

The artist's private life and choice of company (493-494).

493.

#### OF THE LIFE OF THE PAINTER IN THE COUNTRY.

A painter needs such mathematics as belong to painting. And the absence of all companions who are alienated from his studies; his brain must be easily impressed by the variety of objects, which successively come before him, and also free from other cares [Footnote 6: Leonardo here seems to be speaking of his own method of work as displayed in his MSS. and this passage explains, at least in part, the peculiarities in their arrangement.]. And if, when considering and defining one subject, a second subject intervenes--as happens when an object occupies the mind, then he must decide which of these cases is the more difficult to work out, and follow that up until it becomes quite clear, and then work out the explanation of the other [Footnote 11: Leonardo here seems to be speaking of his own method of work as displayed in his MSS. and this passage explains, at least in part, the peculiarities in their arrangement.]. And above all he must keep his mind as clear as the surface of a mirror, which assumes colours as various as those of the different objects. And his companions should be like him as to their studies, and if such cannot be found he should keep his speculations to himself alone, so that at last he will find no more useful company [than his own].

[Footnote: In the title line Leonardo had originally written del picture filosofo (the philosophical painter), but he himself struck out filosofo. Compare in No. 363 pictora notomista (anatomical painter). The original text is partly reproduced on Pl. CI.]

494.

#### OF THE LIFE OF THE PAINTER IN HIS STUDIO.

To the end that well-being of the body may not injure that of the mind, the painter or draughtsman must remain solitary, and particularly when intent on those studies and reflections which will constantly rise up before his eye, giving materials to be well stored in the memory. While you are alone you are entirely your own [master] and if you have one companion you are but half your own, and the less so in proportion to the indiscretion of his behaviour. And if you have many companions you will fall deeper into the same trouble. If you should say: "I will go my own way and withdraw apart, the better to study the forms of natural objects", I tell you, you will not be able to help often listening to their chatter. And so, since one cannot serve two masters, you will badly fill the part of a companion, and carry out your studies of art even worse. And if you say: "I will withdraw so far that their words cannot reach me and they cannot disturb me", I can tell you that you will be thought mad. But, you see, you will at any rate be alone. And if

you must have companions ship find it in your studio. This may assist you to have the advantages which arise from various speculations. All other company may be highly mischievous.

The distribution of time for studying (495-497).

495.

OF WHETHER IT IS BETTER TO DRAW WITH COMPANIONS OR NOT.

I say and insist that drawing in company is much better than alone, for many reasons. The first is that you would be ashamed to be seen behindhand among the students, and such shame will lead you to careful study. Secondly, a wholesome emulation will stimulate you to be among those who are more praised than yourself, and this praise of others will spur you on. Another is that you can learn from the drawings of others who do better than yourself; and if you are better than they, you can profit by your contempt for their defects, while the praise of others will incite you to farther merits.

[Footnote: The contradiction by this passage of the foregoing chapter is only apparent. It is quite clear, from the nature of the reasoning which is here used to prove that it is more improving to work with others than to work alone, that the studies of pupils only are under consideration here.]

496.

OF STUDYING, IN THE DARK, WHEN YOU WAKE, OR IN BED BEFORE YOU GO TO SLEEP.

I myself have proved it to be of no small use, when in bed in the dark, to recall in fancy the external details of forms previously studied, or other noteworthy things conceived by subtle speculation; and this is certainly an admirable exercise, and useful for impressing things on the memory.

497.

OF THE TIME FOR STUDYING SELECTION OF SUBJECTS.

Winter evenings ought to be employed by young students in looking over the things prepared during the summer; that is, all the drawings from the nude done in the summer should be brought together and a choice made of the best [studies of] limbs and bodies among them, to apply in practice and commit to memory.

OF POSITIONS.

After this in the following summer you should select some one who is well grown and who has not been brought up in doublets, and so may

not be of stiff carriage, and make him go through a number of agile and graceful actions; and if his muscles do not show plainly within the outlines of his limbs that does not matter at all. It is enough that you can see good attitudes and you can correct [the drawing of] the limbs by those you studied in the winter.

[Footnote: An injunction to study in the evening occurs also in No. 524.]

On the productive power of minor artists (498-501).

498.

He is a poor disciple who does not excel his master.

499.

Nor is the painter praiseworthy who does but one thing well, as the nude figure, heads, draperies, animals, landscapes or other such details, irrespective of other work; for there can be no mind so inept, that after devoting itself to one single thing and doing it constantly, it should fail to do it well.

[Footnote: In MANZI'S edition (p. 502) the painter G. G. Bossi indignantly remarks on this passage. "Parla il Vince in questo luogo come se tutti gli artisti avessero quella sublimita d'ingegno

capace di abbracciare tutte le cose, di cui era egli dotato" And he then mentions the case of CLAUDE LORRAIN. But he overlooks the fact that in Leonardo's time landscape painting made no pretensions to independence but was reckoned among the details (particulari, lines 3, 4).]

500.

THAT A PAINTER IS NOT ADMIRABLE UNLESS HE IS UNIVERSAL.

Some may distinctly assert that those persons are under a delusion who call that painter a good master who can do nothing well but a head or a figure. Certainly this is no great achievement; after studying one single thing for a life-time who would not have attained some perfection in it? But, since we know that painting embraces and includes in itself every object produced by nature or resulting from the fortuitous actions of men, in short, all that the eye can see, he seems to me but a poor master who can only do a figure well. For do you not perceive how many and various actions are performed by men only; how many different animals there are, as well as trees, plants, flowers, with many mountainous regions and plains, springs and rivers, cities with public and private buildings, machines, too, fit for the purposes of men, divers costumes, decorations and arts? And all these things ought to be regarded as of equal importance and value, by the man who can be termed a good painter.

501.

OF THE MISERABLE PRETENCES MADE BY THOSE WHO FALSELY AND  
UNWORTHILY  
ACQUIRE THE NAME OF PAINTERS.

Now there is a certain race of painters who, having studied but little, must need take as their standard of beauty mere gold and azure, and these, with supreme conceit, declare that they will not give good work for miserable payment, and that they could do as well as any other if they were well paid. But, ye foolish folks! cannot such artists keep some good work, and then say: this is a costly work and this more moderate and this is average work and show that they can work at all prices?

A caution against one-sided study.

502.

HOW, IN IMPORTANT WORKS, A MAN SHOULD NOT TRUST ENTIRELY TO HIS  
MEMORY WITHOUT CONDESCENDING TO DRAW FROM NATURE.

Any master who should venture to boast that he could remember all the forms and effects of nature would certainly appear to me to be graced with extreme ignorance, inasmuch as these effects are

infinite and our memory is not extensive enough to retain them. Hence, O! painter, beware lest the lust of gain should supplant in you the dignity of art; for the acquisition of glory is a much greater thing than the glory of riches. Hence, for these and other reasons which might be given, first strive in drawing to represent your intention to the eye by expressive forms, and the idea originally formed in your imagination; then go on taking out or putting in, until you have satisfied yourself. Then have living men, draped or nude, as you may have purposed in your work, and take care that in dimensions and size, as determined by perspective, nothing is left in the work which is not in harmony with reason and the effects in nature. And this will be the way to win honour in your art.

How to acquire universality (503-506).

503.

#### OF VARIETY IN THE FIGURES.

The painter should aim at universality, because there is a great want of self-respect in doing one thing well and another badly, as many do who study only the [rules of] measure and proportion in the nude figure and do not seek after variety; for a man may be well proportioned, or he may be fat and short, or tall and thin, or medium. And a painter who takes no account of these varieties always



makes his figures on one pattern so that they might all be taken for brothers; and this is a defect that demands stern reprehension.

504.

#### HOW SOMETHING MAY BE LEARNT EVERYWHERE.

Nature has beneficently provided that throughout the world you may find something to imitate.

505.

#### OF THE MEANS OF ACQUIRING UNIVERSALITY.

It is an easy matter to men to acquire universality, for all terrestrial animals resemble each other as to their limbs, that is in their muscles, sinews and bones; and they do not vary excepting in length or in thickness, as will be shown under Anatomy. But then there are aquatic animals which are of great variety; I will not try to convince the painter that there is any rule for them for they are of infinite variety, and so is the insect tribe.

506.

#### PAINTING.

The mind of the painter must resemble a mirror, which always takes the colour of the object it reflects and is completely occupied by the images of as many objects as are in front of it. Therefore you must know, Oh Painter! that you cannot be a good one if you are not the universal master of representing by your art every kind of form produced by nature. And this you will not know how to do if you do not see them, and retain them in your mind. Hence as you go through the fields, turn your attention to various objects, and, in turn look now at this thing and now at that, collecting a store of divers facts selected and chosen from those of less value. But do not do like some painters who, when they are wearied with exercising their fancy dismiss their work from their thoughts and take exercise in walking for relaxation, but still keep fatigue in their mind which, though they see various objects [around them], does not apprehend them; but, even when they meet friends or relations and are saluted by them, although they see and hear them, take no more cognisance of them than if they had met so much empty air.

Useful games and exercises (507. 508).

507.

OF GAMES TO BE PLAYED BY THOSE WHO DRAW.

When, Oh draughtsmen, you desire to find relaxation in games you should always practise such things as may be of use in your

profession, by giving your eye good practice in judging accurately of the breadth and length of objects. Thus, to accustom your mind to such things, let one of you draw a straight line at random on a wall, and each of you, taking a blade of grass or of straw in his hand, try to cut it to the length that the line drawn appears to him to be, standing at a distance of 10 braccia; then each one may go up to the line to measure the length he has judged it to be. And he who has come nearest with his measure to the length of the pattern is the best man, and the winner, and shall receive the prize you have settled beforehand. Again you should take forshortened measures: that is take a spear, or any other cane or reed, and fix on a point at a certain distance; and let each one estimate how many times he judges that its length will go into that distance. Again, who will draw best a line one braccio long, which shall be tested by a thread. And such games give occasion to good practice for the eye, which is of the first importance in painting.

508.

#### A WAY OF DEVELOPING AND AROUSING THE MIND TO VARIOUS INVENTIONS.

I cannot forbear to mention among these precepts a new device for study which, although it may seem but trivial and almost ludicrous, is nevertheless extremely useful in arousing the mind to various inventions. And this is, when you look at a wall spotted with stains, or with a mixture of stones, if you have to devise some

scene, you may discover a resemblance to various landscapes, beautified with mountains, rivers, rocks, trees, plains, wide valleys and hills in varied arrangement; or again you may see battles and figures in action; or strange faces and costumes, and an endless variety of objects, which you could reduce to complete and well drawn forms. And these appear on such walls confusedly, like the sound of bells in whose jangle you may find any name or word you choose to imagine.

II.

THE ARTIST'S STUDIO.--INSTRUMENTS AND HELPS FOR THE APPLICATION OF PERSPECTIVE.--ON JUDGING OF A PICTURE.

On the size of the studio.

509.

Small rooms or dwellings discipline the mind, large ones weaken it.

On the construction of windows (510-512).

510.

The larger the wall the less the light will be.

511.

The different kinds of light afforded in cellars by various forms of windows. The least useful and the coldest is the window at a. The most useful, the lightest and warmest and most open to the sky is the window at b. The window at c is of medium utility.

[Footnote: From a reference to the notes on the right light for painting it becomes evident that the observations made on cellar-windows have a direct bearing on the construction of the studio-window. In the diagram b as well as in that under No. 510 the window-opening is reduced to a minimum, but only, it would seem, in order to emphasize the advantage of walls constructed on the plan there shown.]

512.

#### OF THE PAINTER'S WINDOW AND ITS ADVANTAGE.

The painter who works from nature should have a window, which he can raise and lower. The reason is that sometimes you will want to finish a thing you are drawing, close to the light.

Let a b c d be the chest on which the work may be raised or lowered, so that the work moves up and down and not the painter. And every evening you can let down the work and shut it up above so that

in the evening it may be in the fashion of a chest which, when shut up, may serve the purpose of a bench.

[Footnote: See Pl. XXXI, No. 2. In this plate the lines have unfortunately lost their sharpness, for the accidental loss of the negative has necessitated a reproduction from a positive. But having formerly published this sketch by another process, in VON LUTZOW'S Zeitschrift fur bildende Kunst (Vol. XVII, pg. 13) I have reproduced it here in the text. The sharpness of the outline in the original sketch is here preserved but it gives it from the reversed side.]

On the best light for painting (513-520).

513.

Which light is best for drawing from nature; whether high or low, or large or small, or strong and broad, or strong and small, or broad and weak or small and weak?

[Footnote: The question here put is unanswered in the original MS.]

514.

OF THE QUALITY OF THE LIGHT.

A broad light high up and not too strong will render the details of objects very agreeable.

515.

THAT THE LIGHT FOR DRAWING FROM NATURE SHOULD BE HIGH UP.

The light for drawing from nature should come from the North in order that it may not vary. And if you have it from the South, keep the window screened with cloth, so that with the sun shining the whole day the light may not vary. The height of the light should be so arranged as that every object shall cast a shadow on the ground of the same length as itself.

516.

THE KIND OF LIGHT REQUISITE FOR PAINTING LIGHT AND SHADE.

An object will display the greatest difference of light and shade when it is seen in the strongest light, as by sunlight, or, at night, by the light of a fire. But this should not be much used in painting because the works remain crude and ungraceful.

An object seen in a moderate light displays little difference in the light and shade; and this is the case towards evening or when the day is cloudy, and works then painted are tender and every kind of

face becomes graceful. Thus, in every thing extremes are to be avoided: Too much light gives crudeness; too little prevents our seeing. The medium is best.

#### OF SMALL LIGHTS.

Again, lights cast from a small window give strong differences of light and shade, all the more if the room lighted by it be large, and this is not good for painting.

517.

#### PAINTING.

The luminous air which enters by passing through orifices in walls into dark rooms will render the place less dark in proportion as the opening cuts into the walls which surround and cover in the pavement.

518.

#### OF THE QUALITY OF LIGHT.

In proportion to the number of times that a b goes into c d will it be more luminous than c d. And similarly, in proportion as the point e goes into c d will it be more luminous than c d; and



this light is useful for carvers of delicate work. [Footnote 5: For the same reason a window thus constructed would be convenient for an illuminator or a miniature painter.]

[Footnote: M. RAVAISSON in his edition of the Paris MS. A remarks on this passage: "La figure porte les lettres f et g, auxquelles rien ne renvoie dans l'explication; par consequent, cette explication est incomplete. La figure semblerait, d'ailleurs, se rapporter a l'effet de la reflexion par un miroir concave." So far as I can see the text is not imperfect, nor is the sense obscure. It is hardly necessary to observe that c d here indicate the wall of the room opposite to the window e and the semicircle described by f g stands for the arch of the sky; this occurs in various diagrams, for example under 511. A similar semicircle, Pl III, No. 2 (and compare No. 149) is expressly called 'horizonte' in writing.]

519.

That the light should fall upon a picture from one window only. This may be seen in the case of objects in this form. If you want to represent a round ball at a certain height you must make it oval in this shape, and stand so far off as that by foreshortening it appears round.

520.

## OF SELECTING THE LIGHT WHICH GIVES MOST GRACE TO FACES.

If you should have a court yard that you can at pleasure cover with a linen awning that light will be good. Or when you want to take a portrait do it in dull weather, or as evening falls, making the sitter stand with his back to one of the walls of the court yard.

Note in the streets, as evening falls, the faces of the men and women, and when the weather is dull, what softness and delicacy you may perceive in them. Hence, Oh Painter! have a court arranged with the walls tinted black and a narrow roof projecting within the walls. It should be 10 braccia wide and 20 braccia long and 10 braccia high and covered with a linen awning; or else paint a work towards evening or when it is cloudy or misty, and this is a perfect light.

On various helps in preparing a picture (521-530).

521.

To draw a nude figure from nature, or any thing else, hold in your hand a plumb-line to enable you to judge of the relative position of objects.

522.

## OF DRAWING AN OBJECT.

When you draw take care to set up a principal line which you must observe all throughout the object you are drawing; every thing should bear relation to the direction of this principal line.

523.

#### OF A MODE OF DRAWING A PLACE ACCURATELY.

Have a piece of glass as large as a half sheet of royal folio paper and set thus firmly in front of your eyes that is, between your eye and the thing you want to draw; then place yourself at a distance of  $\frac{2}{3}$  of a braccia from the glass fixing your head with a machine in such a way that you cannot move it at all. Then shut or entirely cover one eye and with a brush or red chalk draw upon the glass that which you see beyond it; then trace it on paper from the glass, afterwards transfer it onto good paper, and paint it if you like, carefully attending to the arial perspective.

#### HOW TO LEARN TO PLACE YOUR FIGURES CORRECTLY.

If you want to acquire a practice of good and correct attitudes for your figures, make a square frame or net, and square it out with thread; place this between your eye and the nude model you are drawing, and draw these same squares on the paper on which you mean to draw the figure, but very delicately. Then place a pellet of wax

on a spot of the net which will serve as a fixed point, which, whenever you look at your model, must cover the pit of the throat; or, if his back is turned, it may cover one of the vertebrae of the neck. Thus these threads will guide you as to each part of the body which, in any given attitude will be found below the pit of the throat, or the angles of the shoulders, or the nipples, or hips and other parts of the body; and the transverse lines of the net will show you how much the figure is higher over the leg on which it is posed than over the other, and the same with the hips, and the knees and the feet. But always fix the net perpendicularly so that all the divisions that you see the model divided into by the net work correspond with your drawing of the model on the net work you have sketched. The squares you draw may be as much smaller than those of the net as you wish that your figure should be smaller than nature. Afterwards remember when drawing figures, to use the rule of the corresponding proportions of the limbs as you have learnt it from the frame and net. This should be 3 braccia and a half high and 3 braccia wide; 7 braccia distant from you and 1 braccio from the model.

[Footnote: Leonardo is commonly credited with the invention of the arrangement of a plate of glass commonly known as the "vertical plane." Professor E. VON BRUCKE in his "Bruchstücke aus der Theorie der bildenden Künste," Leipzig 1877, pg. 3, writes on this contrivance. "Unsere Glastafel ist die sogenannte Glastafel des Leonardo da Vinci, die in Gestalt einer Glastafel vorgestellte

Bildfläche."]

524.

#### A METHOD OF DRAWING AN OBJECT IN RELIEF AT NIGHT.

Place a sheet of not too transparent paper between the relievo and the light and you can draw thus very well.

[Footnote: Bodies thus illuminated will show on the surface of the paper how the copyist has to distribute light and shade.]

525.

If you want to represent a figure on a wall, the wall being foreshortened, while the figure is to appear in its proper form, and as standing free from the wall, you must proceed thus: have a thin plate of iron and make a small hole in the centre; this hole must be round. Set a light close to it in such a position as that it shines through the central hole, then place any object or figure you please so close to the wall that it touches it and draw the outline of the shadow on the wall; then fill in the shade and add the lights; place the person who is to see it so that he looks through that same hole where at first the light was; and you will never be able to persuade yourself that the image is not detached from the wall.

[Footnote: uno piccolo spiracelo nel mezzo. M. RAVAISSON, in his edition of MS. A (Paris), p. 52, reads nel muro--evidently a mistake for nel mezzo which is quite plainly written; and he translates it "fait lui une petite ouverture dans le mur," adding in a note: "les mots 'dans le mur' paraissent etre de trop. Leonardo a du les ecrire par distraction" But 'nel mezzo' is clearly legible even on the photograph facsimile given by Ravaisson himself, and the objection he raises disappears at once. It is not always wise or safe to try to prove our author's absence of mind or inadvertence by apparent difficulties in the sense or connection of the text.]

526.

TO DRAW A FIGURE ON A WALL 12 BRACCIA HIGH WHICH SHALL LOOK 24 BRACCIA HIGH.

If you wish to draw a figure or any other object to look 24 braccia high you must do it in this way. First, on the surface m r draw half the man you wish to represent; then the other half; then put on the vault m n [the rest of] the figure spoken of above; first set out the vertical plane on the floor of a room of the same shape as the wall with the coved part on which you are to paint your figure. Then, behind it, draw a figure set out in profile of whatever size you please, and draw lines from it to the point f and, as these lines cut m n on the vertical plane, so will the figure come on

the wall, of which the vertical plane gives a likeness, and you will have all the [relative] heights and prominences of the figure. And the breadth or thickness which are on the upright wall *m n* are to be drawn in their proper form, since, as the wall recedes the figure will be foreshortened by itself; but [that part of] the figure which goes into the cove you must foreshorten, as if it were standing upright; this diminution you must set out on a flat floor and there must stand the figure which is to be transferred from the vertical plane *r n*[Footnote 17: *che leverai dalla pariete r n*. The letters refer to the larger sketch, No. 3 on Pl. XXXI.] in its real size and reduce it once more on a vertical plane; and this will be a good method [Footnote 18: Leonardo here says nothing as to how the image foreshortened by perspective and thus produced on the vertical plane is to be transferred to the wall; but from what is said in Nos. 525 and 523 we may conclude that he was familiar with the process of casting the enlarged shadow of a squaring net on the surface of a wall to guide him in drawing the figure.

*Pariete di rilieuo*; "sur une parai en relief" (RAVAISSON). "Auf einer Schnittlinie zum Aufrichten" (LUDWIG). The explanation of this puzzling expression must be sought in No. 545, lines 15-17.].

[Footnote: See Pl. XXXI. 3. The second sketch, which in the plate is incomplete, is here reproduced and completed from the original to illustrate the text. In the original the larger diagram is placed between lines 5 and 6.

1. 2. C. A. 157a; 463a has the similar heading: 'del cressciere della figura', and the text begins: "Se voli fare 1a figura grande b c" but here it breaks off. The translation here given renders the meaning of the passage as I think it must be understood. The MS. is perfectly legible and the construction of the sentence is simple and clear; difficulties can only arise from the very fullness of the meaning, particularly towards the end of the passage.]

527.

If you would to draw a cube in an angle of a wall, first draw the object in its own proper shape and raise it onto a vertical plane until it resembles the angle in which the said object is to be represented.

528.

Why are paintings seen more correctly in a mirror than out of it?

529.

HOW THE MIRROR IS THE MASTER [AND GUIDE] OF PAINTERS.

When you want to see if your picture corresponds throughout with the objects you have drawn from nature, take a mirror and look in that



at the reflection of the real things, and compare the reflected image with your picture, and consider whether the subject of the two images duly corresponds in both, particularly studying the mirror. You should take the mirror for your guide--that is to say a flat mirror--because on its surface the objects appear in many respects as in a painting. Thus you see, in a painting done on a flat surface, objects which appear in relief, and in the mirror--also a flat surface--they look the same. The picture has one plane surface and the same with the mirror. The picture is intangible, in so far as that which appears round and prominent cannot be grasped in the hands; and it is the same with the mirror. And since you can see that the mirror, by means of outlines, shadows and lights, makes objects appear in relief, you, who have in your colours far stronger lights and shades than those in the mirror, can certainly, if you compose your picture well, make that also look like a natural scene reflected in a large mirror.

[Footnote: I understand the concluding lines of this passage as follows: If you draw the upper half a figure on a large sheet of paper laid out on the floor of a room (*sala be piana*) to the same scale (*con le sue vere grosseze*) as the lower half, already drawn upon the wall (lines 10, 11) you must then reduce them on a '*pariete di rilievo*,' a curved vertical plane which serves as a model to reproduce the form of the vault.]

530.

## OF JUDGING YOUR OWN PICTURES.

We know very well that errors are better recognised in the works of others than in our own; and that often, while reproving little faults in others, you may ignore great ones in yourself. To avoid such ignorance, in the first place make yourself a master of perspective, then acquire perfect knowledge of the proportions of men and other animals, and also, study good architecture, that is so far as concerns the forms of buildings and other objects which are on the face of the earth; these forms are infinite, and the better you know them the more admirable will your work be. And in cases where you lack experience do not shrink from drawing them from nature. But, to carry out my promise above [in the title]--I say that when you paint you should have a flat mirror and often look at your work as reflected in it, when you will see it reversed, and it will appear to you like some other painter's work, so you will be better able to judge of its faults than in any other way. Again, it is well that you should often leave off work and take a little relaxation, because, when you come back to it you are a better judge; for sitting too close at work may greatly deceive you. Again, it is good to retire to a distance because the work looks smaller and your eye takes in more of it at a glance and sees more easily the discords or disproportion in the limbs and colours of the objects.

On the management of works (531. 532).

531.

OF A METHOD OF LEARNING WELL BY HEART.

When you want to know a thing you have studied in your memory proceed in this way: When you have drawn the same thing so many times that you think you know it by heart, test it by drawing it without the model; but have the model traced on flat thin glass and lay this on the drawing you have made without the model, and note carefully where the tracing does not coincide with your drawing, and where you find you have gone wrong; and bear in mind not to repeat the same mistakes. Then return to the model, and draw the part in which you were wrong again and again till you have it well in your mind. If you have no flat glass for tracing on, take some very thin kidts-kin parchment, well oiled and dried. And when you have used it for one drawing you can wash it clean with a sponge and make a second.

532.

THAT A PAINTER OUGHT TO BE CURIOUS TO HEAR THE OPINIONS OF EVERY ONE  
ON HIS WORK.

Certainly while a man is painting he ought not to shrink from hearing every opinion. For we know very well that a man, though he may not be a painter, is familiar with the forms of other men and very capable of judging whether they are hump backed, or have one shoulder higher or lower than the other, or too big a mouth or nose, and other defects; and, as we know that men are competent to judge of the works of nature, how much more ought we to admit that they can judge of our errors; since you know how much a man may be deceived in his own work. And if you are not conscious of this in yourself study it in others and profit by their faults. Therefore be curious to hear with patience the opinions of others, consider and weigh well whether those who find fault have ground or not for blame, and, if so amend; but, if not make as though you had not heard, or if he should be a man you esteem show him by argument the cause of his mistake.

On the limitations of painting (533-535)

533.

HOW IN SMALL OBJECTS ERRORS ARE LESS EVIDENT THAN IN LARGE ONES.

In objects of minute size the extent of error is not so perceptible as in large ones; and the reason is that if this small object is a representation of a man or of some other animal, from the immense diminution the details cannot be worked out by the artist with the

finish that is requisite. Hence it is not actually complete; and, not being complete, its faults cannot be determined. For instance: Look at a man at a distance of 300 braccia and judge attentively whether he be handsome or ugly, or very remarkable or of ordinary appearance. You will find that with the utmost effort you cannot persuade yourself to decide. And the reason is that at such a distance the man is so much diminished that the character of the details cannot be determined. And if you wish to see how much this man is diminished [by distance] hold one of your fingers at a span's distance from your eye, and raise or lower it till the top joint touches the feet of the figure you are looking at, and you will see an incredible reduction. For this reason we often doubt as to the person of a friend at a distance.

534.

#### WHY A PAINTING CAN NEVER APPEAR DETACHED AS NATURAL OBJECTS DO.

Painters often fall into despair of imitating nature when they see their pictures fail in that relief and vividness which objects have that are seen in a mirror; while they allege that they have colours which for brightness or depth far exceed the strength of light and shade in the reflections in the mirror, thus displaying their own ignorance rather than the real cause, because they do not know it. It is impossible that painted objects should appear in such relief as to resemble those reflected in the mirror, although both are seen

on a flat surface, unless they are seen with only one eye; and the reason is that two eyes see one object behind another as a and b see m and n. m cannot exactly occupy [the space of] n because the base of the visual lines is so broad that the second body is seen beyond the first. But if you close one eye, as at s the body f will conceal r, because the line of sight proceeds from a single point and makes its base in the first body, whence the second, of the same size, can never be seen.

[Footnote: This passage contains the solution of the problem proposed in No. 29, lines 10-14. Leonardo was evidently familiar with the law of optics on which the construction of the stereoscope depends. Compare E. VON BRUCKE, Bruchstücke aus der Theorie der bildenden Künste, pg. 69: "Schon Leonardo da Vinci wusste, dass ein noch so gut gemaltes Bild nie den vollen Eindruck der Körperlichkeit geben kann, wie ihn die Natur selbst giebt. Er erklärt dies auch in Kap. LIII und Kap. CCCXLI (ed. DU FRESNE) des 'Trattato' in sachgemässer Weise aus dem Sehen mit beiden Augen."

Chap. 53 of DU FRESNE'S edition corresponds to No. 534 of this work.]

535.

WHY OF TWO OBJECTS OF EQUAL SIZE A PAINTED ONE WILL LOOK LARGER  
THAN  
A SOLID ONE.

The reason of this is not so easy to demonstrate as many others. Still I will endeavour to accomplish it, if not wholly, at any rate in part. The perspective of diminution demonstrates by reason, that objects diminish in proportion as they are farther from the eye, and this reasoning is confirmed by experience. Hence, the lines of sight that extend between the object and the eye, when they are directed to the surface of a painting are all intersected at uniform limits, while those lines which are directed towards a piece of sculpture are intersected at various limits and are of various lengths. The lines which are longest extend to a more remote limb than the others and therefore that limb looks smaller. As there are numerous lines each longer than the others--since there are numerous parts, each more remote than the others and these, being farther off, necessarily appear smaller, and by appearing smaller it follows that their diminution makes the whole mass of the object look smaller. But this does not occur in painting; since the lines of sight all end at the same distance there can be no diminution, hence the parts not being diminished the whole object is undiminished, and for this reason painting does not diminish, as a piece of sculpture does.

On the choice of a position (536-537)

536.

#### HOW HIGH THE POINT OF SIGHT SHOULD BE PLACED.

The point of sight must be at the level of the eye of an ordinary man, and the farthest limit of the plain where it touches the sky must be placed at the level of that line where the earth and sky meet; excepting mountains, which are independent of it.

537.

#### OF THE WAY TO DRAW FIGURES FOR HISTORICAL PICTURES.

The painter must always study on the wall on which he is to picture a story the height of the position where he wishes to arrange his figures; and when drawing his studies for them from nature he must place himself with his eye as much below the object he is drawing as, in the picture, it will have to be above the eye of the spectator. Otherwise the work will look wrong.

The apparent size of figures in a picture (538-539)

538.

#### OF PLACING A FIGURE IN THE FOREGROUND OF A HISTORICAL PICTURE.



You must make the foremost figure in the picture less than the size of nature in proportion to the number of braccia at which you place it from the front line, and make the others in proportion by the above rule.

539.

#### PERSPECTIVE.

You are asked, O Painter, why the figures you draw on a small scale according to the laws of perspective do not appear--notwithstanding the demonstration of distance--as large as real ones--their height being the same as in those painted on the wall.

And why [painted] objects seen at a small distance appear larger than the real ones?

The right position of the artist, when painting, and of the spectator (540-547)

540.

#### OF PAINTING.

When you draw from nature stand at a distance of 3 times the height of the object you wish to draw.

541.

#### OF DRAWING FROM RELIEF.

In drawing from the round the draughtsman should so place himself that the eye of the figure he is drawing is on a level with his own. This should be done with any head he may have to represent from nature because, without exception, the figures or persons you meet in the streets have their eyes on the same level as your own; and if you place them higher or lower you will see that your drawing will not be true.

542.

#### WHY GROUPS OF FIGURES ONE ABOVE ANOTHER ARE TO BE AVOIDED.

The universal practice which painters adopt on the walls of chapels is greatly and reasonably to be condemned. Inasmuch as they represent one historical subject on one level with a landscape and buildings, and then go up a step and paint another, varying the point [of sight], and then a third and a fourth, in such a way as that on one wall there are 4 points of sight, which is supreme folly in such painters. We know that the point of sight is opposite the eye of the spectator of the scene; and if you would [have me] tell you how to represent the life of a saint divided into several

pictures on one and the same wall, I answer that you must set out the foreground with its point of sight on a level with the eye of the spectator of the scene, and upon this plane represent the more important part of the story large and then, diminishing by degrees the figures, and the buildings on various hills and open spaces, you can represent all the events of the history. And on the remainder of the wall up to the top put trees, large as compared with the figures, or angels if they are appropriate to the story, or birds or clouds or similar objects; otherwise do not trouble yourself with it for your whole work will be wrong.

543.

A PICTURE OF OBJECTS IN PERSPECTIVE WILL LOOK MORE LIVELY WHEN SEEN FROM THE POINT FROM WHICH THE OBJECTS WERE DRAWN.

If you want to represent an object near to you which is to have the effect of nature, it is impossible that your perspective should not look wrong, with every false relation and disagreement of proportion that can be imagined in a wretched work, unless the spectator, when he looks at it, has his eye at the very distance and height and direction where the eye or the point of sight was placed in doing this perspective. Hence it would be necessary to make a window, or rather a hole, of the size of your face through which you can look at the work; and if you do this, beyond all doubt your work, if it is correct as to light and shade, will have the effect of nature;

may you will hardly persuade yourself that those objects are painted; otherwise do not trouble yourself about it, unless indeed you make your view at least 20 times as far off as the greatest width or height of the objects represented, and this will satisfy any spectator placed anywhere opposite to the picture.

If you want the proof briefly shown, take a piece of wood in the form of a little column, eight times as high as it is thick, like a column without any plinth or capital; then mark off on a flat wall 40 equal spaces, equal to its width so that between them they make 40 columns resembling your little column; you then must fix, opposite the centre space, and at 4 braccia from the wall, a thin strip of iron with a small round hole in the middle about as large as a big pearl. Close to this hole place a light touching it. Then place your column against each mark on the wall and draw the outline of its shadow; afterwards shade it and look through the hole in the iron plate.

[Footnote: In the original there is a wide space between lines 3 and 4 in which we find two sketches not belonging to the text. It is unnecessary to give prominence to the points in which my reading differs from that of M. RAVAISSON or to justify myself, since they are all of secondary importance and can also be immediately verified from the photograph facsimile in his edition.]

544.

A diminished object should be seen from the same distance, height and direction as the point of sight of your eye, or else your knowledge will produce no good effect.

And if you will not, or cannot, act on this principle--because as the plane on which you paint is to be seen by several persons you would need several points of sight which would make it look discordant and wrong--place yourself at a distance of at least 10 times the size of the objects.

The lesser fault you can fall into then, will be that of representing all the objects in the foreground of their proper size, and on whichever side you are standing the objects thus seen will diminish themselves while the spaces between them will have no definite ratio. For, if you place yourself in the middle of a straight row [of objects], and look at several columns arranged in a line you will see, beyond a few columns separated by intervals, that the columns touch; and beyond where they touch they cover each other, till the last column projects but very little beyond the last but one. Thus the spaces between the columns are by degrees entirely lost. So, if your method of perspective is good, it will produce the same effect; this effect results from standing near the line in which the columns are placed. This method is not satisfactory unless the objects seen are viewed from a small hole, in the middle of which is your point of sight; but if you proceed thus your work will

be perfect and will deceive the beholder, who will see the columns as they are here figured.

Here the eye is in the middle, at the point a and near to the columns.

[Footnote: The diagram which stands above this chapter in the original with the note belonging to it: "a b e la ripruova" (a b is the proof) has obviously no connection with the text. The second sketch alone is reproduced and stands in the original between lines 22 and 23.]

545.

If you cannot arrange that those who look at your work should stand at one particular point, when constructing your work, stand back until your eye is at least 20 times as far off as the greatest height and width of your work. This will make so little difference when the eye of the spectator moves, that it will be hardly appreciable, and it will look very good.

If the point of sight is at t you would make the figures on the circle d b e all of one size, as each of them bears the same relation to the point t. But consider the diagram given below and you will see that this is wrong, and why I shall make b smaller than d e [Footnote 8: The second diagram of this chapter stands in

the original between lines 8 and 9.].

It is easy to understand that if 2 objects equal to each other are placed side by side the one at 3 braccia distance looks smaller than that placed at 2 braccia. This however is rather theoretical than for practice, because you stand close by [Footnote 11: Instead of 'se preso' (=sie presso) M. RAVAISSON reads 'sempre se' which gives rise to the unmeaning rendering: 'parceque toujours ...']].

All the objects in the foreground, whether large or small, are to be drawn of their proper size, and if you see them from a distance they will appear just as they ought, and if you see them close they will diminish of themselves.

[Footnote 15: Compare No. 526 line 18.] Take care that the vertical plan on which you work out the perspective of the objects seen is of the same form as the wall on which the work is to be executed.

546.

OF PAINTING.

The size of the figures represented ought to show you the distance they are seen from. If you see a figure as large as nature you know it appears to be close to the eye.

547.

WHERE A SPECTATOR SHOULD STAND TO LOOK AT A PICTURE.

Supposing a b to be the picture and d to be the light, I say that if you place yourself between c and e you will not understand the picture well and particularly if it is done in oils, or still more if it is varnished, because it will be lustrous and somewhat of the nature of a mirror. And for this reason the nearer you go towards the point c, the less you will see, because the rays of light falling from the window on the picture are reflected to that point. But if you place yourself between e and d you will get a good view of it, and the more so as you approach the point d, because that spot is least exposed to these reflected rays of light.

III.

THE PRACTICAL METHODS OF LIGHT AND SHADE AND AERIAL PERSPECTIVE.

Gradations of light and shade.

548.

OF PAINTING: OF THE DARKNESS OF THE SHADOWS, OR I MAY SAY, THE BRIGHTNESS OF THE LIGHTS.



Although practical painters attribute to all shaded objects--trees, fields, hair, beards and skin--four degrees of darkness in each colour they use: that is to say first a dark foundation, secondly a spot of colour somewhat resembling the form of the details, thirdly a somewhat brighter and more defined portion, fourthly the lights which are more conspicuous than other parts of the figure; still to me it appears that these gradations are infinite upon a continuous surface which is in itself infinitely divisible, and I prove it thus:--[Footnote 7: See Pl. XXXI, No. 1; the two upper sketches.]

Let a  $g$  be a continuous surface and let  $d$  be the light which illuminates it; I say--by the 4th [proposition] which says that that side of an illuminated body is most highly lighted which is nearest to the source of light--that therefore  $g$  must be darker than  $c$  in proportion as the line  $d g$  is longer than the line  $d c$ , and consequently that these gradations of light--or rather of shadow, are not 4 only, but may be conceived of as infinite, because  $c d$  is a continuous surface and every continuous surface is infinitely divisible; hence the varieties in the length of lines extending between the light and the illuminated object are infinite, and the proportion of the light will be the same as that of the length of the lines between them; extending from the centre of the luminous body to the surface of the illuminated object.

On the choice of light for a picture (549-554).

549.

HOW THE PAINTER MUST PLACE HIMSELF WITH REFERENCE TO THE LIGHT,  
TO

GIVE THE EFFECT OF RELIEF.

Let a b be the window, m the point of light. I say that on  
whichever side the painter places himself he will be well placed if  
only his eye is between the shaded and the illuminated portions of  
the object he is drawing; and this place you will find by putting  
yourself between the point m and the division between the shadow  
and the light on the object to be drawn.

550.

THAT SHADOWS CAST BY A PARTICULAR LIGHT SHOULD BE AVOIDED,  
BECAUSE

THEY ARE EQUALLY STRONG AT THE ENDS AND AT THE BEGINNING.

The shadows cast by the sun or any other particular light have not a  
pleasing effect on the body to which they belong, because the parts  
remain confuse, being divided by distinct outlines of light and  
shade. And the shadows are of equal strength at the end and at the  
beginning.

551.

## HOW LIGHT SHOULD BE THROWN UPON FIGURES.

The light must be arranged in accordance with the natural conditions under which you wish to represent your figures: that is, if you represent them in the sunshine make the shadows dark with large spaces of light, and mark their shadows and those of all the surrounding objects strongly on the ground. And if you represent them as in dull weather give little difference of light and shade, without any shadows at their feet. If you represent them as within doors, make a strong difference between the lights and shadows, with shadows on the ground. If the window is screened and the walls white, there will be little difference of light. If it is lighted by firelight make the high lights ruddy and strong, and the shadows dark, and those cast on the walls and on the floor will be clearly defined and the farther they are from the body the broader and longer will they be. If the light is partly from the fire and partly from the outer day, that of day will be the stronger and that of the fire almost as red as fire itself. Above all see that the figures you paint are broadly lighted and from above, that is to say all living persons that you paint; for you will see that all the people you meet out in the street are lighted from above, and you must know that if you saw your most intimate friend with a light [on his face] from below you would find it difficult to recognise him.

552.

OF HELPING THE APPARENT RELIEF OF A PICTURE BY GIVING IT ARTIFICIAL LIGHT AND SHADE.

To increase relief of a picture you may place, between your figure and the solid object on which its shadow falls, a line of bright light, dividing the figure from the object in shadow. And on the same object you shall represent two light parts which will surround the shadow cast upon the wall by the figure placed opposite [6]; and do this frequently with the limbs which you wish should stand out somewhat from the body they belong to; particularly when the arms cross the front of the breast show, between the shadow cast by the arms on the breast and the shadow on the arms themselves, a little light seeming to fall through a space between the breast and the arms; and the more you wish the arm to look detached from the breast the broader you must make the light; always contrive also to arrange the figures against the background in such a way as that the parts in shadow are against a light background and the illuminated portions against a dark background.

[Footnote 6: Compare the two diagrams under No. 565.]

553.

OF SITUATION.

Remember [to note] the situation of your figures; for the light and

shade will be one thing if the object is in a dark place with a particular light, and another thing if it is in a light place with direct sunlight; one thing in a dark place with a diffused evening light or a cloudy sky, and another in the diffused light of the atmosphere lighted by the sun.

554.

#### OF THE JUDGMENT TO BE MADE OF A PAINTER'S WORK.

First you must consider whether the figures have the relief required by their situation and the light which illuminates them; for the shadows should not be the same at the extreme ends of the composition as in the middle, because it is one thing when figures are surrounded by shadows and another when they have shadows only on one side. Those which are in the middle of the picture are surrounded by shadows, because they are shaded by the figures which stand between them and the light. And those are lighted on one side only which stand between the principal group and the light, because where they do not look towards the light they face the group and the darkness of the group is thrown on them: and where they do not face the group they face the brilliant light and it is their own darkness shadowing them, which appears there.

In the second place observe the distribution or arrangement of figures, and whether they are distributed appropriately to the

circumstances of the story. Thirdly, whether the figures are actively intent on their particular business.

555.

#### OF THE TREATMENT OF THE LIGHTS.

First give a general shadow to the whole of that extended part which is away from the light. Then put in the half shadows and the strong shadows, comparing them with each other and, in the same way give the extended light in half tint, afterwards adding the half lights and the high lights, likewise comparing them together.

The distribution of light and shade (556-559)

556.

#### OF SHADOWS ON BODIES.

When you represent the dark shadows in bodies in light and shade, always show the cause of the shadow, and the same with reflections; because the dark shadows are produced by dark objects and the reflections by objects only moderately lighted, that is with diminished light. And there is the same proportion between the highly lighted part of a body and the part lighted by a reflection as between the origin of the lights on the body and the origin of

the reflections.

557.

#### OF LIGHTS AND SHADOWS.

I must remind you to take care that every portion of a body, and every smallest detail which is ever so little in relief, must be given its proper importance as to light and shade.

558.

#### OF THE WAY TO MAKE THE SHADOW ON FIGURES CORRESPOND TO THE LIGHT AND TO [THE COLOUR] OF THE BODY.

When you draw a figure and you wish to see whether the shadow is the proper complement to the light, and neither redder nor yellower than is the nature of the colour you wish to represent in shade, proceed thus. Cast a shadow with your finger on the illuminated portion, and if the accidental shadow that you have made is like the natural shadow cast by your finger on your work, well and good; and by putting your finger nearer or farther off, you can make darker or lighter shadows, which you must compare with your own.

559.

## OF SURROUNDING BODIES BY VARIOUS FORMS OF SHADOW.

Take care that the shadows cast upon the surface of the bodies by different objects must undulate according to the various curves of the limbs which cast the shadows, and of the objects on which they are cast.

The juxtaposition of light and shade (560, 561).

560.

## ON PAINTING.

The comparison of the various qualities of shadows and lights not infrequently seems ambiguous and confused to the painter who desires to imitate and copy the objects he sees. The reason is this: If you see a white drapery side by side with a black one, that part of the white drapery which lies against the black one will certainly look much whiter than the part which lies against something whiter than itself. [Footnote: It is evident from this that so early as in 1492 Leonardo's writing in perspective was so far advanced that he could quote his own statements.--As bearing on this subject compare what is said in No. 280.] And the reason of this is shown in my [book on] perspective.



561.

#### OF SHADOWS.

Where a shadow ends in the light, note carefully where it is paler or deeper and where it is more or less indistinct towards the light; and, above all, in [painting] youthful figures I remind you not to make the shadow end like a stone, because flesh has a certain transparency, as may be seen by looking at a hand held between the eye and the sun, which shines through it ruddy and bright. Place the most highly coloured part between the light and shadow. And to see what shadow tint is needed on the flesh, cast a shadow on it with your finger, and according as you wish to see it lighter or darker hold your finger nearer to or farther from your picture, and copy that [shadow].

On the lighting of the background (562-565).

562.

#### OF THE BACKGROUNDS FOR PAINTED FIGURES.

The ground which surrounds the forms of any object you paint should be darker than the high lights of those figures, and lighter than their shadowed part: &c.

563.

OF THE BACKGROUND THAT THE PAINTER SHOULD ADOPT IN HIS WORKS.

Since experience shows us that all bodies are surrounded by light and shade it is necessary that you, O Painter, should so arrange that the side which is in light shall terminate against a dark body and likewise that the shadow side shall terminate against a light body. And by [following] this rule you will add greatly to the relief of your figures.

564.

A most important part of painting consists in the backgrounds of the objects represented; against these backgrounds the outlines of those natural objects which are convex are always visible, and also the forms of these bodies against the background, even though the colours of the bodies should be the same as that of the background. This is caused by the convex edges of the objects not being illuminated in the same way as, by the same light, the background is illuminated, since these edges will often be lighter or darker than the background. But if the edge is of the same colour as the background, beyond a doubt it will in that part of the picture interfere with your perception of the outline, and such a choice in a picture ought to be rejected by the judgment of good painters, inasmuch as the purpose of the painter is to make his figures appear