PART ONE

The Passions in General
and incidentally the whole nature of man

1. **What is a passion with regard to one subject is always an action in some other regard**

The defects of the sciences we have from the ancients are nowhere more apparent than in their writings on the passions. This topic, about which knowledge has always been keenly sought, does not seem to be one of the more difficult to investigate since everyone feels passions in himself and so has no need to look elsewhere for observations to establish their nature. And yet the teachings of the ancients about the passions are so meagre and for the most part so implausible that I cannot hope to approach the truth except by departing from the paths they have followed. That is why I shall be obliged to write just as if I were considering a topic that no one had dealt with before me. In the first place, I note that whatever takes place or occurs is generally called by philosophers a ‘passion’ with regard to the subject to which it happens and an ‘action’ with regard to that which makes it happen. Thus, although an agent and patient are often quite different, an action and passion must always be a single thing which has these two names on account of the two different subjects to which it may be related.

2. **To understand the passions of the soul we must distinguish its functions from those of the body**

Next I note that we are not aware of any subject which acts more directly upon our soul than the body to which it is joined. Consequently we should recognize that what is a passion in the soul is usually an action in the body. Hence there is no better way of coming to know about our passions than by examining the difference between the soul and the body, in order to learn to which of the two we should attribute each of the functions present in us.
3. The rule we must follow in order to do this
We shall not find this very difficult if we bear in mind that anything we experience as being in us, and which we see can also exist in wholly inanimate bodies, must be attributed only to our body. On the other hand, anything in us which we cannot conceive in any way as capable of belonging to a body must be attributed to our soul.

4. The heat and the movement of the limbs proceed from the body, and thoughts from the soul
Thus, because we have no conception of the body as thinking in any way at all, we have reason to believe that every kind of thought present in us belongs to the soul. And since we do not doubt that there are inanimate bodies which can move in as many different ways as our bodies, if not more, and which have as much heat or more (as experience shows in the case of a flame, which has in itself much more heat and movement than any of our limbs), we must believe that all the heat and all the movements present in us, in so far as they do not depend on thought, belong solely to the body.

5. It is an error to believe that the soul gives movement and heat to the body
In this way we shall avoid a very serious error which many have fallen into, and which I regard as the primary cause of our failure up to now to give a satisfactory explanation of the passions and of everything else belonging to the soul. The error consists in supposing that since dead bodies are devoid of heat and movement, it is the absence of the soul which causes this cessation of movement and heat. Thus it has been believed, without justification, that our natural heat and all the movements of our bodies depend on the soul; whereas we ought to hold, on the contrary, that the soul takes its leave when we die only because this heat ceases and the organs which bring about bodily movement decay.

6. The difference between a living body and a dead body
So as to avoid this error, let us note that death never occurs through the absence of the soul, but only because one of the principal parts of the body decays. And let us recognize that the difference between the body of a living man and that of a dead man is just like the difference between, on the one hand, a watch or other automaton (that is, a self-moving machine) when it is wound up and contains in itself the corporeal principle of the movements for which it is designed, together with everything else required for its operation; and, on the other hand, the
same watch or machine when it is broken and the principle of its movement ceases to be active.

7. A brief account of the parts of the body and of some of their functions

To make this more intelligible I shall explain in a few words the way in which the mechanism of our body is composed. Everyone knows that within us there is a heart, brain, stomach, muscles, nerves, arteries, veins, and similar things. We know too that the food we eat goes down to the stomach and bowels, and that its juice then flows into the liver and all the veins, where it mixes with the blood they contain, thus increasing its quantity. Those who have heard anything at all about medicine know in addition how the heart is constructed and how the blood in the veins can flow easily from the vena cava into its right-hand side, pass from there into the lungs through the vessel called the arterial vein, then return from the lungs into the left-hand side of the heart through the vessel called the venous artery, and finally pass from there into the great artery, whose branches spread through the whole body. Likewise all those not completely blinded by the authority of the ancients, and willing to open their eyes to examine the opinion of Harvey regarding the circulation of the blood, do not doubt that the veins and arteries of the body are like streams through which the blood flows constantly and with great rapidity. It makes its way from the right-hand cavity of the heart through the arterial vein, whose branches are spread throughout the lungs and connected with those of the venous artery; and via this artery it passes from the lungs into the left-hand side of the heart. From there it goes into the great artery, whose branches are spread through the rest of the body and connected with the branches of the vena cava, which carries the same blood once again into the right-hand cavity of the heart. These two cavities are thus like sluices through which all the blood passes upon each complete circuit it makes through the body. It is known, moreover, that every movement of the limbs depends on the muscles, which are opposed to each other in such a way that when one of them becomes shorter it draws towards itself the part of the body to which it is attached, which simultaneously causes the muscle opposed to it to lengthen. Then, if the latter happens to shorten at some other time, it makes the former lengthen again, and draws towards itself the part to which they are attached. Finally, it is known that all these movements of the muscles, and likewise all sensations, depend on the nerves, which are like little threads or tubes coming from the brain and containing, like the brain itself, a certain very fine air or wind which is called the ‘animal spirits’.

1 Fr. subtil; see note 1, p. 316 above.
8. The principle underlying all these functions
But it is not commonly known how these animal spirits and nerves help to produce movements and sensations, or what corporeal principle makes them act. That is why, although I have already touched upon this question in other writings, I intend to speak briefly about it here. While we are alive there is a continual heat in our hearts, which is a kind of fire that the blood of the veins maintains there. This fire is the corporeal principle underlying all the movements of our limbs.

9. How the movement of the heart takes place
Its first effect is that it makes the blood which fills the cavities of the heart expand. This causes the blood, now needing to occupy a larger space, to rush from the right-hand cavity into the arterial vein and from the left-hand cavity into the great artery. Then, when this expansion ceases, fresh blood immediately enters the right-hand cavity of the heart from the vena cava, and the left-hand cavity from the venous artery. For there are tiny membranes at the entrances to these four vessels which are so arranged that the blood can enter the heart only through the latter two and leave it only through the former two. When the new blood has entered the heart it is immediately rarefied in the same way as before. This and this alone is what the pulse or beating of the heart and arteries consists in, and it explains why the beating is repeated each time new blood enters the heart. It is also the sole cause of the movement of the blood, making it flow constantly and very rapidly in all the arteries and veins, so that it carries the heat it acquires in the heart to all the other parts of the body, and provides them with nourishment.

10. How the animal spirits are produced in the brain
What is, however, more worthy of consideration here is that all the most lively and finest parts of the blood, which have been rarefied by the heat in the heart, constantly enter the cavities of the brain in large numbers. What makes them go there rather than elsewhere is that all the blood leaving the heart through the great artery follows a direct route towards this place, and since not all this blood can enter there because the passages are too narrow, only the most active and finest parts pass into it while the rest spread out into the other regions of the body. Now these very fine parts of the blood make up the animal spirits. For them to do this the only change they need to undergo in the brain is to be separated from the other less fine parts of the blood. For what I am calling ‘spirits’ here are merely bodies: they have no property other than

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1 See Discourse, part 5, pp. 135–9 above.
that of being extremely small bodies which move very quickly, like the jets of flame that come from a torch. They never stop in any place, and as some of them enter the brain’s cavities, others leave it through the pores in its substance. These pores conduct them into the nerves, and then to the muscles. In this way the animal spirits move the body in all the various ways it can be moved.

11. How the movements of the muscles take place
For, as already mentioned, the sole cause of all the movements of the limbs is the shortening of certain muscles and the lengthening of the opposed muscles. What causes one muscle to become shorter rather than its opposite is simply that fractionally more spirits from the brain come to it than to the other. Not that the spirits which come directly from the brain are sufficient by themselves to move the muscles; but they cause the other spirits already in the two muscles to leave one of them very suddenly and pass into the other. In this way the one they leave becomes longer and more relaxed, and the one they enter, being suddenly swollen by them, becomes shorter and pulls the limb to which it is attached. This is easy to understand, provided one knows that very few animal spirits come continually from the brain to each muscle, and that any muscle always contains a quantity of its own spirits. These move very quickly, sometimes merely eddying in the place where they are located (that is, when they find no passages open for them to leave from), and sometimes flowing into the opposed muscle. In each of the muscles there are small openings through which the spirits may flow from one into the other, and which are so arranged that when the spirits coming from the brain to one of the muscles are slightly more forceful than those going to the other, they open all the passages through which the spirits in the latter can pass into the former, and at the same time they close all the passages through which the spirits in the former can pass into the latter. In this way all the spirits previously contained in the two muscles are gathered very rapidly in one of them, thus making it swell and become shorter, while the other lengthens and relaxes.

12. How external objects act upon the sense organs
We still have to know what causes the spirits not to flow always in the same way from the brain to the muscles, but to come sometimes more to some muscles than to others. In our case, indeed, one of these causes is the activity of the soul (as I shall explain further on). But in addition we must note two other causes, which depend solely on the body. The first consists in differences in the movements produced in the sense organs by
their objects. I have already explained this quite fully in the *Optics*.¹ But in order that readers of this work should not need to consult any other, I shall say once again that there are three things to consider in the nerves. First, there is the marrow, or internal substance, which extends in the form of tiny fibres from the brain, where they originate, to the extremities of the parts of the body to which they are attached. Next, there are the membranes surrounding the fibres, which are continuous with those surrounding the brain and form little tubes in which the fibres are enclosed. Finally, there are the animal spirits which, being carried by these tubes from the brain to the muscles, cause the fibres to remain so completely free and extended that if anything causes the slightest motion in the part of the body where one of the fibres terminates, it thereby causes a movement in the part of the brain where the fibre originates, just as we make one end of a cord move by pulling the other end.

13. *This action of external objects may direct the spirits into the muscles in various different ways*

I explained in the *Optics* how the objects of sight make themselves known to us simply by producing, through the medium of the intervening transparent bodies, local motions in the optic nerve-fibres at the back of our eyes, and then in the regions of the brain where these nerves originate.² I explained too that the objects produce as much variety in these motions as they cause us to see in the things, and that it is not the motions occurring in the eye, but those occurring in the brain, which directly represent these objects to the soul. By this example, it is easy to conceive how sounds, smells, tastes, heat, pain, hunger, thirst and, in general, all the objects both of our external senses and of our internal appetites, also produce some movement in our nerves, which passes through them into the brain. Besides causing our soul to have various different sensations, these various movements in the brain can also act without the soul, causing the spirits to make their way to certain muscles rather than others, and so causing them to move our limbs. I shall prove this here by one example only. If someone suddenly thrusts his hand in front of our eyes as if to strike us, then even if we know that he is our friend, that he is doing this only in fun, and that he will take care not to harm us, we still find it difficult to prevent ourselves from closing our eyes. This shows that it is not through the mediation of our soul that they close, since this action is contrary to our volition, which is the only, or at least the principal, activity of the soul. They close rather because the mechanism of our body is so composed that the movement of the hand.

¹ See *Optics*, p. 165 above, and also *Treatise on Man*, pp. 101 ff above.
² See *Optics*, p. 167 above.
towards our eyes produces another movement in our brain, which directs
the animal spirits into the muscles that make our eyelids drop.

14. *Differences among the spirits may also cause them to take various
different courses*

The other cause which serves to direct the animal spirits to the muscles in
various different ways is the unequal agitation of the spirits and
differences in their parts. For when some of their parts are coarser and
more agitated than others, they penetrate more deeply in a straight line
into the cavities and pores of the brain, and in this way they are directed
to muscles other than those to which they would go if they had less force.

15. *The causes of these differences*

And this inequality may arise from the different materials of which the
spirits are composed. One sees this in the case of those who have drunk a
lot of wine: the vapours of the wine enter the blood rapidly and rise from
the heart to the brain, where they turn into spirits which, being stronger
and more abundant than those normally present there, are capable of
moving the body in many strange ways. Such an inequality of the spirits
may also arise from various conditions of the heart, liver, stomach,
spleen and all the other organs that help to produce them. In this
connection we must first note certain small nerves embedded in the base
of the heart, which serve to enlarge and contract the openings to its
cavities, thus causing the blood, according to the strength of its expa-
sion, to produce spirits having various different dispositions. It must also
be observed that even though the blood entering the heart comes there
from every other place in the body, it often happens nevertheless that it is
driven there more from some parts than from others, because the nerves
and muscles responsible for these parts exert more pressure on it or make
it more agitated. And differences in these parts are matched by corre-
ponding differences in the expansion of the blood in the heart, which
results in the production of spirits having different qualities. Thus, for
example, the blood coming from the lower part of the liver, where the
gall is located, expands in the heart in a different manner from the blood
coming from the spleen; the latter expands differently from the blood
coming from the veins of the arms or legs; and this expands differently
again from the alimentary juices when, just after leaving the stomach and
bowels, they pass rapidly to the heart through the liver.

16. *How all the limbs can be moved by the objects of the senses and by
the spirits without the help of the soul*

Finally it must be observed that the mechanism of our body is so
composed that all the changes occurring in the movement of the spirits
may cause them to open some pores in the brain more than others. Conversely, when one of the pores is opened somewhat more or less than usual by an action of the sensory nerves, this brings about a change in the movement of the spirits and directs them to the muscles which serve to move the body in the way it is usually moved on the occasion of such an action. Thus every movement we make without any contribution from our will — as often happens when we breathe, walk, eat and, indeed, when we perform any action which is common to us and the beasts — depends solely on the arrangement of our limbs and on the route which the spirits, produced by the heat of the heart, follow naturally in the brain, nerves and muscles. This occurs in the same way as the movement of a watch is produced merely by the strength of its spring and the configuration of its wheels.

17. The functions of the soul
Having thus considered all the functions belonging solely to the body, it is easy to recognize that there is nothing in us which we must attribute to our soul except our thoughts. These are of two principal kinds, some being actions of the soul and others its passions. Those I call its actions are all our volitions, for we experience them as proceeding directly from our soul and as seeming to depend on it alone. On the other hand, the various perceptions or modes of knowledge present in us may be called its passions, in a general sense, for it is often not our soul which makes them such as they are, and the soul always receives them from the things that are represented by them.

18. The will
Our volitions, in turn, are of two sorts. One consists of the actions of the soul which terminate in the soul itself, as when we will to love God or, generally speaking, to apply our mind to some object which is not material. The other consists of actions which terminate in our body, as when our merely willing to walk has the consequence that our legs move and we walk.

19. Perception
Our perceptions are likewise of two sorts: some have the soul as their cause, others the body. Those having the soul as their cause are the perceptions of our volitions and of all the imaginings or other thoughts which depend on them. For it is certain that we cannot will anything without thereby perceiving that we are willing it. And although willing