

expressing in art the apparent contradiction of attaining the world of mystery through force of reality. Like Hamlet, it was the union of the real with the unreal which appealed to him, of the world as he saw it and the world as he imagined it to be. It was but another expression of the eternal ideal of truth and beauty.

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American Embassy

London, 1906

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I

THOUGHTS ON LIFE

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[Sidenote: Of the Works of Leonardo]

Begun at Florence in the house of Piero di Braccio Martelli, on the 22d day of March, 1508; and this is to be a collection without order, taken

from many papers which I have copied here, hoping to arrange them later, each in its place, according to the various subjects treated. And I think that before I shall have finished this work, it will be necessary for me to repeat the same thing many times over; so, O reader, blame me not, because the subjects are many, and memory cannot retain them and say: This I will not write because I have already written it; and if I did not wish to fall into this error it would be necessary, every time that I wished to copy something, in order not to repeat myself, to read over all the preceding matter, all the more so since the intervals are long between one time of writing and another.

[Sidenote: His Thirst after Knowledge]

2.

Not louder does the tempestuous sea bellow when the north wind strikes its foaming waves between Scylla and Charybdis; nor Stromboli nor Mount Etna when the sulphurous flames, {4} shattering and bursting open the great mountain with violence, hurl stones and earth through the air with the flame it vomits; nor when the fiery caverns of Mount Etna, spitting forth the element which it cannot restrain, hurl it back to the place whence it issued, driving furiously before it any obstacle in the way of its vehement fury ... so I, urged by my great desire and longing to see the blending of strange and various shapes made by creating nature, wandered for some time among the dark rocks, and came to the entrance of a great cave, in front of which I long stood in

astonishment and ignorance of such a thing. I bent my back into an arch and rested my left hand on my knee, and with my right hand shaded my downcast eyes and contracted eyebrows. I bent down first on one side and then on the other to see whether I could perceive anything, but the thick darkness rendered this impossible; and after having remained there some time, two things arose within me, fear and desire,--fear of the dark and threatening cave, desire to see whether there were anything marvellous within.

3.

I discover for man the origin of the first and perhaps of the second cause of his being.

[Sidenote: Leonardo's Studies]

4.

Recognizing as I do that I cannot make use of {5} subject matter which is useful and delightful, since my predecessors have exhausted the useful and necessary themes, I shall do as the man who by reason of his poverty arrives last at the fair, and cannot do otherwise than purchase what has already been seen by others and not accepted, but rejected by them as being of little value. I shall place this despised and rejected merchandise, which remains over after many have bought, on my

poor pack, and I shall go and distribute it, not in the big cities, but in the poor towns, and take such reward as my goods deserve.

[Sidenote: Vain Knowledge]

5.

All knowledge which ends in words will die as quickly as it came to life, with the exception of the written word: which is its mechanical part.

6.

Avoid studies the result of which will die together with him who studied.

[Sidenote: Value of Knowledge]

7.

The intellect will always profit by the acquisition of any knowledge whatsoever, for thus what is useless will be expelled from it, and what is fruitful will remain. It is impossible either to hate or to love a thing without first acquiring knowledge of it.

{6}

8.

Men of worth naturally desire knowledge.

9.

It is ordained that to the ambitious, who derive no satisfaction from the gifts of life and the beauty of the world, life shall be a cause of suffering, and they shall possess neither the profit nor the beauty of the world.

[Sidenote: On his Contemners]

10.

I know that many will say that this work is useless, and these are they of whom Demetrius said recked no more of the breath which made the words proceed from their mouth, than of the wind which proceeded from their body,--men who seek solely after riches and bodily satisfaction, men entirely denuded of that wisdom which is the food and verily the wealth of the soul; because insomuch as the soul is of greater value than the body, so much greater are the riches of the soul than those of

the body. And often when I see one of these take this work in his hand, I wonder whether, like a monkey, he will not smell it and ask me if it is something to eat.

[Sidenote: On the Vulgar]

11.

Demetrius used to say that there was no difference between the words and the voice of the {7} unskilled ignorant and the sounds and noises of a stomach full of superfluous wind. And it was not without reason that he said this, for he considered it to be indifferent whence the utterance of such men proceeded, whether from their mouth or their body; both being of the same substance and value.

12.

I do not consider that men of coarse and boorish habits and of slender parts deserve so fine an instrument nor such a complicated mechanism as men of contemplation and high culture. They merely need a sack in which their food may be held and whence it may issue, since verily they cannot be considered otherwise than as vehicles for food, for they seem to me to have nothing in common with the human race save the shape and the voice; as far as the rest is concerned they are lower than the beasts.

13.

Knowledge of the past and of the places of the earth is the ornament and food of the mind of man.

[Sidenote: Knowledge the supreme Good]

14.

Cornelius Celsus: Knowledge is the supreme good, the supreme evil is physical pain. We are composed of two separate parts, the soul and the the body; the soul is the greater of these two, the body the lesser.

Knowledge appertains to the {8} greater part, the supreme evil belongs to the lesser and baser part. Knowledge is an excellent thing for the mind, and pain is the most grievous thing for the body. Just as the supreme evil is physical pain, so is wisdom the supreme good of the soul, that is to say of the wise man, and no other thing can be compared with it.

[Sidenote: Life and Wisdom]

15.

In the days of thy youth seek to obtain that which shall compensate the losses of thy old age. And if thou understandest that old age is fed with wisdom, so conduct thyself in the days of thy youth that sustenance may not be lacking to thy old age.

[Sidenote: Praise of Knowledge]

16.

The fame of the rich man dies with him; the fame of the treasure, and not of the man who possessed it, remains. Far greater is the glory of the virtue of mortals than that of their riches. How many emperors and how many princes have lived and died and no record of them remains, and they only sought to gain dominions and riches in order that their fame might be ever-lasting. How many were those who lived in scarcity of worldly goods in order to grow rich in virtue; and as far as virtue exceeds wealth, even in the same degree the desire of the poor man proved more fruitful than that of the rich man. {9} Dost thou not see that wealth in itself confers no honour on him who amasses it, which shall last when he is dead, as does knowledge?--knowledge which shall always bear witness like a clarion to its creator, since knowledge is the daughter of its creator, and not the stepdaughter, like wealth.

[Sidenote: The World]

17.

Bountiful nature has provided that in all parts of the world you will find something to imitate.

18.

[Sidenote: The Beauty of Life]

Consider in the streets at nightfall the faces of men and women when it is bad weather, what grace and sweetness they manifest!

19.

Just as iron which is not used grows rusty, and water putrefies and freezes in the cold, so the mind of which no use is made is spoilt.

[Sidenote: Fruitless Study]

20.

Just as food eaten without appetite is a tedious nourishment, so does study without zeal damage the memory by not assimilating what it absorbs.

21.

Truth was the only daughter of time.

{10}

[Sidenote: In Praise of Truth]

22.

So vile a thing is a lie that even if it spoke fairly of God it would take away somewhat from His divinity; and so excellent a thing is truth that if it praises the humblest things they are exalted. There is no doubt that truth is to falsehood as light is to darkness; and so excellent a thing is truth that even when it touches humble and lowly matters, it still incomparably exceeds the uncertainty and falsehood in which great and elevated discourses are clothed; because even if falsehood be the fifth element of our minds, notwithstanding this, truth is the supreme nourishment of the higher intellects, though not of disorderly minds. But thou who feedest on dreams dost prefer the sophistry and subterfuges in matters of importance and uncertainty to what is certain and natural, though of lesser magnitude.

23.

Obstacles in the way of truth are finally punished.

[Sidenote: Versus Humanists]

24.

I am well aware that not being a literary man the presumptuous will think that they have the right to blame me on the ground that I am not a man of letters. Vainglorious people! Know they not that I could make answer as Marius did to the Roman people, and say: They who make a {11} display with the labours of others will not allow me mine? They will say that being unskilled in letters I cannot find true expression for the matters of which I desire to treat; they do not know that in my subjects experience is a truer guide than the words of others, for experience was the teacher of all great writers, and therefore I take her for guide, and I will cite her in all cases.

25.

Although I may not be able to quote other authors, as they do, I can quote from a greater and more worthy source, namely, experience,--the teacher of their masters. They go about swelled with pride and pomposity, dressed up and bedight, not with their own labour, but with

that of others; and they will not concede me mine. And if they despise me, who am a creator, far more are they, who do not create but trumpet abroad and exploit the works of other men, to be blamed.

[Sidenote: Authority]

26.

He who in reasoning cites authority is making use of his memory rather than of his intellect.

[Sidenote: On Commentators]

27.

Men who are creators and interpreters of nature to man, in comparison with boasters and exploiters of the works of others, must be judged {12} and esteemed like the object before the mirror as compared with its image reflected in the mirror.--one being something in itself, and the other nothing. Little to nature do they owe, since it is merely by chance they wear the human form, and but for it I might include them with herds of cattle.

28.

A well lettered man is so because he is well natured, and just as the cause is more admirable than the effect, so is a good disposition, unlettered, more praiseworthy than a well lettered man who is without natural disposition.

29.

Against certain commentators who disparage the inventors of antiquity, the originators of science and grammar, and who attack the creators of antiquity; and because they through laziness and the convenience of books have not been able to create, they attack their masters with false reasoning.

30.

It is better to imitate ancient than modern work.

[Sidenote: Experience]

31.

Wisdom is the daughter of experience.

[Sidenote: Experience never Errs]

32.

Wrongly men complain of experience, which {13} with great railing they accuse of falsehood. Leave experience alone, and turn your lamentation to your ignorance, which leads you, with your vain and foolish desires, to promise yourselves those things which are not in her power to confer, and to accuse her of falsehood. Wrongly men complain of innocent experience, when they accuse her not seldom of false and lying demonstrations.

33.

Experience never errs; it is only your judgements that err, ye who look to her for effects which our experiments cannot produce. Because given a principle, that which ensues from it is necessarily the true consequence of that principle, unless it be impeded. Should there, however, be any obstacle, the effect which should ensue from the aforesaid principle will participate in the impediment as much or as little as the impediment is operative in regard to the aforesaid principle.

34.

Experience, the interpreter between creative nature and the human race, teaches the action of nature among mortals: how under the constraint of necessity she cannot act otherwise than as reason, who steers her helm, teaches her to act.

35.

All our knowledge is the offspring of our perceptions.

{14}

[Sidenote: Origin of Knowledge]

36.

The sense ministers to the soul, and not the soul sense; and where the sense which ministers ceases to serve the soul, all the functions of that sense are lacking in life, as is evident in those who are born dumb and blind.

[Sidenote: Testimony of the Senses]

37.

And if thou sayest that sight impedes the security and subtlety of mental meditation, by reason of which we penetrate into divine knowledge, and that this impediment drove a philosopher to deprive himself of his sight, I answer that the eye, as lord of the senses, performs its duty in being an impediment to the confusion and lies of that which is not science but discourse, by which with much noise and gesticulation argument is constantly conducted; and hearing should do the same, feeling, as it does, the offence more keenly, because it seeks after harmony which devolves on all the senses. And if this philosopher deprived himself of his sight to get rid of the obstacle to his discourses, consider that his discourses and his brain were a party to the act, because the whole was madness. Now could he not have closed his eyes when this frenzy came upon him, and have kept them closed until the frenzy consumed itself? But the man was mad, the discourse insane, and egregious the folly of destroying his eye-sight.

{15}

[Sidenote: Judgement prone to Error]

38.

There is nothing which deceives us as much as our own judgement.

39.

The greatest deception which men incur proceeds from their opinions.

40.

Avoid the precepts of those thinkers whose reasoning is not confirmed by experience.

[Sidenote: Intelligence of Animals]

41.

Man discourseth greatly, and his discourse is for the greater part empty and false; the discourse of animals is small, but useful and true: slender certainty is better than portentous falsehood.

42.

What is an element? It is not in man's power to define the quiddity of the elements, but a great many of their effects are known.

43.

That which is divisible in fact is divisible in potentiality also; but

not all quantities which are divisible in potentiality are divisible in fact.

[Sidenote: Infinity incomprehensible]

44.

What is that thing which is not defined and would {16} not exist if it were defined? It is infinity, which if it could be defined would be limited and finite, because that which can be defined ends with the limits of its circumference, and that which cannot be defined has no limits.

45.

O contemplators of things, do not pride yourselves for knowing those things which nature by herself and her ordination naturally conduces; but rejoice in knowing the purposes of those things which are determined by your mind.

[Sidenote: Insoluble Questions]

46.

Consider, O reader, how far we can lend credence to the ancients who strove to define the soul and life,--things which cannot be proved; while those things which can be clearly known and proved by experience remained during so many centuries ignored and misrepresented! The eye, which so clearly demonstrates its functions, has been up to my time defined in one manner by countless authorities; I by experience have discovered another definition.

[Sidenote: Beauty of Nature's Inventions]

47.

Although human ingenuity may devise various inventions which, by the help of various instruments, answer to one and the same purpose, yet {17} will it never discover any inventions more beautiful, more simple or more practical than those of nature, because in her inventions there is nothing lacking and nothing superfluous; and she makes use of no counterpoise when she constructs the limbs of animals in such a way as to correspond to the motion of their bodies, but she puts into them the soul of the body. This is not the proper place for this discourse, which belongs rather to the subject of the composition of animated bodies; and the rest of the definition of the soul I leave to the minds of the friars, the fathers of the people, who know all secrets by inspiration. I leave the sacred books alone, because they are the supreme truth.

[Sidenote: Completeness in Knowledge]

48.

Those who seek to abbreviate studies do injury to knowledge and to love because the love of anything is the daughter of this knowledge. The fervency of the love increases in proportion to the certainty of the knowledge, and the certainty issues from a complete knowledge of all the parts, which united compose the totality of the thing which ought to be loved. Of what value, then, is he who abbreviates the details of those matters of which he professes to render a complete account, while he leaves behind the chief part of the things of which the whole is composed? It is true that impatience, the mother of {18} stupidity, praises brevity, as if such persons had not life long enough to enable them to acquire a complete knowledge of one subject such as the human body! And then they seek to comprehend the mind of God, in which the universe is included, weighing it and splitting it into infinite particles, as if they had to dissect it!

O human folly! dost thou not perceive that thou hast been with thyself all thy life, and thou art not yet aware of the thing which more fully than any other thing thou dost possess, namely, thy own folly? And thou desirest with the multitude of sophists to deceive thyself and others, despising the mathematical sciences in which truth dwells and the knowledge of the things which they contain; and then thou dost busy thyself with miracles, and writest that thou hast attained to the

knowledge of those things which the human mind cannot comprehend, which cannot be proved by any instance in nature, and thou deemest that thou hast wrought a miracle in spoiling the work of some speculative mind; and thou perceivest not that thy error is the same as that of a man who strips a plant of the ornament of its branches covered with leaves, mingled with fragrant flowers and fruits. Just as Justinus did when he abridged the stories written by Trogus Pompeius, who had written elaborately the noble deeds of his forefathers, which were full of wonderful beauties of style; and thus {19} he composed a barren work, worthy only of the impatient spirits who deem that they are wasting the time which they might usefully employ in studying the works of nature and mortal affairs. But let such men remain in company with the beasts; let dogs and other animals full of rapine be their courtiers, and let them be accompanied with these running ever at their heels! and let the harmless animals follow, which in the season of the snows come to the houses begging alms as from their master.

[Sidenote: Nature]

49.

Nature is full of infinite causes which are beyond the pale of experience.

50.

Nature in creating first gives size to the abode of the intellect (the skull, the head), and then to the abode of the vital spirit (the chest).

[Sidenote: Law of Necessity]

51.

Necessity is the mistress and guide of nature. Necessity is the theme and inventress of nature, her curb and her eternal law.

52.

When anything is the cause of any other thing, and brings about by its movement any effect, {20} the movement of the effect necessarily follows the movement of the cause.

[Sidenote: Of Lightning in the Clouds]

53.

O mighty and once living instrument of creative nature, unable to avail thyself of thy great strength thou must needs abandon a life of tranquillity and obey the law which God and time gave to Nature the

mother. Ah! how often the frightened shoals of dolphins and great tunny fish were seen fleeing before thy inhuman wrath; whilst thou, fulminating with swift beating of wings and twisted tail, raised in the sea a sudden storm with buffeting and sinking of ships and tossing of waves, filling the naked shores with terrified and distracted fishes.

[Sidenote: The Human Eye]

54.

Since the eye is the window of the soul, the soul is always fearful of losing it, so much so that if a man is suddenly frightened by the motion or an object before him, he does not with his hands protect his heart, the source of all life; nor his head, where dwells the lord of the senses; nor the organs of hearing, smell and taste. But as soon as he feels fright it does not suffice him to close the lids of his eyes, keeping them shut with all his might, but he instantly turns in the opposite direction; and still not feeling secure he covers his eyes with one hand, stretching out the {21} other to ward off the danger in the direction in which he suspects it to lie. Nature again has ordained that the eye of man shall close of itself, so that remaining during his sleep without protection it shall suffer no hurt.

[Sidenote: Universal Law]

55.

Every object naturally seeks to maintain itself in itself.

56.

The part always tends to reunite with its whole in order to escape from its imperfection; the soul desires to remain with its body, because without the organic instruments of that body it can neither act nor feel.

57.

The lover is moved by the object he loves as the senses are by sensible things; and they unite and become one and the same. The work is the first thing which is born of this union; if the thing loved is base, the lover becomes base. When what is united is in harmony with that which receives it, delight, pleasure and satisfaction ensue. When the lover is united to the beloved he rests there; when the burden is laid down it finds rest there.

58.

A natural action is accomplished in the briefest manner.

{22}

[Sidenote: Nature Variable and Infinite.]

59.

To such an extent does nature delight and abound in variety that among her trees there is not one plant to be found which is exactly like another; and not only among the plants, but among the boughs, the leaves and the fruits, you will not find one which is exactly similar to another.

60.

If nature had made one rule for the quality of limbs, the faces of men would resemble each other to such a degree that it would not be possible to distinguish one from the other; but she has varied the five features of the face in such a way that, although she has made an almost universal rule with regard to their size, she has not done so with regard to their quality, so that each one can be clearly distinguished from the other.

61.

It is an easy matter for him who knows man to arrive at universal knowledge, since all terrestrial animals are similar in regard to their structure, that is to say, in regard to the muscles and bones, and they do not vary save in height and thickness; then there are the aquatic animals, and I will not persuade the painter that any rule can be made with regard to these because they are of infinite variety--so are the insects.

{23}

62.

The body of anything which is fed is continually dying and being reborn, since nourishment cannot enter save where the past nourishment is exhausted; and if it is exhausted, it no longer has life, and if you do not furnish it with nourishment equal to that which has been before, you will impair the health of the organism, and if you deprive it of this nourishment, life will be altogether destroyed. But if you supply it with so much as can be consumed in a day, then as much life will be restored as was consumed, like the light of the candle which is furnished to it by the fuel provided by the moisture of the candle, and this light with most speedy succour restores beneath what is consumed above as it dies in dusky smoke; and this death is continuous, likewise the continuity of the smoke is equal to the continuity of the fuel; and in the same moment the light dies and is born again together with the

movement of its fuel.

63.

Man and animals are in reality vehicles and conduits of food, tombs of animals, hostels of Death, coverings that consume, deriving life by the death of others.

[Sidenote: Light]

64.

Look on light and consider its beauty. Shut your {24} eyes, and look again: that which you see was not there before, and that which was, no longer is. Who is he who remakes it if the producer is continually dying?

65.

Anaxagoras: Everything proceeds from everything, and everything becomes everything, because that which exists in the elements is composed of those elements.

[Sidenote: Nature]

66.

Nature appears to have been the cruel stepmother rather than the mother of many animals, and in some cases not the stepmother, but the pitying mother.

67.

Why did nature not ordain that one animal should not live by the death of the other? Nature, being inconstant and taking pleasure in continually creating and making lives and forms, because she knows that her earthly materials are thereby augmented, is more willing and swift to create than time is to destroy; and so she has ordained that many animals shall feed on each other. And as even thus her desire is not satisfied, she frequently sends forth certain poisonous and pestilential vapours upon the increasing multitude and congregation of animals, and especially upon men who increase to a great extent, because other animals do not feed on them; and since there is no cause, {25} there would follow no effect. This earth, therefore, seeks to lose its [animal] life, desiring only continual reproduction, and as, by the logical demonstration you adduce, effects often resemble their causes, animals are the image of the life of the world.

[Sidenote: Life's Philosophy]

68.

Now you see that the hope and the desire of returning home to one's former state is like the desire of the moth for the light, and the man who, with constant yearning and joyful expectancy, awaits the new spring and the new summer, and every new month and the new year, and thinks that what he longs for is ever too late in coming, and does not perceive that he is longing for his own destruction. But this desire is the quintessence, the spirit, of the elements, which, finding itself captive in the soul of the human body, desires always to return to its giver. And I would have you know that this same desire is the quintessence which is inseparable from nature, and that man is the model of the world. And such is the supreme folly of man that he labours so as to labour no more, and life flies from him while he forever hopes to enjoy the goods which he has acquired at the price of great labour.

[Sidenote: The Senses and the Soul]

69.

The soul seems to dwell in the intellect, and the intellect appears to dwell in that part where all {26} the senses meet which is called the brain, and the brain does not pervade the whole body, as many have

thought; on the contrary, it dwells entirely in one part, because if it were all in all and the same in every part, it would not have been necessary for the instruments of the senses to combine among themselves in one single spot; but rather, it would have been sufficient for the eye to fulfil the function of its sensation on the surface without transmitting, by means of the optic nerves, the likeness of its vision to the brain, so that the soul, for the reason given above, might perceive it in the surface of the eye. Likewise, with regard to the sense of hearing, it would have been sufficient if the voice had sounded only in the porous cavity of the indurated bone which lies within the ear, without making any further transit from this bone to the brain, which is its destination and where it discourses with common judgement. The sense of smell, too, is likewise compelled by necessity to proceed to the intellect; the sense of touch passes through the nerves and is conveyed to the brain, and these nerves diverge with infinite ramification in the skin, which encloses the limbs of the body and the entrails. The nerves convey volition and sensation to the muscles, and these nerves and the tendons which lie between the muscles and the sinews give movement to them; the muscles and sinews obey, and this obedience takes effect by the decrease {27} of their thickness, for in swelling their length is reduced, and the tendons which are interwoven among the particles of the limbs shrink, and as they extend to the tips of the fingers they transmit to the brain the cause of the sense of touch which they feel. The tendons with their muscles obey the nerves as soldiers obey their officers, and the nerves obey the brain as the officers obey their captain; thus the joint of the bones obeys the tendon, and the tendons obey the muscles, and the muscles

obey the nerves, and the nerves obey the brain, and the brain is the dwelling of the soul, and the memory is its ammunition and the perception is its refundary.

[Sidenote: Of Sensation]

70.

The brain is that which perceives what is transmitted to it by the other senses. The brain moves by means of that which is transmitted to it by the five senses. Motion is transmitted to the senses by objects, and these objects, transmitting their images to the five senses, are transferred by them to the perception, and by the perception to the brain; and there they are comprehended and committed to the memory, in which, according to their intensity, they are more or less firmly retained.

The thinkers of ancient times concluded that the part of man which constitutes his intellect is caused by an instrument to which the other five {28} senses refer everything by means of the perception, and this instrument they have named the "common sense" or brain, and they say that this sense is situated in the centre of the head. And they have given it this name "common sense" solely because it is the common judge of the five other senses, that is to say, sight, hearing, touch, taste and smell. The "common sense" is stirred by means of the perception which is placed between it and the senses. The perception is stirred

by means of the images of things conveyed to it by the external instruments to the senses, and these are placed in the centre between the external things and the perception, and the senses likewise are stirred by objects. Surrounding objects transmit their images to the senses, and the senses transfer them to the perception, and the perception transfers them to the "common sense" (brain), and by it they are stamped upon the memory, and are there retained in a greater or lesser degree according to the importance and intensity of the impression. The sense which is most closely connected with the perception is the most rapid in action, and this sense is the eye, the highest and chief of the others; of this sense alone we will treat, and we will leave the others in order not to unduly lengthen our matter.

[Sidenote: Automatic Movements]

71.

Nature has ordained for man the ministering {29} muscles which exercise the sinews, and by means of which the limbs can be moved according to the will and desire of the brain, like to officers distributed by a ruler over many provinces and towns, who represent their ruler in these places, and obey his will. And this officer, who will in a single instance have most faithfully obeyed the orders he received from his master by word of mouth, will afterwards, in a similar way, of his own accord fulfil the wishes of his master.

An example of this can be frequently seen in the fingers, which learn to perform on an instrument the things which the intellect commands, and the lesson once learnt they will perform it without the aid of the intellect. And do not the muscles which cause the legs to move perform their duty without man being conscious of it?

72.

You will see palsied and shivering persons move, and their trembling limbs, such as their head and hands, quiver, without the permission of the soul, and the soul, though it expend all its might, cannot prevent these limbs from trembling. The same thing occurs in epilepsy or when limbs are partially truncated, as in the case of tails of lizards.

[Sidenote: Intellect]

73.

It happens that our intellect is that which prompts the hand to create the features of figures in {30} divine aspects until it finds satisfaction; and since the intellect is one of the tones of our soul, by means of the soul it composes the form of the body where it dwells, according to its volition. And when it has to reproduce a human body, it takes pleasure in repeating the body which it originally created; whence it follows that they who fall in love are prone to become

enamoured of what resembles them.

[Sidenote: Of the Senses]

74.

There are the four powers: memory, intellect, sensuality and lust. The first two are intellectual, the others sensual. Of the five senses, sight, hearing, smell are with difficulty prevented; touch and taste not at all. Taste follows smell in the case of dogs and other greedy animals.

75.

Why does the eye perceive things more clearly in dreams than with the imagination when one is awake?

[Sidenote: Time]

76.

Although time is included among continuous quantities, being indivisible and immaterial it does not altogether fall into the scope of geometry,--by which it is divided into figures and bodies of

infinite variety, which are seen to be continuous inasmuch as they are visible and material,--but it agrees only with its first principles, {31} i.e. with the point and the line; the point in time may be compared to an instant, and the line to the length of a certain quantity of time. Just as the point is the beginning and end of a line, so is an instant the beginning and end of any given space of time; and just as a line is infinitely divisible, so can a given space of time be likewise divided, and as the divisions of the line are in proportion to each other, so likewise are the divisions of time.

77.

In twelve whole figures the cosmography of the miniature world will be shown to you in the same manner as Ptolemy in his cosmography. And so I will divide it afterwards into limbs as he divided the world into provinces; then I will explain the function of the parts in every direction, and put before your eyes a description of the whole figure and substance of man as regards his movements by means of his limbs. And thus if it please our great author I will demonstrate the nature of man and his habits in the way I describe his form.

[Sidenote: On the Human Body]

78.

And thou, O man, who wilt gaze in this work of mine on the marvellous works of nature, if thou thinkest it would be an act of wickedness to destroy it, think how much more wicked it is to take the life of a man; and if this his structure appears to thee a miraculous work of art, remember that {32} it is nothing in comparison with the soul which inhabits this structure; for verily, whatever it may be, it is divine. Let it, then, dwell in His work and at His good will, and let not thy rage or malice destroy so great a thing as life, for he who does not value it does not deserve it.

[Sidenote: The Experimental Method]

79.

By these rules thou wilt be able to distinguish falsehood from truth by means of which knowledge men aim at possible things with greater moderation; and do not veil thyself in ignorance, for the result of this would be that thou wouldst be ineffectual and fall into melancholy and despair.

[Sidenote: Of Navigation below the Waters]

80.

How by the aid of a machine many may remain for some time under water.

And how and why I do not describe my method of remaining under water and of living long without food; and I do not publish nor divulge these things by reason of the evil nature of man, who would use them for assassinations at the bottom of the sea and to destroy and sink ships, together with the men on board of them; and notwithstanding I will teach other things which are not dangerous....

[Sidenote: Of Physiognomy]

81.

I will not dwell on false physiognomy and chiromancy {33} because there is no truth in them, and this is manifest because chimeras of this kind have no scientific foundation. It is true that the lineaments of the face partly reveal the character of men, their vices and temperaments; but in the face: (a) the features which separate the cheeks from the lips, and the nostrils and cavities of the eyes, are strongly marked if they belong to cheerful and good-humoured men, and if they are slightly marked it denotes that the men to whom they belong are given to meditation, (b) Those whose features stand out in great relief and depth are brutal and bad-tempered, and reason little, (c) Those who have strongly marked lines between the eyebrows are bad-tempered, (d) Those who have strongly marked lines on the forehead are men full of concealed or unconcealed bewailing.

And we can reason thus about many features. But the hand? You will

find that whole armies perished in the same hour by the sword in which no two men had similar marks in their hands, and the same argument applies to a shipwreck.

[Sidenote: Of Pain]

82.

Nature has placed in the front part of man, as he moves, all those parts which when struck cause him to feel pain; and this is felt in the joints of the legs, the forehead and the nose, and has been so devised for the preservation of man, because {34} if such pain were not felt in these limbs they would be destroyed by the many blows they receive.

[Sidenote: Why Plants do not feel Pain]

83.

While nature has ordained that animals should feel pain in order that the instruments which might be liable to be maimed or marred by motion may be preserved, plants do not come into collision with the objects which are before them; whence pain is not a necessity for them, and therefore when they are broken they do not feel pain, as animals do.

84.

Lust is the cause of generation.

Appetite is the support of life.

Fear or timidity is the prolongation of life.

Pain is the preserver of the instrument (of the human frame).

[Sidenote: Fear]

85.

Just as courage is the danger of life, so is fear its safeguard.

[Sidenote: Body and Soul]

86.

Let him who wishes to see how the soul inhabits its body observe what use the body makes of its daily habitation; that is to say, if the soul is full of confusion and disorder the body will be kept in disorder and confusion by the soul.

{35}

87.

The soul can never be corrupted with the corruption of the body, but it is like the wind which causes the sound of the organ, and which ceases to produce a good effect when a pipe is spoilt.

[Sidenote: Memory]

88.

Every loss which we incur leaves behind it vexation in the memory, save the greatest loss of all, that is, death, which annihilates the memory, together with life.

[Sidenote: Spirit]

89.

Our body is subject to Heaven, and Heaven is subject to the Spirit.

[Sidenote: Sense and Reason]

90.

The senses are earthly; reason lies outside them when in contemplation.

91.

Where most feeling exists, there amongst martyrs is the greatest martyr.

92.

That which can be lost cannot be deemed riches. Virtue is our true wealth and the true reward of its possessor; it cannot be lost, it never deserts us until life leaves us. Hold property and external riches with fear; they often leave their possessor scorned and mocked at for having lost them.

{36}

[Sidenote: Flight of Time]

93.

Men wrongly lament the flight of time, blaming it for being too swift; they do not perceive that its passage is sufficiently long, but a good

memory, which nature has given to us, causes things long past to seem present.

[Sidenote: Illusions]

94.

Our intellect does not judge events which happened at various intervals of time in their true proportion, because many things which happened years ago appear recent and close to the present, and often recent things appear old and seem to belong to our past childhood. The eye does likewise with regard to distant objects which in the light of the sun appear to be close to the eye, and many objects which are close appear to be remote.

95.

Let us not lack ways and means of dividing and measuring these our wretched days, which we ought to take pleasure in spending and living not vainly and not without praise, nor without leaving any memory in the minds of men, so that this our miserable existence may not be spent in vain.

[Sidenote: Virtuous Life]

96.

The age which flies glides by in stealth and deceives others; and nothing is more swift than the years, and he who sows virtue reaps glory.

{37}

[Sidenote: Sleep and Death]

97.

O sleeper, what is sleep? Sleep is like unto death. Why dost thou not work in such wise that after death thou mayst have the semblance of perfect life, just as during life thou hast in thy sleep the semblance of the hapless dead?

98.

The water you touch in a river is the last of that which has gone, and the first of that which is coming: so it is with time present.

99.

A long life is a life well spent.

[Sidenote: Life]

100.

As a well spent day affords happy sleep, so does a life profitably employed afford a happy death.

[Sidenote: Time the Destroyer]

101.

O time, consumer of things! O envious age! Thou dost destroy all things, and consumest all things with the hard teeth of old age, little by little in a slow death. Helen, when she looked in her mirror and saw the withered wrinkles made in her face by old age, wept, and wondered why she had twice been ravished. O time, devourer of things! O envious age, by which all is consumed!

{38}

[Sidenote: On Fault-finders]

102.

There exists among the foolish a certain sect of hypocrites who continually seek to deceive themselves and others, but others more than themselves, though in reality they deceive themselves more than others. And these are they who blame the painters who study on feast-days the things which relate to the true knowledge of the forms of the works of nature, and sedulously strive to acquire knowledge of these things to the best of their ability.

But such fault-finders pass over in silence the fact that this is the true manner of knowing the Artificer of such great and marvellous things, and that this is the true way in which to love so great an Inventor! For great love proceeds from the perfect knowledge of the thing loved; and if you do not know it you can love it but little or not at all; and if you love it for the gain which you anticipate obtaining from it and not for its supreme virtue, you are like the dog which wags its tail and shows signs of joy, leaping towards him who can give him a bone. But if you knew the virtue of a man you would love him more--if that virtue was in its place.

[Sidenote: Prayer]

103.

I obey Thee, Lord, first for the love which in reason I ought to bear

Thee; secondly because Thou {39} hast the power to shorten or prolong the lives of men.

104.

Thou, O God, dost sell us all good things at the price of labour.

105.

And many make a trade deceiving the foolish multitude, and if no one comes to unmask their deceits, they punish it.

106.

Pharisees,--that is to say, holy friars.

107.

Nothing can be written by means of new researches.

[Sidenote: Patience]

108.

Patience serves against insults as clothes do against the cold; since if you multiply your clothes as the cold increases, the cold cannot hurt you. Similarly, let thy patience increase under great offences, and they will not be able to hurt your feelings.

[Sidenote: Advice to a Speaker]

109.

Words which do not satisfy the ear of the listener will always weary or annoy him; and you will often see signs of this in such listeners in their frequent yawns. Therefore, you who speak before men whose good opinion you seek, when you {40} observe such signs of vexation, shorten your speech or vary your argument; and if you do otherwise, then instead of the favour you seek you will incur hate and hostility.

And if you would see what gives pleasure to a man speak to him on various themes, and when you see him intent, without yawning, or contracting his brow, or performing other actions, then be certain that the matter of which you are speaking is such as affords him pleasure.

[Sidenote: Advice]

110.

Here is a thing which the more it is needed the more it is rejected:
and this is advice, which is unwillingly heeded by those who most need
it, that is to say, by the ignorant.

Here is a thing which the more you fear and avoid it the nearer you
approach to it, and this is misery; the more you flee from it the more
miserable and restless you will become. When the work comes up to the
standard of the judgement, this is a bad sign for the judgement; and
when the work excels the standard of the judgement, this is the worst
sign, as occurs when a man marvels at having worked so well; and when
the standard of the judgement exceeds that fulfilled by the work, this
is a sign of perfection; and if the man is young and be thus disposed,
he will without doubt grow into an excellent workman: he will only
accomplish few works. But they will {41} be of a quality which will
compel men to contemplate their perfection with admiration.

[Sidenote: Proverbs]

111.

Nothing should be so greatly feared as empty fame.

This empty fame issues from vices.

A broken vase of clay can be remodelled, but this is no longer possible when it has been baked.

The vow is born when hope dies.

The beautiful is not always the good. And the fine talkers labour under this error without any reason.

He who wishes to grow rich in a day will be hanged in a year.

The memory of benefits is a frail defence against ingratitude.

Reprove your friend in secret and praise him in public.

He who fears dangers will not perish by them.

The evil which does me no harm is like the good which in no wise avails me.

He who offends others is not himself secure.

Be not false about the past.

Folly is the shield of lies, just as unreadiness is the defence of poverty.

Where there is liberty, there is no rule.

{42}

Here is a thing which the more it is heeded the more it is spurned,--advice.

It is ill to praise, and worse to blame, the thing which you do not understand.

On Mount Etna the words freeze in your mouth and you make ice of them.

Threats are the only weapons of the threatened man.

Ask advice of him who governs himself well.

Justice needs power, intelligence and will, and is like the Queen Bee.

Not to punish evil is equivalent to authorizing it.

He who takes the snake by the tail will be bitten by it.

The pit will fall in upon him who digs it.

He who does not restrain voluptuousness is in the category of the beasts.

You can have no dominion greater or less than that over yourself.

He who thinks little errs much.

It is easier to contend at the first than at the last.

No counsel is more sincere than that given on ships which are in danger.

Let him who acts on the advice of the young expect loss.

You grow in reputation like bread in the hands of a child.

{43}

Cannot beauty and utility be combined--as appears in citadels and men?

He who is without fear often incurs great losses, and is often full of regret.

If you governed your body according to virtue you would not live in this world.

Where good fortune enters, envy lays siege to her and attacks her, and when she departs sorrow and regret remain behind.

When beauty exists side by side with ugliness, the one seems more powerful, owing to the presence of the other.

He who walks straight rarely falls.

O miserable race of man! of how many things you make yourself the slave
for the sake of money!

The worst evil which can befall the artist is that his work should
appear good in his own eyes.

To speak well of a bad man is the same as speaking ill of a good man.

Truth ordains that lying tongues shall be punished by the lie.

He who does not value life does not deserve it.

The beautiful works of mortals pass and do not endure.

Labour flies with fame almost hidden in its arm.

The gold in ingots is refined in the fire.

{44}

The shuttle says: I will continue to move until the cloth is woven.

Everything that is crooked is straightened.

Great ruin proceeds from a slight cause.

Fine gold is recognized when it is tested.

The image will correspond to the die.

The wall will fall on him who scrapes it.

Ivy lives long.

To the traitor, death is life, because if he makes use of others he is no longer believed.

When fortune comes seize her in front firmly, because behind she is bald.

Constancy means, not he who begins, but he who perseveres.

I do not yield to obstacles.

Every obstacle is overcome by resolve.

He who is chained to a star does not change.

[Sidenote: Truth]

112.

Fire destroys falsehood,--that is to say, sophistry,--and rehabilitates truth, scattering the darkness.

Fire must be represented as the consumer of all sophistry and the revealer of truth, because it is light and scatters darkness which conceals all essences.

Fire destroys all sophistry,--that is to say, deceit,--and preserves truth alone, which is gold. {45} Truth cannot be concealed in the end, dissimulation is of no avail. Dissimulation is frustrated before so great a judge. Falsehood puts on a mask.

There is nothing hidden under the sun. Fire must represent truth because it destroys all sophistry and lies, and the mask is for sophistry and lies, which conceal truth.

113.

Rather privation of limbs than weariness of doing good. The power of using my limbs shall fail me before the power of being useful. Rather death than weariness. I cannot be satiated with serving. I do not weary of giving help. No amount of work is sufficient to weary me. This is a carnival motto: "Sine lassitudine." Hands in which ducats and precious stones abound like snow never grow weary of serving, but such a service is for its utility only and not for our profit. Nature

has formed me thus.

[Sidenote: Ingratitude]

114.

This shall be placed in the hand of ingratitude: The wood nourishes the fire that consumes it. When the sun, the scatterer of darkness, shines, you put out the light which for you in particular, and for your need and convenience, expelled the darkness.

[Sidenote: Physiological Inferiority of Man]

115.

I have found that in the composition of the human body as compared with the bodies of {46} animals the senses are less subtle and coarser; it is thus composed of less ingenious machinery and of cells less capable of receiving the power of senses. I have seen that in the lion the sense of smell is connected with the substance of the brain and descends through the nostrils which form an ample receptacle for it; and it enters into a great number of cartilaginous cells which are provided with many passages in order to receive the brain. A large part of the head of the lion is given up to the sockets of the eyes, and the optic nerves are in immediate contact with the brain; the

contrary occurs in man, because the sockets of the eyes occupy a small portion of the head, and the optic nerves are subtle and long and weak, and owing to the weakness of their action we see little by day and less at night; and the animals above mentioned see better at night than in the daytime; and the proof of this is that they seek their prey at night and sleep during the daytime, as do also the nocturnal birds.

[Sidenote: Man's Ethical Inferiority]

116.

Thou hast described him king of animals, but I would rather say, king of beasts, thou being the greatest--for hast thou not slain them in order that they may give thee their children to glut thy greed with which thou hast striven to make a sepulchre for all animals? And I would say still more if I might speak the whole truth. But let us {47} confine ourselves to human matters, relating one supreme infamy, which is not to be found among the animals of the earth; because among these you will not find animals who eat their young, except when they are utterly foolish (and there are few indeed of such among them), and this occurs only among the beasts of prey, such as the lions, and leopards, panthers, lynxes, cats and the like, which sometimes feed on their young; but thou, besides thy children, dost devour thy father, thy mother, thy brother and thy friends; and not satisfied with this, thou goest forth to hunt on the islands of others, seizing other men and these half naked ... thou fattenest and chasest them down thy own

throat. Now does not nature produce enough vegetables for thee to satisfy thyself? And if thou art not content with vegetables, canst thou not by a mixture of them make infinite compounds as Platina wrote, and other writers on food?

[Sidenote: Man in the Animal World]

117.

The description of man, including that of such creatures belonging almost to the same species, such as apes, monkeys and the like, of which there are many.

118.

The way of walking in man is similar in all cases to the universal way of walking in four-footed animals, because, just as they move their feet {48} crosswise, like a trotting horse, so man moves his four limbs crosswise, that is to say, in walking he puts forward his right foot simultaneously with his left arm, and so on vice versa.

119.

Write a special treatise to describe the movements of four-footed

animals, among which is man, who in his childhood also walks on four feet.

[Sidenote: Fragment of a Letter]

120.

There is one who having promised me much less than his due, and being disappointed of his presumptuous desire, has tried to deprive me of all my friends; and finding them wise and not pliable to his will, he has threatened me that he would bring accusations against me and alienate my benefactors from me: hence I have informed Your Lordship of this, so that this man, who wishes to sow the usual scandals, may not find a soil fit for sowing the thoughts and deeds of his evil nature; and that when he tries to make Your Lordship the tool of his infamous and malicious nature he may be disappointed of his desire.

[Sidenote: Giacomo of Pupil of Leonardo]

121.

On the 23d of April, 1490, I began this book; and started again on the horse. Giacomo came to live with me on Saint Mary Magdalen's day in 1490; {49} he was ten years old. He was a thief, a liar, obstinate, and a glutton. On the second day I had two shirts made for him, a pair

of socks and a jerkin, and when I placed the money aside to pay for these things, he stole it out of the purse and I could never force him to confess the fact, though I was quite certain of it--4 lire. On the following day I went to sup with Giacomo Andrea, and this same Giacomo supped for two and did mischief for four, since he broke three bottles, spilled the wine, and after this came to sup where I... Item: on the 7th of September he stole a silver point, worth twelve soldi, from Marco, who was living with me, and took it from his studio; and when Marco had looked for it for some time he found it hidden in Giacomo's box--lire 1, soldi 2. Item: on the 26th of the following January, being in the house of Messer Galeazzo di San Severino, in order to arrange the festivity of his joust, and certain henchmen having undressed to try on the costumes of rustics who were to take part in the aforesaid festivity, Giacomo took the purse of one of them, which was on the bed with other clothes, and stole the money he found in it--2 lire, 4 soldi. Item: Maestro Agostino of Padua gave me while I was in the same house a Turkish hide to have a pair of shoes made of it, and Giacomo stole this from me within a month and sold it to a cobbler for 20 soldi, with which money by his own confession he bought sweets of aniseed. Item: {50} again, on the 2d of April, Giovanni Antonio left a silver point on one of his drawings, and Giacomo stole it; it was worth 24 soldi,--1 lire, 4 soldi. The first year a cloak, 2 lire; six shirts, 4 lire; three doublets, 6 lire: four pairs of socks, 7 lire, 8 soldi.

And in this case I know that I shall make not a few enemies, since no one will believe what I say of him; because there are but few whom his vices have disgusted, indeed they only disgusted those men whose natures are contrary to such vices; and many hate their fathers and break off friendship with those who reprove their vices, and they will have no examples brought up against them, nor tolerate any advice. And if you meet with any one who is good and virtuous drive him not away from you, do him honour, so that he may not have to flee from you and hide in hermitages, or caverns and other solitary spots, in order to escape from your treachery; and if there be such an one do him honour, because these are your gods upon earth, they deserve statues from you and images ... but remember that you are not to eat their images, as is practised still in some parts of India, where, when images have performed some miracle, the priests cut them in pieces (since they are of wood) and distribute them among the people of the country, not {51} without payment, and each one grates his portion very fine and puts it upon the first food he eats; and thus they believe that they have eaten their saint by faith, who will preserve them from all perils. What is thy opinion, O man, of thy own species? Art thou so wise as thou believest to be? Are these things to be done by men?

[Sidenote: Pleasure and Pain]

123.

This represents pleasure together with pain because one is never separated from the other; they are depicted back to back because they are opposed to each other; they are represented in one body because they have the same basis, because the source of pleasure is labour mingled with pain, and the pain issues from the various evil pleasures. And it is therefore represented with a reed in its right hand which is ineffectual and devoid of strength, and the wounds inflicted by it are poisonous. In Tuscany such reeds are placed to support beds, to signify that this is the place of idle dreams, that here a great part of life is consumed, here much useful time is wasted, that is, the morning hours when the mind is sober and rested and the body disposed to start on fresh labours; there, again, many vain pleasures are enjoyed by the mind, which pictures to itself impossible things, and by the body, which indulges in those pleasures that are so often the cause of the {52} failing of life; and for this reason the reed is used as their support.

[Sidenote: Brain and Soul]

124.

The spirit returns to the brain whence it had departed, with a loud voice and uttering these words:

O blissful and fortunate spirit, whence comest thou? I have known this man well, against my will. He is a receptacle of villainy, he is a

very heap of the highest ingratitude combined with all the other vices. But why should I tire myself with vain words? Nothing is to be found in him save the accumulation of all sins, and if there is to be found among them any that possess good, they will not be treated differently than I have been by other men; in short I have come to the conclusion that they are bad if they are enemies, and worse if they are friends.

[Sidenote: Of the Eye]

125.

The eye, which reflects the beauty of the universe to those who see, is so excellent a thing that he who consents to its loss deprives himself of the spectacle of the works of nature; and it is owing to this spectacle, effected by means of the eye, which enables the soul to behold the various objects of nature, that the soul is content to remain in the prison of the body; but he who loses his eyesight leaves the soul in a dark prison, where {53} all hope of once more beholding the sun, the light of the whole world, is lost.... And how many are they who feel great hatred for the darkness of night, although it is brief. Oh! what would they do were they constrained to abide in this darkness during the whole of their life? Certainly there is no one who would not rather lose his hearing or his sense of smell than his eyesight, and the loss of hearing includes the loss of all sciences which find expression in words; and this loss a man would incur solely so as not to be deprived of the sight of the beauty of the world which

consists in the surfaces of bodies artificial as well as natural, which are reflected in the human eye.

[Sidenote: The Eye in Animal Life]

126.

Animals suffer greater loss in losing their sight than their hearing for many reasons: firstly, because it is by means of their sight that they find the food which is their nourishment, and is necessary for all animals; secondly, because by means of sight the beauty of created things is apprehended, especially those which lead to love, while he who is born blind cannot apprehend such beauty by hearing, because he has never received any knowledge as to what is beauty of any kind. There remains hearing, by which I mean only the human voice and speech; they contain the names of all things whatsoever. It is possible to live happily without the knowledge of these {54} words, as is seen in those who are born deaf, that is to say, the dumb, who take delight in drawing.

[Sidenote: Ascension of Monte Rosa]

127.

I say that the azure we see in the atmosphere is not its true colour,

but is caused by warm moisture evaporated in minute and insensible atoms which the solar rays strike, rendering them luminous against the darkness of the infinite night of the fiery region which lies beyond and includes them. And this may be seen, as I saw it, by him who ascends Mounboso (Monte Rosa), a peak of the Alps which separates France from Italy. The base of this mountain gives birth to the four large rivers which in four different directions water the whole of Europe; and no mountain has its base at so great a height as this. It rises to such a height that it almost lifts itself up above the clouds; snow seldom falls on it, but only hail in summer, when the clouds are at their greatest height, and this hail is preserved there so that were it not for the absorption of the rising and falling clouds, which does not occur twice in an age, a great quantity of ice would be piled up there by the hail, which in the middle of July I found to be very considerable; and I saw above me the dark air, and the sun which struck the mountain shone far lighter than in the plains below, because a lesser quantity of atmosphere lay between the summit of the mountain and the sun.

{55}

[Sidenote: Prophecies]

128.

Men will communicate with each other from the most distant countries, and reply.