PART ONE

Good sense* is the most evenly distributed thing in the world; for everyone believes himself to be so well provided with it that 2
even those who are the hardest to please in every other way do not usually want more of it than they already have. Nor is it likely that everyone is wrong about this; rather, what this shows is that the power of judging correctly and of distinguishing the true from the false (which is what is properly called good sense or reason) is naturally equal in all men, and that consequently the diversity of our opinions arises not from the fact that some of us are more reasonable than others, but solely that we have different ways of directing our thoughts, and do not take into account the same things. For it is not enough to possess a good mind; the most important thing is to apply it correctly.* The greatest minds are capable of the greatest vices as well as the greatest virtues; those who go forward but very slowly can get further, if they always follow the right road, than those who are in too much of a hurry and stray off it.*

For myself, I have never presumed my mind to be any way more accomplished than that of the common man. Indeed, I have often wished that my mind was as fast, my imagination as clear and precise, and my memory as well stocked and sharp as those of certain other people. And I personally know of no any other mental attributes that go to make up an accomplished mind;* for, as regards reason or good sense (insofar as it is the only thing that makes us human and distinguishes us from brute beasts), I am ready to believe that it is altogether complete in every one of us, and I am prepared to follow in this the agreed doctrine of those philosophers who say that differences of degree apply only to *accidents*, and not to *forms* or natures of 3
individuals of the same *species*.*

But I venture to claim that since my early youth I have had

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the great good fortune of finding myself taking certain paths that have led me to reflections and maxims from which I have fashioned a method* by which, it seems to me, I have a way of adding progressively to my knowledge and raising it by degrees to the highest point that the limitations of my mind and the short span of life allotted to me will permit it to reach. For I have already reaped so many fruits from this method that I derive the highest satisfaction from the progress that I believe myself already to have made in my pursuit of truth, in spite of the fact that in appraising my own achievements I try always to err on the side of caution rather than that of presumption, and that when I cast a philosopher's eye over the various actions and undertakings of mankind, there is hardly a single one that does not seem to me to be vain and futile.* And I conceive such hopes for the future that if, among the purely human occupations,* there is one that is really good and important, I venture to believe that it is the one that I have chosen.

It is, however, possible that I am wrong, and that I am mistaking bits of copper and glass for gold and diamonds. I know how likely we are to be wrong on our own account, and how suspect is the judgement of our friends when it is in our
4 favour. Nonetheless, in this essay I shall gladly reveal the paths I have followed and paint my life as it were in a picture, so that everyone may come to a judgement about it; and from hearing the reactions of the public to this picture,* I shall add a new way of acquiring knowledge to those which I habitually employ.

So my aim here is not to teach the method that everyone must follow for the right conduct of his reason, but only to show in what way I have tried to conduct mine.* Those who take it upon themselves to give direction to others must believe themselves more capable than those to whom they give it, and bear the responsibility for the slightest error they might make. But as I am putting this essay forward only as a historical record, or if you prefer, a fable, in which among a number of

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examples worthy of imitation one may also find several which one would be right not to follow, I hope that it may prove useful to some people without being harmful to any, and that my candour will be appreciated by everyone.

I was educated in classical studies* from my earliest years, and because I was given to believe that through them one could acquire clear and sure knowledge of everything that one needed in life, I was extremely eager to acquire them. But as soon as I had finished my course of study, at which time it is usual to be admitted to the ranks of the well educated, I completely changed my opinion, for I found myself bogged down in so many doubts and errors, that it seemed to me that having set out to become learned, I had derived no benefit from my studies, other than that of progressively revealing to myself how ignorant I was. And yet I was a pupil of one of the most famous schools in Europe, in which I believed that there must be as learned men as are to be found anywhere on earth. There I had learnt everything that others were learning; and not just content with the subjects that we were taught, I had even read all the books that fell into my hands on subjects that are considered the most occult and recondite.* Moreover, I knew what assessment others had made of me, and realized that I was not thought inferior to my fellow pupils, even though several among them had already been singled out to take the place of our teachers. And finally, our age seemed to me to be as flourishing as any preceding age, and to abound in as many great minds. This emboldened me to judge all others by myself, and to think that there was no body of knowledge on earth that lived up to the expectations I had been given of it.

I did not, however, cease to hold the school curriculum in esteem. I know that the Greek and Latin that are taught there are necessary for understanding the writings of the ancients; that fables stimulate the mind through their charm; that the memorable deeds recorded in histories uplift it, and they help form our judgement when read in a discerning way; that reading good books is like engaging in conversation with the most

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cultivated minds of past centuries who had composed them, or rather, taking part in a well-conducted dialogue in which such minds reveal to us only the best of their thoughts; that oratory is incomparably powerful and beautiful, and that poetry pos-
6 sesses delightful delicacy and charm;* that mathematics has very subtle techniques that can be of great use in satisfying curious minds, as well as in coming to the aid of all the arts, and reducing human labour; that books on morals contain highly instructive teachings and exhortations to virtue;* that theology charts our path to heaven; that philosophy provides us with the means of speaking *plausibly* about anything and impressing those who are less well instructed; that law, medicine, and other disciplines bring to those who profess them riches and honours;* and finally, that it is worthwhile to have studied all of these branches of knowledge, even the most superstitious and false, in order to learn their true value and avoid being deceived by them.

But I then decided that I had devoted enough time both to the study of languages and to the reading of the books, histories, and fables of the classical world. For conversing with those of another age is more or less the same thing as travelling. It is good to know something of the customs of different peoples in order to be able to judge our own more securely, and to prevent ourselves from thinking that everything not in accordance with our own customs is ridiculous and irrational, as those who have see nothing of the world are in the habit of doing. On the other hand, when we spend too much time travelling, we end up becoming strangers in our own country; and when we immerse ourselves too deeply in the practices of bygone ages, we usually remain woefully ignorant of the practices of our
7 own time. Moreover, fables make us conceive of events as being possible where they are not; and even if the most faithful of accounts of the past neither alter nor exaggerate the importance of things in order to make them more attractive to the reader, they nearly always leave out the humblest and least illustrious historical circumstances, with the result that what

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remains does not appear as it really was, and that those who base their behaviour on the examples they draw from such accounts are likely to try to match the feats of knights of old* in tales of chivalry and set themselves targets beyond their powers.

I held oratory in high esteem, and loved poetry, but I looked upon both as gifts of the mind rather than fruits of study. Those who reason most powerfully and are the most successful at ordering their thoughts so as to make them clear and intelligible will always be best able to persuade others of what they say, even if they speak in the thickest of dialects* and have never learned any rhetoric. And those whose linguistic expression is the most pleasing and who frame their thoughts in the most eloquent and agreeable way would always end up being the best poets, even if they did not know a single rule of poetic composition.

I was most keen on mathematics, because of its certainty and the *incontrovertibility** of its proofs; but I did not yet see its true use. Believing as I did that its only application was to the mechanical arts,* I was astonished that nothing more exalted had been built on such sure and solid foundations; whereas, on the other hand, I compared the moral works of ancient pagan writers to splendid and magnificent palaces built on nothing 8
more than sand and mud. They exalt the virtues, and make them seem more worthy of esteem than anything else on earth; but they do not give sufficient indication of how to learn about them; and what they call by such a fine name is in many cases no more than lack of human feeling, pride, despair, or parricide.*

I revered our theology and hoped as much as anyone to reach heaven; but having learnt as an established fact that the path to heaven is as open to the most ignorant as to the most learned, and that the revealed truths that lead there are beyond our understanding, I would not have dared submit them to my own puny reasoning powers, and believed that in order to engage in the task of studying them, it was indispensable to

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have some extraordinary assistance from heaven, and to be more than merely human.*

I shall not say anything about philosophy except that, when I realized that it had been cultivated by the best minds for many centuries, and that nevertheless there is nothing in it that is not disputed and consequently is not subject to doubt, I was not so presumptuous as to hope to succeed better than others; and that seeing how different learned men may defend different opinions on the same subject, without there ever being more than one which is true, I deemed anything that was no more than *plausible** to be tantamount to false.

As for the other disciplines, in so far as they borrow their
9 principles from philosophy, I concluded that nothing solid could have been built on such shaky foundations. Nor was the honour and the profit they held in prospect enough to persuade me to study them; for I considered myself, through the favour of providence, as not being in the position of having to earn my living from a learned profession for the betterment of my fortune; and although I did not go about sneering at worldly glory as is the habit of Cynics,* I nonetheless held that sort of glory, to which I could never hope to have a true claim, in low esteem. Finally, as for the low sciences,* I felt that I already knew well enough what they were worth to avoid falling for any of the promises of an alchemist, the predictions of an astrologer, the impostures of a magician, or the tricks and boasts of those who profess to know more than they do.

That is why, as soon as I reached an age that allowed me to escape from the control of my teachers, I abandoned altogether the study of letters. And having decided to pursue only that knowledge which I might find in myself or in the great book of the world, I spent the rest of my youth travelling, visiting courts and armies, mixing with people of different character and rank, accumulating different experiences, putting myself to the test in situations in which I found myself by chance, and at all times giving due reflection to things as they presented themselves to me so as to derive some benefit from them. For it

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seemed to me that I could discover much more truth from the reasoning that we all make about things that affect us and that 10
will soon cause us harm if we misjudge them, than from the speculations in which a scholar engages in the privacy of his study, that have no consequence for him except insofar as the further they are from common sense, the more he will be proud of them, because he has had to use so much more ingenuity and subtlety in the struggle to make them *plausible*. And I constantly felt a burning desire to learn to distinguish the true from the false, to see my actions for what they were, and to proceed with confidence through life.

It is true that while I was thinking about the customs of other men and nothing else, I found little to provide me with certain knowledge; I observed in them as much diversity as I had found earlier among the opinions of the philosophers. And so the greatest benefit I derived from these observations was that when I was confronted by things which, although they seem to us very extravagant and ridiculous, are nevertheless widely accepted and approved of by other great nations, I learned not to believe too firmly in anything that only example and custom had persuaded me of.* So it was that I freed myself gradually from many of the errors that can obscure the natural light of our minds, and make them less able to see reason. But after having spent several years studying the book of the world and trying to acquire some experience of life, I took the decision one day to look into myself and to use all my mental powers to choose the paths I should follow. In this it seems to me that I have had much more success than if I had 11
never left either my country or my books.

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PART TWO

At that time I was in Germany, where I had been called by the wars that have not yet come to an end there; as I was returning to the army from the coronation of the emperor, I was halted by the onset of winter in quarters where, having no diverting company and fortunately also no cares or emotional turmoil* to trouble me, I spent the whole day shut up in a small room heated by a stove, in which I could converse with my own thoughts at leisure.* Among the first of these was the realization that things made up of different elements and produced by the hands of several master craftsmen are often less perfect than those on which only one person has worked. This is the case with buildings which a single architect has planned and completed, that are usually more beautiful and better designed than those that several architects have tried to patch together, using old walls that had been constructed for other purposes. This is also the case with those ancient cities, that in the beginning were no more than villages and have become, through the passage of time, great conurbations; when compared to orderly towns that an engineer designs without constraints on an empty plain,* they are usually so badly laid out that, even though their buildings viewed separately often display as much if not more artistic merit as those of orderly towns, yet if one takes into consideration the way they are disposed, a tall one here, a low one there, and the way they
12 cause the streets to wind and change level, they look more like the product of chance than of the will of men applying their reason. And if one considers further that there have always been officials whose task it was to ensure that the design of private buildings should contribute to the beauty of the town as a whole, it will become clear how difficult it is to carry anything through to completion when working only with what others have produced. This led me to the view that those

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nations who were once half-savage and only gradually became more civilized, and whose legislation was forced on them by acts of criminal mischief and legal disagreements, could not be as well governed as those which, from the first moment of their coming together as a nation, observed the constitution laid down by a prudent lawgiver; in the same way, it cannot be doubted that a state which has embraced the true religion whose laws God alone has made must be incomparably better governed than any other. To return to human affairs, I believe that if Sparta once flourished greatly, it was not because of the particular excellence of each one of its laws (seeing that many were very strange and even contrary to good morals*), but because having all been laid down by one man,* they were all directed to a single end. And so I came to believe that book-learning, or at least learning whose rational foundations are no better than *generally approved*, and which contains no real proof, is not as close to the truth, composed as it is of the opinions of many different people, as the simple reasoning that any man of good sense can produce about things in his pur- 13
view. And so, although I came to believe that, because we were children before we were men, and because for a long time we were governed by our appetites and our teachers (the former being often in conflict with the latter, with neither giving the best advice in every case), it is almost impossible that our judgements are as pure or as solid as they might have been if we had had full use of our reason from the moment of our birth, and had been guided by that alone.*

Admittedly, we do not see people pulling down all the houses of a town for the sole purpose of reconstructing them differently in order to embellish the streets; but we do see many people having their own houses demolished in order to rebuild them, and may note that they are even sometimes forced to do so when the buildings are in danger of falling down of themselves or their foundations are insecure. This example convinced me that it would not be reasonable for an individual to set out to reform a state by changing everything

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from the foundations up, and overthrowing it in order to rebuild it, or even to set out to reform the body of knowledge or the established order in schools for teaching it;* but rather, as far as all the opinions I had hitherto accepted were concerned, I could do no better than to set about ridding myself of them once and for all, with a view to replacing them afterwards
14 either with better ones, or even the same ones, once I had tested them with my reason and ensured that they were set straight. I firmly believed that by these means I would manage to order my life better than if I built on old foundations and relied only upon old principles which had been inculcated in me when young, without my ever having sought to find out whether they were true. For although I could see a number of difficulties in all this, they were not unsurmountable; nor did they compare with those which are found in the smallest reform affecting the body public. Such a great body is too hard to rebuild if once destroyed, or even to keep standing if once shaken, and its fall cannot be anything other than very heavy. Moreover, as for any imperfections such bodies may have (and their very diversity is sufficient to ensure that some at least will have imperfections), custom may have considerably attenuated them, and even managed to circumvent or imperceptibly to correct many that could not have been so well remedied through the exercise of political judgement.* Finally, these imperfections are nearly all more bearable than change, in the same way that highways that wind their way between mountains become in the end so smooth and easy through use that it is much better to follow them than to attempt to seek a straighter path, by climbing over rocky promontories and plunging down into deep valleys.

That is why I could not possibly approve of those meddlesome and restless spirits who are called neither by birth nor by riches to take part in public affairs, yet are forever plotting
15 some reform. And if I thought that there was anything whatsoever in this essay that could lead me to be suspected of the same folly, I should be very loath to allow it to be published.

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My project has never extended beyond wishing to reform my own thoughts and build on a foundation which is mine alone. And if my work has pleased me enough for me to reveal to you here what it is based on, I do not want for all that to suggest that anyone should copy it. Those on whom God has bestowed His grace in greater measure will perhaps have more lofty designs;* but I very much fear that mine may already be too bold for many. Even the decision to rid oneself of all the opinions one has hitherto accepted is not an example which everyone ought to follow. The world is made up almost entirely of two sorts of minds to which such a course of action is wholly unsuitable. First, there are those who, believing themselves cleverer than they are, cannot stop themselves jumping to conclusions, and do not have enough patience to govern their thoughts in an orderly way, with the result that once they have allowed themselves to doubt accepted principles and stray from the common path, they would never be able to keep to the road that one must take to proceed in the right direction, and would remain lost all their lives. Second, there are those who, having enough sense or modesty to realize that they are less capable of distinguishing the true from the false than certain others by whom they could be guided, must content themselves with following the opinions of these others rather than seeking better ones from themselves.*

As for myself, I would perhaps have been in this second 16
category if I had only had one teacher, or if I had not known about the differences of opinion that have always existed among the most learned. But having already discovered at school that there is no opinion so bizarre and incredible that has not been uttered by some philosopher or other,* and having come later in the course of my travels to the realization that all those who have opinions that are diametrically opposed to ours are not on that account barbarians or savages, but that among their number there are many who make use of their reason as much or more than we do; and having considered how a given man with a given mind, brought up since childhood

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among the French or the Germans, develops differently from the way he would if he had always lived among the Chinese or among cannibals, and how even down to our fashion of dress, the very thing that pleased us ten years ago and may perhaps please us in ten years' time at present seems outlandish and ridiculous to our eyes (this is because we are much more swayed by custom and example than any certain knowledge; and yet the *majority view** is of no value as proof of truths which are difficult to discover, because they are much more likely to be discovered by one man by himself than by a whole people); for all these reasons, I could not choose any one person whose opinions struck me as preferable to those of others, and I found myself forced, as it were, to provide for myself my own guidance.

But like a man walking by himself in the dark, I took the
17 decision to go so slowly and to exercise such caution in everything that even if I made very little progress, I would at least be sure not to fall. I did not even wish to begin by rejecting absolutely all the opinions that might have slipped into my mind without having been introduced there by reason, until I had first spent enough time planning the work I was undertaking and searching for the true method of arriving at the knowledge of everything that my mind was capable of grasping.

In earlier years I had made some study of logic in the philosophy course, and of geometrical analysis and algebra in mathematics, three arts or branches of knowledge that seemed destined to contribute to my plan. But, on examining them, I noted, in the case of logic, that its syllogisms and most of its other techniques are employed more to explain things to other people that one knows already or even, as in the art of Lull, to speak injudiciously about those of which one is ignorant, than to learn anything new.* And although logic really does contain many very true and excellent precepts, there are so many others mixed in with them that are either harmful or superfluous, that it is almost as difficult to separate the former from the latter as it is to extract a statue of Diana or Minerva from a

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rough block of marble.* As for ancient geometrical analysis and modern algebra, even apart from the fact that they deal only in highly abstract matters that seem to have no practical application, the former is so closely tied to the consideration of figures that it is unable to exercise the intellect without greatly 18
tiring the imagination, while in the latter case one is so much a slave to certain rules and symbols that it has been turned into a confused and obscure art that bewilders the mind instead of being a form of knowledge that cultivates it.* This was why I thought that another method had to be found which retained the advantages of all three but was free from their defects. And just as a great number of laws is often a pretext for wrongdoing, with the result that a state is much better governed when, having only a few, they are strictly observed; so also I came to believe that in the place of the great number of precepts that go to make up logic, the following four would be sufficient for my purposes, provided that I took a firm and unshakeable decision never once to depart from them.

The first was never to accept anything as true that I did not *incontrovertibly* know to be so; that is to say, carefully to avoid both *prejudice* and premature conclusions; and to include nothing in my judgements other than that which presented itself to my mind so *clearly* and *distinctly*, that I would have no occasion to doubt it.*

The second was to divide all the difficulties under examination into as many parts as possible, and as many as were required to solve them in the best way.

The third was to conduct my thoughts in a given order, beginning with the *simplest* and most easily understood objects, and gradually ascending, as it were step by step, to the knowledge of the most *complex*; and *positing** an order even on those which do not have a natural order of precedence.* 19

The last was to undertake such complete enumerations and such general surveys that I would be sure to have left nothing out.*

The long chains of reasonings, every one simple and easy,

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which geometers habitually employ to reach their most difficult proofs had given me cause to suppose that all those things which fall within the domain of human understanding follow on from each other in the same way, and that as long as one stops oneself taking anything to be true that is not true and sticks to the right order so as to deduce one thing from another, there can be nothing so remote that one cannot eventually reach it, nor so hidden that one cannot discover it.* And I had little difficulty in determining those with which it was necessary to begin, for I already knew that I had to begin with the simplest and the easiest to understand; and considering that of all those who had up to now sought truth in the sphere of human knowledge, only mathematicians have been able to discover any proofs, that is, any certain and *incontrovertible* arguments, I did not doubt that I should begin as they had done. Nor did I expect any other usefulness from this, than to accustom my mind to nourish itself on truths and reject false reasonings. Yet I did not, for all that, intend to study all those particular branches of knowledge which habitually go under
20 the name of mathematics;* I saw that, although their objects were different, they nevertheless all concurred insofar as they only took into consideration the different relations or proportions to be found among these objects, and I came to think that it was best for me to examine only these proportions in general,* without *supposing* their existence except in those areas of enquiry which would serve to make my knowledge of them easier; and moreover, not to restrict them to those areas, in order to be better able to apply them thereafter to everything else to which they might be applied. Then, having noted that, in order to know them, I would sometimes need to think about them separately, and sometimes only bear them in mind, or consider many together, I came to the view that, in order to consider these proportions best separately, I had to suppose them to hold between lines, because I found nothing simpler nor more capable of being distinctly represented to my imagination* and to my senses. But for the purpose of

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retaining them in my memory, or grasping several together, it was necessary for me to designate them by the briefest possible symbols;* by this means I would borrow what was best from geometrical analysis and algebra, and would correct all the defects of the one by the other.

And indeed, I venture to claim that the scrupulous observance of the few precepts I had chosen gave me such ease in unravelling all the questions covered by these two branches of knowledge that in the two or three months I spent investigating them,* having begun with the simplest and most general (every truth that I discovered being a rule that I used 21
afterwards to find others), not only did I solve some which I had earlier judged very difficult, but it also seemed to me, towards the end of this period, that I was able to determine, even in respect of those questions which I had not solved, by what means and to what extent it was possible to solve them. In claiming this I will appear perhaps less conceited to you if you consider that, as there is only one truth of any one thing, whoever finds it knows as much as can be known about it, and that, for example, a child trained in arithmetic who does a sum according to the rules can be quite certain of having discovered everything the human mind can find out about the sum in question. In short, the method that teaches one to follow the correct order and to enumerate all the factors of the object under examination, contains everything that confers certainty on arithmetical rules.

But what pleased me most about this method was that, through it, I was certain in all cases to employ my reason, if not perfectly, then at least to the best of my ability; moreover, I believed that, in practising it, my mind was gradually getting used to conceiving of its objects more clearly and distinctly, and that not having set it to work on any particular matter, I was able to set myself the task of applying it just as usefully to the problems of other branches of knowledge* as I had done to those of algebra. Not that I ventured, for all that, to examine all the problems I might come across; for that would have been

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contrary to the order prescribed by my method. But having noted that the principles of each branch of knowledge must of
22 necessity all be borrowed from philosophy, in which I could still find no certain principles, I came to think that it was first necessary for me to try to establish some; and that this being the most important thing in the world and one in which undue haste and preconceptions were most to be feared, I thought that I ought not to attempt to carry this task through to completion until I had reached a much more mature age than the twenty-three years I then was, and until I had spent considerable time in preparing myself for the task, as much by rooting out of my mind all the false opinions I had accepted up to then, as by amassing a large number of experiences to serve afterwards as the matter of my reasoning, and by continually practising my chosen method in order to strengthen my grasp of it.

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PART THREE

Finally, just as it is not enough, before beginning to rebuild the house in which one lives, to do no more than demolish it, make provision for materials and architects, or become oneself trained as an architect, or even to have carefully drawn up the plans, but one must also provide oneself with another house in which one may be comfortably lodged while work is in progress; so also, in order not to remain indecisive in my actions while my reason was forcing me to be so in my judgements, and to carry on living from then on as happily as I could, I formed a provisional moral code* for myself consisting in only three or four maxims, which I should like to share with you.

The first was to obey the laws and customs of my country,* 23
and to adhere to the religion in which God by His grace had me instructed from my childhood, and to govern myself in everything else according to the most moderate and least extreme opinions, being those commonly received among the *wisest* of those with whom I should have to live. For, having begun already to discount my own opinions because I wished to subject them all to rigorous examination, I was certain that I could do no better than to follow those of the wisest. And although there may be as many wise people among the Persians and the Chinese as among ourselves, it seemed to me that the most useful thing to do would be to regulate my conduct by that of the people among whom I was to live; and that for me to know what their opinions really were, I had to take note of what they did rather than what they said,* not only because in the present corrupt state of our morals few people are willing to declare everything they believe, but also because some do not even know what they believe; for the mental act by which we believe something, being different from that act by which we know that we believe it,* often results in one act being present without the other. And I chose only the most moderate

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among many opinions which were equally widely received, as much because these are always easiest to practise and likely to be the best (excesses all being usually bad) as to wander less far from the true path in case I should be wrong, and that having followed one extreme, it transpired that I should have followed
24 the other. And in particular, I placed in the category of these excesses all personal commitments by which one relinquishes some of one's freedom. Not that I disapprove of the laws that, in order to counteract the inconsistency of those who are weak-minded, permit men to make verbal undertakings or contracts which bind them not to break them (in cases where they have some worthy plan, or even, to guarantee the security of commerce, some plan which is no more than morally indifferent); but, because I saw nothing in this world which remained always in the same state, and because in my own case I set myself the task of gradually perfecting my judgements and not of making them worse, I would have seen myself as sinning against good sense if, having once approved of something, I should have found myself obliged to take it to be good later on, when it might have ceased to be so, or I might have ceased to consider it so.

My second maxim was to be as firm and resolute in my actions as I could, and to follow no less constantly the most doubtful opinions, once I had opted for them, than I would have if they had been the most certain ones.* In this I imitated those travellers who, finding themselves lost in a forest, must not wander in circles first to one side then to the other, and still less stop in one place, but have to walk as straight as possible in one direction, and not alter course for weak reasons, even if it might only have been chance which had led them to settle on the direction they had chosen; for by this means, even if they do not end up precisely where they want to be, they will even-
25 tually reach somewhere where they will most likely be better off than the middle of a forest. And, in the same way, as in life we must often act without delay, it is a very certain truth that when it is not in our power to determine which the truest

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opinions are, we should follow those which are most likely to be true, and even though we might see no more *probability** in some rather than others, we must nevertheless opt for one set, and thereafter consider them not as being doubtful, insofar as they relate to the practice of life, but as altogether true and certain, because the reasoning that led us to opt for them is true and certain. This maxim was able from then on to free me from all the regret and remorse that usually troubles the consciences of weak and vacillating minds, who are inconsistent and allow themselves to follow certain practices as though they were good, that they later judge to be bad.

My third maxim was to endeavour always to master myself rather than fortune, to try to change my desires rather than to change the order of the world, and in general to settle for the belief that there is nothing entirely in our power except our thoughts, and after we have tried, in respect of things external to us, to do our best, everything in which we do not succeed is absolutely impossible as far as we are concerned.* This alone seemed to me to be sufficient to prevent me from desiring anything in future which I could not obtain, and thereby to make me content. For as our will is naturally inclined to desire 26
only those things which our intellect represents to it as possible in some way, it is certain that if we consider all external goods as being equally beyond our power, we shall not feel any more regret at failing to obtain those which seem to be our birthright when deprived of them through no fault of our own, than we shall for not possessing the kingdoms of China and Mexico; and by making a virtue out of necessity, as the saying goes, we shall no more desire to be healthy when we are ill or free when we are in prison, than we do now to have bodies made of matter as incorruptible as diamonds or wings to allow us to fly like birds. But I admit that it takes long practice and reiterated periods of meditation* to make oneself used to seeing things from this angle; and I believe that it is principally in this that lay the secret of those philosophers who were able in earlier times to escape the tyranny of fortune and, in spite of

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suffering and poverty, to rival their gods in happiness.* For through constant reflection on the limits laid upon them by nature, they convinced themselves so completely that nothing was in their power other than their thoughts, that this conviction alone was sufficient to prevent them from having any desire for anything else; and they controlled their thoughts so effectively that they thereby believed themselves with some reason to be richer, more powerful, freer, and happier than any
27 other men who, not having this philosophy, never have this control over their desires, however favoured by nature and fortune they may be.*

Finally, as a conclusion to this moral code, I decided to review the various occupations that men have in this life, in order to try to select the best one. Without wishing to pass judgement on the occupations of others, I came to the view that I could do no better than to continue in the one in which I found myself, that is to say, to devote my life to the cultivation of my reason and make such progress as I could in the knowledge of the truth following the method I had prescribed for myself. I had experienced such great joy since I began to employ this method that I did not believe that any sweeter or more innocent pleasures were to be had in this life; and as I discovered daily by its means a number of truths that seemed to me very important and generally unknown to other men, the satisfaction that I obtained from it filled my mind to such a degree that nothing else mattered to me. Besides, the three foregoing maxims were based only on the plan I had to continue to seek knowledge; for since God has given each of us an inner light* to distinguish the true from the false, I would not have believed for one moment that I should content myself with the opinions of others, if I had not intended in due course to use my own judgement to examine them; and I could not have avoided having scruples about following them, if I had not hoped thereby to seize every opportunity to find better
28 ones, in case there were any. Finally, I should not have known how to limit my desires or achieve happiness, if I had not

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followed a path by which I thought I was sure to acquire all the knowledge of which I was capable, and, by the same means, all the true goods that it would ever be in my power to obtain; and seeing that our will tends to pursue or shun only what our intellect represents to it as good or bad, it is sufficient to make a sound judgement in order to act well, and to judge as well as we can in order to do our best;* that is to say, to acquire all the virtues and with them all the other goods we are capable of acquiring. And when we are certain that this state of affairs exists, we cannot fail to be happy.

Once I had established these maxims, and set them aside in my mind with the truths of the faith which have always held first place in my beliefs, I took the decision that, as far as the rest of my opinions were concerned, I could freely undertake to rid myself of them. And seeing that I expected to be better able to complete this task in the company of others than by remaining shut any longer in the stove-heated room in which I had had all these thoughts, I set out on my travels again before winter was over. And through all the next nine years* I did nothing but wander through the world, trying to be a spectator rather than an actor in all the dramas that are played out on that stage; and, reflecting particularly in each matter on what might make it suspect and give occasion for error, I proceeded to eradicate from my mind all the mistakes that might earlier 29
have crept into it. In doing this, I was not copying those sceptics who doubt for doubting's sake, and pretend to be always unable to reach a decision;* for, on the contrary, the aim of my whole plan was to reach certainty and reject shifting ground in the search for rock and clay. And in this, it seems to me, I succeeded reasonably well, seeing that, in trying to expose the falsity or uncertainty of the propositions that I was investigating not by weak conjectures but by clear and certain reasoning, I found none so doubtful that I could not draw some reasonably certain conclusion from it, even if the conclusion was no more than that the proposition in question contained nothing of certainty. And just as, in demolishing an old building, one

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usually preserves the debris in order to use it in constructing a new one; so also, in destroying all those of my opinions which I judged to be ill-founded, I made various observations and accumulated many experiences* which have been of use to me subsequently in establishing more certain opinions. What is more, I continued to practise the method I had prescribed for myself, for, besides taking care generally to conduct all my thoughts according to these rules, I occasionally set aside a few hours which I spent applying it to difficulties in mathematics, or even to others which I could more or less translate into mathematical terms by removing from them all the principles of the other branches of knowledge which I did not find solid enough; you will see I have done this to many problems that
30 are dealt with in this volume.* And so, while apparently living in the same way as those who, having no occupation other than leading a blameless and agreeable life, take care to keep their pleasures free from vices and who, in order to enjoy their leisure without becoming bored, engage in all those pastimes that are honourable, I never stopped pursuing my plan and making progress in the knowledge of truth, perhaps more than if I had done nothing else than read books* and spend time in the company of men of letters.

However, those nine years passed by before I had reached any decision about the questions that are often debated among the learned, or had begun to look for the foundations of any philosophy which might be more certain than that which is commonly received. And the example of the many excellent minds who, having embarked on this project before me, did not appear to have succeeded,* led me to see it as so difficult that I would perhaps not have dared to undertake the task so early if I had not learned that some people were already spreading the rumour that I had completed it. I cannot say on what they based this opinion. If I have done anything to contribute to it by what I have said in public, it must have been by owning up to what I did not know with greater freedom than is usual among those who have undertaken some study, and

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perhaps also by revealing the reasons that I had to doubt much that others take to be certain, rather than by boasting of any positive knowledge. But having enough self-esteem not to wish to be taken for other than I was, I came to think that it was necessary for me to try by every possible means to make myself worthy of the reputation I was being given. And it is now just 31
eight years since this desire made me decide to move away from all the places where I might have acquaintances and to retire here,* in a country in which the long period of war has established such good discipline that the armies that are maintained here seem only to serve to ensure that people enjoy the fruits of peace with correspondingly greater security, and where amid a teeming, active, great people that shows more interest in its own affairs than curiosity for those of others, I have been able to live as solitary and as retiring a life as I would in the most remote of deserts, while lacking none of the comforts found in the most populous cities.*

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PART FOUR

I do not know whether I am bound to tell you about the first meditations that I engaged in there, for they are so metaphysical and recondite that they may not be to everyone's taste. And yet, to make it possible to judge whether the foundations I have laid are firm enough, I find myself in a way forced to speak about them. As has already been said, I had long since observed that, as far as morals are concerned, it is necessary sometimes to follow opinions which one knows to be very unsure as if they were indubitable; but because I wished at that time to concentrate on the pursuit of truth, I came to think that I should do the exact opposite and reject as completely false everything in which I could detect the least doubt, in order to see if anything thereafter remained in my belief that
32 was completely indubitable. And so, because our senses sometimes deceive us, I decided to suppose that nothing was such as they lead us to imagine it to be.* And because there are men who make mistakes in reasoning, even about the simplest elements of geometry, and commit logical fallacies, I judged that I was as prone to error as anyone else, and I rejected as false all the reasoning I had hitherto accepted as valid proof.* Finally, considering that all the same thoughts which we have while awake can come to us while asleep without any one of them then being true, I resolved to pretend that everything that had ever entered my head was no more true than the illusions of my dreams. But immediately afterwards I noted that, while I was trying to think of all things being false in this way, it was necessarily the case that I, who was thinking them, had to be something; and observing this truth: *I am thinking therefore I exist*,* was so secure and certain* that it could not be shaken by any of the most extravagant suppositions of the sceptics, I judged that I could accept it without scruple, as the first principle of the philosophy I was seeking.*

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Next, examining attentively what I was, I saw that I could pretend that I had no body and that there was no world or place for me to be in, but that I could not for all that pretend that I did not exist; on the contrary, from the very fact that I thought of doubting the truth of other things, it followed *incontrovertibly* and certainly that I myself existed, whereas, if I had merely ceased thinking, I would have no reason to believe 33
that I existed, even if everything else I had ever imagined had been true. I thereby concluded that I was a *substance* whose whole *essence* or nature resides only in thinking, and which, in order to exist, has no need of place and is not dependent on any material thing. Accordingly this 'I', that is to say, the Soul* by which I am what I am, is entirely distinct from the body and is even easier to know than the body; and would not stop being everything it is, even if the body were not to exist.

After this, I came to think in general about what is required for a proposition to be true and certain; for since I had just found one such proposition, I thought that I ought also to know in what this certainty consists. And having observed that there was nothing in this proposition, *I am thinking therefore I exist*, which makes me sure that I am telling the truth, except that I can see very clearly that, in order to think, one has to exist, I concluded that I could take it to be a general rule that things we conceive of very clearly and distinctly are all true, but that there is some difficulty in being able to identify those which we conceive of distinctly.

As a result of which, as I thought about the fact that I was doubting and that consequently my being was not altogether perfect (for I saw clearly that it was a greater perfection to know than to doubt), I decided to look for the source from which I had learned to think of something more perfect than I was myself, and I came to the *incontrovertible* realization that this must be from some nature that was in fact more perfect. 34
As for the thoughts I had about many other things outside myself, such as the heavens, the earth, light, heat, and numerous others, I had no such difficulty in knowing where they

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came from, because, seeing nothing in them which seemed to make them superior to myself, I could believe that if they were true, they depended on my nature in so far as it contained some perfection; and if they were not true, I held them from nothing, that is to say, that they were in me because I was lacking something.* But this could not be true of the idea of a being more perfect than mine; for it was manifestly impossible that I should hold this from nothing; and because it is no less contradictory that the more perfect should proceed from and depend on the less perfect than it is that something should proceed from nothing,* I could not hold it from myself either. So that there remained only the possibility that it had been put into me by a nature which was truly more perfect than mine, and one which even had in itself all the perfections of which I could have any idea, that is to say, in a word, which was God.* To which thought I added that, because I knew some perfections that I did not myself have, I was not the only being who existed (I shall here freely employ, with your permission, some scholastic terminology), but that *of necessity* there must be some other, more perfect being upon whom I depended and from whom I had acquired all that I possessed. For if I had been the sole being and had been independent of every other
35 being so as to *have*, *of myself*, that small degree of *participation* in the perfection which I shared with the perfect being, I could have been able to *have of myself*, by the same reason, all the remaining perfection that I knew myself to lack,* and so be myself infinite, eternal, unchanging, omniscient, in a word, to have all the perfections which I could observe in God. For, by following this line of reasoning, for me to know the nature of God in so far as my own nature permitted it, I only had to consider, in respect of each thing of which I found in myself some idea, whether it was a perfection to possess it; and I was certain that none of those things which manifested any imperfection was in Him, but that all the others were. In this way I could see that doubt, inconstancy, sadness, and such things could not be in Him, given that I would have been myself very

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glad to be free of them. Besides this, I had ideas of many corporeal things in the realm of the sensory; for even if I were to *suppose* that I was dreaming and that everything that I saw or imagined was false, I nevertheless could not deny that the ideas were really in my thought; but because I had already recognized in my own case that the nature of the intellect is distinct from the nature of the body, and considering that all composition is evidence of dependence, and that dependence is manifestly a defect,* I concluded that it could not be one of God's perfections to be composed of these two natures, and that, as a consequence, He was not so composed; but that, if there were in the world any bodies or other intelligences* or other natures which were not wholly perfect, their being 36
must depend on His power, in such a way that they could not continue to subsist for a single moment without Him.*

I decided after that to look for other truths; I called to mind the object of study of geometers, which I conceived of as a continuous body or a space indefinitely extended in length, breadth, and height or depth, divisible into different parts which could have various figures and sizes, and be moved or transposed in all sorts of ways, for geometers *posit* all that to be their object of study. I ran through some of their simpler proofs, and observed that the great certainty which everyone attributes to them is based only on the fact that they are conceived of as *incontrovertible*, following the rule that I have just given. I noted also that there was absolutely nothing in them which made me certain of the existence of their object. Thus, for example, I grasped clearly that, *supposing* a triangle to be given, it was necessary that its three angles were equal to two right angles; yet for all that, I saw nothing in this which made me certain that a single triangle existed in the world. Whereas, going back to the idea I had had of a perfect being, I found that existence was part of that idea, in the same way, or even more *incontrovertibly* so, that it is intrinsic to the idea of a triangle that its three angles equal two right angles, or to that of a sphere that all its parts are equidistant from its centre; and

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that, in consequence, it is at least as certain as any geometric proof that God, who is that perfect being, is or exists.*

37 But what convinces many people that there is a problem in knowing Him and even of knowing what their soul is, is that they never raise their mind above the realm of sensory things and are so used not to think of anything except by imagining it, which is a mode of thinking peculiar to material objects, that everything which seems unimaginable seems to them unintelligible.* This is clear enough from the fact that even scholastic philosophers hold as a maxim that there is nothing in the intellect which has not previously been in the senses,* in which, however, it is certain that the ideas of God and the soul have never been. It seems to me that people who wish to use their imagination in order to understand these ideas are doing the same as if, in order to hear sounds or smell smells, they tried to use their eyes. Except that there is this further difference, that the sense of sight no more confirms to us the reality of things than that of smell or hearing, whereas neither our imagination nor our senses could ever confirm the existence of anything, if our intellect did not play its part.

Finally, if there are still people who are not sufficiently convinced of the existence of God and of their soul by the arguments I have adduced, I would have them know that everything else of which they think they can be more certain, such as their having a body, or there being stars and an earth and suchlike, is in fact less certain. For although for all practical purposes we possess an assurance* of these things such
38 that it seems that no one can doubt their existence without being wilfully eccentric, nevertheless, where metaphysical certainty is in question, no one can deny, short of being irrational, that there are sufficient grounds for not being absolutely certain, as when we note that while we are asleep we can in the same way imagine having another body, or seeing other stars and another earth, without this being in fact the case. For how do we know that the thoughts that come to us in dreams are any more false than the others, seeing that they are often no

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less vivid and clear? However much the best minds choose to investigate this matter, I do not believe that they will be able to furnish any argument which is sufficient to remove this doubt, unless they presuppose the existence of God. For, in the first place, even the rule which I stated above that I held—namely, that the things that we conceive very clearly and very distinctly are all true—is only certain because God is or exists, because He is a perfect being, and because everything that is in us comes from Him.* From which it follows that our ideas or notions, being real things which moreover come from God, insofar as they are clear and distinct, cannot thereby but be true. So that if we quite often have ideas containing some falsity, these can only be those which contain something in some way confused or obscure, because in this they *participate* in nothingness, that is to say, that they are in us in this confused form because we are not wholly perfect.* And it is manifest that there is no less contradiction in the proposition that falsity and imperfection as such come from God, than there is 39
in the proposition that truth or perfection come from nothingness. But if we did not know that everything that is real and true in us comes from a perfect and infinite being, then, no matter how clear and distinct our ideas were, we would have no reason to be assured that they possess the perfection of being true.

Now once the knowledge of God and of the soul has made us certain of this rule, it is a simple matter to determine that the things we imagine in dreams should in no way make us doubt the truth of the thoughts we have while awake. For even if one should happen while sleeping to have some very distinct idea, as for example, in the case of a geometer discovering some new proof, the fact that he was asleep would not prevent it being true. And as for the most common error of our dreams, which consists in their representing various things to us in the same way as our external senses, it does not matter that it gives us occasion to distrust the truth of such ideas, because our senses could also quite often mislead us without

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our being asleep;* as when those who suffer from jaundice see everything as yellow, or when stars or other very distant bodies appear to us much smaller than they are. For after all, whether we are awake or asleep, we ought never to let ourselves be convinced except on the evidence of our reason. And it is to be noted that I say 'our reason', and not 'our imagination' or 'our
40 senses'. For although we see the sun very clearly, we should not on that account judge that it is only as large as we see it; and we can well imagine the head of a lion grafted onto the body of a goat, without having necessarily to conclude from this that a chimera exists in the world;* for reason does not dictate to us that what we see or imagine in this way is true. But it does certainly dictate that all our ideas or notions must have some foundation in truth; for it would not otherwise be possible that God, who is all-perfect and altogether true, should have placed them in us unless it were so. Our processes of reasoning are never so clear or so complete while we are asleep as when we are awake (even though our imaginings in sleep are sometimes just as vivid and distinct); so reason tells us also that as our thoughts cannot all be true because we are not wholly perfect, what truth there is in them must infallibly* be found in those we have while awake rather than in those we have in our dreams.

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PART FIVE

I would gladly go on and reveal the whole chain of the other truths that I deduced from these first ones. But in order to achieve this end, it would be necessary here for me to broach several questions that are controversial among learned men with whom I do not wish to fall out, and so I believe it would be best for me to abstain from doing this, and state only in broad terms what these questions are, in order to leave wiser heads to judge whether it would be profitable for the public to be informed about them in greater detail. I have always stuck 41
to the decision I took not to *posit* any principle other than that which I have just used to prove the existence of God and of the soul, and not to take anything to be true which did not seem to me clearer and more certain than the proofs of geometers had previously seemed. And yet I venture to say that I have not only found the way to satisfy myself in a short space of time about all the principal difficulties usually discussed in philosophy, but I have also come to see certain laws which God has established in such a way in nature, and of which He has imprinted notions of such a kind in our souls, that after sufficient reflection on them, we cannot doubt that they are strictly observed in everything that exists or occurs in the world. Moreover, by considering what follows from these laws, it seems to me that I have discovered many truths more useful and important than anything I had hitherto learned or even hoped to learn.

But since I tried to explain the most important of these in a treatise which certain considerations prevent me from publishing,* I cannot let them be known better than by saying here briefly what the treatise contains. Before I started writing it, I had intended to include in it everything that I believed I knew about the nature of material things. But just like those painters who, being unable to represent equally in a flat picture all the

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various faces of a solid body, choose only one of the principal ones which they place in the light, leaving the others in
42 shadow, representing them to the extent that one can see them when one looks at the chosen face; so also, fearing that I could not put everything that I had in my mind in my discourse, I undertook only to reveal fully my conception of light; thereafter, I took the opportunity of adding something about the sun and the fixed stars, because light proceeds almost wholly from them; something about the heavens, because they transmit it; something about the planets, the comets, and the earth, because they reflect it; and in particular something about terrestrial bodies, because they are either coloured, or transparent, or luminous; and finally something about man, because he is the spectator of all this. And in order to remove these things from the spotlight and to be able to say more freely what I thought about them without being obliged either to confirm or refute the opinions of learned men, I decided to leave this earth wholly for them to discuss, and to speak only of what would happen in a new world, if God were now to create enough matter to compose it somewhere in imaginary space,* and if He were to agitate the different parts of this matter in diverse and indiscriminate ways so as to create from it a chaos as confused as any poet could possibly imagine; and that He then did no more than sustain nature in His usual manner, leaving it to act according to the laws He has established. So I first described this matter and tried to represent it so that there is nothing in the world, I think, clearer and more intelligible, except what has just been said of God and the soul; for I even
43 made the explicit *supposition* expressly that it contained none of the *forms* or *qualities** which are discussed by scholastic philosophers, and that it had nothing in general that was not so naturally known to our souls that we could not even pretend to be ignorant of it. Further, I revealed what were the laws of nature; and basing my reasoning on no other principle than the infinite perfections of God, I set out to prove all those laws about which one might have had some doubt, and to show that

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they are such that even if God had created many worlds, there could be not be any in which they could have failed to be observed. After that, I demonstrated how the greater part of the matter of this chaos must, in consequence of these laws, be disposed and arranged in a way which made it similar to the heavens above us; how, at the same time, some of its parts had to compose an earth, some others planets and comets, yet others a sun and fixed stars. And here, enlarging on the subject of light,* I explained in detail the nature of the light to be found in the sun and the heavenly bodies, the way it crossed in an instant the immense expanses of the heavens, and how it was reflected from the planets and the comets towards the earth. I added also many things about the *substance*, position, motions, and all the various *qualities* of these heavens and stars; so that I thought I had said enough to show that nothing was to be observed in those of our world which must not or at least could not appear wholly similar to the world I was describing. Next, 44
I came to speak about the earth in particular, and to discuss how, although I had made the explicit *supposition* that God conferred no weight* on the matter of which it was composed, all its parts nonetheless tended exactly towards its centre; how, there being water and air on its surface, the dispositions of the heavens and the heavenly bodies (principally the moon) must cause tidal movement similar in every circumstance to that which we observe in our seas; and together with all this, a certain current, as much of the water as of the air, from east to west, such as we find here in our tropics; how mountains, seas, springs, and rivers could naturally form themselves, metals appear in the mines, plants grow in the countryside, and in general, how all the bodies that are called *mixed* or *composed* come into being there. And among other things, because apart from the heavenly bodies I knew of nothing in the world which produces light apart from fire, I set out to explain very clearly everything which pertains to its nature, how it comes about and how it sustains itself; how there is sometimes only heat without light and sometimes only light without heat; how it

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can introduce different colours and various other *qualities* into different bodies; how it melts some things and hardens others, how it can consume nearly all of them or turn them into ashes and smoke; and finally, how it can form glass from these ashes, by nothing other than the power of its action. I took particular
45 pleasure in describing this, for the transmutation of ashes into glass seemed to me as remarkable a transformation as any that occurs in nature.

Yet I did not wish to infer from all this that our world was created in the way I suggested; for it is much more *plausible* that from the beginning God made it as it was to be. But it is certain (and this is an opinion widely held among theologians) that the act by which He conserves the world is the same as that by which He created it.* So, even if He might not have given it any other form at the beginning than chaos, provided that He established the laws of nature and gave nature the help to act as it usually acts, we may believe, without casting doubt upon the miracle of creation,* that all purely material things would have been able, in time, to make themselves into what we see them to be at present in this way alone. And their nature is much easier to conceive of, when we think of their gradual emergence in this way, than when we only consider them in their final form.

From the description of inanimate bodies and plants I passed to that of animals, and in particular to that of men. But because I did not yet know enough to speak about it in the same way as I did about the rest, that is to say, by proving effects from causes, and showing from what elements and by what process nature must produce them, I contented myself with the *supposition* that God formed the body of a man,
46 exactly like our own both in the external shape of his members and in the internal configuration of his organs, constituting him of no other matter than that which I had already described, and without placing in him in the beginning a *rational* soul, or anything else which could function as a *vegetative* or *sensitive* soul,* but merely kindling in his heart one of

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those fires without light which I had already explained and whose nature I conceived of as no different from the fire that heats hay when it has been stored before it was dry, or makes new wine rise in temperature, when it is left to ferment on the lees. For, in investigating the functions that could as a consequence be in this body, I found precisely all those which can be in us without our thinking of them, and to which our soul, that is to say, that part of us distinct from the body whose sole nature, as has been said above, is to think, contributes nothing; these functions are the same as those in which irrational animals may be said to resemble us. But I was unable to find in this body any of those functions which, being dependent on thought, are the only ones that belong to us as human beings, whereas I found them all there subsequently, once I had supposed that God created a *rational soul* and that He joined it to this body in a particular way which I described.

But so that one may see how I dealt with this matter, I wish to give here the explanation of the movement of the heart and the arteries, from which, being the first and most general movement that is observed in animals, readers will determine more easily what they must think about all the others. And so 47
that they might have less difficulty understanding what I shall say about it, I should like those who are unversed in anatomy to take the trouble, before reading this, of having the heart of a large animal with lungs dissected before their eyes (for it is in all respects sufficiently like that of a man) and of having its two chambers or cavities pointed out to them. First, the one which is on the right side, to which two very wide tubes are connected; that is, the *vena cava*, which is the principal receptacle of blood and, as it were, the trunk of the tree of which all other veins in the body are the branches; and the *vena arteriosa*, which has been ill-named, being in fact an artery, which has its origin in the heart, and having emerged from it, divides into many branches that spread throughout the lungs. Next, the cavity on the left side, to which two tubes are connected in the

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same way, which are as wide or wider than the preceding ones; that is, the *arteria venosa*, which has also been ill-named, because it is nothing other than a vein, which comes from the lungs where it is divided into many branches, intertwined with those of the *vena arteriosa*, and those with the tube called the *trachea* through which the air we breathe enters; and the *aorta* which, coming out from the heart, sends its branches throughout the body. I should also like my readers to be shown carefully the eleven small membranes which, like so many little doors, open and close the four apertures which are in these two
48 cavities; namely, three at the entrance to the *vena cava*, where they are so disposed that they cannot prevent the blood it contains from flowing into the right cavity of the heart and yet at the same time completely stop the blood from leaving it; three at the entrance to the *vena arteriosa*, which, being disposed in the opposite way, allow the blood in that cavity to pass into the lungs, but stop the blood in the lungs from returning to the heart; and two others at the entrance to the *arteria venosa*, which allow in the same way the blood from the lungs to flow towards the left cavity of the heart, but prevent it from returning; and three at the entrance to the *aorta*, which allow blood to leave the heart but stop it returning. And there is no need to look for any other cause for the number of these membranes other than that the aperture of the *arteria venosa*, being oval in shape on account of its location, can easily be closed with two of them, whereas the others, being round, can more easily be closed with three. Moreover, I would wish my readers to have pointed out to them that the *aorta* and the *vena arteriosa* are of a much harder and firmer texture than the *arteria venosa* and the *vena cava*, and that these latter two widen out before entering the heart to form two pouches, as it were, called the auricles of the heart, which are composed of similar substance to the heart itself. They will observe also that there is always more heat in the heart than in any other part of the body; and finally, that this heat is able to cause a drop of blood
49 entering its cavities to swell up at once and to dilate, in the

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same way that all liquids do when they are allowed to fall drop by drop into a very hot vessel.

I have no need after this to say more to explain the movement of the heart, except that when its cavities are not full of blood, blood necessarily flows from the *vena cava* into the right cavity and from the *arteria venosa* into the left; for these two vessels are always full of blood, and their apertures, which open into the heart, cannot then be blocked; but, as soon as two drops of blood have entered the heart in this way, one into each cavity, these drops (which must very great, since the apertures by which they enter are very wide and the vessels from which they come are full of blood) rarify and dilate because of the heat they find there. In this way they cause the whole heart to swell, and they push shut the five little doors which are at the entrances of the two vessels from which they flowed, thus preventing any more blood coming down into the heart. Continuing to become more and more rarified, the drops of blood push open the six other little doors which are at the entrances of the two other vessels through which the blood leaves the heart, causing in this way all the branches of the *vena arteriosa* and the *aorta* to swell at more or less the same time as the heart.* Immediately afterwards the heart contracts, as do these arteries also, because the blood that has entered them has cooled, and their six little doors shut again; and the five doors of the *vena cava* and the *arteria venosa* open again and allow two new quantities of blood to pass through, which immediately cause the heart and the arteries to swell up as before. And because the blood that enters the heart in this way, passes through the two pouches which are called auricles, it follows from this that their movement is the opposite of the heart's, and that they contract when the heart swells. Finally, so that those who do not know the force of mathematical proof and are not used to distinguish true reasoning from *plausible* reasoning, should not venture to deny all this without examining it, I would like to point out to them that the movement I have just explained follows necessarily from the mere disposition of

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organs that one can see with the naked eye in the heart, from the heat which one can feel there with one's fingers, and from the nature of blood which one can know from observation, in the same way as the movement of a clock follows from the force, position, and shape of its counterweights and wheels.*

But if one asks why the blood in the veins is not all used up by flowing continually in this way into the heart, and why the arteries are not too full because all the blood which passes through the heart goes into them, I need only repeat the answer already given by an English doctor, who must be praised for having broken the ice on this subject.* He was the first to show that there are many small passages at the extremities of the arteries through which the blood they receive from the heart enters the small branches of the veins, from which it immediately goes back to the heart, so that its course is nothing but a perpetual circulation. He proves this very well from
51 the common experience of surgeons, who, having bound an arm moderately tightly above the point where they open a vein, make the blood flow out more abundantly than if they had not bound the arm. And the opposite would happen if they bound the arm below, between the hand and the vein being opened, or if they bound it very tightly above. For it is obvious that the moderately tight ligature, while being able to prevent the blood that is already in the veins from returning to the heart through the veins, cannot stop on that account fresh blood arriving from the arteries, because they are situated below the veins and their walls, being harder, are less easy to compress; and because the blood coming from the heart tends to flow through the arteries to the hand with greater force than it does when returning from the hand towards the heart through the veins. And because the blood comes out of the arm through the opening in one of the veins, there must necessarily be some passages below the ligature, that is to say, towards the extremities of the arm, through which it can come from the arteries. He also proves very well what he says about the circulation of the blood, first by certain small membranes

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which are disposed at various points along the veins in such a way that they do not let blood pass from the centre of the body towards its extremities, but only permit it to return from the extremities towards the heart; second, by the experiment that shows that all the blood in the body can flow out of it in a very short space of time by a single artery when it is cut, even if it is tightly bound close to the heart, and cut between the heart and the ligature, so that there is no reason to imagine that the blood 52
that flows out comes from anywhere but the heart.

But there are many other things which are evidence of the fact that the true cause of this movement of the blood is as I have said it is. First, there is the difference to be observed between the blood which issues from the veins and that which issues from the arteries; this can only be due to the fact that, being rarefied, and, as it were, distilled in passing through the heart, it is thinner, more lively, and hotter straight after leaving it (that is to say, while in the arteries), than it is shortly before entering the heart (that is to say, while in the veins). And if one makes a careful observation, one will find this difference is only clearly perceptible close to the heart and not as perceptible in the parts most distant from it. Next, the hardness of the walls of which the *vena arteriosa* and the *aorta* are composed indicates clearly enough that blood beats against these more powerfully than against the veins. And why should the left cavity of the heart and the *aorta* be larger and wider than the right cavity and the *vena arteriosa*, if not because the blood of the *arteria venosa*, having been in the lungs only since it left the heart, is thinner and becomes more easily rarefied than the blood which flows directly from the *vena cava*? And what can physicians find out from taking the pulse if they did not know that, as the nature of blood changes, it can be rarefied by the heat of the heart to a greater or lesser degree and more or less quickly than before? And if we examine how this heat communicates itself to the other members of the body, must we not admit that this happens by means of the blood which is 53
reheated as it passes through the heart and spreads from there

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throughout the body? From which it follows that, if we remove blood from some part of the body, we remove heat by the same means as well, and even if the heart were as hot as a piece of glowing iron, it would not have sufficient heat to warm up the hands and feet as it does at present, unless it continually sent new blood to them. Then, too, we know from this that the true function of breathing is to bring enough fresh air into the lungs to cause the blood entering them from the right cavity into the heart, where it has been rarefied and, as it were, changed into vapour, to thicken up and convert itself once more into blood, before falling back into the left cavity; if it did not do this, it would not be fit to nourish the fire that is there. All this is confirmed by the fact that we see that animals not having lungs have also only one cavity in the heart, and that unborn children, who cannot use their lungs while in their mother's womb, have an aperture through which blood flows from the *vena cava* into the left cavity of the heart, and a duct by which it comes from the *vena arteriosa* to the *aorta*, without passing through the lung. And then, how could digestion occur in the stomach, if the heart did not send heat there through the arteries, together with some of the most fluid parts of the blood, which help to dissolve the food that we have ingested? And is it not easy to understand the action which converts the juice of this food into blood, if we consider that the blood is distilled perhaps more than one or two hundred times every day by passing repeatedly through the heart? And
54 what else is needed to explain nutrition and the production of the various humours* present in the body other than to say that the force with which the blood passes, as it rarefies, from the heart to the extremities of the arteries, causes some of its parts to come to rest in the parts of the members in which they then find themselves and there take the place of other parts which they expel; and that, according to the position, shape, or small size of the pores they encounter, some parts of the blood rather than others flow to certain places, in the same way that we see that sieves with different grades of mesh serve to separate

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different grains from each other? And finally, the most remarkable thing about all this is the generation of *animal spirits*,* which, like a very *subtle** wind, or rather like a very pure and living flame, rise continually in great abundance from the heart to the brain, pass from there through the nerves into the muscles, and impart movement to all our members. We do not need to suppose any other cause to impel the most agitated and the most penetrating parts of the blood (and hence the best suited to compose these spirits) to make their way to the brain rather than anywhere else, than that the arteries that carry them there are those which come most directly from the heart, and that, according to the rules of mechanics (which are the same as those of nature), when many things tend to move together towards the same place in which there is not room for them all (as in the case of the parts of the blood that leave the left cavity of the heart and flow towards the brain), the weaker or less agitated must of necessity be displaced by 55
the stronger, which by this means reach their destination on their own.

I had explained all these matters in considerable detail in the treatise which I had earlier intended to publish.* And I had then shown what structure the nerves and the muscles of the human body must have to enable the *animal spirits*, being inside that body, to have the power to move its members, as we observe in the case of severed heads, which we can see moving and biting the earth shortly after having been cut off, although they are no longer animate. I had also shown what changes must occur in the brain to cause states of waking, sleeping, and dreaming; how light, sounds, smells, tastes, heat, and all the other *qualities* of external objects can imprint various ideas on the brain through the intermediary of the senses; how hunger, thirst, and the other internal *passions* can also transmit ideas to the brain; what must be taken to be the *sensus communis** in which these are received, the *memory* which preserves them, and the *faculty of imagination*, which can change them in different ways, form them into new ideas and, by the

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same means, distribute animal spirits to the muscles and make the members of this body move, with respect both to the objects which present themselves to the senses and to the internal *passions*, in as many different ways as the parts of our bodies can move without being directed by our will. This will not appear at all strange to those who know how wide a range
56 of different automata or moving machines the skill of man can make using only very few parts, in comparison to the great number of bones, muscles, nerves, arteries, veins, and all the other parts which are in the body of every animal. For they will consider this body as a machine which, having been made by the hand of God, is incomparably better ordered and has in itself more amazing movements than any that can be created by men.

At this point I had dwelt on this issue to show that if there were such machines having the organs and outward shape of a monkey or any other irrational animal, we would have no means of knowing that they were not of exactly the same nature as these animals, whereas, if any such machines resembled us in body and imitated our actions insofar as this was practically possible, we should still have two very certain means of recognizing that they were not, for all that, real human beings.* The first is that they would never be able to use words or other signs by composing them as we do to declare our thoughts to others. For we can well conceive of a machine made in such a way that it emits words, and even utters them about bodily actions which bring about some corresponding change in its organs (if, for example, we touch it on a given spot, it will ask what we want of it; or if we touch it somewhere else, it will cry out that we are hurting it, and so on); but it is not conceivable that it should put these words in different
57 orders to correspond to the meaning of things said in its presence, as even the most dull-witted of men can do. And the second means is that, although such machines might do many things as well or even better than any of us, they would inevitably fail to do some others, by which we would discover that

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they did not act consciously, but only because their organs were disposed in a certain way. For, whereas reason is a universal instrument which can operate in all sorts of situations, their organs have to have a particular disposition for each particular action, from which it follows that it is practically impossible for there to be enough different organs in a machine to cause it to act in all of life's occurrences in the same way that our reason causes us to act.

Now we can also determine the difference between men and animals by these two means. For it is a very remarkable fact that there are no men so dull-witted and stupid, not even madmen, that they are incapable of stringing together different words, and composing them into utterances, through which they let their thoughts be known; and, conversely, there is no other animal, no matter how perfect and well endowed by birth it may be, that can do anything similar. Nor does this arise from lack of organs, for we can see that magpies and parrots can utter words as we do, and yet cannot speak like us, that is, by showing that they are thinking what they are saying; whereas men born deaf and dumb, who are deprived as much as, or more than, animals of the organs which in others serve 58
for speech, usually invent certain signs to make themselves understood by those who are their habitual companions and have the time to learn their language. This shows not only that animals have less reason than man, but that they have none at all.* For it is clear that we need very little reason in order to be able to speak; and given that as much inequality is found among animals of the same species as among men, and that some are easier to train than others, it is unbelievable that the most perfect monkey or parrot of their species should not be able to speak as well as the most stupid child, or at least a child with a disturbed brain, unless their soul were of a wholly different nature to ours. And speech must not be confused with the natural movements that are signs of passion and can be imitated by machines as well by as animals; neither must one imagine, as did certain ancient thinkers, that animals speak,

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although we do not understand their language. For if that were true, they would be able to make themselves understood by us as well as by other members of their species, since they have many organs that correspond to ours. It is also a very remarkable fact that although many animals show more skill in some of their actions than we correspondingly do, it is nonetheless clear than the same animals show none at all in many others, so that what they can do better than us does not prove that they have any mental powers, for it would follow from this that they
59 would have more intelligence than any of us, and would surpass us in everything. Rather, it shows that they have no mental powers whatsoever, and that it is nature which acts in them, according to the disposition of their organs; just as we see that a clock consisting only of ropes and springs can count the hours and measure time more accurately than we can in spite of all our *wisdom*.

Following this, I had described the rational soul, and shown that, unlike the other things of which I had spoken, it could not possibly be derived from the potentiality of matter, but that it must have been created expressly. And I had shown how it is not sufficient for it to be lodged in the human body like a pilot in his ship,* except perhaps to move its members, but that it needs to be more closely joined and united with the body in order to have, in addition, feelings* and appetites like the ones we have, and in this way compose a true man. I dwelt a little at this point on the subject of the soul, because it is of the greatest importance. For, after the error of those who deny the existence of God, which I believe I have adequately refuted above, there is none which causes weak minds to stray more readily from the narrow path of virtue than that of imagining that the souls of animals are of the same nature as our own, and that, as a consequence, we have nothing more to fear or to hope for after this present life, any more than flies and ants. But when we know how different flies and ants are, we can understand much better the arguments which prove that our soul is of a nature entirely independent of the body,

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and that, as a consequence, it is not subject to death as the body is. And given that we cannot see any other causes which may destroy the soul, we are naturally led to conclude that it is immortal.* 60

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PART SIX

It is now three years since I completed the treatise that contained all the above. I was beginning to revise it so that I could place it in the hands of a printer, when I learned that persons to whom I defer, and whose authority holds hardly less sway over my actions than my own reason over my thoughts, had condemned a physical theory, published a little earlier by someone else,* to which I would not want to go so far as to say I subscribed, but only that I had seen nothing in it before their act of censure which I could imagine being prejudicial to religion or state, and which consequently would have prevented me from writing about it, if my reason had persuaded me to do so. This made me fear that there might be one of my own opinions in which I was equally mistaken, notwithstanding the great care I have always taken never to accept any new opinions for which I did not have very certain proof, and not to write about any which might work to the disadvantage of anyone. This was enough to make me change the decision I had taken to publish my theories. For even if the reasons for taking the decision earlier to publish were very strong, my natural inclination, which has always made me dislike the business* of writing books, led me to find a host of other reasons for excusing myself from doing so. And these reasons, both for
61 and against, are such that not only do I have some interest in declaring them here, but the public may also have some interest in knowing what they are.

I have never laid great store by the products of my mind, and as long as I reaped no other benefits from the method that I use (apart from satisfying myself about some problems that belong to the speculative sciences, or trying to direct my life by the precepts that it inculcated in me), I have not felt obliged to write anything about it. For as far as mode of life is concerned, everyone is so sure that they know best that one could find as

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many reformers as there are people,* if it were permitted to any other than those whom God has established as sovereigns over their peoples, or those to whom He has given sufficient grace and zeal to be prophets, to set about changing anything. And although I was very pleased with my speculations, I believed that others had their own which perhaps pleased them even more. But having no sooner acquired some general notions about physics, and begun to test them out on various particular problems, I noticed where they may lead and how much they differ from the principles that have been employed up to now, and I believed that I could not keep them hidden without sinning greatly against the law that obliges us to procure, as far as it is in our power, the general good of all mankind. For these notions have made me see that it is possible to attain knowledge which is very useful in life, and that unlike the speculative philosophy that is taught in the schools, it can be turned 62
into a practice by which, knowing the power and action of fire, water, air, stars, the heavens, and all the other bodies that are around us as distinctly as we know the different trades of our craftsmen, we could put them to all the uses for which they are suited and thus make ourselves as it were the masters and possessors of nature.* This is not only desirable for the discovery of a host of inventions which will lead us effortlessly to enjoy the fruits of the earth and all the commodities that can be found in it, but principally also for the preservation of health, which is without doubt the highest good and the foundation of all the other goods of this life. For even the mind depends so much on the temperament* and disposition of the organs of the body that, if it is possible to find some way of making men in most cases wiser and more skilful than they have been hitherto, I believe that it is in medicine that it must be sought. It is true that medicine as presently practised contains little of such notable benefit; but without wishing to disparage it, I am certain that there is no one, even among those whose profession it is, who will not admit that what is known about it is almost nothing compared to what remains to be

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known, and that it would be possible to be free of innumerable illnesses of both body and mind, and perhaps even the decline of old age, if we knew enough about their causes and the
63 remedies with which nature has provided us.* So, intending to devote my whole life to the pursuit of such an indispensable branch of knowledge, and having found a path which, I think, will inevitably lead me to it, unless prevented from doing so by the brevity of life or the lack of *empirical information*, I judged that there was no better remedy against these two obstacles than to communicate faithfully to the public what little I had discovered, and to urge good minds to try to go further by contributing, each according to his inclinations and power, to the observations and experiments* that need to be undertaken, and by communicating in turn to the public everything that they learn. Thus, as the last would start from where their predecessors had left off, thereby combining the lives and labours of many, we might together make much greater progress than any one man could make on his own.

I noted, moreover, in respect of observations and experiments, that the further we progress in knowledge the more necessary they become. For, at the beginning, rather than to seek out rarer and more contrived experiments, it is better to undertake only those which communicate themselves directly to our senses, of which we cannot remain ignorant, provided that we reflect a little on them. The reason for this is that rarer experiments often mislead us, at a time when we do not still know the causes of more common ones, and the circumstances on which they depend are nearly always so *specific** and minute that it is difficult to take good note of them. But the order to which I have adhered in this regard is the following. First, I
64 have tried to find in general the principles or first causes of everything that exists or can exist the world, without considering to this end anything other than God alone, who has created it, and deriving these principles only from certain seeds of truths which are naturally in our souls. After that, I came to examine what are the first and most common effects which one

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can deduce from these causes; and it seems to me that I have in this way discovered the heavens, heavenly bodies, and an earth; and, on the earth, water, air, fire, minerals, and several other such things which are the most common and the simplest of all, and hence the easiest to know. Then, when I wanted to proceed to more particular things, so many different ones presented themselves to me that I did not believe it possible for the human mind to distinguish the *Forms* or *Species** of bodies that are on the earth from a host of others which might be there, if it had been the will of God to put them there. Consequently, I did not think there was any other way to make them useful to us, than by progressing from effects to causes and by engaging in many individual observations. Following which, I cast my mind over all the objects that had ever presented themselves to my senses, and I venture to declare that I have not noticed anything which I could not explain quite easily by the principles I had found. But I must also acknowledge that the power of nature is so ample and vast, and these principles so simple and general, that I am able to observe hardly any particular effect without knowing from the beginning that it can be deduced from the principles in many different ways, and that my greatest difficulty is normally to find in which of these ways the effect depends on them. For I know of no other means of achieving this than by seeking further experiments and observations, whose results will vary according to the way the effect depends on my principles. For the rest, I have now reached the point where I think I can see quite clearly from which angle to approach most of the experiments and observations which can serve this end. But I can see also that they are of such a kind and in so great a number, that neither my industry nor my income (even if it were a thousand times greater than it is) could suffice for all of them. And so I will progress to a greater or lesser degree in knowledge of nature, according to the means that I have from now on to undertake more or less of them. I undertook to myself to make this known in the treatise I had written, and to show so clearly

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the use the public may derive from it, that I would oblige all those who desire the good of mankind in general (that is to say, all those who are truly virtuous and do not just pretend to be, or just have that reputation) both to communicate to me the experiments and observations in which they have engaged and to help me in determining those which still need to be done.

Since that time I have, however, had other reasons to make me change my mind and decide that I had indeed to go on recording everything that I thought of some importance as I discovered the truth about it, and to bring the same care to this
66 task as if I intended to publish my results; as much in order to have more opportunity to examine them (as, without doubt, we always take greater care over what we think will be seen by many people than over what we do only for ourselves; and things which have seemed true to me when I began to think them out, have often seemed false when I have tried to set them down on paper), as to lose no opportunity to benefit the public, if I can, so that, if my writings are of any value whatsoever, those who will come into possession of them after my death will be able to make the most appropriate use of them. But I decided that I must never agree to them being published during my lifetime, to avoid being given occasion to waste the time I intend to use in acquiring knowledge, either on the opposition or the controversy to which they might be subject, or as a result of whatever reputation they might bring me. For although every man is indeed bound to procure the good of others insofar as it is within his power, and we are, in the true meaning of the word, worthless if we are of no use to anyone else, yet it is also true that our efforts have to reach out beyond the present time, and that it is acceptable to omit doing things which might bring some benefit to our contemporaries, when this is done in order to bring greater benefit to our grandchildren. I would also like it to be known that the little I have learnt up to now is almost nothing in comparison with what I do not know, and what I have not yet given up the hope of
67 coming to know; for those who gradually discover truth in the

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