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Alexander Perrig

Drawing and the Artist's Basic Training from the 13th to the 16th Century

Tobias, Paper and Parthenon

The collections of European graphic material scattered throughout the world contain a mass of drawings whose number may well exceed that of all the paintings, sculptures and important buildings of the Christian era put together. It is so immense that one automatically assumes it to represent the totality of drawings created by European artists anywhere. In reality, however, these collections tell us everything about the drawing practices of the last five hundred years, but almost nothing about those of the Middle Ages. This is due less to the fact that the stock of medieval drawings still extant represents a tiny fraction of the total, than to the absence, within this tiny fraction, of the very categories of drawing which are most important for our purposes. The drawings on pre-1425 paper and parchment sheets are almost exclusively autonomous: book illustrations, building plans, contact drawings (p. 422, left), figure patterns (pp. 418, 420), copies of paintings (p. 419, right). Drafts, studies, practice sketches and notes in drawing form are almost entirely wanting.

The absence is due to the same cause as explains the lack of literary "rough work" of medievals artists (suits, writing practice sheets, drafts of letters, treatises, poems, romances etc.). Such materials were only considered worthy of preservation if they had been produced with a view to long-term use (e.g., catedral plans, sermon books). Logically enough, if this was not the case, expedient carriers such as paper and parchment were discarded in favour of continually re-usable wooden tablets coated with wax or paraffin bane. The fact that such tablets were used as early as the late 7th century for both drawing and writing is documented by the Actummon of Æs, the Abbé of Inns (c. 624-704). He had been sold to the Cushman Bishop Aulici, who had been shippedwright on the easter of Scotland, of the latter's journey to the Holy Land, to give him listen to a better idea of some of the churches he had visited them, the bishop had sketched their ground plans on wax tablets. Astutenius subsequently made fair copies of his colleague's sketches, using them to illustrate his De locis sanctis libri tres ("Thirty Books on the Holy Places").

Artists had dealings with treated wood tablets, either loose or bound into some sort of codex, as vehicles for drawing from time immemorial. Apparitions, at least, were still being done at a time when their masters had long since converted to paper for sketching - as witnessed by a numbers of drawings, dating from the second half of the 15th century, of boys drawing (p. 423 bottom). The impotence of Michelangelo was perhaps the first test to use sheets of paper even as a beginner: needing no preparation, they were so very practical. Lower Sheet no. 632 (p. 458) shows that he obtained his paper in his early years by tearing up old family ledgers. On the reverse of one we have the predilection to one of his great-grandfather's account books.

Sienese and Preliminary Sketches

The most important of all graphic ephemera were, and are, preliminary sketches. By providing the first confirmation of the artist's subjective idea and giving him a means of judging the correctness of his own execution, they form the basis and starting point for the elaboration of all painting, sculpture and architecture. It is all the more astonishing, then, that Giottino Cennini, who, in the 15th century of his Libro dell'arte, deals with every aspect of the late-15th-century artist's workshop from facial make-up to the manipulation and preparation of wooden tablets, does not devote - even as late as c. 1460 - a single word to this species of drawing or to how it was actually done. What he describes instead, in Chapter 67, is a particular way of preparing a preliminary sketch, on the wall, for a fresco. It is presented as a four-stage process: 1. a preliminary outline in charcoal; 2. "brushing up" the contours and shading with a sharp-pointed brush and liquid ochre; 3. rubbing out the charcoal outline with a "rubbing cloth"; 4. drawing in the fine contours with a "thin, sharp-pointed brush" and "smears" (i.e. red ochre, as classical tones exported from the town of Sienna). The end product was something resembling a great watercolour.

The fact that Cennini, by ignoring the usual form of preliminary sketch, tacitly presented the fabulous procedure as the set of preparing one, has given rise to some confusion among art historians. His approach was seen in connection with the absence of any extant mobile sketches dating from before approximately 1425, and, notwithstanding the hundreds of instances in which the practice of drawing on tablets is documented, has been regarded as circumstantial evidence that "in the Middle Ages" artists worked directly, i.e. without a sketch, onto the final surface, namely the panel or the wall, or other worlds designed the picture as they went along. These preliminary mural sketches or "smears" - which often come to light beneath the fresco plaster when old frescoes are removed - are consequently seen as documents of an ex-epistemic, i.e. "asocial", form of preliminary sketch, even though they are unknown before the middle of the 15th century, and continued beyond the end of the 15th night up until the early 17th century, when making preliminary sketches on paper had long been the practice throughout Europe.

However, what Cennini describes is merely the most time-consuming method of producing a full-scale mock-up of a fresco, but by no means the only one. As is proved by the smears of Ambrogio Lorenzetti's Assisicent frescoes (bright), the whole process can be carried out in a single stage rather than four. Indeed, of Cennini's famous known today, only a few are the product of Cennini's four-stage process. Most were produced quickly, like the Lorenzetti example, with the purpose of classifying the main features of the composition and, of these, at most the major outlines. Ironically, the "quick-and-easy" smears was used precisely for the monumental narrative frescoes with many figures, while the four-stage process seems to have been confined to the more-rendered frescoes containing nothing beyond what could be found in any standard pattern-book: a single scene (Cennini refers to a Madonna, a Paris, a crossroads between two roads etc. According to the logic implied by the identification of smears with preliminary sketches, artist created careful preliminary sketches with all the details only in those cases where it was least necessary. Conversely, e.g. in the case of Ambrogio's Annunciation or Bellincioni's gigantic Triumph of Death (p. 76, bottom, and p. 77), this theory would imply that the subject was only finally conceived and composed during the actual painting process. Forced to explain this paradox, we would have to regard the numerous quick-and-easy smears as documents of an imaginative super-imposed to put a few generations of...
in detail would be clear enough from the portable modello. The painter would also have depended on, in a revised final version, the case might be, during the actual execution of the fresco. Only a portable modello of this kind could have supplied him with the occasionally quite substantial - quantity of information which a sinopia would have provided either at all or in a quite different form (i.e. the form rejected by the client). While the quick-and-easy sinopia could have served as no more than an abstract orientation aid to the painter, the portable sketch would have enabled him to determine his daily assignment (i.e. the area of wall he could cover with fresco in a day and which would receive the fresco plaster - which would cover any sinopia - on the morning in question), without regard to his own powers of memory, solely on the basis of his own desired working speed and the difficulty of the elements to be painted. Where the design had been sketched directly on the wall, there was no such possibility, thus necessitating each daily assignment to be kept as small as possible, since the painter otherwise ran the risk of forgetting what was in that part of the sinopia sketch now covered by the plaster. This is why Cennini illustrates a daily assignment painted over a four-stage sinopia by way of a "head of a madonna" - an example which would be quite incomprehensible, had he been thinking of a mural on the scale of Brunelleschi's scribbled fresco (p. 82) or a fresco cycle by his teacher Agnolo Gaddi (p. 87), whose daily assignments often comprised several complete figures.

The appearance in the mid-13th century of wall drawings as preliminary sketches for frescoes may be connected with a more demanding attitude on the part of the client. It changed little as far as the existing practice of preliminary sketches was concerned. Doubtless most of what was subsequently painted continued to be composed on a portable, i.e. small-format, carrier. Since the painters, and the few four-stage sinopi before the document as a means of a pointless waste of time and effort, or else as indications that assistants were at work. Such difficulties evaporate when we see the sinopi for what it clearly was a mock-up, allowing the customer to assess the effect of the future fresco in its intended site, and before it was too late for modifications. Produced in the manner described by Cennini, it could take the place of a regular preliminary sketch, or modello, albeit it would then - and this would explain Cennini's one-sided interest in the four-stage sinopia - have to be paid for extra. Two such "saint watercolours", models of equestrian funerary monuments in pictorial form for the condottieri Pietro Farmine (d. 1367) and John Hawkwood (d. 1394), were commissioned by the Florence Cathedral building supervisors on 2 December 1395 from Giovanni Arrighi, alias Puerlibono, and Cennini's teacher Agnolo Gaddi, for the considerable sum of 30 florins each.

Painted on the wall of one of the Cathedral aisles on a scale of 1:1, they were intended, as was expressly stated in the decision to award the commission, to provide all those responsible with a means of assessing the project.

That a modello substitute of this kind only made sense with routine works requiring no programming in itself evident. If frescoes with a complicated subject, let alone narrative or allegorical cycles, were to be executed, four-stage sinopi would have been no more than a pointless exercise, but simply impossible to produce in any event of dimension such as is, if only by a few months, the field of vision of a painter standing on scaffolding in front of it can be described of box on the plastering without further ado. The substitute in such cases would be an enlarged reproduction, as it were, of the normal preliminary sketch, the production of which would require neither too much time nor particular care; how the end product would look...
Ghiberti knew what he was about. Before he was accorded the privilege of designing the Gate of Paradise doors himself, the Ghiberti guild had had these programs in the usual way. They seem to have taken it for granted that each of the humanists charged with the task (Ambrogio Traversari, Niccolò Niccolò and Leonardo Bruni) would, by dint of their education, make a better job of it than any mere artisan could. Great was their astonishment, presumably, when the opposite proved to be the case. The fixing of detail has been left to anyone with any knowledge of the situation. For while Ghiberti devoted all his free time to extending his knowledge beyond the bounds of his own specialty, none of the programmers we have named considered it necessary to trouble himself with modern art, let alone with modern artists. Take Leonardo Bruni (c. 1370-1446) in his substance for his lack of practical knowledge and of any pictorial concept of his own was arrogance pure and simple. On the evidence of the letter accompanying his programmatic proposals (the only one to have been preserved), he seriously imagined he would be able to guarantee the Camaldoli success in the matter of the bronze doors by handing the artist a list of themes and explaining wryly in each individual case what he, the artist, should bear in mind when encountering the commission.

Bruni's abstract programmatic method (which probably did not differ in material respects from that of his colleagues) recorded, it is true, what is not historically come under the heading of such a function. But it can hardly have acceded with that of his largely anonymous predecessors. To judge by the conspicuous inexactness and confusing complexity of the major pictorial cycles of the 13th and 14th centuries, they took their task more seriously and fulfilled it more efficiently. Instead of compiling a mere list of themes, they evidently produced designs to a programme, in other words harmonized the monumental programme with the pictorial design (cf. pp. 49, 52, 60, 67-69, 76 and 96 top). It is understandable that they are no longer believed to have possessed the necessary expressiveness of draughtsmanship, their degeneration to a monopoly of architecture, artists and designers in the end determined the theory of their baseness, according to which it is a "fact that prior to 1300 no remotely draughtsmanship appears, or can appear, among artisans..."

The Amateur Draughtsman
But clearly it could, and did. True, it is an open question whether Bishop Arcello and Abbé Adamo could use drawings to communicate anything more complicated than the ground plans of churches, or whether the Franciscan scholar Roger Bacon (c. 1220-95), John Petrianius (c. 1240-92) and others were just as competent in draughting figures as they were in the construction of diagrams designed to explain optical theories. Nor do we know how well or how badly Nasir II of Khuzistan (c. 953-1037) could draw animals.
on his tablets, or Duarte Almagro (1365–1321)228 angels on his, or
neither saw fit to actually include a drawing of animals or angels in
spite of having mentioned them in writing (the master-of-facets of
these reveries in the Boethian commentary and the Histo Nova
respectively indicates merely that Nolaire and Duarte were
acquainted with expressing themselves through drawings). Our
establishment in all the greater when we see the standard of
drawings-in-a-drawings-in the relatively few drawings that have been
preserved. Those made, to illustrate their writings, by Adenar de
Chalaisains, the arcanographic monk of St Cybard d’Angoulême
(c.1088–1034), Giraldus Cambrensis, the Welsh scholar, zoologist and
canon lawyer (c. 1146–1223), Matthew Paris, the historiog-
grapher active in the Benedictine Abbey of St Albans (c. 1200–39),
or the master of art Konrad von Mengen (1209–79) — so named
only the less-known — stand comparison with any contemporary
visual-art production by a professional. Since there is nothing to
suggest that any of these scholars was particularly useful for his
drawing talents, we can only assume that they represent the tip of an
icyberg. Until well into the 15th century, manuscripts, cathedral
chapels, parishes, guilds, fraternities and individual charitable
benefactors doubtless had recourse to their like when they needed
donative to design a programme of sculptures for a chapel or pulpit.

A cycle of mural or stained-glass illustrations, or even a more
thoroughly complicated individual picture.

From the early 14th century, as horticultural foundations steadily
grow in number and importance, non-clerical scholars also start to
be recorded as draughtsmen. The first known to modern scholarship
was the Florentine notary and poet Francesco da Barberino
(1364–1348). He had presumably learnt to draw at one of the
mathematically schools attended by those destined for mercantile
professions, whose teaching staff was largely recruited from among
merchants and surveyors, for both of which occupations a certain
skill in drawingmanship was essential. During a stay in Florence
from 1359 to 1363, he composed an encyclopaedic didactic poem
entitled 'Discorso d’amore', which he decorated in his own hand
with several pre-war drawings of allegorical content, and of
which, on his return to Florence, he had four illuminated copies
done. By his own accounts, Francesco also functioned as occasion as
a programmes. It may be taken for granted that he prepared the
preliminary sketches for the paintings he programmed in Florence
and Tuscany in the same meticulous way in which he design the
different illustrations which illustrate his didactic poem. This poem
urges the "artiocracy" to practice the "art of drawing" for the very
reason that would be then able "easoy to convey their
instructions to their audience".

No such statement, it is true, can be attributed to Francesco
Petrarca (1304–74), who - like Ghiberti and Boccaccio, both sons of
noirs — also attended a mathematical school, his father having
intended him for a mercantile career but he certainly understood
programming in terms of designing, and gave expression to his ideas
for the pictures requested of him - e.g. at the Certosa court in Padua.

- in the form of drawings, as is attested by the confident contours
and the spatial persuasiveness of the little pen-and-ink sketch,
accompanied by a text by Piers, with which he gave spontaneous
expression to his mental image of the region of natural springs
around Vouzeste (p. 419 bottom).

Until the beginning of the 15th century the main reason why
non-scientists practised the art of drawing was doubtless the
opportunity it provided of giving a "graphic" description (as both
names) of what was difficult to describe in words. For many, this
continued to be the main reason - Jean Bourré, for example, the
Tanner at the court of the King of France, when in 1461 the
painter Colin d’Amiens was to execute the figure of Louis XI for the
King's tomb, Bourré made it clear both in writing and in pictures
how the royal effigy was to appear in respect of posture, physiognomy,
vocabulary and习俗. Others, however, appear to have
discovered drawing additionally as a means towards inner
enrichment. The case to the Certosa court at the beginning of the
12th century, Piu Paolo Verginio (1270-1444), was of the opinion
that even the ancient Greeks had practised it to this end. He urged
one of his charges, Ubertino da Caserta, to follow the "busy examples
and to immobilize the beauties of art and nature by drawing them.
Vitruvius' De Fibris, the Ponsius among the Romans (1370-1446),
signed a similar vow. Apprenticed tuner to the Giannelli
in court in Mantua in 1425, he established a school there for all social
classes, at which drawing lessons were given by painters he paid out
of his own purse. Presumably Rubens' Conversations (1476-1532)
was only repeating what Vitruvius' pupils had known when, in
chapter 49 of his 1528 bestseller Il Cortegiano (The Book of the
Courtesan), he attempted to explain why the perfect counterpart of
the noble, among other accomplishments, to master the art of
drawing.

Drawing as art mechanism

The mathematical schools teaching the use of drawings to
solve such problems as calculating the volume of a ship's cargo
space required for a particular consignment of wine-casks, thus
providing young would-be merchants and scholars with the
foundations of a possible future career in bookkeeping and
marketing. By constant, apprentice printers, even in Vitruvius' and Verginio's day,
were still being drilled in the technique of optimising
other people's designs, making a definitive sketch, and converting the
result into a painting. They learned drawing by copying numerous
patterns for individual pictorial elements, first in monochrome on a
table, then with chalk, pen and brush on paper and parchment. The
mastery of pattern was not a by-product of drawing lessons; it was
the goal. It demanded hard work and patience, and teaching also,
and literally made drawing an end in itself, especially in the first
year, when the master's pattern-book had to be copied stroke by
stroke. Cennini seems to have had such evil memories of this period
that, forgetting his own interests in a manner, he advised the next
generation of apprentices to copy only "a birth each day" onto the
tablet, "so that you don't lose all pleasure in it" (Libro dell'Arte, chapter VII).

A sheet in the Pierpont Morgan Library in New York (p. 415)
illuminates the terrifying reality: it is drawn in the first quarter of the
15th century, almost certainly by a Tuscan apprentice who had
completed his first year and was using the initial stages of his
familiarity with pen and brush, ink and parchment, to lay the
foundation of a pattern-book of his own. When he started, he was
still steeped in the habit—acquired during the "tablets" year—of
drawing items as small as possible: this was to get as much on to the
carrier (which measured approximately 30 x 20 cm) as he could.
and thus put off the tedious task of re-painting it. Only after he had filled every available space in the top left-hand quarter did he overcome the horror that came on occasion by the 50.3 x 76 cm of the original. He allowed himself to accelerate both the size of the figures and the amount of space between them. The drawings themselves attest to the trouble it cost to carry out a pen moving forward in tiny steps the prescribed complete, and evenly sharp, contours, and out of a hesitant brush the white too hard and not too soft shading effects.

The enced continuous doubleness simply reproduces parts of the master's pattern-books. It contains nothing but min-partners for the run-of-the-mill motifs of contemporary sacred and secular painting: in other words, what the clients asked for time and again: for example, a benefactor kneeling to the left and another kneeling to the right; a model tombscape (as required by municipal patrons): a pelican appropriate to put up a crucifix; a rudimentary figure from the calendar or zodiac, including peacocks (depicted in the prie of both rooms and receptacles), a peacock woman plucking a chicken, crows, and a seagull: a seated two-headed female figure, which could be incorporated into an altar or altar-piece; a jumping hare, which could be mollified for Nuclear, plunging or being hung; a two-headed female figure; two Gothic canons to hang above the transept and a small masque made up of foliage, dog, bird of prey and monkeys, which might come in useful as decorative elements for a page of a book. What these comprehensive card-indexes do not include is first of all any example of the art of composition, and secondly any drawing taken from a pattern-book but from life or nature.

Compositions Patterns and Pattern Compositions

This absence is typical. Complete compositions also appear only rarely in regular (i.e. master's) pattern-books prior to about 1422. Reproductions of paintings done by the owner of the pattern-book do not appear at all, a clear indication that the art of composition was not a concern of the artist's workshop, and thus not part of the curriculum. In fact, the few complete compositions to be found occasionally in pattern-books only reproduce works known to be in demand as copies of paintings or sculptures. They were seen not as illustrative material for a course in design or composition, however conceived, but as a stock-in-trade which would be useful if an order materialized, or indeed might clinch the order in the first place. For example, we find scattered throughout Europe many fresco imitations of the Novella mysteries in the street of St. Peter's in Rome: now the benefactor who wanted to have one of these painted for his parish church in Milan, if he could himself not carry himself with a drawing based on the original or an already existent copy, would have no choice but to award the commission to a Milanese workshop which had done one or two pattern-books.

Even less than professionally drawn picture compositions in pattern-books are those on loose sheets. Before 1422, they seem to have existed only in the form of those painting-like finished drawings of which that in the Louvre depicting The Presentation of the Virgin Mary (p. 419) is doubtless the best-known among those still extant. These quasi-paintings, executed with pedantic precision in a less than different media and colours, never having formed part of a pattern-book, are generally regarded as models for the client. But why coloured sketches, if clients - or express from extant four-stage stumpo and contract drawings (p. 422 above) - attached any importance to colour in preliminary sketches? Were these exceptional cases in which colours were required? If so, why did they not accord with those of the final frescoes (p. 73)?

What was the point of the modelli of an unframed individual scene, when one of the specific demands of the painted final product was that it should include a "frame" painted with a related motif?

Yet more telling than the exclusion of the framing corner is, in the case of the Tempel drawing (p. 475 right), the fact that the angles of inclination of the roof elements are mostly smaller than in the fresco itself. They correspond not to the actual contours of the fresco, but rather to the square constant as seen by a beholder looking from below. This proves the drawing to be a copy rather than a draft. Its complicated composition can also be explained far better by seeing it as an examination piece rather than as a modella. After all, it provides information on matters that can only have been of interest to someone who wanted to know in what extent the draughtsman had understood, in Cennini's words, "the pinnale and gateway of colouring", and was in a position to prime and prepare the carrier as required for the task in hand, to make confident use of the brush and styles, to employ colours properly, and to reproduce...
an existing picture of any given format; the head of the workshop, in other words, and not the customer who might reasonably take it for granted that the commission was going to someone who knew his business. The head of the workshop must also have had a special interest in a perfect result to all appearances, there was a market for these test pieces. For the buyer, they represented a cheap substitute for a painting, while for the workshop they were good publicity. They were for example the sort of art (later displaced by woodcuts and copperplate engravings) that the Paduan humanist Feliciano de' Fasciotto, among others, might afford. According to his will, dated 1646, his house was hung with "drawings and paintings on paper by many excellent masters of drawing."

Before the 15th century, then, there was no workshop-intestinal picture composition or design practice. Even in 1450, the existence of such was still far from being taken for granted, as is shown by the so-called sketch-books of Jacopo Bellini (c. 1400–70?), two thick folio volumes with almost every page filled with black-and-white compositions of his own conception (p. 425). They are unique, and apart from the fact that they contain drawings, they have nothing in common with the Liber ventris in which, from c. 1633, Claude Lorrain (1600–82) reproduced his own paintings in the form of pen wash drawings, for less exceptions Jacopo Bellini's silverpoint and pen-and-ink drawings, by contrast, reproduce compositions that existed only in his own head, and not in painted reality. While all the important personal and monumental themes of the day are represented—from the Adoration of the Magi, and St. Francis Receiving the Stigmata (p. 425), to St. George and the Dragon—they seem understandable only as a demonstration of their creator's comprehensive imagination. They are doubtless rooted in experiences of ignorance and prejudice similar to what Gioberti had encountered a generation earlier. A striking feature in any case is their penetrative melancholy. The pattern-compositions seem to emphasize the learning of their author in precisely the disciplines which feature in Gioberti's list of those he considered a necessary part of an artist's training (see p. 420 n1). St. Francis Receiving the Stigmata gives expression to these, as it were heterogeneous, scholarly standpoint: firstly, that of the "historian" trying to understand the past on the basis of his own image of written sources (which thus lead him to results diverging from the iconographic tradition); secondly, that of the "empiricist" versed in geometry, who, by virtue of his knowledge of the laws of perspective, represents the facts as understood in terms of the visual reality perceived by the beholder; and thirdly, that of the "natural philosopher" versed not only in the appearance and behaviour of men and animals, but also in the history of the Earth. Jacob's moutains, with their helical basic structure and the adamantine hardness of their material, reflect precisely what classical and medieval scholars conceived them to be: unhewn material thrown up by subterranean fires, petrified to hollow, flame-like formations.

Studies from Nature in the Workshops

While the rule played by the study of nature in the late-medieval workshop curriculum may appear to be more important than that played by the art of composition, the appearance is deceptive. It is true that Cennini praises the imitation of nature as "the triumphal arch" and the painter's "most perfect guide" (Libro dell'arte, chapter 25). But what he understood by this "nature" was too be mistated was the so-called "essence" of things, rather than their visible reality in the modern sense. Since Man's existence was considered to reside in his being made in God's image—a quality whose visible expression was thought to consist in a certain overstatement of the limbs—Cennini regarded a knowledge of human anatomy as less important than familiarity with "correct" proportion, in which he saw the key to the lifelike depiction of human beings. And while he devoted a whole chapter—70—in his treatises, on his anatomical instructions were limited to the usual remarks that men had one rib fewer than woman (namely the one which God took to create Eve), and that the penis must be "at the size which women prefer" and his testicles

"small, attractive and fresh." No wonder, then, that this passage through the "triumphal arch" male and female nude, which were becoming more and more frequent in the pattern-books of Cennini's time (p. 420, right), look like representatives of a stylized, long-nosed race with attenuated muscles—even when they were copied not from a painted or drawn pattern, but from a chiselled sculpture (p. 424 below).

A special case were the "dumb creatures" (animali irrazionali), since they avoided "no proportions whatever," Cennini recommended chapter 70 that they be drawn or painted "as far as you can" direct from life ("dall naturale"). That this had occasionally been done as early as the first sixty years of the 13th century is documented by, for example, certain capitals in Rheims Cathedral, the bird ornaments on Emperor Frederick II's book on falconry, and the elephant drawn by Matthew Paris, which dates from c. 1255. In Italy, this practice of painting from nature had already been extended to certain landscapes (p. 65), while in Cennini's day, such attempts was concentrated largely on the domains of the various court emmagnifici as northern Italy. But from the outset, such studies from nature were excluded from the workshop curriculum. The apprentices could be handled from the practice at least indirectly—rather than from c. 1300 they were faced, more frequently than in the past, with first-hand images, and perhaps were even allowed to draw from casts of small animals made from nature. But these masters would seem to have drawn animals and plants direct from nature, if at all, only when they were concerned with the illustrations to a herbal or hunting manual, or the ornament or miniaturist of a pattern-book. As soon as they were dealing with regular commissions which included the representation of animals the creators of the animals, Nicolò Arli, the possession of
The Crisis in Basic Artistic Training

The study from life was a more effective means of “naturalizing” the representation of the human figure than was the study from the classical sculpture, insofar as a pose adopted by a model, unlike that of a statue, can be adapted to current needs at any time. From an, its efficiency was limited as soon as movement was involved. Movements such as stepping, running, or dancing could only be represented by depicting the corresponding poses. Such poses (see p. 423) do not express movement, however, but are merely “stills,” not essentially different from the representation of standing, sitting or reclining figures. To base on them a design of John strolling through the wilderness, or Apollo pursuing Daphne, or Salome dancing (p. 260), thus means that these figures were no less drawn in their tracks than Paolo Uccello’s running horse (p. 264). Now that the standard of the correct representation of the human figure was the model posing in the workshop, there was no longer any possibility of suggesting dynamic effects by mediusional techniques – in other words, by neglecting or distorting anatomical realities. The problem could only either be ignored altogether or else be zero as refining the question of whether studies from life and the internalization of patterns as hitherto practiced could ever lead to the achievement of a dynamic art.

In principle, this question had already been answered in the negative even before the study from life had become the workshop norm, namely by Leon Battista Alberti (1404–72). The educated son of a merchant, he did not make himself explicit on the teaching practices he saw in painters’ workshops. Indirectly, however, by recommending an alternative, he represented them as misguided. “I should like those who are just starting to Devon themselves to the art of painting,” he writes in the third book of his Della Pittura published in 1435, “to proceed in one place, as far as I can see, in the writing schools. Here they start off by teaching the forms of the individual
Leonardo as Researcher and Inventor

In a letter written around 1482, Leonardo da Vinci, who was approximately 30 years old at the time, exclaimed himself in Ducale Ludovico Sforza, called II, as the happy owner of an excellent piece of the great city of Milan, before his final return to Venice. The city, which he had already visited, was a place of great importance to him. In his letter, he mentions the details of the city's architecture and the works of art found there.

Leonardo's interest in architecture and urban planning led him to study the principles of urban design. He believed that the layout of a city should be based on mathematical and geometrical principles. He was particularly interested in the design of public buildings and the placement of sculptures and monuments.

In his letter, Leonardo also discusses the importance of water management in the city. He notes that the city's water supply was provided by a network of canals and that the city's water supply was maintained through the construction of dams and sluices.

Leonardo's interest in water management was not limited to the city of Milan. He had previously worked on similar projects in other cities, including the city of Florence, where he had designed a system of water channels to collect rainwater.

Leonardo's fascination with the principles of urban design and water management was evident in his own work. He designed a number of public buildings and sculptures that were based on mathematical and geometrical principles. His designs were often based on the principles of perspective and the use of mathematical relationships to create a sense of depth and perspective.

In conclusion, Leonardo's interest in architecture and urban planning was evident in his letter to Ducale Ludovico Sforza. He believed that the design of a city should be based on mathematical and geometrical principles, and he was particularly interested in the design of public buildings and the placement of sculptures and monuments. His work in this area would have a lasting impact on the development of urban design and water management.
Leonardo had already been confronted with this problem in the village of Vinci, where he spent the first seventeen years of his life. As he had learned drawing either from his father, the notary Ser Piero, or at the grammar school, he drew from patterns of his own choice, uninfluenced by the rules of urban workshop teaching. The potential range of patterns available was known as "workshops," namely the personal home and its environment, altogether converted, however, of those interesting things which move around and refuse to keep still in frozen poses waiting to be drawn — Garrus'am and livestock, cats and dogs, lizards, snakes, birds and insects. To capture these creatures on paper in such a way as to give them the appearance of continuing life demanded not only quick visual reaction but a no less sturdy mind. For this reason, Leonardo developed a "shaded" technique at an early age that allowed him to move down very rapidly in graphic form, in metamorphosis or whole sequence of movements, of a flying bird, for example, a farmhand at his digging, or a group of men conversing. These minute notes would take hours and, with a pen, dwell the most appropriate attitude problem (p. 431, left). By 1481, when he obtained the commission for The Adoration of the Magi (p. 311) in Florence, Leonardo, with his notebook method, was already aware of all the regularized artists. While the protagonists in the composition sketches (p. 421) for a Scourging of Christ attributed to Ghirlandaio differ in their anatomical positions, the details of the costumes (aside from a few variations on a particular pattern-book figure, they are recognizable as reflections of a study of posing models), Leonardo's preliminary-sketch figures look like another image caught in mid-action. Each of them evokes an instant taken from a lively short story.

Having moved to Milan in 1482, Leonardo soon realized that his structured method was no substitute for a detailed study of the body in motion. In order for the effect to be convincing even on a monumental scale, a knowledge of anatomy was needed. Anatomical knowledge had been steadily demanded of artists by Alberti and Ghisberti, but they had meant something different from what Leonardo needed, namely, more knowledge of "the number of bones and muscles and visible blood-vessels," and "where beneath the skin each muscle is to be found" (Ghirlandaio). This knowledge, which corresponded to the main to what the medical families of the day were teaching their students, was doubtless important if artists were to be weaned away from the traditional, bible-based view of the human body (cf. p. 422). But it contributed absolutely nothing to a solution of the movement problem. Just how little is shown by the male nude of that very artist who, according to Vasari, was the first in the history of an artist himself (p. 275 and p. 425, top). The nudes by Antonio de Poliolo (c. 1430-1498) demonstrate with unparalleled clarity where a strong man's muscles are and what they look like, but nothing else. They give almost no insight into how those muscles are involved in the actions expressed by the bodily silhouette. No swinging muscle is any more tense than a free-leg muscle, and no left knee is any more straight than any right knee. Even when the silhouettes of head or torso indicate a bend or a turn, the symmetry of the bodies is nowhere questioned by any unilateral contraction or distortion. Ancient's nude seems to consist of two whole figures, each looking nothing of the other: a silhouette missing energetic action and, beneath it, an immobile muscular corpus. It was representation like these which Leonardo, exaggerating somewhat disrespectfully, described as "sucks full of nuts."

The naturalism of the body and the individualization of bodily movements were indeed two different problems. The first could be solved without anatomy (p. 425), while a definite solution to the second could only be achieved with a study of anatomy which included a study of organic functions. Leonardo's anatomy proceeded from questions which even the medical schools of the time had not asked: for example, what happens beneath the skin when a man steps forward, bends, stretches out his arm and grips a rod? Which muscles, tendons and bones are involved in such actions, and how? How do the facial corpuscles, skull, teeth and jaw coordinate and interfere (p. 432, bottom)? To what degree are the differences in the shapes of the male and female abdomens, and how do their components function (p. 422, bottom)? Since Leonardo in his obsession for certainty sought to answer every such question by means of a section, and to illustrate every answer, the fruits of his labours consisted not just in the most comprehensive understanding of the external and internal structure and the mechanics of the human body that anyone had ever possessed, but also in an adequate means of conveying. Just as he had used the operation of military and industrial machines (p. 635), so Leonardo also brought the operation of the human organism into the public domain, by having his imaginary public take part in the dissecting process, and this in turn by presenting them with all-round views, which, part by part and layer by layer, display the way the whole is put together.

Because the painted textbook on anatomy never came to fruition (the diagrams for it are not being published until 1796), this new understanding of physical functions remained confined for the time being to the person of its author. Before the publication of a work of approximately equal value, namely Andrea Vesalio's De humani corporis fabrica in 1543, the acquisition of such understanding was reserved to the very few who, like Leonardo, had privileged access to the products of the dissecting room. The first such was Michielangelo (1475-1564). He had also taught himself to draw, albeit under the direction of a pupil of Ghislandaio, and therefore was more in conformity with workshop teaching practice than Leonardo. When, under the protection of the Medici (the Antonio del Poliolo before him), he began to carry out his own dissections in the early 1596, he did so without any exterior didactic motives, but with the sole intention of understanding what was of direct benefit to his art, namely the mechanism of bodily movements. He did
understand them; and yet, he should take into his pedagogical library for the benefit of his own pupils, and those of others, the essays on anatomy and physiology that can be found in the works of other artists. He is a true artist, and his knowledge of anatomy and physiology is essential for him to create works that are realistic and lifelike.

The Reform of the Artist's Basic Training

While Michelangelo did not begin to think about reorganizing his own artistic training until he was about 30, he had already begun to reflect on the need for a more systematic approach to training artists. He believed that artists should be trained in a systematic and rigorous manner, rather than being left to fend for themselves. He proposed a new system of training that would include the study of anatomy, perspective, and proportion, as well as the study of the works of other artists.

Michelangelo's vision for the training of artists was based on his own experience as an artist and his understanding of the importance of anatomy and physiology in the creation of realistic works of art. He believed that artists should be trained in a way that would allow them to create works that were both beautiful and realistic. He was a true artist, and his knowledge of anatomy and physiology was essential for him to create works that were both beautiful and realistic.
of Michelangelo, whose "involuntary style is so different from that of the other arts and from the style of the past precisely because this artist keeps to the real order of the bones."

We may take it for granted that Michelangelo did not owe his style to any order either of flesh or of bones. Nor did he wish to turn his workshop into a chaulk house where, in the 1520s, he taught his factotum Antonio Maria (1506–31) to draw. On the contrary — as is proved by a picture sheet now at Oxford (p. 439), of which he used to advise his pupils to copy (p. 439) — he had him begin with the same ABC as must have been forced upon Cellini. However, Michelangelo knew how to draw on the stimulating potential of alternating between analytical and synthesizing procedures for better than did Cellini's pedantic master. He appeared to urge not only his good Antonio, but also the highly-talented Tommaso da Caravaggio, whom he would be in drawing in 1532–33, at every stage to test the load, so to speak, of what had been learned at the fossil-organ and skull stage, for example, by head constructions on the pattern of the nude draperies he had drawn himself (p. 437), or on the autonomous variations thereof.

The new basic training was more than just a reform of an old one. It revolutionized the whole of art. It led to that internalization of the physical and mental properties of the organism which allowed artists at the very beginning of their careers to freely invent figures in motion and make them appear so less natural than stored from life (cf. p. 434 and 433). By allowing creative activity to be experienced from the outset as a subjective act of imagination, it imbued the students with a hitherto almost unheard-of self-confidence, in the form of a feeling that in the final analysis it was the awareness of the idea, rather than the manual execution, which established the value of a work of art. But it was not long before the reverse side of the coin also made its appearance. Even by 1520, contrary to what Leonardo had envisaged, the art of those trained by the new method was already beginning to alienate itself from its source — i.e., nature. It became artificial, the vehicle not only of lofty ideas, but also of carefully elaborated nascent to express them. It finally needed the foundation of a private academy (1521) and the joint methodological efforts of its three young founders, Leonardo, Agostino and Angelo Carracci, to provide a long-term guarantee of that natural vitality which an excessive trust in the power and goodness of pure imagining so quickly destroyed.