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Author(s): William M. Ivins, Jr.

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A NEGLECTED ASPECT OF EARLY PRINT-MAKING

BY WILLIAM M. IVINS, JR.
Curator Emeritus of Prints

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I am going to talk about deadly commonplace things which everybody knows, and to which, therefore, nobody devotes much attention. I shall begin by stating some of them in very general terms.

Such a meeting as this and the studies to which we devote ourselves are caused by the trouble we have in understanding the past. This is merely another way of saying that were it not for ignorance there would be no learning. But, curiously, we devote our learning to the "whats" of past thought and accomplishment rather than to the "hows" of technique, both mechanical and intellectual, which generated those "whats." We constantly forget that the lack of a technique has its results just as has the possession of one.

The number of books on ancient techniques is remarkably small, and it is astonishing how few of them deal with the problems presented by the lack of techniques in the past. There could be little more illuminating for an understanding of the thought of any period in the past than a careful preliminary statement of the things that that period could not do. I recall no serious study of this kind of thing.

I propose to examine a simple and obvious instance of the results, first, of the lack of a technique, and, then, of its gradual acquisition. Because old prints are always considered as works of art their exact duplicability is invariably overlooked as a factor in their importance. The only way to recognize the basic importance of the printed picture to thought and knowl-

ABOVE: *Woodcut from Ulrich Boner's "Der Edelstein," published by Pfister in Bamberg about 1461. From a collotype reproduction*

edge is to try to think oneself back into a society in which no pictorial statement could be exactly duplicated or repeated. One rapidly finds that it would be a very curious kind of society.

I recall only one account of the effect on knowledge of the inability to make a precisely duplicable pictorial statement. It is interesting to notice that it occurs in the *Natural History* of Pliny the Elder, who died in 79 A.D., that is, approximately one thousand four hundred years before the publication of the first printed illustrated book. Pliny merely tells us what the ancient Greek botanists had discovered to be one of the greatest and most insuperable obstacles to a scientific knowledge of botany, and how that obstacle forced a certain method of procedure upon them. For anyone who is interested in Greek thought, the fact that the Greeks were critically aware of this "block" in the way of knowledge should be very interesting, and the fact that the Greeks saw no way of obviating it should be even more interesting. The two things explain a great deal about Greek thought and that of the other peoples down to the time of the Renaissance.

I shall not bother you with a description of the abstract symbolic nature of the written word and the concrete sensuous nature of the accurately made picture, and neither shall I talk about the function of pointing in the definition of words. It suffices to say that the best way to define many words is still to point at something, and that one of the best ways of pointing is to make a suitable picture. This is the reason that line drawings still hold their heads against photography for many scientific purposes. The combination of illustrations with words produces descriptions of a kind and an accuracy that are impossible with either of them alone. The mere fact that an unillustrated zoology, botany, or anatomy is today almost a contradiction in terms, suffices to make my point.

What Pliny said was this (I quote from the twenty-fifth book of the Bohn translation):

" . . . some Greek writers . . . adopted a very attractive method of description, though one which has done little more than prove the remarkable difficulties which attend it. It was

their plan to delineate the various plants in colours, and then to add in writing a description of the properties which they possessed. Pictures, however, are very apt to mislead, and more particularly where such a number of tints is required, for the imitation of nature with any success; in addition to which, the diversity of copyists from the original paintings, and their comparative degrees of skill, add very considerably to the chances of losing the necessary degree of resemblance to the originals (Chap. 4)."

"Hence it is that other writers have confined themselves to a verbal description of the plants; indeed some of them have not so much as described them even, but have contented themselves for the most part with a bare recital of their names, considering it sufficient if they pointed out their virtues and properties to such as might feel inclined to make further inquiries into the subject (Chap. 5)."

"The plant known as 'paeonia' is the most ancient of them all. It still retains the name of him who was the first to discover it, being known also as the 'pentorobus' by some, and the 'glycicide' by others; indeed, this is one of the great difficulties attendant on forming an accurate knowledge of plants, that the same object has different names in different districts (Chap. 10)."

Aside from its immediate content, the important thing to notice about Pliny's statement is that the situation remained unchanged for almost one thousand five hundred years after he wrote. In 1551 the making of well-illustrated printed books of scientific interest was so new, and the habits of thought that came from the use of manuscripts and drawings rather than of printed books and printed illustrations were so overriding, that in that year Sylvius, the great Galenic professor of anatomy at Paris, publicly berated Vesalius for issuing an anatomy not only with illustrations but with illustrations marked all over with letters of the alphabet that served as indices to his written descriptions. Sylvius wound up his excoriation of Vesalius for doing this by saying that Galen would not permit even plants to be illustrated. Sylvius was a very intelligent person, probably a much more intelligent person than Vesalius, but like



Woodcut of the Creation from Turrecremata's "Meditations," Rome, 1473. First edition 1467

many other intelligent persons since his time, he was not aware that within the span of his own lifetime a new technique had come into the world and that it had changed an entire situation.

What had happened in the long years between Pliny and Sylvius was the slow and gradual discovery of the wider possibilities of a very simple device in the making of textiles. There is no logical reason that the several steps should not have been taken at any time and within a very short period if only someone had had the basic notion or seen the advantage of following it through. As it was, there was no invention and no sudden exploitation of one. Even as today, men found themselves doing something without being aware of just what it was they were doing or of how they came to be doing it.

We may believe that the development began a long time before we can actually see it taking place. In any case, there have been discovered in

Egyptian burials of the sixth and seventh centuries of our era textiles decorated with designs impressed upon them from pigment-charged blocks. The earliest reference I know to any such process in Europe is a sumptuary law of King James I of Spain, which, in 1234, forbade certain groups of the population to wear "estampados" or printed stuffs. Pictures printed on paper, which are stylistically datable about 1400, are not uncommon in the great collections of Europe, but it is probably impossible to prove that any existing pictorial woodcut was actually made before about 1440 or 1450. There seems to be no evidence that in their time the primitive woodcuts were regarded as anything more than very cheap pictures for the lower classes, turned out by a quantity-production method that had no interest in itself. That the impressions from any one block might all be exactly alike was thought of no consequence—as is shown by the fact that almost all of these

early woodcuts were gaudily and carelessly daubed up with colors in such a way that actually no two of the resultant pictures could have been alike.

The earliest known dated engraving bears the date 1446.

Sometime in the 1440's, so far as we know, men began to print words from movable types. This, while a great invention, was primarily a labor-saving device by which to turn out more quickly and cheaply than ever before a very ancient and well-known product. In thinking about it we must realize that a book is merely a conveyor of word symbols in quantity, and that from many points of view the mechanical way in which the word symbols are made is aside from the point. Given adequate proof-reading there is no limit to the number of accurate handwritten copies of even the longest sequences of word symbols. In all probability there have been many more, and more serious, errors committed by the students and commentators of such authors as Plato and Aristotle than have been committed by their humble copyists. Neither should we forget that casual reference by Pliny the Younger, sometime early in the second century A.D., to an edition of a thousand copies. It is important to remember that in ancient Rome there was a highly developed book trade, which seemingly has carried on without interruption to the present time, and that printing from movable types did not gain an entrance into either Paris or Florence for quite a long time after it had become common in many other places. The significance of this last fact lies in the position of these two cities as the largest groups of literate people in Europe at the time and also as the great centers of the European trade in handwritten books. They were so well stocked with manuscripts, and the old methods of hand manufacture were so well entrenched in them that the new mechanical devices had to wait before they could compete in their markets.

The really great novelty was not such a thing as a printed Donatus, the Gutenberg Bible, or the Psalter of 1457, but Boner's *Edelstein* in the edition issued shortly after 1460 at Bamberg by Ulrich Pfister, a church dignitary and amateur

printer who had no connection with Gutenberg. The text of the *Edelstein* was printed from movable types and its illustrations were printed from woodblocks. It may be said that with this event the print emerges from the cloudy realm of guess and learned myth into that of demonstrable fact. The *Edelstein* was the first book of which it could be said that all the copies of the edition might have contained exactly the same pictures. At last the problem of the Greek botanists as described by Pliny had been solved, but no one knew it or paid any attention to it, for the illustrations in the *Edelstein* were very crude and utterly devoid of any informational value—at most but gaudily and carelessly painted-up decorations to attract the attention of the lowest of the literate classes. No one noticed the revolutionary possibilities of the method of illustration. During the next few years Pfister issued several more books of this kind and then vanished from the scene.

Of the illustrated books that followed Pfister's efforts I have time to mention but a very few.

The first illustrated printed book after Pfister was produced at Rome, where, in 1467, Ulrich Hahn printed an edition of the Cardinal Turrecremata's *Meditations*, illustrated with woodcuts which, according to the first sentence in the book, represented murals that the cardinal had caused to be placed in his titular church of Santa Maria sopra Minerva. Crude and clumsy as they were, these illustrations were the first invariant pictorial statements about precisely locatable and definable objects to make their appearance in a book of any kind. That they happen to be reproductions of works of art should make them no less interesting to us here today.

Five years later, in 1472, an edition of Valturinus's *De re militari* was printed at Verona, which contained the first series of printed invariant pictures of tools and machines, shown not as incidentals to something else but as the direct subject matter of the pictures. These may be looked upon as the distant ancestors of our modern blueprints.

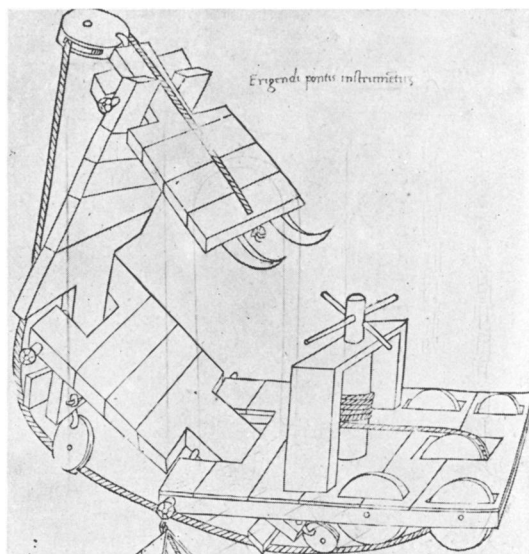
Shortly after 1480, also at Rome, there appeared the so-called Pseudo-Apuleius, the first

fully illustrated printed book about plants and flowers. Its text is a version of the text of a manuscript still in existence (Casinensis 97), and its illustrations are rough copies of the pictures in that manuscript. The manuscript is thought to have been made in the eighth century. Its pictures were themselves copies of copies, etc., of pictures made quite probably in the first century A.D., and which may well have had their origin much earlier than that. As the pictures appear in the manuscript and in the printed book they are frequently so degraded that were it not for the text it would be impossible to tell what plants they represented. They are a very perfect exemplification of the difficulty that was pointed out by Pliny, and of the reason that the most serious scientific workers for almost fifteen hundred years did without pictures in their books.

In 1484, at Mainz, Gutenberg's surviving partner, Schoeffer, printed a Latin Herbal that also was illustrated with printed pictures which were debased copies of debased copies of much earlier originals, and which therefore had no value as representations of actual things. The next year, however, Schoeffer issued a German Herbal—the famous *Gart der Gesundheit*—illustrated with pictures made specially for the purpose and with few exceptions from the actual plants described in the text.

Let me read you a portion of the introduction to this Herbal of 1485—

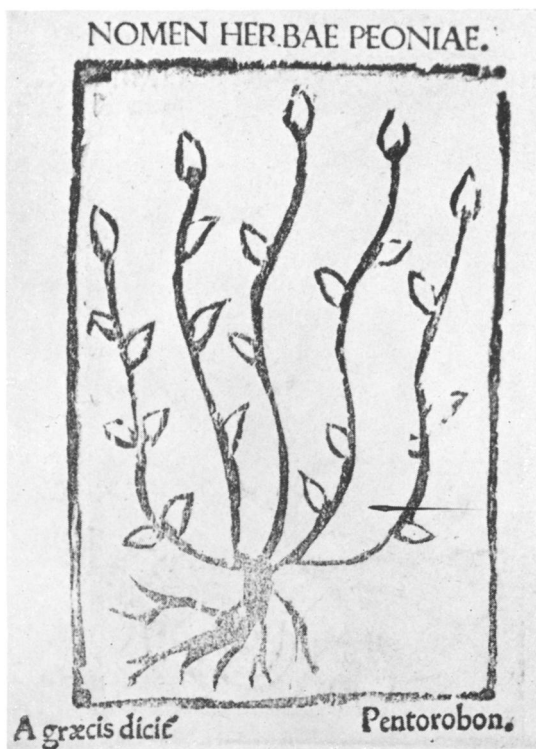
“ . . . as man has no greater or nobler treasure on this earth than bodily health, I came to believe that I could undertake no more honorable, or useful, or holier work or labor, than to bring together a book in which the virtue and nature of many herbs and other creations of God, with their true colors and form, were made comprehensible for the consolation and common use of all the world. Therefore, I caused this praiseworthy book to be begun by a master learned in medicine, who at my behest brought together in a book the virtue and nature of many herbs out of the esteemed masters of medicine. Galen, Avicenna, . . . and others. And when I was in the middle of the work of drawing and painting the herbs I noticed that many noble herbs did not grow in this German



Woodcut of a siege engine from Valturius's
“*De re militari*,” Verona, 1472

land, so that, except by hearsay, I could not draw them in their true colors and form. Therefore, I left the work I had begun unfinished and hanging in the pen until I had received grace and dispensation to go to the Holy Sepulchre and also to. . . . And so, lest this noble work, begun but not ended, be left undone, and also that my journey should serve not only the salvation of my soul but all the world, I took with me a painter of understanding and with a subtle and practiced hand. And so I traveled. . . . In journeying through these kingdoms and lands I diligently learned the herbs that were there, and had them painted and drawn in their true colors and form. And afterwards, when with God's help, I was come again in German land and home, the great love which I had for this work has moved me to finish it. . . . And in order that it may be of use to the learned and the lay I have had it turned into German.”

This German Herbal of 1485 is thus the first printed and illustrated account of the results of a trip undertaken for scientific purposes. It also contains the earliest printed statement I have met that a writer or artist refused to illustrate his book from secondary sources, either of words or pictures, instead of from first hand acquaint-



Woodcut of a peony from Pseudo-Apuleius's "Herbarium," Rome, 1483-1484

ance with the objects themselves. In its funny way I believe this to be an unappreciated but very important milestone in the history of scientific thought in Europe. For the descriptive sciences it was epoch-making.

In 1486 there appeared, likewise at Mainz, the first edition of Breydenbach's *Peregrinations*, that was illustrated by an artist taken on the long trip for the special purpose of making pictures of the more notable things that were seen. His name has come down to us and is worthy of grateful remembrance. It was Erhard Reuwich of Utrecht. His book contains the earliest recognizable printed pictures of any still extant buildings, as well as the first veridical printed pictures of a number of Eastern costumes.

In 1493 Hans Mayr of Nuremberg printed three illustrated catalogues of the reliquaries in three of the German cathedrals. So far as I have discovered they were the first illustrated printed catalogues of any kind of materials, whether in

a collection or not. That they were devoted to what we call works of art gives them an added interest for us.

In 1505 Viator published, at Toul in France, the first illustrated printed book on perspective. For its subject matter alone it is of great importance, but when we turn to it after looking at a group of the earlier illustrated books, we are apt to get a shock, for its pictures are three-dimensional, that is, in good geometrical perspective. For the first time the problem of space representation has been solved. With this book we have definitely left ancient times and find ourselves in the modern era. If its pictures are not in the fashion of today, they are absolutely in our mode of thought.

In 1521 the Como Vitruvius provided the first cross sections and floor plans of actual buildings. That same year gave us the first printed illustrated textbook of anatomy, the fat little *Commentaries* of Berengar. In 1530 there came Brunfels's *Herbarum vivae eicones* with its remarkable and sensitively drawn portraits of individual plants and flowers. In 1542 there was the Fuchs Herbal with illustrations which emphasized the characteristics of the species rather than the accidents of growth and personality of particular plants. The pictures in these two botanies are still the great models for black and white pictures of plants and flowers.

As early as 1532 Estienne had begun work on his *De dissectione*, in which he essayed to give a full pictorial account of the bones, muscles, blood vessels, nerves, etc., of the human body. In 1543 the *Fabrica* of Vesalius was printed with illustrations that are still models of the way to render all sorts of things in anatomy. I recall no earlier book in which objects are represented in a three-dimensional draughtsmanship of the kind that came into existence with Titian. The *Fabrica* is an outstanding example of the combination of a text that has proved its lack of value by never being read, with a set of illustrations that after four hundred years is still of interest and value to every person interested in the artistic rendering of natural shapes. The credit has naturally been given to the author, who was incapable of drawing.

In 1551 Belon put forth his illustrated vol-

ume on fishes, which is said to be the first scientific book on zoology. In 1552 the engravings made for Eustachius provide the first accurate set of pictures of human anatomy. For some reason they were not published until 1714, but they stand as one of the great monuments of the mid-sixteenth century. In 1556 Agricola's *De re metallica* was the first fully illustrated account of a technology and a specialized industry.

From that time there has been no let-down in the publication of illustrated books of scientific and informational intent. Without these books we should in many respects of great importance be very little further advanced than the men of 500 B.C.

The development that took place between the year 1460 and the middle of the sixteenth century, which I have just so hurriedly sketched for you, is rarely or never mentioned by the historians of prints or printing, of art, or of culture and thought. And yet if we look at these early illustrated books and watch how the techniques of representation in invariant pictorial form developed in them, and how the skills so acquired spread over the fields of knowledge, we can feel that we are in the presence of one of the most momentous movements that has ever taken place in the history of either knowledge or thought. We can see how men finally came to grips with the problem of making invariant illustrations for scientific descriptive texts that had blocked the Greeks and their successors for so many centuries. Should we stretch the length of the period of our examination we could see the struggle of the scientists for scientific classification going on before our eyes in the botany books. If we look at the anatomies we can see the change from the first crude hearsay attempts to represent a Galenical anatomy to the fully developed modern first-hand descriptive engravings that were made for Eustachius in the early 1550's.

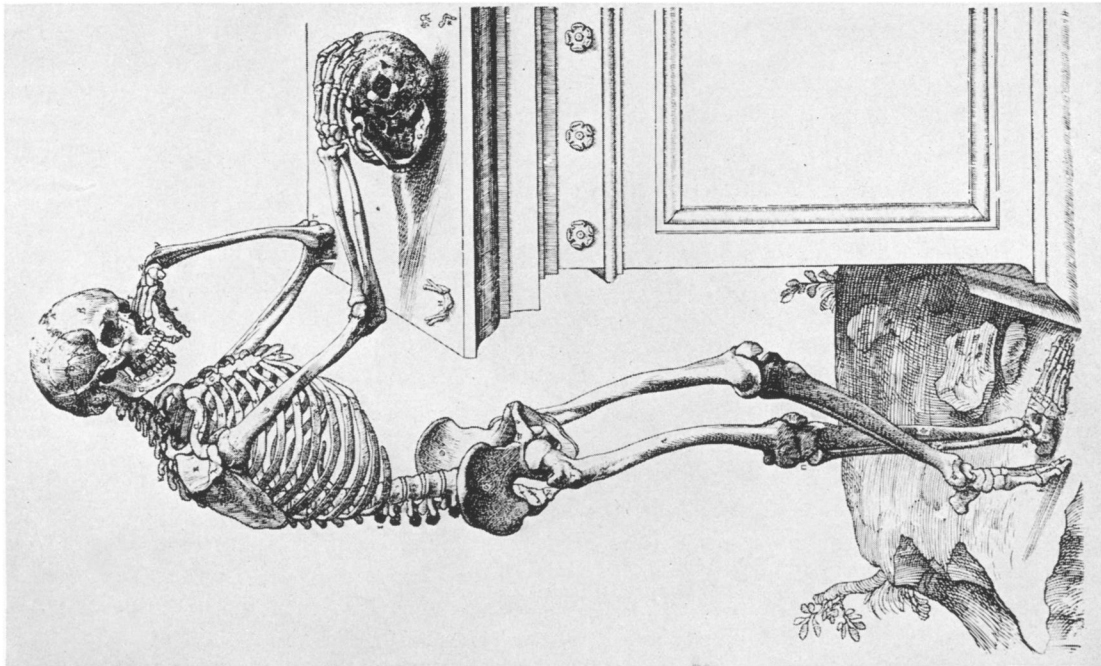
If we stop to think that the history of science consists, not in the discovery of particular, previously unknown, and isolated facts or truths by particular and isolated men, but in the continued publication of statements about observations and hypotheses in such shape that the world can, first, understand and recognize them,



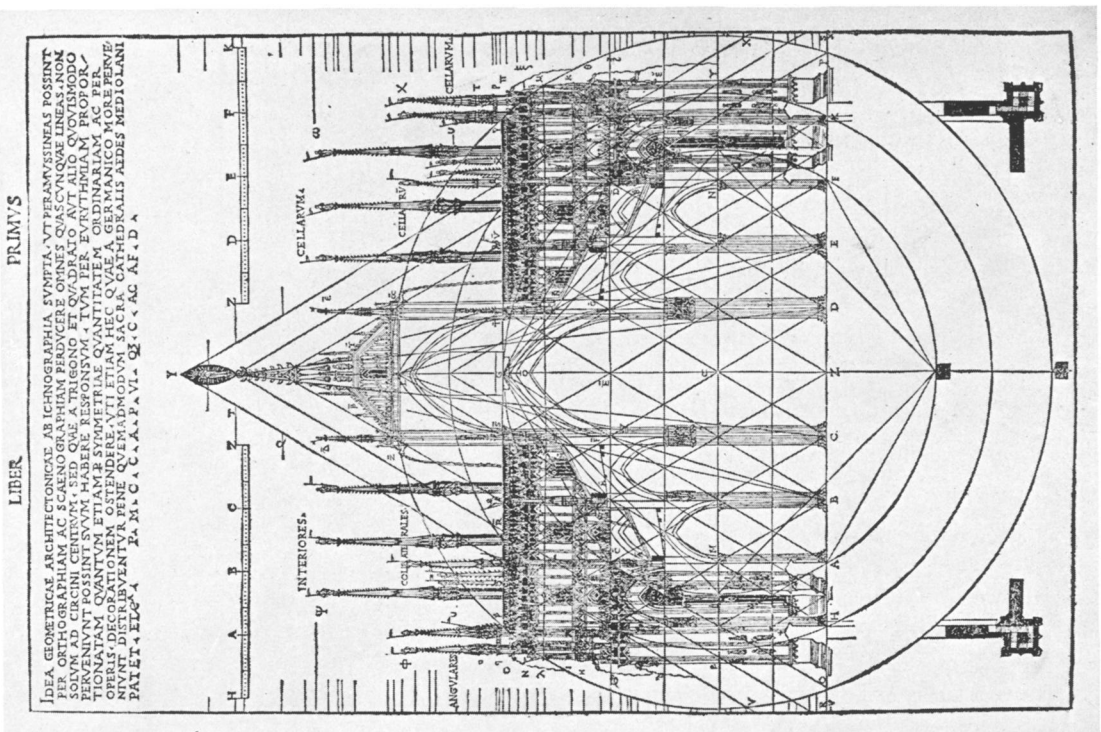
Woodcut of an iris from "*Der Gart der Gesundheit*," Mainz, 1485

then test them, and, finally act on them, we can get some idea of the meaning of the story that I have just recounted to you. Discoveries mean little unless or until they are adequately published. Many of them can only be made plain by pictorial statements.

A group of scholars of very limited linguistic and intellectual interests continually tell us, and many of us are apt to believe, that the central event of the period of the Renaissance was the recovery of the ideas of the Greeks. If this were true it would mean that the Renaissance was a backward-looking period. If we honestly survey its accomplishment it is obvious that it was anything but a backward-looking period, but it is necessary that we look outside the learning of the philologists and the archaeologists to discover this very important fact. For one thing alone, if we turn our eyes to the illustrated books and think about their meaning, it is obvious that the Renaissance made the first discovery of a way by which men were able to



LEFT: Woodcut by John of Calcar for Vesalius's "Der humani corporis fabrica," Basel, 1543. Reprinted from the original woodblock in 1934. RIGHT: Woodcut of Milan cathedral by Cesare Cesariano, from Vitruvius's "Architectura," Como, 1521



LIBER PRIMVS

IDEA GEOMETRICAE ARCHITECTONICAE AB ICHNOGRAPHIA SVMPITA. VTI PER AMYSSINEAS POSSINT PER ORTHOGRAPHIAM AC SCAENOGRAPHIAM PERVICERE OMNES QUASCVNQUE LINEAS NON SOLVM AD CIRCHUM CENITVM SED QVAEVSQVE ALIAS QVAEVSQVE LINEAS QVAEVSQVE PROPORCIONATAM QVANTITATEM ETIAM B SYMMETRIAE QVANTITATEM ORDINARIAM AC PER OPERIS DECORATIONEM OSTENDERE VTI ETIAM HEC QVAE A GERMANICO MORE PERVENIVNT DISTRIBVNTVR FENE QVEMADMODVNI SACRAE CATHEDRALIS AIDES MEDIOIANI PATET. ELCA. ZA M. C. C. A. A. F. A. V. I. SE. C. C. AC. AF. I. D. A.

produce adequate and exactly duplicated pictures of the things they observed, and were thus able to send the same identical picture simultaneously in as many different directions as they desired. Out of the group thought and endeavor, the checking, testing, and theorizing, based on these widely distributed pictures that were exactly alike there came a science and a mode of thought which were utterly unlike anything that the world had ever seen. If the humanist period made no discovery that is still of importance in modern science, it resolved the intellectual road block which had defeated the Greeks, and it produced the method of description and record that in the following period was to revolutionize exceedingly important parts of knowledge and practice. Nothing less Greek than this method or its results can be imagined. Often as it is said that we must not blame a past period or group of men for things it did not know, it nevertheless stands that we cannot understand them unless we know what were the things they did not know and the result of this ignorance on their thought and practice.

The full harvest of a great discovery in method is never reaped in the period that makes it. One of the results of the humanistic period's discovery of how to make a precisely repeatable pictorial statement was the science of the seventeenth century. The next basic discovery after the invention of the woodcut was that which the nineteenth century made of photographic processes. The results of these are only just beginning to be seen. The earliest permanent photographic image was a reproduction of an old engraving. As we look back we can see that this meant that at last a way had been devised of making a new printing surface that produced a picture so closely resembling that which had been produced by an old printing surface that for practical purposes there is no difference in their informational content. The exact duplication of pictorial statements was no longer confined to impressions from the same printing surfaces. Out of this came a method of making a picture without the intervention of a draughtsman. This in turn, towards the end of the century, led to the way to print a photo-

graphic image in printer's ink on the page of a printed book, that is, to provide illustrations which are such exact records of the most minute accidents and details that the precisely duplicated image in a book became a pictorial statement of the this-and-no-other-ness of the thing represented. Picture-making, with this, stretched beyond the universal or generic and came to grips with the personal and particular. For one minor example of the meaning of this, the development of modern connoisseurship would have been utterly impossible without photography and photographic process, and without them that almost complete rewriting of the history of art that has taken place in the last sixty years could never have happened.

The curious qualities of the photographic emulsions which were incidentally developed during the last sixty or seventy years have made it possible to make pictures of things that no man has ever seen or ever can see. This photography of the unseeable has its very great uses in laboratories of all kinds and in the astronomical observatories. Were it not for photography we should have only a very small part of our knowledge about light, and the series of discoveries which have led to the modern theories of relativity and quantum mechanics could not have taken place. Neither should we have had the atom bomb.

In other words, both our most imperative practical problems and our most far-reaching theoretical problems go back to a series of technical applications and developments the first of which were made by the Renaissance when it was in search of a way of making an exactly repeatable pictorial statement.

As I said when beginning, it is the "hows" that are both the generative and the restrictive forces, and not the "whats." Change the "hows" and we get different "whats." To an amazing extent the "whats" of our knowledge are but functional aspects of the "hows" of our operations of investigation and statement. It is doubtful if the Greeks and their medieval successors, in spite of the vast variety of their ideas, had more than the slightest glimmering of such a notion, if they had any at all. It is incompatible with many of their doctrines and beliefs.