxvi to corroborate three points; *Posterior Analytics*, I, xviii, 81b, 2 speaks specifically of induction. The other reference is to the *Nichomachean Ethics*, VI, iii, 3.

[61] *Isagoge*, Chapter II (by extension).

state it is now. Thus you fall into the same difficulty sooner or later, and so on.

I am fairly sure that you will have some answer since you must obviously despair of ever being able to pass under review all the individual cases of even one such genus and yet you spout so many universal propositions about man. You will say that it is not necessary to pass under review all the cases in the enumeration, but to pass under review a certain number of cases is entirely sufficient, for Averroes states that there are even some propositions for which two or three particular cases suffice. But how can you conclude for all cases from two, from three, from a certain number, or even from a great number of cases? You will ask why I will not conclude that a certain property exists without any doubt in other individuals if I have recognized it in two, or three, or even a great many more individual cases. Why shouldn't you come to that conclusion? For the very good reason that even if these few that you have passed under review agree in sharing some property, there may be innnmerable others which are different in this respect. And how can you know that this could not be so since you have not passed under review all the cases? Why shouldn't you come to that conclusion? Because yonr reasoning is exactly the same as if yon had seen three, or four, or a hundred, or even many myriads of Europeans with fair skins and light complexions without ever having seen any Ethiopians and had concluded that all men are white.

Besides, what will you reply to Aristotle himself when in Book V of *On the Generation of Animals* he takes Democritus to task for not having noticed all the different cases when he discoursed on teeth that fall out and those that are permanent. "For," he says, "if a man is to discuss a matter in general, he must speak of all the cases."[62] And then in the fourth book of *On the Parts of Animals* he openly condemns people who reach general conclusions on the grounds of knowledge of a few things.

[62] *On the Generation of Animals*, V, viii, 788b, 20. There does not seem to be any specific passage of *On the Parts of Animals*, IV, behind Gassendi's next remark, though the book frequently mentions the need of adequate sampling.

Indeed, how wise Aristotle himself would have been had he always heeded his own rules! For example, in Book IV of *On the Generation of Animals* he writes, "No animal is endowed with more than one heart."[63] But later his disciple Theophrastus wrote that there were two hearts in the partridges of Paphlagonia and we know for a fact from the dissection of the wolf known as the lynx that it has two hearts too. Therefore, Aristotle should have known these species of animals; for if he had known them, he would not have established his universal proposition, just as he did not dare declare that every animal has only one liver since he had heard that the Bisaltae hare had two.[64] Likewise, although he had first believed that all fish had serrated teeth that meshed like combs, he made an exception in Book II of *The History of Animals* and in Book III of *On the Parts of Animals* for the parrot fish among all the others once he had seen it.[65] Now, could Aristotle see all the other species of fish as well, with their different characteristics, so that there could not by any chance be any others whose teeth were not serrated? Indeed, Athenaeus is eloqnent when he says "I am amazed at Aristotle, so celebrated by learned men. What care, what diligence, or what Proteus, what Nereus rising from the depths of the sea taught him what the fish do, the way they sleep, what their food is, etc.?"[66] In fact it seems to me that Aristotle never spoke more cautiously than when he made the "as far as we know" proviso in Book II of *The History of Animals* after asserting that no animal has an nncloven hoof and at the same time a cloven one.[67] But, passing over such

[63] Book IV, iv, 771a, 4 says no animal is born without a heart; 773a, 10 gives the general principle.

[64] *On Marvelous Things Heard* [122]. (G.'s note.)

[65] *History of Animals*, II, xiii, 505a, 28; *Parts of Animals*, III, i, 662a, 7.

[66] *Deipnosophists*, VIII, xii [352 d–e]. (G.'s note. Modern versions read "how they pass the day" for "what their food is.")

[67] *History of Animals*, II, i, 499b, 14 (see also *Parts of Animals*, III, ii, 663a, 30). At line 14 Aristotle says that the solid hoof is continuous and undivided, which may be what Gassendi has in mind. Rochot suggests that he has a faulty memory of Aristotle's comment three lines later that no animal with an uncloven hoof has two horns.

remarks, I ask you which of us would not subscribe at first glance to the often repeated statement "Every crow is black," if Aristotle had not written that he had seen white crows and if Caelius Rhodiginus had not reported that the King of Sicily had sent a white crow to the King of England in his lifetime?[68] Who would not accept the statement "no animal moves his upper jawbone," if it had not been observed that this is untrue of the crocodile?[69] And after having seen the dissection of a thousand animals, who would not accept the statement "Every animal's liver is on the right and its kidney on the left," if Aristotle himself had not also left a written record of having seen the opposite?[70] Who would not believe that all birds, especially the larger carnivorous ones, were born from sexual intercourse, if Varro, Columella, Pliny, Saint Ambrose, and others had not written that vultures are formed without masculine semen?

But what need is there to remind anyone of more examples in this matter when either reading the authorities or his own observation can furnish any man with innumerable examples of marvels which show clearly how dangerous it is to pile up universal propositions? From all this I draw only one conclusion: that a universal proposition falls down and is false if one single case contradicts it. For example, you will surely tell me that this universal proposition is true "Every man is a biped." To be sure, Porphyry says that it belongs to every man, albeit not to man alone, to be a biped.[71] And yet if I refer you to no other example than that little one-legged girl whom we saw not so long ago in our Provence, doesn't your universal statement collapse? You may say that she was a monster; you may say that one swallow does not make a spring; you may say whatever you want; still it is enough to make your universal declaration false if one single

[68] *On the Generation of Animals*, V [vi, 785b, 35]. Rhodiginus, *Antiquarum lectionum* [Vol. II, Chapter 17]. (G.'s notes.)

[69] *Parts of Animals*, II, xvii, 660b, 27 and IV, xi, 691b, 5 or *History of Animals*, I, ii, 492b, 28 and III, vii, 516a, 23.

[70] *History of Animals*, II, xvii, 507a, 20 and I, xvii, 496b, 19 or *On the Generation of Animals*, IV, iv, 771a, 10.

[71] *Isagoge*, IV.

case contradicts you. Again, how can you know whether one, or a few, or a great many cases contradict your universal scheme unless you have passed them all under review?

I shall overlook those eulogies that are conventionally accorded to the rules of demonstration. From the fact that a proposition is universal it is said that it is necessary, true by itself, in all instances, eternal, and so forth. And yet these praises are every bit as empty as is universality itself. They are called first truths, better known, more true, the source of conclusions. But who does not see that these praises belong more appropriately to particulars than to universals? They are called prime, immediate truths, valid by themselves—immortal god, what nonsense is not spoken about them? Give me just one example of a proof whose principles are resplendent with so many miraculous qualities. Most marvelous of all, if I said "Every man is an animal. Plato is a man. Therefore, Plato is an animal," the dialecticians do not admit this is a proof on the grounds that one of its principles, namely the minor premiss, is not universal. If I said "Every animal is corporeal. Every man is an animal. Therefore, every man is corporeal," they do not admit this is a proof on the grounds that one of the principles, namely the major premiss, is not immediate, for between "animal" and "corporeal" is the middle term "living." If I said, "Every animal is living. Every man is an animal. Therefore, every man is living," they do not admit this is a proof on the grounds that neither the major nor the minor is valid by itself, i.e., cannot be said in reverse order; for if we can say that every animal is living, we cannot say that every living being is an animal. Bring up any example of a proof you wish; some one of these conditions will always be lacking.

What? don't they have a single one which fulfills all these qualities? Aristotle certainly does not offer us one. Here anyway is the single example which is on everyone's lips: "Every rational being is capable of laughter. Every man is rational. Therefore, every man is capable of laughter." Indeed, forsooth! Is it not equally true that this proof is ridiculous and that man, who proves it, deserves to be laughed at? That conclusion cannot be ruled

out, for in Latin *risibilis*, "capable of laughter," also designates something that ought to provoke laughter or deserves it. But let us grant that it means what is intended, namely "capable of laughing"; I ask: does this syllogism actually contain the model of an absolute proof? Let us examine only one of the principles, the major premiss.

First, if it is true that God is rational, which we can conclude from the passage of Aristotle cited above[72] and from the definition of "person" which all theologians attribute to the divine person (also, a rational person is an individual substance), if the angels are rational as we have already seen many philosophers and even Saint Gregory admit,[73] and if you nonetheless profess that neither God nor the angels are capable of laughing, then how can you make a universal proposition asserting that every rational being is capable of laughter?

Second, you say that this statement is necessary and true by itself; and therefore, you are assuming and stating that "capable of laughter" can be derived from "rational" necessarily and by itself. But I ask you by what channels you imagine it is derived and just what the connection between the two is. A certain connection is apparent if you say, "Every rational being is capable of wondering, or of being taught." But capable of laughing? Who can perceive the connection? They say that "capable of laughing" is derived indirectly from "wondering." But in that case the statement first of all is not prime and immediate, as it should be, however, if all the conditions are to be present. Next, and equally embarrassing for your argument, who will perceive the connection between laughter and wonderment even by a careful examination? Far from laughing, don't we remain rooted to the spot when we are struck with wonderment? I will pass over the fact that laughter seems to be the mark and effect of foolishness more than of reason. Therefore, how could

[72] In a section of Article Four not given here, Gassendi refers to *Metaphysics*, XII, vii, 1072b, 27, and adds that Aristotle must believe that God is rational.
[73] In the same passage, Gassendi refers inaccurately to Saint Gregory's commentary on Job 32.

this statement be necessary and true by itself when it has been plainly shown both in these refutations and in the comments in the preceding Exercise that it is neither eternal nor eternally true?

Third, you say that the statement applies in all instances. But apart from the fact that this is the same as saying it is universal, even if I grant that you are speaking only of rational human beings, what, I ask, is the source of your knowledge that every man is capable of laughing? Have you seen all men? How do you know whether or not there might not be a place where men do not laugh? Doesn't history mention several men who never laughed? Then why do you assert that all these ἀγέλαστοι were also capable of laughing? You will say that although they did not actually laugh, they still had the ability to laugh; but how do you know that? For inner potentials are recognized only by outer acts. You will say that every man is innately capable of laughing. But, my dear friend, you are begging the question, for that is precisely the subject in dispute.

Fourth, you say that this statement is valid by itself, as if the subject and the attribute could be interchanged by transposition. But how can you say that every being capable of laughter is rational? For aren't ghosts frequently mentioned as laughing at night? But these evil spirits are not rational in the sense you mean. Will you answer that "laughing" is ambiguous? But if it is not human laughter, it is nevertheless like human laughter, and so has a certain general relationship to laughter. Consequently, how do you know that animals you do not consider rational do not laugh? For I ask you, what is laughter? If you understand it as a kind of joy, animals are acquainted with enjoyment—therefore, they laugh. If it is a kind of opening and separating of the mouth and the gullet, don't we observe this sort of opening and separating in animals? You will say that that opening differs from man's way of opening his mouth; but tell me how these animals differ in species from man and how their laugh differs from man's in species without at the same time stripping them completely of laughter.

Fifth, you call the universal a prior truth, better known, more true, the source of conclusions. But how in the world is the statement that a rational being can laugh "prior" to the statement that a man can laugh? How is it "better known" to you that a rational being can laugh than that a man can? How is it "more true" that a rational being can laugh than that a man can? How is the fact that the faculty of laughter exists in rational beings the cause of the faculty of laughter found in men? In just what way can "The rational is capable of laughing" be the cause of "Man is capable of laughing"? Perhaps we must conclude from the above that it is immediately obvious that the dialecticians intend the "rational" of the major premiss to have no broader and no narrower extent than the "mau" of the conclusion, that the major premiss and the conclusion are completely identical, and so they do not prove a thing with their fine demonstration, but only beg the question. Of the minor premiss I will say nothing for fear that the subject might drag on longer than it should.

Article Six: There is no necessity at all to put a proof in syllogistic form

We must still mention a few matters concerning the form of a proof, which, it is claimed, should be syllogistic. To begin with then, if Aristotle is right wheu he teaches that we may judge that we know something (and consequently have a proof) when we know the cause why a thing must necessarily be, then it is certain that the syllogism is not necessary for this since we can know a necessary cause without it. If a man wants to know, or what amounts to the same thing, to prove to himself that every man is capable of laughing, will you tell him "Every rational being is capable of laughing. Every man is rational. Therefore, every man is capable of laughing"? I would not use that syllogistic form; but yet if I said "Every man is capable of laughing because he is rational," wouldn't I be giving him the same cause as you, but in fewer words, and without any beating around the bush? Surely that little causal conjunction "because" expresses more clearly

in what way being rational is the cause of being capable of laughing than all your reasoning. If such is the case, then proof is in no way syllogistic in its nature. And it is indeed remarkable, as we have already said, that in all the works of Aristotle there does not exist a single proof—not a single one fulfilling the conditions mentioned earlier, nor even one in the form of a syllogistic presentation.[74] Indeed, if Aristotle was a master of the art and handed his philosophy down to us very carefully, shouldn't he have proven everything in the most perfect form, especially when he insisted upon it himself—unless perhaps he intended to make fun of us? It is amazing that we hardly ever hear of any syllogism in the other arts, and especially in mathematics, which all but has a monopoly on the art of proof. There is Clavius, who attempted to develop the proof of Euclid's first proposition in various syllogisms; finally, recognizing the uselessness of the syllogistic art, he said, "Mathematicians, however, neglect this sort of development in their proofs because they prove what they are proposing more briefly and more easily without it."[75] That is why we granted in the First Exercise that any argument at all could be reduced to syllogistic form, but to no avail and without any necessity. You will say that this very fact argues that proof is by nature syllogistic since it can be reduced to syllogisms. But is that good logic? Must we then say that a tree that has lived in the forest until now is by its nature and essentially a bench because it can be reduced to the form of a bench? The comparison is accurate, but especially inasmuch as various sorts of argument can be made from a proof just as various sorts of works can be fashioned from the wood. . . .

Article Seven: The scientific conclusion of a proof is neither a priori nor a posteriori

Furthermore, they insist that a demonstrative and scientific conclusion is either a priori or a posteriori, in other words either

[74] Gassendi means that Aristotle did not take the trouble to put his arguments in syllogistic form—as Gassendi himself will against Descartes.

[75] Christopher Schlüssel, S.J. (1537–1612). The passage is from *Euclidis elementorum*, Book XV (Rome, 1589), page 77.

concluding from the cause to the effect, or from the effect to the cause. But in the first place, cause and effect are interrelated; therefore they are known together. Accordingly, it is apparent that it is impossible to know that this is the cause of that effect and not know at the same time that that is the effect of this cause. If therefore you know the cause and declare it as such in your major premiss, do you not also know the effect? . . .

Besides, to mention one last point, they usually say that an a priori proof is more certain and more manifest than an a posteriori proof. Now I ask: by what right and for what reason? An a priori proof is from causes and from more or less universal statements; an a posteriori proof is from effects and from less universal statements. But since the inquiry after causes follows upon the observation of effects, aren't effects better known than causes? Are not individual or less universal facts better known than universal ones since the second are derived by induction from the first, which are already known? Therefore, a proof that is a posteriori is better known, or proceeds from better known facts, than one that is a priori—hence is more certain, or proceeds from more certain facts. Certainty in fact comes from a greater or more evident knowledge. . . .

Another ridiculous expression, according to which a certain statement is said to be known according to itself and not according to us, refers to the same subject matter. Now I ask with what lenses will a statement inspect itself and what sort of knowledge may be known without any reference and any relation to the knower? For this reason a man would not be wrong to conclude that since all a priori knowledge (and consequently all proof) depends upon and is derived from knowledge which is gotten a posteriori, we must necessarily consider the latter both more evident and more certain than the former, following Aristotle's rule "something that causes another thing to have a property has that property to a greater degree."[76] I shall skip over the fact

[76] *Posterior Analytics*, I, ii, 72a.

that the terms might perhaps be more appropriate if they were interchanged since the knowledge that comes afterwards is called a priori and the one that comes first is called a posteriori. But there is no reason to linger over that point.

SIXTH EXERCISE: THAT NO KNOWLEDGE EXISTS, ESPECIALLY NO ARISTOTELIAN KNOWLEDGE[77]

Article One: Knowledge such as Aristotle describes it cannot exist

To begin with, there is no reason to be surprised if we do not seem to be attacking all knowledge equally. For, first, it may be claimed that the knowledge of the mysteries of orthodox faith should, or could, be called knowledge, since the Apostle says expressly, "We know Christ was crucified," and the church sings "We know that Christ was resurrected from the dead."[78] In the same way we may say that we know God exists in three persons, that the body of the Lord is present in the species of the Eucharist, and likewise for other things, not to mention that there is a knowledge called the knowledge of the saints, and that scholastic theology is commonly counted among the sciences. That is why we declare right from the beginning, and even in the title of this work, that no knowledge of that sort is being attacked here. Indeed, that is not knowledge as Aristotle conceived it, for in it self-evidence is not joined to certitude, and it is not based

[77] The Sixth Exercise, the culmination of Gassendi's argument, is his most thoroughly skeptical work though it concludes upon a generally empirical theory of knowledge, albeit a rather vague one. The present selections amount to about one-third of the total; to have given the complete Exercise would have entailed a repetition of the same material as Gassendi rewrote it in the *Syntagma* (especially pages 303–312).

[78] The Apostle is Paul; the passage on which Gassendi bases his statement is I Corinthians 2:2. The second passage is from the Roman Catholic missal, derived from II Timothy 2:8.

upon demonstration derived from natural principles, but upon faith alone derived from revelation and God's authority. Inasmuch as it is generally not called knowledge, but faith, and through it we are not said to know, but to believe, it could be considered untouched by our title. Still, in order to put a stop to caviling, it seemed wise to make these few prefatory remarks and to quote these words of Saint Augustine as expressing our opinion, "In other matters we are on uncertain grounds; but when it is a matter of the faith, then truly there are no 'perhaps's'."[79]

Secondly, you might allow that a certain knowledge derived from our experience of the appearances of things should be termed genuine knowledge, for instance when I say that I know that I am now seated rather than standing, that it is day rather than night, that I am fasting rather than full, at home rather than in the marketplace. Likewise I know that honey appears sweet to me, not bitter, that fire appears hot, not cold, that snow appears white, not black, that the sun appears luminous, not dark. Therefore, to keep anyone from attempting to stir up ill will against us because we refuse to recognize things so well known and obvious and argue against them, it is our duty to inform you here that we are not attacking that sort of knowledge in this book. And in fact it would be possible to conclude just from our title that it is not included. If you persist in regarding knowledge as the certain and evident cognition of a thing, obtained through an acquaintance with its necessary cause, or by a proof, then on such a view knowledge through experience or appearances would not merit the name of knowledge. . . .

Article Two: This is proven by the objects of our senses, and also by the animals' senses

First, since it is certain that all our knowledge is in the senses or derived from them, it therefore seems equally certain that we

[79] In the *Fragments.* (G.'s note. This quotation is not in Migne's edition of the *Fragments.*)

cannot pass judgment on anything unless our senses bear some witness to it. Hence, as we have already seen, appeal must always be made to the senses as to the highest court and the final proof (this is in agreement with Aristotle's opinion), as is common enough knowledge not to have to be repeated. And so we conclude that the sun is luminous and rises daily in the East, that fire is hot and tends upwards, that water is cold and flows downhill, that honey is sweet and is concocted by the labor of bees, that snow is white and enhances vision by disgregation,[80] that plants are nourished by sap, and bloom and grow strong in the springtime, that animals are born, have feelings, grow, age, die, and other such things, all this on the grounds that our experience shows us that these things are so by the testimony of the senses.

The first difficulty, therefore, concerns whether or not the same thing appears the same way to all the senses of all men when we pass judgment on something according to the way it appears to us.

[*Here we omit a passage amounting to approximately one quarter of Gassendi's argument. In his demonstration of the unreliability of the senses he follows closely the order of presentation in Diogenes Laertius'* Life of Pyrrho, *drawing illustrations and reasonings also from Sextus Empiricus, who develops the same notions in a slightly different order. The same material, somewhat expanded, and the same illustrations will appear later in sections of the* Syntagma. *The most serious and convincing reasoning is reserved for Article Five, which follows.*]

Article Five: The same can be shown from consideration of the different judgments of men concerning the same things

Since the judgments of different men about the same things as they are first perceived by the senses are so very different, what

[80] According to the doctors of the time certain colors, among them white, had the property of disgregation which scattered light rays and made the perception of objects clearer.

other conclusion can one draw except that it is legitimate for each man to label things the way he sees them? But it is not legitimate to state that they are such by their nature, for if they were what they appear to be to some people, obviously they would appear the same to others. You will say: "The unsound constitutions of a few men do not deserve to be placed in opposition to so many others who are of perfectly sound constitution. For example, suppose someone is suffering from a fever and wine tastes bitter and unpleasant to him, must we therefore say that the wine has changed its quality even though it all depends only on a change in taste in this man? And do not cite the example of the abstemious; their taste, like the feverish man's, has been deformed since birth. The wine may still be said to be sweet and delightful notwithstanding a few abstemious men."

Yet, in the first place, whatever constitution is doing the tasting or is imagined to be doing the tasting, still it always lies within the limits of human constitutions and is always human. Consequently, it always causes things to appear in a human fashion. Then who can be certain that the constitution that you call unsound gives rise to appearances that are less true than the ones framed by the constitution you consider legitimate and sound? Just as there are certain alienated people who see things more clearly than those of sound mind, so those whose constitution departs from the normal pattern perhaps perceive things more clearly and truly than others. Imagine someone endowed with a temperament that lives up to your ideas of "not deformed"; he might not be aware of the coolness of a certain spot, whereas a man who had just come from the baths or from a heated room, whose skin was mellow, and whose constitution was completely transformed and changed might be aware of it. Which, I ask you, will be the truer judge of the condition of the air? One man, who spends the night outdoors, may not feel the unhealthy quality that clings to the air after sunset; another, who falls sick, will feel it. Then doesn't the second man perceive the quality better than the first? Don't you acknowledge that there are many sick people who hear more acutely than others? And there are some

whose noses are half obstructed who smell smoke or a vapor in the air immediately while others in good health believe the air is pure and uninfected.

It seems right to mention here something that really astounded me some time ago. A friend of mine suffers from exophthalmia; his eyeballs protrude greatly. An object must be brought up very close for him to be able to see it. I believed that he would be far from able to judge soundly about light and color, which are the objects of vision, because of the deformation of his eyes, so different from a normal constitution. But then one day at dusk a letter was brought to me; when I opened it, I, who have fairly good eyesight, could hardly make out whether the paper was blank or covered with lines; but to my stupefaction he read the whole letter through without hesitation, and he could not persuade me that he was not joking until a torch was brought and I proved to myself that it was so and I had also recognized what he read from a book that was brought up. Consequently, I ask you whether his constitution or mine generated the truer appearance of things at that moment. I see more clearly at midday, but he sees more clearly at dusk. Then we are both even, except that he even surpasses me in that he will see the same thing I do at noon if the object is moved up closer, but I cannot see it at all at dusk, whether it is moved up close or far away. . . .

Everybody has heard of that soldier who went to Italy under Charles VIII; a nondrinker by nature, when he fell victim to a fever, he found the taste of wine most pleasant.[81] Hence it is reported that he preferred never to be free of fever so that he would always savor the same pleasure in wine. I ask, in his case, which physical condition would be called the right one for judging the taste of wine correctly? You will say that this argument goes against the position I maintained not far back that in a fever, when it has an insipid flavor, wine tastes as it should. But actually it is even more against you, since you consider that the only tribunal in which the true taste of wine is to be judged is the state of health. On the other hand, I consider that wine does not

[81] An illustration taken from Pico della Mirandola.

have this or that taste according to its nature, but that the differences stem from different temperaments or states of being. This is obviously so since the same wine does not appear to have the same taste to all healthy people; for instance I, who am, thank God, in good health, do not perceive the same savoriness in wine as you do who are also in good health. You say you are affected by one of its qualities and I by another; you judge it insipid if the least little water is mixed in it and I find it most agreeable when a good deal of water has been stirred in. Which of us two is to be believed? . . .

Why, I say, since all are not given the same sense of taste, should the taste of the majority, who find enjoyment in wine, be the final natural standard? Let them speak for themselves, and for the appearance that happens to apply to them; but others do not fail to have either a sense of taste or their own brand of appearances; the first are superior only in numbers. What conclusion can one draw? Only this, that more people can be found whose tongues and palates are constructed in the first way than in the second. But does it therefore follow that the quality that goes with this constitution is more closely related to the thing itself, and more like it, than another quality? Actually, the most that can be said is that the one appearance is more general than others; but it definitely cannot be said that it is true and in conformity with the nature of the thing. If these other people were sickly and in poor health, there would be some probability in the argument; but in fact nondrinkers also, as I have already pointed out, may be endowed with the best of health and a normal capacity for tasting. What is more, do we not see men intemperately inclined to wine who dissipate their health, and when it comes to the taste of wine, do not come to the same judgment about its excellence as others who drink wine more moderately? It could be added that when it is a question of passing judgment on the nature of a thing, one should not do as they do when the votes of senators are counted to bring a litigation to its close. In the second instance the rule is prescribed by human institutions, but in the first instance nature provides us with no rules. . . .

But finally I would like to insist on one point. Let us grant that the majority of people have a sense of taste that is moderate and well fitted to pass judgment on the qualities of nature. Still which ones among this majority will we decide we should believe? For not all of those who enjoy wine, or find it pleasant, if you wish, agree on its qualities. In the first place, some prefer their wine straight, others diluted; again some like white wine better, some rosé, and some red; likewise some prefer it new, others aged, and so forth. Hence, in the case of a particular wine, you will see one man lap it up eagerly, another wrinkle his brow, a third shake his head, and a fourth even throw it up. One man will notice the taste of a certain kind of grape; another, some herb; another, the cask itself; one man will indeed judge the wine pleasant, but with one kind of pleasantness, while another man finds another kind. Consequently you see that it is not possible among such a discrepancy of judgments to make any assertion about which quality or which taste really belongs to the nature of the wine.

Furthermore, even if you and I and many others seemed to be in the majority or were considered as experiencing the same flavor, who could be certain that we were in agreement among ourselves? I may say that I taste a sweetness like honey's, and you may say the same thing; but how can we know that the same appearance of the taste of honey occurs in each of us? For since we have different constitutions, it is plausible that honey appears to us with different features. And this does not prevent your tasting a flavor, and liking it, and calling it sweet, and my doing the same, for there are many kinds of flavors which our taste likes, and many types of sweetness which delight it. Hence, although the taste sensation of both of us may be termed honey-ish, this will not happen because one sensation is the same as the other, or in conformity with it, but because each is stimulated by the same thing, namely honey, the taste of which is always called sweet, no matter what it may be. From this example you may deduce what could be said for instance against the objection that snow appears indisputably white to all men, and that likewise

fire appears hot, and the like. For men have agreed to call the color of snow whiteness and to call whatever is infused with this same snow color white. But who knows whether I see it red, or another man sees it green? I do not mean that I see it the same color as I see a rose, nor that the other man sees it the same color as he sees grass; but I do say this, that it is possible that the points of view have been altered so that the color I see in a rose you see in snow, and the one you see in a rose, I see in snow. Nor does it make any difference that we both call the color of snow whiteness and the color of a rose redness. Clearly the color of snow, whatever it may be, will be so designated, and the same for the color of a rose; but that does not prevent the fact that the color of snow may appear to me the way the color of a rose does to you, and vice versa. For even if snow appears red to me, I will still call it white since all men are in general agreement that the color of snow is to be called white; and although the rose may seem white to me, I will still call it red since this rosy color is generally called red. And you may do the same even though snow appears yellow in your eyes and a rose green. In fact it is necessary that the term by which a certain thing is designated in a society be absolutely fixed even if it is possible that various appearances are represented by the single term. . . .

Do you not realize then that even the astutest of men will be so divided by the diversity of his judgments that he will not be able to pronounce what sort of thing anything is according to its nature? Assume that he has the healthiest of bodies and the sharpest of minds; still, whether he wants to or not, he will be constituted of organs of his body that will represent the same object in different ways to him; still he cannot help having certain conditions, at the very least as a result of his age, which will represent the same thing variously. What conclusion then will he reach concerning the object that has been represented in more ways than one? How will he be able to determine that it is one thing rather than the other? Won't he be able, at best, to say that rainwater, for example, is salutary when applied to the eyes, but harmful when applied to the lungs, but that considered by itself

it does not seem any more salutary than harmful or harmful than salutary? For if it were salutary, it would be beneficial in all cases; but if it were harmful, it would cause hurt in all cases. Likewise, won't he be able, at best, to say that millet bread seems to agree with him if he is very hungry when he eats and seems tasteless when he is full, and that he is far from being able to say that considered absolutely and according to itself it is entirely tasteful or tasteless? From this it follows that what we call the properties or affects of things do not seem to have been placed there by nature so much as attributed to them from the outside because of their effect upon us.

But I will even concede that that blessed man retains the most perfect faculties all life long and does not experience the alterations that nature necessarily brings. Still, whether he wants to or not, he must admit that the things themselves that he will be examining undergo innumerable changes and alterations. Therefore, at the very least as he observes them he will have different sensatious at various times, so much so that he will never observe anything except in relation to something; and if he sees it in only one context, he will be mistaken, and if he sees it in many contexts, he will see it in different ways. What then will he say about reality except that in one state things have one appearance and in another state another appearance and it is not clear what should be considered their actual nature? Won't he say, at best, that silver, for instance, looks whitish in a lump but blackish when powdered, but it does not seem to be more one than the other since if it were whitish by nature, it would appear so in every case and under every circumstance—and the same would hold true if it were blackish? Aud the same may be said of water, for if it were naturally the color that it appears to be, it would also look the same in snow and spray, and not white as it is observed to be. Won't he also say that the earth seems to him to be large compared with a flea, and small compared to the firmament, but that taken by itself, apparently it should not be considered large any more thau small? For if it were large in itself it would be large in respect to everything which is compared to it, and the

same would hold if it were small? In the same way a cloud, considered in itself, should not be called pink any more than dark gray since if it were gray by nature, it would also appear so when exposed to the sun's rays and if it were pink by nature it would also appear so when deprived of the sun's rays.

You will say that a man will be able to distinguish which of the various appearances is the real one by the discernment with which he has been endowed. Now by what method will he make this distinction? Surely by referring to some appearance, but which one? Shall he base his conclusion on an appearance similar to the one in question? But if this appearance can be used to prove there is a similarity between the two, another appearance of a contrary nature can also be used to prove a similarity to the original appearance in question. Or shall he base his judgment on an appearance dissimilar to the one in question. But then the first appearance will always argue against the dissimilar one. We experience this in the case of water, an everyday thing. When it is flowing smoothly in a canal, it seems to be in its natnral color; let it cascade headlong in a waterfall, it appears white. Which is the true appearance? You will say the first one since after falling the water returns to its color as it flows on a level. But why don't you say the second one seeing that if it comes again to a drop, it again assumes a white color? You will say that water at rest does not have a white coloration, but when it falls, it does not have any other coloration. Water's color depends, therefore, on its state of being, not upon its nature. For when it falls what is there in it besides water that it did not have before? or what does it have when it flows on a level that it did not have when it fell? I have often been amazed at the same phenomenon in a cloud which now shines whiter than snow or hanks of the brightest wool, now is a brooding black, now a fine vivid red color without the addition or subtraction of anything except light and shadow.

Well, you will say, if man does not discern the truth by the senses and appearance, he surely does by the mind and reasoning. But by just what method will he do this? for the mind reasons only upon subjects that have appeared in the senses. Moreover, is it

not true that one appearance has its causes peculiar to it and another one also has its own? Is it not true that the one as well as the other reposes on its own reasons? But you will say, some causes and reasons deserve greater consideration, and some may outweigh others. However, that is to suppose that the consideration due them does differ, for if one appearance strikes the senses as real, so does another strike them as real, and each in its own way. But let us grant that they do differ, how shall the intellect discern the genuine one since the ones that appear of less consideration often are in fact of greater consideration, and since the intellect cannot make the least beginning without some new appearance, which also belongs to its own type and creates new difficulties?

You will come back with the answer that if the understanding has judged according to sight that a painting is in depth and that a stick part in water and part in the air is actually bent, once it has consulted both the appearances and the tests furnished by the sense of touch, from which it will conclude that the picture is flat and the stick straight, it will rightly rely on the later appearances and disregard the first as false. And yet, just as touch recognizes its own flatness and thickness, and its own straightness and curvature, so sight too recognizes its own types. Hence, touch recognizes the flatness of the painting, and it is not mistaken; but sight sees depth in it, and it is not mistaken either, for in order for something to appear genuinely three-dimensional to the sight, it is not necessary for it to display depth to the touch, it is only necessary for its lines to appear somehow in relief. It should be noted here that sometimes the roles will be reversed and you will say that a false tactile impression is rectified by vision. Imagine an enormous sphere; its surface will indeed appear rounded to the sight, but if you put your hand on it, your touch will judge falsely that it is flat. I need not mention the illusion in which a man who crosses his middle and index fingers and touches a ball with them will think there are two balls although when he uses his sight he judges that there is only one. Consequently touch is not the only arbiter of the truth, nor is sight either, but each has

its role, and it can only be said that a thing happens to present a certain appearance according to one sense and another one according to another and that there is no possible way of discerning which of the two is true.

That is too strong you will say; for the picture is really flat. I grant you it is flat, but only in respect to touch; and I confess that the general and accepted ways of speech call that surface flat which is shown to be so by touch or the application of a straight rule. Consequently, if you wish to use this standard to test certain curvatures perceived by the sight, you will have to consider them flat. But if we set aside these ways of speaking, it is possible for one and the same thing to appear really three-dimensional to the sight and flat to the touch, and vice versa; for touch should not belittle sight for the depth it perceives, any more than sight should belittle touch for the flatness it feels. In the same fashion a most sweet-smelling unguent is highly disagreeable to the taste without either sense having the right to predominate or argue that the other is in error. For although you may say that shape can be distinguished by both sight and touch, which is not true for flavor or odor in respect to these two senses, nonetheless shape affects sight and touch so variously that it penetrates the mind as though it came from two different objects and so may be perceived in each sense according to its way of perceiving, as one sense will be no more genuinely affected in its own way than the other in its. . . .

Article Six: All we can know is how something appears to some men or to others

Now then, to come back to our initial statement, since there are so many different appearances of one and the same thing, and since so many different judgments are passed upon it, both by different animals and by different men, as well as by one single man,—what other conclusion remains except that we cannot know what anything is like according to itself or to its own nature, but only how it appears to some men or to others? It is appropriate in this exercise to review what we demonstrated earlier,

first that men do not know the inner nature of things, or their so-called differences. If they really knew these, then they would have genuine knowledge and would encounter the truth of reality, over which so many mortals have toiled so long in vain. Next, it is not possible to pass under review all the species, or all the individual cases, as they say, of a single thing in order to establish any universal proposition. If indeed this could be accomplished, I do not say by that blessed man, of whom I spoke a short while ago[82] (for it is clear that it could never happen that one man saw, heard, and experienced everything), but by many or even all men working together, then that would be a very great advantage in the acquisition of knowledge. And so I will conclude here with only two points as the capstones which will add a certain confirmation of the statement *quod nihil sciatur* [nothing is known].

The first is this remarkable fact that long as men have been philosophizing, or pursuing the truth and the nature of reality, it has not been possible to find, I do not say one man, but one people, or one sect, that has unearthed the truth and brought it out into the open. For among mortals there have been born men who were first called "wise men" and later "philosophers" by the masses, and yet what has any one of them, or what have all of them together, accomplished? In fact, they have always split into so many different sects that they have left nothing behind them to this day but contention. . . .

Yes, Aristotle, dear Peripatetic! Yes indeed, the fundamental elements (*principia*) of reality are matter, form, and privation. All I ask is that, using these, you explain to me the essence of just one thing in nature, even the least little thing, and its true origin, and the cause of so many actions and properties observed in it. I do not challenge you further with the magnet or the remora,[83] I do

[82] See page 93.

[83] The remora is a tiny mythical fish considered by the ancients to have the power of arresting the movements of ships by attaching itself to their keels. See Plutarch, *Moralia*, "Table-talk," II, vii and Pliny, *Natural History*, IX, 41 and XXXII, I. Montaigne mentions the remora in the "Apology for Raymond Sebond."

not invite you to account for the heavens themselves, or the depth of the sea, or the inmost recesses of the earth; I select a tiny animal which inconveniences you often enough, namely a flea; and I ask you to explain the things we have been discussing. You say that the flea is composed of matter and form, and that the privation of this form preceded the generation of this flea in this matter. But have you nothing else in reserve in your larder or your moneybag? Oh what an unnourishing and indigestible philosophy! I did not ask whether there was any matter in the flea, for it is clear and beyond dispute that whatever is corporeal is made of matter. Nor did I ask if there was any form, for it is an established fact that any living thing is made living by its soul, just as a work of art is by its form. I did not ask whether there had previously been any privation of this form in this matter, for it is perfectly clear that this matter has not always had this form. I desired to know just what sort of matter this was, what dispositions it required to receive that form, for what reason it was distributed so that this part of it went into the proboscis, that part into its feet, another into its hair and scales, and the others into the remainder of its body, what was the active force and how was it brought to bear when it formed both the entire body and its very different parts in this order, this shape, this texture, this size, this color.

Again, just what would the nature of this form be, what its origin, by what force is it stimulated to action, how is its perceptive and sentient faculty forged, how does it penetrate such tiny body tissues, which of the organs does it use, how does it make use of such organs? By what power does the flea bite you so sharply to ingest his nourishment from you, how does he digest it and assimilate part of it in various passages, and transform part of it into spirits which conserve him and impart life to his entire body, and eliminate its superfluous parts through his different winding intestines? Where does the power to jump so swiftly dwell in him? How does he disappear and escape your fingers so agilely? What does he think when he does not want to be caught? What qualities result from that form deep within him, and how?

When his little body is crushed, what becomes of that form? And a hundred other questions like that.

These are the things that I wanted to know. But you did not offer anything except the presence of matter and form. If I ask you any question at all, what else will you say, what more or what less? Will you tell me that matter and form are present in the sun? will you tell me that matter and form are present in the air? will you tell me that matter and form are present in rain? will you say they are present in a stone, in a tree? will you say that matter and form are present in man? Fine philosophy! Do we have to spend so much time sweating blood to learn the nature of things when in one formula we have the clearest insight into all things? For we are taught that all things have matter and form.

Perhaps you will add that in all compounds four ingredients, which are called elements, are to be found; but that is just as feeble. So the four elements are to be found in man, in fishes, in plants, in metals? But what portion of each? what compound of them all? what combination results? But not to be too lengthy about this, if the four elements do exist in a flea, explain to me, not in what way they are there, or in what way they are mixed and blended, but by what method I may be able to learn all the things I said I sought to know. Daylight would fail us and you would exhaust yourself in your efforts, but you would not offer me anything except the fact that the four elements are present in it and that they are blended together in some special fashion unknown to you; for you could answer that and nothing more or less no matter what question I might ask you. Furthermore, it is absolutely clear that the same thing can be argued against Democritus, Plato, and all the others. Hence, it is manifestly established that so far we know nothing about natural things through the efforts of all of philosophy.

My second point is that all those who have been considered the sagest of men until now have frankly professed this very ignorance about things. Between you and me, I ask you: who has ever been considered wiser than Solomon "whose wisdom

excelled the wisdom of all the children of the east country, and all the wisdom of Egypt, for he was wiser than all men," and therefore, "his fame was in all nations round about."[84] Those are the words of scripture. Indeed, who ever philosophized with greater acuity not only about morals, which his most excellent works which have come down to us demonstrate, but also about the universe, for scripture says in the same place that he spoke of "trees, from the cedar tree that is in Lebanon even unto the hyssop that springeth out of the wall; he spake also of beasts, and of fowl, and of creeping things, and of fishes."[85] What do you think such a great king felt about this great knowledge and wisdom of his? You imagine that he merely said that all things are difficult and that man cannot explain them in words. Here are the bitter things he said: "I gave my heart to seek and search out by wisdom concerning all things that are done under heaven: this sore travail hath God given to the sons of man to be exercised therewith."[86] Further on he gives his reason in these words: "I beheld all the work of God, that a man cannot find out the work that is done under the sun: because though a man labour to seek it out, yet he shall not find it; yea further; though a wise man think to know it, yet shall he not be able to find it."[87] Could anything be put more succinctly? Now, among the pagans is not Socrates held to be the wisest of mortals by common consent, even according to Apollo's vote (if it please God)? I ask you then, what was his opinion on this question? His formula is famous: "I know this one thing, that I know nothing." And if we unraveled everything he discoursed upon, what would be clearer than that he constantly taught this one thing? How skillfully he used to rip the arrogance of the sophists to shreds when they professed to know everything perfectly and to be able to teach it! . . .

[84] I Kings 4:[30, 31]. (G.'s note. King James Version.)
[85] I Kings 4:33.
[86] Ecclesiastes 1:[13]. (G.'s note).
[87] Ecclesiastes 8:[17]. (G.'s note.)

[*As support for his position Gassendi cites the most illustrious names of ancient philosophy, claiming that they all subscribed to the Pyrrhonist doctrine* nihil sciri. *For a later version of the same material, see pages* 293–303, *where Gassendi cites many of the same examples, e.g., Plato, Homer, Epicurus, Democritus* ("*undoubtedly the most learned man among the ancients*"), *Aristotle* (*speaking of Hector*), *and Cratylus. In this passage Gassendi also states that there was no difference between the positions of Pyrrho and Arcesilas, thereby denying the fine distinction, sometimes a useful one, between Academic and Pyrrhonian skepticism.*]

It remains for us to answer here those objections that are frequently made with great scorn. In the first place, there is no reason to waste much time refuting the argument that they present as their Achilles, boastfully, somewhat along these lines: "Either you know that there is no knowledge, or you do not know it. If you do not know it, why do you claim so rashly that it is so? If however you do know it, then there is knowledge on at least that one point, that nothing is known," Accordingly the statement that "nothing is known" or that there is no knowledge, is false. Now, after what has already been said, the answer to that is perfectly easy. First of all, we do not belong to the party that would condemn the common and familiar ways of speaking when we say that we "know" many things, for instance the examples given at the outset.[88] That is why we said that we do not abandon that knowledge which may be called knowledge from experience or of appearances. Hence, in accordance with this, we answer briefly that we are positive that nothing can be known (at least in Aristotelian fashion), and so there is some knowledge; but still we do not know this with an Aristotelian knowledge. Consequently it is all the less true that the knowledge which we admit exists is Aristotelian, for when we examine all the foundations of such knowledge we find they have no solidity. Quite the contrary, for if all the things that men think they know are subjected to examination by the senses and appraisal by reason, it becomes apparent that no proposition that makes

[88] Above, pages 85–86.

assertions abont the nature of a thing according to itself can be affirmed with confidence. That is why we say that such knowledge of our ignorance can be accounted as belonging to the type that we decided should be retained even thongh it may be said to belong to a class of its own.

Yon will say that this knowledge by which we know that nothing can be known in Aristotelian fashion is clear and evident, and therefore either it is derived from a necessary canse and by a demonstration, or else it is not. If the first is the case, it will be Aristotelian; if the second, then it will not be knowledge, but opinion. In fact, this knowledge is not completely certain, nor completely evident, and does not rest upon some Aristotelian cause or demonstration. But for all that it does not lack its own certitude and evidence, and conseqnently has sufficient probability based upon conjectures and reasons that are obvious enough to be able to keep anyone from accepting the statement that Aristotelian knowledge exists. So call it an opinion, or by any other name you might wish, after all it doesn't matter very much. For we use the expressions "to have an opinion" and "to know" interchangeably, as the practice of everyday speech shows, and if yon look at the matter carefully, knowledge and opinion can be considered synonyms, and it is permissible to speak of certain knowledge and certain opinion as well as of fallible knowledge and fallible opinion. So the whole distinction really belongs with the scholastics. . . .

Article Seven: The Pyrrhonists do not malign nature when they proclaim that "nothing is known"

It is furthermore objected that the Pyrrhonists malign nature seriously, since all men desire to know by nature as Aristotle teaches[89] and experience proves. Nature, they say, would not have instilled such a desire to no avail if nothing could be known

[89] *Metaphysics*, opening sentence. (G.'s note).

by them. And they find confirmation of this in the fact that there do exist various means of knowing, snch as the understanding and proofs, as well as things that are knowable, such as all things that take place naturally. Consequently, in no case does nature let us down so that there is no knowledge. Again, they find confirmation of this in the fact that it would be unjust to leave fruitless the labors of so many excellent philosophers who have been zealous in the pursuit of knowledge up to the present. Nature appears to have elected the philosophers to establish knowledge in this world where ignorance, its opposite, flourished. One may also add in confirmation Aristotle's own words after his enumeration of the opinions which we have listed above.[90] For, he says, the consequences of these theories are quite absurd. If those who see the truth as clearly as possible (that is those who seek it and cherish it the most) themselves hold opinions of this sort and sustain such a position concerning truth, how will those starting out in philosophy escape being disheartened? For to seek the truth wonld be no more than chasing after butterflies. And lastly, confirmation can be found in the fact that it is absurd that physics, metaphysics, jurisprudence, and the other branches of knowledge should be empty names, especially the mathematical disciplines, which no one except a madman denies permit us to know many things most certainly and most evidently, so brilliant and so convincing are mathematical proofs. We can answer these objections in a few words as follows.

First, it does not seem that philosophers malign nature as long as they neither subtract anything from nature nor attribute anything more than her due to her (for it seems every bit as unjust to say what is not true as not to say what is true) and as long as they therefore grant that nature has indeed instilled the desire to know in all men, but not however the desire to know all things in every way. Now as long as all men desire to know as much as possible either according to experience or within the limitations of appearances, it is true that they desire to know these things at

[90] *Metaphysics*, IV, v [1009b, 32]. (G.'s note.) The next three sentences follow Aristotle word for word.

nature's promptings; but as soon as they claim to know other things beyond those, either inner natures or necessary causes, that is the sort of knowledge that belongs to angelic natures, or even to the divinity, and is not proper for paltry men. Consequently that desire cannot be said to come from nature. In much the same way, all men desire to live forever, but who would conclude that this desire is instilled by nature, which has rather established that all men must die one day? That is why, no matter how much men may wish never to die, we conclude that this desire is in no way natural since there is no man who has managed to live forever; and in the same fashion we may conclude that since there is no man who has penetrated into the nature of the slightest thing, that desire is unnatural which prompts him to seek to have it revealed to him.

Secondly, following this line of thought, it may well be that the basis for knowledge does exist, but for a knowledge of experience and, I may say, of appearances; for our intellect knows or learns through its experience of numerous appearances. As for "demonstration," that can be accomplished in various ways, either by pointing with the finger, or by teaching in a lesson, or by some other method.[91] But the intellect does not know anything in Aristotelian fashion, nor does there exist any demonstration such as Aristotle describes it. Moreover, it can also be agreed that there are some things capable of being known, though they are still not ones that can be known with an Aristotelian knowledge, but only experientially, or according to appearances. If you say that the understanding can draw conclusions concerning much more hidden matters from the things that are encountered in experience or apparent to the senses, I shall answer that it can proceed no farther by reasoning than to things which must be exposed again to experience or which can be evidenced by means of some appearance. What we deny is that one can penetrate to the inner nature of other things. The same can be demonstrated

[91] Gassendi is following a long skeptical tradition as he repeats a story which takes the word "demonstrate" in its literal meaning (see Sextus Empiricus, *Outlines of Pyrrhonism*, II, 134–192 on proof).

in the same way concerning the labors of the most outstanding philosophers, for they need not be considered useless just because they have not produced any Aristotelian knowledge for us so far; for they have produced another sort which is more true and more useful, namely knowledge from experience and the appearance of things. Therefore, the greatest gratitude is due to these great men because they have been willing to hand down to us in proper order and classification the things they have observed either in their experience, their study, or their reasoning. For just how far, I ask, would our philosophers have progressed if they were not borne on the shoulders of so many giants? So we do not deny that they elected to dispel ignorance, seeing that the knowledge of which we speak is opposed to ignorance. But on the other hand, ignorance such as our opponents conceive it is no more a deficiency in man than his not having a hundred fingers, for just as nature does not owe him that many fingers, so it does not appear to owe him knowledge of inner natures. Hence you see how unjustified Aristotle's criticism is, for those who wish to philosophize will not be driven to despair just because they see the great philosophers profess that nothing can be known (I mean concerning the inner natures of things since they admit they are ignorant in that area); but in other areas they are still recognized as very wise, for nothing about things that can be known is totally hidden from them, so that someone has said with good reason that their ignorance is most learned,[92] for obviously it is no common virtue to have risen to the point where you deem ignorance what others consider knowledge and you acknowledge in good faith that you do not know what you actually do not know.

Article Eight: The existence of various branches of knowledge must be admitted in addition to this

[*Gassendi has answered all the objections given on pages 102–103 except the last, that various branches of learning give us knowledge. Of*

[92] Evidently an allusion to Nicholas of Cusa's *De docta ignorantia*.

the ones he mentions, only mathematics, the most impressive discipline, claims to know essences. He opens this section with a long quotation from the now forgotten Spanish Jesuit Benedict Peirera, the substance of which is repeated in his own arguments.]

Secondly, I add that when a mathematician proves some proposition you had not known, he accomplishes no more than a man who discloses the contents of a casket by writing out a label for it or by opening it up. As he merely shows what was there but all closed up, for example a theriac,[93] and as his act of writing the label or unpacking the casket do not make the theriac be there, so the mathematician merely discloses to you that this figure is such-and-such without his proof's making it be that way. You will be told (if I may keep to Pereira's example) that the three angles of a triangle are equal to two straight angles; you are not sure of this, just as you were not sure there was a theriac in the casket, no matter how much they told you so. But you are sure when angles are constructed equal to these which are obviously the equivalent of two right angles. And you are very sure there is a theriac in the casket once the label has been seen or the lid removed. Now I admit that a certain knowledge of the thing, which had not been clearly perceived previously, is born in each case; however, this knowledge is nothing more than one of the appearances of the thing as encountered in experience, for that is the only way we learn what sort of things appear to us in our experience. Clearly the equality of those three angles to two right angles was not obvious to you because your eyes are not acute enough to measure the size of the individual angles accurately; but once the inspection of the other angles had come to your help, the matter was quite apparent. Now what is all this if not a more painstaking observation of one and the same thing? Certainly, just as it was mere negligence on your part if you did not open the casket when you did not know there was a theriac in it, in the same way it was simply because of the inadequacy of your eyes that you did not perceive earlier what you perceived afterwards. Consequently, the mathematician does

[93] An antidote against snakebite.

nothing more than to advise you to look more closely to see what you did not notice at first glance. Hence, the demonstration that he offers you or the means he uses is not the cause of the thing's being as it is (as is clear from the previous argument of Pereira's), but merely makes it obvious to you that the thing is so. But in that case, this is not Aristotelian knowledge, but the sort we felt was to be retained.

Therefore, I conclude that whatever certainty and evidence there is in mathematics is related to appearances, and in no way related to genuine causes or the inner natures of things. However, I must add that with the help of mathematics I can become certain that, for instance, the earth is round; this can be made manifest through the eclipses of the moon and the varying height of the poles. But why is the earth round? what is its true nature? is it animate or not? and if it has a soul, what kind does it have? what functions does it perform? what properties is it allotted? why does it lie motionless in the center, or if it moves, what force impels it? The same questions are to be asked about the sun and the other stars, and likewise about sound, which is the subject of music, and light, the subject of optics, and so forth. Truly, the moment you pass beyond things that are apparent, or fall under the province of the senses and experience, in order to inquire about deeper matters, both mathematics and all other branches of knowledge become completely shrouded in darkness.

Do not say that this may be true of applied mathematics, but not of geometry and arithmetic since these treat the inner nature and true properties of shapes and numbers; for as soon as numbers and figures are considered abstractly (a way they have never been in existence), then they are nothing at all. Accordingly, in order for them to be anywhere or anything, they must be considered in actual things, which they affect by their presence. But if this is the case, the difficulty reappears, namely that no matter how much you may philosophize about a shape, you will still never know the inner nature of the thing which is in that shape, and the same considerations apply to numbers, also. You will say then that geometry merely pursues chimeras since it considers shapes

abstractly and not the shapes of this or that thing. I reply, however, that it is false that it does not consider the shapes of this or that thing; for it does not in fact consider them in individual things, or singly, but considers them all in general. Now it is known that the species are contained in the genus. Hence, if mathematics makes some proof, for instance about the triangle, it does not name this triangle or that one; but yet it understands this triangle and that one, not singly, but in conjunction with all others. In fact, however, if it did not base its conclusions upon triangles appearing in some material form, it would only be chasing chimeras since no other triangles but these can exist. There is, however, a distinction between geometry and applied mathematics, for the latter deals with the particular shapes of specific things while the former handles general shapes of all things. There is no need to mention that shape in itself does not appear to be anything at all; but the development of this point belongs to another subject. . . .

[*Gassendi continues his argument with a defense of Pyrrhonists against the frequent objection that if they followed the consequences of their doctrine logically, they would not be able to live a normal, pragmatic life. They would not warm themselves at a fire because they refuse to assert that fire is warm by nature. To this Gassendi replies, along with quotations from Diogenes Laertius, that on the contrary, Pyrrhonists follow appearances regularly and confidently. They know that fire appears warm; they just do not know if it is warm by itself. The manuscript stops abruptly. A note in handwriting other than Gassendi's says that the work was stopped because of the hostile reception of Book I, and because the author became acquainted with the works of the Italian opponent of Aristotle, Francisco Patrizzi, who had already said much of what Gassendi was saying.*]

Letter to Diodati

PIERRE GASSENDI TO ELIA DIODATI,[1] IN GENEVA, 29 AUGUST 1634

My very dear friend, in answer to your letter of the 16th of this month, I have two topics primarily to discuss briefly with you: one is the expression of my feelings concerning Mr. Herbert's book, the other is Mr. Peiresc's and my observations made a little while ago concerning the eyes and the lacteal vessels.

On the first topic, I may tell you that finally, quite overcome with distress, I took pen in hand these last few days to write this fine man, but that at the same time you increased my distress indeed by the praises that you informed me so many great people, and particularly the pope, have already given his book.[2] The reason for this is that not only am I unable to go beyond what the others have said, but also, if I am not to betray my feelings, I must accompany the few praises that I can give it with a general refutation of almost the entire work. Now, when I see on the one hand that I hold an opinion contrary to the pope's and all those other great men's and when I realize on the other hand that this author receives the advantageous judgments of his work with

[1] Diodati (1576–1661), a Protestant from an Italian family that had moved to Geneva, was one of the central members of the libertine scholars studied by Pintard. He was particularly interested in English ideas and helped disseminate Bacon's works in Europe. He had returned from England with several copies of Herbert of Cherbury's *De veritate* (*On the Truth*), which he distributed among friends asking for their opinions. I follow Rochot's version of the French text, printed in the *Actes du congrès du Tricentenaire de Pierre Gassendi*, pages 288–290.

[2] In fact the *De veritate* had been put on the index six days previously along with Galileo's *Dialogo*.

such great exultation, am I not right to deem that it would be better for me to keep quiet than to sing in a different key from so many able masters' and to do something disagreeable to a man of such merit who has done nothing to me to deserve it? I remember the declaration that he sent to those who have already seen his book, but I also have just remembered that he confesses that he will not receive anyone's objections to his treatise in good part unless the opponent undertakes at the same time to do better at defining, dividing, and treating the truth than he has done.[3]

That being the case, what shall I decide to do, I who do not profess to know that truth which he claims to prove and who am accustomed to saying with Cicero and Saint Jerome: "Would that it were as easy to discover truth as to refute falsehood!" To tell the truth, even that thought seemed to me a little unfair, as if I were not allowed to say that the King is not presently in Aix or in Marseilles without being able to say in the same breath where he actually is. The truth, in my judgment, is indeed hidden from men's eyes; and Mr. Herbert seems to me to have gone a bit fast and to have had a bit too good an opinion of his accomplishment when he condemned the reasonings of the skeptics so bluntly. He even seems to me to be a little excessive in the praises he gives himself and his work, as if he had found the bean in the cake[4] and all those who preceded him had been blind men. If I may say so, I really feel a certain sympathy for them in myself, especially when I consider that this whole work only amounts to a species of dialectic which may indeed have its good qualities, but which does not prevent the fact that a hundred others of the same worth, perhaps even greater, can be forged.

He takes special pride in his zetetics[5] but what questions does he propose that were not known? And how easy it is to show that his ten can be reduced to a smaller number, and besides that

[3] Gassendi loses control of his sentence, which is freely rendered here.

[4] On Twelfth Night a bean is traditionally hidden in a cake.

[5] The zetetics (inquiries) are a series of ten questions, reproducing almost exactly Aristotle's ten categories, which were to guide Cherbury's pupils to the truth about any subject. Gassendi ridicules them as inadequate and derivative.

they are not sufficient, no matter how complicated he takes pains to make them? Just check to see what knowledge or really clear definition of truth in general you find on the entire page that he devotes to defining it according to these ten types of questions, either taking them one by one or joining them all together to make a complete description of it.

On the other hand, he has recourse principally to every man's natural instinct and internal faculty which gives evidence (*faculté testifiante*) in order to judge the inner truths of things. And if it boils down to that, what reason could be found for the great diversity of judgments which are met with on almost every subject? Is it not true that each man follows his own instinct and has an internal faculty which gives evidence and brings him to the conviction he holds? And that if one man says that his friend is not really sound and well, his friend will say the same thing about him, and each of them will say so and believe so in accordance with his instinct and his inner faculty? Who will arbitrate this matter and be able to prove that he is legitimately neutral? I will not even mention that instinct may indeed serve the purpose in the judgment of moral questions but it is still formed according to preconceived notions derived from our laws, customs, acquaintances, education, etc . . ., but as for the truths of nature, which are the principal ones that have always caused difficulties for so many seekers, instinct is, in my opinion, a very feeble guarantee and a very unstable witness.

But I am going into too much detail to be able to speak to you of anything else. I will only add that having given what I had already scribbled out to a young man to copy, namely the beginning of a letter to Mr. Herbert, I will send it on to you so you may see what it is all about.[6] Considering the way I approach the subject and how I then come to the criticism of his principal foundations after having made the gentlest and most deferential

[6] This letter was not sent. After slight retouching it was printed posthumously in incomplete form as an independent work of Gassendi's (*Opera omnia*, III, 411–419, translated by Rochot in the *Actes du congrès du Tricentenaire*, pages 256–286).

protestations I can, let me know if you judge that I can go ahead with it and that Mr. Herbert is not a man to take offense. I will soon have finished it, for I have its outline already made in my mind; but if on the contrary, you judge that I may anger him in some way, I shall leave the matter as it is and shall remain among the crowd of so many others who will not speak of his book to him. And even though it might perhaps be a good idea for some one out of so many extollers to speak out frankly, if not without flattery, at least *con bel modo*, still I would have my qualms about being that person, for fear I might be considered a man who puts on airs, and likes to contradict others, and provokes men of quality without cause . . . .

GASSENDI

AIX, THIS 29TH OF AUGUST, 1634

De Motu

{1642}

Introduction

Cut off the gas supply and a stove burner goes out immediately; stop feeding wood to a fire and it will consume its fuel, then subside. This would seem to be the way the universe works; withdraw the source of energy, and the work will stop or run down. The same apparently applies to motion; for all terrestrial motion, excepting free fall, slows down and comes to a halt the minute the motive force ceases to act. When Kepler introduced the word "inertia" to physics, he used it to designate exactly this natural resistence to motion in a body. Cessante causa, cessat effectus, "*When the cause ceases, the effect ceases,*" *a formula derived from Aristotle, was one of the fundamental principles of medieval physics. Its overthrow and its replacement by the modern law of inertia provided one of the two cornerstones of classical, that is, Newtonian, physics. (The other is the accurate understanding of force, especially that a constant force acting upon a particle of matter produces a uniform acceleration.) The first law of Newtonian physics reads: "Every body continues in its state of rest, or in uniform motion in a right line, unless it is compelled to change that state by forces impressed on it." Motion, then, remains constant when the mover is removed.*

In 1633, fifty-four years before Newton published his Principia, *Descartes had already formulated this law in the manuscript of his* Le Monde, *a treatise intended to explain how a Copernican universe would function; but the condemnation of Galileo convinced him that it would be imprudent to publish his ideas (at least until 1644 when the law appears in his* Principia philosophae). *It was Pierre Gassendi who first published an accurate formulation of the law of inertia in 1642, the year of Galileo's death and of Newton's birth. It is particularly*

significant that he was also the first to perform the experimentum crucis *of dropping balls from the mast of a moving ship to prove his law. Until recently history has not given this discovery much weight. Voltaire tells us that Newton admired Gassendi and referred to him frequently, but the English physicist does not once mention Gassendi's name in his writings (where he does attribute the law of inertia to Galileo, but not to Descartes). The notebooks Newton kept as a youthful student in the mid-sixties show that Gassendi's concepts of motion, time, space, and atomism all exercised considerable influence on Newton, either directly or through the intermediary of Walter Charleton.*[1]

The immediate significance of the experiment, both for Gassendi and for the physicists of his time, lay in its application to the Copernican hypothesis of the earth's movement, particularly its daily rotation around its axis. There is no strictly astronomical argument against the earth's rotation, but since the time of Ptolemy physical arguments had been used to refute it. If the earth were spinning so rapidly, it was claimed, then the ball dropped from a high tower would not fall at the base of the tower, but somewhat to the west of it. We would feel a constant wind blowing from the east; birds would not be able to fly, but would be swept backwards as soon as they left the ground. Tycho Brahe gave the argument a modern flavor when he said that a cannon firing to the west would shoot farther than one firing east. The heliocentric theory had been the subject of considerable debate almost from its inception and had been condemned by the Church in 1616. What is surprising is that no one had actually performed any experiment on these matters in the ninety-eight years between the posthumous appearance of Copernicus' great treatise and Gassendi's experiments in Provence in 1641. The experiment of dropping the ball from the mast had been mentioned by many scientists. Giordano Bruno predicted the ball would fall directly. Brahe said no; Kepler disagreed with his argument of the cannon ball, but did not mention the experiment of the mast. In a letter

[1] Richard S. Westfall, in his "The Foundations of Newton's Philosophy of Nature," *British Journal of the History of Science*, I (1962), 171–182, writes, "More than anything else the *Quaestiones* appear to be a dialogue between the Cartesian philosopher and Gassendist atomist—a dialogue from which the Cartesian philosopher emerges, rather consistently, second best."

dated June 1, 1641, Gassendi makes fun of all scientists who make experiments in their heads, like Clavius who swore the ball would not fall to the mast's foot. Such experiments conducted in the imagination were quite common at the time.

The measure of just how great Gassendi's achievement was lies in the comparison with Galileo, whom he ardently admired and followed quite faithfully. In his Dialogue Concerning the Two Chief World Systems, *Galileo has Salviati first claim that the ball will not fall to the base of the mast, and then declare just the opposite only a few pages later. Clearly Galileo believed the ball would fall to the foot of the mast, though he never felt the necessity to make the experiment, and his reasoning in the matter was erroneous (he assumed a kind of circular inertia, in which it was "natural" for the ball to follow a circular path around the earth's axis). He could not conceive of motion in a straight line and denied that it existed in nature at all (First Day).*

In a closed universe, such as Galileo's, obviously no motion could continue indefinitely; in an Aristotelian universe, where up and down are differentiated, where everything has its natural place, any motion whatsoever, even a "natural" one, implies something is out of place, and seeks to return to rest, its normal condition. It was surely Gassendi's long acquaintance with Epicurus' doctrine of atoms falling through the void that permitted him to imagine a body existing in empty spaces beyond the universe. There, freed from the effects of gravity (something Galileo never really imagines), in an infinite space where there is neither up nor down, left nor right, the body would stay at rest, or once moved would continue to move indefinitely, or eternally, in a straight line. Whereas all physics had previously stressed the superiority of circular or rotational motion, rectilinear motion now became the only "natural" motion. Implicit in the law of inertia is the assumption of the infinitude of space and time as well as the relativity of all motion, which is conceived as a "state" of the body no different from rest and not definable except in terms of a relationship to other bodies or some coordinate system. Gassendi and Newton are only partially aware of all of this, for each believed in an absolute space and time. Still, the selections given here from Gassendi's short work show how clearly he saw the theoretical consequences of his law.

The one major form of motion that still required explanation was the falling body, whose kinematics (the laws describing how it falls) had been formulated by Galileo. Believing, as the Italian had, that gravity functions in a way analogous to magnetic waves, Gassendi realized that weight, like motion, was then a relationship between bodies and not an inherent characteristic; but he went astray in his attempt to account for Galileo's laws of motion in terms of mechanical compulsion. Like all the others of his time, he did not understand the mathematics of acceleration and also refused to believe in the possibility that anything in the universe could work by means of attraction.

Gassendi's little work, consisting of two letters addressed to Pierre du Puy, explaining the experiments he had performed and their significance, appeared in 1642. It immediately drew hostile criticism from Jean-Baptiste Morin, whose arguments against the earth's rotation Gassendi refuted in a third letter addressed to Joseph Gaultier dated the tenth of August, 1643 and published with the other two, unknown to Gassendi, in 1649. The following selections are drawn primarily from the first letter, the most incisive of the three.

Three Letters Concerning the Motion Imparted by a Moving Body[1]

First Letter

TO THE SCHOLAR AND SINCERE FRIEND PIERRE DU PUY, BROTHER OF CLAUDE, PIERRE GASSENDI WRITES

I. Our friend Luillier suggested in his last letter that you were reluctant to believe what I had written to him about the experiments I had conducted concerning the motion of projectiles. I was not at all surprised, for I am convinced that nothing could strike one as more paradoxical; and I have known other distinguished men to whom the facts seemed no less improbable until they had consulted experience themselves. Not long ago, the excellent viceroy[2] gave me the opportunity to discover once again without a doubt the truth in this matter. Having come to Marseilles, he invited me to join his retinue. Since he is a very

[1] The 1642 title, *Concerning the Motion Imparted by a Moving Body. Two Letters in which some Eminent Difficulties over Motion in General and the Motion Attributed to the Earth in Particular are Explained,* clearly indicated Gassendi's interest in the Copernican system and its defense.

[2] Louis Emmanuel de Valois, count of Alais, son of a bastard of Charles IX, was patron and friend to Gassendi, whose lengthy correspondence with the young nobleman is a rich source of information on his philosophical and scientific views.

learned man and devotes whatever time is left over from his civic duties to liberal studies, he had engaged in several discussions en route about motion. On the way, I enumerated both my own observations and those which Galileo compiled in support of the theorem that "If the body we are on is in motion, everything we do and all the things we move will actually take place, and appear to take place, as if it were at rest." As both the learned prince and others of the company were of the opinion that this principle surpassed all belief, they were stunned when, being bidden to put it to the test either running or on horseback, they realized that things thrown up in the air fell right back into their hands, whether they were at rest or moving at great speed, and that things dropped from their hands fell in line with their movement or the horse's pace; and that things thrown forward did not land either nearer or farther away, nor did they fall behind; and that things aimed to the right or the left continued abreast of them in a lateral direction. Afterwards, so they would be convinced beyond a doubt, they were taken down to the sea where they were to observe a ship moving with great speed, as well as one at rest, to see whether a stone thrown into the air along the length of the mast (for instance from the foot of the mast) would always keep the same distance from the mast as it rose and as it descended and would fall back to exactly the same spot (at the foot of the mast), and whether a stone dropped from the top of the mast by a hand at rest and without the least impulsion, would fall right at its foot, and whether it would appear to travel with the same impetus[3] and cover the same distance when it was tossed with equal force from the prow to the stern and from the stern to the prow, and finally whether any different motion at all was evidenced when it was flung laterally, obliquely, in short in any direction whatsoever. All in all, the experiment resulted in their no longer hesitating, for they observed these and other things in a trireme traveling so fast on an open and quiet sea that within a quarter of an hour it covered four miles. It was especially astounding how a stone dropped from the top of the mast with-

[3] Gassendi is not using the word in its modern meaning.

out any force, or without being thrown, neither fell behind the mast in the direction of the stern nor was overtaken by the mast in the direction of the prow, but always fell in a line parallel to it. [*After three chapters on the phenomena of inertia for a man running or on horseback, Gassendi returns to the behavior of the stone thrown up in the air from shipboard.*]

V. . . . [The fact that the stone rises parallel to the ship's mast] is due to the compound natnre of the motion, one characteristic, the upward motion, coming from the hand, the other, the forward motion, coming from the boat, with the result that a mixture of the two, or an oblique motion, is formed; and whatever upward movement it has stems from the hand, and whatever forward movement it has stems from the boat. In my opinion, this takes all the amazement out of what I said had happened when they watched the stone as it was thrown from the foot of the mast as high as its tip and neither fell behind the mast in the direction of the stern nor was overtaken by it in the direction of the prow. Indeed, although the stone, both rising and falling, always seemed to be on the same perpendicular course since it stayed constantly in a line parallel with the straight mast, nonetheless it actually did not move along a straight, or perpendicular, line. Instead it described a curve which anyone who watched the stone from a trireme at rest not far away would have noticed. For he would have seen the mast moving forward, and the stone following along with it from behind and keeping ahead of it on the forward side so that it would not fall behind the mast toward the stern since however far the mast moved away, the stone followed hard upon it at the same distance; nor would it be overtaken by the mast moving in the direction of the prow since however far the mast moved forward, by so far the stone preceded it.[4]

Then imagine the man who stretched out his hand from the top of the mast and dropped or let fall a stone. Indeed the stone

[4] The mind's eye might perceive this curve, but would the physical eye? Gassendi is thinking of two stones, one thrown directly up in the air from a position to the fore of the mast, the other from the aft of the mast.

appeared to fall perpendicularly both to him and to all of us who were being transported in the same trireme. But if it had been observed from that other boat at rest we mentioned, it would appear to have described one half of the curve I have explained; and in the same way to have always followed the mast from the rear and preceded from the front so that the mast could neither leave it behind nor overtake it. Moreover the cause of this is already known seeing that the hand holding the stone did not impart any motion of its own but nonetheless imparted the motion it got from the mast and which the latter had in common with the whole ship. From this it followed that a hand located on the aft side would be bearing its stone along in the same direction as the mast and one located on the fore side would be bearing it ahead of the mast; and so a stone falling from the first hand would be projected in the direction of the mast, therefore would follow while one from the second hand would be projected ahead of the mast, and would precede it; and both would have forward motion in the same direction as the ship (besides a downward movement, which was due to gravity). Nor is there anything to be snrprised at if the motion appeared perpendicular to all of us who were in the same trireme. In fact, only the downward motion of the stone was noticcable for us, as the forward one could not be observed since it was common to us and the stone, and as far as the stone moved forward, by so far an eye located on the stern followed behind it, and one on the prow went ahead of it. . . .

[*Gassendi continues to list the experiments that can be made on a ship.*]

VI. I return to the experiments, especially the ones conducted on the mast; for they are the kind that allow us to discover as nearly as possible if not what the true cause of both natural motion and the motion of a projectile is, at least what it is like. For it has always seemed remarkable that a stone acting[5] on its own, when it falls through the air with natural impetus, flies more slowly at first and then faster, and similarly when it is violently

[5] Reading *actus* for *factus*.

impelled and borne upward by an impetus imparted to it, it rises more rapidly at first and then more slowly at the end.

But before anything else two facts must be mentioned, for which, among many other things, we are indebted to the great Galileo. First, a free falling body accelerates at such a rate that in equal times it covers constantly greater distances in the same proportion as the odd numbers beginning from one. In other words, if, for instance, a stone dropped from a high tower falls 1 ell[6] in the time of one heartbeat, it will fall 3 ells in the second heartbeat, 5 in the third, 7 in the fourth, and 9 in the fifth. When we add these up we get that at the end of the first pulse it has traveled 1 ell, at the end of the second 4 ells, at the end of the third 9, at the end of the fonrth 16, at the end of the fifth 25, which are all squares, to use the arithmetical term. It follows from this that the distances covered in different times are proportionate to the doubles of their times, to use the geometrical term (namely to the square of the times).

Secondly, the path or line which we conceive a projectile thrown laterally in the air as describing, which is known to be a curve, is not a circle (or a kind of arc, or part of a circle), but a line that the geometricians call parabolic, which you may picture if you imagine a cone cut at an angle to its base so that the section is parallel to the opposite side and cuts the entire cone. Now while the area of the section is called a parabola, its circumference is the line called parabolic.

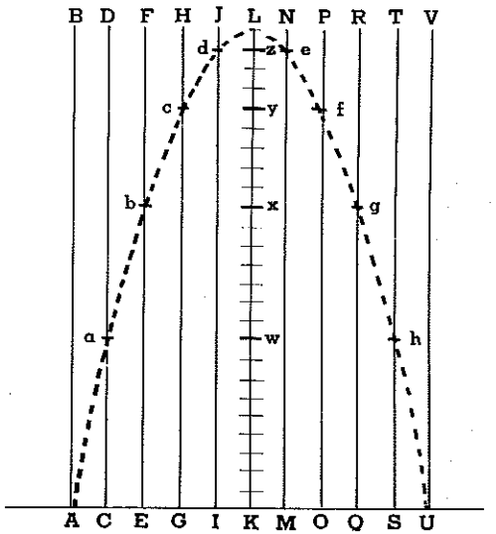
Look at the figure below, for the greater part not only of what I have just said but also of what I am abont to say may be understood from it.[7] First, let *KL* be the height of a tower of 25 half-ells, or the mast of the ship at rest of 25 half-ells. Assume that a stone falling from *L* will arrive at *K* in a period of five heartbeats. According to what has already been said, it will arrive at *z* in the first pnlse, at *y* in the second, at *x* in the third, at *w* in the

[6] Gassendi's word, *orgyia*, refers to the span of two outstretched arms, approximately 6 feet. An ell is 45 inches.

[7] For the sake of clarity the letters of Gassendi's illustration (on the next page) have been changed, and the text accordingly.

fourth, and at *K* in the fifth. Then let a stone be thrown obliquely from *A* so that it reaches *L*, then starting its descent from that point, finally reaches *U*. It will describe the curve *AabcdLefghU* in the air, the line which we have just said was parabolic.

Now let us speak no more of a tower, but rather of a mast, and not of one at rest, but of one in motion, or moving in consequence of the motion of the ship in which it is seated. And let the surface or the sea level on which the ship is traveling be represented by the line *AU*. Let us assume that *AB* is the mast at the moment when the stone is thrown straight up from *A* to *B* with just the force that would enable it to reach *B* were the ship at rest. Next, let the ship be moved forward so that at the end of a moment, or a heartbeat, the mast has become *CD*. Then, since the stone does not leave the mast, nor is left behind by the mast, it will follow the mast and move straight up to *a* from the foot of the mast, or the spot on the ship near it from which it was thrown. Again, let the ship be moved forward for a second moment, and let the mast be *EF*; for the same reason as before the stone will be at *b*. Let the ship be moved forward for a third



moment, and let the mast be *GH*; the stone will be at *c*. Let it be moved forward for a fourth moment, and let the mast be *IJ*; the stone will be at *d*. Let it be moved forward for a fifth moment, and let the mast be *KL*; the stone will be at *L*. From that point on it will begin to fall and head downward so that as the mast of the ship is moved forward with each moment, it will be successively *MN*, *OP*, *QR*, *ST*, and *UV*; and the stone will also be successively at *e*, *f*, *g*, *h*, and finally *U*. . . .

Gassendi draws twelve conclusions concerning this trajectory, including the facts that the two motions are independent of each other and do not impede each other, that variations in the speed of the boat would produce thinner or squatter parabolas, that the rising half of the parabola is symmetrical with the falling half, an implicit denial of the difference between "natural" and "violent" motion. He ends Section VII:

> I will add that while we were in the same trireme, a noble deputy described to the good viceroy and those of us present an experiment conducted upon his orders, which should not be omitted here. For he claimed that once when he was in command of some ship which was moving very rapidly with the wind, he ordered that a leaden bullet be fired from the top of the mast up into the air from a pistol, and that a little while later it fell at the foot of the mast.

Section VIII analyzes what happens when balls are thrown with and against the motion of the ship.]

IX. This would seem the proper point, before proceeding further with the topic, to require me to insert a parenthetical remark about what can be deduced from the above considerations concerning the famous question of the motion or rest of the earth, especially since you and your brother and the others who were there immediately inquired of Luillier whether I came to any conclusions about the movement of the earth from these experiments. But since I may wander too far afield, it would be preferable for me to defer it to the end of this work; in the meanwhile, let me present what can be discovered from the above concerning the physical cause of movement, whether natural or projectile.

Now, when I say "natural," I am following a common figure of speech, according to which the motion of projectiles is called violent while the motion of falling bodies, called "heavy" bodies, is termed "natural." In the first place, clearly there is no motion that cannot be considered natural inasmuch as there is none that does not result from the fundamental particles of things, particles whose nature was willed by their author to include forever a principle of motion by which they could move.[8] And this would seem to be the reason why they are mixed together in different ways and create different sorts of things which act variously among themselves and are acted upon, or move and are moved. Generation, also, and death, growth, and decline, every transformation by which heat, cold, humidity, dryness, and also color, odor, flavor, and other qualities come into being appear to be nothing more than certain local motions in which the fundamental particles of things, although very tiny and imperceptible, mix in different ways, are separated from each other, approach each other, withdraw, are shifted around, and so forth. Such at least, according to Sextus Empiricus, was the opinion of famous philosophers who held that such changes were no more than certain kinds of local motion against Aristotle who defended the position that they were distinct from local motion.

In the second place, there does uot seem to be any motion, with the exception of the primordial motion, which could not be considered violent inasmuch as no motion takes place except as the result of the impact of one thing upon another, which is the reason why Aristotle sought an external mover, or generating principle, even for falling bodies. And in the movements of living beings he felt that it should be kept distinct which limbs were moved by which, until you came to the one which, itself unmoved, moved all the others. Nor should it seem absurd that perpetual violence should exist in nature since that very violence may be held to be natural by the very fact that the author of

[8] Gassendi believed that every atom was endowed with an ineradicable motion, which might be reduced to a kind of vibration in place, but could not be eliminated.

nature brought it into being so that it might be of service in the generation of nature's entities. Besides it is well established that nothing changes, nothing dies, nothing is born without some reciprocal motion, or action and reaction, in which one thing or another suffers violence, with the result that violence may pertain to individual natures only, not to nature as a whole. Therefore, since natural and violent motion are apparently words that ought not be confused, the most convenient concept has always seemed to me to be that whatever is done either spontaneously or without any resistance, should be called natural, and what is done contrary to nature or with some resistance should be called violent. Thus, walking is natural in a living being since it is spontaneous; jumping is violent since it is done with some resistance. Thus the flight of a sphere thrown through the air is violent since it is against nature; rolling around on a plane is natural since nothing resists it. Again, inasmuch as the cause frequently does not appear either spontaneous or resistant, and since some one may ask for a criterion with which he will be able to discern whether a certain motion is natural or violent, it appears that uniformity may be assumed to be the trait whose presence will declare a certain motion natural, whose absense will declare it violent, and this by reason of the fact that the motion of the fundamental particles, which is utterly natural, is uniform. Clearly, as the common saying holds that nothing violent is perpetual, from which it follows logically that whatever is natural is perpetual, it is evident that the source of perpetuity is uniformity and lack of uniformity the source of cessation; for only something that does not gather strength or grow weaker can last forever, and nothing can increase or decrease infinitely by the action of a natural force.

In this connection, if anyone were to look for the most natural motion to be found in composite things, clearly it would be celestial motion; for it above all others is uniform and perpetual, thanks to the circular form chosen by the creator, which permits uniformity and permanence, being without a beginning or an end. Do not argue that the motion of animals seems more

natural; note how our fatigue alone indicates a certain violence even if the motion of living beings would otherwise seem natural if only by reason of its being made up of circular movements though it would seem violent by reason of the imperfections and complications of these circles. It appears paradoxical that no motion can be executed by a living being which is simply straight; a man, for instance, cannot trace a straight line with his finger or pen except through the combination of several circular movements at once. But this matter is already clearly understood from what we said a few pages back; and it is only necessary to notice how the arm is extended as it traces a straight line, the movements of the fingers, hand, elbow, and arm each over its own special center point. Also, consider the spontaneous motion of the arms as you walk in a hurry; their center is the shoulder blade, so they are not subject to fatigue, and the movement of the leg, whose center is the hipbone so that it is not impeded by the other motion and is not forced to correspond to it. But I am off my subject.

Finally, should someone want to know what is the most violent motion, it would seem to be the two being discussed here, that is, not only the one in the projectile when it strives to rise, but also the one in it when it is borne downward as a falling body. The argument for this is that just as the first movement comes from an external principle, so the second cannot come from an internal one, such as the one they call "form," and the cause of such a motion, as indeed of any unequal impetus, cannot be conceived of as one acting perpetually in a single way, for since the motion cannot acquire a continual increase infinitely, it is far from being able to endure permanently. But why talk about permanently since the most enduring of all falling motions lasts hardly a minute out of the hour and is completed at such a rate that if it were a less compact body falling from high up, it would be shattered by its own momentum (*impetus*). We may be sure that if something were allowed to fall an immeasurable distance and its velocity (*impetus*) increased constantly in the same proportion over immeasurable space, no density, however compact,

would be sufficient to keep the body from being broken up.[9] That really proves that this motion is violent instead of inherently natural, in fact the most violent of motions in the last analysis; or at least no more violent one than it can be imagined. For it is agreed that whatever comes from nature is supposed to be gentle and uniform and anything but tending toward the destruction of the body it belongs to.

X. I shall not repeat here how the stone dropped from the top of the mast of a moving ship appears to fall along a perpendicular line while it really falls along the slanted line I have described; I will only suggest that the stone does not move on its own since it is moved by a force imparted by the hand, a force stemming from the displacement of the hand by the ship, in which it is situated with the mast. And this is true when a hand stationed at the summit of the mast drops the stone or when a stone thrown from the base of the mast reaches the top and then falls back afterward. So you understand from this that the motion of a falling stone or of one returning to the earth may be called violent.

You will say that since this oblique motion is a mixture or compound of a perpendicular and a horizontal motion, the horizontal element may be considered violent, but the perpendicular element at least is natural. For it seems clear that the stone hurled up in the air but still proceeding obliquely is violent in both elements [of its trajectory] since the cause of each element is external impulsion, to wit, the horizontal force of the ship and the perpendicular force of the hand. But it cannot be admitted as obvious that the stone dropped downward and still

[9] One cannot help wondering what Gassendi expects will break up this rapidly traveling body if it is crossing a void. But then Gassendi feels that infinite acceleration is physically impossible—and in fact it contradicts the law of inertia he is about to formulate. Note that he has reversed the traditional Aristotelian use of physical terms by calling the motion of a falling body violent (because accelerated) rather than natural. Those who like to do that sort of thing may see in Gassendi's rejection of infinite acceleration a foreshadowing of the Einsteinian notion that as the velocity of a body approaches the speed of light its mass increases toward infinity.

proceeding obliquely is violent in both elements; for the cause of the horizontal motion is the same external impulsion, to wit, the force of the ship, but the cause of the perpendicular motion is not the force belonging to the hand. That is why is appears necessary that in this motion the stone is moved by an internal principle, and consequently, that this movement is not violent, but natural. And yet, first, it seems worth considering whether of these two motions which make up the oblique motion, namely the perpendicular and the horizontal, the second, that is the horizontal, should not be considered natural rather than the perpendicular. In fact it is perfectly obvious for the reason that since the projectile was part of a whole[10] which moved along the horizon, or circnlarly, it therefore moves circularly in imitation of the whole, and naturally and completely uniformly, so that however much the perpendicular movement may increase or decrease constantly, the horizontal movement flows evenly at all times and proceeds unchangingly. And perhaps the whole question of movement imparted by the earth's motion wonld be far less astonishing if it were assumed that it turned on its axis. Indeed the stone could then be said to move uniformly because of its spontaneous conformity with the uniform movement of the whole, whether it was attached to it or separate from it. But this communication of movement from the ship, the horse, the run, or something else, even just from the hand, this is truly miraculous considering that the stone does not have a similar relation with these things or with their motions.[11]

Hence, it is qnite legitimate to consider that the horizontal movement, whatever its cause, would be perpetual if some other force did not intervene to divert the moving object and to wipe out the motion. To find this idea less absurd you must imagine a moving body which is impelled in a forward motion just as

[10] The ship, not the earth.

[11] The earth's motion is continuous and uniform; that it should be communicated to the stone, which is always associated with it, is less surprising than the communication of an intermittent and changing motion in an object with which the stone has only a temporary relationship.

much as it is held back. A finely wrought sphere of a uniform substance could be such an object if you imagine it rolling on the horizon or the circumference of the earth, which you also imagine as exquisitely smooth and polished. For if you assume you impart the slightest little motion to it, you will understand that this motion would never cease, but the sphere would go on rolling on the entire circumference and having finished one revolution would go on a second, and again in the same way, and would continue forever.[12] Now the cause of this is the fact that the sphere cannot be moved the least little bit in this situation without there being an equal amount of mass (*molis*) in front of its midpoint as behind it at the same time that its center remains constantly perpendicular to the point where the sphere touches the horizontal plane, and its front part cannot head downward without its rear part heading upward; and the former always draws the latter forward while the latter always propels the former with the result that since no cause can force the sphere downward without raising one part of it as much as it lowers another part, it follows necessarily that any motion imparted to it will constantly remain a mean between rising and falling, and will persist uniformly and iucessantly. I may add that there is no reason why its course should ever accelerate or diminish since it is never further away from or closer to the center of the earth, and there is no reason why it should stop moving as it would if you assume there is some irregularity in the surface. For wherever there was any rise or dip, the motion would accelerate on the downgrade and decelerate on the upgrade; and if the incline were so steep that it could not rise above it, it would be forced to fall back, to roll up the opposite side, and after rolling up and down several times, to come to rest at least between the rise and the decline.[13] You can also see from this that if the sphere's nature is such that it is accelerated by a downgrade and retarded

[12] This is Galileo's concept of inertia (within a gravitational system). The unceasing motion is circular, not rectilinear.

[13] Gassendi feels no need to account for the fact that the motion does not continue indefinitely.

by an upgrade, in a place that goes neither uphill nor down it will be neither accelerated nor retarded, but will maintain its course and move indefinitely. I bring up these considerations only to make it clear that if either of the motions is to be considered natural, it is the horizontal one rather than the perpendicular.

[*In the following section Gassendi asserts that the stone's fall results from an external force, not an internal nature as in Aristotelian physics, and that the force is one of attraction, not impulsion. He refutes Aristotle's theory that the motion is maintained by the medium through which the projectile travels, in this case the air, though he concedes that the medium may influence the motion. Section XII opens "And so, it appears necessary to have recourse to attraction, rather than impulsion, as the cause which performs this function. Besides, what other force could this be except the one that belongs to the earth as a whole and is called magnetic?" Gassendi mentions his source, William Gilbert, the most outstanding proponent of this theory of gravity, which Galileo accepted but could never find a way to handle mathematically. Gassendi imagines tiny cables pervading the atmosphere and providing the mechanism by which magnetism attracts heavy bodies:*

> Is it not necessary that something act as a medium since no physical action takes place without a physical agent, and no physical agent can act upon a distant object except through some intervening instrument? Nor is it sufficient to say that a certain quality is emitted from the magnet to the iron unless you say at the same time that little imperceptible bodies are emitted which function as conveyors of this quality.

The following section explains that all sensory perceptions are to be accounted for by similar tiny atoms, fine enough to penetrate solids, as light passes through glass or magnetic attraction through paper, wood, or stone.]

XIV. But even when it has been granted that some corpuscules do proceed from the magnet and attract iron to it, is it still possible to understand what configuration they have in order to be the instruments of attraction, or in what manner and in what fashion they can accomplish the attraction? In these matters

especially we are forced to make conjectures since it is not only difficult but even impossible to recognize the real way the internal nature of reality performs its marvelous operations. Isn't it therefore reasonable for you to pardon me if I babble somewhat murkily as I am making uncertain conjectures, if I offer nothing completely established and documented about which no doubt is permissible, and if I never wish to create a prejudice against further exploration and the devising of better ideas? I leave no stone unturned in order to find out if something like the truth may turn up; and when I admit ingenuously that there are perplexities everywhere, it seems to me that I deserve to be excused as long as, always ready to recant, I offer for the time being a theory that seems closer to the truth than the others.

In this business, even though it seems obvious enough that a body cannot attract another unless it transmits something by which it draws the other body to itself, who is wise enough to conjecture or explain what kind of thing a magnet transmits like some sort of instrument to summon the iron to itself? We may perhaps state that it is something like the image (*species*) of a perceptible object which entices a living being; but it is too much to suppose as Thales does that either the magnet or the iron has some soul. But if it must at least be assumed that there is something continuous between the magnet and the iron, how can it have the strength of a grappling hook if it is made up of unconnected corpuscules? if it is not held onto at the source when it is emitted, but is let go? if, after grabbing onto the little handles in the iron at the other end, it is not pulled back right away, but is pushed onward continuously? There are many such questions of no little difficulty. Grant as Empedocles does that the corpuscles run together and form compounds; postulate a void between them as does Democritus; of the flight from the void as does Plato, or adopt any other theory you want as others do; the problems will remain as great.

May we therefore say that because they are emitted continuously, these magnetic rays can be imagined better than the other conjectures as maintaining the rigidity of a tiny rod or at

least of tight cables? Even if they are made up only of contiguous particles, still a continuous supply of successive particles, an uninterrupted persistence, and a forcefnl propulsion can create a rigidity of the right kind, as clearly happens when water spurts forth from narrow pipes. Does it seem possible to conceive of light rays in any other way than as vibrating or as emanating? Therefore, may it not be true that just as when rays of light coming from a common point strike a surface of water and penetrate it (in this way analogous to a fountain) wherever there are little pores and apertures, but one ray penetrates directly and perpendicularly while the others are refracted or deflected toward it, so magnetic rays, which are known to be propagated in circles (as if coming from a common point), when they strike iron, penetrate (again analogous to a fountain) wherever there are little pores and apertures, but one penetrates directly (namely the one that is projected through the middle of the mass and to the center of gravity, as it were) while others are refracted and deflected toward it? Whatever the arrangement of the tiny solid particles in water that make the refraction of light rays is, the same arrangement could cause the refraction of magnetic rays, keeping all things proportionate. And while both magnetic and light rays emit solid particles, specifically those which are in the middle and constitute the perpendicular ray, and against which others are deflected and upon which others exert pressure, may it not be true that the magnetic rays are stronger and expel parts of the magnetic with greater force?[14] Since the rays that have been refracted in this way are like bent cables and taut (as we just said), they cannot help pushing and pressing upon the parts which are included inside the angle of deflection. May it not be true that we can understand how the iron is compelled toward the magnet by reason of this pressure, since something like arms have been formed by all the cables with the deflections acting as elbows and fingers, all of which work together to compel the iron toward the magnet? It is possible to test a force of exactly this type by passing several strands fixed tightly to a wall through

[14] The Latin here is obscure beyond comprehension.

small holes in a sphere or a solid stake with the holes constructed so that the middle one is a straight line and the others are angled slightly toward the middle hole as they proceed from the near to the far side. Now while the middle strand is held taut and alone is directed in a straight line, if the other strands are connected to the back of the sphere or stake and are pulled tight at the same time, they will exert pressure on it until they force it back to the spot on the wall where they are tied. May it not be true that in this way we can understand that the iron will not be attracted except within a prescribed distance because with the rays streaming out in orbits that become progressively less and less dense, either none of them or too few to overcome the resistance of the weight reach the iron? Wouldn't the iron be more powerfully attracted the nearer it is because the rays would be denser and so there would be more cables, or more little arms to seize it and pull it in? Wouldn't the iron be held very firmly joined to the magnet because the single cables pull it tight and hold it captive, and so forth? May it not be true that we can also understand how amber, sealing wax, and other static electric materials attract straws, threads, bits of paper, and other very light objects of the same nature because they emit a dense exhalation made of tiny rays which enter the pores of the objects, are deflected in the same way, crisscross, make the objects veer toward the material they emanate from, press upon them, force them, and drive them home? Evidence for this is found in the fact that static electricity does not attract these bodies unless the material has been previously rubbed with a cloth, or carpeting, or other substance so that it is energized by this rubbing and the dense exhalation flows out to bring back its booty, so to speak.

XV. What is the point of so many speculations? Obviously to allow us to understand in what way there can be a magnetic force in the earth by which all so-called heavy bodies are dragged downward perpendicularly toward it. And that there is some such force in the earth itself cannot be better substantiated than by the fact itself. Consequently, just as the force that is in a magnet cannot be demonstrated in any other way than by the attraction

of iron itself, so the force that is supposed to exist in the earth cannot be demonstrated in any other way than by the attraction of stones and other objects. Regarding the method of the attraction, exactly the same thing may be said which we have just said concerning the magnet, proportionately speaking, of course. I submit, therefore, that it is likely that in the same way that the power of a magnet is propagated in circles so that corpuscules emanating in rays become less dense the further out they radiate, and being less compact exercise less attraction, and beyond a certain distance are incapable of attracting and finally are no longer, in this way the globe of the earth propagates its attractive force in circles so that the rays of corpuscules emitted finally become exceedingly scattered and cannot attract a stone from a certain distance (beyond the moon if you wish, or outside the world).

Now picture a stone in those imaginary spaces that stretch beyond this world and in which God could create other worlds. Do you think that out there where it had been made it would fly off straightway toward this earth instead of remaining motionless in the spot where it was first put as if it did not have any up it could flee from or any down to tend toward? If you think it would travel in this direction, imagine that not only the earth, but also the entire universe was reduced to nothing, hence that these spaces were empty as they were before God created the world; at that time at least all space was alike since there was no center. You will appreciate that the stone would not approach this way, but would rest fixed in that place. Let the universe be restored, and in it the earth; will the stone suddenly strive in this direction? If you say it would, the earth must necessarily be felt by the stone, and the earth must therefore transmit some force to it, and consequently corpuscules with which it impresses its sensation upon the stone and brings back the news, so to speak, that it has been restored and exists once more in the same place. For otherwise how do you imagine that the stone can be attracted to the earth? But if that is how it would be, what else is proven except that both the stone and the other terrestial bodies seek the

earth because they are attracted to it by corpuscules transmitted by it?

And now have God make a certain space in the atmosphere surrounding us completely empty so that nothing from the earth or anywhere else can reach it, will a stone placed in it move toward the earth, or its center? Certainly no more than one placed in those spaces outside the universe; since for it, with no communication with the earth or with any other thing at all of this universe, wouldn't it therefore be as if the universe and the earth, or its center, did not exist and nothing at all existed? If it does move toward the earth, wouldn't it make you think of a piece of iron because something would be surrounding it with which it would have communication, and obviously something from the direction of the earth by which it would be pulled. If that is not enough, what else is there that would set it in motion? Do not be detained by the fact that it does not seem possible for so great a mass as a huge stone to be forced into motion by such fragile cables, for consider also how great a mass of iron is pulled toward a lodestone by fragile cables.

Let me add that stones and other bodies which are called heavy do not have the resistance to motion that is generally believed. You will see that if a huge weight (*moles*) is hung by a rope, it will require only a very light force to move it from its place and make it go back and forth. Why then would it require a greater force to be able to make it move down? Now you must not say that it is greater because of the greater speed of the motion; for when it first starts on its journey downward, its motion is not swift, but rather very slow, and the cause of its subsequent acceleration will soon be given.

In the meantime, let me point out that the force that is made and forged from the individual strengths of the imperceptible cables can be shown to be equal to the force that must be overcome if a hand or something else is to lift a heavy object, say a stone, from the earth. Clearly, this is what is apparently happening when a stone resists you as you try to pick it up from the ground. For so many little cables hold it entangled in their

deflections and crisscrossings; and unless a greater force intervenes to move these deflections and crisscrosses and force the bonds to be made at a point further away, the stone will never be picked up from the ground. This means that to whatever degree an external force, or one which a hand or some other thing applies from the outside, overcomes the force of the cables, the stone is raised that degree higher, or lower if the force is inferior. It also means that powerful force imparted to a body sets an object in motion violently at the beginning since it has not yet been opposed; but subsequently it moves the object more and more slowly since it is constantly being reduced by degrees until only that degree remains which is equal to the force of the cables.[15] This occurs in somewhat the same way as when struggling against a strong current you are able to plough through a certain number of oncoming waves with increasing effort; but since in the meantime your energy (*conatus*) is gradually checked as one wave drives on another (for what force is left over from one is taken away by the following wave), you are finally forced to give up and are carried off with the current.

Finally it means that if two stones or two spheres of the same material, such as lead, one very small and the other one large, are dropped at the same time from the same height, they reach the earth at the same moment; and the very small one, even if it weighs no more than an ounce, arrives with no less velocity than the large one even though it weighs a hundred pounds and more. Clearly, the large one is attracted by more cables, but also has more particles to be attracted, so that the force and the mass are commensurate, and in both cases it is as great in relation to each sphere as is required to complete the motion in the same time. It is indeed amazing that if the spheres were of different materials, such as one of lead and one of wood, the one (the wood) reaches the earth hardly any later than the other (the lead), for the same commensurate relation applies since there are just as many cables as there are particles, Nevertheless, there is a slight difference, though almost imperceptible, because the air gets

[15] Gassendi is thinking of a stone thrown into the air.

mixed in slightly more on account of the lesser density of the material and resists the downward motion slightly more.[16]

XVI. You will ask in passing what would happen to that stone which I claimed could be imagined in empty space if it were roused from its state of rest and impelled by some force. I answer that it is probable that it would move indefinitely in a uniform fashion, slowly or rapidly, depending on whether a small or great impetus had been imparted to it. I take my proof from the uniformity of the horizontal motion I have already explained since it would apparently not stop for any other reason than the influence of perpendicular motion. Hence, as there is no influence of perpendicular motion in space, whatever direction the motion had started in, it would behave like the horizontal one and would not be accelerated or slowed down, and therefore would never stop.

Would you like some experiment to prove this, as good at least as we can have? On a string hang a piece of lead or a stone which is at rest when it is perpendicular, and then give it a forward push. You will see that this motion is uniform and perpetual in its nature. For although you applied the least little force, why does it happen that the stone swings back and forth so many times and takes the same amount of time to swing back as to swing forth? You certainly would not have thought that the motion of such a large body would last so long, coming from such a little force. But in fact the attraction of the stone to the earth is neutralized by the string; and so the stone remains indifferent, so to speak, between two opposite forces. Consequently, if you push it sideways, you would impart a motion to it against which it would have no resistance; and so unless something else intervened, it could be maintained forever. Nor does it make any difference that the motion is not completely lateral, or along the

[16] In theory, then, every object, regardless of its material would fall at the same rate because the cables are commensurate with the atoms to be attracted. In fact, the resistance of the air slows some objects down. Benedetti had seen that every object of the same material (i.e., all lead balls) falls at the same rate. Galileo stated that all bodies, regardless of material, fall at the same rate.

horizon, but follows an oblique and upward course; for although the string retains the stone, the earth still attracts it too at the same time; and whenever the earth pulls it down, the string holds it back. This is the reason why the permanence of the motion imparted to it is not effaced on this count [gravity], for the opposing forces compensate each other. And although it appears that in its course through the lowest, or perpendicular, point the stone is moving fastest, while it moves slowest at the highest point of its ascent and at the beginning of its descent, and so on proportionately at the other points, nevertheless, the uniformity is always preserved in such a way that the durations of every swing back and forth are equal. In other words, at the beginning the strokes are in fact longer, and at the end they are shorter, but this does not mean that they ever take greater or less time, for the attraction [of gravity] and retention [by the string] always remain equal and a constant compensation is made between the remaining motive force and the space remaining to be covered.

How then does it happen that the force diminishes continuously and the distance covered decreases continuously, and the motion finally ceases? Galileo attributes this to two causes. One is the atmosphere which resists each vibration of the stone somewhat and therefore constantly reduces somewhat the force imparted to it, or its impetus. The other is the weight of the thread itself or of each of its particles. For where the thread is shorter, its vibrations, or backward and forward motions, are more frequent. Hang small stones at one-inch intervals along the longer string from which you have hung the stone. You will perceive that the stone hung at the first inch endeavors to swing back while the one hung at the second inch is still in its forward swing, and that its forward swing will be somewhat shortened by the opposition of the first stone. And in the same way the forward swing of the third stone will be shortened, as will that of the fourth, and the rest until finally the lowest stone is also forced to shorten its forward swing because of the resistance of the several little stones, which will make itself felt all the more frequently as the stones are higher up; and you will see the

final stone almost laboring, as if to drag this series of bundles that are unwilling to be carried off. Now forget the little stones, but in their place imagine all the particles of the string. Since they do hang down it is clear that they behave like little stones and are considered like bundles which do break down the impetus of the stone only a very little bit, but that incessantly. In order to see this more clearly, hang the same stone from a string of the same length, but of a different thickness and weight, and you will perceive that the thicker it is, the more rapidly its motion will die down as the individual vibrations are shortened more noticeably. Thus, if you have used a rather thick rope, or a rod of wood, or links of iron, you will have very few vibrations and a motion of short duration.

Accordingly, when the air is thinner and the string finer, the vibrations will be greater in number and the motion longer lasting. Imagine that the air has been reduced to the thinness of a vacuum and consequently offers no resistance and that you are using not a string, but an incorporeal ray which has no weight and is not impeded by its parts. Do you not see that a stone hung in this fashion would preserve quite constantly any motion imparted to it, that is by completing all its vibrations, not only in equal periods, but also always over equal arcs? Then all this leads us to draw only one conclusion, that a motion imparted in empty space where nothing either attracts it or holds it back or resists it in the least would be uniform and perpetual. And so we deduce from this that absolutely any motion imparted to the stone would be of the same nature taken in itself; so that whatever direction you throw the stone, if you assume that the moment it leaves your hand everything except the stone is reduced to nothing by divine power, the result would be that the stone would be moved eternally by its motion and in the same direction that the hand directed it. If that does not actually happen, the cause is apparently the influence of the perpendicular motion that intervenes because of the attraction of the earth, which makes it depart from its path (and it would not stop until it is brought to the earth), just as iron filings in the vicinity of a magnet do not

continue in a straight line, but are diverted toward the magnet; or in general terms, whenever we hit something sideways which is moving, we deflect it sideways in the same direction.

[*Sections XVII and XVIII reconstruct by "composition" what Gassendi has so far deduced by "resolution." Starting with the stone in empty space, he restores the air around it, and finds that it has no effect on the stone, which is motionless as is the air. When the gravitational field is restored, however, it is sufficient to overcome the resistance of the air, and to impart initial motion to the stone. If a series of impulses in the same direction pushed the stone consecutively, the individual motions would add up to a single accelerating motion. In order to avoid any theory involving action at a distance, Gassendi is careful to assert that the source of the motion is in fact impact,*

> for to attract is nothing but to impel something towards oneself with a hooked instrument, and it is clear that the aforementioned stone or sphere can be propelled just as easily by one or several blows when someone walking in front of it pulls it with fingers clasped around it as when someone coming on from behind impels it with shoves.

But Gassendi does not believe that the constant series of shoves will succeed in accounting for as great an acceleration as Galileo had found. An object accelerated only by the earth's attraction, he believes, would fall one unit in the first second, then two units in the second second, three units in the third second, and so on. But the space covered in each successive second follows the arithmetical progression 1, 3, 5, 7, 9, instead of the one he expected 1, 2, 3, 4, 5. To account for the extra unit of space covered, he assumed that two forces contributed equally to accelerate the stone, the attraction of the earth and the impact of the air rushing to fill in the vacuum left behind the falling object. This second source of the acceleration was commonly considered to be Aristotle's, though in fact that is a slight misinterpretation of his theory. Gassendi mentions that the same proportions of acceleration are observed in the motions of pendulums and balls rolling down inclined planes.]

XIX. Let me add one thing, namely that we may conclude from all this what opinion to hold about the difficulty frequently

raised concerning the force imparted to projectiles. It is asked just what this force in the moving object is, how it is imparted to it, how it is preserved, and how it dwindles to nothing. Although it is customarily considered to be an active force moving the stone, it seems however to be the case that the active force which is the cause of the projection lies in the projector and not in the projectile, which behaves purely passively. It is motion that is in the projectile. It may be sometimes called "force," "impetus," and the like (as I have also done frequently when I adhered to the familiar words as much as possible in order to be understood more easily), but still in reality it is nothing else than motion itself. In fact, in Aristotelian terms, one and the same motion is both action and passion at the same time, action inasmuch as it comes from the mover, passion inasmuch as it is in the object moved; for (in his terms) just as there is an active force in every mover by which it imparts movement, so there is a passive force in every object by which it is moved; and whenever an object is actually moving, one must not look for any active force in it, which is necessary only in the mover, but only a passive force which is in it and has been "reduced," as they say, to action. And the fact that the mover is separate or that it may even have perished is no hindrance to the continuation of the motion once it is transferred, for in addition to the motion the mover is not required to transmit any other force to maintain the motion subsequently, but it is enough if it imparts the motion once to the moving object, which can then continue without it. Now it is able to do so because motion is an accident of a nature which can endure without continuous action of its cause as long as its subject continues to exist and it does not come up against something contrary to it. And even though the internal principles[17] of the moving object may be said to possess force both passive and active by which they continue the motion, this force cannot be said to be imparted by the mover; instead it is aroused. It is only too clear that we should say that nothing but motion is imparted by the mover. Whatever motion the mover has while the moving

[17] Gassendi means atoms.

object is attached to it, is imparted, I say; and it will remain the same and exist eternally unless it is canceled by some adverse motion.

Now, to understand how this transference takes place, reflect on the fact that before the stone is hurled into the air, it is joined to the hand for a certain period of time and may be considered one and the same with it as a single moving object because one and the same motion applies jointly to them both, or because the hand moves the stone with the very same motion as itself. Hence it happens that when the hand is moved upward, or horizontally, or in any direction you please, the stone is moved in the same direction. But because the hand, held fast by the body, or supported by it, draws away from the stone in the meantime, the stone, which only touches the hand and is not joined to it, continues and does not foresake the course it adopted with the hand. And if it does not keep to that course forever, if it is forced to deflect, if it finally comes to rest, I have already given the cause of that more than once. Observe only that what I say of the hand may be understood to apply to any other physical mover. Indeed there is no mover in nature which is not in motion itself, so that it accompanies the object it is moving a certain distance, directs it on the course it will hold, and by passing on an invested right as it were, impels it; nor would it ever impel something by simple contact without a forward motion of this sort. There is no need to prove this since all that is required is to consider any of the examples proposed here; besides, it is well know that the faster a mover is moving when it overtakes a moving object and follows it off in some direction the faster the moving object goes; and the slower the mover, the more sluggish the object. . . .

[*Gassendi closes with a few polite remarks, and promises to discuss the bearing of these experiments on the question of the earth's motion in the following letter. The principal point of this second letter is that everything in the earth's inertial system behaves exactly as if the earth were motionless. Gassendi discusses the problems usually raised: how*

birds fly, the wind, the cannon ball shot with the earth's motion and the one shot against it, the object dropped from the tower that falls at its feet. The trajectory of such an object is a straight line as far as the atmosphere is concerned, but it is actually a parabola in space. "But it should not be hard for you to imagine that air is one thing and space, in which air is, is another. For air is a mobile body; space is an incorporeal and immobile place"(IV). Turning to the various apparent motions of the heavenly bodies, he finds it more likely that their complexity and rapidity are due to the motion of the earth than to their own natural motion.

> Why would it not be more plausible, more probable, and more reasonable that the earth moves toward the east and pays its respects to the entire structure of the universe and all the stars in order than that so great a structure and so many and such large stars go around it and pay their respects to it? . . . In comparison to the immensity of so great a structure, the earth is not merely a point, but even less than a point, if something more minute can be imagined. Even then, the [geocentric] theory might perhaps seem somewhat acceptable if that whole structure circled in a single, simple motion toward the west: but on the other hand, when so many planets also circle toward the east, what could be more absurd than to imagine beyond the planets and beyond all the fixed stars and even the crystalline spheres, an enormously vast sphere of the primum mobile, which pushes on in a direction contrary to the lower spheres, striving with their own slow motion toward the east, and carries all the others to the west with incredible rapidity? Can anything be more violent and still be believed a permanent part of the nature of things? Could anything be more involved and still be attributed to nature, which always follows the shortest and levelest path to its goal? (VII).

Arguments that the earth would have to spin very fast, or that it is too heavy to accomplish such a movement are refuted. Here Gassendi makes an interesting point about weight:

> The gravity which is in the parts of the earth or in terrestrial bodies is not so much an inherent force as one imparted to the

bodies by the attraction of the earth. This can be understood if we consider the example of the magnet; pick up a small bar of iron weighing several ounces and hold it in your hand. Then if you hold a rather powerful magnet underneath your hand, you will now feel a weight of several pounds, not of several ounces. And since you admit that this weight is not something inherent in the iron as much as it is something imparted to it by the attraction of the magnet held under the hand, then when it comes to the weight of the gravity of a stone or other terrestrial body, it may be understood that this gravity does not belong to such a body in itself but to the attraction of the earth under it (VIII).

Weight is not an intrinsic quality, nor is its opposite lightness; for both are relative qualities. As for the earth's orbital motion, it may be deduced from the moon's.

Surely no one denies that the moon has a force that holds its parts together, even drawing them back if they become separated, and so gravity and lightness may be admitted as existing in the parts of the moon, as well as motion upward and downward, without its being true that the moon as a whole is heavy or light and travels in a straight line, not a circular motion.[18] I ask, then, if there is nothing contradictory about the moon's moving in an orbit when it is surrounded only by the ether, what could be contradictory about the earth's also moving in an orbit when nothing surrounds it except the ether (or, if you wish, its atmosphere)? (VIII).

Gassendi then gives a description of the heliocentric universe, with the relative position of the planets and their known satellites as well as the immense distance of the fixed stars. The earth has two motions, a daily revolution on its axis which is inclined, and shifts slightly, and an annual revolution about the sun. The planets, but not the fixed stars, derive their light from the sun, and the phases of some of them can be seen through telescopes. The orbit of the earth, as Kepler had recently shown, is not circular, but elliptical, which Gassendi tried to account for

[18] When he writes "in a straight line," Gassendi is thinking of a body falling under the influence of gravity. One must not forget that Newton's discoveries were unleashed by his concept that the moon is falling toward the earth.

by the analogy of the poles of a magnet, which will attract or repel the poles of another magnet. In its course around the sun, the earth may be alternately attracted and repelled in the same way.

Gassendi also argues on sound astronomical grounds against Tycho Brahe's theory that the five planets revolved around the sun, while the sun, moon, and stars revolved around the earth. Finally, following Galileo's lead, he attempts to account for the tides by the various shifts in the earth's motion and the moon's gravitational field.

In sum, then, the bulk of the second letter is a spirited defense of the heliocentric theory, based on a knowledge of the most recent discoveries and on the theory of inertia deduced from his experiments. There can be no doubt that Gassendi personally was persuaded by this astronomical system as the more economical way to "save the appearances," but he was very aware of the Church's proscription of Galileo's teachings, and he was unwilling ever to oppose its ukases. The final section of this letter follows.]

XIII. But let us make an end at last to these matters; although I set out only to speak of the weakness of the argument taken from the motion of projectiles which is commonly alleged in support of the earth's immobility, I was gradually carried on until I seem to have been able to touch upon the principal difficulties of some famous problems. Do not make me repeat that I did this, not in order to assert that the earth moves, but in order to suggest from love of the truth that the earth's immobility must be founded upon firmer reasonings. Do not press me either to communicate to you any such reasonings that you may think I have up my sleeve; for if I had any, I would do so willingly. And indeed not a few men, the first among them our Morin,[19] have so

[19] Jean-Baptiste Morin, astronomer and one-time friend of Gassendi's, attacked the *De Motu* violently, thereby initiating a long and bitter feud that lasted until both men died over a decade later. Gassendi replied to the first attack in a third letter addressed to Joseph Gaultier and published, unknown to Gassendi, in 1649 with the two given here. On the whole, he avoided taking too great a part in public controversy and allowed his partisans to carry on much of the battle.

far devised not a few arguments with great cleverness. But still, as for me, I always see that there is some hitch in them; so I come to the point where I revere the decree in which several cardinals are said to have given their approval to the earth's immobility.[20] For indeed, the Copernicans may maintain that the passages in Holy Scripture which attribute a certain position, or immobility, to the earth and motion to the sun are to be explained as dealing merely with appearances in easily comprehensible terms and commonly accepted ways of speaking. Their theory is that Scripture does not speak of reality except as it appears and is known and experienced by the common man (and consequently we must often have recourse to a meaning other than the literal one) and that it does not aim at scientific accuracy in physics, mathematics, and such things, but at instilling grace and supernatural salvation, and that consequently since every man is concerned about his salvation, the term most easily understood by all men had to be used. Or they may maintain that these passages are to be understood as referring to the steadfastness and indispersibility (*consistentia* and *indissipabilitas*) (as they say) of parts which do not extend beyond this earth and which change only their place or form in the same way that the parts of a piece of wax imprinted with different signets do not extend beyond the wax, but do vary in place and shape only, and when one figuration disappears another takes its place while the piece itself always remains and continues to be the same. Nevertheless because these passages are explained in other ways by men who are known to have great authority in the Church, I therefore take my stand apart from the Copernicans and do not blush to hold my intellect captive on this occasion. Not because I deem that it is an article of faith, for as far as I know, that has not been claimed or promulgated and received in the universal Church, but because the Copernicans' judgment is to be considered a prejudice which cannot carry very great weight among the faithful. Besides, do not dwell on this, but excuse this great

[20] Undoubtedly an illusion to the tribunal of seven cardinals in the Galileo trial who, on June 22, 1632, declared Copernicus' system an absurd proposition.

wordiness of mine instead; be assured that I had no other intention than to testify my regard for you as I remember your kindness to me. My greetings to the best of brothers and to your learned circle.

YOURS
AIX, DEC. 11, 1640

[*Here is the paragraph from the* Syntagma *in which Gassendi again compares the theories of the universe* (*Physics, Section One, Chapter III* in fine):

> And so in short there are the three principal systems according to which the order of the universe can be conceived. However, which of the three is to be preferred to the other two is a great question. Now, since this cannot be settled except from deductions from the celestial motions, in the interests of approximating what seems likely to be the fact, it is apparent in the first place that the common, or Ptolemaic, system is the least probable, for many reasons, but primarily because it is now firmly established that Mercury and Venus are not always on this side of the sun, but circle in an orbit on this side and on the far side, or above, below, and lateral to the sun, so that they are sometimes nearer us than the sun and sometimes farther from us.[21] The phases of Venus that are observed through the telescope prove this, for they are of the sort that require locations on the near side, on the far side, and lateral to the sun; for it can be shown from the rising and falling motion of both bodies that either their spheres or the sun's are not solid, otherwise they would be shattered. In the second place, while it seems necessary that one of the two remaining systems must be deemed preferable, the Copernican appears to be clearer and more elegant. But since there are sacred texts which attribute rest to the earth and motion to the sun, and they say that a decretal exists which commands that

[21] Gassendi himself had been one of the first and most eminent astronomers to observe the evidence of phases in Mercury and Venus, as well as the passage of Mercury in front of the sun (November 7, 1631).

these texts are to be understood to refer to actual, and not merely apparent, rest and motion, the result is that Tycho's system is recommended and defended by those who revere such a decretal.[22]]

[22] Note that Gassendi always leaves open the possibility that the Church has not really condemned the Copernican system and may yet find it acceptable. Some readers might wish he had been more forthright in his espousal of the heliocentric view; but considering the delicate situation a mere nine years after Galileo's condemnation, there is no reason not to regard his statement here as blunt almost to the point of indiscretion.

The Rebuttals Against Descartes {1644}

Introduction

Until quite recently the only philosophical work of Gassendi's translated into any modern language was his series of Objections against Descartes's Meditations. *Father Mersenne, following Descartes's lead, submitted the manuscript of the* Meditations *to several philosophers asking for their criticisms, which were to be passed on to the author. During April 1641, while occupied with the publication of his* Life of Peiresc, *Gassendi composed his "Doubts," as he preferred to call them, somewhat hastily, completing them on the sixteenth of May. By the twenty-third of June Descartes, who was in Holland, had returned this set of Objections, by far the longest, and his Replies to them. He recommended to Mersenne that they be published with their author's name, a gesture of pique, for Descartes respected the anonymity of the other objectors and did not refrain from revealing clearly his contempt for the Fifth Objections in his replies to them. Gassendi was evidently annoyed, both by the bitter tone of the answers and by the publication itself (August 28, 1641, in the first edition of the* Meditations), *for Mersenne had apparently led him to believe that the communication was a private one. He therefore determined to defend his original doubts, probably feeling that they would benefit from elaboration. He completed a 319-page series of Rebuttals by the fifteenth of March 1642, which was finally published by Samuel Sorbière in Amsterdam in February 1644 along with the complete text of the* Meditations *in an appendix. Descartes appears not to have read the Rebuttals in their entirety, and the only answer he composed was in the form of a letter dated January 12, 1646 to his translator and disciple Clerselier, who had submitted a list of Gassendi's principal criticisms for his consideration. He also requested that Clerselier*

follow Gassendi's wishes and omit the text of the Fifth Objections from the 1647 French translation of the Meditations. *(Clerselier did not comply but rather inserted at the end of the Sixth Objections an appendix containing the Fifth Objections, the Replies, and Descartes's letter in answer to the Rebuttals.) This ends the complicated six-year exchange of opinions that had included the original* Meditations, *the set of Doubts, the Replies, the lengthy Rebuttals, and finally the short letter to Clerselier.*

The extent of Gassendi's annoyance is proven by the untypical act of entering a long and personal debate. On the fifth of November 1647 César d'Estrées, prompted according to Descartes by Clerselier, organized a banquet with Descartes, Roberval, and Mersenne present followed by a visit to the ailing Gassendi at which the hatchet was officially buried, if not genuinely.

*The central concept of Cartesian philosophy, the "clear and distinct" idea, which in fact means an innate a priori idea, bore the brunt of Gassendi's attacks. When Descartes claims that a philosopher must rid his mind of all preconceived judgments, his opponent replies that the result would be an empty mind with no ideas at all. Descartes could not conceive his primary "clear and distinct" idea "I am; I am a thing that thinks" without preconceived notions of "I," "I am," "a thing," and "thinks." In fact, according to Gassendi, the "*cogito, ergo sum*" consists of the minor premiss and conclusion of a syllogism whose major premiss is "whatever thinks is." This is but one of many syllogisms Gassendi reconstructs to reveal that Descartes's thinking always starts with the minor premiss, the individual case, and neglects the major premiss, the universal. In Gassendi's view all reasoning inevitably relies on certain general concepts and to attempt to start from scratch, or at least from the individual, as Descartes wished, is to mistake the nature of ideas and reasoning. Gassendi zeroes in on other "clear and distinct" ideas. It is impossible, he argues, to know anything about the substance under a piece of wax; only its properties can be known. (This is the same critique he had made earlier of the Aristotelians' search for inner natures and essences.) We cannot have clear ideas of either the infinitude of God or of his perfection; in fact, the argument from final causes, rejected by Descartes, is the best way of conceiving him. Descartes*

was forced to admit in one of his Replies that he would have a clearer idea of God if his mind had never been cluttered up with sense data. Gassendi then asks him to explain what idea a blind man would have of God. In general, Gassendi cannot conceive of an idea without sense content; the intellect, he believes, cannot function without the participation of the imagination. Even mathematical concepts are derived from experience, which they represent only partially.

All the major weak points of the Cartesian system are subjected to penetrating analyses, all the more remarkable for the fact that they appeared so shortly after the publication of the Meditations, *and many were composed even before then. Gassendi indicates clearly the famous Cartesian cycle (our clear and distinct idea of God is the proof of his existence, the existence of a perfect God is the proof of the validity of our clear and distinct ideas); he analyzes the ontological argument devastatingly; and he points out the problems facing Descartes as he tries to account for the juncture of body and thought. Modern philosophy can add little or nothing significant to the objections made by Gassendi.*

In more than one area Gassendi is less audacious than Descartes. He wishes to preserve arguments from final causes as helpful in demonstrating God's providence. He cannot accept Descartes's radical denial of knowledge derived from the senses. Against this he must defend the senses in order to accredit appearances just as he had had to undermine the senses in order to reduce them to mere appearances when arguing against the Aristotelians.

Not everything Gassendi says is sound; he is often verbose; occasionally he misses Descartes's meaning disastrously; he does not see the impressive rigor of systematic doubt; he is so far from conceiving anything like an innate idea that he is occasionally unfair to his adversary. He may claim to agree with Descartes's conclusions—both men intended to stay within the fold of Catholic orthodoxy—and to disagree only with his opponent's arguments and methods, but in fact the two are radically opposed on most philosophical questions, and the composition of these pages allowed Gassendi to clarify many of his positions and at the same time to set the grand lines of the debates to ensue between Cartesians and their opponents, especially Locke, who subjected innate ideas to a crushing critique.

Gassendi chose a most unfortunate form for the presentation of his ideas. The debate is fragmented to the point where the reader cannot always follow, or even locate, the main arguments. In his refusal to omit the slightest point of difference, Gassendi repeats himself far too often and leads his reader into unnecessarily trivial byways. Finally, and somewhat surprisingly, he chooses to debate in traditional, highly technical terms, more appropriate for a schoolman than for a modern philosopher. Though he had earlier argued that there is no necessity to put proof in syllogistic form (pages 82–83 supra) and had denounced Aristotelian dialectics at length, he here indulges in them and displays his mastery of them as he couches his refutations in conventional terms that may be rigorously exact, but have the disadvantage of excessive virtuosity. The selections given here, slightly less than one-fourth of the total work, are intended to represent the principal arguments and at the same time convey a sense of the contrast between rather repellent niggling and solid, sensible reasoning.

Metaphysical Colloquy, or Doubts and Rebuttals concerning the Metaphysics of René Descartes with his Replies

ON THE REASON FOR WRITING THIS BOOK TO THE MOST EXCELLENT RENÉ DESCARTES FROM PIERRE GASSENDI

Most excellent sir, onr friend Mersenne honored me by commnnicating to me your sublime *Meditations on First Philosophy*. The importance of the subject, the perspicacity of the thonght, and the brilliance of the style impressed me enormonsly. For these reasons I take great pleasnre in congratulating you on the superior and happy understanding with which you have undertaken to push forward the limits of knowledge and to disclose things hidden to all the ages of the past. More distressing, he requested me in the name of our friendship to write down for you any scruples that might occnr to me or linger in my mind. Indeed I felt that I would only be displaying lack of perception on my part if I did not agree with your arguments, or else temerity if I dared speak even the slightest criticism in opposition as if I disagreed with you. Nonetheless, I accepted the request of my friend in the conviction that you would consider it not my idea, but his, a good and just man's, and that you would readily believe that I had no other intention than to propose my simple doubts to you, for you are a man of integrity.

I swear that it will be enough if you manage to read them through to the end, for I myself certainly do not pretend that they should move you to the point of distrusting the least of your arguments or of wasting any time destined for better causes on answering them. In fact I hardly dare bring these to your attention without blushing, except that I am quite sure that there is not one of them that did not occur to you more than once in the course of your meditations, not one that you did not either disdain or deem worth ignoring after due deliberation. And so I advance these arguments, but in the spirit that they are no more than proposals, directed, I insist, not against the things themselves that you undertook to prove, but against your method and the strength of your proofs. For I confess my firm belief in the existence of the almighty God and in the immortality of our souls, but I balk only at the demonstrative force you claim for the line of reasoning by which you prove both these and allied metaphysical doctrines.

[DESCARTES'S] REPLY

Most eminent sir,

You took exception to my *Meditations* in such an elegant and precise critique, which it appears to me will be of service in making their truth shine forth, that I feel that I owe a great debt to you for having written it and to Father Mersenne for having inspired you to write it. That man, a most industrious inquirer into all things and an indefatigable promoter in matters concerning the glory of God, saw clearly that no better way could be found to show whether my arguments should be considered conclusive than to have a few men outstanding in learning and intelligence examine them and criticize them with all their power in order to test whether I would then answer without too much difficulty all the objections they had proposed. With that in mind, he invited a certain number to do this, and succeeded in persuading a few of them, and I rejoice that you also are one of them.

Although you did not use philosophical arguments to refute my opinions so much as certain oratorical arts to evade them, still I find reason to be pleased in that very fact; for I conjecture from it that it is not easy to put forth arguments against me different from the ones contained in the preceding objections presented by others, which you have read. For if there were any, they would not have escaped your intelligence and industry, and I judge from this that you had no other aim than to inform me how my arguments might be evaded by men whose intelligence is so steeped in their senses that they are totally repelled by metaphysical thoughts and in this way to give me an opportunity to meet them. For this reason, I shall answer you here not as a most discerning philosopher, but as one of those men of the flesh.

Rebuttal.[1]

Article One: The necessity of rebutting

Last fall your *Meditations*, which Mersenne had communicated to me in manuscript form, were published. Appended to them was a set of Objections and Replies that you assume incorrectly I had read when I wrote you, for I had absolutely refused to look at them when Mersenne offered them in order not to approach the examination of the *Meditations* with any preconceptions. I saw my rather lengthy letter printed along with other things that had been objected against you. After reading through your Replies I could not have been more astonished at the attitude you displayed toward me. In fact, that you gave no importance to the things I had written conformed with my wishes, for I do not esteem anything of mine so much that I believe a high price should be put on it. But I could not fail to wish for greater good will, on your part, which would have prompted you to shroud the matter in silence and darkness if nothing I wrote seemed to

[1] This work of Gassendi's was known in Latin as the *Instantiæ* and in French as the *Instances*, a technical term, which I translate as "rebuttal," designating an answer given to an answer to an objection.

you of any moment instead of publicly insulting me as you did. For I had not written to you on my own accord but at another's bidding, and in disagreeing with you I did not indicate my reservation publicly but privately. At least it was my intention to propose to you frankly and amicably the doubts I saw arise as I read so that, if it seemed worthwhile, you could clarify your text somewhat for your readers, and if it did not, then at your discretion you would suppress the whole matter. For I thought that you wished me and others to read the copy in order that when our various judgments had been made known, you could see if the manuscript required changes in some respects before you undertook to publish it. But instead you received this well-intentioned advice as if I had challenged you hostilely; and without writing back to me in private, you made a public debate of it, declaring that you had actually shown the manuscript around, not in the spirit of one who was in doubt about the validity of anything he had once written, but because you wished to stir up some opponents against whom you could try your powers. Consequently, didn't you put me in a position where I had to defend myself, you who seemed to want nothing less than to force a friend who had no such idea into the arena as an adversary? I accept with appropriate gratitude those kind words that you put in at the beginning and the end (although you treat me like a little boy whose goblet has been rimmed with honey so he will drink down the foul wormwood). In the rest you acted as if you thought you were testing to see if you could prove me a feeble philosopher who should concede the laurels to you. Therefore, I accept your conditions; and at the close of the battle I will bear no grudge if you take the ovation and triumph for yourself just as you began by applauding yourself. I shall be on guard for one thing; realizing that you were offended (in the belief that when I called you "Mind" because you spoke in the name of the mind throughout your *Meditations*, I had done ironically what in fact was done without any ill intention as will be mentioned later) I will be on guard, as I say, not to call you "Mind" any more, but I will address you as a whole man

even though you speak only like part of a man. You may address me as you wish; for you are quite at liberty to address me not only as "Flesh," the word that occurred to you cleverly as the antithesis of "Mind," but even as stone, as lead, and so on if you can think of anything more mindless.

As for your remark that you will answer me here "not as a most discerning philosopher, but as one of those men of flesh," I am first grateful, as I should be, and I return the epithet "most discerning" to you, who deserve it more; and furthermore, I who wrote you do not reject the epithet with which you answered. Indeed, I live far too simply to recognize that distinction [between mind and flesh]; and since I do not know how to dissimulate, I do not assume a double personality. Therefore, I naively decline the one you have denied me and take up the other that you have left unused. But if we were dealing with the true and real nature of things, as for example the existence of God or the immortality of souls, in that case I would not accept this name because according to the sense of Holy Scripture the flesh can be understood as opposed to the spirit; but as we are dealing with nothing more than the strength of you reasoning, and since it is your private affair and I am opposing you alone, there is no reason why I should refuse that role any more than Aristotle when he is contrasted with Anaxagoras, who was commonly called "Mind."[2] For although you call me "Flesh," you do not thereby make me inanimate; when you play the role of mind, you do not thereby make yourself fleshless. And so you should be allowed to speak in your own way; it is enough that, by the favor of God, I am not simply flesh without mind, and you are not simply mind without flesh; and you are not above the human condition, nor I beneath it. However, you reject what is human; I could not think it foreign to me.

[2] Diogenes Laertius, II, iii, 6 is the source of the designation "Mind" for Anaxagoras.

Against the First Meditation, which concerns the things that can be called into doubt

A SINGLE DOUBT. CONCERNING THE METHOD ACCORDING TO WHICH EVERYTHING KNOWN, WHETHER TRUE OR FALSE, MUST BE REJECTED, EVEN BY ARTIFICIAL MEANS

As for the First Meditation there is no need for me to dwell long on it, for I approve of your purpose of stripping your mind of all preconceived notions (*praejudicium*).[3] The one thing that I do not understand is why you were not satisfied with explaining simply and in a few words that all things that you had previously known were uncertain so that you might then select the ones that were observed to be true instead of considering everything false, a method which introduces a new prejudice as much as eliminating an old one. And note that in order to give yourself this idea you were forced to pretend that God (or some illusory Evil Genius) is a deceiver when it should have seemed sufficient to give as your reason the fogs that beset the human mind or the mere weakness of our nature. Furthermore, you pretend that you are dreaming in order to call everything into doubt and to consider

[3] Descartes uses this term *praejudicium* in its literal sense—a previous judgment—concluding that we may strip ourselves of *praejudicia* because it is in our power to suspend judgment. Gassendi uses the same term to refer to all the notions or concepts in our mind. He believes these concepts are necessarily derived from experience, never innate as Descartes held. To wipe them out, according to Gassendi, would leave a blank. Sacrificing precision to consistency, I have always translated *praejudicium* as "preconceived notion."

everything that happens as an illusion. But can such reasoning wring from you the belief that you are not awake or the feeling that the things that occur before your eyes are false and uncertain? Say what you will, no one will be convinced that you convinced yourself that nothing of all the things you had known was true and that your senses, or sleep, or God, or some bogeyman has constantly deluded you. And would it not have been more worthy of philosophical candor and the love of the truth to explain matters simply and honestly in the way they happen than (as might be objected) to have recourse to such a device, to run after illusions, to follow such a labyrinthine trail. Nonetheless, since that seemed best to you, I will not argue the matter further.

[DESCARTES'S] REPLY

You say that you approve of my purpose of trying to strip my mind of preconceived notions since no one can pretend that it should be condemned. But you wish that I had done so "simply and in a few words," that is to say perfunctorily. As if it were so easy to free oneself from all the errors that have been imbued in us since childhood! And as if it were possible to do too carefully what no one deuies should be done! But you surely meant to point out that many men coufess at least in words that preconceived ideas are to be avoided, but never do avoid them since they expeud no effort or toil on the task and never think that any of the things that they have once accepted as true should be considered as preconceived ideas. You certainly assume their role very well here, and you omit none of the things that they could say. But in the meanwhile you offer nothing that appears to have the savor of philosophy. For when you say that there is no need to pretend that God is a deceiver, or that we are dreaming, or such things, a philosopher would have believed that he should

add some reason why these things cannot be called into doubt. Or if he did not have any, as indeed there are no real reasons, he would not have said what yon did; nor wonld he have added that it suffices in this place to give as his reason the fogs that beset the human mind or the weakness of our natnre; for it is no benefit to our efforts to correct onr errors to say that we err because onr mind is shronded in fog or our nature is weak, for that is tantamonnt to saying that we err because we are snbject to erring; and obviously it is more useful to direct our attention, as I did, to all the cases in which we may happen to err so that we will not rashly give our consent to them.

Also, a philosopher would not have said that "by considering everything doubtful[4] as false, I introduce a new prejudice as much as I eliminate an old one"; or he would have tried first to prove that some risk of error rose from making such a hypothesis. But quite to the contrary, a little later you assert that I can not wriug from myself the belief that the things I supposed to be false are really false or uncertain; iu other words, that I can uot adopt that new prejudice that you feared I might adopt. And a philosopher would have been uo more amazed at my hypothesis than at the fact that when we straighteu out a rod that is bent we beud it back in the opposite directiou; for he knows that it is ofteu useful to assume something false in order to briug the truth to light, as wheu astronomers imagine an equator, a Zodiac, and other circles iu the sky, as wheu geometers add new lines to given figures, and as philosophers often do on many occasious. However, anyone who calls that "to have recourse to such a device, to run after illusions, to follow such a labyrinthiue trail" aud says that "it is not worthy of philosophical caudor and the love of the truth," proves that he himself does not wish to use philosophical candor or any reasoning but merely rhetorical deceits.

[4] Gassendi had not used the word "doubtful," and Descartes is misquoting him here by inserting *dubia*. At the same time, the insertion is necessary to give a precise definition of Cartesian methodical doubt.

Rebuttal

Article Two: It is false to assume that all preconceived notions can be eliminated and that then very certain and evident principles can be found

Besides, since this Meditation on avoiding preconceived notions is the stronghold of your proofs, their Trojan Horse from which they issue and take by storm any defenses no matter how heavily fortified, let us examine the facts, that is let us begin by analyzing your initial reasoning. You will hardly deny that it can be reduced to this form:

"Whoever frees his mind from all preconceived notions draws conclusions from very evident and certain priuciples, not from obscure or uncertain ones;

"Now I have freed my mind from all preconceived notions;

"Therefore, I draw conclusions from very evident and certain principles, not from obscure and uncertain oues."

Such is your line of reasoning; and there is much to be said here especially about your minor premiss; but I shall also speak of your major premiss in order to ascertaiu fully whether or not there is auy error in your logic. First then, you assume in the latter that "it is possible for a mind to be freed of all preconceived notions"; but that appears impossible to me. To begin with, since the memory is like a storehouse of judgmeuts that we have previously made and deposited in its keeping, we caunot cut it off at will. Everyoue experiences this iu himself, and the man who wished for the ability to forget, not to remember, fully recoguized this.[5] Obviously judgmeuts already made persist so strongly by habit, and imprints similar to those of a signet are so fixed, that it is not in our power to avoid them or erase them at will. Besides, there are some precouceived notions that can be changed and there are likewise some that canuot; and those which are changed do not thereby free the mind from precouceived notious. Now since every judgment refers to some object as it appears to the mind, it results that if the object always appears round and

[5] Themistocles, in Cicero's *De oratore*, II, lxxiv, 299.

shining, or as the meeting of two straight lines always forms two right angles or angles equal to two right angles, then we always make the same judgment. But if the object appears one way at one time and another way at a different time, as a tower seems round from a distance but from close up seems square, or as a rod is perceived as bent when it is half in the air and half in water and as straight when all of it is in the air, then different judgments are made, and not the same. And so I say that the first judgments cannot be changed (because what appears in the object is not changed), and therefore the mind cannot escape them; the second judgments can indeed be changed (inasmuch as what appears is changed), but the mind cannot therefore be freed from preconceived notions since new ones occupy it when the old ones are abandoned.

Secondly, even if I granted that the mind is liberated and is like a *tabula rasa* on which no judgment has been traced, you assume that "it can deduce some conclusions from principles"; but this too appears to be impossible. Clearly if it has no preconceived notions, then it does not have any principles; for principles, as they are here understood, are statements; and statements are kinds of judgments in which something is either affirmed or denied. Hence these principles will be judgments, and inasmuch as they are conceived in advance, they are preconceived notions. Therefore, if the mind has no preconceived notion in it, neither will it have any principles from which it may deduce something. Will you say that when it lays aside its preconceived notions, the mind casts off even the copulae of a statement, namely the words "is" and "is not" which join the terms, as they are technically known, but that it does not reject the terms themselves, or the simple notions of the terms, from which the mind constructs new principles and thence new judgments? Anyway, you agree that statements can be broken down in this way; since no new evidence appears which convinces us that any different relationship than the one above is to be enunciated, it follows that the statements about reality will be neither new statements, nor opposite ones, but the same ones as before, and so the same

preconceived notions will crop up again. Consider the sun and light separately however long you want, and likewise the meaning of two straight lines separately from the two right angles or the two angles equaling them; when it comes finally to connecting the terms, or attributes, to the subject, you will use no other connective than this very word "is." You will never say, the sun "is not" luminous or the meeting of two straight lines "is not" the cause of the formation of two angles which are either right or equal to two right angles.

Thirdly, granted that the mind may retain some principles from which it may draw conclusions, you assume that they are "not obscure and uncertain, but very evident and certain." But, finally, this too is impossible, namely that there should be different principles from the ones that already were, that is to say some that are self-evident and certain, and the majority obscure and uncertain. The majority, I say, are such because of the fog shrouding the mind and human weakness; for however pure and sublime the mind may be by its nature, it is nonetheless immersed in the body's mass, on whose functions it depends, by which it is confused and shackled. At least, after this liberation from preconceived notions, it remains equally inclined to assent to false principles as to true ones in the event that the former should turn up first and appear to be fact; and you cannot induce any reason why in this state of equal inclination false principles must come to the mind seeming only apparent and obscure and therefore uncertain rather than seeming evident and therefore certain. For the mind will be as if it were at a crossroads, and it will be a matter of chance whether one set of principles offers itself, or another, and whether it accedes to the first, to the ones that make a stronger impression by the mere fact that they appear to be real, rather than to the others.

Article Five: It is true that any sense impression may be misleading; but not that all sensation is false, and not that a man who is awake cannot be more certain that he is awake than that he is asleep

Then, coming to the heart of the matter, and as if to undermine the very foundations, you give reasons why the senses are misleading, which makes all things subject to doubt for you. This is because "whatever you have admitted as most true until now, you had in fact received from the senses or through them, and you had learned that sometimes they could be wrong; therefore, you decided that it was the part of prudence never to have complete faith in them, as they had once deceived you." Now in this you acted as if you had decided never to take any food on the grounds that food had once been harmful, since prudence demands that whatever had once been harmful should be avoided. But in fact prudence does not dictate that no food is to be trusted because a certain food has occasionally been harmful, but rather that we should be forewarned against noxious food and that we should make use of foods that have always been beneficial; nor does it therefore dictate that all sensation is subject to doubt or must be held false because a certain sensation has occasionally been wrong, but rather that sensation subject to doubt should not be held certain and that the false must be rejected, also that sensation that has always been discovered true and for which there is nothing that proves it false must be accepted as true. Thus, if someone asks concerning a tower seen from a distance if it is square or round, it is right to restrain our belief in appearances no matter how much it seems round because in other cases we have discovered that a tower appearing round from a distance was square seen from close at hand. But if the tower seen from close up appeared to have no corners and to be quite rounded, then I cannot see why any desire to restrain our belief in appearances or any doubt whether it is round and smooth rather than square would occur to anyone except those you call "not of sound mind." Likewise, even though a man may have been

deceived when he judged that a rod part in the air and part under water was bent, yet since it seemed straight after it had been withdrawn from the water and was wholly in the air, there is surely no reason why this sense impression should also be suspected of deceiving us.

You will say that you held all things suspect for only a while and until the time you could separate the certain from the uncertain—that is indeed a useless roundabout journey, and one that does not produce any greater profit on its return than what it took with it on its departure; and when the whole course of the *Meditations* has been completed, no one knows more certainly that the tower seen up close is smooth or that the rod seen in the air is straight than if he had stayed on his own doorsill. You also argue against yourself that "it is so clear to you that you are sitting there, that you hold a paper in your hands, that you have these hands, this body, and so forth that to doubt such things seems as mad as those lunatics who imagine they are kings when they are very poor, or that they have heads of clay, or that they are gourds, or blown glass." Still, you answer that "you do doubt these things because you might be asleep, and in sleep you frequently experience things, and sometimes even less plausible things, than the things that these lunatics experience awake." What more can be said here than what has already been suggested, that we hold opinions regarding you that are truer than the opinions you yourself hold?[6] Indeed we are quite sure that you were awake when you examined these questions and wrote them down; for otherwise, if you had really been sleeping, they would not have come to us. I will add that this subtlety seems to me clearly superfluous (although Socrates frequently expressed the same idea, saying "At this moment, are we dreaming and imagining all the things in our minds or are we in fact awake and carrying on a conversation among ourselves?", and I do not say, as some have, that this is mere caviling or sophistry).[7] For however much we may not be able to distinguish in sleep

[6] In Article Three, not included in these selections.
[7] *Theaetetus*, 158B.

whether we are sleeping or awake, there is no doubt at all when we are awake and not sleeping; and to ask for any other argument to prove this other than its mere self-evidence seems the part of a man with some leisure time to waste, or like someone who disregards the midday sun and asks for a small torch to look at something. Obviously, whatever argument you may dream up, it will not be of any profit for a sleeping man, nor will it make a waking man any surer he is awake. In one word, this roundabout way does not succeed in making doubtful things which the senses showed certain.

[*With characteristic scorn Descartes refused to answer the arguments raised in Gassendi's* Rebuttals. *However, when his friend and translator Clerselier sent him extracts of what were considered its most telling points, Descartes responded, on 12 January 1646, with an eight-page letter, excerpts of which will be inserted at the appropriate points here. Only the major passages of the letter will be given.*

Sir,

I am greatly obliged to you for having noted that I neglected to answer the huge book of rebuttals that the author of the Fifth Objections produced against my Replies and for having begged some of your friends to bring together this book's strongest arguments and for having sent me the extract they made of it. In so doing you showed more concern for my reputation than I had, for I assure you that it is completely indifferent to me whether I am esteemed or scorned by men who could have been persuaded by such reasoning. The finest minds I know who have read his book have informed me that they found nothing in it to give them pause; they alone are the men whom I desire to satisfy. I know that most men take more notice of appearances than of the truth and judge badly more often than well; that is why I do not believe that their approval is worth my going to all the trouble necessary to acquire it. But I cannot fail to be grateful for the summary you have sent me, and I feel obliged to answer it, more out of recognition of your friends' efforts than out of the necessity of defending myself; for I think that those who took

the trouble to compose it must now judge as I do that all the objections that this book contains are founded only on the misunderstanding of several terms or on a few false suppositions. I think this because all the objections that they noted are of that nature and because they have still been so diligent that they have even added a few objections that I do not remember having read in it.

They note three against the First Meditation, namely: (1) "that I require an impossibility when I insist that every sort of preconceived notion be abandoned; (2) that while trying to abandon them, one adopts other preconceived notions that are more prejudicial; (3) and that the method I proposed of doubting everything cannot be of service in the discovery of any truth."

The first of these is based on the fact that the author of this book has not taken into consideration that the term "preconceived notion" does not apply to every idea in our minds (I admit it would be impossible to strip ourselves of them all), but only to every opinion lodged in our belief by judgments that we have made previously. And since to judge or not to judge is an act of the will, as I explained in its place, it is self-evident that it is in our power; for, after all, in order to strip ourselves of every sort of preconceived notion we need do no more than to resolve ourselves neither to assert nor to deny anything that we had asserted or denied previously, except after having examined it once again—although this does not mean that these same notions are not retained in our memory. Nevertheless, I said that it was difficult to dislodge thus from our belief everything that we had previously lodged in it, partly because one must have some reason for doubting before determining on such a course (that is why I proposed the principal reasons for doubting in my First Meditation), and also partly because no matter how resolved one may be to assert or to deny nothing, one easily forgets later on unless the idea is firmly implanted in one's memory; that is why I wished my readers to reflect with care on the matter.

The second objection is nothing but a manifestly false presupposition; for, even though I said an effort was necessary to deny things we had asserted too strongly previously, I explicitly limited this to the time during which we exerted our attention to seeking something more certain than anything we could deny

in this fashion, during which time it is self-evident that one cannot adopt any preconceived notion that is prejudicial.

The third objection also contains nothing but cavils; for although it is true that doubt alone does not suffice for the establishment of any truth, it is nonetheless useful in the preparation of the mind for the eventual establishment of one; and that is the only usage that I made of it.]

Against the Second Meditation, which deals with the nature of the human mind, and that we know it better than the body

DOUBT ONE. OF THE USELESSNESS OF THE PRECEDING PRELIMINARIES TO MAKE ANYONE CONCLUDE THAT HE IS BECAUSE HE THINKS, THAT HE CAN DEDUCE ALL THINGS FROM THIS PRINCIPLE, AND PARTICULARLY THAT HE IS NOT A BODY

Concerning the Second Meditation, I see that you persist in the same fiction, and that nevertheless you notice that at least YOU ARE while you are being deluded and that therefore "you establish that the statement 'I am, I exist' is true whenever you make it or conceive it mentally." Still, I do not see that you needed so many preliminaries when it was true that you are and you were sure of it for other reasons. And yon could have drawn the same

conclusion from any other act of yours since it is obvious to the natural light[8] that whatever acts is.

You add that "nevertheless yon do not understand well enough what you are." I take you at your word and willingly grant that this is the real problem. This, it seems, is what reqnired investigation without all those assumptions and beating around the bnsh.

As a result of all this, yon want to examine "what sort of thing yon had believed you were so that once you have gotten rid of everything doubtful only what is certain and unshaken will remain." Surely no one will object to your doing this. Getting down to work, you ask "What is a man?" since you have always believed you were a man; and having deliberately renounced the common definition, you choose the first things that come to your mind, snch as that "you have a face, hands, and other limbs," which you designated by the name of body, and likewise that "you eat, you walk, you feel, you think," which you attribute to your soul. I agree with that; only let us be careful of your distinction between the body and the soul. You say that "you had not turned your attention to what a soul was, but that you imagined it was something like a wind, a fire, or a gas which was diffused through the more solid parts of your body." That remark is worth remembering. "Concerning the body, you did not doubt that its nature lay in the fact that it was something capable of having a shape, of being contained in a place, of filling a space and excluding any other body from that space, of being perceived by touch, sight, hearing, smell, and taste, and of being moved in several ways." Now you can still attribute those things to bodies today, as long as you do not ascribe all of them to every body, for if the wind is a body, it is nonetheless

[8] This term, or as it will often be translated "the natural light of reason," was utilized by Gassendi, Descartes, and the entire century to refer to reason in general, or a universal faculty shared by all mankind that could be expected to arrive at the same conclusions. Descartes, who, along with his followers, particularly favored the term, defines it as the faculty that distinguishes the true from the false.

not perceived by the sight, and as long as you do not exclude other qualities, for wind, fire, and other elements cause movement. I do not see how you can maintain what you then add, that "you denied bodies the power to move themselves," as if every body had to be immobile by its nature and all its motions proceed from an incorporeal source, as if we must think that water does not flow, or an animal walk without an incorporeal mover.

[DESCARTES'S] REPLY

You continue to let a false show of rhetoric usurp the place of reasoning; for you imagine that I am jesting when I act in all seriousness and you take seriously, as though it were said and affirmed as true, a statement taken from the common opinion of others that I proposed only as a question with the intention of investigating it later. For when I said "all testimony of the senses is to be held uncertain, even false," it was entirely in earnest, and so essential for the understanding of my *Meditations* that anyone who will not or cannot grant it is incapable of making any objections worth answering. But let me remind you of the distinction that I have underscored in several passages between the acts of daily life and the inquiry after the truth. For when it is a matter of regulating our lives, it would clearly be foolish not to believe the senses, and obviously those Skeptics deserved to be laughed at who so neglected human things that they had to be guarded by their friends to keep them from falling into precipices. That is why I claimed somewhere[9] that "no one of sound mind could seriously entertain doubts about such things." However, when we are inquiring if something can be known very certainly by the human mind, it is clearly unreasonable not to be willing to reject in earnest these same things as doubtful, even as false too, in order to see that some other things, which

[9] In the final paragraph of the Synopsis of the *Meditations*.

cannot be rejected in this way, are therefore more certain and really better known to us.

Concerning my remark that I did not sufficiently understand what sort of thing something that thinks is, you are not acting in good faith when you take it seriously, for I had explained my meaning; the same is true for my statement that I did not have any doubts about what makes up the nature of body, or that the power to move itself was not to be attributed to it, or that the soul is to be imagined like a wind or a fire, or other such things which I had only retained from common opinion in order to show them false in their place. Can you call it good faith when you say that "I attribute eating, walking, feeling, etc. to the soul" and then add immediately after "I agree with that; let us be careful of your distinction between the body and the soul"; for shortly after that I said expressly that I assigned eating to the body alone, that I assigned walking and feeling also for the most part to the body, and that I attribute nothing that pertains to them to the soul excepting only anything that is a thought?

Next, what reason do you have to say that "there was no need for so many preliminaries to prove that I exist"? On the contrary, your own very words make it seem to me that I have the greatest reason to believe that I had not yet given sufficiently long preliminaries if I have not yet been able to make you understand the matter correctly. For when you tell me that "I could have drawn the same conclusion from any other act of mine," you are very far from the truth since I am completely certain of none of my acts except the mere act of thinking (at least with that metaphysical certitude of which it is a question here). For example, it is not admissible to infer "I walk, therefore I am" except insofar as the awareness of walking is a thought. This inference is certain only when it is drawn from the thought, not from the motion of the body, which does not exist sometimes in dreams when it still seems to me I am walking; so that from the fact that I believe I am walking, I infer most correctly the existence of the mind that believes this, but not however the

existence of the body that is walking. And the same applies to other acts.

Rebuttal. Article Two: The skeptics are vilified without justification; they left everyday conduct and appearances (ta phainomena) *quite intact and raised controversies only over matters that were genuinely obscure and uncertain*

In my opinion, that distinction "between the acts of daily life and the inquiry after truth" is totally justified; but in this matter you have recourse to it to no avail, and your formulation of it, so it seems to me, is less satisfactory than the skeptics'.... Therefore, I shall touch upon this point only: Their way of distinguishing between the acts of daily life and the inquiry after truth resulted in their rejection of indifference in questions about everyday conduct and their endorsement of obeying their country's laws, of passing judgment in cases of necessity, of offering their services, in a word, of doing everything that good men and citizens do, both privately and publicly. Concerning the inquiry after truth, they made a further distinction, establishing the difference between *ta phainomena*, "the things which appear to the senses," such as fire's warmth, honey's sweetness, and all similar things and *ta nooumena*, "the things which are understood by the mind," such as what we call inner and proximate natures and causes and the properties of these same things. Next, though they considered the second class of question uncertain, none the less they accepted the first class except when they felt like taking on the insolence of the dogmatics in dispute. So, for example, when the question of honey's sweetness was raised, Pyrrho or anybody else would answer that it appeared sweet to him and he was sure of that fact; but he said he did not know whether honey was sweet by its nature, or bitter, or of some other taste.... It seems certain that the skeptics, accepting appearances, insofar as they appeared so, and in whatever way they did appear, in the meantime never making pronouncements about the inner nature, truth, causes, effects, properties, or modes of anything,

continually inquired about everything; that these men, having normal reactions in the daily conduct of their lives, remained devoid of any prejudices and retained complete liberty of mind. You act differently; for you do not accept the appearances of the senses, but consider them uncertain and false; and as they cannot be of any service in life's necessities according to such a system, you consider certain, on the other hand, questions concerning inner natures. And so, either you do not rid yourself of preconceived notions, or you fall upon new ones, as can be proven by the fact that you behave like such an ardent dogmatist.

Article Five: It is in vain that you sweat to establish your "I am" as an unshakable principle, especially for one who has been stripped of all preconceived notions

... In this passage, I will speak only of that Archimedean fulcrum which you boast you have discovered, having argued in the following fashion:

"If any man establishes one certain and unshakable principle from which all other things which are known with certainty can be deducted as necessary consequences, he fulfills great expectations;

"Now I establish one certain and unshakable principle from which all other things which are known with certainty can be deduced as necessary consequences;

"Therefore, I fulfill great expectations."

And you cannot deny that your line of argument is of this sort without denying yourself, or your whole work. I will not even say anything about the major premiss since the reasoning is valid whether this hypothesis is possible or impossible. The minor premiss has two parts. The first is that "you establish one certain and unshakable principle," the second, that "from your principle all other things which can be known with certainty are deduced by necessary inference." You prove the first part by offering the

principle, or the statement "I am" at the same time confirming it by adding this reason "for I think." Truly, as for me, when I came to that place in my first reading of your *Meditations* where I hoped to find the truth unheard until this time which was to be the foundation of all truths, or of all true statements, I cried "Good God! is this the new thing that had to be sought out with so many preliminaries and so much effort, that "you are." Clearly this pronouncement had been lurking in shades darker than the Cimmerians',[10] unknown to you, so uncertain that if anybody had asked you before that day, "Descartes! do you exist?" you would not have had anything to answer, for it would have been a surprising, unexplored, unknown question and you would have asked for several weeks or months (as you do of your readers) to ascertain something solid about it. Obviously all truth lay hidden from you before that day so that if anyone had asked you, "Descartes, do you know if two and three are five, or that a square has neither more nor less than four sides?" you would still have requested some weeks or months until it was firmly proven that "you are." You say that "you were not certain with that metaphysical certitude, that is, one derived from thought." But certitude knows no degrees; and if something can be added to it that makes it solider, it is shown by this very fact not to be solid. Therefore, either this new certitude of yours adds nothing, or if it adds something, it is an argument that what you called a certitude was not a certitude. And you may not say that previously you were certain, but that now you realize that it is possible you were mistaken then. For just as you now recognize that following these principles you cannot be mistaken, so, following those principles then, you recognized that you could not be mistaken. But let us not dwell on this subject; you take it upon yourself to prove something that no one would have disputed you, but that you did not think solid nnless you proved it in your way.

Come then let us explore your reasoning in a kindly spirit: "I think; therefore I am." Fine! But do you remember that you

[10] Ancient mythology held that this people lived in perpetual darkness.

are in a situation in which you deem false whatever you had known up till then? And in that situation you put aside all preconceived notions (anyway, let us here grant that it is not a preconceived notion to deem everything false), to the point that, once stripped of all judgments, you are about to derive a whole series of consistent judgments from the one that you are establishing here. Doubtless you remember that. And I willingly grant that the memory or recollection is not a preconceived notion; nor do I require that you tell me why you speak, or how you understand what being is, what thinking is, and so forth. In short then, you say, "I think; therefore I am."

Article Six: The vanity of the preliminaries to this consequence: "I think; therefore I exist"

But first, it is pure chance that this thought "I think" should occur to the mind rather than some other one; for surely you cannot have it by your own choice since choice is a judgment and you have stripped yourself of judgments, and this "I think" holds first place in the series. Therefore, all the judgments which then are piled up on top of it are in no way necessary, but depend on the same chance as it does. Secondly, you say, "I think"; but what are you thinking about? For every thought is a thought about something. About heaven? the earth? anything else at all? about yourself? Until now you thought all things were false, and you have not changed your opinion; hence, whatever you think, you must think it is false, and therefore that this thought of yours is false. And therefore whatever thoughts you may derive from it consistently will be false.

Again, you say: "I think"; but when you say "I," do you know yourself or not? Without any doubt you know yourself, for otherwise you would not name yourself. Do you know that you exist or don't you? If you know you exist, you have a preconceived notion, which is contrary to your assumptions. If you do not know you exist, then you cannot know that you are

acting, for action, as they say, presupposes being. Therefore, you do not know that you are thinking, for thinking is an action. And so when you say "I think," you do not know what you are saying; consequently, whatever you think or infer from it will be based upon an absolutely unknown principle.

Furthermore, when you say "I think," you make a statement about yourself at the present time; it is the same as if you said, "I am thinking." In fact you are the subject and thought is the attribute. However, you cannot say that you are thinking without saying "You are." Logicians declare this when they teach that the verb makes a statement about time, namely *to nun huparchein*, the fact of existing now. Accordingly, when you say "I think," you are saying "I am"; and when you then draw the conclusion "therefore I am," you are adding nothing but what you have presupposed; and so you are proving something by itself.

To continue, when you say "I think; therefore I am," you are making an enthymeme [an incomplete argument in which one of the premisses is missing] which has no force as a proof other than the force it derives from the solidity of the consequence drawn from the premiss "whoever thinks is," a premiss that did not elude you in a passage somewhere else.[11] So a syllogism must be made up, either in the first and perfect figure, to use a technical term, as follows:

"Whoever thinks is; I think; therefore I am."

or in the fourth figure, generally disapproved of and called Galenic, as follows:

"I think; whoever thinks is; therefore I am."

But in either form, your collapse is evident. For if you draw your conclusion according to the first form, the statement "Whoever thinks is" becomes a preconceived notion, antecedent to the one you wish to establish as the first judgment. And according to the second form, your minor premiss "Whoever thinks

[11] Gassendi is referring in all likelihood to Descartes's Replies to the Second Objections (Adam and Tannery, VII, 140; Haldane and Ross, II, 38).

is" becomes a judgment that does not depend upon your statement "I think" and does not follow your conclusion "I am," upon which you want all judgments except "I think" to depend. From which it follows that whichever figure you accept, the truth, the knowledge, and certainty of that pronouncement "Whoever thinks is" is in no way deduced from the truth, knowledge, and certainty of your Archimedean fulcrum "I am," or of its basis "I think." In fact, do you realize that propositions can be deduced which are prior even to that one? For it is derived itself from the prior statements, "Whoever acts is; whoever thinks acts; therefore whoever thinks is." Are there propositions which are prior even to these? In fact, the statement "Whoever acts is" is deduced from these: "The posterior does not exist without the antecedent," and "Being is antecedent, action is posterior"; and the second statement is deduced from "Motion is an action," and "Thinking is a motion," and so on for the others.

Now from all this it is manifestly clear that you have used a fallacious line of reasoning to prove something that is otherwise true, clear, and obvious, namely that "you are." The weakness is not that the principle "I think" cannot be used validly to prove it, but that it cannot be of use with your presuppositions. I shall lay the whole matter out according to your syllogism so that it will be clear what necessary bond you established between the one and the other.

"If any man who is asleep, who is deceived by God, or who is deluded by an Evil Genius deems false everything that he had known earlier and is stripped of every preconceived notion, he concludes that he exists because he thinks;

"Now I, who am sleeping, deceived by God, or deluded by an Evil Genius, deem false everything that I have known earlier and am stripped of every preconceived notion;

"Therefore I conclude that I exist because I think."

Whoever can, may accept the cogency of the logic in the major premiss and believe that it is not possible without that hypothesis to conclude that one exists because one thinks or that it is impossible to come to no conclusion at all starting from

those assumptions. And anyone will realize what judgment to reach concerning the minor premiss from the objections we raised against the preceding Meditation.

[*Descartes's answer in the letter to Clerselier:*

Your friends notice six articles against the Second Meditation. The first is that the author of the Rebuttals claims that when I say "I think therefore I am," I assume the major premiss "Whoever thinks is"; aud therefore that I have already espoused a preconceived notion. Once again he abuses the term "preconceived notion": for although we may apply that term to the statement when we pronounce it without reflecting and when we believe it is true only because we remember having reached that judgment previously, still we cannot say that it is a "preconceived notion" when we examine it, because it appears so self-evident to the understanding that it cannot possibly help believing it, even though it may be the first time in our life that it reflects upon the idea, about which, consequently, it may have no "preconceived notion." But the most considerable error here is that this author assumes that the knowledge of particular propositions must always be deduced from universals, following the order of the syllogisms of formal logic. Here he shows that he hardly knows at all how the truth should be sought; for it is certain that in order to find it one must always begin with particular notions, only to come later to general notions, although in the opposite way one may also deduce other particular notions from general notions that have already been found. Thus, when you teach the elements of geometry to a child, you won't make him understand the general propositions "When equal parts are taken from equal quantities, the remainders are equal" or "The whole is greater than its parts" unless you show him examples taken from particular cases. It is his failure to have noticed this that has misled our author into the many false reasonings with which he has swollen his book; for all he has done is to fabricate false major premisses to his heart's content, as if I had deduced from them the truths that I have explained.

It is perhaps worth nothing that Descartes carefully avoids the famous phrase "I think therefore I am" in the Meditations. *We may assume that in his mind its substance is present there, for he never drew attention to its absence and answered objections, such as this one, which presuppose its presence. In fact, the incontrovertible principle of the* Meditations *is "I am; I am a thing that thinks."*]

Article Seven: It is false that everything else which is known is deduced as a necessary consequence from this principle, once it is established

The second part of the minor premiss taken up earlier remains, and I cannot grant it, namely that "everything else which is known certainly is deduced as a necessary consequence from the fact that you know that you are because you think." What was said a few pages earlier applies here. It was shown there that at least the statement "Whoever thinks is" and those prior to it do not depend upon your proposition since it depends upon them. Another consideration is that even though there is nothing that you can know is certain or uncertain except that you are and that you think, still there is no necessity for you to think that you are, or for you to think that you know surely and without a doubt that you are, or for you to think that you are so sure of this and do not doubt your existence because of the fact that you think; there is, I say, no necessity for you to have these thoughts in order to be able to be sure that it is daylight when the sun shines, that you get hot when you go near a fire, and all sorts of other things like that.

Finally my criticism will apply whenever in the course of your *Meditations* you bring these propositions up to prove some portion of your argument. For once you have made this your starting point, after you have made your premiss that "it is settled that this statement 'I am, I exist' is true whenever it is pronounced or conceived by my mind," you continue that "I do not yet understand well enough what I am, I who henceforth exist by necessity, and consequently I must be careful not to mistake something else for myself unwisely or accidently, thereby misleading myself in the very knowledge that I claim to be the

most certain and evident of all. That is why I shall now meditate at last[12] on what I used to believe I was, and so on. . . ." My first remark is that a transition from one topic to another is not a necessary deduction derived from a necessary interconnection. For after you have concluded that you are because you think, then any other project besides inquiring into your nature and getting to know it certainly may come to mind; and this is all the more true because your thought, whether of the sun, the moon, the earth, or anything else, can lead you to some other thought.

To continue, the knowledge of the existence of a thing has no necessary connection with the knowledge of its essence or inner nature, for otherwise we would know the nature, essence, and inner depths of anything that was obvious to the senses or whose existence we knew of in any way at all. Hence from the fact that you may know that you exist, it cannot be inferred that you know or can know your nature. Furthermore, since whatever is known to exist is known to exist because of its action, or its quality, or some other attribute, that action, quality, or attribute cannot be said to constitute its entire nature unless it is admitted that whatever is known about anything at all and proves that it exists, no matter how little that may be, is that thing's entire nature. Since that would be absurd, you must be sure "to understand yourself well enough" not only so that you will not unwisely mistake something else for yourself, but also so that you will not mistake something insufficient for yourself, for example you might believe that your entire nature lay in this act of thinking from which you know that you exist. Finally, on the basis that whoever proves nothing more than he assumes argues circularly and adds nothing new, it seems that in order to know yourself sufficiently (for you do not know yourself sufficiently when you know that yon think and therefore are), you have to be careful not only not to take something else for yourself, but also not to attribute to

[12] This is a misquotation of Descartes, who had written "once again" (*denuo*), not "at last" (*demum*). Gassendi had evidently missed or overlooked the reflex motion of Descartes's thought as it returns to the same subject.

yourself only what you already know of yourself. For example if you start from the fact that you already know that you think or are a thinking thing, and if you should then take this very fact for your principle and not prove anything else but that you think or are a thinking thing, you can see that this would be circular and that nothing new would be known. But these considerations concern the things that follow.

DOUBT FOUR

Rebuttal. Article One: On the misuse of the words soul and mind, and on thought in the womb and during drowsiness

You are mistaken when you say that I sought to obscure matters by equivocating on the word "soul," for you will find no one who loves clarity more either in thought or in speech, who acts more frankly, who quarrels less over a word or a name, who strives less to acquire a reputation for subtlety from obscure or equivocal words. I would much prefer to appear mad than to speak in a way that would make work for a listener or a reader or in a way that not everyone could understand what I mean and feel that he could follow in his mind the thought I had in mine. If in fact it is not sublime, it is nonetheless easy to grasp. And if there is something that I do not grasp, I frankly confess I do not for fear that others might complain that they are being trifled with if they do not grasp it. Consequently, I am astounded that you say I sought to obscure matters when I sought only clarity in matters where you spoke obscurely, where therefore you had the opportunity to give more enlightening distinctions and explanations.

At this point I began to call you "Mind" after you had begun to speak of yourself as a mind rather than a soul, not detained by the fact that you wished to be considered a mind even though

you did not speak as a mind, but in a mingled and confused way, sometimes as a mind, sometimes as a whole man. So I do not admonish you as another would over the fact that you decide the principle by which we feed ourselves is to be distinguished in its entire nature from the one by which we think; instead I accept simply what you say, that you consider the mind or soul not as a part, but as the entirety of that soul which thinks. And I do not insist on the fact that there would therefore be two souls in man and in every animal, one the source of thought, the other the source of nutrition, growth, and generation, or else nutrition, growth, and generation would in fact pertain to some principle other than the soul.

Moreover, concerning the question which perplexed me, whether you judged that the soul or mind always thought, you yourself admit that "it thinks even in drowsiness and in the womb." And as I indicated earlier that I did not wish, if that was your opinion, to molest you by asking if you remembered the things that you thought at such times, you grant that you do not remember them because there are no traces of the thoughts imprinted on the brain. If I ask you at this point just what argument you have to make you believe that you did think at such times, you surely would not offer your experience in testimony, but rather that definition of yours, according to which you describe the mind as a thinking substance. And you recognize that if someone else were to define a substance that was thinking, or produced thoughts, or was capable of thinking, he would not be forced to admit that even a drowsy man thinks. For you do not admit from any other reason or necessity except that you define things on the basis of their action rather than their capacity to act; but there is no necessity for that, and it cannot be proved without begging the question that any necessity obliged you to do so.

I pass over the subject of thought in the womb. If the embryo thinks anything there, it is clearly apparent that it is not about the heavens, or the earth, or the light, or about its own body, or its soul, or anything else inside or outside its envelopes, but at

the most about the abundance or lack of food, about a comfortable or uncomfortable position, or little things like those which apply especially to touch; nor shall I myself dwell on whether it thinks continuously and almost continually or without stopping or intermission at all; you who have keener sight and see through things, say whatever you want.

Article Three: Again, this reasoning is invalid, and it is not proven here, as the Sixth Meditation assumes it is, that "I know myself, to speak precisely, only as a thinking thing; therefore I am only a thinking thing"[13]

About this passage, where you had said that "perhaps the things which I assume are nothing (such as all bodies, especially the most

[13] Gassendi's point in this article is probably well taken. Descartes argues here, as elsewhere, that all he can know about his self at this point is its thinking dimension; he cannot say whether or not thought depends on the existence of a body. For the moment he sets aside the possibility of a corporeal dimension as unproven. Later he speaks of it as disproven. Gassendi would not accept, and does not see, the intermediary step which establishes the principle that what is clearly conceived as separate is separate in fact.

Descartes was sufficiently impressed by the difficulty raised here to answer it in the letter to Clerselier. He focuses on the ambiguity of the terms "to speak precisely" and "only." They may modify "I know" or "thinking." In the first case they would mean "precisely speaking all I know is myself as a thinking thing." In the second, they would mean "I know that I am only a thinking thing, no more." Gassendi assumes with some reason that Descartes is taking them in the second sense.

Here is the somewhat murky passage from the letter to Clerselier: "The first [ambiguity] is on page 63, where, because I said in one place that during the time that the soul doubts the existence of all materials things, it knows itself to speak precisely only, *praecise tantum*, as an immaterial substance; and seven or eight lines later, in order to show that I do not intend to make a total exclusion or denial by these words *praecise tantum*, but only an abstraction of material things, I said that in spite of this, we are not certain that there is nothing corporeal in the soul although we are not aware of any such thing—because I said this, the author treats me so injustly that he tries to persuade

refined, like wind and such) are something and not different from the self that I know (namely, a thinking substance), but I do not know this and will not discuss it now," I had commented: "But if you do not know this and do not discuss it, why do you affirm that you are none of those things?"[14] Why aren't you a wind or some other of the refined bodies you listed above? In your answer you complain "that I had said that you affirmed something which you did not know." However, with the words cited above before my eyes, I do not believe I need make any retractions, above all since it has been shown that either you made an unfounded affirmation, or you had no proof when you concluded that "I am therefore, to speak precisely, only a thinking thing." It seems better to accept your frank confession, and as I did at the end of this Doubt, to remind you again here please not to forget that after saying that "I am therefore, to speak precisely, only a thinking thing," you said you did not know, and would not discuss at this point, "if you are an assemblage of members which is called the human body, or some refined gas diffused throughout its members, or a fire, or a vapor, or a breath, etc."

From all this then two things follow: the first is that later on when we arrive at your proof in the Sixth Meditation, if you are caught without having proven anywhere that you are not an assemblage of members, or a refined gas, a vapor, etc., yon will not be able to claim that such a statement has been either proven or conceded. The second is that you had no right to conclude so hastily with these words, "I am therefore, to speak precisely, only a thinking thing." Now just what does that word "only" mean? Doesn't it restrict you, as they say, to being

his reader that when I said *praecise tantum* I intended to exclude the body, and hence that I contradicted myself later on when I said that I did not intend to exclude it. I make no answer to the ensuing accusation that I assumed something in the Sixth Meditation that I had not previously proven, thereby committing a paralogism; for it is easy to recognize the falsity of this accusation, which is only too commonly made in this book, and which could lead me to suspect that its author had not acted in good faith, if I did not know his character and did not believe that he was the first to be deceived by such a false belief."

[14] In Doubt Four, not cited here.

only a thinking thing, and exclude all other possibilities, among which are an assemblage of members, a refined gas, a vapor, a breath, and other bodies? But even though you are a thinking thing, do you know in addition to that that you are none of the others? You answer explicitly that you do not know. "I do not know this," you say, "and will not discuss it now." Then why do you say that "you are only a thinking thing"? Aren't you saying something that you do not know? Don't you infer what you do not prove? Don't you tear down what you think you are building up? Anyway, here is your reasoning:

"Whoever knows that he is a thinking thing and does not know if he is anything else besides, such as an assemblage of members, a refined gas, etc., he is, to speak precisely, only a thinking thing;

"Now I know that I am a thinking thing, and I do not know if I am anything else besides, such as an assemblage of members, a refined gas, etc.;

"Therefore I am, to speak precisely, only a thinking thing."

I will not go into detail to disprove this; it suffices to have put it down as it is. I only add that inasmuch as the major premiss seems so absurd, I was not off the subject when I warned you earlier to be careful not only not to mistake something unwisely for yourself, but also not to mistake something insufficient for yourself and because you know something about yourself not to believe that it is your entire nature. Moreover, I now add that you could have reasoned correctly only by arguing in the following manner:

"Whoever knows that he is a thinking thing and does not know that he is anything else besides, such as an assemblage of members, a refined gas, etc., he knows himself, to speak precisely, only as a thinking thing;

"Now I know that I am a thinking thing, and I do not know that I am anything else besides, such as an assemblage of members, a refined gas, etc.;

"Therefore I know myself, to speak precisely, only as a thinking thing."

In this fashion, you would argue correctly and conclude truly, and no one would have been upset at you, but would merely have looked carefully at whatever deductions you could make; now, on the other hand, since there is so great a difference between these two conclusions "I am, to speak precisely, only a thinking thing," and "I know myself, to speak precisely, only as a thinking thing," who will tolerate your paralogism as you proceed from what you know to what you are?

DOUBT SIX

Rebuttal. Article Three: Once again, it is far from true that a man who sees clearly that the mind thinks therefore sees clearly the entire intimate nature of the mind

Since on the other hand you give yourself so much glory for having discovered clearly and distinctly the nature of the mind and for having disclosed it to mankind, let us stop here a while and let us expand a little further on what has already been suggested. "The entire nature of the mind," you say, "consists in the fact that it thinks." Obviously a great new discovery, unheard of: the human mind thinks! and what is more, its nature lies entirely in the fact that it thinks. Indeed until now all men, and especially the philosophers, have been stupid, for they did not notice that the mind thinks! How laughably foolish they were to investigate it or want to know anything about it except the one fact that it thought! Oh, if nothing else was to be produced by all that effort, you could have spared yourself such toil. Really, you have introduced nothing new by asserting that the mind thinks, and you have not fulfilled the desires of the learned by asserting that the entire nature of the mind is in the fact that it thinks.

What if someone asked you just what you understand by the noun "nature"? Is it not the underlying component (*principium*)

of all properties, faculties, and operations? And when we ask to know the nature of a thing, aren't we asking to know that underlying component and what it is like? Are we perplexed by its operation? Do we doubt that such and such an operation belongs to it? whether such an operation stems from such an underlying component? And if everyone admits this fully, doesn't the difficulty remain of knowing just what sort of thing it [the underlying component] is? If this method of philosophizing of yours was sound, what property and what nature in the world would then remain hidden? And if anyone struggled to explore and investigate the nature of the magnet, wouldn't he be very silly since he should consider himself satisfied by this little formula of yours, that the entire nature of a magnet consists in the fact that it attracts iron and points toward the poles? The same sort of thing may be said of everything: a stone's entire nature consists in falling earthward, a fire's in heating, a horse's in running or whinnying; thus it will be enough to know the action of a thing to declare immediately that the entire nature of the thing consists in the fact that it performs that action. Nor will it even be necessary to peer into its substance, to penetrate and lay open all its parts, to study its positions, its modes, its conditions. And if no one is so ill advised that he trusts you in these matters, and leaves off philosophizing (for there is no reason to toil once you have made so public the nature of things), there will also be no real reason for him to believe that the entire nature of the mind consists in the fact that it thinks and that consequently there is no search to be made beyond thought itself to know the underlying component of thought in order to distinguish, if possible, what sort of thing it is, how it exists, how it holds together, how it acts, whether it has certain faculties and functions, whether or not it has parts, and if it has any, what kind they are; if it does not have any and is indivisible, how it arranges itself in so many different forms; how it performs so many functions; by what means it deals with the body; by what means it goes beyond it; how it lives without it; how it is moved; and myriads of such questions.

Perhaps you will say that though others restrict thought to

one form of internal function, you have included various forms of operation which should therefore be considered as thoughts, namely doubting, conceiving, affirming, denying, willing, refusing, imagining, seeing, hearing, and the other sensations, and that you have learned or even shown that there are no other functions which the mind can perform and that its entire nature consists in performing these. But still, no matter what some may think, that is an ancient and well-known opinion of the most noble philosophers, and one expressed in our day in the words "the mind sees, the mind hears." And as far as I know, there was never anyone who did not believe that all these things that you list and several others too were thoughts or who asserted at least that they occurred without thought. This is why they commonly set themselves problems and then answer them, such as how it happens that even though our eyes are open and our ears unstopped, we notice that we have not seen something right in front of us or heard some words pronounced in our vicinity. The reason for this is that the faculty of seeing or of hearing is either the same as the mind or at least does not function at sensing objects without thought and attention on the mind's part and does not work, exactly as the finest crew is useless for gaining port without the direction of the helmsman who holds the rudder.

Our point of contention is merely the question whether the thing or substance called the mind has only the power to think, that is to doubt, to conceive, to affirm, to deny, to will, to imagine, and to perceive sensations, or whether it has in addition the power to inform the body, to dominate it, to move it, and to direct it, whether it also has the power to nourish the body after having taken in food, to make it grow, and to generate another like itself from semen it has prepared, and whether it has the power to remove itself from the same body, to move itself from one place to another, to set something else in motion, to receive motion from another, and innumerable other things. You may announce that the mind has none of these beyond thought, or doubting, conceiving, etc. Others think the contrary is probable,

or at least withhold their consent and do not announce themselves rashly and foolhardily in a matter unknown to them. And so it happens that while they seem to philosophize correctly, you seem always to be deluded by your error in logic derived from the preconceived notion according to which you judge that your knowledge must be their measuring rod, not only of all things that man can know about a certain thing, but also of the things that are in it. Thus your reasoning is as follows:

"The whole nature of the mind is no more than what I know about it;

"Now I know only this about the mind, that it thinks, or doubts, conceives, affirms, denies, wills, refuses, imagines, and perceives through the senses;

"Therefore the whole nature of the mind is that it thinks, or doubts, conceives, affirms, denies, wills, refuses, imagines, and perceives through the senses."

[*Let us insert here two sections of the letter to Clerselier that apply more or less to these pages:*

> The second objection your friends notice is that "in order to know that one is thinking, one must know what thought is; but I do not know that, they say, because I have denied everything." But I have only denied "preconceived notions," and not notions like this one which are known without assertion or denial.
>
> The third is that "thought cannot exist without having an object, for example the body." Here we must avoid the ambiguity of the word "thought," which can be taken for the thing which is thinking as well as for the action of that thing; now, I deny that the thing which thinks needs any other object than itself to exercise its action, although it may also extend that action to material things when it examines them.]

Article Four: It was not proven that the mind understands independently of the brain even though one is aware that one is dreaming during a dream

But let us leave these matters. You say that "you have also often shown distinctly that the mind can operate independently of the

brain." But, I beg of you, where have you once shown a thing of such great moment even confusedly, much less distinctly? It is certainly completely hidden from me. For when you detached yourself from yourself, when you considered yourself precisely as a thinking thing, still this was not done without the concurrence of the brain; and if you intended to prove that it was, you could only have recourse to the error in logic already mentioned so often. You say that "we make no use of the brain in pure understanding, but only in imagining and in perceiving through the senses." And what do you mean by pure understanding? And when, in what manner, and what have you understood purely? Do you remember any time or any thing that you understood purely and without using your brain? Or can anyone remember such a thing at your prompting? In fact not many pages back, you said that imprints in the brain were essential. Then if you cannot recall anything without any imprints in your brain and hence without using your brain, how will you know if you have ever understood something purely? And perhaps you might say that you understand purely things that are inferred by reasoning; but since nothing can be asserted in the major or minor premiss without the memory of the subjects and their attributes, since nothing can be inferred without the recollection of the premisses that have been agreed upon, how can these things occur without imprints in the brain? How can the mind reason independently of the brain?

You bring up the example of "the man who realizes he is dreaming while he sleeps." But does this realization occur without using the brain? You say that "what we dream is the operation of the imagination; what we realize is the operation of the understanding alone." But what need is there to have recourse to dreaming, in which this realization is not pure and clear, but only a confused and obscure reflection? On the contrary doesn't experience show that when we are awake not only do we imagine, but also we turn a pure and clear reflection on the things we imagine and so are able to distinguish better between the operations of the imagiuation and the understanding. Anyway, in

either case, it had to be proven that the imagination, or image-making faculty, and the understanding are really two distinct faculties, and not a single one that exercises two functions.

For the fact that it can realize that it is dreaming, or understand that it is imagining, is nothing more than the fact that it can think that it is thinking or perceiving one idea by another, which is the privilege of the internal faculty and is not granted to the external senses except in a far more imperfect way, for the external sense cannot exercise reflection except when an external body reflects the image either of its shape or of its voice. On the other hand the internal faculty works inside the brain and has within the brain the imprints of external appearances adhering to it, imprints transmitted from the organs and functions of the external senses and engraved there; and in addition to these it has the imprints of its own actions, in a word all the things necessary for reflection. Therefore, wheu it is dreaming it can recognize and scrutinize to a certain extent the things it is imagining with the same facility that it can recognize and scrutinize them when it is awake. And since we are often amazed when we are awake at the absurd things we think in dreams, it is not surprising that sometimes when these incongruities occur in a dream, the same sort of amazement is stimulated and consequently these things appear absurd although we are dreaming. This is precisely what happens to me when I seem to see men at the same time I remember they are dead. Immediately the thought occurs to me that I am dreamiug since dead men do not come back; and from this some indistinct confusion and commotion rises straightway in me, which wakes me up, or else if I begin to ask myself whether I am really dreaming, where I am, I who am dreaming, in what city, in what house, in what room, in what bed, all this to arouse myself or to find out the truth, I am at last awakened in equal confusion and commotion. Obviously, as we experience in other matters that we reason and give proofs in our dreams and perform all such actions just as when we are awake (for the images come to light in a certain ordered arrangemeut), so we can think something is absurd and be amazed at its absurdity, and reason about

it because things could not happen that way except in a dream, and likewise for similar activities. The same applies to what Socrates said about things we do while awake because of the memory of something we had dreamed.[15]

DOUBT SEVEN

Rebuttal. Article Two: The main difficulties concerning the substance of the wax that remains unknown are glossed over; and the same holds for the substance of the mind, even though the substances are considered after most of their accidents have been recognized and stripped off

I shall pause for a moment at the fact that once you had poured forth your bile you passed right over the difficulty and judged that it was enough if you gave it no answer. The question had been whether the thing, or substance, which thinks and is called the mind is perceived clearly and distinctly apart from any image of even the slightest body, in other words without exercising the imagination. You had affirmed this and I had denied it. You had brought up the example of the wax in order to prove that beyond the taste, odor, and other accidents perceived by the senses and beyond the mutability and extension perceived by the imagination there still remained the substance of the wax, which is in fact perceived neither by the senses nor even by the imagination, but by the understanding alone, and then clearly and distinctly. Hence the substance of the mind is perceived clearly and distinctly not by the senses or the imagination, but by the understanding alone. I had taken exception, for I understand that the wax or its substance should be something different from the attributes which you say pertain to the senses or the imagination,

[15] Socrates frequently mentions premonitions that come to him in dreams (e.g., *Phaedo*, 60C, 61A; *Apology*, 33C; and *Crito*, 44A–B).

but I do uot understand just what it is or what kind of thing it is; nor can it be disclosed or revealed to us stripped of auy of these attributes in the way a man can be revealed and disclosed stripped of the hat and clothes that you yourself had mentioned.[16] Accordingly I was astounded that you said that you had achieved the divestment of the attributes, as if they were clothes, and that you perceived more perfectly and more evidently what the wax was. By your leave, you did not perceive this more perfectly and more evidently any more than you would perceive more perfectly and more evideutly who the man was who had beeu hidden first under this hat and clothes, then under others, and then under even others, just because you understood that there must be some man under the different hats and clothes. You plainly glossed over these things.

Furthermore, I had taken exception on the grounds that whatever it is that remains after being stripped of the attributes as if of its clothes, it is perceived as something extended, not as a point, and as something with a shape (since it is not infinitely extended) and also as colored (since any bounded area is conceived with some vague color). Therefore, your understanding is a kind of imagination; and if you do not perceive that thing, to wit the substance of the wax, with some sort of extension, shape, and color, then you should say candidly exactly what you conceive it to be like. You also glossed over that objection.

And I had taken exception to you on the grounds that when you perceived that a man was hidden under the hat and clothes, that did not indicate so much the exercise of your mind as of your imagination. For while you deny that any dog has a mind and leave him with only an imagination, he also perceives that

[16] An allusion to the famous passage in the Second Meditation: "So I may by chance look out of a window and notice some men passing in the street, at the sight of whom I do not fail to say that I see men, . . . and nevertheless what do I see from this window except hats and cloaks which might cover ghosts, or automata which move only by springs? But I judge that they are men, and thus I comprehend, solely by the faculty of judgment which resides in my mind, that which I believed I saw with my eyes."

a man, or his master, is hidden under the hat and clothes, and even under a variety of different forms. You skillfully glossed over the force of this argument and merely said that "relying on you knew not what argument, I had affirmed as certain that a dog judged in the same way we did." Now obviously you had seen the argument; nor is the experience of occurrences similar to the one at stake unknown to you; but since you had nothing to answer, you went off on a detour and once again slipped away under a flood of ink, saying: "unless it is that when you see that it [the dog] is made of flesh, you believe that all the things that are in you are also in it." Then again, you add this, "But I, who notice no mentality in the dog, I think that nothing like the things that I recognize in the Mind will be found in the dog." Is it not true that if you think the existence of a mentality is evidenced by your realization that there is a man underneath when you see nothing but his hat and clothes, and if likewise a dog realizes that there is a man underneath when he sees nothing but his hat and clothes, is it not true, I say, that you should also think that the existence of a mentality like yours is evidenced in that dog?

Finally, I had taken exception to that inspection of the wax on the grounds that either the imperfect inspection or the more perfect one, either the confused one or the more distinct one applied only to accidents and changes in them, but did not apply to substance itself; consequently, from them we can conceive and explain what is understood by the name wax, but not, however, that bare substance which will always retain its hidden quality; for lying under the accidents there is always something indescribable subject to change. You also glossed over this and persisted in your reasoning as follows:

"Whoever considers a certain substance as if it were bare, after stripping off its accidents or external attributes like clothes, perceives it clearly, distinctly, in the understanding alone, and not in the imagination;

"Now I consider the substance of wax as if it were bare, after stripping off its accidents or external attributes like clothes;

"Therefore I perceive the substance of wax clearly, distinctly, in the understanding alone, and not in the imagination."

It is clear enough what opinion one should have of this reasoning from the doubt itself, to which no answer was given, and from the recapitulation that I have just made.

DOUBT EIGHT

Rebuttal. Article Two: What we know about things is not their inner nature, which God wills to keep hidden from us, for the knowledge that we would have of it is not as necessary as the knowledge of accidents

In this passage, if you believed that there was no further inquiry to be made because the capacity of the human mind could not penetrate further, you were quite right to believe so, as far as I can judge; and you were quite right also to add that "hence, the more attributes of a certain substance we know, the more perfectly do we then, understand its nature," if you meant this was exactly the degree to which we can be said to understand the nature of that substance. But, if you believed that on that account its substance, or its nature, what it is really like in itself, had been made clear or understood to the point that its inner qualities were no longer hidden, as far as I can tell, you are straying far from the mark which the weakness of the human mind can and should aim for. Indeed, since the attribute or property is one thing and the substance or nature to which it belongs or from which it emanates is another thing, therefore to know the attribute, or property, or a collection of properties is not to know the substance or nature itself. All we can know is this or that property of such a substance or nature if it is open to observation and becomes familiar by experience; nor do we penetrate in this way into the substance itself, or its inner nature, just as when we look at

gushing water, we know that this water comes from a certain source, but we do not therefore plunge the forward edge of our gaze into the inner and underground spring.

So it seems the good and omnipotent God established when he formed nature and left it to us to use. Indeed whatever it was necessary for us to know about any single thing he made open to us by assigning to things their properties by which they became known, and to us the different senses by which we apprehend them as well as the inner faculty by which we judge them. As for the inner nature and underground spring, so to speak, he willed it a secret on the grounds that it need not be known to us; and when we aspire or presume to know it, we are guilty of immoderation. Not that to know it does not indeed seem beautiful and desirable, but it is beautiful and desirable (as I often say) in the same way as it would be for us to have wings or to live in perpetual youth. To be sure, it is typical of a soul intemperate and ignorant of its condition to yearn or hope for the one or the other. And what would be the difference between man and God if man were aware of all the things in the works of God? if he could boast that he had so clear an understanding of the entire nature of a thing that God knew nothing more about it? Then it seems that the thrice great God acted the way the artisans do who construct automatons for our amazement. Just as they display their automatons to the crowd, just as they do not begrudge the exhibition of their admirable motions, and just as it would be an insult if the spectators grumbled when the artisans were unwilling to give away the internal mechanisms, so God, the artisan of the world and of all remarkable things from the greatest to the smallest, had the goodness not to begrudge us the contemplation of them, and it would be an offense to him if anyone complained that beyond those things which he willed we should know he did not also reveal the inner secrets of every nature or if anyone presumed to be able to know as much about them as he does.

But to return to my subject, since what you have proven in this Meditation of yours is nothing more than that the mind is a thinking thing, what more have you achieved than a man who

proved after strenuous work on magnets that a magnet is a thing that attracts iron and makes it turn toward the poles, as I said in the example already given. Now if we had not known that it is the property of the mind to think, we would be most indebted to you for showing us something unknown. But, on your honor, is it something new and unheard of that the mind thinks, that it is a thinking thing, that its property is to think? Is this what the very title of the Meditation led us to hope for? No more than if someone, having promised us something about the nature of the magnet in his title and that it would be made clearer than the sunlight, should teach us no more than what we all already had known for a long while, that a magnet attracts iron, or that it is a thing attracting iron, or that to attract iron is its property, and so forth.

[*The letter to Clerselier continues:*

The fourth is that "although I have a thought of myself, I do not know if that thought is a corporeal action or an atom in motion rather than an immaterial substance." Here the equivocation on the term "thought" is repeated, and I can see in it nothing more than a baseless question which runs something like this: you judge that you are a man because you perceive in yourself all the things which cause you to call whoever possesses them a man; but how do you know that you are not an elephant rather than a man on account of some other reasons that you cannot perceive? For after the thinking substance has judged that it is intellectual because it notices in itself all the properties of intellectual substances and has not been able to notice any of the ones that belong to bodies, they still ask it how it knows it is not a body rather than an immaterial substance.]

Against the Third Meditation, which deals with God, that he exists

DOUBT ONE

Rebuttal. Article One: On the order of the Meditations *and the contradictions that follow from the rule assumed at this point while there is no knowledge of God, which is left for the future*

What an excellent counsellor you are! how sure of yourself in a bad cause! I give full liberty to judge whether I have supplied any argument before now or whether you are right to claim the opposite[17] to those who wish to determine it. As for what concerns you, you felt that this little dust that you kicked up behind yourself like a cat would keep hidden whatever you had done. You also believed it worthy of your ingenuity to ridicule me by alleging that here was some kind of argument, which was not really an argument but that you immediately qualify as an appeal to authority and by accusing me of forgetfulness, I who had not kept in mind who you were, nor what your condition was.[18] In fact, although I had thought that I was dealing with a wise man, I should have remembered that I was dealing with a man who

[17] Descartes had opened his Response with the words "Bravo! Here at last you bring up a real argument against me, something I have not noticed you doing anywhere up to this point. . . ."

[18] Descartes had said: "But you should have remembered, oh Flesh, that you were dealing here with a mind so severed from corporeal things that it does not even know that any men have ever existed before it and is therefore not moved by their authority."

had been dreaming until then, who thought that he was being deceived by God, or at least being tricked by an Evil Genius.

But leaving aside your good manners and before speaking of the argument or appeal to authority I adduced, let us examine how you join this Third Meditation to the Second. After you have said that "you desired to close your eyes and block your ears, etc., in order to look deeper into yourself," and after you have repeated that "you are a thinking thing, that is doubting, affirming, etc.," you add "now I shall consider more carefully whether perhaps there are some other things in me that I have not yet noticed." You continue, however, "I am sure that I am a thinking thing." And so the first thing that you notice is the certainty of the statement of yours "I think," which you do not call into doubt in any way, in consequence of which you ask, "Do I not therefore also know what is required for me to be certain about some thing?" Then you answer, "Indeed there is nothing else in the first thought than a certain clear and distinct perception of the thing that I am affirming, which truly would not suffice to make me certain of the truth of the thing if it could ever happen that anything which I clearly and distinctly perceived was false; and therefore it now seems that I can establish as a general rule that everything which I perceive very clearly and distinctly is true." However, you join a doubt to the rule "because you had previously accepted some things as completely certain and manifest which however you had learned later were doubtful, namely the earth, the sky, the stars and everything else acquired by the senses, and also those arithmetical and geometric truths that two and three are five and the like, in which God could make you err"; consequently you say that "as soon as an occasion arises, I must examine whether there is a God and whether he is or could be a deceiver, for as long as I do not know that, I do not seem to be able ever to be fully certain of anything else." It is only in the Fourth and Fifth Meditations that you confirm this rule when you prove that there is a God who cannot be a deceiver.

Now I shall first note in passing the fact that by turning from the examination of yourself to a property of that examination,

namely its certitude, you seem to make a completely random deduction (just as you take the opportunity quite unexpectedly to discuss God), whereas sound method, on the other hand, would seem to require that the conditions of thinking be treated without reference to the things thought and that once discussion of the first matters had begun, no opportunity should be sought to digress to the second.

Second, I note that a circular argument appears to have its beginning at this point, according to which you are certain that there must be a God and that he is not a deceiver on the grounds that you have a clear and distinct idea of him, and you are certain that a clear and distinct idea must be true on the grounds that you know there is a God who cannot be a deceiver.

Third, I note that you seem to be reversing the order in violation of the laws of induction and to be deducing a universal proposition here from the examination of a single individual, when from the mere fact that you have observed that the certainty of the statement "I think" arises from a clear and distinct perception you deduce the conclusion that "therefore everything that I perceive clearly and distinctly is true." Hence it is not surprising if your penchant for errors in logic is so strong.

Fourth, I note that when you remark that "as long as I do not know the things that must be examined concerning God, I will not be able to have complete certainty about anything," either your remark applies to the certainty of the statement "I think," or it does not. If it does apply to it, then you have accomplished nothing so far and have rashly claimed that you think, that you are, and all the other things, and have reasoned about these things; what is more, you will accomplish nothing since everything you may discuss or assert about other matters assumes the certainty and solidity of this more-than-Archimedean fulcrum. If your remark does not apply to it, then your principal certainty does not depend on God or any knowledge you have of him; what is more, the certainty of the idea of God receives its solidity from the other statement, and therefore every certainty about

any matter at all can be reduced not to the certainty of the existence and veracity of God but to the certainty of that statement of yours, "I think." I make these remarks in passing, I say, and add only that when you say, "I am certain that I am a thinking thing," you reason in such a way that it can be proven against you that "you are not certain that you are a thinking thing." Here then is your line of reasoning:

"I would not be certain that I am a thinking thing if I were not certain that it could never happen that anything which I perceived clearly and distinctly was false;

"Now I am not certain whether such a thing could happen or not (for previously I accepted many things as completely certain and manifest which I learned later were subject to doubt, and until I know there is a God who cannot be a deceiver, I can never be completely certain of anything);

"Therefore, I am not certain that I am a thinking thing."

DOUBT TWO

Rebuttal. Article Two: The objection was especially neglected that dealt with the idea 'thing' which is not formed except by inspecting individual things and the ideas we have of them, and anyone who finds some ideas in himself after striving to rid himself of all preconceived notions cannot say they are innate

Furthermore, since you find especially remarkable the objection I made concerning the idea 'thing', I notice first how hastily you blame me for this; for I did not maintain, as you say, that "the idea 'thing' cannot be in the mind unless the ideas 'animal', 'plant', 'stone', and all the universals are there at the same time";

but I asked first how the idea 'thing' could be in the mind unless there were at the same time enough individual things and types of things to suffice for the abstraction and formation of the universal concept 'thing'. And then I said that if the idea 'thing' was innate, the ideas 'animal', 'plant', 'stone', and the others would also be innate since they are universals of the same sort as 'thing'. I also notice how illogically you deduce consequences from what I say; thus, when you should have declared at least whether it would be necessary to recognize one individual thing, or several, or none in order to recognize that you are a thing, you avoided the matter cleverly, and passed surreptitiously over it, using the phrase "as if." Will you say that it was not necessary to explain this matter since when you established that the idea 'thing' is innate, it was manifest that the recognition of no individual thing other than yourself was required to form it. But first, you had not established that, since you were intent upon establishing it. Secondly, whether you had established it or not, the same difficulty still remains. For when you say "I am a thing," the concept 'thing' is either singular or universal. If it is singular, it is the concept of you yourself; for if it were of another, the meaning of the statement would be "I am other than myself." But if it is of you yourself, it is a tautological and futile statement, to use a technical term, and is the same as if you said "I am I." If it is universal, then it includes a comparison of yourself to other things which share the same attribute, and it is tantamount to saying "I am a certain thing" or "one of a number of things." Therefore, in addition to recognizing yourself, you must also recognize other things. So when you say "a thinking thing," the word "thinking" obviously acts as a differentiation limiting the scope of the word "thing" in such a way that when you say "I am a thinking thing," your meaning is "I am not a thing of just any sort, but of the sort that thinks." Consequently, you recognize other things that do not think. But why all this? Simply to make clear that the idea 'thing' is not innate, but acquired from the examination of many individual things in which their differences are stripped off and only a general notion is retained.

Accordingly I maintain two things: one, if you had never known anything, and if I grant that you think even though all your senses have been blocked up, it is quite likely that you would think nothing more than this: I, I, I—because you would not be able to attribute anything to yourself in your thought for you would never know any attribute, and you would not know the force of the verb "am," since you would not know what being is or the difference between being and not being.[19] And even though you did think, you would still not be able to say "I think," since you would not understand what it was to think. Secondly, from what you imagine in this divestment of yours you cannot draw any conclusions concerning what you would have done if all previous knowledge had been totally wiped out. And if you are now thinking about the sky, an angel, God, or about a thing, truth, thought, or about the sun, fire, noise, or about sirens, hippogriffs, chimeras, or about ideas, judgments, feelings, and if you affirm, deny, or argue different things about these and many other things, you cannot therefore say that you would have thought, affirmed, denied, and argued the same things in that condition. What shall we conclude? Obviously, you may no longer believe that we must accept as a very certain principle of proof a conclusion that was arrived at in the following manner:

[19] I translate Rochot's note to this passage for the reader's consideration. "This Article Two makes it clear that Gassendi's theory is that all knowledge is derived from some other knowledge and is placed in relation to it. But it does not occur to him that the question of the conditions of all knowledge should replace the question of original or innate knowledge. Nor does he think that the knower's knowledge may be anterior to all experience, not in the sense that it is innate, but in the sense that it is intuitive. Quite the opposite, he always makes a distinction with something else: *agnotion, notio* (recognition is knowledge) while he rejects the process of exclusion (*negatio*) that Descartes established. Of course, if the *cogito* meant "I am thought in general, the condition of any other thought," it would escape the dilemma Gassendi poses. Now that is just what it means. The thing that thinks is both individual in that it thinks only about itself and universal in that it thinks about itself in every possible mind through an intuition anterior to any other possible operation, especially any comparison with something else. To think is to be an 'I', no matter what 'I'."

"If a man who has once known things, considers himself in a state of ignorance as a result of his effort to divest himself of ideas, he readily recognizes innate ideas, that is the ones he would have in a state of ignorance as a result of total eradication;

"Now I, who once knew things, consider myself in a state of ignorance as a result of my effort to divest myself of ideas;

"Therefore, I readily recognize innate ideas, that is the ones that I would have in a state of ignorance as a result of total eradication."

DOUBT SEVEN

Rebuttal. Article Two
[*The major premiss is weak*][20]

Next, to address myself to the major premiss, first, as I said before, you have departed from the royal road, open and level, which leads to the knowledge of God's existence, power, wisdom, goodness, and other qualities, namely the excellent works of this universe which extols its author by its immensity, its divisions, its variety, its order, its beauty, its constancy, and its other attributes. You have, I say, rejected this entire creation, so great, so varied, so miraculous; you have considered false whatever you had known about it; and in order to prove God's existence, power,

[20] In the previous article Gassendi had set up a syllogism with this major premiss: "If there is an idea in me whose objective reality is so great that it cannot originate in me, it must have been put in me by some other cause distinct from me, in which there is at least as much formal reality as there is in the objective idea, and which therefore has a real existence." It must be remembered that Descartes uses the word "objective" exactly where we would say "subjective." In his terminology every idea is an object of sorts and has its "objective" existence, namely is an idea. Hereafter, this usage of the word will be in single quotation marks. Note that the term 'formal reality' comes close to corresponding to the modern 'objective reality'.

and other attributes you have used only the idea contained in your mind, an idea that is obscure for you and cannot be shown to others as the stars and other parts of the universe are shown; an idea, I say, of a kind that all men do not have, that you did not always have, that you may not always have, a fluid and accidental thing, in fact not even a thing, but a mode of a thing, a mode of a mode, a part of a mode.[21]

Second, you did not make use of the total reality of the idea, but only of its 'objective' reality, although it does not actually have any reality of its own since it is not a thing, but only modality since it is only a mode.[22] And obviously, just as a figure impressed in wax is nothing of itself, but is only so much wax, depressed here, raised there, broader here, narrower there, so an idea impressed on the mind is nothing of itself, but is only so much mind which contains it as one of its modes arranged in this or that way or otherwise. And as the likeness or representation of the seal in the wax is merely a relation and not a being at all, so the likeness or representation of an external thing in the mind which you call an 'objective' reality, is merely a relation, and will never be a being. See the fine results you have achieved in your attempt to demonstrate so great a matter.

Third, the 'objective' reality of an idea, as you understand it, is inseparable from the formal reality of the same idea; for there will be no 'objective' reality unless there is formal reality, nor formal reality without 'objective'. Therefore, the 'objective' reality will depend upon the same efficient cause the formal reality will depend upon. And so, according to your system, the formal reality depends on no other cause than your thought or mind. You even teach this explicitly, "Such is the nature of this idea that it requires no other formal reality beyond the one that it borrows from your thought, of which it is a mode." Therefore, the 'objective' reality also will depend on your thought, or mind,

[21] In Descartes's terminology all specific ideas are "modes" of thought in general, and if an idea occurs more than once each instance is part of the mode.
[22] The term "reality" (which Gassendi objects to as an innovation) is derived from the word for "thing," *res*. Only a *res* can have *realitas*.

alone. Hence, either your hypothesis is utterly superfluous and futile since you seek outside of yourself a cause which you know is in yourself, or you are hiding the truth from yourself and it is not surprising if you are led to certain conclusions by this concealed truth.

Fourth, is it possible to maintain anything more obscure than that "there is at least as much formal reality in the cause, as there is 'objective' reality in the effect"? Even if you were calling actual reality by another name, 'formal', still you did not make clear what constituted formality or actuality, nor if the reality of a cause was its substance, or its ability to be represented by an idea, or finally anything else that was necessary to make the statement evident. Although you also added that "the mode of existing 'objectively' in the understanding through an idea, however imperfect it may be, is still not just a mere nothing," still you did not say to what extent it was something, to what extent it deserves to be called a thing, to what extent it has reality, to what extent it requires a cause, all of which was indeed necessary to make the statement evident. Again, although you compared 'objective' reality to formal reality, nonetheless you did not explain whether both were absolute, or both relative, or one absolute and the other relative, nor what it was that made formal reality equal or possibly greater than 'objective' reality; and since other things of this sort were not made clear, it was impossible for the statement to be evident.

Article Three: The same applies to the minor premiss[23]

To speak next of the minor premiss, or assumption, you say first that you have an idea which represents God to you as "a

[23] The minor premiss runs: "Now there is in me an idea whose 'objective' reality is so great that it cannot originate in me, namely the idea which makes manifest to me, or through which I understand, that God is a certain infinite, eternal, independent, supremely intelligent, supremely powerful substance, by whom I myself and everything else, if anything else exists, in short whatever exists, was created."

certain infinite substance," etc. But when did you have that idea? Was it before you had heard anything at all about God, about substance, about infinity? Surely, before you equipped yourself with that reasoning, you received from other men both the words and their meanings according to which the concepts, or ideas, of the things designated by these words were formed in your mind, remained fixed there, and even now cling to it; and you cauuot remember any concepts or ideas representing the things designated by these words prior to the time when you heard other men speaking about God, substance, and infinity.

Second, you say that you understand "a certain substance," and you do well to say "a certain," for you do not understand what sort of substance it is, nor can you understand it or explain it in words. For you do not even know the true nature of corporeal substance, nor of the substance of that wax, no matter how much you may have examined it in diverse forms; you only imagine it in some confused, obscure way, or, if you prefer, you understand it. How then would you understand clearly and distinctly what is the nature of that substance of which it is so truly said that the darkness has made it its hiding place, and also that it inhabits the light, but nevertheless an inaccessible light? Again, you do well to say "a certain"; for it [divine substance] is not in the least the same as are absolutely all the things which we understand or believe we understand as substances; it does not support any accident; it is not the full substance of any thing; it is not a substance properly speaking, but rather a supersubstance; it is something far more excellent than anything we understand as substance; finally, it is something that we are incapable of understanding.

Third, you say that you understand it as "infinite." But that is precisely what is utterly denied to you since it is given only to an infinite understanding to understand an infinite thing, for it alone is every bit as intelligent as the thing is intelligible. And although we may use the word "infinite," still we do not therefore understand all that immensity across which its infinite nature extends; but when we have progressed to a certain point in our

understanding and have realized that it is not permissible for us to proceed farther even though we may not see any limits from there, then having come back to ourselves, so to speak, we call infmite that thing whose limits we have not perceived, and so by that word we do not signify what we understand about a thing, but rather what we do not understand. It is the same as if a man going down into a cave tries to see through the whole thickness of a mountain, for having gone a certain way, and being unable to see any farther, he will call the mountain impenetrable to sight, and by this word he will signify not what he saw, but rather what he did not see. But many things have already been remarked on this matter, and there are some to be said very shortly when what you answer is assessed.

Fourth, you say that you understand it as "eternal"; but this also is denied you, for eternity is nothing but an infinitude of duration, and just as infinitude, either of place or of perfection cannot be understood, neither can an infinitude of duration. We say that something eternal lacks a beginning and an end, but we do not therefore understand the whole breadth of duration; indeed, having penetrated to a certain point in past time and to a certain point in future time, we come to a halt and return; and since we have perceived neither a beginning nor an end, we call the thing eternal, that is without a beginning or an end. Consequently, this word also expresses not what we understand, but what we do not understand.

Fifth, you say you understand it as "independent"; but if you do not understand infinity and eternity, how can you understand that substance should appear to you not to depend on any place, on any thing, or on any time?

Sixth, you say that you understand it as "supremely intelligent, or omniscient"; but how can you unless you are as intelligent as God himself is? For if you understand only part of the things he understands, you do not understand him as supremely intelligent and omniscient.

Seventh, you say that you understand him as "supremely powerful" or "omnipotent." But how can you unless you

understand absolutely every effect he ever produced, or will produce, or was able to produce, or can, or will be able to produce throughout eternity? For if you understand only a part of these effects, clearly you do not understand him as supremely powerful or omnipotent.

Eighth, you say that you understand him as "the creator of yourself and of all the other things that exist, if they exist." But how can you understand that first of all concerning yourself if you know about yourself only that you think, that you are, and that you are a thinking thing? Have you proven that you were created? Do you remember not existing at some time? Do you remember the moment when you crossed over from not being to being, and how you crossed over, and what agent caused you to cross over, whether you were made from some matter, or from nothing, by your parents, or with their help or without them? How can you understand that he created other things if you believe all other things are false and if you do not know if anything else was created or not? If it seems to you that nothing has been created, can you understand being created, or having been created, or all things' having been created? Did you exist at the time all things were created at the place they were created, and did you see how? If you did not exist, if you did not see it, do you really understand what you claim you understand?

Ninth, what you say about the idea by which you understand God, that "its 'objective' reality is so great that it cannot," etc. would be acceptable if you said that you understand God, the "infinite, eternal, etc." substance in a confused, obscure, human —or rather all too human—in short, in a most imperfect way; but since you boast more than once that you understand it clearly, distinctly, and all but in the manner of the angels or of those who no longer see through a glass darkly, but face to face, as Holy Scripture says,[24] the words "so great" are not acceptable in the sense you give them.[25]

[24] I Corinthians 13:12.

[25] In fact Descartes does not use "so great" in Latin, but "such." Gassendi's substitution does not violate Descartes's meaniug.

In the same fashion, when you say, in the tenth place, that it is "so great that it cannot originate in you," your statement would be acceptable if you understood your idea to be such that you could not have had it in yourself without the parents, the teachers, the priests, and the other men with whom you talked and by whom you often heard God called infinite, eternal, omnipotent, creator of heaven and earth, or if your idea was to imagine yourself like the first men, as we see the pagans imagined them, in which case you could not have this idea of God without the presence of the stars and their movements, without the beauty, order, and perfection of the universe and its parts. But inasmuch as you are thinking of "so great" a reality that it cannot originate in you even in that way, namely by the action of external things illuminating your mind, your statement is not acceptable.

[Here are the pertinent passages from the letter to Clerselier:
Against the Third Meditation, your friends notice: "(1) that not everybody experiences the idea of God within himself, (2) that if I had that idea, I would comprehend it, . . ." But if we take the term "idea" in the way that I explicitly said that I took it, without seeking refuge in the equivocation of those who restrict it to the images of material things formed in the imagination, we cannot possibly deny having some idea of God unless we say that we do not understand the meaning of these words "the most perfect thing we can conceive"; for that is what all men call God. And it is going to extraordinary lengths when one reaches the point of saying that one does not understand the meaning of the most ordinary words found in every mouth just because one desires to make some objections. Besides, that is the most impious confession that one can make, namely to say about oneself that one has no idea of God in the sense that I took the term "idea"; for that is saying not only that one fails to know him according to natural reason, but also that one cannot possibly know anything about him either by faith or by any other means because if one has no idea, that is to say no perception which corresponds to the meaning of the word "God," it is futile to say that one believes that *God* exists, for that amounts to saying one believes that *nothing* exists, and so one remains in abysmal impiety and extreme ignorance.

When they add that "if I had that idea, I would comprehend it," they are speaking without firm basis; for inasmuch as the word 'comprehend' means some kind of limitation, a finite mind cannot possibly comprehend God, who is infinite; but that does not prevent its perceiving him, just as you can touch a mountain without being able to embrace it.]

DOUBT EIGHT

Rebuttal. Article One: The difficulty concerning the conclusion "If one thing is more perfect than another, it is therefore infinite" was glossed over

How outrageously you play upon equivocations! For while the phrase "the true idea" can be understood to mean either a genuine and sufficient idea representing how God is and how great he is in himself or one representing some truth that it is possible for us to assert about God according to the limited means of our knowledge, it is clear that we are discussing and devoting our attention to a difficulty concerning a true idea only in the first sense. But you answer and dream up arguments concerning a true idea in the second sense, and pretend that "I fall into the same error" which I am far from even dreaming of having made. How subtly and logically you dodge and gloss over the force of the argument or the manner in which I objected that the idea you could have of a more perfect being without therefore having the idea of an infinite being. As you wished to show that "the perception of the infinite is in a certain sense antecedent in you to the perception of the finite, that is the perception of God antecedent to the perception of yourself," you had given the

reason in these words "For by what means would I understand that I doubt," etc. which makes your reasoning appear to be as follows:

"If I have the idea of a more perfect being, in comparison with whom I understand my faults, I have the idea of an infinite being;

"Now I have the idea of a more perfect being, in comparison with whom I understand my faults (since I understand that I doubt, that I desire, that is, that I lack something, and that I am not entirely perfect);

"Therefore, I have the idea of an infinite being."

I admitted that you really do doubt, desire, lack something, and are not entirely perfect, that there is something more perfect than you, and that you understand that. And since you seemed to reason exceedingly wildly according to this logic "I have the idea of a more perfect being, therefore I have the idea of an infinite being" and even more so "There is a being more perfect than me; therefore there is an infinite being" as if between you and the infinite being there were no intermediate steps and you were one degree less than Jupiter, for this reason I showed that you could understand a being more perfect than yourself without its being infinite, first from the consideration of the universe of which you are only a part since it is very well known besides that the whole is more perfect than its part; second by directing your mind to some other part of the universe in which the perfections lacking in you can be found, such as there could be a healthier man, a more robust one, a handsomer one, a more learned one, a more moderate one, and so forth. Since you had to defend your reasoning when you felt that you could not, you decided to blacken my reputation, saying that "I bring up some reasons that bear witness to the fact that although I am flesh, I still insist on attacking many things whose meaning I do not grasp." Truly I cannot detect what bile moved you in this passage, unless perhaps it is that when you said you had doubts, I took you seriously and I admitted that you did not know everything and that you could conceive of a man who was more

learned, more moderate, and in other ways more perfect than you. If that is not true, you may rejoice in your good fortune.

What surprises me is that when I added these words "even though what you desire is not always more perfect than you in any way at all, as when you desire some bread, etc.," with the sole intention of forestalling a sophistic objection which I foresaw could be presented, you concentrated entirely on those words. Here is what you found to answer: "From the fact that someone desired bread it is not inferred that the bread is more perfect than he is, but only that a man who needs bread is more imperfect than the same man when he does not need it." Nevertheless you are not saying anything here that I had not already actually said. In fact I said explicitly that the bread was not more perfect than you who desired it; and when you say that when you need bread you are more imperfect than when you do not need it, or have it, all you are doing is saying concretely what I said abstractly by comparing bread with nothingness or the lack of bread. Most important, you should not have taken a side issue for the main issue, or you should have shown logically how, from the fact that at one time, without bread, you are less perfect, and at another time, with bread, you are more perfect, it follows that you have an idea of an infinitely perfect being. For you may indeed conclude that anyone not stricken with hunger is more perfect than you are, that anyone who does not have doubts about the things you find doubtful is more perfect than you, that anyone who has things that you lack is more perfect than you; and you can imagine a man like yourself who is not pressed by hunger, who is not perplexed by uncertainties, who feels no lacks, but you cannot conclude that such an idea is an idea of an infinite being or an infinitely perfect one. Nor is it any more permissible to infer that the man represented in this idea actually exists than to infer the actual existence of giants, chimeras, and other such things of which you may have some idea.

Article Two: On the error in reasoning constantly committed according to which the existence of an actual thing is inferred from the existence of an actual idea, or the infinitude of the object of a thought is inferred from a finite thought that can be extended in scope, or the existence of a thing acting as a cause is inferred from the fact that the idea of that thing exists

Furthermore, inasmuch as you had reasoned as follows:

"Anything exists of which there is an idea that is in no way potential, but totally actual;

"Now in the idea of God nothing is potential, but everything is actual;

"Therefore, God exists."

I had objected that you reasoned badly when you go from things that exist actually in an idea to things that exist actually in nature. And since you might make the distinction between actual and potential mean that whenever something is represented by an idea, it is in fact actually represented, still the thing might be understood either as existing only in potentiality or as actually existing in nature. Therefore, in order to show that neither type of reasoning was valid, I provided two examples, one of an architect whose idea actually represented a house as existing only in potentiality, the second of the ancient philosophers, whose idea actually represented an infinite universe, an infinite number of worlds, and infinite atoms (*principia*) as actually existing. You felt the force of these arguments; for truly if you conclude that an infinite being exists in whom nothing is potential and everything is actual from the fact that an idea represents such a being to you, nothing would prevent those philosophers from inferring

any the less that an infinite universe, an infinite number of worlds, and infinite atoms exist from the fact that an idea represents an infinite universe, an infinite number of worlds, and infinite atoms in them.

Then what did you answer to that? Just this: "From the fact that something exists in an idea, I do not infer that the same thing is in nature except when no other cause of this idea can be given except the thing that is represented as actually existing, which I have shown to be true exclusively of God, not of the plurality of worlds or of any other thing." But first, it is not true that you have demonstrated that no other thing can be the cause of the idea you have of an infinite thing except the actual existence of that thing, as I have already made clear. Also, it is not true that you have demonstrated that what you concluded about God cannot be concluded about the plurality of worlds. Therefore, your entire reason for proving the existence of God was his infinitude as represented in your idea along with the principle you had assumed that "there is at least as much formal reality in the cause of an idea as there is 'objective' reality in the idea." But the same reasoning militates for the ancient philosophers and the infinitude of the universe, its worlds, and its atoms, along with the principle assumed and the same form of argument. Isn't the error in logic clearly established by this? And is it not even greater because of the obvious circular reasoning or begging the question according to which you prove that an infinite being actually exists because it is represented in your idea as actual, and on the other hand you prove that an infinite being is represented in your idea as actual because it actually exists.

Furthermore, since you had reasoned in this way:

"A man whose knowledge cannot grow until it becomes actually infinite and is beyond being increased can nonetheless judge that there is a being actually so infinite that nothing can be added to its perfection;

"Now my knowledge cannot grow until it becomes actually infinite and is beyond being increased;

"Therefore, I can nonetheless judge that there is a being actually so infinite that nothing can be added to its perfection." I suggested that you should realize that that is self-contradictory. For inasmuch as the knowledge of some object always becomes all the greater as more is learned about the object, it follows that if the knowledge cannot increase until it becomes infinite, it is not possible to know an infinite number of things about the object; and so the man who has such knowledge cannot judge that the object is actually infinite. And since he knows only a finite number of things about it, and since there always remain many things he does not know (because his knowledge has the capacity to increase), he cannot judge what the object lacks or does not lack; so far is he from being able to judge that it lacks nothing—for to be able to he would have to know everything that was in it—or that it is logically impossible for anything to exist which was not in it. I had suggested, I say, that for these reasons you should realize that you will never have a true and genuine idea of God and that there will always be more, in fact infinitely more, left to know, much as if all you saw of a man was the extremity of a hair. You had nothing to say about this, but when I had objected that "when you judge that God is actually infinite so that it is impossible to add any perfection to him, you are passing judgment on something you do not know, and you judge merely from presumptions, like the philosophers who judge that there are an infinite number of worlds," and so forth, you bellyached and took exception: "I do not pass judgment on something I do not know; for I gave my reasons for so judging, and indeed such solid ones that you could not contradict any one of them in the least." How true that is, and how adequate a reply, the readers may judge.

DOUBT TEN

Rebuttal. Article Two: It is false that nothing can be added to or taken away from the ideas which we have of things

Now, for your answer. You object that "I did not heed what philosophers commonly say." But first, did you pay heed to what yon had said yourself? For indeed these words of yours appeared toward the end of your response to the objections to the previous Meditation: "As for me, I never thought of requiring anything else beyond its various attributes to make a substance known, so that the more attributes of a certain substance we know, the more perfectly do we therefore understand its nature."[26] Now what do the philosophers say? According to you, "they say that the essences of things are indivisible; for the idea represents the essence of the thing, and if anything is added to it or subtracted from it, it becomes the idea of another thing." But do you agree with this or not? Clearly you agree with it; for the entire force of your answer lies in it. But if the essence, or nature, is indivisible, then wherever the tiniest bit of it is, it is there in its entirety, and it is nothing more than that, and it does not have any parts since it is indivisible. If an idea also is such that nothing can be added to it or subtracted from it, then wherever there is the least part of the idea, there is the whole idea; and there is nothing in the thing that it does not represent, for if there were something else which it could represent, then something would be added to it and it would become the idea of another thing.

Now since you admit that not just one, but more and more attributes of a substance, nature, or essence can be known so that the more that are known, the more perfectly therefore the thing is understood, I ask: when you acquire your first knowledge of a

[26] Response to Doubt Eight against the Second Meditation, not included in these selections.

thing, and you know a single attribute of the essence, do you believe that the entire essence of the thing is contained in it, or not? If you think so, then it is false that there are several attributes and that you understand something more perfectly through several attributes. If you do not think so, then the essence of a thing does not consist in something indivisible, but has the range of its attributes and furthermore a certain division of the attributes between each other insofar as one can be known without the others being known. Therefore the idea of a thing is not such that nothing can be added to it, but rather is capable of being added to, to the extent that attributes learned later can then be represented in the idea as well as the one known first. Truly now, whether you paid attention to this or not, I shall not ask here, as far as the philosophers are concerned, to what degree it must or must not be admitted that they say the "essences of things are indivisible," nor shall I ask if they really knew the essences of things about which they make this statement.

As for you, when you say that "the idea represents the essence of a thing," it seems that I may infer not incorrectly that if there are any things whose essence you do not know, you do not have an idea of them. Therefore I ask you: do you know the essence of the sun, of the moon, or of some other star? I suspect that you will not say that you do. For what do you know about them besides their size, shape, movement, distance, light, brightness, heat, their power to generate growth, to warm, to move, and other such things, if there are any. But the very essence, the nature, the inner substance which lies underneath these is totally hidden from you. For even though you assert that, knowing these attributes, you understand the nature of the stars, you will be asserting that to yourself alone, proving it to yourself alone; you alone will applaud yourself; you alone will honor yourself before all others even though you have nothing more to offer than they do. Certainly I think there is no one who would believe that you know the essence of the stars when you know only these things, and accordingly that he could get an idea of the stars from you. And if you do not have the idea of the stars, then

of what things do you? of the earth? of water? of some meteor? of a stone? of a mineral? of a plant? of an animal? of a man? of some body in general, or of something existing in the universe? Clearly, you do not know the essence of anything; for whatever you can offer that you know about these things, in every case they are nothing but adjuncts, or accidents, properties, and effects, all of them outside the essence itself. Consequently it is clear that you do not have an idea of anything that exists in the world. Then how can it be that you also speak about things which exist in the world and that you understand them if you do not have ideas of them?

Actually, you do have ideas of things, but not the kind you claim to have. In fact ideas of things exist only to the degree that we know them. And since we know their accidents with a distinct knowledge, but not their essences, which we divine as it were or conceive indistinctly as lurking under them, therefore, there is a distinct idea of their accidents, but not of their essences, which we comprehend indistinctly underneath them. From which it results that the clearer and more precise idea we have of some thing, the clearer and more precisely we know several of its accidents. Since experience shows that the ideas in our minds are like images of things, and the images are not of a thing's essence, but of its accidents, it follows that just as the image of a certain man reproduced in a picture is all the more perfect if the symmetry, the arrangement, and the representation of a great number of parts is more elaborately worked out, and each of the individual traits which are in the separate parts is more carefully reproduced, so the idea of any thing becomes all the more perfect if it portrays more of its accidents, or more of the things surrounding it, as it were, in a more ordered fashion, with greater skill, and more lifelike.

Against the Fourth Meditation, which deals with the true and the false

DOUBT ONE. ON THE FACULTY OF JUDGMENT CREATED BY GOD, THAT IT IS NOT IMMUNE FROM ERROR, AND ON THE REJECTION OF FINAL CAUSES FROM PHYSICS

In the Fourth Meditation, at the start you pass in review the things which you believe you have proven in the earlier sections, by which you suppose a path has been cleared for proceeding further.[27] Myself, not to introduce any delay, I shall refrain from insisting again that you should have proven these things more solidly. It will suffice if you remember what I have granted and what I have not granted to avoid misjudging the matter.

Following that, you argue that "it is impossible that God should deceive you"; and to excuse that defective faculty, subject to error, that you receive from him, you throw the blame "on nothingness, a certain idea of which you say is present in you, in which you say you participate" and claim that you are

[27] Doubt One concerning the Fourth Meditation is given complete. Gassendi was the only one of the original objectors to criticize the several lines of the *Meditations* in which Descartes rejects final causes: "For, knowing by now that my nature is extremely weak and limited and that God's, on the contrary, is immense, incomprehensible, and infinite, I no longer have any difficulty in recognizing that there are an infinity of things within his power the causes of which lie beyond the powers of my mind. And this consideration alone is sufficient to persuade me that all causes of the type we are accustomed to call final are useless in physical or natural affairs, for it does not seem possible for me, without presumption, to seek and undertake to discover the impenetrable purposes of God."

"a mean between it and God." What a lovely piece of reasoning! But, passing over the fact that it is impossible to explain how we have an idea of nothingness, or what kind of idea it is, or how we participate in nothingness, and other matters, I will note only that this distinction does not remove the possibility that God could have given man a faculty of judgment immune from error. For even if he did not endow man with an infinite faculty, still he could have given him one that would not assent to an error, which would perceive clearly the things that it really knew, and would not proclaim that the things it did not know were of one nature rather than another.

You invent an objection against yourself that "you see no cause for surprise that you do not understand the reason why some things were made by God." And you are quite right to say so; yet there is cause for surprise that you should have a true idea which represents an omniscient, omnipotent, and totally good God and that you see nevertheless that some of his works are not perfect (*absoluta*); for in that case since he could at least have made them more perfect, and yet did not, there would seem to be reason to believe either that he did not know how, or that he could not, or that he did not want to. And in this respect at least he was imperfect, for if he refused when he had both the knowledge and the power, he valued perfection less than imperfection.

As for the statement that "you reject the use of final causes in the study of physics," perhaps you would have been right in another context; but since it is a matter of God, it is indeed to be feared that you have rejected the main argument by which God's wisdom, providence, power, and even his existence can be proven by the natural light of reason. Leaving aside the world in general, the heavens, and its other excellent parts, how or on what better basis could you argue than from the use of the parts of a plant, of the animals, of men, or of yourself (or your body) who bear the likeness of God? And we know very well that many great men not only rise to the knowledge of God from the anatomical study of the human body, but also sing hymns of praise because he so formed and arranged all the parts for their

usefulness that he should be commended in the highest for his skill and incomparable providence.

You will say that it is physical causes of such shape and situation that should be investigated and that those who revert to the final cause rather than to the agent or material cause are foolish. But no mortal can understand, much less explain, what agent forms and disposes those valves which are placed in the cavity of the heart at the mouth of the blood vessels in the way that we see them, in what circumstances and from what sources the material is obtained with which it constructs them, how it applies itself to the task, what instruments it uses, or how it uses them, what it needs to complete them with that fine tempering, that consistency, that interconnection, that suppleness, that size, that shape, and that placement—since, I say, no naturalist is able to penetrate and explain these and other things, what reason is there that he should not at least marvel at this most extraordinary usefulness and ineffable providence which fashioned these valves so beautifully for their function? Why not praise him if he recognizes from these considerations that some prime cause must inevitably be admitted which disposed these things and all others most wisely and appropriately toward their goal?

You say that "it is rashness to investigate the purposes of God." But although that may be true if you mean purposes that God himself meant to keep hidden or forbid to be inquired into, still it is surely not so if you mean those which he put on public display, so to speak, which are known without much effort, and which besides are the type which confer great praise on God himself as their author.

Perhaps you will say that the idea of God which is in each of us suffices to give us a true and real knowledge of God and his providence without taking into consideration the purposes of things or anything else at all. Truly, all men do not share your good fortune and do not have such a perfect idea from birth or contemplate it with such clarity. Therefore, there are no grounds for begrudging those to whom God has not given such great perspicacity if it is possible for them to recognize and glorify the

artisan from the examination of his works. I need not mention that this does not restrict the liberty to use that idea [you have of God], which too, seems to be created wholly from the knowledge of things, so much so that, if you were willing to speak the truth, you would admit that in this matter you owe not just a little, but almost everything, I might say, to that kind of knowledge. For I ask you, how far do you believe you would have progressed if from the moment when you were emhedded in your body, you had kept your eyes closed and yours ears blocked and in short you had perceived this universe of things and everything outside yourself without any help from the external senses and in the meanwhile had spent all your time meditating inside yourself turning your thoughts over and over again? Tell me in good faith, and describe the idea that you suppose you would have had of yourself and of God.

[DESCARTES'S] REPLY

What idea we have of nothingness and how we participate in nonbeing I explained sufficiently by calling the idea negative and by saying that I meant no more than that we are not the supreme being and that we lack quite a few things. But you always look for knots on a reed.[28]

When you say that "I see some works of God that are not perfect," you simply invent something that I have not written anywhere or thought; but only if some things are regarded as totalities in themselves, and not as having a role in the universe, only then can they seem imperfect.

Next, everything you bring up concerning final causes really belongs to efficient causes; so it is acceptable to admire God as the maker from the usefulness of the parts in plants and animals, etc., and to know him from the inspection of his works, and to glorify the artisan in him, but not to guess for what end he made

[28] Descartes's image, which Gassendi will pick up later, means to find difficulties where there are none.

each thing. And although it is sometimes pious in ethics, where the use of conjecture is often permissible, to consider what end we may guess that God proposed to himself in governing the universe, certainly it is inappropriate in physics where everything must be supported by the most solid arguments. Nor can it be imagined that some of God's purposes are more out in the open than others, for all of them are concealed in the same fashion in the abyss of his inscrutable wisdom. Nor should you imagine that no mortal can fathom the other causes, for there is none that is not much easier to know than God's purposes. And the very oues that you present as difficult cases, not a few men esteem that they know them.

Finally, since you ask so frankly "what ideas I think my mind would have had of God and of itself if from the moment it was embedded in the body it had kept its eyes closed and continued to the present moment without any usage of the other senses," I answer frankly and openly that I do not doubt (provided that we assume that the mind was not hindered by the body from thinking, as it was not helped) that it would have had the same ideas it now has of God and itself, except only that it would have had much clearer and purer ones. For the senses hinder it in many ways and do not help it in any way to perceive these things; and nothing prevents all men from being aware also that they have the same ideas except that they are too much taken up with perceiving the images of corporeal things.

Rebuttal. Article One:
As usual the difficulty concerning
the creation of a faculty subject to error
is glossed over. What must be proven later
is established as a principle, and what
has still not been proven is
assumed proven

It is up to others to judge whether you, despite the fact that you consider yourself a reed and believe you have no knots, are not

at least so flexible that you can be tied in knots and may be considered one of those called "knotty" by some of the Latins and "snarled" by the Greeks.[29] To be sure I ask for nothing else than plain dealing, or absolute clarity; and fancy words, which for the most part neither those who offer them nor those who hear them understand, have no effect on me at all. You speak of the "idea of nothingness," of a "negative idea." I swear that I passed over that on the grounds that it was impossible to understand how there could be an idea and no object, how there could be an image which was the image of no thing at all. You accept with equanimity that it can enjoy the nature of an idea, which is to represent something, and still be something negative, or represent nothing. You say that "the fact we participate in nonbeing" is nothing more than "that we are not the supreme being and that we lack quite a few things." But I say that I do not understand why you do not say we are merely what we are rather than that we participate in something we are not and that we lack, and so forth. However, I declare that I do not want to insist on these things. You call this looking for knots on a reed. All right, so there are no knots in your meaning of the word; reassure yourself as much as you can.

In the meantime aren't you looking for knots yourself when you say that "clearly I imagine something that you had not written anywhere, or thought," namely that "you see some works of God that are not perfect (*absoluta*)." In fact I did not in the least say that you had written or thought that; I merely state the fact that "you see that some works of God are not perfect," which you immediately corroborate when you say that "at least they may seem imperfect as they are parts." Let attentive readers decide if you may have given an adequate answer as you stop here over the so-called knot and then leave it quite untouched.

Then I objected that your idea of nothingness and your distinction concerning participation in nonbeing do not obviate the possibility that some one might say that God could have given

[29] Both classical languages find in matting woven from rushes an image of intricate or enigmatic thought.

man a faculty of judgment, if not infinite, then at least immune from error. And later in response to your answer that "it is not surprising that you do not understand the reason why some things were made by God" I countered that nevertheless it was surprising to see the way you asserted that you had a true idea which represented an omniscient, omnipotent, and completely good God, and that you saw nonetheless that some of his works were not perfect (such as the faculty of judgment we are talking about, which is subject to error), which makes a case either that he did not know how to make things more perfect, or that he could not, or that he did not will to because of some sort of bad humor. But all this you overlooked, thinking that it only deserved to receive a short phrase or so.

You were a little more circumspect about my commentary on your resumé in which you began by saying that "henceforth you would turn your thought without any difficulty from things that can be imagined to purely intelligible things entirely separate from matter" and continued "and I have a much more distinct idea of the mind insofar as it is a thinking thing, not extended in length, width, and depth, and not having anything else of a corporeal nature than I do of any corporeal thing. And when I consider that I doubt, or that I am an incomplete and dependent thing, a clear and distinct idea of a complete and independent being, in other words of God, presents itself to me, and from the single fact that I have such an idea, or that I who have that idea exist I conclude so manifestly that God exists and that my entire existence every moment of my life depends on him that I am confident that the human mind can know nothing more certainly and more evidently." Since you supposed that in this process you had opened up a path to advance further, I swore that I did not want to create any delay or to insist unceasingly that you ought to prove everything more solidly, but that you should keep in mind what I had granted and what I had not to avoid misjudging the matter. You did not pause to clear anything up nor did you consider it worthwhile to think about establishing your points more solidly. Therefore, since the

responses that you make in later comments assume that you had proven the other points perfectly, I disengage the following reasoning from the words you use:

"If I have a clear and distinct idea of a complete and independent being, in other words of God, and if I who have that idea also exist, I conclude manifestly that he exists, and that my entire existence every moment of my life depends on him, and the human mind can know nothing more certainly and more evidently;

"Now I have a clear and distinct idea of a complete and independent being, etc.;

"Therefore, I conclude manifestly that he exists, and that my entire existence every moment of my life depends on him, and the human mind can know nothing more certainly and more evidently."

In fact while you have not yet proven, but will prove later, that a clear and distinct idea cannot be misleading because God exists and is the trustworthy author of the knowledge of him in you, you still assume in this passage that he is truthful in order to prove that he exists and is the author of all your existence and consequently of your knowledge of him.

For the rest, I have nothing to add to the objections about the previous Meditation. I shall comment only on the words that you wrote immediately following: "First, I recognize that it cannot be that he should ever deceive me, for in every deception or fraud is found some imperfection; and although the ability to deceive appears somewhat to be an indication of cleverness or power, there is no doubt that the wish to deceive is testimony of malice or weakness and cannot therefore occur in God." My comment is that here you are only repeating yourself and taking as a principle for further development of your argument a statement about which I have already remarked that you had not proven it in my comments on the final words of the previous Meditation where you reasoned as follows:

"If God is subject to no defects, he cannot be a deceiver;

"Now God is subject to no defects;

"Therefore, God cannot be a deceiver."[30]

Article Two: It is most necessary to consider purposes in physics so that God may be recognized as the creator and director of the universe

Let me add something further about the question that you develop rather fully in your *Response* when you rebut me, saying "everything you bring up concerning final causes really belongs to efficient causes." What do you mean by "really belongs to"? For if your meaning is that the wonder, praise, and glory which we derive from reasoning concerning the purposes of things and from the so very appropriate uses we see for each of them really belongs to the originator who disposed all things so wisely and providentially, then you are not saying anything that I did not say throughout my Doubt. And it seems that it can be inferred this is indeed your meaning from the words which follow immediately. For you say that "it is acceptable to admire God as the maker from the usefulness of the parts in plants and animals and to know him from the inspection of his works and to glorify the artisan in him." But if your meaning is that we are free only to explore and contemplate efficient causes and that we just renounce the investigation and consideration of final causes, that is definitely something I did not say, especially where God is concerned, for I also said clearly that that may be true in another context. That this is your meaning is made clear first by the way you state the question and then by what you say next. For when you said that "it is acceptable to admire God from the usefulness

[30] In Article One of Doubt Ten, Third Meditation, Gassendi had made two brief comments concerning this passage: (1) Descartes cannot know the true nature of God's perfection, or lack of defects, since he draws his ideas of defect entirely from his own experience; therefore, however right his conclusion may be, it is based on faulty evidence; and (2) Descartes is not to assume that just because he has mentioned that God cannot have the defect of being a deceiver, he has the right to use this proposition later as if it were demonstrated.

of the parts, etc." you continued "but not to guess for what end he made each thing." On this point I might wonder how you believe men may admire God from the usefulness of those parts and still not guess for what end he made them since "usefulness" and "purpose" are the same thing, and it is impossible to admire the creator of some usefulness without admiring the creator of some purpose.

Now just see if you are right to reject final causes as you do. For the mere inspection of the sun, the moon, and other parts of the world, and so of the whole world, does not make us see clearly that there was therefore an originator, or cause, of the world. For surely someone might suspect either that the world was always the same and that his forebears had not seen a different world and that his descendants would not, or else that it grew up by chance from the atoms (*principia*) of which it is made with the result that it is formed in its present disposition and not in another. Such ways of thinking not only banish final causes, but also remove efficient causes from the world. And from the investigation of purposes, not only do we understand that the final cause itself exists, but also we take a step toward recognizing the efficient cause which had such a purpose in mind as it acted. In much the same fashion, if someone raised in the forest left it and saw a bridge, but at first sight noticed only the opening through which the river's water flowed, he might interpret it as something like what he had observed in some stream where he saw two rocks with touching tips and bases narrowing the stream's bed, which he had accounted for merely on the grounds either that they had always had that formation or that rolling down from the mountains they had run into each other in that position. But when he later saw travelers going across the bridge to their great advantage and convenience, and when proceeding to examine the work closer because of that, he considered the broad, skillfully made arch formed by many rows of rocks that had been cut, rough hewn, assembled, and positioned in orderly fashion, exactly in the way that they could not have been more cleverly disposed for their intended use, then surely he would realize that

the bridge could not have been made by chance, or simply have been there without a maker, but must have been made by some architect who had an eye to its purpose and had thought out the arrangement of the work intelligently, and also had had the power to execute his design. From this then it does not follow, no matter what you may say, that "it is pious" only "in ethics to consider what end we may guess that God proposed to himself in governing the universe," but that "it is also inappropriate in physics." A much more likely conclusion is that it is wholly appropriate and laudable to consider the end, inasmuch as it is absolutely necessary if we wish to recognize that the universe is governed by God and the prerequisite to that, that God is the cause of the universe. In fact, the mere sight of the universe does not immediately give rise to the thought and the conviction that it is the result of some constructive directing cause; and since either the thought that the universe is uncaused and governs itself or the thought that it was made by chance and is ruled by that same chance could occur to someone, then in what way will the conviction arise either that the world was really created by some cause or that it is governed and ruled by some moderator unless we observe the wisdom with which all things in it are disposed? And since the wisdom consists in the fact that nothing is done without cause, or without an intended purpose, let us conclude that there is a cause which worked from the purpose which it still has in mind.

Article Three: Not all the purposes of God are unknown to men, and this is certain from the purposes of the different parts of the human body

However, when you say "that it cannot be imagined that some of God's purposes are more out in the open than others, for all of them are concealed in the same fashion in the abyss of his

inscrutable wisdom," that appears totally false. Otherwise we must refuse to admit that God is the cause of the structure of things even though the purposes of some things are so obvious; and we would have to impute all things to chance and say that things are not so designed because of their usefulness and purposes, but that, the things being so disposed by fortune perhaps, their uses, or purposes, had also perhaps been discovered by fortune. For it is indeed true that some of God's purposes are profoundly hidden from us and concealed in the inscrutable abyss of his wisdom (and I have professed that he has willed them to be secret and prohibited that they be inquired into). But it is not therefore true that God did not leave some of them out in the open, as there are numberless ones that can be observed in the human body. What? Can we not say that when God formed the human mouth, he took care that man should inhale and exhale through it and take in food for his nourishment? And when he willed that its passage should be open at the moment of birth and at the same time provided the milk, the breast, and the nipple, which is seized and sucked by the mouth, can we not say that he did this to nourish the infant? And when he made the esophagus hollow and the stomach empty, did he not do this so that the food could be transmitted by the first and digested by the second? And when he formed the other vessels as he did, did he not make them for the passage of waste on the one part, of food on the other? And when he formed the solid bones and articulated their joints, did he not have an eye to the strength of the body and the achievement of various movements and twistings? And when he created the muscles and attached the tendons to the firmer parts, did he not wish them to be organs which could move those parts? And when he created the movement of the heart and joined it to the arteries, did he not allot it to them in order to create and distribute warmth and to receive, prepare, and transmit the blood through the whole arterial system? And when he stretched nerves out from the brain through the whole body, did he not extend them so that sensations and movements might reach the organs? And when he fashioned the eyes and the eyelids, and added eye-

lashes, did he not fashion them so that we might see and the eyes might be protected? But why do I spin out individual examples when they are infinite? From them it appears that we can assert without temerity that God had these ends in mind or ones like them. There is nothing that does not seize me in wonderment as I consider these things. But there are two or three especially which will always arouse vast amazement in me. One, the placental vessels so fittingly formed, assembled, extended, and attached as they distribute the humors bearing food, waters, and spirits, together with their subsequent constriction in birth and the very convenient transfer, replacement, and appropriation by other parts of their functions. And secondly, the valves of the heart, so fitting in substance, shape, number, and placement for receiving and dispersing in each chamber of the heart, and so fittingly supplied by the blood vessels by the alternate opening and closing of mouths of the vessels. Thirdly, the muscles joining the articulations of the fingers to the palm of the hand, so fittingly perforated with holes to allow the passages of other muscles. Surely these and also other phenomena no less worthy of admiration make clear to us, whether we wish to see it or not, what purpose nature's author had in molding them in that fashion. And so, when you compare kinds of causes, you seem to be carping irrelevantly at what I remarked concerning the difficulty of understanding efficient causes as though you really believed that there was not one that was not much easier to know than God's purpose.

Article Four: The difficulties proposed concerning the efficient cause of the valves of the heart cannot be explained away, whereas their purpose, or usefulness, seems completely obvious

But when you continue that "the very ones that you present as difficult cases, not a few men esteem that they know them," what great claims you make, not only for yourself, but for others!

Certainly with regard to myself, I reject your claim as I confess frankly I do not think I can live up to it. I can also stand pledge for not a few others who I know will candidly admit that although they have devoted their lives to investigating such causes, nonetheless they are completely unable to penetrate them. I will pass over other things in silence, but truly do you esteem that you know causes of this sort? Do you believe you can tell them? Specifically, I repeat, do you understand and can you explain "what agent forms and disposes those values which are placed in the cavity of the heart at the mouth of the blood vessels in the way that we see them, in what circumstances and from what sources the material is obtained with which it constructs them, how it applies itself to the task, what instruments it uses, or how it uses them, what it needs to complete them with that fine tempering, that consistency, that interconnection, that suppleness, that size, that shape, and that placement."? Oh, you are no man, no hero, no demigod, but truly some God! But consider, I ask you, if you do not have too much confidence in yourself. For if you should say that you know that this agent is God, first of all you are saying nothing that every pious man would not say, nor is there any reason why you should labor so strenuously in physics since anyone at all from the common crowd knows enough to say the same. Second, even if you know that there is a God who is the maker of all things visible and invisible, still you do not know his nature, or how he is present in the womb, how he acted there, how he chooses his material, or what material he chooses, how he uses it, shapes it, tempers it, and so forth. Third, inasmuch as it seems clear that God does not do everything alone, but allows second causes and particular causes to act, even if I grant that you know that God is the agent who forms and disposes the valves, etc., you know only the first and universal cause, which is not in question since nobody doubts it, and it would be possible therefore to answer all inquiries with a single word, or without any distinctions. The question is whether you know the second and particular causes which form and dispose the valves, etc. That is what is worth knowing.

In addition, if you should say that you do know that, if therefore you should answer the difficulties I proposed, what a great Apollo you will be! But again, consider, I ask you, if there are not among the second causes some that are general and remote and others that are individual and immediate (*propinquae*). You mistake the first for the second since I asked not for the former, but for the latter. For, as there is no philosophical sect which does not strive to deduce all natural effects from the fundamental components (*principia*) of things (once it has worked them out), there is none that does not proclaim its general and remote causes; but when they are summoned for individual and immediate causes, which are worth knowing, there is none that does not remain mute or talk the most arrant nonsense. And some offer more plausible explanations than others and seem to make somewhat greater progress; nevertheless even they cannot advance beyond plausibility and cannot help but come to a halt on this side of the insuperable gulf between them and the particular and immediate cause. So I do not deny at all that you, because of your brilliance, may say some things that are quite probable, more specific, and somewhat closer to the facts. But anyone aware of the weakness of the human condition will not let himself be persuaded that you will give us the answers that will fully resolve the difficulties proposed to you and not leave them shrouded in an impenetrable fog. You may well say that "in physics everything must be supported by the most solid arguments," but you should add to the extent and limit humanly possible. For there is nobody who does not proceed *more geometrico* concerning general causes: "Nothing exists that is not made of material; nothing happens without motion, without an agent, etc." But when it comes to specifying what material, what motion, what agent, and the like, there is nobody who does not slip up and babble like a child. Consequently, when you say that "there is no cause that is not much easier to know than God's purposes," I ask that the decision be awarded between us by comparing any instance of special and immediate causes with anyone of the purposes mentioned in what I said a little while

ago about the parts of the body. There is no one who will not realize what to think.

Article Five: It is false that if anyone lived from birth without any use of the senses, he would have the same ideas of reality (and even purer ones) that he has from the use of the senses

When you say in the end concerning the idea of God and of your mind that you would now have if from the moment when you were embedded into your body, you had kept your eyes closed and your ears blocked and in short had perceived this universe of things and everything outside yourself without any help from the external senses and in the meanwhile had spent all your time meditating inside yourself turning your thoughts over and over again, when you say, I repeat, that "you do not doubt that you would have the same ideas you now have, and even much clearer and purer ones," you are evidently speaking consistently with your position if we consider the things noted earlier about the mind iu the womb and about drowsiness; but how probable your position is and for what reason other than begging the question you take it, let others decide as they will. But when you claim that "in this case the mind would not be hindered by the body from thinking, as it would not be helped," you assume that it can think by itself (once the hindrance has been banished) and can know God and itself more purely and clearly than it now knows him or thinks—but that is the point being debated.

Assuming then that your body is in thoroughly normal condition (no other assumption is permissible), I ask whether it would be a hindrance to thought, or none at all. If none at all, then your mind would have behaved in your body exactly as if in a state of separation and you could have asked for nothing

worse than to have your eyes opened, your ears unblocked, and then to be allowed to smell, taste, and touch something. Doesn't this amount to saying that whoever gave you sight, hearing, and the other senses deserved no gratitude from you? If the body would be a hindrance, it would be either more so than it is now after you have known the heavens and the other things that are in the universe, or less so. If more, then you would not have purer and clearer ideas. If less, then my counterargument again applies, because that condition would be more desirable than your present one and because whoever established you in your present state would deserve no gratitude from you. Then the further consideration occurs that God could not censure us if we failed to know from his works that he exists, as indeed we should; for everyone might answer God, saying: Why then did you bring me forth from my mother's womb, or why did you not forthwith blind me and deprive me completely of all my senses, for by that means I would have been able to know you better, as I should?

Furthermore, since you say not only that "the senses hinder the mind in many ways," but also that "they do not help in any way to grasp ideas of God and the mind," you seem to be accusing all wisdom, both divine and human, which urges us to use our sight so that we may rise from the perfections observed in things to the understanding of the perfections of God, as when, having beheld the magnitude of the universe, the beauty of the sun, and the wisdom of their architect, we strive to understand how much greater, how much more beautiful, how much wiser must be he who made the world, the sun, and the architect. From this it follows that when you add that "nothing prevents all men from being aware also that they have the same ideas except that they are too much preoccupied with perceiving the images of corporeal things," it would indeed be possible to find fault with them if they are in fact so preoccupied that they judge that God is like the corporeal images used to represent him. But still it could not be denied that those corporeal images aid them somewhat since they act as the occasion, and become a kind of

stepping-stone from which they rise to an understanding of God as much as lies within their power. And I ask if corporeal images do act as an obstacle for the man who has contemplated the entire universe (hence is assumed to be endowed with sight); let us ask a blind man to explain to us what kind of idea of God he has.[31] And if he can describe God better by reason of the fact that he has no images of the sun, of the rainbow, or of other corporeal things. There is no need to dwell longer on these points.

DOUBT FOUR

Rebuttal. Article Two:
To prove that God exists and is trustworthy because our knowledge of him is clear and distinct and that our knowledge of God is clear and distinct because God exists and is trustworthy is arguing in a circle. In short, the method you longed for is still wanting

Now it has already been remarked in the first rebuttal, both in this and in the preceding Meditation, that you reason in a circle when at last you come to this point.[32] Now, so that you may really feel this, I observe that since the beginning of the Third Meditation, your line of argument has run:

"At that time I was certain that I would at last be certain that a clear and distinct knowledge was true beyond a doubt as soon as I had proven that God exists and is the author of all things, including this clear and distinct knowledge, and is not a deceiver;

"But now I have proven that God exists and is the author of all things, including this clear and distinct idea, and is not a deceiver;

[31] Diderot dramatizes this philosophical point in the *Letter on the Blind* when he has the sightless English mathematician Saunderson state "If you want me to believe in God, you must make me touch him." Diderot, *Oeuvres*, ed. Assézat and Tourneux, I, 307.

[32] Pages 204 and 231.

"Therefore, I am at last certain that a clear and distinct knowledge is true beyond a doubt."

As for the major premiss and the conclusion, both the words quoted from shortly before the end of this Meditatiou and the ones that were reproduced in their own place from the beginning of the previous Meditation give abundant confirmation that you prove that "a clear and distinct knowledge is true, that is, not deceiving, because God exists, because he is its author, and because he is not a deceiver." Moreover, as for the minor premiss, what is related in the remainder of the previous Meditation and in the opening of this one gives abundant confirmation that you prove that "God exists, that he is our author, and that he is not a deceiver because our clear and distinct idea of him is true and not misleading." And the following words, more than any others, betray the same tendency: "But the longer and the more carefully I examine all these matters, the more clearly and distinctly do I know that they are true." And later, "it is euough that I understand this [the incomprehensibility of the infinite] and that I judge that all the qualities that I perceive clearly and that I know bear some perfection in them, as well perhaps as an infinity of others that I do not know, that all these qualities exist either formally or eminently in God, so that the idea that I have of him is the truest, clearest, and most distinct of all the ideas I have." Then I ask whether or not you are arguing in a circle, as they say, falling into a *diallelus*, and begging the question when you prove one proposition by another which cannot itself be proven except by assuming that the first one has been proven.

Despite the fact that no one doubts that God is the author of clear and distinct knowledge, do we not in fact see that there are many men who believe they have a clear and distinct idea and yet are mistaken? You say they do not really have one, otherwise they would not be mistaken; for unless they know exactly the nature of something, they do not know it clearly and distinctly; in fact they really do not know it at all. But since there are many people who believe they have clear and distinct knowledge when they do not have it and there are others who think

they have it when they do in fact, and since both groups think that God exists, that he is their author, and that he is not a deceiver, are we not left with the need to furnish a method by which the first may recognize that they have so clear and distinct a knowledge that they are not mistaken and the second that they do not have it and therefore are mistaken?

But let me see where you have furnished this fine method before now. You say that you have recommended that all things must be examined with attention and that when nothing is found that may cast a doubt on something, then it would be knowledge so clear and distinct that it would be true beyond any doubt; for if it were not true, it would follow that God is a deceiver. But I beg of you, be more moderate and more modest about God the thrice great. Since he tolerates the existence of malice in the world, it is possible that he tolerates the existence of error, and that for purposes which you yourself cannot deny are utterly inscrutable. Concerning your recommendation, as I have already said, it is neither new nor exclusively yours; and the question always remains, since both those who are mistaken and those who are not mistaken examine all things with as much attention as they can and believe that all things have been examined attentively, by what method can they be assisted so that they may become certain that they have not overlooked something and that nothing will ever arise which proves they had overlooked something? For experience shows that many such things have arisen despite an attentive examination which led to the judgment that nothing had been overlooked. You will say that if anything arises, or could arise, that is a sign that the knowledge is not clear and distinct. I agree. But still in the interim it was believed to be clear and distinct, and after the most diligent examination possible it was concluded that nothing had been overlooked or could arise to prove that something had been overlooked. Consequently the method remains to be furnished by which it can be recognized that nothing has been overlooked and that nothing will occur to prove that something has.

Perhaps you will say that it is contained in those four rules

that you supplied in your *Discourse on Method*. But the first of them prescribes that "nothing is to be accepted that is not perceived in a clear and distinct idea"; on the one hand, that is not new; on the other, it does not prescribe what is needed, namely how we shall recognize that an idea is so clear and distinct that it does not deceive us and is to be accepted. The second prescribes that "every difficulty is to be divided into as many parts as necessary in order to solve it better"; on the one hand, that is not new; on the other, it does not prescribe what is needed, namely how we shall recognize that we have made enough parts and how each one of the parts is to be solved individually or the whole is to be solved generally. The third prescribes to "begin with simpler and better known things and to rise as though by steps to the knowledge of more complex things"; on the one hand, that is not new; on the other, it does not prescribe what is needed, namely how we shall recognize the simpler and better known things and the order of the more complex and more obscure things and how they depend on the simpler and better known things. The fourth prescribes that "we make at all times so general and so painstaking an induction, or enumeration of all the parts that we may be sure nothing has been omitted"; on the one hand, that is not new; on the other, it does not prescribe what is needed, namely how we shall recognize that we have examined and enumerated everything so painstakingly that we become snre we have left nothing out. Enough about this.

Against the Fifth Meditation, which deals with the essence of material things, and once again of God, that he exists

DOUBT ONE. CONCERNING THE ESSENCE OF MATERIAL THINGS AS IT IS KNOWN SOLELY FROM QUANTITY, SHAPE, AND SO FORTH AND CONCERNING THE EXTERNAL AND IMMUTABLE NATURE ATTRIBUTED TO IDEAS AND UNIVERSALS

In the Fifth Meditation, you say first that you imagine distinctly "quantity, that is, extension in length, width, and depth, and also number, shape, position, motion, and duration." From all these things of which you say you have an idea, you choose shape, and among shapes the triangle, concerning which you say this: "Although such a shape may perhaps exist nowhere in the world outside my thought, and may never have existed, it still has a certain fixed nature which is not made by me and does not depend upon my mind, as is clear from the fact that various properties of this triangle can be demonstrated, for example, that its three angles are equal to two right angles, that the longest side subtends the largest angle, and the like, which, whether I like or not, I now clearly recognize even if I had never thought about them before in any way when I imagined a triangle, and which therefore are not made by me." And that is all that you say about the essence of material things, for the little you add amounts to the same thing.

I do not wish to dwell on this subject; I will merely suggest that it seems hard to accept the existence of "some immutable

and external nature" besides almighty God. You will say that you are advancing nothing but what the schools teach, that natures, or the essences of things, are eternal and that statements made about them are eternal verities. But that too is hard to accept; and besides it is impossible to comprehend how human nature can exist when no man exists, or to say that a rose is a flower when there are no roses at all. . . .

[*Gassendi here repeats in abbreviated form his analysis of the concept of human nature in Plato and Socrates as well as the truth "Man is an animal."* *See pages* 42–46.]

I can say the same thing here of your triangle or its natnre; for the triangle in your mind is a measure, so to speak, by which you test whether something deserves to be called a triangle. But it must not be concluded on that account that such a triangle is something real and a true nature existing outside the understanding, which, as I said in the case of human nature, formed that nature by itself and made it general on the basis of material triangles it had seen. Nor is it to be concluded that the properties proven true of material triangles belong to these triangles because they have been derived from an ideal triangle; for it is instead the real triangles which have these properties in themselves, and the ideal one does not have them except to the extent that the understanding accords them to it on the basis of its inspection of the material triangles, only to return them later to their source in the proofs it makes. This is the same way that the properties of human nature are not in Plato and Socrates as if they had received them from a universal nature; rather the universal nature has them because the understanding attributes them to it after noticing them in Plato, Socrates, and others, only to return them subsequently to their source when it is useful in reasoned discussion. For it is well known that the understanding comes to this universal proposition "Every man is rational" from having seen that Plato, Socrates, and all the others were rational, and then when it wants to prove that Plato is rational, it introduces that statement as the major premiss of its syllogism.

And, Mind, you also say that "you have an idea of a triangle

and that you would have had it even if you had never seen any triangular shape in bodies, just as you have ideas of several other shapes which have never appeared before in your senses." Now if, as I said above, you had been deprived of all the operations of your senses until now, so that you had never seen or touched different surfaces, or the extremities of bodies, do you believe that you could have or form the idea of a triangle or any other shape? "You already have several which have not slipped into you through the senses." But obviously it is easy to have them since from those that have slipped in through the senses you imagine these and fashion others in the way I explained just now.

I should also mention here the falsity of the nature of the triangle which assumes that it is made of lines which lack breadth, that it bounds an area which lacks depth, that its limits are three points which lack any parts, but then we would go too far afield.

[DESCARTES'S] REPLY

Since you remark that "that is all I have to say about the matter in question" after quoting a few of my words, I am forced to point out that you did not pay enough attention to the internal coherence of the things I wrote; for I believe that it is so great that everything that precedes it, and part of what follows, applies to the proof of each point, so that you cannot report in good faith everything I think about one question without also reviewing everything I wrote about the rest.

But when you say that "it seems hard to accept the existence of something immutable and eternal besides God," you would be, apparently, quite right if it was a question of a thing that exists, or even if I had accepted the existence of something so immutable that its immutability did not depend on God. But just as the poets imagine that the fates were created by Jupiter, but that once they had been created, he pledged himself to preserve them, so I

do not believe that the essences of things and those mathematical truths that can be known about them are independent of God; but I do think nonetheless that they are immutable and eternal because God so willed and so arranged matters. Whether you choose to call this hard or soft, it is enough for me that it is true.

Next, what you say against the universals of the logicians does not concern me since I do not understand them at all as they do. But as for the essences which are known clearly and distinctly, such as the essence of a triangle or of every other geometrical figure, I will easily force you to confess that the ideas we have of these things have not been derived from individual cases; for here you call them false obviously because they do not agree with your preconceived opinion about the nature of things.

And a little later you say that "the object of pure mathematics, such as the point, the line, the surface, and the indivisibles formed from them and inseparable from them, cannot exist in reality," from which it would follow that no triangle and nothing at all of the things that are understood to pertain to the essences of this and other geometrical figures has ever existed, and therefore that these essences have not been derived from any existing things. "But," you say, "they are false,"—in your opinion, that is, since you assume the universe is such that they cannot be in conformity with its nature. But unless you also contend that all geometry is false, you cannot deny that many truths about these things have been demonstrated which may rightly be called immutable and eternal since they are always the same. Moreover, the fact that they are not in conformity with the universe as you assume it to be, just as they also are not in conformity with the one Democritus and Epicurus constructed out of atoms, is only a matter of a terminology quite foreign to them, which changes nothing. And they are undoubtedly no less in conformity with the true nature of the universe which was created by the true God. Not that there exist in the world substances that have length without width, or breadth without depth, bnt rather that geometrical figures are not considered as substances, but as limits within which substance is bounded.

At the same time, I do not concede that the ideas of these figures ever slipped into the minds through the senses as everybody ordinarily persuades himself. For although some could undoubtedly exist in the world like the ones considered by geometry, still I deny that there are any in our surroundings unless they are so small that our senses cannot reach them in any way; for the figures are made up for the most part of straight lines, but never once did even a part of a line that was really straight strike our senses; indeed when we examine under a microscope the ones that seem the straightest to us, we learn that they are quite irregular and everywhere curved in undulations. And then when we first saw a triangle drawn on a piece of paper long ago in our childhood, that figure could not show us how a true triangle, as it is considered by geometry, should be conceived because the true triangle was contained in it in very much the same way that Mercury is contained in an uncarved block of wood. But since the idea of a true triangle was already in us beforehand and could be understood more easily than the more complicated drawing of a triangle figure, when we saw that complicated figure, our minds did not apprehend it, but the true triangle instead. In precisely the same way, when we look at a paper on which lines have been inked in to represent the face of a man, the idea of those lines is not aroused in us, but the idea of a man, which would not happen at all if we did not know the human face from other sources and if we were not more accustomed to think of it than to think of those lines, which, by the way, we are often unable to tell apart if they are only somewhat distant from us. And so, in truth we would not have been able to recognize the geometrical triangle from the one drawn on paper if our mind had not already had the idea of it from somewhere else.

Rebuttal. Article One: The treatment of the essence of material things seems quite meager, and with good reason

. . . I will not dwell longer on this subject, for it is enough to warn

every reader to look closely to see just how much wiser he has grown than he was before concerning the essence of material things after he has weighed your contributions not only in this chapter but in the preceding and subsequent ones. Now that all material things are endowed with quantity and with parts, with shape and with places for the parts, with motion or rest of the whole or its parts, why, even the half-blind and barbers know this and other things like it. Besides, you do not prove that people who know these things are aware of all the beauties and wonders of the universe and have penetrated very deeply iuto their inner being and the farthest retreats of nature or that precisely these things that they know make up the very essence of each thing, or that other philosophers weary themselves in vain as they yearn for some more ample account, in vain not because of the difficulty in discovering it, but because there is nothing more there in the universe. In short, the prize is to be awarded to those who have striven to explain the nature of material things, their powers, their properties, and their actions in terms of size, shape, motion, position, and a few other qualities that either lie within or are added onto the tiny bodies or primary elements (*principia*) from which every material thing is assembled, that is, to those who have studied these verses:

> From their clash, motion, pattern, placement, shape
> Flames are forged; altering their pattern's shape,
> They alter their nature. . . .[33]

[33] Lucretius, *De rerum natura*, I, 685 ff. and II, 1021 ff. Gassendi is not contradicting earlier passages in which he had said that the innermost nature of matter could not be known. He is chiding Descartes for claiming to have achieved an impossible goal and for then presenting an obvious and meager answer that elucidates nothing. With a certain ironic pleasure he is accusing Descartes of producing a theory of matter that is in no way different from Epicurus', the exponent of ancient atomistic materialism, wlnch Descartes himself had associated with Gassendi in his Response (page 248). Of course, Descartes was not a materialist; but the material half of his philosophy did correspond rather accurately to Gassendi's picture of it: it behaved very much like corpuscular atomism, and it effectively blocked the consideration of divine purposes in natural phenomena. By reducing the entire corporeal dimension to extension, and by refusing to believe that anything beyond extended qualities could be known about body, Descartes became one of the seventeenth-century's outstanding advocates of the mechanistic study of nature.

Article Two: There are no real and eternal natures of things; and the ones that we have in our minds in the form of ideas are formed from examining individual things

When I said that it was hard to accept the existence of an immutable and eternal nature besides thrice great God, you reply that "whether I choose to call this hard or soft, it is enough for you that is true," because "you do not make it exist independently of God." I congratulate you then on having a gullet which finds nothing hard in such matters and which swallows everything with the greatest ease as if it were very soft. I also congratulate you on that highly acute vision by which you profess to recognize natures, or in other terms real things, which are nevertheless not existent, which are nowhere, either in this world or beyond it, which are not God, and which are still dependent upon him.

Now since no law forbids me to ask you how you understand this, come, answer me. When you say that "God so willed and so arranged matters that these natures would be immutable and eternal," either these natures existed by themselves, uncreated, and God willed and arranged them only as a builder wills and arranges in a building the stones that he finds already made and does not make himself, or else they were created by God, and God was their author and willed and arranged them in that he actually made them. And if the first is the case, then the natures existed by themselves and independently of God, and it was useless for God to will and arrange them to be immutable and eternal since they were already by themselves. In fact, put the case that God did not so will and arrange matters; would they have been any less what they are? And if the second is the case, first they were not immutable since they passed over from non-

being, so to speak, to being. Secondly, they were not eternal inasmuch as they must have not existed in order to be created, and so at some point they began to be, which is inconsistent in an eternal thing. Third, then they were effects since every creation is the creation of an effect. Therefore they existed since every creation results in an existence; therefore, they were not only immutable and eternal, as you assert, but also existent, which you deny as you take something hard for me and make it so soft for yonrself that you can say that it is not a question of any existing thing.

From this you can see just how fittingly you borrow the example of the fates from the poets, and from the Stoics as well. For if Jupiter created the fates, it is assumed that he existed before them; and he made decrees about things that could have been otherwise or could not have been. But God did not exist before the natures if they were really immutable and eternal or if they could not have been other than they are (for otherwise they would not be the natures of the things they are natures of). Tell me, I beg of you, when God deliberated concerning the nature of the triangle and decided what he wanted the triangle to be, could it have happened that he came to some other decision about the triangle, or could there have been a triangle which was not made of three sides and three angles?[34] But surely the thrice great God is not bound by the things he created as the Jupiter of the poets is bound by the fates, but he can destroy with his absolute power anything he has created. I ask you, in what way do you conceive that God could have so arranged the triangle that now, if he absolutely willed it, destroying its nature, he

[34] Problems such as these (can God change an essence? an eternal verity? the past?), raised by Descartes and answered affirmatively, represent tricky and dangerous complexities for theologians. To answer that he cannot is to deny his omnipotence; to answer that he can leads to absurdities such as the ones Gassendi is pointing out here. As far back as 1277, Etienne Tempier, Bishop of Paris, had condemned the "necessitarian" answer that God was bound by the necessities of logic, essence, or definition. Spinoza's philosophy, universally condemned as atheistic in its own day, always took the necessitarian position.

would do what he could have done in the beginning, namely determine that a triangle is not made of three sides and three angles?

And you must not say that if God destroys it or makes it something else it would not be a triangle but a different shape. For whenever a fignre is subsequently composed of three sides and as many angles, it will not fail to be a triangle; and the obvious conclusion is that the nature of the triangle is such not because God willed it so rather than making it something else, but because it is such out of its own necessity. And so how much more satisfactory it seems to recognize that nothing real exists besides God except things created by him, things that exist and are individual, and to think that things not yet created and having no existence, but being merely possible, have no reality and no truth, or if they are felt to have some, it must be understood to be future, so that they do not have any genuine reality (since they are not a thing and cannot therefore have anything) so much as they will one day have it (since they will exist some day).

Finally these things, or rather ideas, must be allowed to exist in no other fashion than as an operation of the understanding as it extracts them as it were from individual things it has observed and things it has considered possible and then forms certain general notions which can be attribnted to individual things as appropriate to them simply because they are derived from individual things. Considered in this way there is no doubt that these things, or universal natures, can be said to be dependent upon God to the extent that the individual things from which they are formed and from which they do not differ in reality depend upon God, and also because the understanding and its operation by which universals are made have God as their author. Still, they could even be called immutable to the extent that God willed that individual things of this sort should always exist and eternal to the extent that if God had willed to create individual things throughout eternity, the understanding could extract such notions from them.

Your reasoning ran as follows:

"If I have the ideas of figures which either do not exist or cannot be suspected of having entered through the senses, and if I can demonstrate various properties of these figures, such natures are assuredly immutable and eternal, and not derived from individual things;

"Now I have the ideas of such figures which I can imagine even though they did not exist anywhere in the world outside my thought or ever had existed, such as of the triangle and of others which cannot be suspected of having entered through the senses, and I can demonstrate various properties, both of the triangle and of the others;

"Therefore, their natures are immutable and eternal, and not derived from individual things."

However, you did not answer the things that I gave back to you as replies and which follow from the discussion about the faculty in the understanding which composes, divides, separates, deduces, and in one word manipulates in various ways ideas that it has derived from individual things.

Article Three: It is false that the ideas of geometric figures are not drawn from the senses and that they can exist in the world as they are conceived by geometers, namely indivisible

You simply asserted that "you would force me to confess that the ideas we have of the triangle and other geometrical figures have not been derived from individual cases." You asserted this, but you did not fulfill it although nothing would have gratified me more than either to be forced by some proof or at least to be steered by the strength of some probability. Surely I am not going to be forced to yield merely because you say that "the things I propose are false, or what I call false is true even though it does not agree with the opinion I have of the universe or with the one

that Democritus and Epicurus have" (with whom I have nothing in common on this question, though you do have much in common with them in the opinion you have concerning the corporeal nature of things and the essence of material things, indeed a great deal as far as I can surmise). For your comment does not invalidate the explanation I gave of how statements which may be called eternal verities can be made and can be acceptable.

Nor am I forced to yield when after admitting that "substances that have length without width, or breadth without depth do not exist in the world," you add that "geometrical figures are not considered as substances, but as limits within which substance is bounded." For these limits under which some substance or other is bounded are individual things; and since in reality they are nothing more than the individual substance itself bounded in some way, from this point of view they are something physical. You yourself show that it depends on the thought process of the understanding that they are considered separately, and from that point of view they are something geometrical or mathematical.

Once again, I am not forced to yield because you say that "you do not concede that the ideas of these figures slipped into our minds through the senses"; for that is the point in question, and the matter does not depend on its being conceded or not by you or me or anyone else. However, when you admit at the same time that "everybody ordinarily persuades himself that they did slip in through the senses," you are admitting that everybody ordinarily recognizes that his ideas of them are not innate, so that you are striving to force me to admit something contrary to what all men recognize and believe.

Again, what is it all about when you say that "figures like the ones considered by geometry could undoubtedly exist in the world"? For can there possibly be a line with length but no width, which, however, is the way you conceive it? I should expect that you will not say that it has no substance. But if it has substance, is not this substance a physical reality? is it not corporeal? and is the body not long? and even if it is ever so thin, doesn't it have a certain thickness? does it not have parts arranged

both in length and in breadth? does it not then have a certain width? and isn't that certain width different from the kind considered in geometry? You say that "there are none in our surroundings unless they are so small that our senses cannot reach them in any way." Let us grant that they do not reach our senses; it would be sufficient if you proved that they exist, if you showed how they can hold together; is it without a body, or with a body devoid of width and depth? You say that "these figures are made up for the most part of straight lines." Who showed you that? How do you know that? How do you understand it? How do you prove that these figures are made up in that way? You say that "that is beyond the capacity of senses," and offer the example "of the material straight liues which the microscope still shows to be very uneven no matter how fine they are." But if this observation is so very true of lines perceived by the senses, just what hope is there that the multitude of your tiny lines will ever be seen by the eye? What hope that you will prove they are straight? Therefore, these comments do not force me to yield either.

Article Four: It is false that the experience of children shows that they have an idea of a triangle before they have seen a triangle or other figure upon which they may reason by analogy

You continue, "when we first saw the triangle drawn on a piece of paper loug ago in our childhood, the figure could not show us how a true triangle, as it is considered by geometry, should be conceived." True, for in childhood we were not geometers, and we only became geometers through the lessons of our teachers or books or through discovery or study and our own work. Likewise we learned about the triangle formed of lines devoid of width from teachers or the books of Euclid or others; or else we derived it by our own thinking as we reasoned about the

triangle and other figures which were present in our senses or that we had formed by putting together, breaking down, or moving about the ones that had been present in the senses. Only then could we notice that our reasonings went swimmingly and squared with experience itself when we posited lines devoid of width and surfaces devoid of depth, i.e., when we considered length without paying attention to width, no matter what kind or how much of it might be present. It was therefore not the sight of a single triangle seen in childhood, but partly the first one we saw and partly others (along with instruction or contemplation brought to bear upon them) that furnished us with the cause of that triangle whose sides, or extremities, we sought to conceive of as lacking width. We conceive of this triaugle as contained in a triangle drawn on paper, but in a totally different way than Mercury is conceived of as iu an uncarved block of wood. For a real statue of Mercury can obviously be carved out of the wood, but that triangle composed of indivisible elements cannot exist except mentally and by hypothesis.

You continue, "since the idea of a true triangle was already in us and could be understood more easily than the more complicated drawing of a trianglar figure, wheu we saw that complicated figure, our minds did not apprehend it, but the true triaugle iustead." But just because these and other splendid and Platonic things have been said, have they been splendidly aud truly proveu? Show a child who has never seen oue before the figure of a triangle (which you call "complicated"); it will impress its idea, or image, in his mind; and if he sees another one or conceives of it as possible, he will also form a general idea of a triangle in the same way he will form the general idea of a man from having seen or conceived one or several men. But if you ask him how he felt that idea rise in his mind, he will say anything except that he had that idea of yours already in him, as if he was remembering it, that is the idea of a triangle made up of lines totally devoid of any width. I maintain that he will say something else unless subsequently either you, or readiug Euclid or someone else, or an argument expounded to him suggests a thought

which corresponds to the one that you are looking for. The illustration of a human face traced with lines on paper does not help your case at all. For that sketch was made only with the intention of representing a thing which exists outside the understanding and from which an image already has passed into the understanding. But your triangle represents only itself; and it is clearly necessary, since it represents itself, that it must transmit an image of itself into the understanding before it may arouse an image of itself in the understanding. Consequently, in order to arouse the idea of the geometers' triangle it is first necessary that such an idea has been imprinted in the mind either through the instruction of another man or the suggestion of reason.

DOUBT TWO

Rebuttal. Article One: Existence is not a property, nor any specific class of things

You do not see what class (*genus*) of things I would have existence belong to. I am not surprised, since I would not have it belong to any special class. But at the same time, don't you see what you are doing when you wish it belonged to some specific class? First, you apparently conceive of reality (*res*) (or, as is commonly said, being or "something") as the most general class, which you divide into two species, or lower classes, namely substance and property. Then dividing the class property into its species, you count existence as one of them, and in the process get the words "property" and "attribute" confused.

To speak first then of this confusion, which seems to have resulted from an ambiguity, it is known that the word "property" designates something physical, hence independent of the operation of the intellect, while the word "attribute" designates something logical, hence dependent upon the intellect as it makes an attribution or predicates something about something else. Thus it

happens that any property may be an attribute or become one, but not vice versa that any attribute may become a property, as is especially obvious from the fact that substance also is an attribute, but nevertheless is not a property, but a class distinct from it; furthermore reality itself is an attribute which is a class more general than property or substance. It is evident then that an attribute is not only something transcendent as may be reality or being, but even supertranscendent since it can be predicated to reality or to being. In fact, it is transcendent or supertranscendent to the degree that it is something logical and pertains to the intellect, which passes beyond the totality of things in its thought. Accordingly, to avoid any ambiguity, either you must give up the word "attribute"; or by confining it to the notion of property, you must understand "attribute" to be something distinct from substance, which covers a realm smaller than reality itself. Then, if it is your wish that existence is to be a particular property, or a particular attribute, the term "property" can be applied to existence, and even the word "reality" can (since whatever is characteristic of the whole class can be applied to the species). But the term "existence" cannot be applied either abstractly or concretely to property in general (since the characteristic of the species cannot apply to the class) or to reality in general (since what cannot be applied to the lower, or less general, category cannot be applied either to the higher, or more general category). What is more, it cannot be applied to substance (since the characteristic of a species cannot be applied to a class opposed to it, for the characteristic of one class to which the species belongs cannot be applied to another class). And finally it cannot be applied to any other property since the characteristic of one species cannot apply to another species under the same class. And so, just as we do not say "Animal is human," "The living body is human," "Plant is human," "Horse is human," so we would not be able to say "Property is existent, or exists," "Reality exists." "Substance exists," "Wisdom or another property exists."

Do you see how many things it follows do not exist from the

fact you wish existence to be a particular class of things? Do you see now why I would not refer it to any special class of things, but put it instead in the most general, or transcendent, class which subsumed all classes and species of things so that if it could not be applied to them, they could not be things or connted as things. That is why I made objections to you previously about the noun "perfection" which now turn up to be made about the noun "property."[35] You wish to know whether existence should be considered as a property of something or other that exists; judge for yourself whether things can possibly be deprived of existence or be conceived of as deprived of it and still remain some sort of thing or still be conceived of as remaining a thing. Now you will find out that it is true of all properties that if they are removed either in thought or in reality, still a substance, whose properties they are, is conceived of as continuing to be some sort of thing. But if it is existence that is taken away either in reality or in thought, I ask if the thing to which it belonged will continue to be something or will be nothing. Obviously it will be nothing since what does not exist is nothing. For if you assume that it continues to be in separate parts, you also assume that it was not deprived of existence in its separate parts. And when you assumed that no existence remained, then the thing would become really nothing. From such considerations I derived the distinction between a perfection, or property (e.g., sight), and existence itself. For a man, in whom the characteristic of sight is normally found, does not become nothing if he is deprived merely of it, but only blind, in other words imperfect, and deprived of sight. But if existence is taken away from anything whatsoever in which it is a characteristic, then it can truly be called nil or nothing, not imperfect or deprived of existence, while something that is called imperfect or deprived is still something, even thongh it lacks one of its perfections, or properties.

[35] See Articles One and Two of Doubt Eight concerning the Third Meditation, pages 215–220.

DOUBT TWO

Rebuttal. Article Three: It was not proven that God exists by any other reason than that God exists[36]

From that it is clear what must be said of your minor premiss. For you say, "But after we have investigated carefully enough what God is, we understand clearly and distinctly that it pertains to his true and immutable nature to exist"; but your Meditations prove that you did not iuvestigate by studying God himself, whom you did not see as he is iu himself, but by studying only the idea of him that you felt you had within your understanding. Accordingly, whatever you understaud as pertaining to his nature, yon do not understand to pertain insofar as it is in nature itself, but insofar as it is in your idea; from which it follows that your minor premiss should have been stated in no other way but this:

"But after we have investigated carefully enough what God is, we understand clearly and distinctly that it pertains to his true and immutable nature to exist insofar as it is in an idea."

And that you are considering divine nature as it exists in an idea, and not as it is in itself is clearly shown by the fact that you intend to prove its existence by arguing from the examination, or testing, of an idea. And as the idea contains a description of the divine nature, you therefore describe God according to your idea of him as becomes clear from what you wish to be understood by the noun 'God'. To be sure, it is useless to ask if a thing exists or not unless it is made clear what sort of thing is meant. Therefore, when yon claim to prove to a man whom you imagine denying the existence of God that God does exist and when you describe to him what sort of God you conceive, actually you are describing to him his conception of God as God exists in your idea, not as he truly exists in himself; and so he

[36] Gassendi gives a very sound analysis of the weakness of any "ontological" proof here, though he does not use the term.

expects you to prove that God exists in himself as you describe him existing in your idea. Then, if you press your minor premiss to the point where you claim that the existence of the divine nature conceived in your idea must be accepted as the existence of the divine nature in itself, then he could accuse you of a manifest sophism, and he will press you concerning the minor premiss as I have spelled it out just as he would press you if you were to make a minor premiss about a golden mountain in this form.

"But after we have investigated carefully enough what a golden mountain is, examining its idea, we understand clearly and distinctly that it pertains to its true and immutable nature that it is made of gold insofar as it is an idea."

And as he could take exception to you saying: What form of proof is this, pray? We were discussing whether God exists; but you assume that it pertains to his nature to exist. And isn't that the very point at debate? Isn't that just what has to be proven, that it pertains to his nature to exist? Will you perhaps say that it remains proven by the description you made? But is to describe how you conceive of a thing to prove that it exists? And do you prove it by enumerating all God's perfections, eternity, immensity, supreme power, wisdom, existence, and so forth? But what else are you doing but putting existence among his perfections so that you may prove that existence exists, which is proving a thing by itself? Do you prove it because a supremely perfect being cannot be conceived by the understanding without existence? But isn't this the issue at stake, whether there is a supremely perfect being who is understood under the term 'God'? But shouldn't the existence of a supremely perfect being be proven in some other way than supposing that there is a supremely perfect being, which is simply begging the question? Do you prove it on the grounds that no other existence but possible and contingent existence belongs to other things, but actual and necessary existence belongs to God himself? But isn't this also the subject of dispute, namely whether existence, whatever kind it may be, belongs to God? for if someone denies it in general, he also denies actual and necessary existence. And so he would tax

you with nothing other than begging the question. It is sufficient for me to have noted down the fault in logic produced by counting existence among the perfections, by confusing existence in an idea with existence in reality, by assuming existence in your minor premiss in order to prove existence. . . .

[*Speaking of the concept of extension, not of God, Descartes has this to say in his letter to Clerselier:*

> But at the end they add a thought that I cannot surely state our author wrote in his book of Rebuttals although it resembles his ideas closely. "Several excellent minds," they say, "believe that they see clearly that mathematical extension, which I set as the principle of my physics, is nothing but my own thought and that it does not have and cannot have any existence outside my mind, since it is only abstraction that I make from a physical body; and consequently my entire physics cannot be anything but imaginary and fictitious like all pure mathematics; and that the real physics about the things that God created must have a real, solid matter, and not an imaginary one." This is the objection of objections and summarizes the entire doctrine of those excellent minds that are being cited here. According to them, all the things that we can understand and conceive are mere imaginations and fictions of our minds which can have no existence; from which it follows that there is nothing that can be accepted as true except what we cannot not understand, conceive, or imagine in the least, that is to say that we must close the door completely on reason and be satisfied with being monkeys or parrots, no longer men, if we are to deserve to be placed on a level with these excellent minds. For if the things that we can conceive are to be judged false for the mere reason that we can conceive them, what remains except that we must accept as true only those things that we do not conceive, and build our doctrine out of them, copying others without knowing why we are copying them, the way monkeys do, and uttering only words whose meaning we do not understand, the way the parrots do. But I have good reason to feel consoled because in this objection my critics link my physics with pure mathematics, which I am especially desirous to have it resemble.]

DOUBT THREE. [DESCARTES'S] REPLY

Concerning what you relate about Diagoras, Theodorus, Pythagoras, and others, I will cite the example of the skeptics in answer to you.[37] They had their doubts concerning geometrical demonstrations, and I maintain that they would not have had any if they had known God as he should be known. And it is not a valid proof that one thing is better known than another to say that it appears true to a greater number of people, but only if it appears to be more primary, more evident, and clearer knowledge to those who know both things properly.

Rebuttal. Article One: The skeptics did not argue against appearances (among which they counted geometrical propositions), but against hypotheses and the arrogance of the dogmatics

There is nothing for me to add here to what has been set down in my Doubts, except on the replies you make concerning the skeptics. I shall pass over the fact that the uncertainty of the skeptics did not prevent the dogmatics from being certain, or rather very certain, of their dogmas, including specifically the ones I named, the geometrical demonstrations, against which it is of no avail to have cited the example of the skeptics. I shall pass over this and say first that the skeptics neither doubted nor argued against things as they appear or as they are useful in daily living, but only against secret, uncertain, or vain things or ones cooked up ostentatiously. And if they ever appeared to be saying something against appearances or actions useful in daily living, they swore that they did so not because they desired to attack those things, but because it would be so worthwhile to blunt

[37] Gassendi had said that these pagan atheists might well believe in geometrical demonstrations without feeling any need to found their validity on God's existence or his reliability. Descartes answers that geometrical proofs are subject to doubt, more so than God's existence.

the edge of the arrogance of dogmatic philosophers who boasted that they had penetrated into the most abstruse matters although they were quite foggy on the most obvious matters of all.

I add further that they counted whatever was proven by geometrical demonstrations in the ranks of appearances with the result that they had no doubts about them, but only attacked the method of proving them, about which the geometers were so self-satisfied. For example, in astronomy they counted the eclipses and various aspects of the planets among appearances and yet spoke out against hypotheses not insofar as these hypotheses applied to predicting eclipses and other things, but insofar as they were held to be so true that their defenders thought they were absolutely true and in conformity with nature when, however, the same appearances could be predicted and preserved by contrary hypotheses which could not be true at the same time as the first.

In the same way, in geometry they always counted as appearances the propositions that a triangle has three angles equal to two right angles and that the square of the hypotenuse is equal to the square of the two sides, and others of the same sort, for these things exist in nature and required only to be examined by the mind and comprehended in words (for to demonstrate is nothing more than to point out what needs to be considered as when someone looks at a face without detecting a mole and is ordered to look closer and to pay attention to the area where the mole is), but they raised doubts concerning the method of proving by hypotheses, not insofar as they were conducive to stimulating the attention or revealing the solution being sought, but insofar as they were held to be so right and true to nature that actual things would be assumed to be exactly the way the hypothesis supposed they were, for example the indivisibility of points, lines, and planes which I mentioned a short while ago. Accordingly you would not see them proposing doubts against demonstrations, or clear natural principles that are neither hypothetical nor suppositious, but only against genuine hypotheses, about which they would first ask *ei ex hupotheseôs ti lêpteon* 'if that

ought to be accepted as a hypothesis'. And then, even though they seemed to be debating against appearances, and proven statements, and the proofs themselves, in their own words, however, it was a matter, *ouch anairein boulomenous* 'not of their desire to overthrow those things', *alla epideiknuntas tên tôn dogmatikôn oiêsin kai propeteian* 'but of exposing the arrogance and boasting of the dogmatists', so that they should not be cited as examples against Pythagoras, Plato, and others as though they proposed serious doubts in the objections they made against the dogmatics.[38]

Against the Sixth Meditation, which concerns the existence of material things and the true distinction between the mind and the body

DOUBT TWO. THAT THE SENSES DO NOT ALWAYS DECEIVE

Then your argument turns to the senses, and you begin with a clear enumeration of the things which were learned through the senses and that you believe true according to the guidance and judgment of nature alone. After that you relate the experiences that shook the faith you had had in the senses so much that they drove you to the point where we saw you in the First Meditation.

It is not my intention here to direct the debate toward the truth of the senses. For although deception, or falsity, is not to be found in the senses themselves, which merely behave passively and only report things as they appear and as they must appear

[38] Neither Gassendi nor the classical skeptics truly understood the nature of an axiom system. They saw that the strength or weakness of a system might lie in its axioms (hypotheses), but had trouble arguing for or against them.

given their causes, it is to be found in the judgment, or mind, when it does not act with enough circumspection and does not perceive that things which are distant, for this and for other reasons, appear more indistinct and smaller than they do close up, and so on.[39] Yet wherever the deception lies, there is no denying that it exists; and the only difficulty is whether it is always the case that one can never rely on the truth of a thing perceived by the senses. But really there is no need to seek them when examples are readily available. To your comment, or rather objection, I will only reply that there seems to be no doubt at all that we are certain that a tower is square when we examine it from close up and touch it, even though when we were farther off, we had reason to judge it round, or at least for doubting whether it was round, or square, or some other shape. In the same way the sensation of pain which still appears to be in a hand or a foot after these limbs have been cut off may sometimes deceive people who have lost the limbs, this because the sensation-bearing spirits are used to bearing information to the limbs and expressing the feeling in them; but whole people are so certain that they feel a pain in the foot or the hand which they see being pricked that they cannot doubt it. Likewise, since we sleep and wake alternately as long as we are alive, we will be misled through dreams because things will appear to be in front of us which are not in front of us; but still we are not always dreaming; and when we are really awake, we cannot doubt whether we are awake or dreaming instead.

And so, though we may think that we are naturally subject to error, even about things that seem very true, nonetheless we also think that we are by nature capable of knowing the truth. And as we sometimes are mistaken, for example, when we do not detect a sophism, or when a rod is immersed halfway in water, so we sometimes understand the truth, for example, with a geometrical proof or with a rod removed from the water, so strongly in fact that we cannot have any doubts about the truth in either case. And though it is possible to doubt about other things,

[39] This is precisely the position taken by Epicurus.

at least it cannot be doubted that things do have certain appearances; and it is not possible for it to be anything but very true that they appear that way. Moreover, that reason dissuades us of many things that nature inclines us to believe does not in any way diminish the truth of what appears, of *ton phainomenon*. However, there is no need to inquire here if reason resists the impulses of the senses in the same way that the right hand supports the left hand when it slips from fatigue, or in some other way.

[DESCARTES'S] REPLY

You show clearly here that you base your argument only on prejudices and never get rid of them since you insist we should not look for falsehood in matters where we never detected any falsehood; and so you can say "when we examine a tower from close up and touch it, we are certain that it is square" if it appears square, and "when we are really awake we cannot doubt whether we are awake or dreaming," and such. For you have no reason to judge that you have already examined long ago everything in which there may be some error; and it could be shown easily that you are sometimes mistaken in things that you claim are so certain. However, when you are reduced to saying "at least it cannot be doubted that things appear to be what they appear to be," you came back to the right way, and I stated the very same thing in the Second Meditation. But there it was a matter of the truth of things outside ourselves, about which you had nothing true to say.[40]

[40] Philosophically Descartes is more sound, though Gassendi seems to be talking more sense. The former finds in appearance a subjective truth which is not the truth about reality; for the latter it is the only truth available to men, but it is not the whole truth about reality.

DOUBT FOUR. CONCERNING THE SENSIBLE IMAGE OF A CORPOREAL THING, WHICH IT WOULD APPEAR CANNOT PENETRATE INTO AN INCORPOREAL MIND, AND CONCERNING THE MIND, WHICH IT WOULD APPEAR CANNOT BE UNEXTENDED IF IT COEXISTS WITH A BODY, OR EXTENDED THING

But you say that "I have on the one hand a clear and distinct idea of myself insofar as I am only a thinking thing, and not extended, and on the other hand a distinct idea of the body insofar as it is only an extended thing, not thinking."

Indeed, first regarding the idea of body, it does not seem necessary to elaborate much upon it. For if you stated anything general about the idea of body, I would have to repeat my objection that it is up to you to prove that it is contradictory to the nature of a body to be able to think; and also my objection that when you are asked about yourself if you are in fact a very refined body, you would beg the question since you would answer that the idea of a thinking body was contradictory.

Now since you do state that, and surely you are speaking of that coarse body from which you contend you are distinct and separable, I do not so much deny that you have an idea of it as I deny that you *can* have such an idea if you are really a thing without extension. For I ask you, how do you think the sensible image (*species*)[41] or idea of body, which is something extended, can penetrate into you, an object (*subjectum*) without extension? For either such a sensible image proceeds from a body and is without a doubt corporeal and has parts outside of each other, and consequently is extended, or else it is imprinted in some other way; but since it inevitably represents an extended body, it must still have parts and therefore be extended. Otherwise, if it lacks all parts, how does it represent parts? if it lacks extension, how

[41] The Latin word *species* is again taken in its technical sense. See Aristotle, footnote 56.

does it represent an extended thing? if it lacks shape, how does it represent a thing having parts above, below, on the right, on the left, in the middle? if it lacks variety, how does it represent a variety of colors, and so forth? Therefore, an idea does not seem to be totally lacking in extension; but if it does not lack extension, how would you be the subject in which it occurs if you were unextended? how will you adapt it to your nature? how will you perceive it and feel it gradually being blotted out and eventually disappear?

Secondly, concerning the idea of yourself, there is nothing to add to what has already been said, particularly about the Second Meditation. For that has made it sufficiently clear that you are so far from having a clear and distinct idea of yourself that you seem to have absolutely none at all. For indeed you still do not know what kind of thing you are which thinks although you realize that you think, so much so that even though this one activity is known, the main point still remains hidden, namely the substance which performs that activity. This brings to mind the comparison in which you can be said to be like a blind man who believes because he feels warmth and has been told that it comes from the sun that he has a clear and distinct idea of the sun in that if he were asked what the sun is, he can reply that it is a thing that produces warmth.

But, you will say, I add in this passage that I am not only "a thinking thing," but also "a thing that is not extended." Nevertheless, not to mention that you declare this without proof when it is the issue at stake, I ask first if that gives you a clear and distinct idea of yourself. You say that you are not extended; you are saying what you are not, but not what you are. In order to have a clear and distinct idea of something, or a true and genuine one, for they are the same thing, is it not necessary to know that thing positively and affirmatively, so to speak, and is it enough to know that it is not something else? Will it therefore be a clear and distinct idea of Bucephalus if somebody at least knows about him that he is not a fly?

But in order not to press this point I ask instead: assuming that

you are not an extended thing, are you diffused throughout your body? I do not know what you will answer; for although I admitted from the start that you were in your brain alone, I did so rather from conjecture than from full assent to your opinion. I arrived at this conjecture from your words, which followed later, in which you say that "you are not affected by all parts of the body, but only by the brain or even by one tiny part of it." But I was not fully certain from this whether you were in the brain alone or in part of it since you can be in the entire body and be affected by sensation in only one part, as we commonly admit that the soul is diffused through the entire body and still sees only in the eyes. Likewise the following words raised doubts: "and although the whole mind seems to be united to the whole body, etc." To be sure, in that passage you do not assert that you are united to the entire body, but still you do not deny that you are united to it. Whatever you mean, let us suppose as our first case that you are diffused through the body, whether you are the same as the soul or something different, I ask you: are you unextended, you who reach from your head to your foot? you who are a coequal of the body? you who have parts corresponding to each of its parts? Will you say that you are not extended because all of you is in the whole body and all of you is in every part of it?[42] If you tell me so, I ask you how you conceive of that? Is it possible for a single thing to be totally in several places at the same time? Our faith teaches us this concerning the sacred mystery; but here our discussion is about you as a natural being and is being carried on in the light of natural reason. Is it possible to understand that there is more than one place and not more than one thing in those places? And are not a hundred places more than one? And if a thing is entirely in one place, can it be in other places without being outside of itself as one place is separate from other places? Say what you will, it will be at least uncertain and obscure whether you exist entirely in every part of yourself, rather than each individual part of you in your individual

[42] Again a reference to the doctrine of transubstantiation. See Aristotle footnote 48.

parts. And since it is far more clear that nothing can be entirely in several places at once, it will become even more clear that you are not entirely in your individual parts, but that you are entirely in the whole body alone and therefore that you are diffused through the whole body by parts, and so have extension.

Let us assume as our second case that you are in the brain alone or even in one tiny part of it; you see that the same difficulty remains since however little that part is, it is still extended and you are coextended with it, and therefore you are extended and have parts corresponding to its individual little parts. Will you say that you conceive of the part of the brain as a point? That is really impossible to believe, but let us assume it is a point. If it is a physical point, the same difficulty remains since that sort of point is extended and is not entirely lacking in parts. If it is a mathematical point, you must first realize that that does not exist except in the imagination. But let us suppose that there exists, or rather let us imagine that there exists in the brain a mathematical point to which you are united and in which you exist. You will see how futile this fiction will be. For in order to imagine this, we must imagine it such that you are at the meeting point of the nerves through which all the parts inhabited (*informatae*) by the soul transmit to the brain ideas or images of things perceived by the senses. But to begin with, all the nerves do not meet at one point, in the first place because many nerves from all over the back end in the spinal column (for the brain is extended down into it), also because the nerves which run to the middle brain are known not to stop in the same place in the brain. But let us grant that they all meet at a point; nonetheless their confluence in a mathematical point is impossible since they are bodies and not mathematical lines which can come together at a mathematical point. Let us grant that they do come together, the spirits[43] transmitted by them could not leave the nerves or

[43] A reference to the "animal spirits," a substance that Descartes and other physiologists of the time thought traveled along the nervous system, as do electric impulses in modern biology, bearing messages to and from the brain center.

pass across them seeing that they are bodies and a body cannot be in no place or cross through no place such as a mathematical point, which is no place. And even though we grant that they can do these things, still you who exist in a point where there are no surfaces, left, right, upper, lower, or other, you cannot determine where they come from or what they report.

Moreover, I say the same thing for the spirits that you must send out to convey feelings or messages and to cause your movements. I need not mention that it is impossible to understand how you impart movement to them if you are in a point unless you are a body yourself or have a body with which to touch them and transmit impulses to them. For if you say that they move themselves and you only direct their motion, I remind you that somewhere you denied that a body moves itself[44] and that it may be inferred from that denial that you are the cause of its movement. And then explain to us how such a direction of yours could exist without any exertion, or motion, on your part. How can there be any influence exerted upon a thing and any motion in it without mutual contact between the mover and the moved? How can there be contact without a body when, as is so clear to the natural light of reason, "no thing can touch or be touched without a body"?[45]

[*The letter to Clerselier treats this question as follows:*

> As for the two questions they add at the end, namely "how the soul moves the body if it is not material and how it can receive images (*espèces*) from corporeal objects," they will only give me occasion to point out here that our author had no right, under cover of making objections against me, to propound a great many questions whose solution is not necessary in order to prove the things I wrote. The most ignorant people could make up more such questions in a quarter of an hour than the wisest men could solve in their whole lives. That is why I did not go to the trouble to answer any of them. Among other matters these questions assume some explanation of the

[44] In the Second Meditation.

[45] Lucretius, I, 304, not quoted verbatim.

union between the soul and the body, about which I have not yet written. But I will tell you *entre nous* that the whole difficulty involved in them is derived from a supposition that is false and cannot be proven in the least, namely that if the body and the soul are two substances of different natures, that prevents them from acting upon each other; for on the contrary, those who believe real accidents exist, like heat, weight, and such, do not doubt that these accidents can act upon a body, and yet there is more difference between it and them, that is between accidents and a substance, than there is between two substances.]

And yet why do I linger over this when it is incumbent upon you to prove that you are not an extended thing, and therefore incorporeal? I do not think that you will draw an argument based on the fact that man is commonly said to be made up of a body and a soul and concluding that if one part is called a body, the other part must be called a nonbody. If you did, you would give me grounds to make the following distinction: man is made up of two bodies, namely a coarse one and a subtle one so that while the first retains the common name "body," the second is given the name "soul." I omit that the same can be said of the other animals to which you do not grant a mind like your own. They are indeed lucky, if we are to believe you, if they even have a soul.[46] Hence, you see that when you conclude that "it is certain that you are truly distinct from your body," it will be granted you; but it need not be granted therefore that you are incorporeal, and not rather a kind of very subtle body distinct from the coarser body.

You add that "you can consequently exist without a body." But even if it were conceded that you can exist without that coarse body like the fragrance that escapes from an apple and is dispersed in the atmosphere, what advantage would you gain from that? To be sure, you would have something beyond what

[46] Following classical doctrine, it was generally admitted that all animate functions were performed by the soul (*anima*). Descartes denied animals not only all thought, but all sensation, and reduced all other animal functions (such as growth and motion) to the operations of mechanical automata.

the philosophers previously mentioned[47] supposed; for their opinion was that you perished completely with your death like a figure which disappears with the alteration of its surface so afterwards it is absolutely nothing at all. And yet since you could be some tenuous corporeal substance, you would not be said to perish completely with your death or to turn into nothing at all, but to subsist in the dispersed parts of you, despite the fact that you would no longer be able to think because of the dissolution, nor would you be called a thinking thing, or a mind, or a soul. When I make all these objections to you, it is not that I doubt the conclusions you intend to establish, but that I have no confidence in the solidity of the proofs you offer.

Rebuttal. Article Two: The comparison between the man who says that "he knows clearly the mind's nature" since he can say that "he is a thinking thing" and the blind man who says that "he knows clearly the nature of the sun" since he can say that "it is a thing that produces warmth" has not been refuted

Concerning the idea of the mind itself and especially the comparison made to a blind man, you say: "That blind man can have a clear idea of the sun as a thing that produces warmth although he will not have one of it as a thing that produces light." Here at last I seem to recognize what you think it is "to have clear and distinct knowledge of a thing." If it is known to us in any way at all through any one of the qualities it has acquired, or if it causes some sense response in us and gives rise to a concept, that suffices for us to say we have a clear and distinct idea of it, so long as it is understood that we have an idea of it as having such and such a nature, or to the extent that it is known to us. Reasoning in this fashion, if someone crossed your path in a thick fog and bumped into you without making any sound, you

[47] See Doubt Three concerning the Fifth Meditation (page 264) where Gassendi mentions three pagan atheists.

will say that you have a clear and distinct knowledge of him even though you were not able to see him or distinguish him from anything else. And when you are asked who that man is, you will answer, "He is a thing that bumps into others." And when the question comes back: "Can't you say anything else?" you will take exception: "I did not say that I had any other knowledge of him than as 'a thing that bumps into others.'" And it will be the same with other subjects.

But not to get off the subject, you said that you have a clear and distinct idea of the mind; and since you might be asked what the mind is then, you have said "It is a thinking thing." Then I took exception: "Don't you know anything else or can't you tell us anything else?" You took umbrage and insulted me as I asked for more on the nature of the mind of which you had an idea and boasted you could convey a clear and distinct knowledge, saying that it was worthy of the flesh, such as I was, to want to know and to track down in a sort of chemical analysis the inner nature, or substance, of the mind when it was sufficient to know of it that "it is a thing, and furthermore one that thinks." I suggested that this was just as if a blind man who had felt the warmth of the sun said that he had a clear and distinct idea of the sun and therefore professed to convey a clear and distinct knowledge of the nature of the sun; for if he were asked what the sun was, he could answer "It is a warmth-producing thing," and when he was pressed that that was not to fulfill his promise, he would grow hot and bothered and say that to have a clear and distinct knowledge of the sun and its nature it suffices to say "It is a thing, and furthermore one that produces warmth."

Now the matter being discussed was not the idea of the mind insofar as it is thinking nor the idea of the sun insofar as it is warmth producing (for no one denies that the mind thinks or is unaware that the sun produces warmth), but the idea of each of them insofar as it has a nature which is subsumed obscurely and confusely under the name 'thing'. Your answer said nothing abont 'things', but only touched on what was not controversial. Nevertheless, I will accept your position; and from the

fact that you concede that the blind man has an idea of the sun only as "a warmth-producing thing," but not "as a light-producing thing" (nor, I might add, as a thing having a certain color, shape, size, position, motion, distance, substance, and other properties also which remain completely hidden by reason of its inner nature), I infer that you must then concede in the same way that you have an idea of the mind only "as a thinking thing," but not "as a thing having a certain substance, nature, and other properties mentioned only too often"; for to say that these things are to be understood as subsumed under the name 'thing' is to admit that you do not know anything; since, just as when the blind man says "The sun is a thing that produces warmth," it is the same as if he said "The sun is I-don't-know-what that produces warmth," for I learn nothing else about it except that it has warmth, so when you say "The mind is a thinking thing," it is the same as if you said "It is I-don't-know-what that thinks," and I know nothing else about it except its thought. You say that "your comparison with a blind man was not exact, first because the knowledge of a thinking thing has a much wider scope than the knowledge of a warmth-producing thing, indeed much wider than anything we know about anything else because it has been revealed in its own location." But the question is not the extension, but the clarity and distinctness of the knowledge and what bounds the clarity and distinctions are restricted to in the case of the object being known. For it is certain that the objects being known are not of equal importance and that what is known about one is not the same in nature or quantity as what is known about the other. But it may still be the case that the knowledge of the first, though limited to only a few of its aspects, is still knowledge and just as clear as the knowledge of the second, which extends to many of its aspects. This is the same as if it were a question of two vases and how full they were, not how much they could hold. For although the larger one contains more liquid than the smaller, it is still possible that the smaller is proportionately as full as the larger; and though the larger may be full of wine and the smaller of water, the water represents the

same proportion of the capacity of the smaller vase as the wine does of the larger. Likewise, though thought may have a larger extent than warmth, it is still always thought and nothing but thought in proportion to the faculty of knowing thought. In the same way, though warmth does not apply to as many cases, yet still applies to innumerable cases (namely to the number of drops of water and the number of blades of grass and all the other things capable of being warmed), it is still warmth proportionately to the faculty of knowing warmth. Accordingly, when you know the mind only as a thinking thing, you are in precisely the same position as the blind man when he knows the sun only as a thing producing warmth.

The Syntagma
{1658}

Introduction to Selections from Part I: The Logic

Gassendi devoted his last years to composing his greatest work, the Syntagma philosophicum, *which means approximately* A Philosophical Compendium.[1] *In fact he had been working since the early 1640's on a general statement. Much of his notebook material was dismembered and published in the hectic disorder of the* Animadversiones. *Then he set about recomposing his* Syntagma, *about one-half of which is repetition of passages from the earlier work more suitably ordered. The* Logic *and the chapters of the* Physics *from which these selections are taken had been completed by Gassendi himself before his death. The* Syntagma, *two large folios of Latin, and its very popular French abridgment by Bernier became the basis of Gassendi's considerable reputation and following in the later half of the seventeenth century.*

Creation has always been considerably more difficult than criticism, and Gassendi's constructive philosophy is no exception. Inevitably he must reaffirm much of the traditional logic, apparently retracting many of his earlier attacks on Aristotle's logic and the syllogism. In Book II, on The Goal of Logic, *he returns for the last time to the question of the criterion of truth, and repeats the skeptical arguments of Sextus Empiricus, both the ten tropes on the fallibility of the senses, and the*

[1] Not to be confused with the *Philosophiae Epicuri Syntagma, The Compendium of Epicurus' Philosophy*, an appendix to volume II of the *Animadversiones* later reprinted separately in the *Complete Works* of 1658.

more devastating three tropes on the unavailability of a reliable criterion.[2] *The surprise comes in the fifth chapter where he furnishes answers to the skeptical arguments and seeks to lay out a "middle way" between the skeptic's defeatism and the excessive claims of the dogmatics.*

In the physical sciences, he says, man must expect to achieve no more than the probable knowledge of appearances, not essences. The senses may indeed sometimes be unreliable, but they may also provide the antidote to their own failings. In general, errors are made by the judgment as it interprets sense evidence and not by the senses themselves. The arguments of the tropes are not decisive. If they do show us that variations in the condition of the object perceived and of the perceiver must be taken into account, they also show that no matter how different the individual perceptions may be, there is something outside ourselves that is causing sensation. Most important, by examining appearances reason can discover truths not open to the senses. Observation, deduction, and further observation to confirm deductions can produce genuine progress in the sciences. Although the example cited by Gassendi, the existence of pores in the skin, is taken from antiquity—it appears frequently in Sextus Empiricus—it seems undeniable that he is here thinking of the experiences of a lifetime of study and observation in the sciences, of the many discoveries he had witnessed being made through technological advances such as the use of the telescope and the microscope, of the experiments he had performed himself, and the observations he had made to confirm the conclusions of others, particularly in astronomy, where it would have been imprudent to mention his confirmations of the Copernican world system. In the face of these he could not remain totally skeptical about the possibilities inherent in the careful application of reason to appearances. Though reason draws all its evidence and its concepts from the senses, it is in a way superior to them in its capacity

[2] Of the third chapter, Pierre Bayle wrote: "One hardly knew the name of Sextus Empiricus in our schools. The methods he had proposed so subtly for bringing about suspense of judgment were not less known than the *Terra Australis*, when Gassendi gave us an abridgment of them, which opened our eyes." This assessment is unfair to Henri Estienne and Gentian Hervet, whose Latin editions of Sextus had been published in both the sixteenth and seventeenth centuries and to Montaigne, whose "Apology for Raymond Sebond" had popularized these ideas in French.

to see beyond them. It must, however, he warns, always be subject to confirmation by experiment and may never contradict sense evidence. His illuminating example here is the experiment of the ball thrown up in the air from a moving ship which lands at the spot it was thrown up from and not behind it, as reason would wish to predict.

This final position of Gassendi's is a moderate empiricism providing the needed basis for scientific investigation. What it lacks is the awareness of the crucial role of mathematics. But the elaboration of modern scientific method was the work of many minds; and Gassendi's brand of empiricism avoided the pitfalls of excessive abstraction, such as Descartes's, which could be quite cavalier about observation and sense evidence. It is noteworthy that Gassendi's entire treatment of epistemology is framed in terms set down by classical philosophers (the tropes, the "sign," and such) and that he completely neglects the arguments of Descartes's methodical doubt, in contrast, for example, to Pascal, whose Pensée 434 (Lafuma 131) formulates the questions in terms of the dream hypothesis and the Evil Genius.

Rebutting the reasoning of the three tropes is no easy matter, and all Gassendi can say is that all things considered, our experience and our reason are now more convincing than rigorous philosophical argument. In the last analysis neither experience nor certain self-evident ideas need any proof.

The Logic

BOOK II
THE GOAL OF LOGIC

Chapter One. The nature of truth, which is considered the goal of logic, and what criteria of truth have been designated

Up to this point our topic has been the origin and varieties of logic. We strove to show precisely what each man thought so that the history of logic would be made simpler. Now, since we must speak of its goal, which all men readily agree is the truth or its attainment, the first thing to be noted is the common distinction according to which one goal of an art is called internal and the other external. The internal goal is the product itself, that is, the thing to be manufactured, for which rules are handed down in the craft; for example, in the case of bridle-making, it would be the bridle. On the other hand, the external goal is the function of the article itself, in the case of the artifact the bridle, the control of a horse. From this then we understand that when truth is said to be the goal of logic, it obviously must not be taken for the internal goal, since that would have to be soundly conducted thinking, but for the external goal inasmuch as we achieve the truth by soundly conducted thinking. In addition to this, we understand that just as the art of making bridles has discharged its function when it has taught how to make a bridle fit to control a horse, and leaves the rest, that is the use of the bridle itself, or the direction of the horse, to the rider, so logic appears to have discharged its function when it has prescribed how to shape thoughts fit to investigate and discover the truth, and turns over

the rest to physics or some other science to use such thinking in its subject matter.

From these considerations we understand the distinction made by the Greek interpreters of Aristotle between logic "detached from things" and logic "attached to things," which the Arabs and the Latins term "teaching" logic and "applied" logic, obviously in the same sense. For they call the logic which gives its rules abstractly and generally for different modes of thinking "detached" or "teaching"; but logic that applies rules to a specific subject matter, either physics, or mathematics, or some other they call "attached" or "applied." For example, in the same way, the arithmetic which teaches to count abstractly "one, two, three" can be considered "detached" and "teaching"; while the one that counts specific things "one cent, two cents, three cents, one man, two men, three men, etc." is "attached" and "applied." Or, to use Alexander's example,[1] "detached" or "teaching" geometry regards the triangle abstractly; the "attached" or "applied" geometry regards specific triangles, such as wooden or stone ones. When Cicero asks persistently "You say that dialectic was invented to be a sort of arbiter and judge of truth and falsity. The truth and falsity of what? On what subject? Will the dialectician judge what is true and what is false in geometry? or in literature? or in music? But he is not acqnainted with them. In philosophy, therefore, shall he judge how big the sun is? What does that have to do with him? What is the sovereign good? What does he have that enables him to pass jndgment? etc."[2] When he asks these questions, we understand that we should conclude that logic can be called the arbiter of truth and falsity not because it may resolve any questions of this sort specifically, but because it supplies general rules which anyone may use to settle a debate. In the same way the art of making bridles may be called the tamer of horses, not because it tames

[1] In his Commentary on Book I of the *Topics*. (G.'s note. Alexander of Aphrodisias taught philosophy in third-century A.D. Athens and founded one of the major schools of Aristotelianism.)
[2] *Academica*, II [91]. (G.'s note.)

horses itself, but because it provides the bridles which the horseman uses to tame his animals. In this way also arithmetic supplies general rules for enumeration, which are applied specifically when

The soldier counts his wounds, the pastor his sheep.[3]

It should also be noted in our preliminaries that two sorts of truth can be appropriately distinguished; the one called truths of "existence" or of "being" and the other truths of "judgment" or "statement." Now in the first place, although anything regarded in itself is just what it actually is, and nothing more, yet for the sake of a somewhat greater explanation it is customary to apply the attribute "true" to it. And so we habitually say that a thing exists truly, or is true, according to itself, for example "true" gold, a "true" man, and the like, although it cannot be called "false" in the same sense since it is always something true according to itself—even fool's gold is not false gold but true fool's gold, and a painting of a man is not a false man, but a true image of a man. This is the import of Epicurus' statement as quoted in Sextus Empiricus, "There is no difference between saying that something is true and that it is existent,"[4] or again in the letter to Herodotus where, linking existence and truth together, he says, "This falls under the category of things that are called existent or true."[5] It is also the import of what Aristotle says in the *Metaphysics*, "In whatever way a thing is related to being, in that way it is related to truth."[6] And so whatever exists in reality, or is part of the universe, is true and may be called a truth of existence for which there is no falsehood opposed to it.

[3] Propertius [I, i, 50]. (G.'s note.)

[4] *Against the Logicians* [II, 9]. (Gassendi indicates Book I by error. Here as elsewhere in the *Syntagma* Gassendi is likely to quote the original Greek and follow it with a Latin translation. No attempt will be made to transliterate the Greek except in the case of technical terms of interest. Likewise minor discrepancies between the seventeenth-century text and Loeb Classical Library texts will not be mentioned.)

[5] Diogenes Laertius, X. (G.'s note.)

[6] II [i, 993b *in fine*]. (G.'s note.)

Secondly, since every thing, insofar as it is represented in an idea or an utterance of ours, is judged and declared either to be or not to be of such-and-such a nature according to itself, it follows that a judgment and statement may be termed true according to the first meaning of "true," since they correspond to the thing itself, and the judgment and statement may be false according to the second meaning since they differ from the thing. And so there is a certain truth which consists in the conformity of the judgment and statement with the thing judged and reported in the statement; and it is this truth for which there is in fact a falsehood opposed to it, consisting obviously in the discrepancy between the judgment and statement and the thing judged and reported in the statement. This is the import of this quotation from Epicurus in Empiricus, "Whatever actually is as it is said to be is true; whatever is not actually as it is said to be is false."[7] Likewise Aristotle says in his *Logic*, "Statements are true in the same way things themselves are."[8]

I might point out here that the Stoics do feel that neither the things nor the word are true, but the meaning of the word; according to Empiricus they distinguish three elements; the thing which is expressed by the word, the word which is pronounced by the mouth, and the meaning of the word which is perceived by someone who understands it, hence not by a foreigner even though he is listening;[9] and furthermore they insist neither the thing nor the word is true, but only the meaning and not even all the meaning; but according to them when it is properly speaking a *lekton*, an "expression" (*dictum*), they insist that this "expression" alone, which is called an *axioma*, is true. What an *axioma* is may be understood from what I said not so far back.[10] Empiricus adds that the Stoics make a distinction between the true and the truth, so that the true is a fact taken singly, but the

[7] *Against the Logicians*, II, 9.

[8] *On Interpretation* [19a, 33]. (G.'s note.)

[9] *Against the Logicians* [II, 11–12]. (G.'s note.)

[10] In Book I, Chapter vi, Gassendi gives Stoic terminology. An *axioma* is "a statement that is either true or false."

truth is a complex of axioms, or of several facts, which is called a science, whence it happens that they compare the true to a citizen and the truth to the populace or the state. But I shall pass over the fact that they say that a man who has the truth, or knowledge, can say something false and yet not be in error just as a grammarian gives an example of incorrect usages and still does not speak incorrectly; this clearly belongs to the virtue of veracity, which will be spoken of elsewhere.

But I do not want to linger over these questions; since the truth which is in the judgment or statement depends upon the one that is in the thing itself and to which the judgment and statement correspond, and likewise since to inquire after the truth of a thing is nothing but to investigate whether it is, or exists, and what sort of thing it is, and since to find the truth is nothing but to learn whether a thing is, or exists, and what sort of thing it is, it therefore seems that truth may be defined as "that which really is," or if you prefer, "that which really exists."

Surely the truth is something like that, about which Plato says that the love of it is born in us,[11] and which Aristotle refers to in his famous saying "all men desire to know by nature."[12] But from that he also proves that all men cherish their senses since they are the instruments furnished by nature by which the ignorant may know what things are, that is, something of the truth. I shall pass over the fact that the first indication of this love or innate desire seems to present itself in infants since they cry even though they have had ample milk and sleep if they are taken off to the cradle as if they could not bear darkness and silence like some species of ignorance and they become cheerful when a light is lit and they are calmed by singing. I shall only observe that this desire makes itself even more manifest when with the passage of time they delight in seeing and hearing many things and when they begin to interrupt and ask lots of questions and turn avid ears to hear those little tales and fables which they learn eagerly

[11] Gassendi's reference to Book VI of the *Laws* appears to be inaccurate; perhaps he is thinking of Book VI of the *Republic* (485 C–D).
[12] *Metaphysics*, I, i [980a]. (G.'s note.)

as something true which they had not known and which was suitable to their grasp. It is not in the least surprising if, when they have grown up, enticed by the sweetness of knowing, they always seek to add to their knowledge and to know some truth they had not known, when some new pleasure in learning is constantly being coined, so to speak, and inevitably accompanies the recognition of the truth. Surely the truth is the real food of the soul, and nourishment is not more sweet to the starving stomach than the truth is to the soul hungering for it. For no one ever exulted so much over the taste of food that he sacrificed a hecatomb on its account as they say that Pythagoras did over a certain truth he had attained, nor has anyone been so exultant that forgetful of his nudity, he sprang up shouting "I have eaten it, I have eaten it" as they report that Archimedes leapt from his bath because of another truth which he had uncovered, shouting the famous, "*Eureka, eureka!*" "I have found it, I have found it." And certainly not all men are seized by the desire of knowing the same truth, but still all without exception desire to know some truth, just as not all are stricken with the love of the same foods, but nonetheless without exception they are attracted by some foods. And on the same subject, it is true that even though every truth is lovable and desirable by its nature, still any truth that is common and familiar does not seduce the soul as does one that is more refined and more select. For Aristotle was not far from the mark when he observed that we are more thrilled at the idea of knowing, however little, those divine bodies as he calls the stars in the heavens, than at the idea of grasping bodies near at hand.

Now, to speak specifically to the point of the truth sought by philosophy and the criteria by which it is possible to discern it, it must be remarked in the first place that some of the things whose truth can be sought after are manifest and some are hidden. And those which come to be known by themselves are *manifest* such as that it is daylight or daytime, such as the external appearance of things which strikes the eyes automatically and shows itself in our sight with no veil drawn over it; but the *hidden*

things warrant a distinction into three types, as Empiricus shows so persuasively;[13] indeed some are, or are said to be, totally hidden, some are naturally hidden, and some temporarily. The *totally hidden* are those which are such that in no way can they come within our grasp, for example whether the number of stars is even. Things *naturally hidden* are those which cannot become evident by their own nature, or by themselves, but which we can nevertheless know and understand through something else, such as pores, or mouths in the skin, which cannot become perceptible to us by themselves, but yet their presence in the skin can be deduced from sweat. Things *hidden temporarily* are those which, though they are evident by nature, are still hidden from us for the time being because of some obstacle, like a fire because a building is in the way, or Constautinople because of the distauce between us, and so on for other things which become mauifest when circumstances like these have been eliminated. On the basis of this, the truth that philosophy seeks is not of mauifest things siuce that is public knowledge; nor is it of totally hiddeu thiugs since our ignorance of them is invincible, but of things hidden either naturally or temporarily, especially uaturally, for the dispute over things hidden temporarily is not great since they can be known upon the mere removal of the obstacle.

Now then, in order to discover a hidden truth and to come to some judgment whether it has been discovered or not, we need some iustrument of judgment, which is called a *criterion* by the Greeks, which has always been the subject of a famous controversy among philosophers. Furthermore, it must be noted that we are not usiug this word iu its possible meauiug of the tribunal of the judge (*kritês*, in Greek), or the place where he passes judgment, but in the seuse of a means or instrument of judging, which we have already mentioned, speaking of Epicurus.[14] Cicero trauslates it with one word "judgment" (*iudicium*); it could perhaps be called more clearly "the seat or orgau

[13] *Against the Logicians* [II, 145–147]. (G.'s note.)
[14] In Book I, Chapter vii, not given here.

of judgment" (*iudicatorium*)[15] in the same way that *to aisthêtêrion*[16] is commonly called "the seat or organ of the senses" (*sensorium*) (although it is a most unsatisfying name as Cicero himself says from the outset that he will call it "juridical," *iuridicialis*)[17]; indeed, seeing the power of a name, nothing stands in the way of making the word "criterion" familiar and using it.

But since the criterion has been ordinarily understood in more ways than one up until now, especially in Empiricus,[18] in order to get a firm idea what this word is all about, you must know first that the criteriou is twofold: first, whatever we keep before our minds as we live and act, examples of this being the law of the land, or the usages to which we adapt ourselves in our communal life; and a third criterion of this nature is Epicurus' incliuation, or pleasure, and pain to the extent that we do everything in order to obtain the former and to avoid the latter. But since these are matters of ethics, there is nothing to discuss at this point concerning them. Second, the criterion is that by which we may judge, and particularly of things in the realm of nature, that something is or is not, aud likewise that it is true or false. This is our topic here. Aud even this, according to Galen,[19] can be understood in two ways; for the first is the *artificial* or *mechanical* standard, such as the compass by which roundness is put to the test, or the yardstick for leugth, or the scales for weight; aud the second is the *natural* standard, which we did not provide ourselves, but were furnished with by nature; and this is the proper subject of our iuquiry, for the artificial standard is only accepted occasionally as a crutch.

[15] *De finibus*, I [22, 64] and *Academica*, II [142]. (G.'s note.)
[16] In the *Topics*. (G.'s note. This word is frequent in *On the Soul*, *Movement of Animals*, and appears elsewhere in Aristotle, but not that I can find in the *Topics*.)
[17] Lexicons list this word only in Top. 92 and Inv. 69, 109. It is barely possible Gassendi has the first passage in mind.
[18] *Outlines of Pyrrhonism*, II [14–80] and *Against the Logicians*, I [29–37 and elsewhere]. (G.'s note.)
[19] *De optimo docendi genere*, iv. (G.'s note.) This little work was published at the back of the 1621 edition of the works of Sextus Empiricus.

Now then, the natural criterion is divided into two sorts: first, *to di'ou*, the instrument (*id per quod*), and second, *to kath'o*, the procedure (*id secundum quod*). And the criterion of the instrument is nothing but the faculty granted by nature through which we know something, for example the intellect or the senses; and the criterion of the procedure is nothing but the functioning of this faculty or its operation, by which we know, either sensation or intellection. There are some who take these two for one function, and include them under one term *tou di' ou*, the faculty of the man (*illius per quod*), like Alcinous,[20] who elsewhere adds the criterion *huph'ou*, the agent (*a quo*), saying that it is the mind, or the man, by whom the truth is being determined. And there are some who, while they keep the first two distinct, also admit this last one as a third criterion. This is confirmed in Empiricus, who uses an image to illustrate the principle that there are three criteria, the agent, the instrument, and the procedure. Just as when light and heavy things are subjected to examination three things are required, namely a weigher, by whom the examination is made, a scale, with which it is made, and a weighing according to which it is made, and also as in testing straight or crooked lines, you need first a tester by whom, then a ruler with which, and finally an application of the ruler according to which the matter is investigated; in the same way, in order to determine truth and falsity, those three ingredients are necessary, a man by whom, an instrument with which, and an application, or function, or operation (for nothing else is meant by the name *t'epibolês*) of the faculty according to which the determination is made. But since the criterion of the agent cannot in fact be called a criterion completely correctly, and is rather a *kritês*, or judge, the whole difficulty turns principally on the other two. But still all the dissension over the criterion of procedure is derived from the distrust of the criterion of the instrument, for sensation implies the senses and intellection the intellect. Hence although several philosophers give special weight to the criterion of the procedure, the one about which there is generally the most

[20] *De doctrina Platonis*, iv. (G.'s note.)

hesitation is chiefly the criterion of the instrument, with the result that the controversy principally concerns *whether the instrument by which the truth is determined is the senses, or the mind, the understanding, reason* (these three are counted as the same thing), *or both of them, or something else, or nothing at all.* Now since it has seemed to most philosophers that the uncertainty which the hidden things inspire in us can be surmounted by certain signs, or indicators, so it has been their opinion that we do not lack a criterion by which we perceive such signs, or indicators,[21] with the help of which we may achieve knowledge of what really is, or the truth. But since this uncertainty seems to others to be quite insurmountable on the grounds that all signs or all indicators are uncertain and insufficient, or that all the faculties in us are deceptive and subject to doubt, these men have come to the conclusion that the truth cannot be determined, and that therefore no criterion for it exists. Hence there are two general opinions about the criterion, the one of those who posit its existence, the other of those who deny its existence, which we will become acquainted with below.

Chapter Two. Those who deny the existence of the criteria of truth

It seems best to begin with those who deny the existence of the criteria for as a great many of them are also cited as holding the opposite opinion, it will be possible to see more distinctly what the criterion is. Those who deny the existence of the criteria are the same, obviously, as those who are famous for saying "nothing can be known" (*nihil sciri*), "man can comprehend nothing"; certainly, if there is nothing in the universe which man can know and comprehend, or of which he can be certain, it follows that he has no faculty, or no criterion, by which he can determine, learn, retain, and come to the defense of what is true rather than false. Nor is it sufficient to distinguish the true from the probable,

[21] Reading *indicia* for *iudicia*.

as some men do, so that although man may not be able to grasp what is really true, he may still attain what is probable; and in this way some criterion remains, if not of the truth, then at least of probability. And yet the criterion ought to be one that is subject to no falsity and that gives birth to certain and infallible knowledge; moreover, it cannot be one that can only prove something as probable, nor one that does not create full confidence and therefore command an assent that is anything but unsteady and fearful.

Nor is there enough solidity in the customary objection to those who say that nothing is certain or can be comprehended, namely that they do not really doubt that it is daylight when the sun is shining, that fire is hot, snow white, honey sweet, and other things of that sort; and that therefore they must at least accept the criterion by which those things are determined, namely the senses. For these men, as we observed above, say that the appearance of things, or what things appear to be on the outside, is one thing and the truth, or the inner nature of things, namely what the things are in themselves, is another matter, and that when they say that nothing can be known certainly and that there is no criterion, they are not speaking of what things appear to be and of what is revealed by the senses as if by some special criterion, but of what things are in themselves, which is so hidden that no criterion can disclose it. The example of honey is brought up to show they do not deny that it appears sweet and pleasing to most men and likewise to a great many animals; but since there are a certain number of men and innumerable species of animals to whom it appears otherwise, for they cannot bear to taste it, therefore they say that it remains uncertain whether according to itself, and by its nature honey is sweet and pleasing or bitter and unpleasant instead; for if it were sweet or bitter of itself or by its nature, it would appear so to all men; and since it does not, there is no criterion by which the controversy can be settled.

In order that we may call to mind the authors who are of this opinion, first we note that Laertius lists most of them in his treatment of Pyrrho and the Skeptics.[22] He puts Homer first, before many others as if he is naming him the head of this sect on the grounds that while speaking about the same things he says one thing at one time and another at another and does not say anything definitely certain about them. Perhaps also because Pyrrho constantly read the poetry of Homer, as Empiricus tells us; and as Philo says, quoted by Laertius, he admired very greatly this verse:

> For the generation of men is like leaves.[23]

He read it to mean not only that the nature of man is transitory like the leaves, but also his opinions are inconstant and just as changeable as the leaves of trees are restless in the slightest wind. And other things have been quoted from the same poet, for example not only Aristotle's observation that Homer had said that while Hector was out of his mind from a wound, he "lay there, thinking other thoughts," which Aristotle interprets to mean "that deranged men have their own wisdom, although a different one,"[24] but also this verse:

> You shall hear said just what you said yourself.[25]

Since Laertius teaches that this verse exemplifies antithesis, or contradiction, in which we see nothing mentioned by one side whose opposite is not defended by the other, you may believe that he had contemplated the author of this distich:

> On no one thought will all mankind agree;
> Where you wond'ring gaze others mock with glee[26]

To illustrate this one could take the famous controversy over the state of souls, since there are those who regard them as having existed before the body, as being sent down into the body as into

[22] Book IX [71–73]. (G.'s note.)
[23] *Against the Grammarians* [272] and Diogenes Laertius [IX]. (G.'s note. The verse is *Iliad*, VI, 146.)
[24] *Metaphysics*, IV, v [1009b]. (G.'s note.)
[25] Diogenes Laertius, IX [73]. (G.'s note. The verse is *Iliad* XX, 250.)
[26] Gassendi's cryptic note, "Samosat," may refer to Lucian of Samosata.

a tomb, as living in it as if they were dead, and as coming back to life when the body dies, and this while most people maintain the opposite; and so because of the reasons on both sides, among others Laertius quotes this verse of Euripides as if he believed the question remained in doubt:

> Who knows if this living is our demise?
> And what men call death is to come alive?[27]

But what he cites from Archilochus to prove not only that different men hold different views, but also that the same men do not remain consistent with themselves like men who have now one opinion, now another as they are affected by different sensations,

> Glaucus, son of Leptinus, child, men's minds
> Change in tenor each day as Zeus inclines

is the same idea that is presented in Empiricus also[28]

> The mind of earthly man hourly jibes
> As the Father of men and gods prescribes

And so, if I may skip Laertius' statement that the Seven Wise Men shared this opinion, witness the famous sayings "nothing in excess" and "Commit yourself and you are in trouble," it may seem that Empedocles should be counted as having the same opinion as they did, not only because of the verses cited from him in which he says that things are such "that they can neither be expressed in speech, nor conceived in hearing, nor understood in the mind," and likewise "each man must believe what things seem to him to be";[29] and also because of the other verses cited in Aristotle in which he says that "men know as much as present circumstances permit, and they think one thing at one time and another at another according as they change"[30] and finally also because of what Cicero has to say about him where he writes "Does Empedocles seem to you to be mad? But in my opinion

[27] Diogenes Laertius, IX, 73, 71.
[28] *Against the Astronomers* [5] and *Against the Logicians*, I [128]. (G.'s note.)
[29] Diogenes Laertius, IX, 71, 73.
[30] *Metaphysics*, IV, v [1009b]. (G.'s note.)

the strain he sings is most worthy of the subject he is speaking of. Is he blinding us and blocking up our senses just because he deems that they do not have enough capacity to judge the things that come under their surveillance?"[31]

Laertius also considers Xenophanes to be of the same school of thinking because of his comment

> No man knows the truth clearly, and there shall
> Never be one who does.

to which Empiricus adds this hemistich (I skip a few lines in between)

> In all matters, opinion holds sway

and then Aristotle has this from Parmenides

> As each man is bestowed members so fine,
> And so flexible, so limber is his mind.[32]

Cicero, moreover, links them both as he says of them "In verses that are less good, though they still are verses, they denounce the arrogance of men who dare to claim they know something when nothing can be known."[33] Laertius adds Zeno the Eleatic on the grounds that since he denied the existence of motion, the most obvious of all things, he felt that other things which are more abstruse cannot be comprehended. I will not remind you that according to Seneca[34] Zeno undoubtedly believed that "Nothing exists." And Laertius adds Democritus because "Having rejected all qualities, he said that a thing may be cold from one point of view and hot from another" and "that we know the cause of nothing, for the truth is hidden in the depths." And indeed, Democritus is quoted in Aristotle as saying "Either nothing is true, or it is unknown to us."[35] Cicero says, speaking of him,

[31] *Academica*, II, 74.
[32] Diogenes Laertius, IX, 72; *Against the Logicians*, I, 49; and *Metaphysics*, IV, v, 1009b.
[33] *Academica*, II, 74.
[34] Epistle lxxxviii [44]. (G.'s note.)
[35] *Metaphysics*, IV, v, 1009b.

"For he did not say what we say when we refuse to deny that some truth exists but do deny that it can be perceived; he denied outright that the truth exists," and again "Is this our fault? Blame nature, which has totally concealed the truth in the depths, as Democritus says."[36] Laertius also adds Hippocrates[37] because he was called "hesitant and humanly modest," and that is precisely the savor of the excellent and noble beginning of his *Aphorisms* "Life is short, art is long, chance is foremost, experience misleading, judgment difficult." And it is quite possible that he said, as Aenesidemus remarked in Empiricus,[38] that "opposites are true of one and the same thing." In fact his opinion can be quite fully ascertained from the fact that he felt that all things change in unending flux and so nothing can ever be verified about anything as it never stays still. This can be inferred from Plato and is stated by Aristotle, for according to the latter, Cratylus the Heraclitean believes that "one should not say anything, but only make a sign with the finger as if pointing to something in flux," and he went beyond Heraclitus in that whereas the latter said that "it is not possible to step twice in the same river," he thought it was not possible "even once" since, at any moment you wish, a part of it has already flowed past and a part is on the point of flowing past.[39]

Finally, Laertius adds Plato, primarily because he taught (in the *Timaeus*) that "he left truth to the gods and the sons of the gods, but he inquired into what was probable."[40] But Cicero joins Socrates to Plato, "And you said that Socrates and Plato were not to be included among these. Why? Can we speak with greater certainty about anybody? It seems almost as if I had lived with these men, so many dialogues have been written from which it is impossible to doubt that it seemed to Socrates that

[36] *Academica*, II, 73, 32.
[37] Book IX, 73.
[38] *Outlines of Pyrrhonism*, I [210]. (G.'s note.)
[39] *Cratylus* [440D]. (G.'s note. The bulk of this information comes from *Metaphysics*, IV, v, 1010a.)
[40] Diogenes Laertius, IX, 72; *Timaeus*, 40D.

nothing could be known, that he knew nothing, excepting only one thing, he knew "he knew nothing and nothing more." He continues, "What shall I say about Plato, who would not have written these thoughts down in so many books if he had approved of them since otherwise it was senseless to set down his perpetual irony in writing."[41]

Furthermore, other names are added to this list by Empiricus;[42] after Xenophanes he specifically mentions Xeniades of Corinth, mentioned by Democritus, on the grounds that he could not help abandoning the truth and the things from which the truth is determined when he said "everything is false, and every appearance and every opinion is fallacious." And likewise Anacharsis the Scythian who undermined any perception that would judge the arts because "a man would not be able to pass judgment if he was inexperienced because of his ignorance or if he was experienced because his experience would be challenged and someone would be needed to pass judgment on it." This is not unlike what is reported elsewhere, that Anacharsis said the Greeks were ridiculous because the most accomplished flute players competed for first place in their skill, but the people, completely untrained in the art, judged and awarded the prize. Then there is Protagoras, who, quite the contrary of Xeniades, believed that nothing was false, but that everything was true that appeared true to any man, whether he was sane or mad, an infant or an old man. He believed this on the grounds that something does not appear to be true except to a man in a certain condition, and whatever that condition may be, the things believed in accordance with that condition deserve our belief. And so a madman would be a reliable judge of the things that seem true to madmen, a sleeper of the things that seem true in sleep, a child of the things that seem true in childhood, an old man of the things that seem true in old age; and, therefore, someone who is not in the same condition could not be a judge of the things that seem true to it. In fact, he

[41] *Academica*, II, 74.
[42] The material of the next three paragraphs is based largely on Sextus Empiricus, *Against the Logicians*, I, 55–88.

insisted that "man is the measure of all things," hence all things that seem true to him are true. This is the reason he is attacked by Aristotle in more than one place,[43] when he argues against him that the result of this theory would be that diverse opinions could be held about the same things, that the same thing would exist and not exist at the same time, that the same thing would be good and bad, that if several people made contrary or contradictory statements, none would be saying something false, none would be lying, and so forth. Plato also has some things to say about him.[44] And yet, Protagoras does not seem to have been so utterly ridiculous as to say that whatever appeared true to each man was true in itself, but only that it was true in respect to the man to whom it seemed true (in fact, according to Empiricus, he believed that the truth lay in those things that were referred to something); and this is clear from a sentence of Cicero's in which he says, "The opinion of Protagoras is different, for he believed that whatever seemed true for each man was true for each man."[45] Sextus Empiricus attributes the same opinion as Protagoras' to Euthydemus and Dionysodorus insofar as they felt that truth lay in those things that were referred to something. And he makes Gorgias of Leontini one of them since he destroys the criterion though in a different way and for a different reason from the ones Protagoras used.

To touch briefly on these matters, Gorgias clearly taught three things in successive order: the first, that nothing exists; the second, that if anything exists, it cannot be known by man; the third, that granting that it may be known, it is not known in a way that can be communicated to another man. And he declared the first, that "Nothing exists," because it was impossible either for nonbeing to exist (as is obvious) or for being to exist. For such being would either be eternal (but nothing eternal can exist, for it would have no beginning and be infinite, and consequently be nowhere because it could not be contained in any space, otherwise something greater than the infinite would be said to exist)

[43] *Metaphysics*, XI, v [1062b] and IV, v [1009a]. (G.'s note.)
[44] *Theaetetus* [passim]. (G.'s note.)
[45] *Academica*, II [142]. (G.'s note.)

or be born, in which case it would be born from nothing (which cannot be) or from some being (which again cannot be since its very formulation already supposes being to have existed).[46] Secondly, he asserted that "nothing can be known," or conceived by the mind, since the things that are conceived by the mind, or thought, are not actual beings, otherwise whenever somebody thinks of a man flying or racing a chariot around on the sea, it has to be admitted that man can fly and race a chariot on the sea. Or to put it another way, just as we do not call false the things which have been perceived by our hearing though not by our sight on the grounds that it is reasonable that the act of judging should rest within the individual faculty, so it would appear that we must not call false the things that are perceived in thought without the confirmation of our sight on the grounds that it belongs to a different faculty; and the result of all this is that if anyone thinks of a man running a chariot on the sea, although he does not see it, still he must believe what he thinks, or else, if that conclusion is absurd, he must say that the things he thinks are not actual beings (not to mention the fact that he thinks of Scylla, the chimera, and other such things, which are not actual beings). Lastly, he taught that "it is impossible to communicate and make clear to another man anything that is known, or thought," since any such thing is perceived by either sight, hearing, or some other sense and is located outside the perceiver, but what is communicated to another is not a thing located outside ourselves but merely the speech of the man communicating the thing. All this is laid out in greater detail in Sextus Empiricus or also in the book attributed to Aristotle *On Xenophanes, Zeno, and Gorgias*.

Perhaps I should not omit at this point what Plato wrote: "Gorgias and Tysias put probabilities before the truth itself, and made the small appear great, and the great appear small in turn, likewise the old appear new, and the newest things appear old, all by the persuasiveness of their oratory."[47] This is the same as

[46] Following Rochot's suggestion, I read *dicitur* here.
[47] *Phaedrus* [267A]. (G.'s note. G.'s text reads Lysias by mistake.)

what the poets record of Autolycus, that worthy son of Mercury,

> Who claimed, not having lost his father's knack,
> To turn ebon to white and make great black
> Pitch from radiant hues[48]

And to Gorgias Sextus joins Metrodorus of Chios, Anaxarchus, and Monimus the Cynic; Metrodorus because, if I may quote the words of Cicero, following Democritus "he called the senses obscure and full of darkness, and in the beginning of his book entitled *On Nature* he says, 'I deny that we know whether we know something or nothing, nor do we know that we know or do not know even that, nor do we know in the least whether anything exists or nothing,'" Anaxarchus and Monimus because they said that the things that exist are like scenery painting and believed they are no different from the things that occur to our mind in sleep or in madness.

Finally, he adds that the Skeptics are to be numbered among these, for when they argue that "it cannot be known what things are like according to themselves," they are necessarily arguing that "it cannot be said," and from that it follows that "nothing is true, and therefore there is no criterion of truth." But I shall have more to say about the Skeptics shortly. Here let me join those whom the same Sextus Empiricus concluded hardly differed from the Skeptics, namely the Academics, especially those who, founded by Arcesilas, made up the Middle Academy. To be sure, since Arcesilas reasoned by saying "*akatalêpsia*," "nothing can be understood" or "*epochê*," "I suspend assent, or judgment,"[49] he really could not leave behind a corpus in which anything is understood or judged. Nor could Carneades when he founded the Academy called the Third Academy, even though he did introduce some innovations and restored the criterion, for he did not believe he held the truth, but only probability, which

[48] Ovid, *Metamorphoses*, XI [314–315]. (G.'s note. G. refers to Book X by error and quotes the verses in reverse of the usual order. Mercury is the patron god of thieves and tricksters.)

[49] *Outlines of Pyrrhonism*, I, 232. (G.'s note.)

is why he is different according to Sextus Empiricus from those who posit some criterion. Let us also add the Cyrenaics who descended from Aristippus and who seemed, according to the account given by Sextus Empiricus, to say nothing really different from what the Skeptics said themselves, as can be seen from what Cicero says in few words, "They deny that there is anything outside ourselves that can be perceived. They perceive only those things that are felt internally by touch, such as pleasure and pain; and they do not know something by its color or its sound, but only feel that they are affected in a certain way," and again "they believe that no criterion exists outside of the internal emotions."[50] Finally, Sextus Empiricus shows that the school of doctors called "methodical" assented to skeptical doctrine[51] since, just as a skeptic is led to action among other things by the compulsion of his passions in matters concerning everyday life, as to food by hunger, to drink by thirst, so a "method" physician is guided from a state of passivity to one consonant with nature's will, as from constriction to relaxation, from relaxation to constriction, and so forth, without reference to dogmas about the nature of reality.

Chapter Three. The Skeptics' modes of suspension of judgment concerning the truth and its criteria

We promised that we would speak more specifically of the Skeptics because they seem to have brought together all the reasons, or at least the principal ones, that can contribute toward denying the criteria and because this is clearly the place indicated earlier when we put aside the logic of Pyrrho (if there was such a thing) for a more suitable moment.[52] Now there is no need to

[50] *Academica*, II, 76, 142.

[51] *Outlines of Pyrrhonism*, I, 240. (G.'s note. Gassendi has missed the meaning of the Greek text.)

[52] In Book I, at the close of Chapter IV, Gassendi postpones consideration of the logic of the Academics (not the Pyrrhonists).

repeat that the Skeptics are the same as the Pyrrhonists; why they are called by that name, and also why they are called Ephectics, Zetetics, and Aporetics was explained right at the beginning. This only must be stressed, that Skeptics are primarily those who make a habitual distinction between *tê phantasia*, "appearances," or what things seem to be, and *tê alêtheia*, "the truth," or what things are, and who swear that they will raise no quarrel concerning the appearance of things, but only concerning their truth. Indeed they give assent to appearances in the direction of the actions of their daily life, since they choose as their guide on the one hand nature, which furnished men with the senses, reason, and certain necessary passions (such as the hunger and thirst which I mentioned a while back), and on the other laws and customs which prescribe what is to be done and what not to be done by the citizens in whose number they count themselves. And since they consider these unassailable and have no hesitations about accepting them, they engage in dispute with the dogmatics only over the claim they make to know not only how things appear but also what they are like in themselves, or what their inner nature is like. In fact, they even share these appearances in common with dogmatics; but since they do not allow themselves to get carried away, as the latter do, to the point of believing that things are in fact what they appear to be, but withhold their assent and make no pronouncements, they say they have arguments with which they oppose the dogmatics in order to prove to them that they too should withhold their assent. These reasons are rather like "commonplaces," which they call "types," or more frequently *tropoi* or "modes." Ten modes are ordinarily distinguished, which Diogenes Laertius condenses quite succinctly and Sextus Empiricus draws out to considerable length; it is worth our while to touch upon them.

The first mode is derived from *the difference between animals*. Indeed since the manner of being born is so varied among animals, some are generated by propagations, others spontaneously, so to speak, and among the former some are born alive and others from eggs, and among the latter some come

from animals, some from fruits, some from grasses, some from slime, some from flat wine, some even from fire, as in Egyptian stoves, and others from objects, and since they are consequently so various in the formation of their parts, the structure of their organs, and their constitutional temperament, and since some can live only in warm places, others only in cold ones, some only in the air, and others only in the water, and since some are nourished exclusively by one type of food and others exclusively by another, and so forth, the result is obvious that they have senses that are affected in different ways and that these creatures having sensations of a different condition by nature perceive different things, colors, sounds, tastes from the ones we do in just the way that we do not see the same colors, the same shapes, the same sounds, the same odors, the same tastes, and so forth when our senses are differently affected. And since things still appear otherwise to us than to those creatures having senses from nature just as we do, it follows inevitably that one may say how a thing appears to us and how it appears to them, but not, however, what it is like according to itself; for if it were such as it appears to us, it would appear that way to them too; or if it were as it appeared to them, it would also appear that way to us. Therefore, when we see some animals desiring something that others avoid, and some finding healthful something that is deadly to others, if for example, it is asked whether grass is good to eat or not, and the same thing for meat, neither can be definitely pronounced one or the other as regards their nature; but each may be said to have only an appearance—the herb good to eat to a sheep and bad to a wolf, and on the other hand the meat good to the wolf and bad to the sheep. And if it is asked whether hemlock is a poison or a food, it may only be said that it appears to be both, a poison, for example, to a man, and food to a quail; but it is neither by its nature, since if it were one or the other, either it would also kill quails, which, however, it fattens, or it would also nourish men, whom it kills.

The second mode is derived from *the diversity among men*. For even if it is granted that discussion is to be limited to men alone

(despite the fact that this is part of the debate), there is nevertheless sufficient discrepancy in bodies and temperaments among them for it to be manifest that one thing does not seem the same to all men, but this way to this man, and that way to that man, as Plutarch proves in the striking example of Berenice and the Spartan woman, who were equally repelled when they met each other, the one by the perfume, the other by the unguent.[53] Let me not repeat what he relates, that there have been men to whom drinking hellebore or hemlock did no harm at all, to whom it was nothing to have been stung by scorpions or bitten by snakes, and while the Psyllaeans are recorded as having been like that, there were also people in Ethiopia, above Lake Meroe, who ate such animals with impunity; likewise they also say that Androne of Argos made a trip across desert Libya without feeling thirst, that Demophontes, a servant of Alexander's, shivered in the sun and grew warm in the shade, and such things.[54] I infer only this: since the temperaments of men are so varied, and things appear so different to different men, and because the soul follows the temperament of the body and passes judgments on things in accordance with how they appear to the senses, the result is that so many different sensations are felt about the same objects and that they conflict in such a great disagreement of opinions. Hence one may conclude that when it is asked what something is like, a man may at best say that it appears to him to be like this or like that, but not that it is like that in itself, or by its nature; for a man to whom it does not seem to be so, but the opposite, will also contend with equal right that it is such as it appears to him inasmuch as a thing must be of one sort or another in itself and by its nature.

[53] *Reply to Colotes* [1109B].

[54] The ten modes are given by Diogenes Laertius and Sextus Empiricus (*Outlines of Pyrrhonism*, I), whose order Gassendi follows here. All the illustrations, excepting Berenice, can be found there, and were endlessly repeated by skeptical authors such as Pomponazzi and Montaigne. Gassendi had already used them in the Sixth Exercise of Book II against the Aristotelians. The remaining material in this chapter continues to follow Sextus' development, though somewhat less slavishly.

The third mode is taken from *the differences between the senses within the same man*. For even if discussion were to be limited to only one man, a man of the sort that everybody imagines the sage would be (there will not be any agreement at all on this point as not all men recommend, choose, or follow the same man as their leader in wisdom and doctrine), even then, by virtue of the fact that this man has senses, or the organs of the senses, they perceive things differently. Hence, honey is sweet to the tongue and painful to the eyes, and perfumes delight the smell but offend the taste. And so rain water, beneficent to the eyes, irritates the windpipe and the lungs; and oil which makes the skin smooth irritates them. Therefore a thing can only be said to appear this way to a man according to this sense and that way according to another, or this way in respect to this part and that way in respect to a second part, and it is not possible to affirm anything absolutely about it. I shall not mention that it is unsure whether there are not more qualities in things than the ones perceived by men inasmuch as men may be deprived of a certain sense. If all men were born lacking the sense of smell, as we know some to have been, then they would not suspect that there is any odor in an apple and would be of the opinion that it contained only color, taste, smoothness, shape, weight, and such things affecting the other senses. In the same way, men may not suspect that other qualities exist in things which do in fact exist in them although they are not perceived because of the missing senses. On the other hand, we cannot be sure there is not perhaps a single quality in a thing, for example an apple, which produces different sensations in different senses, as food transmitted to various parts of the body becomes flesh at this point, a blood vessel at that point, and elsewhere a bone, or as the same water diffused throughout a plant, here becomes fruit, there a leaf, and elsewhere bark, or as air breathed into a flute sometimes becomes a shrill sound, at others a bass sound, and so forth.

The fourth mode comes from *the divergence of sensations within the same sense*. Even if discussion were to be limited to only one sense of one man, still how many different circumstances there

are which account for differences in its arrangement and the sensation it feels with the result that since differing and various appearances will consequently be produced, it may be said what a thing seems to be according to any one of the appearances, but not however what it is like according to itself. Therefore, we may consider variations of circumstances, such as whether a man is in his youth or old age, asleep or awake, in sickness or in health, hungry or well fed, in motion or at rest, loving or hating, and so on for myriads of others. To illustrate, the same air which appears cold to an old man seems moderate to his junior, the same voice that appears full-volumed to the latter appears thin to the former, the same hoop that pleases a boy is repellent to an aged man; and in one word it is well known that each age has its amusements, and so the same things do not always appear the same way. In sleep and awake, things appear different and have their mode of existence in either state. How much difference there is between health and disease! The same flavors do not appear to the taste; the same water spread over inflamed parts appears boiling hot which seems only lukewarm on other parts; anyone who is stricken with jaundice or hyposphagma[55] sees things in a different color from other people; how many things a man in a frenzy or delirious in some other way sees that others cannot discern! If you then say that such appearances ought not to be given any weight because a sick constitution is unnatural, it will be urged that they ought to be indeed since they are every bit as necessary in a man whose condition is unnatural as the other appearances are in a man whose condition is natural; and things could be such that while they are neither one thing nor the other, nevertheless they appear one way in the first condition and another way in the second condition. In regard to this, it is evident that the same food is considered good to eat by a hungry man and bad by a full man, that an object appears to be at rest to a man at rest, and moving to a man in motion, that the same woman may be beautiful to a man in love and deformed to a man filled

[55] A suffusion of blood in the eyeballs and eyelids making objects appear reddish.

with hatred, that the same thing may be agreeable to a man in jubilant health and disagreeable to a man in failing health, that a thing may be scorned by a confident man that inspires terror in a fearful man, and to these circumstances you must add others like them, particularly physical preconditioning, as when the air seems warm to a man about to get into a bath, but cold when he gets out of it, or when wine tastes bitter to people who have eaten sedge beforehand, and sweet to those who have have eaten nuts, and so on.

The fifth mode is derived from *positions, distances, and locations.* For it is well known that as things change from one position to another their appearance changes, so for example the neck of a dove gives off different colors according to its position in the sun, sometimes gray, sometimes purple, and in the same way there are many more birds, especially in America, which change colors miraculously by merely drawing their feathers apart. Indeed there is nothing at all which does not seem to change its color as often as it is put in the light or the shade or differing degrees of light. It is well known that the same object appears small from far off and big from close up by reason of the distance, that a tower seems rounded from the first position and square from the second, that a ship seen nearby is judged to be moving though when far away it seems to be at rest, and so on for other cases. Finally, in regard to location, many things are hard in the air that are soft in other locations, for example coral in seawater, an egg in a bird, and a jacinth in a lynx.[56] Likewise an oar seems straight in the air and bent in the water, and the flame of a lamp appears brilliant in the dark, but dim, or nothing at all, in the sunlight. Therefore, since no object is without a certain position, distance, and location, it cannot be determined what the object is like according to itself, but only how it appears in relation to each position, distance, and location.

The sixth mode stems from *the mixture* of things which penetrate to the senses along with the things that are the genuine

[56] The stone jacinth (*lyncurium*) was believed to be formed by the freezing or crystallization of lynx urine.

objects of the senses. For things are perceived by the senses in different ways according as their image is transmitted through a cold medium or a hot one, a dry or a humid one, a straight or a twisted one, a narrow or a broad one, examples of which turn up everywhere in colors, odors, sounds, and other qualities. Another aspect of this is the fact that when the body is surrounded by water, it feels light, but when surrounded by air, it feels heavy. And these things count, not to mention the various membranes, humors, and passages in the different parts of the body and their arrangements by which those images are obviously formed and transformed in various ways before they come to the sensing faculty; hence it happens, as I implied a few pages back, that those who suffer from jaundice, or bile, see everything pale or yellowish, and those who suffer from hyposphagma, or suffusion of the blood, see everything reddish. Consequently, once again we may infer that it is permissible only to assert that an object appears such and such a way according as it is presented as such through the disposition of its medium.

The seventh mode is from *the quantities and constitutions of external objects*. For example, the horn of goat which appears black when whole appears white when ground into filings just the way, or actually just the opposite of the way, shavings of silver appear black, which seem white when in a mass. So the grains of sand which are rough to the touch when separate become smooth when put together, and the wine which gratifies us when drunk in moderation then harms us if drunk in too large quantities, and the same holds true of any food. And this is most obvious in the preparation of medicines; one which ordinarily would be beneficial, if the slightest bit more or less of some ingredient gets mixed in through negligence, becomes dangerous and often even poisonous. Consequently, we may only say how a thing appears in such and such a quantity or constitution, but not how it is absolutely and according to its nature.

The eighth mode is derived from *relationships*; since there is no thing that is not in some relationship to another thing, this mode is the most general, encompassing all the others; indeed

in the first modes everything refers to the judger, either to some animal, to some man, to some sense, or to some habit or conditioning of the sense; and in the following modes everything refers to some position, to some distance, and so forth. In one word, it is evident that there is nothing that is not equal or unequal in respect to another, similar or dissimilar, suitable or unsuitable, etc., nothing that is not a species in respect to some genus or a genus in respect to some species, nothing that is not a subject in respect to some quality that occurs in it, or a quality in respect to some subject in which it occurs, nothing that is not a cause in respect to some effect or an effect in respect to some cause, and so on for other things. Whence it is true that we cannot recognize, and therefore cannot state, what a thing is in its purity and according to its nature, but only what it appears to be in comparison with other things.

The ninth mode comes from *the frequency or rarity of occurrence*. We are not ordinarily astounded at the sun since it is constantly before our eyes; and we are stupefied by a comet, which is rarely seen, and we consider it something caused by divine intervention even though the sun is in so many ways more marvelous and more divine than a comet. So we consider gold valuable because it is rare; and we count water for almost nothing because it is abundant, although, however, if you changed things around, you would give a wagonload of gold for a bucket of water. And so, as a rule, things are considered pretty, ugly, pleasant, or unpleasant, to the extent that they are customary or unusual; and therefore, the result is that miraculous things are reputed valuable, precious, or the opposite not because they are according to their nature, but because they are either common or familiar.

The tenth mode, which concerns ethics, comes from the *institutions, laws, customs, legendary beliefs, and dogmatic doctrines*. You have surely observed that different peoples like opposed ways of life, for example the Spartans and the Sybarites, Diogenes and Aristippus,[57]

[57] Diogenes the Cynic led a very simple life, giving up clothes and shelter. Aristippus, traditionally cited as the founder of the Cyrenaic school of philosophy, symbolized the soft life.

and that the laws of some are opposed to the laws of others as the Romans do not force a man who has renounced his patrimony to be answerable in his father's name but the Rhodesians do, and customs are opposed to other customs as the Indians have intercourse with their spouses in public, but others do quite the opposite, and legendary beliefs are opposed to legendary beliefs, as that Jupiter is the father of the gods and of men and that Oceanus is the father of the gods, and dogmatic doctrines are opposed to dogmatic doctrines, as for the Stoics all sins are equally serious but for the Epicureans serious in various degrees. And you have observed just as surely that these things may contradict each other in mixed combinations, as institutions against laws, laws against customs; nor is there any need to list examples. Since contradictory ideas win men's allegiance and please them, the only conclusion is that the most that can be said is what appears good, decent, just, and beneficial to each man, but not that it is that way by its very nature and according to itself; for if it were so by its nature, it would seem so to all men; as Aristotle says, "since fire is burning by its nature, it burns in the same way here as it does among the Persians."[58]

And so these are the ten modes. Nausiphanes, taking them from Pyrrho and proving that he was a disciple of his concluded that, as we see in Seneca,[59] "among the things that seem to exist, there is no difference between existence and nonexistence," indeed, whatever seems true to one man is canceled by what seems true to another. When Pyrrhonism was later revived, certain other modes were added; but it suffices to review three of the most important ones. The first is the one that can be called the "infinite regress," in which something brought in as the confirmation of another statement is declared to be in need of confirmation by a second statement, and that one again by another, and so on until no way out can be discovered. The second is the *diallelus*, or "circular reasoning" (*alternans*), in which someone who is giving a proof is shown to bring forward one statement in proof of a

[58] *Nicomachean Ethics*, V, vii [1134b]. (G.'s note.)

[59] Epistle lxxxviii [144]. (G.'s note.)

second statement which is itself proven by the second, or in other words, the statement by which it has been proven is proven by it. The final mode is derived from "hypothesis" or "assumption," in which when one man makes an assumption, another also claims the right to make the opposite assumption. And examples of these three modes could be presented on any subject matter at all about which dogmatic opinions exist, but it is appropriate to bring forward ones on the topic at hand. For all the arguments that are heaped up by the Skeptics either against the truth or against the criteria have been these same modes—expressed until now in a strung out fashion—or are related to them, or can be understood in terms of the modes.

Therefore, to pause over some of them, first they argue that "nothing is true," or that "there is no truth" on the grounds that whoever says something is true either simply declares so or offers a proof too. If he only declares so, and hence is assuming it, he need not be believed since anyone who denies this is likewise making a declaration and assuming the contrary with as much right as he. But if he offers a proof, either it is true or it is false; and if it is false, then it does not deserve to be believed; but if it is true, then it is a "diallelus" since the question is whether anything is true. And in addition to that, proof will be required by which the proof will be proven true, and then another for it, and another on to infinity where it is foolish to be reduced. So also they say that "there is no sign" by which the inner truth, or what is naturally hidden, can be brought to light, alleging that either it is affirmed without a proof, and then it is enough for anyone denying it to assert the opposite; or it is affirmed with a proof, and then one falls into a "diallelus" since the proof contains in itself some sign for hidden things, and that is the issue at stake.

Secondly, they argue that "there is no criterion," on the grounds that in order to be able to come to a decision in the debate over this statement one must have a criterion that is granted by all, and for a criterion to have been granted the debate must be previously decided npon, which again is a "diallelus," as it would also be if it were urged that it is impossible to

prove a criterion without a demonstration and impossible to judge whether the demonstration is true without a previously established criterion. Consistent with this, they argue that "there is no man who is the criterion of the agent," on the grounds that if any man asserts that such a man exists without proving it, there will be no reason to believe him; if he has a demonstration, either it will be unjudged, therefore uncertain and not to be believed, or it will be judged, and then we would ask "by whom?" Since he would have to answer by a man, it would be a case of the mode "diallelus." And all this is proven without mentioning the fact that inasmuch as animals are not fit judges of things according to the first of the ten modes, and likewise men are not according to the second, or even a single man according to the third and fourth, it follows that since there is so much disagreement among judgments, it is not known which man should judge the truth, especially since even if everybody agreed on one mau, who would then be the wisest of mortals, still it would not be known whether or not in future times someone would be born wiser and a still wiser would follow later. They also argue in this fashion that there is no criterion "of the instrument" on the grounds that if someone designated the senses as criterion, it has already been shown how diverse the judgments are reached by following the senses since what is sweet to one man is bitter to another. Consequently, Democritus concluded that it was therefore neither the one nor the other, and Heraclitus that it was both. If someone designates the intellect, everyone knows how great is the battle of opinions and how uncertain it is what intellect should be given the most weight. If both are designated, it is clear that the intellect cannot judge by means of the senses for then it will go astray along with them, and come to contrary decisions; nor can the senses judge by means of the intellect since they are the ones that bore the torch to light its way so that without them there would be nothing that is distinguished. Finally similar objections can be made against the criterion "of the procedure" as dependent upon and inseparable from the criterion of the "instrument," as it clearly is.

Furthermore, I must not omit to say here that when the Skeptics bring forth their ten modes (or more, or fewer), they do not do so as if propounding dogmas to us, but because at the time that appears to be appropriate. Indeed although they are forced to use the common words agreed upon by usage, it is always the case that they wish it to be understood, however, that they come to no determinations; and although they seem to be saying that something exists or does not exist, they maintain that this is nothing more than if they said that something appeared that way to them, or did not. And when a Skeptic says, for example, *ouden horizô*, "I say nothing definitely," this must not be received as if he was saying definitely that he says nothing definitely; but it is as if he said: I am at present in such a state of mind that I neither accept nor deny dogmatically any of the things that fall under the present subject of discussion. And when he says *epechô*, "I suspend judgment," it is as if he said: I abstain from making pronouncements since I cannot say to which of the things that have been proposed one should surrender or not surrender one's opinion. It is no different when he says *ou katalambanô*, "I do not understand," which is the same as saying: I forebear to make any pronouncement about these matters because of uncertainty. Likewise, when they say *panta estin akatelêpta*, "All things are incomprehensible" or *panta estin aorista*, "All things are indefinite," they do not utter these ideas dogmatically, but as if a Skeptic were to say: All the things that I have perused among those which are argued over in the opinions of the dogmatics seem to me to be incomprehensible and indefinite. The saying *panti logô logos isos antikeitai*, "To every argument an equal argument is opposed" is also to be understood in the same sense, namely as if a Skeptic said: For every argument I have developed which affirms something dogmatically another is raised against me just as dogmatically affirmative which is as likely as the first to obtain belief or not to obtain belief. The same applies to the saying *ouden mallon*, "nowise more," for a Skeptic does not give it any other sense than if he said: I do not know which one of them to agree with, and which one I should not agree with.

Likewise when they say *tacha*, "perhaps," *endeketai*, "it could be," etc., it is just as if they said: perhaps this but perhaps something else, perhaps even the opposite. Whatever words of this sort a Skeptic may use, he always maintains his *epochê*, "suspension of judgment" and his *aphasia*, "nonassertion," that is, the disposition of mind in which he is inclined to state nothing, that is, to affirm, or proclaim, nothing dogmatically. And when he is pressed with the argument: "Then at least you say definitely that you say nothing definitely; you understand that you understand nothing; and you know that you know nothing," and so forth, he answers that while sayings, or statements, of this sort deny others, they also deny themselves, like medicines which, having been taken into the body, as they purge the humors, expel themselves along with them. Now how the Skeptics may have attained their goal of *ataraxia*, "tranquillity of mind," from this retention of assent may be omitted at this point.

Chapter Four. Those who affirm the existence of criteria of the truth

I must now speak of those who agree that there are criteria of the truth. Dismissing the criterion of the agent since everybody admits it is man, we are left with the criterion of "the instrument" and of "the procedure," and either of them is designated by the terms "senses" and "intellect" since the word "senses" (*sensus*) is used both for the faculty of sensing and for its operation, or sensation, and similarly the word "intellect" is used for both the faculty and the operation of understanding, or intellection. Now some recognize only the senses as their criterion, others only the intellect, and others both of them. And although there are some who seem to be saying something else, still it turns out to apply either to the senses or to the intellect.

To take up matters individually in order, among those who considered the senses alone as their criterion only one is remembered, Asclepiades. Of him, Antiochus the Academic says in

Sextus Empiricus, "However, a certain other man, second to none in medicine, who also touched on philosophy, was persuaded that the things perceived by sensations were real and true perceptions, but that we understood nothing at all by means of reason."[60] And since Asclepiades shared many things in common with Epicurus, the latter might seem to have gone him one farther because of what Cicero says about him, "He places the criteria of things in the senses; if they once took something false for the truth, he believes that every criterion of truth and falsity is destroyed."[61] But from the things said earlier and from what will be mentioned shortly, it can be known certainly that Epicurus did not believe in only one criterion, the senses, but instead in two, namely "anticipation" and "sense reception" of which "anticipation" pertains to the intellect.

Among those who considered the intellect, or mind or reason, alone the criterion, first Sextus Empiricus lists a great many whom we remember from him, or from Diogenes Laertius, or from Cicero, or from Aristotle.[62] Empedocles may be called the first among these. And yet although there is no lack of people who deem that he made the criterion consist in the senses because of those famous verses

> We kenned the land by means of land, the water
> By water, etc.

also for example because of the particles of elements of which our senses are composed; others, however, maintain that he established the criterion in the intellect since he said clearly that the senses are misleading and he seems to have granted their correction by the intellect in the final verses which are to be found in Empiricus. Next, Xenophanes, for although both knowledge and opinion have a share in the intellect, he rejected the understanding which comes from knowledge, but still left the one that

[60] *Against the Logicians*, I [201]. (G.'s note.)
[61] *De finibus*, I [22]. (G.'s note.)
[62] *Against the Logicians*, I [121–122]. (G.'s note. Empedocles' verse comes from this section. In general, I, 89–262 furnishes Gassendi with the material for this chapter.)

is derived from opinion, according to his saying "in all things opinion reigns." Then Parmenides, because from a reading of the thirty-five verses which Sextus cites he appears to have rejected both the senses and opinion from the judgment of truth, but to have set up reason, or the mind, which he calls *dikê* 'justice', which would show that there is an undoubted truth (as is seen in this verse: "the undoubting heart of true persuasion"), that it differs from opinion, and that not everybody is to be believed. Concerning Zeno it is clear from his entire dogmatic logic that he must be added to the list. Democritus is joined to these on the grounds that although he condemned the knowledge that comes from the senses, he still retained the knowledge that comes from the mind and assigned to it the "judgment of the truth," and this in the book of canons which was mentioned earlier. This is why we read that he rejected things that appear true to the senses because nothiug coming from them is really so, but merely by convention, or appears true in conformity with the disposition of each individual. But still he retained some truth about things that actually exist, for example, according to Diogenes Laertius he says that atoms exist, and the void too. As far as Herachtus is concerned, otherwise so obscure, his feeling in this matter is quite clear. (I will say nothing about Hippocrates, who is not mentioned by Sextus, since from the mere word "aphorism" which designates a definite, sure belief or doctrine, it is manifest that it would not be in keeping for the author of *Aphorisms* to say "I state nothing definitely.") Heraclitus clearly said that the senses are bad witnesses and declared that people who have faith in them are uncivilized; moreover, he asserted that it was to reason that the judgment of things belonged. But it must be observed that he believed that reason, or mind, that is in us does not draw its powers from itself, but from its participation in the universal mind, or reason, which extends through the entire universe, and therefore exists even in the air around us. In fact, he believed that when we sleep a separation of the two takes place, but that when we are awake, the greater mind surrounding us is drawn in through the senses, and the mind born in us draws the

power to judge and the intelligence into itself in this way, just as a brand bursts into flame when fire is brought close to it. I shall skip the fact that he therefore believed that what was agreed upon by all men ought to be considered certain because of its perfect and full, as it were, participation in the general reason, but that what was agreed upon by one man or a few men ought not to be since it did not participate either perfectly or fully in the universal mind.

Moreover, in addition to these, Sextus writes that the physicists of the school of Thales were of the same belief, specifically Anaxagoras, the renowned affirmer of the Mind, who said that "reason is the criterion," and elsewhere of the senses that "we are incapable of judging the truth because of their weakness." That the senses are weak and not worthy of any credit he proved from the fact that if we mix some of the two colors black and white into each other drop by drop, our vision does not distinguish in the least the gradations which take place little by little even though they are part of nature. It is known that he argued that snow is black from the fact that snow is solid water, and water is black, rather than white. Sextus Empiricus adds that the Pythagoreans also displayed this belief, especially Philolaus; indeed he and they concluded that reason is the criterion, not any reason, but one that has been cultivated by instruction. And then they believed that the mind, or reason, that is in us bears a likeness to the one that is infused throughout the universe and that because of its participation in the greater reason (since it is a part of it immersed in a human body) and since, as we said when speaking of Empedocles, only things that resemble each other can know each other, only this reason can comprehend and make judgments concerning the nature of universal things, and then principally when it was purged through instruction and stripped itself as fully as possible of the ignorance and forgetfulness that it contracted from the contagion of the body. I shall pass over the fact that since they contend that the world is governed by harmony and that harmony consists of numerical proportions (so that they call the soul and nature harmony and number), it is

possible to understand what they mean when they say that "a number resembles a number, and a number is known by a number"; but I shall speak explicitly about these matters elsewhere. For the rest, it is sure that Plato descended from the Pythagoreans since, although he was mentioned among those who denied the existence of the criterion, it appears that this must be accepted only in respect to the objects of the senses and of opinion, objects that are in continual flux, but not in respect to the objects of thought and the understanding, which are unchanging and remain the same forever. Hence Cicero says, "Plato believed that any criterion of the truth, and the truth itself, is separate from the senses and opinions and belongs to the mind and thought itself."[63] At this point the distinction between thought and mind ought to be pointed out; namely, as we understand from Plutarch,[64] "thought" (*dianoia*) is the criterion of "mathematical things" which we abstract from matter, not in fact, but in thought, when we understand them in our thinking; "mind" (*nous*), on the other hand, is the criterion of "intelligible things," or ones that are conceived by the intellect to be separate from all matter, not merely in thought, but also in actual fact, such as God and intelligence.

Among those who considered both the senses and the intellect as the criteria were the successors of Plato himself; and in the first place Speusippus, for although he expressed distinctly the opinion that the senses are the criterion for sensible things and the intellect is the criterion for intelligible things, nevertheless he added that the senses must be as much the source of knowledge as reason since the senses can also be a partner in the truths of reason. As the fingers of a flute player execute very skillful operations, ones that they do not come by from birth, but ones that training has achieved, and not without reasoning, in the same way, although the senses themselves do not exercise any operation appropriate to knowing, still from reason's instruction they acquire a practical skill at discerning their object without error. I said "distinctly"

[63] *Academica*, II, 142.
[64] *Platonic Questions*, III [1001C–1002B]. (G.'s note.)

since Speusippus seems to have derived this from his uncle Plato; indeed, both according to a passage in Plutarch and even more explicitly according to one in Proclus,[65] the criterion Plato established for sensible things, or those which come into the senses on their own power, was "faith" (*pistis*), or the capacity to believe and assent to things perceived by the senses; and as the criterion for sensible things which are perceived through images and not on their own power he established "conjecture" (*eikasia*), or the capacity to surmise what things are represented by the images.

On the other hand, Xenocrates, who also succeeded Plato, held the view that the criterion was in part the senses, in part the intellect, and in part a mixture of both in the category of opinion. He distinguished three essences: the first sensible, or of those things which are contained beneath the heavens; the second intelligible, or of those things which are beyond the heavens; and the third, opinionable, or mixed, which consists of the heavens which, inasmuch as they can be observed by the eye, can be understood by astronomy. On this basis he felt that the criterion for the things beneath the heavens was the senses themselves, for those beyond the heavens, science, and for those in the heavens themselves, opinion. He added further that although the senses are not as stable or true a criterion as knowledge, they are nonetheless a true criterion, and only opinion is capable of being true or false. It also seems that under the category of things which are beyond the heavens he understood nothing else but the things called "intelligible" by Plato, for example things existing, as it were, in an intelligible world which can be viewed from this world, not as a world occupying any space but as one converted into terms of thought. I pass over the fact that he says this is why tradition related that there were three Fates since Atropos is the Fate of intelligible things, which do not change, Clotho is the Fate of sensible things, and Lachesis of opinionable things.

[65] *Platonic Questions* [1001D], and Proclus' *Commentaries on the First Book of Euclid's Elements*, Chapter V. (G.'s note.)

Concerning the Academics who followed, there is nothing for us to add; for although Arcesilas accepted "reasonableness" (*eulogon*), or a deed or act for which a decent and fitting reason can be given, and although Carneades accepted the "probable" (*pithanon*), or that which, all things considered, seemed probably the best thing to do, nonetheless it is clear that these are not so much criteria for determining the truth as criteria for leading one's life, much like the appearances (*phainomenon*) of the Skeptics and the feeling (*pathos*) without agitation of the Cyrenaics, and anything else of the sort.

Since Aristotle was part of the succession from Plato, Sextus Empiricus declares that both he and Theophrastus as well as the Peripatetics with them distinguish two highest classes of things, namely the sensible and the intelligible, and so they set up two criteria, the senses for the sensible and the intellect for the intelligible, while Theophrastus adds that the evident (*enarges*), or self-evidence, is common to both, for a self-evident perception is necessary for making a judgment with either the mind or the senses. Diogenes Laertius[66] agrees that the criteria set up by Aristotle are the senses and the intellect, although some error seems to have crept in since he applies the intellect to ethical matters only, namely ones pertaining to the state, to the laws, and to the home; for it is well known that the intellect belongs first to visible things. When he calls the senses the criterion of "those acts which are done in accordance with the imagination," since the word "imagination" (*phantasia*) does not have the same connotation as it does among almost all other philosophers, namely the external appearance of things, it must be interpreted instead as that internal faculty that we generally call image-making because in it we perceive things in the same image and appearance by which they are represented externally so that in order to judge whether we imagine things correctly we must use the senses as our criterion, that is we must explore whether they are presented to the senses in the same form. But since we also apprehend intelligible things, or ones which are known to the mind

[66] Book V [29]. (G.'s note.)

alone, with images too, Aristotle finds in this reason to distinguish two sorts of imagination, namely the sensitive and the intellective, and makes each of them the "judge" (*kritikê*) in its own way, and reason to say on several occasions that since we perceive individual things with the senses and universal things with the intellect, the senses are the judge of individuals and the intellect of universals.[67] But I shall speak more amply of this elsewhere. It is enough to remark here that according to Sextus Empiricus, in Aristotle's view the senses and the intellect are the criteria in such a fashion that the senses function as an instrument and the intellect as a craftsman. For just as we cannot weigh light and heavy objects without a scale or investigate straight and oblique lines without a ruler, so the intellect cannot test a thing without the senses. Anyway, the upshot of this is that the intellect is first in dignity, but the senses have a certain priority in order. What shall we say of the fact that Aristotle also made so much of the senses that he sometimes said that the senses are to be preferred to reason and that failure belongs to the mind as it seeks a reason and disdains the senses?[68]

Galen appears possibly to be descended from the Peripatetics, for although in his argument over the criteria with Phavorinus, who supported the Skeptics, he does not once mention sensation or intellection, he declares that the senses and the intellect are criteria born in us; and he also teaches the same thing clearly when he shows in his comparison of Plato's opinions with Hippocrates' that Hippocrates was also of the same conviction.[69]

Now to speak of the Stoics, whose diversity Diogenes Laertius remarks upon. For how much they too ascribed to the senses, Plutarch implies and Cicero describes openly; and how much they also ascribed to the intellect, Saint Augustine observes in

[67] *On the Soul*, III, ii [or iii] and *On the Movement of Animals*, VI [7006]. (G.'s note.)

[68] *On the Generation of Animals*, III, x [7606 *in fine*] and *Physics*, VIII, iii. (G.'s note. The second reference appears to be an error.)

[69] *De optimo docendi genere* and *De placitis Hippocratis et Platonis*, IX. (G.'s note.)

those "notions" (*enneias*) which they said were derived from the senses.[70] Indeed according to Diogenes Laertius, Boethus distinguished four criteria: the intellect, the senses, the appetites, and knowledge; and yet since knowledge belongs to the intellect, and the appetites, which really pertain to moral considerations, are inappropriate in this place, it might therefore seem that he only proposed the senses and the intellect. About the same may be true of Chrysippus when he said in imitation of Epicurus that the criteria are two, the senses and "anticipation" (*prôlepsis*), and understood by that last word a universal notion belonging to the intellect. Only the early Stoics did not mention the senses expressly since they thought of right reason alone as the criterion. But not so the later ones, Antipater and Apollodorus, whose side Chrysippus sometimes takes, when they affirm as the single criterion, the one Zeno had named the "comprehending (or comprehensive) imagination" (*katalêptikê phantasia*). Anyway, this opinion concerning the comprehending imagination became very famous, as we learn from Cicero and Sextus Empiricus, especially from the latter, who is our outstanding source of explanation of this type of imagination. The most important point is that as Zeno generally felt that the imagination is a sort of "impression" (*typôsis*) on the soul or as his followers said expressly "in the highest part of the soul," which is the mind or the intellect, there arose immediately a controversy between Cleanthes and Chrysippus concerning the formation of this impression. For since we feel a certain effigy, as it were, which remains impressed in our soul from something external that we have seen, Cleanthes believed this impression was to be understood in terms of protrusions and depressions, like a signet in wax; but Chrysippus contended that it was a certain alteration instead. As various classifications and species of the imagination had been designated, they believed that the particular one that is to be the criterion has to be "comprehending" and in order to be comprehending it must be "probable," otherwise it would not induce the soul to assent to it. And it must be "true" if it is

[70] Diogenes Laertius, VII [54]; Plutarch, *De placitis philosophorum*, IV, ix; Cicero, *Academica*, II [196]; and Augustine, *City of God*, VIII, vii. (G.'s note.)

to furnish knowledge, otherwise it would be a meaningless comprehension; consequently in their definition they added that it must "arise from what exists" since there surely is no truth or knowledge concerning something that is nothing. Furthermore, since the imagination receives its impressions from actuality, they say that the comprehending imagination is one which is "imprinted and sealed by actuality, and in conformity with actuality" in order to avoid occasions where it is not in conformity with actuality[71] or does not have impressions of every property, or is obstructed by something. They added moreover that every effort should be made to assure that such an imagination clearly fulfills the requirements that enable it to be a genuine criterion of the truth. Just listen to what Cicero says: "And Zeno conveyed this in gestures. For he would hold his right hand out with its fingers spread wide apart, and say that vision (Cicero translates imagination with this word) was like that. Then, having closed his fingers a little bit, he said assent was like that. Next, when he had completely closed his hand, making a fist, he said that was comprehension (from this comparison he derived the name *katalêpsis*, 'grasping' which had not been used before). However, when he brought the left hand over and squeezed the other tightly and roughly, he said that was like knowledge, which no one except the Sage was capable of possessing."[72] From such considerations you may now understand what Diogenes Laertius and others relate concerning the Stoic Sphaerus.[73] For once while he was staying at the court of Ptolemy Philpator in Alexandria when the conversation had turned to the question whether or not a Sage had opinions and Sphaerus denied that the Sage could have an opinion (for he would have true knowledge), the King, wishing to refute him, quietly ordered some waxen pomegranates put before him. When Sphaerus fell for the trick, the king exclaimed that he had accepted a false impression as true. But he denied that he had accepted as true that they were pomegranates, believing only

[71] Reading *ipsum* for *ipsam*.
[72] *Academica*, II, 145.
[73] Book VII, 177.

that it was probable they were pomegranates. For it is agreed that there is a difference between the comprehending imagination and the probable, or reasonable (*eulogos*). I will pass over in silence the fact that Potamones resembled the Stoics since according to Diogenes Laertius[74] he set up two criteria, the one "of the agent," namely "the highest part of the soul," *to hêgemonikon*, the second "of the faculty," namely "the most accurate perception," *tê akribestatê phantasia.*

It remains to speak of Epicurus, but this matter has been discussed adequately in the passages about his logic, which contain everything that would be put in an account of his criteria.[75]

Chapter Five. That some truth can be known by a sign and determined by a criterion

All in all, to find what can be concluded with some probability in this welter[76] of opinions about the criteria of the truth, we would do best to hold to some middle way (*media quaedam via*) between the Skeptics (in this term I include all those denying the criteria) and the dogmatics. For the dogmatics do not really know everything they believe they know, nor do they have the appropriate criterion to determine it; but neither does everything that the Skeptics turn into the subject of debate seem to be so completely unknown that no criterion can be found for determining it. And since the dogmatics really do not know the greater part of the things they believe they know, the occasion arises only too frequently in the physical sciences to declare that we are fortunate if we attain not what is true but what is probable. As you see, we feel that in such an incapacitated state it

[74] In his Preface [I, 21]. (G.'s note.)

[75] In Book I, Chapter VII, not given here, where Gassendi lists fourteen canons of Epicurean logic, including "That the senses are infallible," "Any anticipation, or notion of an object, that exists in the mind is derived from the senses," and "In speaking one must choose familiar and clear words."

[76] Some such word as *diversitate* is missing in the Latin.

should be considered a great gain if we can rise to the point where we may glimpse not the truth itself (its very body, so to speak), but some slight image of it, or even its shadow. For indeed nothing would be more beautiful or more desirable for us than to know fully the things that nature had kept in her depths or her farthest recesses; but though we may wish for that, we are being quite as absurd as when we yearn to fly like the birds or to stay young forever, than which nothing appears to be more delightful and desirable. In the meantime do we not have reason to rejoice, and if we do not at least those living near us do, at the fact that if we do not have wings, at least out feet suffice to get us eventually wherever we have to go, and if we are not born immortal, still we have attained the length and course of life during which we may inhabit and enjoy the beautiful spectacle, I might even say theater, of nature? And should we not for the same reason consider it a great boon that if we cannot be admitted into the very inner shrines of nature, we can still live among certain of the outer altars; surely on this account the inquiry into the truth is not in vain by virtue of the fact that however little it may be that we advance toward it, that little is most precious and gives us great delight, so that everyone should therefore consider that as good reason for him to whisper to himself:

> Your eyes perhaps are not so keen of sight
> As Lynceus'; yet you annoint their blight.
> Though you may not hope for Glaucon's strong limbs,
> Would you fail to save yourself from gout's whims?
> Each step forward counts though we may not take two.[76a]

We must now show in a survey of a few words that most of the things disputed by the Skeptics can really be known, and so some truth is available and there is a criterion for determining it. In the first place, the truth in question here is not any general truth about existence; indeed although many things exist individually and this cannot be legitimately disputed, still there are unwarranted controversies over whether anything is, or exists,

[76a] Horace, *Epistles*, I [i, 28–32]. (G's note.)

in general. For whatever objections Gorgias may make, it is still true and certain that something exists; and since the fact is manifest of itself, his whole line of argument appears to be mere caviling.[77] Obviously if nothing existed, it would not occur to his mind to deny that something exists; and unless he himself were something, he would not reason along those lines. Hence anyone who hears is not so bewitched that he thinks he is nothing, that the man who is speaking is nothing, or that other things which he perceives in the meantime by means of his eyes are nothing.[78] And besides he believes that it is quite enough for him if he answers erroneous logic and sophisms in Diogenes' way, making light of mere words and facing them solidly with this reply: "My friend you have no reason to complain if someone thrashes you within an inch of your life or kills you, for he is thrashing or killing nothing." Surely there is no one who cannot answer Gorgias' argument by saying that what exists is Being, and he is correct in saying there are two possibilities: either it is eternal, as would be the first cause and, according to the philosophers, the primary matter (it does not follow that what is infinite in duration must also be infinite in extent—this is how some envisage the atom; and even if it were infinite in extent, it does not follow that it would not be everywhere rather than nowhere, as would be the case of something lacking physical mass—Almighty God is like this, and according to some so is the void); or else it is born not from nothingness, but from matter, or certain beings that exist in another mode; so things in nature also have their origin, exactly as a house comes into being from materials that already existed but were not assembled.

Secondly, the truth in question here is not a general truth about judgment or statements; for it is at least true and certain

[77] In Chapter II (pages 300–301) Gassendi had listed Gorgias' three conclusions, which he will now answer point by point.

[78] Note that Gassendi's argument resembles Descartes's *cogito*, except that it derives the evidence for existence, of external objects as well as of himself, from the senses, which Descartes specifically rejects as sources of certain knowledge.

that a man who says he is speaking is telling the truth and if he concludes he is speaking, his conclusion is true. Granted that men do not know everything nor in every way possible, and cannot say what the nature of everything is, nonetheless without a doubt there are many things whose nature they do know and can explain. Is there really anybody who would truly doubt at sunrise that it is known, or concluded, and may be said, or proclaimed, that the rising sun spreads light above the horizon and brings a new day into being, and other things like that? And Gorgias' argument makes no difference to this since we think many things that are not chimeras or chariots borne upon the sea; and when we express things through other things, we do not pronounce the things themselves but words designating them since this is the very nature of speaking, namely that when things cannot be brought into our presence or cannot appear before our eyes,[79] we substitute words for them which indicate them and perform the same function for our ears that fingers perform for the eyes when we point at those things for the same purpose. And I say these things with Gorgias specifically in mind, and any others that might be like him; for since the Skeptics ordinarily accept "appearances" *ta phainomena*, or "what things seem to be," they leave untouched that truth which concerns appearances; and just as they do not doubt that appearances exist (and they even do not hesitate to admit that a thing of some sort exists under the appearances, but argue only that what sort of thing it is cannot be known in the least), they do not dispute the fact that people can make statements and draw conclusions concerning the kind of appearances they perceive. Consequently, the truth in question is hidden, lying concealed beneath appearances; we must then inquire, since its nature is not open to us, whether it is still possible to know it through some sign and whether we have a criterion by which we may recognize the sign and judge what the thing truly is.

But we must first know just what the ancients ordinarily meant by a "sign" and how many kinds of signs there were. In

[79] The Latin text appears corrupt here.

general terms anything that designates or signifies something different from itself can be called a sign, or if you prefer, anything which, once it is known, leads us to the knowledge of something else; or to be specific, as it is understood here, it is actually nothing else but what is commonly called a "middle term" or an "argument."[80] For on the one hand both the Stoics and Aristotle say that it is a proposition while according to Sextus Empiricus the former assert distinctly that a sign is a statement (*axioma*) which is the antecedent in a valid and true conditional sentence and which reveals the consequent; for example, in this conditional sentence "if the sun is shining, it is daylight," the clause "if the sun is shining" is the sign of "it is daylight." On the other hand, when Aristotle established the distinction in the [*Prior*] *Analytics* between "the plausible," *to eikos* and "the sign," *sêmeion*, he first says that the plausible is a probable statement since what usually happens or does not happen, is or is not, becomes thought of as plausible, for example that "lovers cherish each other" or "envious people hate each other." And then he adds that "a sign is a demonstrative proposition, or a necessary one, or a probable one," for example when it is shown that "a woman has just given birth since she has milk," or "a Sage is a good man since Pittacus is good." Although they define a sign in this way, still, I say, their definition does not make it a middle term since however much it may be a statement, it is still also part of a conditional statement; for obviously "if the sun is shining" is part of a hypothetical condition; and when it is said that "to have milk in her breasts is a sign that a woman has conceived," it is undeniable that "to have milk in her breasts" functions as a subject, accordingly as part of such a statement.

Furthermore, in the *Rhetoric*[81] Aristotle, making a résumé, as it were, of what he had said in the *Analytics*, distinguished signs

[80] Sextus Empiricus, *Outlines of Pyrrhonism*, II [97–133], *Against the Logicians*, II [141–299], and Aristotle, *Prior Analytics*, II [xxvii]. (G.'s note. The examples of the pregnant woman and of Pittacus come from Aristotle.)

[81] Aristotle, *Rhetoric*, I, ii [1357b]; Quintilian, *Institutio oratoria*, V, ix [3–5]. (G.'s note. The other reference is to the *Prior Analytics*, II, xxvii.)

into the necessary, which he says are called "positive proofs," *tekmêria*, and the not necessary (or probable), which, he says "lack a name" although Quintilian calls them a "sign," retaining the general term. He believes that the first group functions like a universal statement applied to an individual case, but the second group resembles an individual instance being made into a universal statement; for from the universal fact that a woman who has milk has conceived one may infer necessarily that this particular woman who has milk has conceived, and from the fact that Pittacus, who is a Sage, is also a good man one may infer the probability, but not the necessity, however, that all Sages are good men. Here is the passage of Quintilian that I have been referring to: "Signs are divided into two species because there are some which are necessary, called *tekmêria* by the Greeks, and others that are not necessary, called *sêmeia*." When he adds, however, that the first may relate to any period of time, he says "For a woman who has given birth must have had intercourse with a man, which refers to the past; there must be billows when a high wind has hung over the sea, which refers to the present; and a man who is wounded will surely die, which refers to the future." Then, saying that the second sort of signs is the same as what the Greeks (except Aristotle) call *eikota*, he defines them as "those which, even if alone they do not suffice to dispel doubt, still carry great weight when taken in conjunction with others."[82] It should be mentioned that Cicero speaks of the necessary sign; he says "The argument derived from a particular token makes something clearly certain because it never happens any other way, for example smoke indicates the presence of fire"; however concerning the one specifically called a sign, he says, "it makes something probable because the majority of cases happen that way; for example youth is inclined towards violent desires"; otherwise he uses the word "sign" for "traces left behind," such as "a weapon, blood from a wound, a piercing cry, a staggering step, a change in color, wavering speech, trembling, etc."

[82] *Institutio oratoria*, V, ix [3–5]. (G.'s note.)

While we are discussing the sign that is truly a *tekmêron* and which they call "one that produces knowledge," *eidenai poioun*, according to Aristotle, we must add a further distinction proper to it found in Sextus Empiricus.[83] It assumes the division already made among hidden things whose truth is being sought, namely that some are naturally hidden and others are hidden only temporarily; accordingly, some of the signs are called "indicative," *endeiktika*, and others are "empirical," *hypomnêstika*. The indicative sign pertains to things naturally hidden, not because it indicates a thing in such a way that the thing can ever be perceived and the sign can be visibly linked to the thing itself, so that it could be argued that where the sign is the thing is too, but on the contrary, because it is of such a nature that it could not exist unless the thing exists, and therefore whenever it exists, the thing also exists. An illustration of this is sweat as it indicates the existence of pores in the skin, for pores cannot be seen; still sweat is of such a nature that it would not appear upon the skin unless pores existed through which it could pass from inside to the outside. Such also is vital action as it indicates the existence of the soul, and motion as it indicates the existence of the void (at least according to Epicurus), and other things of this sort. An empirical sign pertains to something hidden temporarily, like something which had always been observed to be connected with a thing which we could see clearly, so that as soon as we perceive it at a later date we are reminded of the thing which must accompany it. Such is smoke as it suggests fire, milk as it suggests pregnancy, a scar as it suggests a wound received, dawn as it suggests the rising sun, and so forth.

Consequently, though it seems that we are concerned with both these signs, still the Skeptics raise no disputes over the empirical sign since they realize that it is useful in the conduct of life, but only over the indicative sign, whose existence they refuse to admit. However, since it does not seem that it can be denied that something of this sort does exist and that at the same time some criterion by which it is understood does exist, we must

[83] Gassendi gives the same references as in footnote 80.

then observe that Epicurus seems to have been right when he said, according to Sextus Empiricus, that "the sign is a thing of the senses," *aisthêton einai to sêmeion*.[84] Since it is well known that we perceive some things through the mind and some through the senses, and that all knowledge which we have in the mind had its beginning in the senses (even Plato, when he contends that knowledge is nothing but recollection, teaches that it is aroused by things perceived through the senses), therefore a certain sensible sign must come before the mind by which it is led to the knowledge of the thing lying hidden unperceived by the senses. Accordingly, the result is that we may distinguish two criteria in ourselves: one by which we perceive the sign, namely the senses, and the second by which we understand something hidden by means of reasoning, namely the mind, intellect, or reason. And although it is admitted that the senses are sometimes misleading and that therefore the sign may not be reliable, still reason, which is superior to the senses, can correct the perception of the senses so that it will not accept a sign from the senses unless it has been corrected and then at last it deliberates, or reaches its judgment of the thing.

Therefore, it is possible to claim now from the examples provided in the course of the argument that something concealed, or a hidden truth, can be known by a sign. If someone asks if the skin is a continuous whole or is broken through by innumerable little pores and openings, at first blush it will be judged a continuous whole since neither the hands nor the eyes perceive any pores in it. But on the other hand, since the senses do perceive a humor that exudes from underneath and creates an external moisture, despite the fact that they cannot perceive any pores, the mind reasons from the existence of this humor as from a perceptible sign that pores do exist. Having assumed from other sources incontrovertible principles, or propositions, which it concluded by induction from things also perceived through the senses, and which it preserves in the storehouse of the memory, the mind reasons, I say, more or less in this manner: "This

[84] *Against the Logicians*, II [177]. (G.'s note.)

humor is a body; no body goes from one place to another unless it passes through the space between them; the skin occupies the space between them; therefore the humor must go through the skin. But the skin itself is a body too; and since two bodies cannot be in the same place at the same time, since therefore one body cannot pass through the space where another body is, the humor would not pass through or penetrate the skin if the whole area that appears to be skin were body. Therefore the skin must be like a sieve or strainer, that is of such a texture that in between the parts of it that have corporeal mass it intersperses little holes, through which the humor, broken up into droplets, passes." In this fashion, therefore, it seems we can be certain of something which was hidden, or which lay concealed from the senses. By an analogous line of reasoning we concluded in another instance that light rays are corporeal and that glass is permeated with pores since part of the rays landing on the glass are reflected and part pass through, and it is logical that only those which strike solid, corporeal parts of the glass are reflected, and those which fall upon the empty parts and interspersed holes pass through.

And these conclusions are confirmed by the fact that there are many such things for which with the passage of time helpful appliances are being found that will make them visible to the senses. For example, take the little animal the mite, which is born under the skin; the senses perceived it as a certain unitary little point without parts; but since, however, the senses saw that it moved by itself, reason had deduced from this motion as from a perceptible sign that this little body was an animal and because its forward motion was somewhat like a turtle's, reason added that it must get about by the use of certain tiny legs and feet. And although this truth would have been hidden to the senses, which never perceived these limbs, the microscope was recently invented by which sight could perceive that matters were actually as predicted. Likewise, the question had been raised what the galaxy in the sky with the name of the Milky Way was. Democritus, concerning whom it was said that even when he did not know something he was knowing, had deduced from the

perceptible sign of its filmy whiteness that it was nothing more than an innumerable multitude of closely packed little stars which could not be seen separately, but produced that effect of spilt milk when many of them were joined together. This truth had become known to him, and yet had remained undisclosed to the senses until our day and age, until the moment that the telescope, recently discovered, made it clear that things were in fact what he had said. But there are many such things which, though they were hidden from the ancients, have now been made manifest for our eyes. And who knows but a great many of those which are concealed in our time, which we perceive only through the intelligence, will one day also be clearly perceived by the senses through the agency of some helpful appliance thought up by our descendants? Who would have dared dream fifty years ago that he would discern the little stars of which the galaxy is made, that he would be able to distinguish the limbs of the mite as clearly as those of some larger animal? A Skeptic will say that these things still belong among "appearances," *ek tôn phainomenôn*. But really, before they appeared to us, were they less true than they are now, however much less known they may have been? And were they not on the same footing as many things which are known now by reason alone, and I do not mean those that are defined as hidden only temporarily, to which some empirical sign is ascribed? Then why aren't so many of these things considered true with equal authority though they are perceived by the mind alone and can no more appear to the senses than those other truths could in the past?

Secondly, if someone wonders whether a certain body is endowed with a soul or not, the senses are not at all capable of determining that by taking a look as it were at the soul itself; yet there are operations which when they come to the senses' notice, lead the intellect to deduce as from a sign that there is some soul beneath them. You will say that this sign belongs to the empirical type, but it is not at all of that type, for it is not even one of the indicative signs since it does not inform us of something that the senses have ever perceived in conjunction with the sign,

as they have seen fire with smoke, but informs us instead of something that has always been impenetrable to the senses themselves, like our skin's pores or the mite's feet before the microscope.

You will persist with the objection that we should not ask so much whether there is a soul in a body as what its nature is, if it is the cause of such operations, just as there is no question that there is a force attracting iron in a magnet or that there is a tide in the sea, but there are questions over what their nature is or what they are caused by. But let me omit these matters which are to be fully treated elsewhere, and let it be enough if we say that not every truth can be known by the mind, but at least some can concerning something otherwise hidden, or not obvious to the senses themselves. And we bring up the example of the soul both because vital action is proposed by Sextus Empiricus as an example of an indicative sign and because even though it pertains not so much to the nature of the soul as to its existence, still a truth of existence of such magnitude as this, which it is most valuable for us to know, is made indisputable. For when among other questions we hear it asked if God is or exists in the universe, that is a truth of existence which it would be a great service to establish firmly even if it is not proven at the same time what he is or what his nature is. Although God is such that he can no more come under the perusal of the senses than the soul can, still we infer that the soul exists in the body from the actions that occur before the senses and are so peculiarly appropriate to a soul that if one were not present, they would not be either. In the same way we deduce that God exists in the universe from his effects perceived by the senses, which could not be produced by anything but God and which therefore would not be observed unless God were present in the world, such as the great order of the universe, its great beauty, its grandeur, its harmony, which are so great that they can only result from a sovereignly wise, good, powerful, and inexhaustible cause. But these things will be treated elsewhere at greater length.

In the meantime it gives me pleasure to record here a story

that Pliny tells.[85] Apelles landed at Rhodes; not finding Protogenes in his studio, he seized a stylus and traced a line of remarkable delicacy on a certain blank tablet and ordered an old woman to announce to Protogenes that the man who had drawn that line was one who sought Protogenes. Having come back, Protogenes drew an even more delicate line along the first and ordered it to be announced that if a man came back who drew a line between them, that was the man he sought. Returning to the studio, Apelles cut the middle with another line of such fineness that Protogenes, having no doubts that it could be drawn only by Apelles, flew down to the port in search of his guest. Now I relate this to point out that Protogenes did not know from this sign what Apelles would look like, but did understand with the greatest certainty that he was present in Rhodes; in the same way we do not know from those works, so great and so perfect, which are some sort of sign, just what God looks like or what his true nature is; but we understand with the greatest certainty that he is present in the universe, for the lines that he has traced in the universe, so to speak, are such that they can come only from an incomparable artisan.

Finally, let us mention the illustration of the soul since from its actions we know not only that it exists, but what it is like, or what its nature is; and the more types of actions that we know from which we understand that it is endowed with more properties and qualities, the more perfectly we know it. Indeed it should not be thought that the nature of every thing consists of something so indivisible that it does not have a range of qualities, or attributes, the more of which we have penetrated and revealed as we describe the thing, the better we may be considered to know the thing and define it. The qualities of the human soul are of this kind, by which we understand that it is such that in the same man it not only gives life, feels, and moves, but also understands, reasons, wonders, probes abstruse questions, speaks, laughs, makes laws, discovers skills, and so forth. The nature of the soul is located in these qualities. But if you wish to know in

[85] *Natural History*, XXXV [xxxvi, 81–83]. (G.'s note.)

addition to this what its color, texture, and substance are, you must wait until you have eyes and a microscope up to such a task. I shall add that since a proof, according to Cicero,[86] is "something that leads from things perceived to what has not been perceived," it can be said that even the nature of the soul has been proven and known insofar as without having had prior perception of what it was like we are led to a knowledge of its qualities and properties from the various functions that we have perceived in it.

It is hardly worth spending time on Aristotle's wish that the proof by which we know something must proceed from first principles that are immediate, true in themselves, universal, and so forth,[87] since it has not been possible to offer any such proof so far. And on the other hand, it is hardly worth mentioning that Plato contends that there is no knowledge more perfect than definition, as when we are said to know that the sun is the brightest of all the stars.[88] Also that there are followers and interpreters of Aristotle, specifically Themistius, who refuse to call genuine even the knowledge not only of first principles but also of definitions.[89]

I mentioned an example from Epicurus, in which from the existence of motion as a perceptible sign he deduces that the void exists in nature interspersed between things, or bodies, because unless there were a void mixed in with things, no motion would be able even to get a start since, however different the bodies of which the world were composed might be, they would all be so tightly packed that they would form a single totally rigid mass, utterly inflexible, as if there were no direction in which something could be pushed back or forward, indeed with all its places occupied in every direction, so there would be nothing that could yield its place into which something else could succeed it. Not to linger too long over this, which is to

[86] *Academica*, II [26]. (G.'s note.)
[87] *Posterior Analytics*, I, ii, etc. (G.'s note.)
[88] *Theaetetus* [208D]. (G.'s note.)
[89] *Commentary on the Posterior Analytics, I, iv.* (G.'s note.)

be treated at greater length in its own place, one may observe that there are innumerable things which can be proven by similar arguments.

The moon constantly changes its quarter according to it relationship to the sun by which it is illuminated. Using this change as a sensible sign we have occasion to prove that the moon, which otherwise appears to be a flat disc, is a globe, or spherical, because it would not undergo such a change unless it were spherical and because it must undergo it as long as it is spherical. Likewise, from the fact that it does not happen that the moon goes into an eclipse except in full moon, at which time the earth, positioned between it and the sun, can take the sun's light away from it, and from the fact that the sun has eclipses only in the new moon, at which time the moon, positioned between the earth and it, takes the light away from the earth, it is proven as by a sign both that the interposition of the earth is the cause of eclipses of the moon, and that the interposition of the moon is the cause of the eclipses of the sun. Likewise, since the invention of the telescope, from the changes in the phases of Venus and from the fact that it appears horned and larger when it is in retrograde motion and full and smaller when it is moving forward, we prove that Venus is sometimes between us and the sun and sometimes beyond it, which the ancients proved from the mere condition of its motion.[90] Likewise, Copernicus, from seeing Mars grow so much larger when it was in opposition to the sun and so much smaller when it was nearer the sun, formulated an argument in which he proved that the earth moves, in the belief that Mars would necessarily seem largest when the earth came closest to it and smallest when the earth left it on the other side of the sun.

How large a field would now offer itself if we let ourselves extend our comments to other sorts of learning, and especially geometry! And there would be no call for a stick and some sand to draw the signs by which this study so clearly proves that, for

[90] This movement is compatible with the theory of either Tycho or Copernicus.

example, every triangle has three angles equal to two right angles; in a right triangle the square of the hypotenuse is equal to the squares of the sides; the opposite angles of any quadrilateral inscribed in a circle are equal to two right angles; the area of a sphere is four times the area of its great circle; the area and volume of a cylinder are one and a half times the area and volume of a sphere whose great circle is the cylinder's base and whose diameter is its altitude; the volume of a cone is one-third that of the cylinder and the volume of a pyramid is one-third that of the prism having the same base and altitude; every parabola is one and one-third times the triangle whose base and altitude are the same; the lunule made from a quadrant of a circle having for its diameter the diagonal of any square and from the semicircle whose diameter is the side of the same square is equal to the triangle which is one-fourth of that square, and countless other things of that sort. It is not worthwhile to explain these in detail or to prove them in a few words right here, but they seemed worth indicating in order to suggest that although these are not obvious in themselves and no one would have suspected them or convinced himself of them before he had heard about them and heard them proven, there are a great many other things about which the hidden truth can be proven by some sign in much the same way as these just mentioned which gained credence from the moment they were discovered so that no one at all doubted them. Note that not even the Skeptics dare deny these, but denounce only the hypotheses which the geometers take as signs, or principles, chiefly the definitions by which a point is said to have no parts, a line is length without width, a surface is width without depth. They argue that nothing like those things actually exists in nature or even could exist. And yet Aristotle already in his own time answers that a line is said to be length without width because even though a long thing is at the same time broad to some extent, nonetheless its length alone is being considered, and not its width too, just as when someone wants to know how long a wall is and does not care in the least how wide it is.[91]

[91] Sextus Empiricus, *Against the Physicists*, I, 412.

And whatever the Skeptics threw back in reply to this, it is obviously not the sort of thing that it seems worth replying to.

But, you will ask, what answer can be given to those modes presented by the Skeptics? It seems indeed to be the case that the same thing appears different to different men and different animals and even to one man according to his separate senses and conditions (which are the first four modes) since so many different images, or appearances, are produced; nevertheless, it can be inferred that there is some general cause underneath in the thing, or object, that is sufficient to produce all these manifestations. And so, however much the effects may not be iu conformity with one another, there are still two things which are certain and can be proven true upon examination: one, that there is a single *cause* in the thing itself, or the object; and two, that there are different *dispositions* in the receiving faculties. In much the same way, when we see the sun melt wax and harden clay, it is the same heat from the sun which produces the effect once it has penetrated each body; however, there is a different disposition in each body, namely a fatty humor in the wax, which can be stirred up and disengaged to a certain extent, but still cannot be completely removed and dispersed ou account of its tenacity, with the result that the whole mass remains softened or even liquefied; but in the clay there is a lean humor which because of its lack of tenacity can not only be stirred up and disengaged from the dry particles with which it is mixed but can also be completely detached from them and go off into the atmosphere, or be evaporated, with the result that the mass that is left becomes dry and hard. Consequently the only task that remains is the investigation of the uniformity of the cause and the dissimilarity of the effects; and if someone should succeed in understanding this, he will be considered to have nothing less than full acquaintance with the nature of the thing and to share in the knowledge of it. For no matter how much it is objected that it cannot be stated definitely from these considerations just what the thing is like according to its nature, but only what it is like in respect to one thing or to another, it may still be said what there is in it which

makes it appear to be this in respect to one thing and that in respect to another; and consequently it may be said both to be one thing according to its nature and to be this or that in respect to other things. Likewise, althongh the snn cannot be said to be softening rather than hardening according to its nature, it can be said, however, to be heat-producing by its natnre since it provides the heat which according to the condition of the receiving matter melts it or hardens it. The objection made more frequently than any other concerns the variety of tastes that the same thing can be thought to have; but it can be firmly established that the general cause of all the tastes is the salt if it is established that anything becomes tasteless when the salt is removed; and since salt has a multiple nature, and can be distributed differently in various mixtures, it can happen that it is distributed in one fashion in honey and another in wormwood, and so, however great a variety of particnlar flavors it may have, there is a corresponding variety in taste sensations it may produce.

On the other hand, it can also be established that not every palate and not every tongnc is formed in the same way; if one admits that it seems highly likely that the same diversity that is found in foreheads, noses, cheeks, and the rest of the face and the entire body should be expected in the palate and the tonguc. Then, wherever there was a difference of configuration in them, it cannot happen that the same salt produces the same effect in all of them. For since the particles of salt set free in the liquid and mixed in it have a certain shape, as will be made clear in its proper place, it is inevitable that these particles, when received in the apertures of the organ which also have their own configuration, create an agreeable sensation whenever they are admitted into apertures similarly shaped into which they fit gently, but create a disagreeable one whenever they are admitted into others which they do not caress, but tear instead with their points because of their different configuration. From these considerations it will be obvious how so many different appearances happen to be generated by one and the same cause. Obviously the same can be said of odors, colors, sounds, and other sensations

although all these matters depend upon considerations that will be explained explicitly in the section on physics. It is enough at this point if it is granted that the qnality which appears to one man cannot be said to be exactly the same as the one that is in the object since other qualities will be apparent to others which might claim the same right; but it can be said that the object has really only one nature and that the various appearances it has exist by the necessity of the nature of the faculties in which they are created.

Concerning the following modes, the same or analogous answers can be given. For indeed position, distance, location, mixture, constitntion, qnantity, rarity, frequency, and whatever else, do not prevent things from actually being certain things in themselves and creating this appearance because of some physical necessity in some people and that one in others. Moreover, it is impossible not to recognize some necessity of this sort; and canses why things present this appearance or another can be investigated in order that something certain and true may be won and known. For example, to speak of the difference in colors, it depends upon the cognition of a general cause producing the effect of color; and if it has been established that that cause is light, it is only appropriate that it produces a diversity of apparent colors in the eye according to the variations in the degree of light, in the reflections, refractions, and relative presence of shadows. And even that range of colors which is produced by interposing a prism, or triangle of glass, which anyone can procure, conveys quite clearly what the case is. Since the colors displayed in this phenomenon are not in the things, or in the glass itself, or in the medium of the air, it is likely that how they appear to the senses is created in the eye alone and that the eye receives the impression of colors because the rays of light reflected from objects in front of us undergo the same refraction as in the glass, and bearing this refraction as they strike the eye, imprint such-and-such an appearance upon it. And since objects themselves can reflect rays from their surfaces which have been refracted in the same way according to the configuration of the tiny bodies of which they are composed, nothing prevents the colors that appear to be in

things from taking their appearances from such a cause. But I shall speak of these things in their place, telling at greater length and in more detail how they occur.[92]

Likewise, by reason of the distance involved it happens inevitably that a thing appears to be large, small, square, round, and so forth. Since any visible thing diffuses rays in every direction from its surfaces and parts which make it perceptible as they strike the eye, the result is that the more rays reach the eye, the more parts of the thing are depicted, and so the thing appears to be bigger, being made up, so to speak, of more parts; and the fewer the rays, the fewer the parts that are depicted, and so the thing appears to be smaller, as if it were made np only of those parts. And since rays spread out in a circle are more densely packed closer up and fall upon the eye in greater numbers, and are less dense at a distance and hence fewer of them reach the eye, the outcome is that a thing appears larger close up, as if it were made up of more parts, and seems smaller from a distance as if it were made up of fewer parts. Add to this the fact that the eye is so situated that in one look it takes in an entire hemisphere made up of various visible things, the nearer of which cover the farther with their bulk; a thing always appears so much the larger as it occupies a greater part of the hemisphere and so much smaller as it occupies a smaller part. Moreover, close up it occupies a larger part since it covers up a greater number of visible things farther out, and at a distance it takes up a smaller part since the farther away it is the greater the number of those things that are uncovered. And this is exactly why it happens that a tower appears square from close up[93] and round or smooth from a distance, since the rays which come from the corners and surfaces close by

[92] The chapter on color in the Physics clears up this obscure paragraph. What happens as light passes through a prism, Gassendi feels, is that it is refracted in proportion to the number of atoms of the glass it encounters. Some light rays have more glass to penetrate and are correspondingly more affected by the encounters. Hence different rays emerge from the refraction in different conditions, which the eye translates into color. The surface of every body acts as a prism on light reflected from it.

[93] Reading *prope*, "close up," for *procul*, "at a distance," an obvious misprint.

are numerous and convey the parts distinctly separated from each other by intervals and make it possible for the eye to perceive their differences because of the short distance from them to the eye, but those coming from far away are fewer in number and on the contrary portray the parts which are separate from each other as if they were joined with the intervals suppressed, as it were, and make it impossible because of the great distance[94] to perceive the differences which allow the eye to keep the parts separate. Consequently, the surface of the distant tower appears stretched and even, with indistinguishable corners. But more details about this in their place since it is sufficient for our purposes here that the capacity for error of the senses which is usually given as the reason for this and similar experiences does not prevent the possibility of knowing something true and certain.

I shall pass over the fact that the dispute whether the senses have any capacity for error could seem to be one of words inasmuch as those who say they do not mean that the senses do not make errors because they do not make judgments, or define what a thing is like, but only apprehend the appearance of the thing which is produced in them while those who maintain that they do have the capacity to err understand this matter as if the senses were the occasion of the error in the intellect by their apprehension of the thing. Hence it seems to be the case that properly speaking it is not the senses themselves, but the intellect which makes the error; and when it makes a mistake, it is not the fault of the senses but of the intellect whose responsibility it is as the higher and dominant faculty before it pronounces what a thing is like to inquire which of the different appearances produced in the senses (each one of which is the result of a necessity that produces them as they are) is in conformity with the thing. For this reason, even Epicurus himself, as we related above, ordered that any appearances coming from the senses be held in abeyance, *prosmeirai*, and that judgment be suspended or deferred until all obstacles to a genuine knowledge had been removed and

[94] Reading *longitudinem*, "great distance," for *diversitatem*, again an obvious error.

the truth about the thing had been clearly established. If this advice were duly observed, many things would become certain and indubitable about which it would be possible to offer a true judgment; for instance the tower would be square when you came up close to it, the stick would be really straight when taken out of the water and held entirely in the air, and things like that.

The other matters contained in these modes are on a par with the things that have been said about the first modes. The tenth one, which deals with ethics, contains things which, like the rest, depend on physical causes, stemming principally from the fact that the soul is inclined to follow the constitution of the body, the consequence of which is that since such diverse temperaments exist, diverse things will please them, and the same thing will not appeal to everybody.

The three modes appended to the ten deal with the general form of proving and refuting. But in answer to them when the objection is made, for instance, that no truth, no sign, no criterion of the agent, of the instrment, or of the operation exists because whoever says they do exist does so either with a proof or without one, and that in either case, etc.—it can be declared as a general fact that in the first place we do have a proof, not one such as Aristotle requires or one which insists upon a previous inquiry of a most exact sort into the sign, the criterion, and the like, but certainly one that all well-endowed, wise, and intelligent men will generally accept as reasonable and which cannot be denied except for contradiction's sake. For it seems that we can stand firm in this and have no dread of an infinite regress or diallelus or pay any heed to arguments put forth more cleverly than solidly.

To illustrate, it is asked if there is any truth; the answer is that there is; and in order to forestall any subterfuge, one must then say what kind of truth it is, for instance that there are pores in the skin. The question comes whether this is claimed with or without proof. The answer is with a proof, namely the one given above. But is this proof true or false? The answer is that it is true.

But it must be proven, in fact with a proof which requires another and then another on to infinity. But this whole argument must be denied on the grounds that the truth of the proof by which it is demonstrated that pores exist is obvious enough by itself, that is that it is firmly established upon propositions which are known in their own right and which the intellect cannot reject and therefore the debate must come to a stop at them.[95] But that is a circular argument since the question was whether any truth exists. But it must be denied that any circle exists on the grounds that a certain truth does exist, namely that there are pores, and this is demonstrated fully, not from the fact that there are pores, but from the fact that if there were not, two bodies would have to be in the same place at the same time. Likewise, when it is asked whether any sign exists, the answer is that they do; and perspiration is immediately presented as an example of a sign that pores exist. But when the further question is raised whether that is claimed with or without proof, the reply is that it is claimed on the basis of the proof of experience itself, which requires no proof. And when it is said that someone denying this argument may legitimately assert the opposite, the answer must be that he may if he wants to, but let him just see whether his experience supports or rejects his assertion.

In the same way, when it is asked if a criterion exists, the answer must be that it does; and an example of the criterion must be given, for instance, the intellect is the instrument; and there is no necessity to fall back on an infinite regress or circular argument. And when it is countered that one cannot be sure to whom to give credence, given the very great diversity among intellects, the answer must be to that man who, having weighed all considerations, presents an argument that cannot be legitimately contradicted, such as the one concerning the existence of pores. Next, it is permissible to say that proof does not count and is not necessary when things are so clear that merely stating them convinces us of them, as is the case not only with specific things that are obvious to the senses and established by experience, but also

[95] Basically, this is Descartes's self-evidence, though applied to external reality,

with general statements against which no counterargument can be brought forth, such as the axioms to which mathematical demonstrations can be reduced like "the whole is greater than its parts," or "if equals are taken from equals, the remainders are equal," and others of the same sort. But when it is countered that someone who simply makes a declaration and does not prove it does not deserve to be believed and that the opposite can be asserted hypothetically and claimed to be true by anyone arguing against him and wishing to maintain the other side, it is clear that this can indeed be done in doubtful matters in which neither experience nor some convincing and reasonable argument comes to our support; but it canuot be done without folly in other cases in which if someone persists in assumiug and maintaiuing the opposite, one might think of applying these verses of Lucretius to him:

> I will not plead my case against a man
> Who follows his traces to find himself.[96]

But, to sum up the whole matter in a few words, I take pleasure in makiug use here of this passage which I quote from Seneca to bring to a conclusion this treatise on truth and the criterion in a final summary: "Let me tell you how much harm too much subtlety does and how inimical it is to the truth. Protagoras says that one can debate equally well on either side of any topic, and even on that very topic, whether all things are debatable on both sides. Nausiphanes says that of the things that seem to exist, nothing has more existence than nonexistence. Parmenides says that of the things that seem to exist, the one is everything. Zeuo of Elea removed all difficulties over the difficulty; he says nothing exists. The Pyrrhonians, Megarians, Eretrians, and Academics, who have introduced a new knowledge—that we know nothing —are occupied with almost the same matter. Put all these theories

[96] *De rerum natura*, IV [471–472]. (G.'s note. This would appear to be the meaning of the verse as Gassendi cites it; modern editions emend the Latin text to read approximately "Who places his head where his feet should be." One translator gives "With foreward head he wends his backward way.")

in that useless flock of liberal studies. One man does not offer me any useful knowledge; another takes away all hope of knowledge. It would be better to know useless nonsense than nothing at all. One man does not bear any light before me by which my gaze is directed toward the truth; the other scratches out my eyes. If I believe Protagoras, there is nothing in the universe that is not doubtful. If I believe Nausiphanes, this one thing is certain, that nothing is certain. If Parmenides, nothing exists except the one. If Zeno, not even the one. Then what are we? What are those things that are all around us, that feed us, that sustain us? The whole universe is a shadow, either empty or deceptive. I could not easily say whether I am more angered by those who believe we know nothing or those who do not even leave us this truth, that we know nothing."[97] So Seneca.

Chapter Six. What service is logic to the truth, for the pursuit of which it was devised?

Since the truth which is being investigated and determined is cousidered to be the goal of logic, it remaius for us to examine in a few words what service logic can perform and bestow in this pursuit. Besides, we have already suggested the answer more than once when we said concerning the pursuit of the truth that logic proceeded in oue fashion, physics and the other sciences in auother. Clearly physics and the other sciences each explicitly studies its own subject matter in order to perceive clearly what the truth about it is; but logic takes precedence over individual branches of learning and offers a certain beacon, so to speak, because it provides general precepts and rules common to all branches; and if they use them, they do not go astray from the path of the truth beiug sought; or in case they have gone astray, then they are warned of their error and enter upon the straighter path. For this reason it is clear in the meantime that logic may be held to be more general, and so in some way more lofty, than all the sciences; and it is not surprising that Plato cousiders

[97] Epistle lxxxviii [43–46]. (G.'s note.)

it the crown and pediment of them all,[98] and not only because it is a species of theology, but also becanse it provides the rules for defining, dividing, and so forth. On this subject, Proclus, speaking along lines similar to Plato's opinion concerning mathematics, says "logic embraces their entire sphere; by itself it supplies them with the different capacities of reaching perfection of judging, and of understanding, for example, the process of resolution as well as division, definition, and demonstration; with the aid of these mathematics makes some discoveries through resolution, others through composition, explains some matters through division, others through definition, and deduces others of the things being investigated through demonstrations."[99] He develops these ideas at greater length, and then more specifically concerning Euclid (who he holds was a Platonist) he also states that in his teaching Euclid had used "forms of syllogisms of every type, some of them deriving their credibility from arguments of causation, others proceeding from things known to be certain, but all of them undoubtable, certain, and fit to give us knowledge; in addition to that he took over all the methods of formal logic: division in the discovery of species, definition in reasoning concerning essences, demonstration (or composition) in chains of reasoning which descend from basic principles to the subjects of inquiry, resolution in chains of reasoning which ascend from the objects of inquiry to basic principles, and also various sorts of conversion," etc.[100] I quote these words because they mention[101] a good part of the things that logic gives rules for. I do not mean that there do not exist some excellent mathematicians who become proficient without the study of logic both in Euclidean demonstrations and in other matters treated in this type of knowledge, but that even if they may lack any logic beyond the natural logic that they have given birth to from their own observation,

[98] *Republic*, VI [511E]. (G.'s note. VII, 534E would appear to be a more accurate reference.)
[99] *Commentaries on Book I of Euclid, I, xiv.* (G.'s note.)
[100] *Ibid.*, II, v and II, iv [his Platonism]. (G.'s note.)
[101] Reading *continent* for *conticent.*

it would seem far easier and more sensible to discuss and pursue all subjects on the basis of a prior knowledge of logic, particularly subjects in which errors in reasoning are frequently committed due to faulty knowledge of the rules of logical consequence. Indeed it belongs to a man versed in logic alone to organize the propositions of an argument in such a way that he can grasp where the fault lies concealed and what is the source of the error as well as what follows or does not follow from the suppositions, for he knows such things from his studies.

But since it is the function of logic to give certain general rules which lead to the possession of a true and legitimate knowledge of things, and since on the other hand there are so many different systems of logic, mentioned earlier, it may be inquired which of them appears the most serviceable. In order to be able to make some sort of evaluation (it is very hard to come to a definite conclusion as each individual system is defended by great and celebrated authorities who chose the paths they followed for weighty considerations), we may call to mind the four principal headings of logic that we touched upon in the beginning, under which the rules are given. For since we saw that logic may be defined as the art of clear thinking, we explained thereupon that what we call "clear thinking" seems to include these four things: *forming clear ideas, stating propositions clearly, making clear deductions, organizing thought clearly.* And so, if thinking clearly, and consequently hitting the truth in the bullseye, has so many ramifications, then we will be able to understand in some way or other to what degree the rules given in these different logics are effective or ineffective.

First then, we observe that the logic of Zeno, or Eleatic logic, has nothing to offer which is conducive to forming clear ideas and constructing clear statements.[102] For in fact any logical con-

[102] In Book I Gassendi had given descriptions of each of the logics he is here judging; hence his brevity. Zeno drew up twenty-four types of logical consequence stemming from any position, inaugurated a question-and-answer debate in which the answerer was limited to one-word replies (the questions usually being in the either-or form), and proposed some very famous paradoxes, notably the Achilles paradox, which denies the existence of motion.

sequence, question-and-answer dialogue, or debate, which are the three things included in his logic, presupposes that we have ideas about the things in question and fashion statements from them; but to inform us in what way we may have the first or form the second so that they will be true and legitimate, for they are usually quite the opposite, that would have been a valuable service. Besides, the different sorts of logical consequences may be considered as related to making clear deductions and organizing thought; but actually what can be derived from them is not very fruitful beyond the general precept that "one must see what follows from a fact and what does not follow." On the contrary, how one should proceed to prove that one thing follows or does not follow from another, and therefore how a syllogism should be set up, this is not revealed in the least by Zeno. The very same may be said of the dialogistics, or the logic of disputes, namely that nothing is said about disputation besides what any man might have already thought; and since he makes no solid argument either in the question-and-answer form or in the continuous form of a chain development, it is not worthwhile providing the rules capable of furnishing a refutation by which an opponent may arrive at a just assessment of the question; and Zeno does nothing of the sort. As for the logical dilemmas, although logic need not treat them expressly except in the interests of solving them so that they may not act as an obstacle to obtaining the truth, still Zeno appears to have examined them on their own for their own sake, for he constructed such syllogisms, but did not teach the art of undoing them or replying to them. In fact, the famous debate between his imitator and defender of his art, Protagoras, and Euathlus, his disciple, was so perplexing that having been postponed by the judges until a distant day, it remained unadjudicated.[103]

[103] Gassendi is evidently following Aulus Gellius's version of the famous anecdote (*Attic Nights*, V, x). Euathlus enrolled as Protagoras's pupil on the agreement that he would pay half his fee at once and the remainder when he won his first law case. Protagoras sued for his fee, arguing "If the verdict of the court is in favor of Euathlus, he must pay my fee, because he has won his first case; and if the verdict is against him, he must pay it because of the decision of the court. The verdict must be either in his favor or against him; therefore he must pay the fee." Euathlus contered, "If the verdict is in my favor, I am absolved from payment by the decision of the court; and if the verdict is against me, I am absolved because I have not won my first case. The verdict must be either in my favor or against; therefore I am absolved from payment."

Nor does it seem that we should come to any other assessment of the logic of Euclid, or Megaric logic.[104] In fact, since it is entirely eristic, or concerned with debate, you will hardly find anything in it which is actually logic, for example, something that might direct the mind toward thinking clearly. Clearly all that congeries of sophistic syllogisms does not tend to speed the progress of a mind aspiring to the truth, but instead distracts it and ensnares it in traps. I grant that they do present some matters subtly, but they are proposed as nothing but riddles to be solved; and all such logic is ludicrous, or rather a swindle, and belongs more properly to the mountebanks who find sport in gulling fools with thimblerigging and being the admiration of the people than to grave and serious men who are proving the truth they seek beyond any ambiguity and caviling. But if Euclid, Eubulides, or another member of that family of philosophers had at least furnished the art of disentangling reasons whenever they encountered sophisms rather than of entangling them as they did, then he would have given us some logic. But these philosophers seem to have wanted nothing except to become renowned for their sort of chop-logic and to make its skills their own if indeed there was any skill besides a general cleverness cultivated by that sort of trifling. That Euclid consistently attacked conclusions more than premisses belongs to the same sophistry. Indeed, although it may sometimes happen when the chains of logic are utterly transparent that they are not able to mislead the man answering the questions, still for the most part there is nothing more insidious because of the imperceptible degrees by

[104] Euclid the skeptical philosopher and dialectician, who antedated Euclid the geometer by almost a full century.

which it is possible to move from the truth into falsehood. It is for this reason that a method of arguing cannot be proven in general terms, and in order to prove it a philosopher must furnish rules by which we may recognize what are the assumptions from which the individual conclusions are drawn and what is the interrelation of these assumptions. There appears to have been only one rule in the logic of Euclid, for he obviously taught that arguments must not be based on analogy. Yet, this could still be taken as a warning to keep us from believing that any argument of that sort provides an invincible demonstration or comes to any final conclusions, but not as a rule to refrain totally from such reasoning. On the contrary, despite the fact that anything similar to the object under examination is also different from it, the thing is being examined in relation to the object; and since similar qualities belong to similar things, the thing may be understood to have qualities and an origin analogous to those of the object. And clearly, this is the only way of disclosing hidden things; and if you took it away from philosophy, you would be gouging its eyes out, as is understandable from what was said earlier about the pores in our skin by analogy with the holes in a sieve or strainer. Obviously this problem cannot be better understood or explained in any other way.

Here Plato is clearly superior since among other sorts of induction he approves of the one based on analogy. But if I may add something concerning the totality of his logic, since it included knowledge about both the end and the means to the end, and since knowledge of the end actually came to the same thing as theology, or the contemplation of God, who is the prime Being, the idea of the good, goodness itself, beauty itself, etc., it seems that knowledge of this end exceeds the bounds of logic since by its nature logic is the science or general art, that is handmaiden not only to theology, but also to other studies, and should therefore confine itself within general limits and not venture forth and become attached to the specific material of any study for fear that if it became attached to one, it might not be suitable for others, or if it was, it might not be so much the instrument of

all studies as a single knowledge of all things. Accordingly, it is true that even if it is the knowledge of the means, it should not concern itself with the particular means to theological contemplation as much as with means in general and should be applicable in physics, mathematics, politics, and any other study as well as in theology. But let me pass over that.

What Plato has to say about the ideas and also about division and definition is logic and pertinent to forming clear ideas and stating propositions clearly. I mean what he says about ideas, not insofar as they are really in the mind of God, but such as we form them ourselves starting from the occasion of things perceived by the senses, then keep them in our mind, according to which we define, divide, and express in words the things which are represented by these ideas, breaking them up or keeping them together as the case may be. Also a part of logic and made to order for making clear deductions and organizing thought clearly is what he has to say about induction and also about detailed analysis into division and subdivision even though these matters are brought to the light more from Plato's uses and practices and from many available examples in his work rather than from any special doctrine which he had handed down. Hence as we warned about the logic that Alcinous elaborated, the same thing may be said of Plato, that various sophisms are indeed to be found in him, but not the general technique by which they are to be confounded as well.

Aristotle was the one who, succeeding Plato and others, took upon himself that worthy task of selecting which arguments were logical and then of consolidating them in a single theory with certain prescribed rules and formulae. For in the first place, he wrote the book on *Categories* concerning the formation of clear ideas. For either he wrote this book intending it to be joined with a logic, or he had some other work in mind; at least as he separates things into classes he banishes confusion from their midst, which Plato felt was accomplished by division, and also suggests the idea we should have of each thing and what its qualities are, which Plato felt was revealed by definition. The

book *On Interpretation* obviously concerns stating propositions clearly since it is entirely about propositions. Furthermore, the books of the *Analytics* concern making clear deductions so exclusively that they do not contain a single thing explicitly related to organizing thought clearly, or to method; but nonetheless, Ramus derived his famous *de omni, per se, universale primo* from them.[105] And yet, whatever the case may be as far as method is concerned, it surely cannot be denied that one method we owe to Aristotle, that one which he insists upon our gratitude for, the art of the syllogism, which he discovered and passed on. There is no question that no one before him either noticed or taught that the necessity of the conclusion depends on the fact that in the premisses the extreme terms are joined by a middle term when the conclusion is affirmative, or that when it is negative, one of the terms is joined with the middle and the other distinct from it. And the theory may occasionally seem to have been recorded in too complicated and obscure a fashion, either because it is mixed in with useless matters or because the repetition of useful material makes it tedious and annoying reading; but this may be excused on the grounds of the passion with which he went to great pains to invent this art, to perfect it at the same time, and leave no part of it untouched upon. Concerning the books of the *Topics*, they are a sort of overflow of Aristotle's fecundity and relate to practical matters, being suited[106] chiefly for the persuasion of the mob. And they appear to have not a little bearing on making clear formulations of ideas because of the axioms and statements in the form of maxims which they contain, and also on making clear deductions because they make clear what consequences follow from these maxims taken as premisses previously agreed upon. This appears less admirable

[105] These are the three conditons that a statement must meet in order to be true of necessity: *de omni*, what is affirmed of the genus must be true of every one of its species; *per se*, the statement must be equally true of the species as of the genus, of the subject as of the attribute; and *universale primo*, the subject and the predicate must be interchangeable, e.g., "All men are rational animals" and "All rational animals are men."

[106] Reading *accommodati* for *accommodatis*.

because the rules in these maxims are presented in order to quibble over them, unless you allege in excuse that anyone who realizes that he is only quibbling will be able to recognize the quibbles of others. Nor can I say anything else about the books of the *Elenchi*, for they also contain precepts which the sophist uses in order to deceive. Since he explains elsewhere how sophistries are put together and in what way they are refuted, this is to be construed not as a fault, but as worthy of praise.

The logic of the Stoics includes many matters that should be foreign to it, particularly those that belong to grammar and rhetoric and which if they cannot be neglected by logic, should still be assumed by it and left to their own experts, otherwise every subject would be treated by everyone. I shall be silent about what they teach concerning these things, which are mentioned not only by Plutarch when he says of Chrysippus, "this man, speaking about discussions of word usage says not only that it is to be disregarded, but also that some unclear usages and faulty expressions are acceptable, even certain solecisms that others find reprehensible,"[107] but even by Seneca who was one of their sect, as when he says, "I am broken up with laughter whenever I pretend to myself that solecisms and barbarisms, and syllogisms are living beings, and like a painter I give appropriate images for them. We dispute over these things with furrowed brows and wrinkled foreheads. I cannot help repeating at this point that remark of Caecilius: 'Oh wretched inanities. They are laughable!'"[108]

The things they did say that were pertinent to logic were first the many comments they made about the imagination (*phantasia*), for by this word they understood nothing more than an idea of the mind's, or an image; and in order to form clear ideas they required that it be *katalêptikê*, "apprehensive." There were the many comments they wrote about "axioms" that concern expressing ideas clearly. Concerning making clear deductions

[107] *Common Conceptions Against the Stoics.* (G.'s note is mistaken, for the passage appears in *Contradictions of the Stoics*, 1047B.)

[108] Epistle cxiii [26]. (G.'s note. Modern versions differ in the last words.)

there were the far more numerous comments about reasoning, or hypothetical syllogisms. Cicero, however, objected against them that when they used this logic of theirs, all they did was "to lay bare bones, to pluck out thorns, to come to contorted conclusions, to speak roughly, to use niggling arguments,"[109] and the like. And Plutarch, already quoted, objected that "they were like polypi devouring their suction pads during the winter,"[110] as if their logic feasted upon its own discoveries and there was no use for its rules outside of itself and that therefore it was necessary to consume within its confines whatever was produced within them. And yet, it seems that this can be said primarily with reference to the remaining portion of their logic, which deals with sophisms, concerning which Lucian concluded as follows; "they do nothing but dream up horns against each other and make crocodiles; and they have nothing to contribute but miserable quibbles and catchy little questions with which they nourish their minds."[111] Also when Themistius ticked off their "no mans, veiled men, rulers, horns, which are annoying and troublesome sophisms difficult to understand and as useless to know as the leather strap with which Midas' chariot was tied down,"[112] he considered them unworthy to be called

[109] *Academica*, II; *Tusculan Disputations*, II [xii, 29] and III [x, 22]. (G.'s note.)
[110] *Common Conceptions Against the Stoics* [1059E]. (G.'s note.)
[111] G.'s note, "in Diog, & poll. in Sympos. &c.," makes identification of his source difficult. I have not found the sentence in Diogenes Laertius, nor in Lucian's *Banquet of the Lapiths*.

The sophism of the horns runs as follows: "Whatever you have not lost you must have." "Yes." "And you have not lost any horns?" "No." "Then you have horns."

The logical crocodile poses a conundrum: "Is that your child?" "Why do you ask?" "What if a crocodile seized him when he went down to the river and then promised to return him on condition that you told him what decision he had reached about returning the boy. What will you say he has decided?" (In another version, the mother answers "You will not return my child" when told that he will return the child if she tells him rightly what he will do.)
[112] *Oration*, XIV. (G.'s note seems to be in error.) Here are the sophisms. (1) "Do you know your father?" "Of course." "Then what if I brought you a man under a veil and asked 'Do you know this man?' What would you say?"

philosophers. Without mentioning Seneca, who reproaches them bitterly on several occasions for these things, I shall only relate that Quintilian puts a slightly more indulgent interpretation on the matter when he does not discourage the future orator from being introduced to intricate ambiguities "not," he says, "because the sophistries concerning horns or crocodiles can make a man wise, but because he must not be taken in even by the most insignificant things."[113]

No such reproach was made against the logic of Epicurus for since he aimed only for the truth, he had nothing to do with formulating fallacies, but merely required that whoever spoke should use straightforward language, and that if he did not, his hearer should compel him to speak clearly.[114] So he was not truly defenseless against sophistries, as it has been objected against him, for there can be no more general, more admirable, or safer method for disarming sophistries. Moreover, what he says in his logic concerning the imagination, or the appearances created by the senses, and concerning anticipation inasfar as it is nothing but the image of a thing, or its idea dwelling in the mind, these things are applicable to forming clear ideas. Likewise, he is concerned with expressing ideas clearly, when he consistently teaches that he does not wish an opinion to be declared immediately from just any fantasy, but to be explored and examined until it is established on the strongest evidence; for one should not judge concerning the roundness or squareness of a tower until one has gone up close or of the straightness or

"Obviously I would say I did not know him." "But he is your father; and so if you did not know him, then it would be no secret you did not know your father." (2) "What I am you are not. But I am a man. Therefore you are not a man." An obvious steal from the *Odyssey*. (3) "The son of Themistocles (or any other ruler) rules Greece and does not rule Greece. For he does not rule over it since he does not give orders or even think of giving orders. But he rules in that he gives orders to his mother who gives orders to Themistocles, who gives orders to the Greeks."
[113] Epistles xlv, xlviii, xlix, etc. and *Institutio oratoria*, I, x [5]. (G.'s note.)
[114] Cicero, *De finibus*, I. (G.'s note. I have not located the passage in question.)

curvature of a rod before it has been withdrawn from water. Finally he has something to say about making clear deductions to the extent that he draws by inference the particular conclusions that depend automatically on our anticipations (in the general meaning of the term). Nevertheless, certain rules according to which a line of reasoning can be set up properly and errors in logic can be forestalled are missing; in fact, a fallacy can creep even into a proof which proceeds to an unknown thing from a perceptible sign unless the intellect has been instructed in the rules of logical consequence. So there are no grounds for amazement if Epicurus and Lucretius slipped up, among other things, when they concluded that the antipodes did not exist.

The rules for organizing thought clearly are also lacking; and if indeed he has nothing to say on this topic, Epicurus was also censured by Athenaeus because he did not keep to any order in his *Symposium*.[115] Elsewhere he appears to have accepted a third criterion, passion, or emotion, as appropriate in ethics, though foreign to logic in some ways. For although the senses and reason are in general the criteria about which logic is supposed to furnish rules, they become appropriate to individual arts and sciences as they are narrowed down by certain individual limitations. Hence, for example, music has the senses (namely hearing) as its criterion to a certain degree, not in just any way at all, but inasmuch as it is affected by harmony and discord; in the same way ethics has the senses as its criterion, not in just any way at all, but inasmuch as they can be affected by pleasure and pain. And pleasure and pain are as much the province of logic as are harmony and discord.

Concerning Lull's logic, or his Great and Little Art,[116] it does

[115] The *Deipnosophists*, V [187c]. (G.'s note.)

[116] Ramon Lull (or Lully), c. 1232–1316, a Franciscan philosopher, born in Majorca, composed a great treatise on Logic, the *Ars magna* (c. 1274), which was intended to convert unbelievers to true Christianity and to form a basis for ecumenical agreement among theologians of all faiths. Its mystical diagrams and highly specialized vocabulary, quite foreign to traditional logic, are the basis of its appeal to its initiates as well as of the general disfavor it has met with among more sober philosophers, such as Bacon or Gassendi.

indeed contain a certain amount of logic insofar as it teaches to form ideas of things according to a certain organization, to construct statements from subjects and predicates, to draw conclusions according to the figure of the mean between the extremes, that is the subject and predicate, and things of this sort; nevertheless, even if all this is taken over from common logic, it is made so confusing by the complexity of figures, compartments, tables, chambers, letters, positions, transpositions, and the like that it is not easy to tell what profit is to be reaped from it. For the system is quite suited to make a man able to talk all day long on any subject at all, even one he does not understand; indeed the variations are inexhaustible by which the subject is put eighteen different ways, and the system is prompt to adapt questions to its own format; but this is really not something that wise men, who love something more than mere words, desire. For what they want to know about each thing is its particular and peculiar characteristics. But this art produces a sort of Theramen's sandal which could fit every foot. And if it were thought of as a kind of organ fit for encompassing the sciences which treat various subjects individually, then it would not be disapproved of quite as much; but it is claimed to be the most absolute knowledge of all things, so much so that if anyone dedicated himself to it seriously for a year, there would be no subject about which he could not speak at length. It is claimed, I say, since in reality this art contains nothing but pointless intricate arrangements of letters and a very few terms collected from theology and other branches of knowledge so that they may have something to train themselves in and may do so *ad infinitum*. I shall not fail to mention that I happened upon some one of them who was expert in a hundredth part of what is conveyed in their system, who still knew more than well enough how to inundate me with words when asked some question, who, as he trumpeted forth so many words, appeared to be offering me something worthy of a sound and mature judgment. But this does not prevent the fact that there may be some on the other hand who will speak wisely and maturely on these matters since they are

experienced in various fields and expert in this system; but they will do the same even when they do not restrict themselves to the formulas of the system just as men who were wise and serious in other ways but ignorant of this system would do the same.

In regard to Ramus's *Logic*, it can truly be said that it contains nothing that does not relate to logic. For in the first book he distributes the ideas we form and from which statements are built into certain classes, not like Aristotle's categories, but according to the subjects of argument. Consequently, he transferred the topics there in place of the categories, although the way they are presented and illustrated with examples would seem to follow from rather than precede the treatment of the syllogism. Then in the second book what he relates about axioms pertains to expressing ideas clearly, as what he then says about the syllogism applies to making clear deductions, although, inasmuch as he had divided axioms into necessary and contingent, it would have seemed worthwhile mentioning something as well concerning the necessary and the contingent, or probable, syllogism. It also would have seemed worthwhile to give at least some warning about fallacious reasoning for fear that we might be unprepared to refute it when we came upon it. Just as we would not want to coin false money ourselves but still when it is offered to us, we are glad to be able to recognize how it differs from real money; so although we would not want to make up sophisms ourselves, still it is not nseless to know how to refute them when they are forced upon us. Anyway, whatever the case, what he reports at the end concerning method, or the way to organize ideas clearly, is splendid.

The entire logic of Lord Verulam [Sir Francis Bacon] is directed toward physics in itself, and therefore toward the truth, or genuine knowledge of things. Moreover, it consists principally in forming clear ideas since he desires foremost that all preconceived notions be wiped out, and then that new notions, or ideas inferred from new experimeuts properly conducted, be formed. Likewise, it consists in expressing ideas clearly, since he desires

that we construct axioms from individual cases duly examined through experimentation, not by flying off the handle directly up to the highest, or most general, axioms, but by proceeding gradually in an orderly manner through intermediate steps. It consists also in making clear deductions, but only universal statements from individual cases since that is done by a legitimate induction, and not individual truths from universals, siuce that is done by means of the syllogism, which he does not approve of. However, since the sinew and muscle of all reasoning actually lies in the syllogism, and not even induction proves anything except by the force of a syllogism because of the general proposition clearly implied [in inductive reasoning] according to which it is claimed that everything which can be enumerated individually has been enumerated, or that not one thing can be found which does not agree with the statement, the syllogism seems to be condemned quite without reason inasmuch as he can be convicted of using it whenever he reasons at all, even though he condemns it. Accordingly, he does not seem to have rejected the syllogism totally but merely the syllogism which is founded on statements that have not been sufficiently examined and adequately confirmed; therefore, before he explains the form or uses of the syllogism, he may be expected to have estimated to what extent general propositions subject to no exceptions may exist. Meanwhile, however, just this treatise on the syllogism is lacking, and so is any general treatment of method, although he perhaps intended to furnish some such treatment when he spoke about the partition of the sciences. I shall not try to justify all those words that may be considered a trifle too affected since the founder of a new system seems to have the right to use new words or words in a new way.

Lastly, Cartesian logic is founded upon a direct imitation of Lord Verulam's since in order to form ideas clearly, it stresses the elimination of malformed preconceived notions and the adoption of true ideas (for that he thinks all of them are to be eliminated, and how they are to be, that is another matter); but since immediately afterward in order to gain a true and real knowledge of

things he concludes that the intellect should find help as it proceeds in its judgment not so much from examining things themselves both in themselves and by themselves as from its thoughts alone examined by itself in solitude, it is obvious that his method is less fitting than Bacon's. If there is occasionally something that concerns logic in the whole series of things that follow, it is primarily the principle that the author proposes as follows: "Everything that I perceive clearly and distinctly is true." In fact he proves this laboriously on the grounds that God exists and that he is not a deceiver, that he has imprinted the idea of himself in us, that since he is the cause of all things, he is also the cause of a clear and distinct perception, etc. And it would perhaps be satisfactory if it were proposed in this manner: a wise man must accept nothing as true and unshakable, except on the basis that he perceives it clearly and distinctly. But it is well known that experience teaches us, as he himself confesses in his own case, that it happens from time to time that we learn subsequently something is false which it seemed to us we perceived clearly and distinctly. But even when we have taken every precaution human skill and diligence allow us to take, we still learn with the passage of time that we had been deluded; we may then assign the cause of this merely to human weakness, considering which we cannot be too cautious to prevent something false from insinuating itself upon us sometime.

And so it has been possible to establish up to this point what is lacking and what is superfluous in each of the logics mentioned. Although it would be reasonable on the basis of this to select from each of them whatever is especially useful and at the same time if anything is missing to supply it, or if anything is extra, to exclude it, that is actually a much more arduous task than it would seem to someone inexperienced in these matters. Indeed, if only a few things have been said up till the present, still there were some among them which can be counted as alien to logic or pointless; and if a great many were said, still there were many which logic seemed to have need of and to have overlooked. This is why logic is sometimes expanded and sometimes shortened

and why it always results, as Clitomachus had already remarked long ago according to Stobaeus, that logic is like the moon which never ceases to wax and wane.[117] Be that as it may, since we have agreed to present some sort of manual of logic, not a perfect one of course, it will be given next. Since it does much to recommend the study of logic, I shall give only this forewarning, as Aulus Gellius phrases it, "The study and knowledge of this discipline in its rudiments ordinarily seems to be horrid, disagreeable, uncivil, and despicable; but once you have made some progress, then at last its advantages will become clear in your mind and a certain insatiable desire to learn will follow. Truly, if you do not put some bounds on this desire, there will be no mean danger that you too, like many others, will grow old in the twisting paths and courses of dialectics as if you were caught on the Sirens' rocks."[118] I forewarn you, I say, that this bound which he implied must be put on logic lies in the fact that after a man has grasped the rules for thinking clearly, he should proceed to the branches of knowledge in which he can put these rules to use about real things and that he should not spend himself entirely within logic like the polyp devouring its suction sups (as I mentioned before), that is, living out his life in the manner of the ancients contriving the twisting paths and courses of sophisms, and quarreling disgracefully over the ones handed down by logic, sticking to it as if it were the goal toward which he was hastening and not the path to it. And instead of assuming the subjects that we have developed at some length earlier in this work, there would be nothing wrong if we carved out from them, in order to give some coherence to this manual, a few statements from which we may construct an adequate beginning for it. And so here it is.

[117] Sermo 97. (G.'s note. Other editions number this 82, 14.)
[118] *Attic Nights*, XVI, viii [16–17]. (G.'s note.)

The Logic

MANUAL OF LOGIC IN FOUR PARTS

Part Four. On Method

The subject of method remains. Since it is nothing more than an orderly progression of thoughts made with a certain plan, it may legitimately seem to include the other parts of logic to the extent that they teach how to proceed in an orderly fashion from the elements of thought through statements to the conclusion of a syllogism. And in fact there are those who feel that properly speaking the syllogism is the method; they contend that the progression we make use of to expound branches of learning to beginners should be called "order" rather than "method." There are others who call the part of logic that deals with definition and division the method of defining and dividing; there are those who maintain that every method is either of resolution or of composition.

In our opinion, as our intention is to relate here the things that belong under this topic, it appears that thoughts may be arranged in a certain order, and may proceed and be directed either for the purpose of penetrating investigation and discovery or for the purpose of shrewd examination and assessment of what has been discovered, or for the purpose of assimilating properly whatever has been discovered and assessed so that it may be taught to someone else. For this reason it seems that method can be divided into three parts, so that we may distinguish first the method of discovery, second the method of judgment, third the

method of instruction. The following canons can then be established concerning them.

Canon I. The method when discovering a truth consists in penetration in finding a middle term

Once the question has been propounded, it is especially desirable to find some middle term, or argument, by which one or the other side of the question (either the affirmative or the negative) may be proven true or false.[1] Therefore, as a dog takes after the tracks of a wild animal he cannot see and follows them eagerly sniffing his way until he unearths the beast, so if no middle term is evident on first perusal, we must take after something, concerning either the subject or the predicate, which will serve as a track which, if followed, may lead to some place where a middle term is unearthed which we recognize may be predicated of one term and may also be predicated or denied concerning the remaining term.

It is obvious that there are certain categories, or types of middle terms, or arguments, which have already been mentioned more than once;[2] and since it is always difficult either to select the most appropriate categories or to perceive the precise middle term contained in them, some rule ought to be supplied that guides us to the correct category and from there to the required middle term.

This must be something we already know (*primo notum*) and may be called a sign since it leads us to the knowledge of something hidden in the way that tracks are a sort of sign indicating to a dog which way he should pursue the chase in order to catch the

[1] A "problem," or question, was usually stated in such a way that it might be answered with a simple affirmative or negative, for example, "whether Socrates was mortal or not."

[2] In Part III of the *Logic*, Canon XIX, Gassendi had mentioned arguments based on cause, on effect, on separation, on opposition, on enumeration, and others. (Mathematics is not mentioned as a possible middle term.)

quarry. The ancients usually called the sign the middle term itself, and named it a *têkmerion* when it was an infallible indicator, and a *sêmeion* when it was contingent. Hence the first of these was also considered to be a middle term, although it was not an immediate argument like the one we are seeking, which is a middle term in the true sense of the word.

Canon II. The search for a middle term may be conducted either by analysis, or resolution, starting from the subject, or else by synthesis, or composition, starting from the predicate[3]

For example, to take a familiar illustration, snppose you are having difficulty solving the problem, or proving the affirmative side of the question "man is a substance," you may begin your inquiry either from the subject "man" or from the predicate "substance," whichever you know better.

[3] "Resolution" and "composition" are translations of the Greek terms "analysis" and "synthesis" as used by the Greek geometers and adopted by Galen in medicine. Relying on Aristotle's *Posterior Analytics*, Grosseteste had constructed a scientific method out of resolution, composition, and verification. As he sees it, we know natural effects because they are close to us in nature, but we can know them only partially because every individual effect is a confused mixture of components. We do not know natural causes, for they are too general and universal to be readily observed; but we can have knowledge of them, once we discover them, because they are simple and rational. Resolution seeks to single out the salient components of a particular phenomenon in order to reach the cause by analyzing the effect. It moves from the complex to the simple by weeding out extraneous factors. Composition works in the opposite fashion, starting from the simple and gradually adding elements until it reaches the particular object. Scientific writers constantly stressed the need of using both methods in the search for truth. The Paduan rationalists used these terms, as did most of the major thinkers of the seventeenth century—Harvey, Galileo, even Newton. See A. C. Crombie, *Robert Grosseteste and the Origins of Experimental Science, 1100–1700* (Oxford Univ. Press, 1953), pp. 27–29, 52–90, 297–318.

And, if you start with "man," you proceed by resolving him into characteristics he shares with others and his proprium, in other words into his genus, according to which he is an animal, and his property, or differentia, according to which he is rational. Next, from the concept of animal as it is further analyzed, by resolving it in the same fashion into its genus according to which it is living, and its proprium, according to which it is sentient; and further by resolving living into the genus "body" and the proprium "animate," and finally, since a body by reason of its proprium is anything endowed with mass, and since we understand that anything of such a nature is a substance, or a thing subsisting through itself, the outcome is that by the same token we understand that the genus into which a body can be immediately analyzed is substance itself.

If, however, you start from "substance," you proceed in reverse order by comparing substance with the two properties, or differentiae, into which it is divided, and by selecting not the one without mass, since man is not of such a nature, but the one with mass called body. Then in the same way, this term body when qualified by the proprium animate (as man is) constitutes a living being, and a living being when qualified by the proprium sentient (again as man is) constitutes an animal, and lastly this term animal when qualified by the proprium rational, immediately constitutes man.

And so either body as reached by resolution or animal as reached by composition may be used as the middle term since starting from the already known immediate connection of animal with man we proceeded up to body, which is immediately connected to substance, or starting from the already known immediate connection of body with substance we proceeded to animal, which is immediately connected with man. And so in either method we are certain of the connection between the extremes because of the connection they have with the intermediary terms.

This is the same process we would use putting together a genealogy if we set out to prove that a certain man was born from

a certain stock. For either by starting with the man whose origin we are investigating, we arrive at last at the head of the family tree through the steps of father, grandfather, great-grandfather, great-great-grandfather, and so forth; or by starting from the source and going through the steps of son, grandson, great-grandson, great-great-grandson, and so forth, we come to the man being investigated.

From this it must also be understood that when the negative side of the problem is being proved, the same procedure, either by resolution or by composition, applies. As in the case of the family tree, as soon as someone occurs in the intermediate generations who is not related to the next generation, it is proved that the man is not a member of the family, so from the moment that a step occurs which has no connection with the predicate, it is proved that the subject itself has no connection with the predicate.

Likewise it must be understood also that resolution and composition are especially significant for geometricians. For when they are studying a matter not knowing whether it is true or an operation not knowing if it can be performed, they assume it has beeu conceded to be true, and they proceed from it by logical deductions until finally they arrive at some proposition which is such that if it is accepted as true and as a sort of first principle, then they may couclude that the matter studied or proposed from the beginniug is also true. And in the case of au operation they couclude that it can be performed if they come across something which is admitted as possible to do. If, however, they arrive at something which is false and self-contradictory, then they conclude that the matter being studied or proposed is also false or that the operation cannot be performed if they come across something which is shown to be impossible to do. This then is their form of analysis, or resolution.

Their synthesis, or compositiou, involves startiug from the point where their resolution euded and taking up again iu order the same inferences that in the first procedure were antecedents in order to construct a demonstratiou by which the matter being

studied or proposed is proven true or false, or the suggested operation is shown either possible or impossible to perform.

Canon III. The method of judging, or examining a proof is either by composition, when the discovery was made by resolution, or by resolution, when the discovery was made by composition

This is wholly undeniable, just as in arithmetic we check addition by subtracting and subtraction by adding. Similarly, our procedure is accepted as legitimate if as we go back over our tracks, we reach point A from point B and vice versa point B from point A since, as they say, it must be just like the road from Athens to Thebes, which is also from Thebes to Athens. Hence this double method is like Ariadne's thread, which began as a follower and became a reliable leader on the return trip.

I need not mention that this method applies to any work which is constructed or compounded from several parts. For a machine, e.g., a clock, is proven to be in working condition or not when its parts taken separately (*resolutae*) are known to be in working order, or taken together (*compositae*) are known to fit nicely and perform their function. Likewise either we fiud out what kind of alloy metals will produce by mixing them together; or resolving the alloy into its components, we determine what metals it was concocted of and how much of each. The same sort of consideration applies to other cases.

Canon IV. The process of judging is accomplished by two criteria, or instruments of judgment, namely the senses and reason

Now, siuce all things either come under the senses or are perceived by the intelligence alone (although occasioned by some

stimulation of the senses, as I said in the beginning[4]), whenever there is some doubt about something whose existence or nature can be proven by the senses, we must refer to the senses about it and decide in accordance with the evidence which comes from them. Evidence, I say, which exists whenever there is no hindrance, or when there is one, after it has been removed. To illustrate, I call distance a hindrance, because it makes a large object appear small, a square one round, et cetera, as we also mentioned when we discussed ideas.

Whenever there is some doubt about something which can be perceived by the intelligence alone, then we must refer to reason, which deduces the existence of something not perceived by the senses from some other thing which is perceived by the senses, as when it is asked "whether or not pores exist in the skin." Despite the fact they are not perceived by the senses, reason proves that they exist on the grounds that if they did not, no passage would lie open for the sweat that passes from the inside outward and is perceived by the senses. Or when the inquiry concerns "whether the vacuum exists" (which is imperceptible to the senses), Epicurus concludes that it does on the grounds that if none did, there would be no motion, which however exists according to the evidence of the senses.

But when it sometimes happens that reason seems to be in conflict with the senses, Aristotle teaches most strikingly that we must decide more on the basis of the senses than on the basis of reason;[5] this because such reasoning cannot really penetrate the matter, but remains only apparent while the real reason why the matter appears as it does to the senses lies hidden. For example, although reason at first convinces us that an arrow shot up into the air from the stern of a ship in motion will not land on the

[4] In Part I of his *Institution of Logic*, Canon II, Gassendi writes: "Therefore, if a man is born blind, he has no idea of color because the sense of vision is missing. . . . Consequently if it were possible for a man lacking all senses to live (but this is impossible, at least without the senses of touch, the only one developed in animals still in the uterus), he would not have any idea of anything."

[5] Conceivably a reference to *On the Generation of Animals*, III, x, 760b *in fine*.

same stern but fall into the sea since the ship will have moved on during the fall, still reason must surrender to the senses when experience teaches that things turn out otherwise and brings to light the true reason, namely that the motion is imparted to the arrow not only by the bow, but also by the ship itself.

Likewise how many men over the ages have held that inhabitants of the antipodes did not exist, adducing as their reason that they would fall downwards into the sky; but as they have since been perceived by the senses, such reasoning clearly vanishes before the evidence of the senses. And since reason has recognized that on parts of the terrestrial sphere as well as on other worlds, falling is to tend in the direction of the center and not to recede from the center, there is nothing remarkable in the fact that the inhabitants of the antipodes walk erect no less than we do, who in their eyes are the inhabitants of the antipodes, nor in the fact that they do not fall any more than we do into the heavens that are supposed to lie over them as they lie over us.

Canon V. The method of instruction begins with resolution and proceeds to composition

Now, since all instruction concerns either practical or theoretical matters, it is commonly divided into practical, or active, and theoretical, or speculative, education. Instruction first applies to the crafts, which are knowledge about things that can be done or made. A goal is set up in the crafts which must be constructed like a device, or reached, like a target; and the instruction explains what larger or smaller parts go into its makeup or by what methods, sometimes general, sometimes specific, it is attained—all of which is accomplished by resolution. And then it is taught how by building with the smaller parts or by beginning with the specific methods one proceeds through the larger parts or the general methods and finally the finished product or the target aimed for results—which is done by composition. And the saying that what comes last in resolution comes first in composition is not inappropriate here.

Thus, for example, someone teaching the craft of building houses first explains what the parts of a house are, the walls, the foundation, the roof, the flooring, the ceiling, the bedrooms, the stairs, doors, windows, and other parts, also the various materials, what they are made of, where they come from, how they are arranged, which ones are used in individual parts, such as stones, cement, wooden beams, lumber, nails, tiles, and others which are the smallest or simplest parts of the house; then, when this resolution into parts has been made, he explains how they are put together by using stones and cement for laying the foundation and erecting the walls, and the beams and lumber for the flooring, and so on for the others until the entire house has been raised. Nor does a grammarian giving instruction on proper speech work in any other way; he first divides speech into its parts, nouns, verbs, and the others (I shall forebear to mention the smaller elements such as syllables and letters). Then having shown the qualities and properties of these individually, he teaches how to combine them into correct sentences and periods.

Likewise in medicine, or the art of preserving health, the first thing taught is what health is, in what different ways and from what causes it is undermined; and then after a variety of remedies have been described, it is explained which ones to begin with and which ones to proceed to so that health may be restored and benefited by the expulsion of the disease. Moreover, in teaching ethics, that is the art of living and behavior, it is first made clear what constitutes the good life and the proper means of achieving and maintaining it are explained to be honorable morals, or virtue, and acts inspired by virtue; then it is explained how to acquire virtue, how to motivate honorable acts, and how the good life is achieved by these.

Secondly, this clearly holds for the sciences which are the knowledge of speculative or contemplative subjects. For although it is not we ourselves who created such things by our industry, nonetheless since we consider nature or nature's creator as their cause, we philosophize about them just the way we do about things of which we are the authors (it is even true that among

those who regard the world as uncreated there is no lack of those who assume that it is made in order that they might philosophize more elegantly about its structure, or conformation). Hence in these sciences we do not proceed in any different manner.

Consequently, a physicist teaching natural science sets before our eyes the outward configuration of nature, or the machine of the world, the heavens, the earth, the things that are found in them, just as if they were the greater and lesser parts of an enormous building, and by resolving them into their smallest elements, he assumes these as his primary particles (*principia*) from which the universe is constructed; and then one after another he investigates what materials and what configuration and proportions of materials could have produced the heavens and the sun, moon, and other stars in them, from what matter in and what way the earth is produced and so many inanimate, animate, and sentient beings, which are observed to propagate and to be generated, until he has accounted for the entire body of the universe and made its workings clear in the same way as a man who investigated a building and made its workings clear although he had not built it himself.

Truly, wherever nature permits, we use anatomy, chemistry, and such aids so that by breaking bodies down as far as possible, dismembering them as it were, we may understand what they were compounded from and how, and whether other things can or could have been compounded in the same manner in the same or different ways.

The geometer also breaks down volume considered as a whole into components and concludes that it is length, breadth, and depth, and then begins building up from the point, than which nothing smaller can be conceived, as he imagines a point spreading, so to speak, in such a way that by its repetition it forms a line having no dimension other than length, and the line spreading to make a surface, or the dimension of width, and the surface spreading to produce a body, or a dimension with depth and thickness. One by one he teaches how different figures come into being, or are drawn and constructed, or assuming that they have already

been made, or drawn and constructed, he considers what are the consequences of such arrangements.

Canon VI. The method of instruction should present its subject matter with the greatest possible clarity

Since instruction and learning are the same thing, called instruction when it is being given by a teacher, and learning when it is being received by a student, it is obvious that the teacher should give his instruction so that the learner will know it as fully as possible. Furthermore, this happens most when the teacher presents the subject matter in a way that leaves nothing to be desired in its clarity.

Canon VII. Therefore, his first concern should be that his words are not ambiguous and his sentences are not obscure

Since obscurity arises either from words or from things themselves, surely nothing can be more perverse than to add the effort created by words to the effort that exists in most cases in understanding the things. Obviously a man does not fulfill his promises when he undertakes to teach something if he raises obstacles for his pupil so that he understands him less distinctly and the teacher, interpreting an obscure subject, requires interpretation himself.

Canon VIII. If what is taught is a craft, it should consist of rules; if it is a science, it should consist of speculations[6]

Now every craft is active and aims at the effortless performance of an action, for example the art of singing, or music, and the

[6] In Latin this word does not have connotations of unreliability as it does in English. The text makes clear Gassendi's meaning that in the crafts man may act while in the sciences he may only ponder.

art of life and conduct, or ethics, or at the production of a work fitted to its purpose, for example the builder's craft produces a house which is to be inhabited, the locksmith's craft a key that will open doors. But every science is contemplative, for example physics, which contemplates the world and the things in it, contemplative not because these works are not the product of divine skill, or Nature, but because they cannot in the least be the works of the man contemplating and it is permissible only to speculate in what way they are made or were made by God or by Nature.[7] Therefore, anyone who is teaching a craft should give rules on making and finishing a work; anyone who is teaching a science should guide the mind by speculation to the knowledge of things.

Canon IX. He should first propound and explain by definition what it is he is treating

This is necessary so that it may be established whether it is a question solely of acting or of speculation and so that everything that is treated may be directed either toward correct action or toward correct speculation. And certainly it would be the sheerest obscurity if someone who claimed to teach something gushed empty words without making clear what he was teaching. Hence if a thing has an equivocal name, it is essential that he make verbal distinctions and make it clear in what sense the word is understood; and unless the matter is well known and evident,

[7] Gassendi is not suggesting that God and Nature are the same things (as the selection on second causes will make clear). He means that things may be explained either in terms of God's works or in terms of Nature's processes. There are two words for "or" in Latin, *aut*, which is exclusive—either living *or* dead—and *sive*, which tends to designate synonyms—living, or sentient. In this sentence Gassendi uses *aut*, thereby signifying that God and Nature are different (Spinoza writes *Deus sive natura*): earlier in the paragraph he writes "divine skill, or (*sive*) Nature."

he must define it or describe its context so that once these are understood it cannot be taken for anything other than what it actually is.

Canon X. Then the subject being treated should be divided into the appropriate classifications

Indeed, classification, or distribution, is like a beacon lighting the way for the learner to keep him from wandering off the path in uncertainty and to let him know where he is during the whole course of the teaching, or instruction, how much of the way he has completed, what remains before him, in what direction he will come out. The classification will be appropriate if all the members together produce a single harmonious whole.

Canon XI. But in the division and treatment of the members, the more general classes must be given generally and handled first

This is so that once a thing has been said it may be assumed to have been said and so that the necessity of repeating it may not arise, for there is nothing more useless or annoying than a tautology which says the same thing too often. In the meanwhile, I suggest that at the beginning the division be made into the principal headings, so in the more thorough treatment of individual subjects the way towards subdivisions into less significant headings will have been prepared.

Canon XII. As nothing extraneous should be included in the classification, nothing essential to it should be omitted

For whatever is foreign is assumed to be outside the category, and would seem like a blemish on a face; and anything essential

to the thing not included in the division leaves a gap like a disfigured body. At the same time, I do not call a subject extraneous if consideration is given to something from another field without which it is impossible to understand the subject being treated, or if occasionally something is hinted at in passing as a sort of corollary to be deduced from the subject.

Canon XIII. One should always begin with well-known matters and ones quite essential for the understanding of what will follow and then proceed

For in this way the route is made more level for the student and consideration is given both to its usefulness for him and his pleasnre while his time and effort are spared at the same time.

Canon XIV. Hence the distribution and treatment of every subject should be suited to the student and in agreement with the state of the subject itself

For beginners should be taught in one way and more advanced students in another since the latter have acquired knowledge of the rudiments that the former seek to learn. However, anything that is being taught to either one or the other must be selected according to the nature and condition of the subject. Obviously, when the subject is thoroughly known, it is easy to see to it that one proceeds more in accordance with both the subject itself and the comprehension of the student dividing it, as a genus into its species, or a whole into its parts, or a subject into its attributes (*adiunta*), or a cause into its effects, or an effect into its causes, or an end into the means to it, or a means into its ends, or uses, and so forth for other classifications. But let this be the end of our institutes of logic.

Introduction to Selections from Part II: The Physics

Any atomic theory attempts to explain the complex phenomena of nature in terms of fixed unit factors. Whether a completely successful atomic system can ever be achieved cannot be said; in the present state of physics the ultimate particle would appear to be the massless photon, although the label "atom" has been fixed on the chemical atom made up of electrons and nucleons. The first atomists were the Greeks, who had several corpuscular theories of matter including those of Anaxagoras, Empedocles, and the Democritean atomists. In answer to Zeno's paradoxes, Democritus, the principal founder of atomism, drew a distinction between mathematical points and physical points. All nature, he claimed, is made up of the void and tiny indivisible particles of solid matter, much too small to be perceived individually, endowed with the properties of size, shape, and weight. All other qualities, such as color, odor, density, hardness, warmth, and the like, do not exist in the atoms, but are the product of their different arrangements and can be accounted for entirely in terms of local (physical) motion. According to Democritus atoms fell through the void at rates determined by their size/weight. Epicurus and Lucretius disagreed on this point, claiming that the rate of fall was the same for all atoms and that collisions occurred because of unaccountable swerves (the declamen). *The shapes and sizes of the atoms were finite in number, but there was an infinite supply of each size and shape.*[1] *This theory of Epicurus, which had been preserved principally in two documents, Book X of Diogenes Laertius'* Lives of the Philosophers *and Lucretius'* De rerum natura, *is the theory that Pierre*

[1] Note how very different these atoms are from Dalton's chemical atoms, which differ in qualities from element to element, have the same quantity for each atom of an element, and are all of approximately equal size.

Gassendi devoted much of his adult life to rehabilitating in a modified modern form acceptable to Christian theology.

Classical atomism had never been very successful for various reasons. Aristotle argued vigorously against the void and provided a theory of natural minima (which had all the qualities of the larger things they composed) that could act as a partial substitute for the atoms in accounting for change. Moreover, atomism was intimately associated with materialism and atheism, propounding a universe run by chance rather than one ordered by some rational principle. A few medieval thinkers defended more or less atomist positions, notably William of Conches and Nicolas d'Autrecourt, whose writings were condemned. But a full exposition of classical atomism became available to the modern world only in 1417 when Poggio discovered the sole surviving complete text of Lucretius. Among modern thinkers Bacon had first accepted and then perhaps rejected the atomic theory; Galileo declared his belief in the void and the atoms. In 1624 atomist doctrines were condemned by the Sorbonne. Various seventeenth-century figures of lesser importance contributed discussions or defenses of Democritean or Epicurean physics: among others one might mention Nicolas Hill in England, Sebastian Basso in France, and J. C. Magnen in Italy, and not a few such as Daniel Sennert whose ideas mixed elements of Aristotle and of atomism. But by far the most articulate and systematic of the modern champions was Gassendi, whose works provided a system of physics as respectable as either Descartes's or Aristotle's.

In his modernized version of Epicurus' theory Gassendi had to make several adjustments in the interests of religion. Rather than eternal, the atoms became created; rather than infinite in number they became part of a finite universe; rather than subject to pure chance, they followed laws of physics and functioned as part of a universe constructed to fulfill goals set by God and occasionally evident to men.

The other objections raised against atomism Gassendi tries to forestall by establishing the principles of a mechanistic universe, here at one with Father Mersenne and his enlightened circle of French scientists who strove to undo Aristotelian qualitative sciences. Rejecting out of hand any attraction in physics, he asserts vigorously that all causation in science must be by physical impact. The motion of the atoms is an

inherent quality instilled in them by God at creation, each atom with the same rate of motion. Rest can only be apparent, as atoms hold each other in oscillation, ready to resume their rush at the first opportunity. (Gassendi does not attempt to measure this motion or derive mathematical laws concerning it or impact.) Sensation and vital functions are all explained in terms of mechanical models, much as Descartes explains them. Secondary qualities such as color must be accounted for by different position and arrangements of the atoms; here Gassendi uses the familiar classical example of letters ordered to make different words, knowing full well that the phenomena of sensation will always retain some mystery. He makes an exception of one secondary quality, heat, which he ascribes to the liberation of atoms of a special shape.

Concerning space and time, Gassendi refuses to consider either in the category of accident and promotes them to the status of absolute, infinite entities that exist independent of any bodies or any motion which they measure. His position on time differs from Aristotle's according to which time cannot exist without being measured, from Descartes's according to which it is divisible into separate and independent moments, and even from Epicurus', according to which time is a quality of things. The result is a theory very close to Newton's—and correspondingly far from Leibnitz's, the first truly relative theory of time. To make his concepts of time and space theologically acceptable (anything infinite or eternal must exist beyond God's power), Gassendi is forced to have recourse to the scholastic notion of imaginary space and time. Any form of infinitude in physics made him wary, and he avoided the radical conclusions that a Nicolas of Cusa or a Giordano Bruno were willing to draw.

The Physics. Section I

BOOK II. ON PLACE AND TIME, OR ON SPACE AND THE DURATION OF THINGS

Chapter One. Place and time do not come under the division of reality (or being in general) into substance and accident

Having already touched upon several principal topics concerning the universe in general, before we speak specifically of the things within it, it appears worthwhile to treat the subjects of place and time, both of which transcend the universe in some fashion and encompass it. Such a statement may appear quite unwarranted, especially since our previous account concluded that the universe is the aggregation of all things and that place and time are to be considered as conditions of natural bodies, or the things in the universe. But we must first know what general classification things are to fall into. Because reality, or if you prefer, being, is customarily divided into the two most general categories of substance and accident so that if something is neither a substance nor an accident it must be considered not real, or a nonbeing, place and time have been counted among the accidents, in fact among those belonging to corporeal objects under the genus quantity. The question we must now inquire into is whether this theory is right or wrong, or whether these two should be considered instead as real things, but of a nature that they are neither substances nor accidents and are not included in that general classification and should rather be considered as fundamental elements of all classification. Furthermore, I shall add that, as I said above, they are real things, or genuine entities, that actually exist even when no one is conscious of them, and may be

distinguished from fictions, such as chimeras and the like, which have no existence except in the mind when they are being thought about. Since it is a matter of the classification of real being (or just what is a genuine thing), I must first speak on that subject. . . . [*Here Gassendi reviews various classical positions.*]

From the above you may understand that as it is generally argued that all being is either substance or accident, and that all substance is either corporeal or incorporeal, and hence that all accident is either corporeal or incorporeal (since it pertains to substance, or a being having existence), and that of all the corporeal accidents the first is quantity of which place and time are species. From this you may understand that the common opinion holds place and time to be corporeal accidents, and consequently that if there were no bodies upon which they depended there would be neither place nor time. Since, however, it appears to us that even if there were no bodies, there would still remain both an unchanging place and an evolving time, it is therefore apparent that place and time do not depend upon bodies and are not corporeal accidents. And they are not therefore incorporeal accidents (ones that would be present in the manner of accidents in incorporeal substance), but they are certain incorporeal natures of a different kind from those ordinarily called substances or accidents. Whence it follows that being, taken in its most general sense, is not adequately classified as substance and accident, but that space and time must be added as two members of the classification, as if to say that all being is either substance or accident or place, in which all substances and all accidents exist, or time, in which all substances and all accidents endure. This is because there is no substance and no accident for which it is not appropriate to say that it exists somewhere, or in some place, and exists sometime, or at some moment, and in such a way that even if the substance of the accident should perish, the place would continue nonetheless to abide and the time would continue nonetheless to flow. From this we conclude that space and time must be considered real things, or actual entities, for although they are not the same sort of things as substance and accident are

commonly considered, they still actually exist and do not depend upon the mind like a chimera since space endures steadfastly and time flows on whether the mind thinks of them or not. However, so that all this may be understood a little more clearly, it must be gone into further, particularly place, with which we will draw a parallel in order to understand time.

And we must admit that place is a quantity, or some sort of extension, namely the space or interval made up of the three dimensions length, breadth, and depth in which it is possible to hold a body or through which a body may travel. But at the same time it must be said that its dimensions are incorporeal; so place is an interval, or incorporeal space, or incorporeal quantity. Therefore, two sorts of dimensions are to be distinguished, of which the first may be called corporeal and the second spatial. For example, the length, width, and depth of some water contained in a vase would be corporeal; but the length, width, and depth that we would conceive as existing between the walls of the vase if the water and every other body were excluded from it would be spatial.

Now Aristotle denies that any other dimensions except the corporeal exist or that there exists any interval (*diastêma*) beyond the body's that is being contained by the vase or in place;[1] but several of the ancients believed that incorporeal dimensions did exist for intervals, or for space, from which we derive the name "spatial." In order not to cite Epicurus and the others, let what Nemesius has to say stand for them all:[2] "Indeed every body is endowed with three dimensions, but not everything endowed with three dimensions is a body. Of this sort are place and quantity, which are incorporeal beings." Therefore, in order to understand that beyond corporeal dimensions there exist local, or spatial, ones, let us consider a thing that has no body and let us conceive through the exercise of our minds a container far more extensive than any vase. Let us reflect, if you please, upon the

[1] *Physics*, IV, vi, viii, x, etc. (G.'s note.)

[2] *On Human Nature*, ii. (G.'s note. Nemesius is a Christian philosopher of the fourth century.)

lunar sphere, as it is generally conceived, and let us also imagine that the entire mass of elements included within it according to the Aristotelians has been destroyed by God and reduced to nothing so that absolutely nothing remains in its place. I ask whether or not after this reduction to nothing we do not still conceive the same region between the surfaces of the lunar sphere that had been there, but now empty of the elements and devoid of every body. That God can preserve this lunar sphere intact and reduce the bodies contained in it to nothing and prevent any other body from taking their place no one would deny, except a man who denies God's power. Moreover, even if someone should deny this, contending that our argument serves no purpose because we assume something impossible, nevertheless he must know that this impossibility does not prevent us from making the supposition and drawing the logically consistent conclusion in the matter. In fact it is frequently necessary to proceed in this fashion in philosophy, as when they tell us to imagine matter without any form in order to permit us to understand its nature. For it is no less necessary for matter always to have some form than for region, or space, or place to have some body. Even Aristotle, although he believes that the heavenly bodies move by necessity, still insists that the motion of the skies is not rapid, so that we may conceive of them as at rest, and from that infer the reason why the earth is at rest.[3] And, to stick to our topic, in order to prove that no other dimensions exist for a wooden block in a vacuum than the dimensions in the block itself, he assumes that the dimensions must be imagined without any linear mass or other accidents. Therefore there is nothing that prevents us from supposing that the entire region contained under the moon or between the heavens is a vacuum, and once this supposition is made, I do not believe that there is anyone who will not easily see things my way.

[3] *On the Heavens*, II, iii, [286b], and *Physics*, IV, xii [221b]. (G.'s note. What Aristotle says in *On the Heavens* is: "the existence of the earth followed from the necessity of having something fixed for ever if there was to be something for ever in motion.")

Now, I ask, since the sphere of the moon is circular, if you take a point on its round surface, don't you think that there is a certain interval, or distance, from that point to the one opposite it? And isn't this distance a certain length, namely an incorporeal and indivisible line which is the diameter of the sphere and on which there is a midpoint that is the center of the realm or sphere and where once the center of the earth existed? And do we not forthwith imagine how much of the region surrounding this center had been previously occupied by earth, by water, by air, by fire? Do we not assign mentally how much of each belongs to the surface and how much to the depths? Then are not the dimensions that we imagined from the start—length, width, and depth—are they not present there? Clearly, wherever it is possible to conceive some interval, or distance, it is also possible to conceive a dimension because that interval, or distance, is of a determinate measure, or can be measured. Therefore, this is the nature of the dimensions that we call incorporeal and spatial.

Moreover, if we continue and imagine the entire machine of the heavens reduced by God to nothing in the same fashion, then we conceive that this realm would be empty in the same fashion and of the same nature as the vacuum that had existed beneath the moon, and at the same time that the spatial dimensions of each would be the same as the corporeal dimensions which had existed distributed throughout the whole universe. Now if the universe had been larger and larger in its previous existence to the point of infinity, and then God had reduced it to nothingness in the same way, we conceive that the spatial dimensions that would have remained would have been larger and larger to the point of infinity and we imagine that this space would have existed with its dimensions extended in every direction to the point of infinity. Let us further imagine that God creates the universe a second time exactly as it had been before; we understand that what had been made in the first creation would be made again; but it is apparent that according to the hypothesis we would understand three things.

The first is that space would be boundless (*immensa*) before God created the universe, that it would still remain if He should destroy the universe, and that of his own free will God delegated this determined part of space's realm in which he created the universe (leaving the remaining space, generally called imaginary space, around it on all sides). And the total realm of space can be comprehended in respect to the entire universe in such a way that just as the totality of space corresponds to the totality of the universe, so each part of space corresponds to some part of the universe. Consequently there is no part of the universe, either large or small, for which there is not some proportionately large part of the universe's space.

The second is that this space would be totally immobile. And it is not true that if God moves the universe from the place in which it is situated, the space will therefore follow it and be moved along with it, but the universe alone will move, traveling from a certain portion of space that remains motionless through an intervening motionless space into another equally motionless space that receives it. Likewise, in the same way, when some object, or part of the universe, moves from its place, the space in which it is situated does not move along with it, but remains motionless as it is left behind, and the space across which it journeys is constantly motionless, as is the space toward which it travels and which receives it.

The third is that these spatial dimensions, without which this space lies unbounded in length, width, and depth, are to be understood to be incorporeal, as they are motionless, displaying therefore no resistance to bodies either penetrating them or resting in them. Consequently, wherever there is a body, either in permanence or in transition, by this logic it occupies a part of space eqnal to itself, and wherever it is possible to assign corporeal dimensions we may understand that there are also incorporeal ones corresponding to them. There is therefore some truth in what Empiricus attributes to the Epicureans when he says, "Empty [space] is indeed straight, but nonetheless it cannot be twisted, for the

void is not mobile, either in part or in the whole."[4] And this is precisely why Aristotle proved that there is no interval except a corporeal one or and no dimensions except corporeal ones.[5]

To continue, whenever we claim that an incorporeal interval and incorporeal dimensions exist, it is abundantly clear and goes without saying that this sort of incorporeal being differs from the one that is a species of substance and refers to Almighty God and the intelligences, as well as the human mind. Obviously in the case of the latter the word "incorporeal" does not imply the mere absence of bodies and corporeal dimensions, but in addition to that signifies the existence of an actual, genuine substance and an actual, genuine nature with its appropriate faculties and actions, whereas on the other hand, according to our statements above, space cannot act or suffer anything to happen to it, but merely has the negative quality (*repugnantia*) of allowing other things to occupy it or pass through it. By the same reasoning we must eliminate any scruple that might possibly arise from thinking that space as here defined may be inferred to be uncreated and independent of God, for since it has been said that it is indeed a thing, it might seem to follow that God is not the author of all things. But it is undeniable that by the words "space" and "spatial dimensions" we do not mean anything but that space which is generally called imaginary and which the majority of sacred doctors admit exists beyond the universe. And they do not permit this space to be called imaginary merely because it depends upon the imagination, like the chimera, but because we have an image of its dimensions by analogy to the dimensions that appear to our senses. Nor are they deterred by those who say that this space is uncreated and independent of God alleging that it is nothing positive, neither a substance nor an accident, under which headings all things created by God are subsumed. On the contrary, this concept appears to be far more acceptable than another that the doctors commonly admit, namely that the

[4] *Against the Geometers* [98]. (G.'s note.)
[5] *Physics* IV, viii, 214b.

essences of things are eternal, uncreated, and independent of God, especially since the essences are the principal components of substances and accidents. Surely if it is permissible to assert that the essence of man had no beginning and will have no end and that as it consists in the fact that man is a rational animal, it is of such a necessity that it does not depend on God and no power at all can make it any other way, how would it not be permissible to assert the same about space, which is not one of those things that can be created, as is man in whom the essence is so vitally important?[6] Finally, what I have said about space must be understood as having been said also of time. . . .

Chapter Seven. What time is and how it is distinguished from eternity

It remains to speak now of time, or duration, that is of the other member that I said in the beginning belonged in the division of being into substance and accident. Everybody quite rightly remembers what Saint Augustine said: "If no one asks me what time is, I know the answer; if I wish to explain to it an inquirer, I do not know it."[7] For when we hear the words "daily" or "a little while," we are not puzzled by what time is meant by them. However, it is amazing what quandaries we are thrown in if we desire to define what the genus and differentia, as they are called, of time are. So, while Cicero says that "it is difficult to define time in general terms,"[8] we would almost say that it is impossible, and that a satisfactory definition cannot be found. The reason for this appears to be that following the twofold classification of substance time is ordinarily considered as if it were some accident existing in corporeal things whereas, whatever it is, it would appear to be something incorporeal, like the void, clearly

[6] The point is that the essence of space is to be neuter and passive; hence it cannot present as many theological problems as a more active essence like man's.

[7] *The Confessions.* XI, xiv. (G.'s note.)

[8] *De inventione rhetorica,* I [xvi, 39]. (G.'s note.)

independent of the existence of any other thing, much as there exists an incorporeal space, which, though called imaginary, is the same as the one which constituted the nature of place, as I have already demonstrated. In the same way there seems to exist some incorporeal duration independent of bodies, which, though called imaginary, is the same as the one which constitutes the measure of time. For just as that space extends through every position beyond mere place, which belongs to the universe and all its parts, so this duration goes beyond mere time, which belongs to the universe and all things existing in it and is conceived as having been extended beyond any beginning of the universe and as extending without limit even if the universe were destroyed. Hence, perhaps it would be sufficient if we said when we imagine incorporeal things by analogy with corporeal ones that there exist two diffusions, extensions, or quantities, one permanent, namely place or space, and one successive, namely duration or time just as there exist two corporeal extensions, one permanent, namely magnitude, and one successive, namely motion. Then in the same way that space was described earlier as an incorporeal and immobile extension in which it is possible to designate length, width, and depth so that every object might have its place, so time may be described as an incorporeal fluid extension in which it is possible to designate the past, present, and future so that every object may have its time. . . .

[*Gassendi lists the various theories of the classical philosophers concerning time.*]

Therefore, when it is objected that time is nothing on the grounds that while it is said to consist of the past, present, and future, the past no longer exists, the future does not yet exist, and the present is totally evanescent, one may answer that this is just as if it were objected that a flame is nothing on the grounds that whatever existed before it no longer exists, whatever will follow it does not yet exist, and whatever it is at present is evanescent. The error in logic is apparent, for they consider heterogeneous things as if they were homogeneous, or successive things as if they were permanent, when they are totally distinct

in kind, and worlds apart. Indeed they are examining the former with the criterion of the latter, and behave like men who measure a straight line with a compass, or judge weight with a yardstick, or length with scales. They are demanding of successive things something that is not in their nature; and if it were in their nature, they would not be successive. For make their parts stand still, make them cease to flow, make them rest in place; then they will not be successive, but permanent. But is nothing actual if it is not permanent? It must be coufessed that nothing actual exists permauently if it is uot permanent, but also that something actual exists in its own way, namely successively, if it is successive. For just as the nature of the first cousists in the fact that its parts are always the same and it may be said of it as a whole "it is, it is, it is"; so the nature of the second consists in the fact that its parts are not always the same and concerning it as a whole it can only be said "it was, it is, it will be." This is obviously because there is no simple verb by which we may signify its entire existence which contains not only the present, but also the future and the past since it is not always the same. There is no need to spend any longer on this, especially as the dispute may well appear to be one of words. I need only observe that Posidonius appears to have done wisely when, according to Stobaeus,[9] undaunted by a sophistical subtlety, he expressed the opinion that the time we call the present must not be taken too strictly as analogous to a mathematical point, but rather broadly, as the minimum span of time apparent to the senses in which what is future and what is past are joined. Similarly Aristotle allowed us to say "Now is approaching, since today is approaching; now has reached us since today has reached us."[10] We usually speak of the "present" day, and not without reason. Apollodorus says the same thing, that we are right to speak of the "present" year, and it would not be any different if we said the "present" century and so forth.

[9] *Eclogarum physicarum et ethicarum* [I, viii, 42]. (G.'s note.)
[10] *Physics*, IV, xiii [222a]. (G.'s note.)

Moreover it does not seem that Epicurus is right to say that the day or the night is long or short relying only on a time that we devise in our thought, for they are long or short instead relying on a time which flows by in the meanwhile whether we think about it or not. For that day or that night is not long for a man full of hope or short for one filled with fear; and it stretches out or is shortened because of their thoughts. Nor may Aristotle say that time is the measure of some motion which would not exist without a measurer,[11] for in the last analysis whatever the time is, it elapses and has its before aud after whether it is being measured or uot. Still it is true that men do make use of motion, relate to it, and measure it, especially the motion of the heavens, in their designation, discrimination, and partition of time's divisions. But time does not therefore depend upon the motion itself or its parts, whether numbered or not, for the very good reason that it exists before the motion of the heavens and we perceive most clearly that time is not multiple while celestial motions are. Nor would there be several times if several universes and several celestial motions were created by God. I had this in mind when I suggested previously that Aristotle's objection (against those who concluded that time was the motion of the heavens that if there were more than one heaven or universe, there would also be more than one time because there would be more than one motion) did not take sufficiently into account that his argument could be turned against himself when he defined time as the measure of this same motion.[12] For if there were several universes and several motions of primum mobiles, would not one be able to infer that there existed therefore several times simultaneously since there would be several simultaneous measures of the motions some earlier, some later? But if you say there would be one measure or standard for all the motions, and we assume that there would be some motions faster than others; how, since there would be several parts, some before others, some after, could there be one measure or one standard for all? Secondly

[11] As in *Physics*, IV, xi, 219b.
[12] *Physics*, IV, x, 218b.

how would you defend the fact that there would be one time by this measure when there would be more than one subject of motion, and so of time?

Perhaps, as usually is done, you would distinguish internal time from external. For example, you say that the motions of the lower beings have an internal time of their own, and in addition an external common time would also apply to them, the time of the primum mobile; thus you will say that a particular time applies to each of them and a general time to all of them. But you would not be able to designate this general time since there exists no general motion which would be regarded as the standard of before and after, nor are your particular times of any account unless you admit that ten hours have passed when ten bodies or spheres have moved through one hour and that one hour has gone by twice as fast as another because one of the motions was twice as fast as the other.

And so it seems that in his objection Aristotle glimpsed the nature of time, but he passed beyond it when he defined it as the measure of a motion. In fact time is a certain flux, as I have already said many times, that is no less independent of motion than of rest, with which not only several but indeed innumerable diverse motions may coexist. And it is as far from the truth that time is the measure of celestial motion as that celestial motion is the measure of time if only for the reason that the measure ought to be better known than the thing being measured. Those philosophers who make a distinction and recognize the existence of a time they call imaginary catch a glimpse of this. They also grant that before the creation of the universe a certain time flowed by within which they admit that the universe could have been made before it was, a time which flows during the existence of the universe and will continue to flow when the universe ceases to be. But because of their preconceived notions they proceed too far and declare that there therefore exists a certain time which they call true and real, for example like the one defined by Aristotle, which had its beginnings with the motion of the heavens, which stands still when the motion is interrupted and

ceases when it stops. I say because of their preconceived notions since if we look at the matter seriously, it does not seem that this is any other time than one they call imaginary and one that is necessary only in order for them to grant that it flowed when the sun stood still and Joshua fought for a time against the king of the Amorites.

To put the matter in a clearer light, let us resume what we have already begun concerning the comparison and parallel, as it were, which is apparent between this imaginary time, or duration, and the place, or space, also called imaginary, for the nature of the former can be illuminated not a little by the nature of the latter, which we have already examined. . . .

As place, considered in itself, is totally unbounded, so time, considered in itself has neither beginning nor end. And, as any particular moment of time is the same in all places, so any portion of space remains the same at all times. Likewise, as space remains the same and motionless whether something exists in it or not, so time always elapses at the same rate whether anything endures in it or not, whether it is in motion or at rest, and whether it moves faster or slower. And, as space cannot be broken in two by any force, but remains continuous, the same, and motionless, so time cannot be stilled and suspended by any force, but proceeding unimpeded always flows without variation. Again, as a portion of place, or limitless space, has been carved out in which the universe was stationed, so a part of infinite time was selected in which the universe exists. Furthermore, as any single body (or more generally any single thing) to the extent that it is here or there appropriates a certain part of the universe's space, or place, to itself, so also any particular thing to the extent that it exists now or then arrogates to itself a certain part of the universal duration. Moreover, as we say "everywhere" and "somewhere" in relation to place, so we say "always" and "sometimes" in relation to time. This occasioned Plotinus' rebuke to the Peripatetics for having those two categories called "where" and "when" distinct from the genera "place" and "time."[13]

[13] *The Enneads*, VI, i, 13–14. (G.'s note.)

Hence, as it is fitting for created things to be only "somewhere" in respect to place and "sometime" in respect to time, so it is fitting for the creator to be "everywhere" in respect to place and "always" in respect to time; and so those two outstanding attributes apply to him, immensity according to which he is present in every place, and eternity, by which he endures for all time. Finally, as place has unchanging dimensions that correspond to the length, width, and depth of bodies, so time has successive dimensions which are the equivalent of the motion of bodies. Whence it happens that as we measure length, width, and depth by a yardstick, so we apportion the flux of time by the motion of a clock. And since there is no more general, constant, or single motion than the sun's, we adopt this motion as a sort of general clock for measuring the flux of time. Not that if the sun moved faster of slower, time would therefore move more rapidly or more slowly, but whatever the motion of the sun happens to be, we use it for the division of time. If, for example, it were twice as fast, time would not therefore be twice as fleet, but only the space of two days would equal the space of one of those we now have; and if it were twice as slow, one day would equal two. In my opinion this is how we should understand what Plutarch reports of Empedocles,[14] that he thought that in the beginning the days lasted much longer than they do now, more specifically that in the time when men were first formed a day was as much as is now occupied by two months. Clearly we must believe that the motion of the sun has become sixty times faster since those days.

From these considerations it is apparent that time is not something dependent upon motion or posterior to it, but is merely indicated by motion as something measured is by its measure. For otherwise it would be impossible to know how much time we spend doing something or not doing it. Therefore we raise our eyes to the celestial motion and say that time has fled in proportion to its quantity. And since the observation of

[14] *Of the Sentiments Concerning Nature with which the Philosophers were Delighted*, V, xviii, 907F. Plutarch says ten months, not two.

this motion was commonly found to be difficult, the movements of readily familiar objects such as water, sand, wheels, or the pins of sundials were adapted to the celestial motion so that since it was easy to glance at them, it was possible to take a count of them and of the time. This is the reason why I said a short while ago that the heavens are a sort of general clock, for they are inasmuch as all our clocks imitate them as closely as possible and are called upon to help us when we cannot see them. As I demonstrated a short time ago that time is independent of celestial motion and does not fail to exist before and after it, I might then point out that time may be conceived as flowing when the heavens are at rest, and that it flows while the heavens move, and I might suggest as an illustration what sacred history records concerning Joshua. Clearly no one would believe that time did not pass while Joshua did battle with the Amorites when the sun stood still and that almost as many hours as would make up a whole day did not pass, for Scripture testifies "And there was no day so long before it or after it,"[15] in which the word "long" cannot be understood in any relation except the flux of time. Suppose then that the heavens now stood still (they could be stopped by God), do you not see that time would continue to flow just as when the heavens were in motion? You will say, how could there be hours if the sun did not distinguish between them? They would exist not because they were distinguished by the sun's actual motion, but because they were distinguishable in terms of motion of the sun which could have taken place in that time. In the meantime they could be distinguished by the flow of the water clock or some other time machine. So we say that the universe could have been created a thousand years before the creation not because at that time years were being distinguished by the repeated revolutions of the sun, but because time flowed, of which the revolutions of the sun such as we now have them could have been an adequate measure. Do not say that all these times are imaginary, for there is no other way that we can under-

[15] Joshua 10:[14] (G.'s note. I have revised the usual translation to include the word "long" as the Latin does.)

stand that time continues to flow without the motion of the heavens.

The Physics. Section I

BOOK III ON THE MATERIAL PRINCIPLE, OR THE PRIMARY FORM OF MATTER

Chapter Eight. It is apparent that atoms may be accepted as the material component (principium) of things, or as the primary form of matter

Hence, to present at last our conclusion that apparently the opinion of those who maintain that atoms are the primary and universal material of all things may be recommended above all others, I take pleasure in beginning with the words of Aneponymus. After his opening remark that "There is no opinion so false that it does not have some truth mixed in with it, but still the truth is obscured by being mixed with the false," he then continues, "For in their assertion that the world is made up of atoms the Epicureans spoke the truth, but in their assertion that these atoms had no beginning and that they flew about separately in a great void, and then coalesced into four great bodies they were telling fairy tales."[16] I say I take pleasure from these words for one can draw the inference that there is nothing to prevent us from defending the opinion which decides that the matter of the world and all the things contained in it is made up of atoms, provided that we repudiate whatever falsehood is mixed in with it. Therefore, in order to recommend the theory, we declare first

[16] *Dialogus de substantiis physicis.* (G.'s note. Aneponymus is the little-known Guillaume de Conches, 1080–ca. 1150, philosopher and teacher at the University of Paris.)

that the idea that atoms are eternal and uncreated is to be rejected and also the idea that they are infinite in number and occur in any sort of shape; once this is done, it can be admitted that atoms are the primary form of matter, which God created finite from the beginning, which he formed into this visible world, which, finally, he ordained and permitted to undergo transformations out of which, in short, all the bodies which exist in the universe are composed. So stated, such an opinion has no evil in it which has not been corrected just as it is necessary to correct opinions in Aristotle and others which make matter eternal and uncreated in the same way, as others also make it infinite. In the meantime, this theory of matter has the advantage that it does not do a bad job of explaining how composition and resolution into the primary elemental particles is accomplished, and for what reason a thing is solid, or corporeal, how it becomes large or small, rarefied or dense, soft or hard, sharp or blunt, and so forth. For indeed these questions and others like them are not so clearly resolved in other theories where matter is considered as both infinitely divisible and either pure potentiality (as they say) or endowed with a certain shape from among a very small range of possibilities, or endowed with primary and secondary qualities, which either do not suffice to explain the variety in objects or are useless, as is clear from what I have already said.

Next we declare that the idea that atoms have impetus, or the power to move themselves inherent in their nature, is to be rejected and also its consequence that they have motion by which they have been wandering and have been impelled every which way for all time. It may then be admitted that atoms are mobile and active (*actuosas*) from the power of moving and acting which God instilled in them at their very creation, and which functions with his assent, for he compels all things just as he conserves all things. By this means such an opinion is also quite correct just as others which attribute motion and activity to matter must be corrected; to be specific, ones like Plato's, which holds that matter wandered without shape from eternity until its movement was reduced to order by the demiurge. (Incidentally, it appears that

this is the eternity of motion on account of which Aristotle links Plato with Leucippus, the discoverer of atoms since both said *aei kinesin eivai*, "that motion always existed."[17] In the meantime this theory has the advantage that it accounts for the innermost source and root, as it were, from which all movement and all activity arise in causes known as second causes; whereas it cannot really be accounted for by the others, least of all by form, which they would like to have the principle of all motion and activity though they would also like whatever entity it has in it to be kept distinct from matter, which they make otherwise totally inert and free of any motive or active power. In any case, it is worth noting that Plato alluded to this whole subject in such a way that although he did not use the word atom, still he described atoms with the same smallness that not the senses, but the intellect, perceives them and declared himself as follows concerning these minuscule particles, "It was wholly fitting that God provided for their great numbers, their movements, and other faculties, to the extent that nature, obeying necessity, would comply, etc."[18]

Accordingly, it may therefore be supposed that in the beginning God created as great a quantity of atoms as was necessary for the formation of this entire universe. Not that it was necessary for God to create the atoms separately, which he would then have built up into bigger and bigger units from which the world would finally be constructed, but that when he created a mass of matter which could be broken down into tiny bodies, and which was therefore just as if it were constructed out of those tiny ultimate particles, he may be considered to have created these tiny bodies along with it. It may also be supposed that the individual atoms received from God as he created them their corpulence, or dimensions, however small, and their shapes in ineffable variety, and likewise they received the capacity (*vis*) requisite to moving, to imparting motion to others, to rolling about, and consequently the capacity to disentangle themselves, to free themselves, to leap away, to knock against other atoms,

[17] *Metaphysics*, XII, vi [1071b]. (G.'s note.)
[18] *Timaeus*, 56C. (G.'s note.)

to turn them away, to move away from them, and similarly the capacity to take hold of each other, to attach themselves to each other, to join together, to bind each other fast, and the like, all this to the degree that he foresaw would be necessary for every purpose and effect that he destined them for. Again it may be supposed that in the beginning when God ordered the earth and the waters to come into being and to produce the plants and the animals, he made the seeds, so to speak, of all things capable of generation, in other words, that from selected atoms he fashioned the first seeds of all things, from which later the propagation of species (*rerum*) would occur by generation. These seeds were then dispersed throughout the entire kingdom of creatures capable of generation, not equally however, nor the same ones everywhere, but however many were appropriate in each place. Although these seeds can indeed also be broken down into their atoms, these atoms can in turn easily form themselves back into seeds by coming together, being of the same nature, compatible among each other whether associated in combinations or separated. Finally, it may be supposed that that chain of generation and corruption that continues even now and will persist on into the future had its beginning there, in that inexhaustible chaos of atoms, constantly supplying both the matter from which bodies were constructed and the motion, or cause, by which they were shaped.

And it seems right that these several aspects of matters should be explained here more fully, especially in order to prove that such atoms exist so that all things are made from them and not from something else or by themselves, and consequently that these are the fundamental particles, or the primary material of things; but since the conclusion almost follows from the things I have already said,[19] and will be demonstrated more abundantly in the following books, it appears that a résumé of the whole matter would be desirable at this point.

Besides that, there is apparently need first of an inquiry into whether the authors favoring atoms as the primary elements of

[19] Gassendi has devoted six chapters to atoms.

things posited not only atoms but also the void, as is commonly believed, for on account of it the objectiou is made that they are absurd because they make things not only out of atoms, but also out of nothing. Secondly, there is need of an answer to the various sorts of objectious which were usually urged against the position of the atomists and were carefully assembled by Lactantius.[20]

But regarding the inquiry I mentioned, first, it is a fact that in Servius we read that Epicurus said that "There are two primary elements (*principia*), namely body and void."[21] Not only Servius believes this, but also Plutarch when he objects against Colotes that "Epicurus' primary elements are the infinity and the void."[22] And so that you may not conclude that this applies to Epicurus only, according to Clement of Alexandria, Leucippus and Metrodorus "left two primary elements, namely the plenum and the vacuum." And Stobaeus confirms this about Metrodorus, as Tully [Cicero] does about Leucippus, joining Democritus to him.[23] Aristotle also confirms this about both of them when he says in the *Metaphysics* that "they say that the fundamental elements are the plenum and the vacuum,"[24] and more specifically about Democritus when he proves in the *Physics* that the primary elements are different from the ones that Democritus "establishes, solid matter and the void."[25]

Now, in answer to this, it must be said that neither Epicurus nor the others felt that all things were made out of two primary elements, namely atoms and the void. Many people were misled by the fact that they claimed that these two things were uncreated and indestructible and by the fact that they said that the universe,

[20] In Chapter X of *On the Anger of God*. All the references to Lactantius are to this chapter.

[21] Servius' *Commentary on Vergil*, Eclogue, VI [31], (G.'s note.)

[22] *Reply to Colotes*, I [1114B]. (G.'s note.)

[23] Clement of Alexandria, *Exhortation to the Greeks* [V, 57]. Stobaeus, *Eclogarum physicarum et ethicarum* [I, x, 14]; Cicero, *Academica*, II [xxxvii, 118]. (G.'s note.)

[24] Book I, iv [985b]. (G.'s note.)

[25] *Physics*, I, v [188a]. (G.'s note.)

or the nature of things, was made out of these two parts, so to speak, as I have made clear above; but, nevertheless, they did not feel because of this that the things which come into being and decay were made out of these same two parts, or components as they say, as their primary elements. For although in a certain sense they may be said to be the primary elements, or fundamentals, of the universe—in the sense that I mentioned before—still they cannot both be the primary elements, or fundamentals, of creatures (*generabilium*). Only atoms can be that; the void merely supplies a location and a principle of separation. In fact, since it is incorporeal, is it not utterly incapable of being the component of a body? For although it may be proven to be intermixed in bodies, it is not therefore a part of them, just as the air which is present in our nostrils, bones, arteries, or lungs is not generally counted as part of us. But the void would be even less so since it does not inhere in things in any way at all and cannot be moved with them, but when they change location, a new void always is formed as I have already made clear before this.

This is why although they very often asserted that all things were constructed out of atoms, neither Epicurus in all the surviving fragments nor Lucretius in his entire work ever said that they are constructed out of void. Also besides the witnesses already presented, you may see that there are countless others who attribute the atoms to Epicurus without making any mention of the void when speaking of the primary elements. Even Plutarch mentions it only incidentally in the passage cited; in others, however, where he is explicitly reporting the doctrines of the philosophers concerning the primary elements of things, he does mention the atoms, but remains silent about the void.[26] Likewise, when Aristotle enumerates the opinions of the ancients about the

[26] *Reply to Colotes*, I, iii. (G.'s note.) This is somewhat perplexing, for it is simply not true that Plutarch does not mention the void. In fact, Gassendi has just quoted him (footnote 22) as testimony that Epicurus believed in the void and is about to do the same thing for Democritus (footnote 28). Gassendi may have in mind a passage in Plutarch concerning how things and qualities are made from mere atoms (1110F–1111A).

primary elements in the beginning of his *Physics*,[27] he does not attribute the void to Democritus. On the contrary, when he teaches that the philosopher recognized "a single sort of primary element, though in various shapes," he demonstrates clearly enough that Democritus had settled upon only the atoms; for otherwise, if he had also settled upon the void in addition to them, he would have accepted two types, not one. But then if he did proclaim the void in addition to the atoms, he still did not proclaim it as a primary element opposed to the other, but only as something else of a contrary, or opposed, nature in the same way that nonbeing is opposed to being (hence in Plutarch[28] body is called *to den* and void *to mêden*) so that there would be no necessity for Alexander to object against Democritus that he contradicted himself to the extent that while he asserted that nothing could be made from nonbeing, he also asserted that things were made from void, which is nonbeing.[29]

In regard to the sorts of objections that are found in Lactantius,[30] among other things he asks first "Where do these tiny seeds come from, or what is their origin?" "For, if all things come from them," he says, "we will ask where they themselves come from." We can answer that they come from God, the author of all things; but since he is attacking the ancients, and above all Epicurus, they would not be able to make any other answer than what Aristotle, Plato, and other pagans did who, unwilling to accept creation, or production, from nothing, said therefore that matter did not have a cause, or efficient principle, hence that it was uncreated, not made, and eternal; that therefore it was inappropriate to ask what was the material from which primary matter was made since something is called primary only

[27] Book I. (G.'s note.) Again Gassendi seems to be contradicting what he has just said in footnote 24. He is striving unconvincingly to prove that the distinction has always been made that void may be a genuine *principium*, but not an *elementum*, since it cannot be made into anything.

[28] *Reply to Colotes*, I [1109A]. (G.'s note.)

[29] Alexander of Aphrodisias, *Commentary on Metaphysics*, I, v. (G.'s note.)

[30] *On the Anger of God*, X. (G.'s note.)

because there is nothing prior to it from which it is made. Hence Epicurus said specifically that there is nothing prior to the atoms and no one should insist on knowing from what underlying material they are formed unless he wishes to joke as the poets do, for in their anthology there is not only this passage:

> Now Menophanes bought a piece of land
> Then hanged himself from a neighbor's broad oak
> When famine struck. Not his own soul, but a strand
> Rented in another's field holds the bloke.
> Had Epicurus heard this tale, no doubt
> He would have declared the world is filled out
> Not with atoms, but with land all about.[31]

bnt also the following one:

> Epicurus, dear Alcimus, has said
> The world is made from atoms all outspread.
> His doctrine is: nothing littler can exist.
> Had he but seen Diophantes, I insist,
> He would have built his world from that small man,
> Tinier by far than the atom's span.
> Or else, my Alcimus, he would have made
> All things from atoms massed in a great swarm,
> But each atom from Diophantes' form.[32]

Next Lactantius argues, "if the seeds are round and smooth, surely they will not be able to take hold of each other in order to make some body. If anyone wants to bind together grain into a single conglomerate, the very smoothness of the grains themselves does not permit their joining into a solid." Now he was not unaware that all atoms were not considered round and smooth; he knew there were also angular and hooked ones, so I need say no more about the others. Epicurus had said that those with round or smooth surfaces could at least be caught onto if they could not catch onto each other and could be enclosed in the angles and hooks of the others and thus be joined into a single mass or solid.

[31] *The Greek Anthology*, II, vii. (G.'s note. This is XI, 249 in the Loeb edition.)

[32] *The Greek Anthology*, II, xxxii, (G.'s note. IX, 103 in Loeb.)

And this could well appear to be the cause of evaporation in which particles that are smooth, or less angular and hooked, set themselves free and fly away, but others enmeshed in the angles and hooks stay fast and do not set themselves free unless by several twists until they finally leave. And this may well be the reason why water evaporates far more rapidly than oil, why lead melts more quickly than silver, and other things of a similar nature which it would be pointless to list. But, Lactantius says, "if they project angles and hooks, atoms are divisible and severable and so can be cut and torn apart." From what I have already said, you can guess that Epicurus would reply that neither the angles and hooks nor the main body of the atom can be severed because they are solid through and through, lacking any admixture of void.

He makes the further objection that "it may be that atoms will do as long as it is a matter of small things, but when it is a question of the universe, it is a sign of sheer madness to increase their number and to say that it is formed from them"; and having made mention of the infinity of worlds, he says "What great power the atoms must have had to assemble such immeasurable masses from such tiny parts!" But if we conceive the entire earth as some part of the universe in such a way that the universe could be constructed from several masses like the earth, we surely would also understand that the entire earth is made up of several masses such as Mount Atlas or the Caucasian Mountains. But by the same reasoning we would realize that a mountain is made up of the accumulation of several masses either of vast chunks of earth or of boulders, and likewise that boulders are made up of rocks, and larger rocks of little ones, and finally they are made of molecules which are like grains of sand; so that nothing prevents us from conceiving the entire universe as composed of particles no larger than grains of sand.

On this basis I alluded earlier to a proof of Archimedes by which it was demonstrated invincibly that even if the grains of sand were so small that a poppy seed would divide up into ten thousand particles equal to them, not only fifty-two zeros placed in a row after a one (1,000,000,000 etc.) would suffice to express

the number of those grains of sand which would be enough to produce the entire universe according to its generally accepted dimensions; but also sixty-four would do to express the number which are adequate to fill up that incredible vastness to which Aristarchus and Copernicus expand the universe. Now if you wish to proceed to the tiny dimensions of the atoms, imagine that every one of these particles is composed of ten hundred thousand of the most minute particles, then multiply this times the number with sixty-four zeros, and the number of the particles is expressed by no more than seventy zeros. And if you do not yet think that they are wholly beyond being divided into parts, split every one of them into ten hundred thousand; and then when you have made the multiplication, the resulting figure will not exceed seventy-six figures. Proceed further if you wish to, and note how easily figures will always be available by which you may finally express the number of atoms from which the universe could be constructed.

He pursues his objections, "If all things are made from indivisible particles, nothing would ever require a seed of its type, but would be made haphazardly by atoms rushing about and flying in different directions, and so plants, trees, fruit, and all things could be generated without soil, without roots, without moisture, and without seeds; birds could be generated without eggs, eggs without being laid, and so forth." And so he turns against Lucretius his own verses (already quoted once) as if he had no understanding of them

> If things are made from nothing, any breed
> Might bear another, no need for its seed.[33]

But the poet would answer in one word that all things are not made from all other things because not all atoms are the same, and therefore do not have the capacity to form into the same bodies. From the atoms there are first formed certain molecules of differing configurations which are the seeds of different things,

[33] *De rerum natura*, I, 159–160. Gassendi had quoted these and the thirteen subsequent lines in Chapter 1 of this book.

and then every thing is woven and constructed from its own seeds in such a way that it is not and cannot be made from other seeds. And since the earth contains the seeds of plants, fruits, and trees, they cannot grow without the earth or without roots by which such seeds are assimilated as nourishment or without moisture in which these seeds are dissolved, and so on for the others.

Lactantius rises to his height and asks further "whether the atoms of fire lie concealed even in iron and flint or in a glass bowl full of water exposed to the sun, since it is well known that fire is generated by these." The poet will answer that not only atoms, but also seeds of fire lie in the flint, which needs only to be uncovered to spread out and make the flame appear. He says further that such seeds are contained not so much in the water as in the sun's rays projected through the water, so that they need only to be brought together to show their fire, which the configuration of the bowl can produce. The same thing can be said concerning a liquid in which vapor is condensed, and which Lactantius opposes with a similar argument.

Finally he gathers various arguments to show that "the senses, thought, memory, the mind, genius, reason, and the like cannot result from tiny seeds" and to prove that "the universe and all things are the effects of the deliberation and providence of God, and not of the chance concurrence of atoms and things related to them." These are special considerations. The first sort belong to the third section in which it is denied that the mind and human reason are derived from the atoms or corporeal configurations; and in regard to the senses and the faculties dependent on them it will be explained, rightly or wrongly, how sensate things like animals can be born from insensate things such as atoms. And the second objection regards mostly the matter of the following book in which it will be shown to follow from our premisses that nothing was created without the deliberation and providence of God, and if atoms were the instrument used, they coalesced into the magnificent work of the universe not by a chance concurrence, but according to divine disposition. This much then was to be said about the primary elements of matter.

The Physics. Section I

BOOK IV. ON THE EFFICIENT PRINCIPLE, OR THE CAUSES OF THINGS

Chapter Eight. The initiating force in second causes and the primary principle of action

It would follow that something must be also said in detail at this point about second causes; however, since everything in nature except God, that has some capacity to act, is included under this name, and since therefore they will be the subject of examination throughout the entire course of this work, there seems to be only this one question of a general nature to be discussed concerning them, to wit just what is the internal or root principle of motion in them (as Aristotle calls it, the first principle), which may also be properly termed a cause, as it is primary.

First of all, there is a well-known controversy among philosophers over what the substance of this cause is. For there are those who believe that it is incorporeal, such as Pythagoras according to both Stobaeus and Plutarch[34] (if you are willing to correct the text of the second to accord with the reading in the first) as well as Plato, and in a word, everyone who claims the world has a soul and thinks that the individual forms of objects are parts of that soul which are the efficient cause of everything that happens in those objects. The Peripatetics appear to hold this opinion, in that they feel that the forms are somehow the simple driving force of things and say that they are incorporeal, especially

[34] *Eclogarum physicarum et ethicarum* [I, xiii, 1] and *Sentiments of the Philosophers*, I, ii [876F]. (G.'s note.)

Alexander of Aphrodisias, who teaches that consequently every act of a body stems from an incorporeal source.[35]

Others cousider the cause corporeal, for example the Stoics; since, as the same Plutarch informs us,[36] they suppose that the causes are spirits—but by spirits you must understand what we commonly call animal or vital spirits—and likewise all those who make matter out of one or more elements, for they wish these same elements to be the principles of every action, being endowed with their own qualities, and active ones (especially heat and cold); and finally Leucippus, Democritus, Epicnrus, and others who do not separate the atoms from the causes, although here another controversy arises over the distinction between efficient and material causes, or principles. In fact, those who make the causes incorporeal are not the only ones to decide that they are distinct from matter, for the Stoics also do so when they claim the causes are corporeal, but in such a way that they still think matter is a different sort of body, namely a purely passive one, whereas they consider causes as active bodies. At this point it may be added that when Zeno, Chrysippus, and Posidonius say according to Stobaeus that a cause is a being and that what results from a cause, or its effect, is neither a being nor a body, but an accident and a designation (*sumbebêkos kai katêgorêma*), they would appear to mean nothing else but that the cause, or that which acts, is indeed a body and something subsistent; and yet since nothing subsistent which was not a body earlier is produced by its action, the effect then, or that which depends upon the action of the cause, is not so much a being, or body, as some new mode beyond the others which is added and allotted to that being, or body, that existed already, with the result that it may be given a new name and designation. To explain the matter more clearly, whenever a craftsman is the cause of something, a house for example, as he works toward that end, or builds, he is a being and a body; but what he makes or what results from his construction is not stone, not quicklime, not plaster, not wood, nor any

[35] Commentary on *On the Soul*, I. (G.'s note.)

[36] *Sentiments of the Philosophers* [I, xi, 882F]. (G.'s note.)

being, or body, at all that had been a body before, but is only a mode, form, or arrangement added to such preexisting bodies, by which means an assemblage of them arranged in this fashion earns the name house. But others did not distinguish cause and matter in this way, and so they thought that matter was not active and that it might be called matter insofar as something was made from it, but it might be called a cause insofar as it made something itself.

As we have already implied, those before Anaxagoras who said that the principle of all things was one or several elements appear to have been of this school. For, although Aristotle always refutes them on the grounds that they did know about the efficient cause, apparently he did so not so much because they ignored it as because, as he says himself, they posited it within the notion of matter and did not understand it as a genuinely distinct principle.[37] Take Heraclitus as an example; he was one of those whom Aristotle refuted, and since according to Plutarch he said that a certain part of the primordial fire was transformed into earth, that the earth having been unloosed by the force of the fire gave forth water, and that the water gave birth to the air in an exhalation, and so on in that vein, would yon not be willing to grant a certain motion and action to his element which he had assumed as his matter? And so it could have been both the material and the active principle at the same time. Leucippus, Democritus, and Epicnrus have also been cited as belonging to that number. Indeed Aristotle understood Leucippus and Democritus (and he would have inclnded Epicurus except that he lived later) in the same sense as those already mentioned, for he reports that they also were negligent in omitting to explain motion and its origin in things, or in one word, the efficient principle. But they did not really omit it; instead they insisted only that the efficient principle was to be distingnished from the material principle as different in thought, but not in fact and substance. For it is clear from what has been said before that they did not consider atoms, which they said are the matter of all things, as inert or motionless, but rather

[37] *Metaphysics*, I, iii, *et al.* (G.'s note.)

as most active and mobile, so much so that they held them to be the first principle from which things take their motion. It is plain that Lucretius stems from their way of thinking, especially Epicurus's

> Now come, I shall set clear by what compact
> Matter's teeming bodies bear diff'ring fruit,
> Then undo what they've borne, by what impact
> Driven, with what movement endow'd, to scoot
> Across the great void.[38]

In this passage you see the atoms called matter's teeming bodies and at the same time the principle producing different things (diff'ring fruit) by its motion and destroying them.

And so it seems that it must be concluded first that the internal principle of action that works in second causes is not some incorporeal substance, but a corporeal one. There is no need here to establish this fully because of the arguments that were presented earlier when discussing the soul of the world. It is sufficient that God be incorporeal and that he pervade and support the universal machine of the world, but it is not necessary for him to be like the soul, or the form, of the world in such a way that his substance is pulled apart, as it were, and cut into little pieces which become the individual souls, or forms, not only of men, but also of beasts, even of plants, even of metals, of stones, and of every single thing, a theory that is not only impious to mention, but also most absurd, as if an incorporeal being, immeasurable and eternal could be broken up, transferred, and enmeshed and affected by bodies! Besides there is no reason to deny that there is a certain vital heat in the universe which may be considered its soul, so to speak, some part of which is distributed to everything; but this soul would not in fact be incorporeal since whoever says heat at the same time implies a subject of a corporeal nature for the heat to be in, for whatever is hot is a body. And the fact that the principle of action in bodies must be corporeal can be inferred from the fact that since corporeal actions are physical, they cannot be induced by any principle except a physical

[38] *De rerum natura*, II [62–66.] (G.'s note.)

and corporeal one. And truly, since such a principle even as it creates itself, compels the body in which it resides to move itself and in many cases even to move some external body, it is impossible to conceive how it can bring itself to bear on a body in order to impart an impulse to it if it is not corporeal. Nor is it possible to conceive that it will ever touch the body if it lacks the mass or the sense of touch with which to touch something.

Other considerations apply in the case of God since he can act upon and move anything not by any movement of his but by his mere command, for he is ubiquitous and infinite in power. For even though Aristotle felt both the prime mover and the other movers from a distance did not move the heavens physically [i.e., by impulsion], but finally, or morally [i.e., by attraction], still he did so on the grounds that he did not wish to attribute to the prime mover, or to God, a power infinite in intensity but only in duration, nor did he wish him to be immeasurable but rather bound to a certain seat.

As for the fact that the human soul acts upon its own body and moves it despite the fact that the soul is incorporeal, we shall say in its place that the human soul, insofar as it is the intellect, or mind, and so incorporeal, does not stimulate actions except for intellectual, or mental, and incorporeal ones, and insofar as it is sentient, animate, and endowed with the power of moving bodies, and so is corporeal, does stimulate corporeal actions and moves its own body sometimes and sometimes also a foreign body by its intervention.

The difficulty is somewhat greater concerning the other substances that are distinct from matter, which are ordinarily called the "intelligences," or "genii," or the "daimons," or as we say, "the good and bad angels." To be sure, such substances do not have infinite capacities and are not boundless, or everywhere, as God is, nor are they the forms of bodies, nor are they composed in a certain measure of corporeal and incorporeal parts as the human soul is, which would permit them to exert action upon bodies. And Aristotle, who wishes the movers of the heavens to be separate, or incorporeal, seems to have attributed to

them solely a moral, or metaphorical, action upon celestial bodies not a physical, or real, one as well, for no other reason except that the mind could not conceive how an incorporeal being could influence a corporeal one, and touch it, take hold of it, overpower it, move it, and impel it. Other pagans who attributed physical actions to genii, or daimons, also attributed bodies to them, and consequently made them subject to generation and destruction, as will be explained elsewhere in greater detail.

In regard to our philosophers, it is well known how many of the Church Fathers considered the angels corporeal and have therefore been called to witness that they can be painted in bodily form, obviously from the belief that it was not possible in any other way to understand the things that are found in Holy Scripture and in the lives of the saints concerning either the several appearances or the deeds in different bodies of both good and bad angels. It is also well known that starting from the fact that the Holy Faith has declared angels incorporeal, a good part of the Sacred Doctors do not admit that the fires of hell physically affect the bad angels, or evil spirits, and the souls imprisoned there since they do not understand how it can happen that a corporeal being such as fire acts upon, or leaves some impression upon, an incorporeal being; in a word, their belief is that a reciprocal action of one thing upon another cannot exist if they cannot touch, seize, impel each other, for if one struck the other without a collision, it would pass through it without meeting any resistance or the least obstacle, as if there were nothing there. The difficulty, I say therefore, is greater; but it could be said perhaps that the incorporeal angels, or pure spirits, had been created in the beginning to understand, love, praise, and bless God as they assisted him; and furthermore, God deemed it good, having subsequently created men, to destine a part of the angels to their ministration; and since to accomplish this they had to move men's imaginations to form bodies and assume their shapes in which they would appear to men, and in their guise to seem to walk, eat, speak, and move other bodies in various ways on repeated occasions and even to kill whole armies, therefore since there is

nothing he cannot do, God imbued the angels destined for these offices with an extraordinary and special power beyond our comprehension so that they might perform these extraordinary feats that they cannot ordinarily do. If by faith alone we hold it certain that the angels are incorporeal and do the things that we read in the Holy Book, we seem to be able according to this reasoning to maintain something that physical reason does not adequately understand. Still such a thing is permissible in sacred theology, and what remains to be said about the abstract substances must be postponed until other occasions, such as our comments in the ensuing section concerning the cause of the movements of the heavens, and in the ethics concerning divination.

To return to those who go yet further and feel that the principle of action in second causes is incorporeal, the interpreters of Aristotle reason that form, which is this principle, is a simple and incorporeal being from Aristotle's statement that form, or appearance (*speciem*), is indivisible (*to eidon atomon*),[39] and from the distinction he makes elsewhere between matter and form, that he believes all things consist of matter to the extent that they are corporeal, divisible, and have some dimensions, but consist of form to the extent that they are determined toward a certain manner of being. Now on this topic neither Aristotle nor his interpreters make clear where this form, or act, comes from or how it got the power to act, since they do not constitute one general form from which all forms are derived or of which they are parts as there is one general matter from which all individual materials are drawn. For even though they usually say that form is drawn from matter, they are still saying something that escapes our comprehension as long as they believe that form is a real entity distinct from matter; and yet they do not admit that even the slightest particle of matter goes into its makeup or that the matter loses anything even though something is being made from it.

And when they say that form is made from the potentiality of matter, that is mere verbiage. For if they mean that it is made

[39] *Metaphysics*, VI, viii [*in fine*, 1034a]. (G.'s note.)

in a way that results in its being only a mode of matter as is the shape of a statue into which brass or wood has been modeled, then they will be saying something real, but the form will be merely passive as will be the matter, whose mode it is, and not its active principle. But if, however, they believed that it is some additional entity, then they would not be at all able to say where this entity got its existence from if the matter's potentiality is to be in no way diminished, nor where its power to act comes from since the matter's potentiality is merely passive, and not active in any way; and it is utterly inconceivable that matter could furnish what it does not have itself.

And if someone should perhaps say that this power comes from the agent by whom the form is fashioned, that is not true either, since both the agent and his action, which becomes distinct from him, are external things, and nothing is more internal in a form than its power to act. Add to this the further consideration that since all the agent's power to act, or move, depends upon its form, and since this form, by the same reasoning, must have been fashioned from matter, the difficulty of explaining how it happens that matter can furnish form with a power that it does not have will regress continually. Once again, it is not true either that such power resides in matter endowed with qualities.[40] For it is agreed that all these qualities, or accidental forms, are contained in matter's potentiality and are fashioned from that potentiality; consequently we always come back to the same point, that the entire active potentiality is taken from a merely passive potentiality, which is like getting fire from ice, or ice from fire.

Hence those who made the principle corporeal and believed that matter is not inert but active (*actuosa*) seem to have chosen the better course. The Stoics were among these, at least in part, insofar as they said that the cause was corporeal despite the fact that they attributed immobility (*inertia*) to matter (but not to all matter); for a cause that exists corporeally must also exist materially, and since the course was considered corporeal, it had also

[40] That would be Aristotelian matter, as opposed to atomic matter, which lacks qualities.

to be considered material according to the arguments just given. Whence it happens that the only disagreement that remains between them and the others who saw no distinction between matter and the cause is whether all matter is active and mobile and may therefore be considered a cause, or only some matter. Indeed although I said earlier that the opinion which establishes atoms as the material of all things is more probable than others, nothing prevents us from supposing either that some atoms are inert or that they are not all equally mobile. In fact, since all their mobility is imbued in them by God the creator, some of them may have been created by God with excellent mobility, some with moderate mobility, some with scant mobility, and some with none. On this assumption we can explain why some solid bodies are highly mobile, like fire, others very sluggish, like stone, and others are in intermediate positions, like the various types of animals. On the other hand, nothing prevents us either from supposing along with the original atomists themselves that all atoms are equally endowed with the greatest mobility. For that solid bodies have greater or lesser mobility or inertia in comparison with each other may come from the fact that because of their individual shapes and masses the atoms are freer and less shackled, extricate themselves more easily from snares, and more easily find ways or make them, by which they may impart motion and move the mass of bodies as they run about between them and crash up against their stickier parts; or else they may be more entangled and obstructed, and may beat each other back and restrain each other mutually, and because they are incapable of moving this way or that way or moving at all, or only barely, they produce a motionless or sluggish mass. One thing may be legitimately assumed, namely that however much mobility may have been implanted in the atom, it continues to be the same always, so that atoms may indeed be restrained until they do not move, but not to the point that they do not strain and endeavor to disentangle themselves and renew their motion. To return to the matter of causation, how else could it be that there is such a great uniformity of motions and vicissitudes in the universe?

How would it happen that some things move perpetually and ceaselessly, that some are roused from their languor, and renew their motion after rest, that some dislodge themselves from themselves and fly off into the air, and so forth?

Nor is there any reason for you to persist in objecting that it makes no sense to join matter and its agent into one entity that would be therefore capable of making itself or being made by itself, and consequently would be both the artisan and the artifact, as if the house and its builder could be the same thing, and so forth. Let us examine if such an objection is valid. First, it produces a sort of absurdity, that is, the comparison of natural phenomena with an artificial thing. For in the case of the latter, the agent, which acts from the outside, is itself totally distinct from its material, nor can any part of the artifact be produced by itself; so the builder cannot be part of his material or part of the house, which is constructed of stone, quicklime, sand, and other things none of which he is and into which he does not mix himself. But in the former case the agent is held tight within the material and is distinct from the matter in part but not wholly, namely as far as it is the most mobile and active part of the entire matter, and moves and manages the rest in such a way that it is intermingled with it and composes a single artifact, whose chief part it remains, which it does not leave as the house builder does who lives away from his house as if he were a stranger to it.

Furthermore, the works of nature are not to be compared with those whose matter is totally inert or dead, but with those in which at least some part of the matter, if not all its parts, is not destitute of all motion and action. Therefore, if comparisons suit your taste, compare a work of nature with an army, not with a house, its material with the soldiers, not with stones, and its agent with the general, not with a builder. As you can see, although he is one of the military, the general still draws his entire army up by squadrons and companies and moves all his soldiers at a nod from himself, so that he is the noblest and principal part of the army even though at the same time he is one element of it along with the others. What! is it not so that if you imagined all

soldiers so well trained and so familiar with all the functions applying to themselves that each one kept himself in his rank and place and performed the requisite movements by himself as if he were commanded, you would understand how an army could bring itself into being, and have no other agent except the matter as a result of the purposeful motion of each part? Moreover, in their chapter, it will be said that the generation of living beings can be understood as happening in the same way because of a not dissimilar motion imbued in particular parts of the matter, that is the seeds. And indeed the whole question may indeed be comprehended as the same as if you attributed motion and intelligence to stones so that each one held itself in its place in the house being built, for in such system the thing would be both its matter and its artisan; but as I said, artificial things do not behave that way.

Moreover, I shall omit the fact that if any artifacts were to be compared with the works of nature, they would be automatons in which something internal acts to produce its own effects, something which is also a part of the matter of the artifact, in short a machine which as a result of its weight and resistance is the initiator of the actions which can be seen from the outside, like the striking of the hour in a clock, or the movement of its hands, or the walking of Daedalus' statues, or the flight of Archytas' dove, and such things.[41]

Will you then continue with the argument that the same thing cannot be both the mover and the object moved, that whatever is moved is moved by something else, and that such things are ordained? Now these questions do raise various difficulties for Aristotle, but not for the Stoics, who make the first cause mobile also according to Stobaeus, and not for Plato, who not only made the soul the cause of its own motion, but also deemed it immortal

[41] The name Daedalus designates a mythical sculptor and several historical ones, all noted for their extreme skill. Archytas, ca. 428–347 B.C., philosopher, scientist, geometer, and close friend of Plato, is credited by Aulus Gellius (*Attic Nights*, X, xii, 9) with the invention of a wooden flying machine in the shape of a dove, suspended on a cord.

since it moves itself eternally, nor for any others who assume that matter is the cause of its own motion and do not seek to find any principle of its motion outside of matter itself.[42] Certainly not even Aristotle denies that these speak "more scientifically" (*phusikôteron*) than the others by whom some form, or idea, is posited as the cause rather than matter.[43] And although he takes them to task because he believes that it is the part of matter merely to be passive and to be moved and that it belongs to another power to act and to move, and that likewise it is not water that makes an animal, but nature, just as it is not wood that makes a litter, but craftsmanship; nevertheless, he does not clear up why matter cannot be both the nature and the agent (I shall pass over the fact that water alone is not the material of an animal). And as far as art goes, I have just now spoken about it. For he persists that they act just as if they attributed the cause of things which are built to the saw and other instruments; it is certain that this does not follow since they do not consider matter inert as are saws and other things that do not move unless moved by others. And Aristotle's argument why the same thing cannot be both a mover and moved at the same time is that the same thing would itself be in act and in potential at the same time. But while he says that in the *Physics*, in the *Metaphysics* he teaches that an agent is at its greatest potential when it is acting in fact.[44] He also lays down this conclusion of his on the grounds that while "to move" and "to be moved" (*kinein, kai kineisthai*) are separate voices of the verb which should be attributed to distinct things, the one of which is active, the other passive, there is however nothing which is not one voice or the other (unless "to run" could be), by which we would designate that a thing either imparts motion to itself without there being something which acts upon it, as when it is said to move itself, or else it is the object of its own action, as when

[42] Stobaeus, *Eclogarum physicarum et ethicarum* [I, xiii, 1] and Plato, *Phaedo* [passim, especially 94C–D, 105B–E]. (G.'s note.)
[43] *On Generation and Corruption*, II, ix [335b]. (G.'s note.)
[44] *Physics*, VIII, vi, and *Metaphysics* XII, vi [1071b]. (G.'s note. Perhaps Gassendi had *Physics*, VIII, v, 257b in mind.)

it is said to be moved by itself.[45] Hence, while he does not deny that something may be moved by itself, for he explicitly concedes this concerning animals, he believes that there are always two parts, one of which moves, namely the spirit, and one of which is moved, namely the body. Nevertheless, when the spirit moves, is it not moved by itself? He says that it is moved, not by itself, but by accident, as a sailor is moved in consequence of the motion of the ship. But in the same way that the ship is not moved and he is not borne in consequence of the ship's motion unless he moves himself to steer the ship, so unless the spirit is moved by itself to impart motion to the body, the body is not moved nor is the spirit carried in consequence of the body's motion. Surely it is beyond all comprehension that one thing should move something else (no matter how much it may be in it or joined to it) if it remains unmoved in itself and then waits around to be moved in consequence of the other's motion.

And so since it is impossible to go on infinitely in a series of motions each one of which is moved by another, it seems absolutely necessary to come to a single first principle, not one which moves though unmoved, but one which is itself moved through its own action. For when Aristotle came to the unmoved mover, he clearly believed that it inspired motion only as a goal [i.e., by attraction], and therefore he denied it any real action upon moving things, or even any awareness of anything beyond itself. Having left the realm of natural sciences by this procedure, he denied that it was actually a mover. Leaving aside moral and metaphorical movers, it is clear that we are seeking that thing which is in every natural object which acts through its own agency and moves a first principle of action, or motion. For when a boy runs to an apple offered to him, what is needed to account for the apple's attraction to the boy is not just a metaphorical motion, but also most of all there must be a physical, or natural, power

[45] *Physics*, VIII, viii and *On the Heavens*, II, ii. (G.'s note. Both references seem wrong. Again Gassendi may be thinking of *Physics*, VIII, v. The existence of the middle voice in the Greek verb system makes the force of this argument particularly unimpressive.)

inside the boy by which he is directed and impelled toward the apple. Hence it may apparently be said most plainly that since the principle of action and motion in each object is the most mobile and active of its parts, a sort of bloom of every material thing and which is the same thing that used to be called form, and may be thought of as a kind of most rarefied tissue (*contextura*) of the most subtile and mobile atoms—it may therefore be said that the prime cause of motion in natural things is the atoms, for they provide motion for all things when they move themselves through their own agency and in accord with the power they received from their author in the beginning; and they are consequently the origin, and principle, and cause of all the motion that exists in nature. It gives me pleasure to report here what Lucretius has to say in these verses:

> For the prime parts of things are self-impelled;
> Next, those slightest bodies which then are jelled
> From atoms, yet most close to their impact
> Remain, move by their unseen blows attacked,
> And bounce 'gainst forms that somewhat greater are.
> So motion mounts up from atoms to jar
> Our human senses.[46]

He felt that the smallest solid objects, or molecules, are first made from atoms colliding into each other and that to the extent that they contained the impetus of more than one atom, they should be driven off in some direction, but yet that their movement should become somewhat more sluggish because of the cancellation and counteraction of the motions. Then as other atoms join on to them, the molecules become a little larger and move slower or faster in proportion to the motion of the newcomers. Again, as further atoms are added, the molecules constantly become bigger and bigger until they are perceptible and whatever motions they have can be observed. Finally, the object comes to the notice of the senses; and not only single atoms, but also somewhat larger clusters and masses are gradually united to

[46] *De rerum natura*, II [132–139]. (G.'s note.)

it and incorporated in it. In such a way all bodies, large as well as small, may be made and may execute particular motions and the actions peculiar to them in conformity with the fabric of the atoms. Hence it happens that whatever motion or action natural bodies have ought to be regarded as received from their atoms.

It would seem appropriate to speak here of fortune and fate; many count them among the second causes, fortune or chance being an accidental cause, fate, on the other hand, being a necessary cause. But fortune is not a proper cause at all; and whatever is accidental is ethical, not physical and is therefore related to men's knowledge or ignorance. Furthermore fate is really nothing other than natural causes insofar as they act on their own according to their innate powers. Anything beyond that is a matter of morality to the degree that it tends to impede human free will, or preserve it. Consequently it is more appropriate to relegate the whole subject to the ethics, where freedom will be discussed.

It would also seem appropriate to mention universal causes which concur with several particular causes to produce their effects, and which are sometimes called equivocal because they produce effects of a nature different from theirs, for example God produces mau, or the sun produces a frog, in contrast to particular causes, which are called univocal because they yield effects of their own nature, for example a man produces a man or a frog produces a frog. One should also mention concomitant causes, or co-effective causes, as these universal causes are sometimes known; for particular causes are so dependent upon them that they cannot function without them and are usually said to be subordinate to them in essence (as God works within all second causes, and as the sun is also thought to act upon all things beneath it). This holds true even when the particular causes are said to be subordinate by accident, that is, when something produced by other things can still act without them, for instance a father can reproduce without the grandfather, great-grandfather, and other forebears. And again, sometimes particular causes are called partial because they are not or cannot be total

when they are separate, for example the two parents in relation to their offspring. But what I have to say about these and similar considerations is either easy to understand or will be explained when the occasion arises to discuss them. Therefore, this shall be sufficient on the subject of causes.

The Physics. Section I

BOOK V. ON MOVEMENT AND CHANGE

Chapter Seven. How the qualities of compound objects can be produced by mutation, or alteration

To continue, then, with what remains of the subject we have begun; since it is change, or alteration, through which qualities are created in compound objects, one may well wonder how it happens that if it is true that the only material components of things are atoms and if the atoms have no qualities other than size, shape, and weight, or motion, as I have declared above—it may be wondered, I say, how it happens that so many other qualities are produced in things and reside in them, such as color, heat, taste, odor, and innumerable others. Indeed, if we accept the opinion of Anaxagoras, this question would seem easy to answer since among the individual *homoiomereis* [basic particles] some are colored, or warm, or have a taste or an odor, and so compound objects may show the same qualities. But since the atomists believe that they are not only unchangeable and unalterable, but also hold them lacking in qualities (*apoios*), except for those three attributes, it is not at all apparent how any change or alteration can take place through which the atoms will create qualities that they do not have themselves.

So, in order to relate the means by which they maintain that atoms produce in compound objects qualities that they lack themselves, one must above all have recourse to the very well known accessory qualities (*eventa*), for the trio size, shape, and weight are as I said, inherent qualities (*coniuncta*), not accessories.[47] Now the first accessory qualities to be attributed to atoms are two in number; for Leucippus and Democritus attribute to them not only association and dissociation; *sugkrisis kai diakrisis*, by which generation and corruption are accomplished, but also arrangement and position, *taxis kai thesis* (*ordo et situs*), by which change, in other words the creation of all qualities observed in compound objects, whether inherent or accessory, is affected. So Aristotle reports in his book *On Generation and Corruption*.[48] On the other hand, in the *Physics* he adds shape, *to schêma*, according to the theory of Democritus;[49] still since it is certain that shape is an inherent quality in atoms, rather than an accessory one, it may therefore be said that shape is to be counted among the second only insofar as it contributes to the variety of changes in conjunction with arrangement and position. Whatever the case, he repeats the same three in the eighth book of the *Metaphysics*, where he interprets the Abderian words that Democritus used when he taught that atoms differed in "*rhusmos*, that is shape, and *tropê*, that is position, and *diathêgê*, that is arrangement."[50] And in the first book, after saying the same thing, he uses letters to illustrate this sort of difference; "For," he says, "A and N are different in shape, AN and NA in arrangement, and Z and N in position."[51]

Epicurus, however, attributed position (or location), *thesis*, as the accessory quality according to Diogenes Laertius; arrangement, *taxis*, according to Sextus Empiricus; and both of them

[47] *Eventa* and *coniuncta* are Lucretius' terms for two kinds of accident, translating what Epicurus had called *symptômata* and *symbebêkota*.
[48] Book I, ii [315b]. (G.'s note.)
[49] Book I, v [188a]. (G.'s note.)
[50] Chapter ii [1042b]. (G.'s note. The air of Abdera, the home of Democritus, was alleged to induce stupidity.)
[51] Chapter iv [985b]. (G.'s note.)

according to Plutarch.[52] For we read that he said in the second book against Theophrastus that "colors are not innate to bodies but are created in accordance with certain arrangements and positions in relation to sight." Furthermore, according to Lactantius he attributes qualities to the two functioning together; for he says "[The atoms] combine in various arrangements and positions, just as the letters do, which although they are few in number, nonetheless produce innumerable words when brought together in different ways."[53] He also added shape, saying "For just as the letters have different shapes, so do the primary particles; some are rough, some are hooked, some are smooth."

Lucretius catalogues several qualities and lists them:

> Intervals, paths, attachments, weights, impacts
> Clashes, movements, order, position, shapes[54]

But surely he intended to give a special place to the inherent quality weight, which is implied by motions, clashes, and impact; and intervals and combinations belong in general to position, as passages (*viae*), or areas, do to arrangement. These qualities can be illustrated by the same example of letters since different forms may be produced as you combine letters or separate them and move them to the right or the left. Add to this, if you will, another inherent quality, namely size (for it contributes considerably to the variety of writing if you join a capital or a small letter to the others), and then you have the three inherent qualities and the two accessory ones, or the five general headings from which atoms create qualities which they lack. It is manifest that size and motion may be added from the fact that if it is asked for what reason light is so refined that it passes through glass while water and air do not, it does not seem that any better cause can be given than to say that the corpuscules of light are smaller, or have less size, than those of either water or air. Or if it is asked

[52] Sextus Empiricus, *Against the Physicists*; Plutarch, *Reply to Colotes*, I [1110c]. (G.'s note.)
[53] *The Divine Institutes*, III, vii. (G.'s note, by error for III, xvii.)
[54] *De rerum natura*, II, 726 and I, 685.

why moving air gives a sensation of coolness which is not felt in still air, again it will not seem that a more fitting cause can be given than to say that the corpuscules of air enter and penetrate the skin's pores because of their motion and produce the sensation, but they do not do this when they are at rest. If, however, you wish to retain only the three qualities of shape, arrangement, and position, you have no concept at all of how the different qualities can be produced from them singly or in combination.

Once again the simile of the letters is most apposite. For, as letters are the elements of writing, and as from them are produced first syllables, then words, sentences, orations, and books, so atoms are the elements of things from which first the tiniest concretions, or molecules, are formed, and then larger and larger ones, and minuscule bodies, bigger ones, and finally great big ones. And to extend the metaphor to the three headings of qualities, just as the different shapes of letters, for instance A and O, present different forms when we look at them and different sounds when we pronounce them, so the atoms, depending on whether they are sharp, or rounded, or of some other shape, when they strike the organs of our sight, hearing, smell, or the other senses will create different impressions on them, or appear as different qualities, which is the same thing. And just as the same letter put in a different position represents something different to both sight and hearing, for instance N and Z, or to cite Philoponus' example of small letters γ and λ, or in our alphabet b, d, p, and q; so the same atom put in a different position will have a different effect on the senses, for example if it is in the shape of a pyramid, sometimes it may penetrate point first, and sometimes land on its base. And as the same two letters or more when they precede or follow each other in different order suggest different words to the eye, the ear, and the mind, for example ET, TE, MUS, SUM, ROMA, ARMO, SIMUS, MUSIS, LAURUS, URSULA, and so on endlessly as those who play anagrams know; so the same atoms in various transpositions display different qualities, or appearances, to the senses. Finally, just as letters with no more shapes than the ones we find in the alphabet can produce an innumerable diversity

of words by the mere variation of their arrangement, so great a diversity indeed that they suffice not only for all the books heretofore written, but also for all those yet to be composed, so it is logical that atoms with their innumerable shapes in various compounds may produce a diversity of qualities, or appearances, far more innumerable beyond any proportion, I might even say infinitely more.

To cite an example, observe what Lucretius has to say when he explains the matter in these words:

> Hence it matters greatly which seeds are packed
> With which, in what positions, what motion
> Is imparted or received by impact.
> Knowing this, you'd frame a simple notion
> Of why objects once dark in color change
> Before our eyes to marmoreal sheen
> As when high winds the sea's smooth face derange
> And the hoary crescent billows careen.
> You could tell how this thing, which appears black,
> May be mixed with that matter, may array
> Its secret parts anew, pack and unpack
> New atoms, then behold, it's bright as day![55]

Clearly, when sea water foams, no other change takes place except in the position and shape of its parts formed into tiny bubbles; and the light reflected from them and borne to the eyes in rays that are less dense than under other circumstances creates the sensation of white, which ceases immediately when the bubbles vanish, as will be explained later in its place.

Again, to give you another example from color, take a cup of water, as hot as possible (to perform the experiment faster); immerse in it a handful of senna leaves; then stir in a few drops of the oil called tartar,[56] and you will see the water turn bright red on the spot. But what is the cause of this? For there was no such redness in the water, nor in the leaves, nor in the oil. But the water penetrates so deeply, and so separates and extracts the

[55] *De rerum natura*, II, 760–771.
[56] Bitartrate of potash.

tiniest particles of the leaves' substance by dispersing them, that when the particles of oil become mixed with the particles of water and senna, they change their composition and move their corpuscules so that light falling upon them from the outside, reflected and conveyed to the eyes, exhibits the appearance of that color. Do you wish to see this even more clearly? Instead of drops of this oil, stir in drops of copperas water, or vitriol, and the water does not get red at all. Why should this be so unless because this oil lacks the capacity to cut into something, move it around, and convert it? But stir a few drops of this oil in water in which you have immersed a handful of rose petals, and you will immediately see it turn red although it will not become red in the least if you stir in some oil of tartar instead. Does this not at least prove that red can be created from things that are not red simply by mixing them and changing the positions of their parts, in much the way that the same feathers on the neck of a dove change colors when they are moved among themselves and their position in relation to the light is changed? Similarly, as a piece of cloth is stretched and folded, as its threads change their position among themselves and in relation to the light, it appears to be of different colors.

Furthermore, to cite some examples from qualities of other sorts, touch both of these, namely vitriol and tartar, with your finger, and neither appears to be warm. Mix a few drops of the second into a certain amount of the first, and you will see the whole thing boil over and get extremely hot. How can this be when there is nothing new in the admixture that was not in the separate components? But here, on the contrary, it is obvious that the arrangement of the parts and their position has not been changed. A mutual severing and intermixture has taken place; then some air was absorbed causing the liquid to grow thinner, to foam, and turn spongy; then once the particles that had been compact had been separated and dissociated, the barbs of the corpuscules turn outward and when they strike the senses, they smart and produce in them the sensation, or quality, that we call heat. This shows at least that heat is created by things that are not

hot by mere mixture and transposition of their parts, as when hairpins piled up in a heap are prickly in every direction but are smooth to the touch when they are arranged in small bundles, much like hedgehogs. You may touch the quills of a hedgehog when they are flattened against the skin without harm, but not when they bristle and stand up.

Lastly, to present an illustration that is more familiar, look at an apple as it is rotting and a part of it is still left good. I ask you how great is its diversity in color, odor, taste, softness, and other qualities? What is the origin of this unless it is that the particles, or corpuscules, so changed their position in relation to each other because the part of the apple that rotted was touched, bruised, or bitten into, that they display different qualities from the healthy part's, which, however, will show similar ones in a short time, assuming that the position of its parts has been rearranged in the same way. Now I ask, after it has rotted, what particles or corpuscules will it be made of except the ones it is made up of when it is healthy? If you said that certain parts melt away in evaporation and that others are absorbed from the air, that would be all right; for the rot would follow merely from these evaporations or absorptions and other alterations, and thus the color would become dark, the odor offensive, the taste bitter, the flesh soft, and everything else of the sort, although earlier it presented another appearance. But hundreds of such examples may occur to any man's mind, and from them it is quite clear how wholly appropriate is the comparison with letters which Lucretius injects as follows (two verses already quoted concerning accessory qualities have been included here):

> In these lines of ours it makes a diff'rence
> What letters are placed with which, what sequence
> They take; for now they spell the sky, the seas,
> The earth, sun, rivers, now fruit, now the trees,
> Living things. If they are not all the same,
> Most are alike, though in different frame.
> So nature's material things, when
> Intervals, paths, attachments, weights, impacts

> Clashes, movements, order, position, shapes
> Are changed, the objects too must change again.[57]

From these verses we may see quite clearly what doctrines were held by not only Epicurus, and Lucretius after him, but also by Democritus. To begin with Epicurus, these are his words to Herodotus, according to our interpretation of them: "Now, to turn to the matter of the atoms, we must conclude that none of the qualities of common appearances belong to them except shape, weight, and size (and also any quality which has a necessary connection with shape, for instance, sharpness or smoothness). On the other hand, other qualities, such as color or heat, change in relation to variations in the atoms' position, and therefore are not inherent in the atoms themselves, nor do they belong to their nature at all. But no quality that exists in them, that is no quality peculiar to their nature, as the three just named may be considered, is subject to change; nor are these atoms in any way subject to change, for in the dissolution of compound objects something solid and unimpaired necessarily remains since it is manifest that changes may not take place in nothing, or out of nothing, but rather take place sometimes as a result of the transposition of several atoms which display one quality in one arrangement and another in a second arrangement, sometimes as the result of the accretion of new atoms and the removal of some of those previously present, which makes the qualities change again, or appear different from what they had been. It follows from this that things whose parts cannot be transposed, or which cannot grow larger or be separated into components, i.e., the atoms, are indestructible, and at the same time their inherent qualities, or natural properties, which do not have a nature subject to change, are indestructible, namely their tiny masses, or their minuscule sizes, and minute shapes inherent in them and peculiar to them. Obviously it is these qualities which necessarily remain the same along with the substance of the atoms in dissolution.

[57] *De rerum natura*, II, 1015–1016; I, 820–821; II, 1017–1019; II, 726; I, 685; II, 1021–1022.

Surely in things which we commonly change by our willpower, as when a man goes from a standing, or upright, position to one sitting, or with his limbs contracted (if you wish, you may add that he is black-skinned or is warm), the same size is still understood to be inherent in him, and the same shape, or disposition of his parts, is understood to apply to him; but qualities that are not in fact inherent and characteristic (for example, the standing position, uprightness, white skin, coldness, etc.) do not remain unchanged in the changing subject, as those others do, but pass on from the whole body, or the part of it they occupy. And so, if these two, to wit shape and size, and with them weight, or the natural impetus to motion, remain in the atoms (since some things must remain and something cannot disappear totally into nothing), they are enough to account for all the variety of solid objects." Those are the words of Epicurus.[58] . . .

[*Several pages are omitted here in which Gassendi quotes at length, over half of verses II, 730–864, Lucretius' reasons for believing atoms colorless.*]

It remains to speak in a word about the general types of change or alteration. I say general types, for as there are innumerable specific types, there would be no end to cataloguing them. Aristotle treated change in the entire book which Galen and Olympiodorus consider the fourth book of the *Meteorologica* and Alexander considers the third book of *On Generation and Corruption* instead,[59] but he discussed only changes that apply to touch and those which depend on heat, cold, and the other qualities of the commonly accepted four elements; and therefore he did not speak of the general ways by which heat, cold, and other qualities may appear in these elements. On this subject, it may be observed that Plutarch appears to prefer Plato and

[58] Diogenes Laertius, X, 54–55. Gassendi gives a Latin translation only of the original Greek. In it he expands somewhat, especially in the illustrations offered in the second half.

[59] Galen, *On the Natural Faculties*, I, iii [9?]; Alexander of Aphrodisias, Commentary on *Physical Problems*, III, 14 III, xvi. (G.'s note. The book in question is Book IV of the *Meteorologica*, Loeb edition.)

Democritus to Aristotle since he commends them because they did not stop their speculation at mere earth and fire when seeking the causes of heat and weight, but reducing sensible things to primary elements that can be contemplated by the mind alone, they had proceeded to the smallest things, the very seeds as it were.[60] Moreover, in the *Timaeus* Plato discusses some types of change, tracing them from the smallest particles back to the changes; but he does not list the general types, according to which both those changes and others he omits can be deduced. As far as Democritus is concerned, both he and Leucippus taught that qualities originate from the arraugement, position, and shape of atoms, as I pointed out a little earlier; but they also seem to have said in what three general ways these may vary, thereby designating at the same time the general types of change.

Epicurus listed these in the text quoted from the letter to Herodotus, when he taught that qualities all originate either from the transposition of the same parts, or atoms, or from the arrival of new ones, or from the departure of those formerly present. Lucretius gives an illustration from touch and the passions generated in it:

> For touch, by God's holy power, yes touch,
> Is the body's sense, whether some things hit
> It from outside, or are borne away, such
> As the phallic joys of Venus exit,
> Or when some shock pitches our body's seed
> In disarray and confounds our senses
> As you may feel yourself and know indeed
> By striking hard some limb.[61]

With these in mind, changes can he explained; of the first type, by transposition, are liquefaction, solidification, putrefaction, and the like; of the second type, by addition, are nutrition, growth, moistening, and the like; of the third type, by loss, are drying, distillation, precipitation, and countless others. Nonetheless, there is scarcely any form of change which is accomplished

[60] *On the Principle of Cold* [948C]. (G.'s note.)

[61] *De rerum natura*, II, 434–441.

by action of only one type, and not by two or even all three. For instance, when something turns to liquid, not only do its parts change their positions, but also some are absorbed from the fire, and some of the more rarefied ones depart from the melting substance, and so for other changes. Consequently when one type is said to be the correct one for a single kind of change, it should be understood merely as the principal and dominant one.

It might appear that the principal forms of change would logically be designated and explained at this point; but since all changes end up as qualities, and since the next Book will be devoted to those qualities, whatever comes to mind to be said about their varieties should be understood as being said also about the varieties of change.

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