

PREFACE.

A singular fatality has ruled the destiny of nearly all the most famous of Leonardo da Vinci's works. Two of the three most important were never completed, obstacles having arisen during his life-time, which obliged him to leave them unfinished; namely the Sforza Monument and the Wall-painting of the Battle of Anghiari, while the third—the picture of the Last Supper at Milan—has suffered irremediable injury from decay and the repeated restorations to which it was recklessly subjected during the XVIIth and XVIIIth centuries. Nevertheless, no other picture of the Renaissance has become so wellknown and popular through copies of every description.

Vasari says, and rightly, in his Life of Leonardo, "that he laboured much more by his word than in fact or by deed", and the biographer evidently had in his mind the numerous works in Manuscript which have been preserved to this day. To us, now, it seems almost inexplicable that these valuable and interesting original texts should have remained so long unpublished, and indeed forgotten. It is certain that during the XVIth and XVIIth centuries their exceptional value was highly appreciated. This is proved not merely by the prices which they commanded, but also by the exceptional interest which has been attached to the change of ownership of merely a few pages of Manuscript.

That, notwithstanding this eagerness to possess the Manuscripts, their contents remained a mystery, can only be accounted for by the many and great difficulties attending the task of deciphering them. The handwriting is so peculiar that it requires considerable practice to read even a few detached phrases, much more to solve with any certainty the numerous difficulties of alternative readings, and to master the sense as a connected whole. Vasari observes with reference to Leonardos writing: "he wrote backwards, in rude

characters, and with the left hand, so that any one who is not practised in reading them, cannot understand them". The aid of a mirror in reading reversed handwriting appears to me available only for a first experimental reading. Speaking from my own experience, the persistent use of it is too fatiguing and inconvenient to be practically advisable, considering the enormous mass of Manuscripts to be deciphered. And as, after all, Leonardo's handwriting runs backwards just as all Oriental character runs backwards—that is to say from right to left—the difficulty of reading direct from the writing is not insuperable. This obvious peculiarity in the writing is not, however, by any means the only obstacle in the way of mastering the text. Leonardo made use of an orthography peculiar to himself; he had a fashion of amalgamating several short words into one long one, or, again, he would quite arbitrarily divide a long word into two separate halves; added to this there is no punctuation whatever to regulate the division and construction of the sentences, nor are there any accents—and the reader may imagine that such difficulties were almost sufficient to make the task seem a desperate one to a beginner. It is therefore not surprising that the good intentions of some of Leonardo's most reverent admirers should have failed.

Leonardo's literary labours in various departments both of Art and of Science were those essentially of an enquirer, hence the analytical method is that which he employs in arguing out his investigations and dissertations. The vast structure of his scientific theories is consequently built up of numerous separate researches, and it is much to be lamented that he should never have collated and arranged them. His love for detailed research—as it seems to me—was the reason that in almost all the Manuscripts, the different paragraphs appear to us to be in utter confusion; on one and the same page, observations on the most dissimilar subjects follow each other without any connection. A page, for instance, will begin with some principles of astronomy, or the motion of the earth; then come the laws of sound, and finally some precepts as to

colour. Another page will begin with his investigations on the structure of the intestines, and end with philosophical remarks as to the relations of poetry to painting; and so forth.

Leonardo himself lamented this confusion, and for that reason I do not think that the publication of the texts in the order in which they occur in the originals would at all fulfil his intentions. No reader could find his way through such a labyrinth; Leonardo himself could not have done it.

Added to this, more than half of the five thousand manuscript pages which now remain to us, are written on loose leaves, and at present arranged in a manner which has no justification beyond the fancy of the collector who first brought them together to make volumes of more or less extent. Nay, even in the volumes, the pages of which were numbered by Leonardo himself, their order, so far as the connection of the texts was concerned, was obviously a matter of indifference to him. The only point he seems to have kept in view, when first writing down his notes, was that each observation should be complete to the end on the page on which it was begun. The exceptions to this rule are extremely few, and it is certainly noteworthy that we find in such cases, in bound volumes with his numbered pages, the written observations: "turn over", "This is the continuation of the previous page", and the like. Is not this sufficient to prove that it was only in quite exceptional cases that the writer intended the consecutive pages to remain connected, when he should, at last, carry out the often planned arrangement of his writings?

What this final arrangement was to be, Leonardo has in most cases indicated with considerable completeness. In other cases this authoritative clue is wanting, but the difficulties arising from this are not insuperable; for, as the subject of the separate paragraphs is always distinct and well defined in itself, it is quite possible to construct a well-planned whole, out of the scattered materials of

his scientific system, and I may venture to state that I have devoted especial care and thought to the due execution of this responsible task.

The beginning of Leonardo's literary labours dates from about his thirty-seventh year, and he seems to have carried them on without any serious interruption till his death. Thus the Manuscripts that remain represent a period of about thirty years. Within this space of time his handwriting altered so little that it is impossible to judge from it of the date of any particular text. The exact dates, indeed, can only be assigned to certain note-books in which the year is incidentally indicated, and in which the order of the leaves has not been altered since Leonardo used them. The assistance these afford for a chronological arrangement of the Manuscripts is generally self evident. By this clue I have assigned to the original Manuscripts now scattered through England, Italy and France, the order of their production, as in many matters of detail it is highly important to be able to verify the time and place at which certain observations were made and registered. For this purpose the Bibliography of the Manuscripts given at the end of Vol. II, may be regarded as an Index, not far short of complete, of all Leonardo's literary works now extant. The consecutive numbers (from 1 to 1566) at the head of each passage in this work, indicate their logical sequence with reference to the subjects; while the letters and figures to the left of each paragraph refer to the original Manuscript and number of the page, on which that particular passage is to be found. Thus the reader, by referring to the List of Manuscripts at the beginning of Volume I, and to the Bibliography at the end of Volume II, can, in every instance, easily ascertain, not merely the period to which the passage belongs, but also exactly where it stood in the original document. Thus, too, by following the sequence of the numbers in the Bibliographical index, the reader may reconstruct the original order of the Manuscripts and recompose the various texts to be found on the original sheets—so much of it, that is to say, as by its subject-matter came within the

scope of this work. It may, however, be here observed that Leonardo's Manuscripts contain, besides the passages here printed, a great number of notes and dissertations on Mechanics, Physics, and some other subjects, many of which could only be satisfactorily dealt with by specialists. I have given as complete a review of these writings as seemed necessary in the Bibliographical notes.

In 1651, Raphael Trichet Dufresne, of Paris, published a selection from Leonardo's writings on painting, and this treatise became so popular that it has since been reprinted about two-and-twenty times, and in six different languages. But none of these editions were derived from the original texts, which were supposed to have been lost, but from early copies, in which Leonardo's text had been more or less mutilated, and which were all fragmentary. The oldest and on the whole the best copy of Leonardo's essays and precepts on Painting is in the Vatican Library; this has been twice printed, first by Manzi, in 1817, and secondly by Ludwig, in 1882. Still, this ancient copy, and the published editions of it, contain much for which it would be rash to hold Leonardo responsible, and some portions—such as the very important rules for the proportions of the human figure—are wholly wanting; on the other hand they contain passages which, if they are genuine, cannot now be verified from any original Manuscript extant. These copies, at any rate neither give us the original order of the texts, as written by Leonardo, nor do they afford any substitute, by connecting them on a rational scheme; indeed, in their chaotic confusion they are anything rather than satisfactory reading. The fault, no doubt, rests with the compiler of the Vatican copy, which would seem to be the source whence all the published and extensively known texts were derived; for, instead of arranging the passages himself, he was satisfied with recording a suggestion for a final arrangement of them into eight distinct parts, without attempting to carry out his scheme. Under the mistaken idea that this plan of distribution might be that, not of the compiler, but of Leonardo himself, the

various editors, down to the present day, have very injudiciously continued to adopt this order—or rather disorder.

I, like other enquirers, had given up the original Manuscript of the Trattato della Pittura for lost, till, in the beginning of 1880, I was enabled, by the liberality of Lord Ashburnham, to inspect his Manuscripts, and was so happy as to discover among them the original text of the best-known portion of the Trattato in his magnificent library at Ashburnham Place. Though this discovery was of a fragment only—but a considerable fragment—inciting me to further search, it gave the key to the mystery which had so long enveloped the first origin of all the known copies of the Trattato. The extensive researches I was subsequently enabled to prosecute, and the results of which are combined in this work, were only rendered possible by the unrestricted permission granted me to investigate all the Manuscripts by Leonardo dispersed throughout Europe, and to reproduce the highly important original sketches they contain, by the process of "photogravure". Her Majesty the Queen graciously accorded me special permission to copy for publication the Manuscripts at the Royal Library at Windsor. The Commission Centrale Administrative de l'Institut de France, Paris, gave me, in the most liberal manner, in answer to an application from Sir Frederic Leighton, P. R. A., Corresponding member of the Institut, free permission to work for several months in their private collection at deciphering the Manuscripts preserved there. The same favour which Lord Ashburnham had already granted me was extended to me by the Earl of Leicester, the Marchese Trivulsi, and the Curators of the Ambrosian Library at Milan, by the Conte Manzoni at Rome and by other private owners of Manuscripts of Leonardo's; as also by the Directors of the Louvre at Paris; the Accademia at Venice; the Uffizi at Florence; the Royal Library at Turin; and the British Museum, and the South Kensington Museum. I am also greatly indebted to the Librarians of these various collections for much assistance in my labours; and more particularly to Monsieur Louis Lalanne, of the Institut de

France, the Abbate Ceriani, of the Ambrosian Library, Mr. Maude Thompson, Keeper of Manuscripts at the British Museum, Mr. Holmes, the Queens Librarian at Windsor, the Revd Vere Bayne, Librarian of Christ Church College at Oxford, and the Revd A. Napier, Librarian to the Earl of Leicester at Holkham Hall.

In correcting the Italian text for the press, I have had the advantage of valuable advice from the Commendatore Giov. Morelli, Senatore del Regno, and from Signor Gustavo Frizzoni, of Milan. The translation, under many difficulties, of the Italian text into English, is mainly due to Mrs. R. C. Bell; while the rendering of several of the most puzzling and important passages, particularly in the second half of Vol. I, I owe to the indefatigable interest taken in this work by Mr. E. J. Poynter R. A. Finally I must express my thanks to Mr. Alfred Marks, of Long Ditton, who has most kindly assisted me throughout in the revision of the proof sheets.

The notes and dissertations on the texts on Architecture in Vol. II I owe to my friend Baron Henri de Geymuller, of Paris.

I may further mention with regard to the illustrations, that the negatives for the production of the "photo-gravures" by Monsieur Dujardin of Paris were all taken direct from the originals.

It is scarcely necessary to add that most of the drawings here reproduced in facsimile have never been published before. As I am now, on the termination of a work of several years' duration, in a position to review the general tenour of Leonardos writings, I may perhaps be permitted to add a word as to my own estimate of the value of their contents. I have already shown that it is due to nothing but a fortuitous succession of unfortunate circumstances, that we should not, long since, have known Leonardo, not merely as a Painter, but as an Author, a Philosopher, and a Naturalist. There can be no doubt that in more than one department his principles and discoveries were infinitely more in accord with the

teachings of modern science, than with the views of his contemporaries. For this reason his extraordinary gifts and merits are far more likely to be appreciated in our own time than they could have been during the preceding centuries. He has been unjustly accused of having squandered his powers, by beginning a variety of studies and then, having hardly begun, throwing them aside. The truth is that the labours of three centuries have hardly sufficed for the elucidation of some of the problems which occupied his mighty mind.

Alexander von Humboldt has borne witness that "he was the first to start on the road towards the point where all the impressions of our senses converge in the idea of the Unity of Nature" Nay, yet more may be said. The very words which are inscribed on the monument of Alexander von Humboldt himself, at Berlin, are perhaps the most appropriate in which we can sum up our estimate of Leonardo's genius:

"Majestati naturae par ingenium."

LONDON, April 1883.

F. P. R.

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1.

How by a certain machine many may stay some time under water.
And how and wherefore I do not describe my method of remaining
under water and how long I can remain without eating. And I do
not publish nor divulge these, by reason of the evil nature of men,
who would use them for assassinations at the bottom of the sea by
destroying ships, and sinking them, together with the men in them.
Nevertheless I will impart others, which are not dangerous because
the mouth of the tube through which you breathe is above the
water, supported on air sacks or cork.

[Footnote: The leaf on which this passage is written, is headed with
the words *Casi* 39, and most of these cases begin with the word
'*Come*', like the two here given, which are the 26th and 27th. 7.

Sughero. In the Codex Atlanticus 377a; 1170a there is a sketch, drawn with the pen, representing a man with a tube in his mouth, and at the farther end of the tube a disk. By the tube the word '*Channa*' is written, and by the disk the word '*sughero*'.]

The preparation of the MSS. for publication.

2.

When you put together the science of the motions of water, remember to include under each proposition its application and use, in order that this science may not be useless.—

[Footnote: A comparatively small portion of Leonardo's notes on water-power was published at Bologna in 1828, under the title: "*Del moto e misura dell'Acqua, di L. da Vinci*".]

Admonition to readers.

3.

Let no man who is not a Mathematician read the elements of my work.

The disorder in the MSS.

4.

Begun at Florence, in the house of Piero di Braccio Martelli, on the 22nd day of March 1508. And this is to be a collection without order, taken from many papers which I have copied here, hoping to arrange them later each in its place, according to the subjects of which they may treat. But I believe that before I am at the end of this [task] I shall have to repeat the same things several times; for which, O reader! do not blame me, for the subjects are many and memory cannot retain them [all] and say: 'I will not write this

because I wrote it before.' And if I wished to avoid falling into this fault, it would be necessary in every case when I wanted to copy [a passage] that, not to repeat myself, I should read over all that had gone before; and all the more since the intervals are long between one time of writing and the next.

[Footnote: 1. In the history of Florence in the early part of the XVth century *Piero di Braccio Martelli* is frequently mentioned as *Commissario della Signoria*. He was famous for his learning and at his death left four books on Mathematics ready for the press; comp. LITTA, *Famiglie celebri Italiane, Famiglia Martelli di Firenze*.—In the Official Catalogue of MSS. in the Brit. Mus., New Series Vol. I., where this passage is printed, *Barto* has been wrongly given for Braccio.

2. *addi 22 di marzo 1508*. The Christian era was computed in Florence at that time from the Incarnation (Lady day, March 25th). Hence this should be 1509 by our reckoning.

3. *racolto tratto di molte carte le quali io ho qui copiate*. We must suppose that Leonardo means that he has copied out his own MSS. and not those of others. The first thirteen leaves of the MS. in the Brit. Mus. are a fair copy of some notes on physics.]

Suggestions for the arrangement of MSS treating of particular subjects.(5-8).

5.

Of digging a canal. Put this in the Book of useful inventions and in proving them bring forward the propositions already proved. And this is the proper order; since if you wished to show the usefulness of any plan you would be obliged again to devise new machines to prove its utility and thus would confuse the order of the forty Books and also the order of the diagrams; that is to say you would have to mix up practice with theory, which would produce a

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