Leonardo da Vinci
The Forerunner of Modern Science

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THE position held by Leonardo da Vinci in the world is unique. He embodied practically all the knowledge of his own day as well as that of the ancients, and his work contains the germ of much that has been startling and revolutionizing in modern times. A statement like this seems bold, for scarcely any branch or art of the present day can be examined, that Leonardo da Vinci has not correctly apprehended. When compared to his, the accomplishments of most men become dimmed, and he may well be called a universal genius. To enumerate the fields of his active and valuable research is a difficult matter, since he was a complete artist, and for his own time, a complete scientist. The only things that he said little about were government and theology, and it is evident that he cared little for either. Apparently, he considered them artificial and out of his province, for he was, first of all, a naturalist.

He is the epitome of the Renascence, and in him may be found whatever is contained in that period, when it is regarded, not as the revival of ancient institutions, but as the developement of individualism.

The Italian Renascence from the thirteenth to the eighteenth century, was a progressive revolt against Church dogma; the principles of the Catholic Church being static, and at variance with
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the tendencies of evolution. The Church attempted to control the development of the free will by regulating the subjects and manner of study. It allowed education to few outside the clergy; and therefore superstition held the minds of the common people. It subordinated and subjugated the individual. But the spirit of freedom is ever strong in the human heart, and the very means that the Church used to control the people were responsible for its final loss of unrestricted power. The struggle has been long and is not yet over, but with the birth of individual freedom, the fundamental idea of the Catholic Church was overthrown, although the power has tried to stem the tide by concession and by interpretation of dogma. When Aristotle’s philosophy rose as a menace, Thomas Aquinas in the thirteenth century typified the True, the Good and the Beautiful in the Father, the Son and the Virgin. But the revolution occurred in other fields than in those of theology and philosophy, while classical legacies and the study of nature gave a new meaning to the life of the people.

As a revolutionist of such character, Leonardo da Vinci played the most important role of the Renascence.

Were the activity of the master minds of this period investigated, it would reveal a remarkable versatility. It would be hard to find an artist with but a single profession. An architect was usually a philosopher, a sculptor and a goldsmith, but most artists had thorough and practical knowledge in all branches of applied art.

The Italian Renascence was the expression by means of art in general of a tendency to make nature the chief teacher, and, therefore, a crystallization of its spirit may be found in the lives and achievements of the artists of the period.

Regarded in this light, not only does the life of Leonardo grow in importance, but interest and completeness are given to the time in which he lived. His birth, which occurred in 1452, was stained by illegitimacy, but he was recognized by his father, the Count di Vinci, taken to the paternal home, and reared with care. He developed into a quiet, handsome youth, with a great love for finery and beautiful things, and with a certain arrogance which never left him. He loved to gather a concourse of people about
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him and then to address them on some interesting, original topic until his dreams became realities to the multitude because of his lucid explanations. At a very early age, he began to invent, and being a musician, he made fine original harps and lutes. His personal strength was such that he could tear an iron link chain asunder; and yet those same hands could paint so lightly and delicately that many of his pictures are as smooth as lithographs, although every detail is indicated with unerring precision.

In the bottega, or studio of Verrocchio, at twenty, he undertook his first commission. But even in his earliest works he showed the fault that characterized his whole life: his failure to keep his engagements with his patrons. Again and again he undertook commissions that he never finished. His mind traveled so rapidly that his ideal constantly advanced as his work progressed. He was dissatisfied with everything that he did. He was, beside, extremely capricious and would lock himself up with most dangerous reptiles and insects for the sole purpose of studying their modes and habits of life, that he might paint them afterward. But he was never idle, and improved every moment by some new discovery in the natural world. He was essentially a doer and not a talker, and yet he was extremely frank and open-hearted to all.

About 1487, a year before his master Verrocchio’s death, when he was thirty-five years old, he was advised that Ludovico Sforza, the tyrant of Milan, needed a general supervisor and, therefore, sent him a letter in which he claimed to be an engineer of various kinds, a mathematician, musician, sculptor, painter and architect. He made a favorable impression upon the duke, and a lasting attachment was formed between the patron and the artist. Leonardo began at once to make the model for a heroic equestrian statue of Francesco Sforza (1401-1466), father of Ludovico. After continued application of different interpretations, the model, a colossal one, was finished and exhibited. It called forth great praise, and its cast would probably to-day adorn a square in Milan had not the Sforza régime suddenly ended in 1495, three years after the discovery of America. The French took the Lombard city and the model perished at the hands of the victorious soldiers.
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At this point in the life of Leonardo (he was then forty-three) comes a question difficult to decide. From the facts it would appear that he did not care greatly who held the reins of government, and he promptly entered the services of the French king, Charles VIII, who, three years later, in 1498, was succeeded by Louis XII. This action, from a modern point of view, should be justly criticised as disloyal and unpatriotic, and compared with Michelangelo in this respect, Leonardo suffers. There lies, however, justification in the fact that to flourish at that time artists needed a patron, and since Leonardo felt his value to the world as an artist, he followed him who desired his services.

Beside making this model for the statue of the warrior, he designed the various pageants of which the Milanese court was so fond. He also wrote his famous treatise on painting, and established a school of art known as the Accademia, which was the first of its kind in history. More important, however, is the painting which has caused his great fame: "The Last Supper." A whole treatise has been written regarding this painting on the wall of Santa Maria delle Grazie, and it is interesting to see how far Leonardo advanced beyond those who, before him, painted the same subject. The facts are simple. He employed perspective to the greatest advantage. He seated the guests on one side of the table—its long side parallel to the wall—and used light and shade in a way previously unknown. Very interesting are the accounts of the manner in which he painted the picture. He would run hatless to the convent at mid-day, mount the scaffold, and paint incessantly until daylight failed; then he would return before dawn the next day, and work without taking time for rest and food. Then for a number of days he would avoid the place, or if he visited it, he simply looked at the work and went away. He spent months searching for a Judas head, and could find none. He threw his brush away in deep despair when he reached the head of the Christ, saying that no mortal could picture that face.

He was, however, very careless in his processes, and employed an oil mixture for the painting which soon made it fade and perish. It was his love of science, of the new and the possibly better, that made Leonardo an experimentalist to a dangerous degree.
After the occupation of Milan by the French, Leonardo went to Florence, where in a competition with Michelangelo, who, at that time, was a young man of about twenty-two, he was commissioned to make his famous cartoons of the Battle of Anghiari. He began, but became disheartened because a new mixture of paint turned black, and left Florence without finishing his work. In this painting Leonardo’s wonderful knowledge of anatomy and his great love for the horse came into play: he gave to the animal something of the human being and his horses fight as keenly as their riders. He without doubt took his inspiration from an old cameo, preserved at that time and even to-day in the Museum of Florence.

It was hardly possible for two natures like Leonardo and Michelangelo to agree, and they did not form any close friendship. Leonardo was too universal to be moved by little things, too far above the ordinary course of events to be sentimental and passionate, while Michelangelo was bent with every obstacle cast into his way. Da Vinci was, however, chosen as a judge in the placing of Angelo’s David, but aside from the cartoons and the judgeship, the relations between the two men were very much strained.

While in Florence, Leonardo painted mostly portraits, chief among which is the so-called Gioconda, or Monna Lisa. This painting has long been considered as the most beautiful and artistic portrait ever painted, and many believe that it echoes the Hermes by Praxiteles. The echo consists in the delicate, half-expressed smile, so elusive as to cause doubts of its existence; yet it gives the portrait a sympathetic quality that grows through constant observation. The Hermes, it will be remembered, is treated in practically the same manner, and both faces required an artist who could portray in a vanishing smile all the warmth and geniality that can animate a human being.

After a short stay in Milan under the French king, and then under Maximilian Sforza, Leonardo went to Rome at the moment when Giovanni de’ Medici became Pope Leo X. The artist, at first treated with consideration, was afterward neglected, and left Rome to follow Francis to Paris. After some difficulty with the Florentine government, he was finally free to go and left, accom-
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panied by Melzi, his favorite pupil and disciple. His health began to decline, and one of the pictures that he is known to have painted at his time is the Saint Anne, now in the Louvre. Soon his right arm became paralyzed, but as he was left-handed, it did not greatly interfere with his work, and to this period, also, is ascribed a portrait of Francis First. Leonardo lived at the Hôtel de Cloux, near Fontainebleau, and received about four hundred crowns ($5,000) a year as a pension. He died on the second of May, 1519, at the age of seventy-five years. His grave has recently been discovered at Cloux, by M. Arsène Houssaye, the French author and critic, who found a broken and incomplete inscription: “LEO” on one stone, and on another the letters ING. Other evidence added to the broken inscription makes sufficient the proof that this is the place of interment of the great genius of the Renascence.

After this brief review of the life of Lionardo, the characteristics of his activity still remain to be investigated, as well as his method of inquiry and presentation.

The spirit of the time is exemplified most strikingly in the manifold and interesting studies of most of the great men; supremely so in the life of da Vinci. He is supposed to have known and to have done so much that the question presents itself: “How much did the other great men know?” To answer this would be difficult—almost impossible, for it would mean practically the re-writing of the history of the Renascence, according to the biographies of its great men.

Leonardo da Vinci was born into the “Time Spirit” (Zeit Geist), and from his earliest youth, his mind was most analytic. One might sum up his actions by saying that he cut up or took apart everything that could be so treated. His biographers mourn that our knowledge about him can be only superficial, because so little of what he did is left to us. It is true that of a great man nothing from his pen can be too much, yet it is equally true that from the hand of Leonardo more has come down to us than of any other man of the Renascence. Although his work was so scattered that the whole mass is but a fragment, it is only about the lack of personal reference that we can complain. He has left only one, or
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perhaps two portraits of himself, and those were taken in his old age. None of that beauty that his contemporaries extol has been immortalized on canvas. Yet in the red chalk drawing now in the Royal Library at Turin, one sees a face that is grand and majestic, almost sublime. In it we can read the depth of the sage’s mind and his harmonious, restful spirit.

Of his paintings very few are left, it is true, but that is due more to his experimentalism than to the ruthlessness of others. “The Last Supper” as it now exists, has hardly a stroke on it as da Vinci made it: a state due mainly to the necessity of repainting, after he had finished it. The wall upon which his Anghiari battle was painted, turned black, and the many pictures that he began were unfinished and, consequently, have been lost.

Of his sculpture none remains and scarcely any of his architecture. The Martesana Canal shows his qualities as an engineer, but in view of the facts already stated, one is tempted to ask: “What then does remain?”

The answer can be briefly made. There are several thousand sheets of paper written in a thick, back-handed manner, with many hundreds of drawings, as well as promises for complete treatises, which were, perhaps, never written. There are also many sketches, some of which may, or may not be from his hand. They are to be found in different museums of Europe, chief among which are the Institute of France, the Royal Library at Turin, and the libraries of Milan, Florence, Rome and Venice, the Library at Windsor, the British and South Kensington Museums.

The history of these documents is varied and interesting. They were all willed to Melzi and treasured by him as his most sacred possessions, but, after his death, they were stored by his children in an attic and allowed to remain there for several generations. At last a few of the sheets came into the hands of an art-critic, who learned that there were many more similar papers in the garret of the old house. They were promptly collected and placed in the Ambrosian Library at Milan. There they remained, with the exception of some which were sold for the Royal collection at Windsor, until 1796, when Napoleon entered Milan and took them away with him to France. In that country they
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are still to be found, except the so-called “Codex Atlanticus,” which, after the peace of 1815, was returned to Milan. These manuscripts have been photographed and published by several authoritative persons, Messrs. Charles Raisson and Mollien and Jean Paul Richter.* They have been lettered and are known by the same system of designation throughout the world.

They were no doubt written as texts for his lectures at the Accademia, and while they nearly all have some pages missing, they are otherwise quite complete. They are mainly on uniform paper, written in Italian, with a thick pen or quill and backward, a mirror being needed to read them. They were written with the left hand and the illustrations always begin at the right side of the paper. The shading on the drawings consists of dexter lines very close together, and by these shade-lines critics try to distinguish Leonardo’s work from his imitative pupils, of whom, due to his Accademia, there were many. Some are drawings made upon tinted papers with colored inks, but most of them are monochromatic. They contain very peculiar abbreviations and marks, and scarcely any punctuation; almost every word being followed by a period. Many small words are combined: a device adding difficulty to the reading. The manuscripts contain treatises or parts of them, on the following subjects:

I.

PURE SCIENCE
MATHEMATICS:

Geometry

Astronomy

II.

NATURAL HISTORY AND SCIENCES

PHYSICS:

Treatise on Water
Treatise on Vapors, Clouds
and Smoke
Treatise on Flight of Birds
Anatomy
Zoölogy
Physiology

Botany
Geography
Geology
Psychology
Chemistry
Physiognomy (crimin-
ology)

*These works are contained in the Astor Library and in the Avery Architectural Library of Columbia University, New York City.
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III.
APPLIED SCIENCE

Optics
Invention of machines
Treatise on Mechanics and Engineering
Hoisting
Casting
Motive Power
Inextinguishable Lamps

Life-Saving buoy
Wheelbarrow (?)
Trowel (?)
Divers' Breathing Apparatus
Topography
Military Warfare
Naval Warfare

IV.
ART

Treatise on Architecture
Treatise on Painting

Notes on Sculpture and Music
Some poetry

V.

Philosophy
Speculation
Theology

Maxims (Allegory)
Morality (Ethics)
Humor

If this list be thoroughly examined, it will be found to treat of almost the entire curriculum of a modern university. Of course the nature of his work is experimental and primitive from a modern point of view, yet, for that reason, it required so much the more genius because much of it was original.

Leonardo never copied the ancients with a view to imitation, but rather in order to understand how they did their work and for the purpose of establishing a scientific method of procedure. In his paintings and other work in general, there is, therefore, not much imitation of the classic. He simply obtained from antique art the sincerity with which it treated nature. His one great maxim was: "Do not imitate! Get knowledge from Nature herself." Leonardo's greatness does not consist so much in what he knew, as in his method of procedure; although to recount his acquirements is dazzling. He took very little for granted, and, aided by mathematics, he personally investigated all things; drawing conclusions from his experiments. He was not hasty. He
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weighed all evidence, and by his keen sense and patience, he usually reached the correct generalization.

A number of his great contemporaries were many-sided. Alberti was not only an architect and a goldsmith, but also an engineer and a writer. His work: "De Re Aedificatoria" exists even to this day and treats proportion and building much in the manner of Vitruvius. Vignola, Vasari, Michelangelo, and all the other great Italians were distinguished in many other arts beside architecture, but not one grasped the truth which he investigated in the way that Leonardo did. His philosophical mind saw in his experiments and discoveries a manifestation of an eternal unity: a conception developed at a much later date. As Humboldt put it: "He was the first to start on the road toward the point where all impressions of our senses converge to the idea of the unity of nature."

Our remaining task is to glance at his conclusions. His manuscripts reveal many accurately drawn geometric propositions, in some cases accompanied by explanations. In Astronomy he investigated the stars and considered our earth a body like other stars, receiving its light and heat from the sun. Many have read into his words his belief in the spherocity of the earth, and he has a drawing with the Christ as ruler of mankind, holding in his hand a sphere. The meaning of this is not quite evident, but the sphere has been interpreted as the earth. Furthermore, one of his manuscripts states plainly that the earth has a center about which it rotates. (G. 54)

In Natural Science he treats of the various laws of motion, weight, action and reaction; thus preceding Kepler by nearly one hundred years. He wrote a treatise on the movement of water, the cause of waves, of eddies, the effect of water upon rocks, etc.; how water, turning into vapor, rises because of its lightness and forms clouds; how smoke and dust are mixed, as in a battle; the dust being darker and remaining below the smoke on account of its weight. Indeed, he gives his pupils directions as to the representation of battle scenes with this effect.

He wrote a treatise upon the flight of birds for which he dissected many specimens, inspected the bones and joints, and made drawings as to the mechanical operations of their wings.
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In Anatomy his two favorite subjects were man and the horse. He understood the structure of both perfectly, and, in his paintings, gave such great beauty to horses that they appear almost human. He studied and classified animals and plants zoologically and botanically, anticipating Linnaeus by nearly two hundred years. His work, of course, does not compare with that of Linnaeus, but his method is the same: the method of classification. He wrote a special treatise on Botany for architects, showing how flowers ought to be conventionalized.

As a geologist, he examined the stratification of various rocks and concluded that they were the results of a congestion that had, perhaps, gone on for ages, and that by means of the layers the age of the earth could be calculated. He classified and minutely examined all rock forms that he saw and treated geology by the same scientific method that he did all other studies. In Chemistry he was the first to rob Alchemy of its position and he absolutely denied the ancient doctrine about the four elements. He was the first to say that the so-called elements were in themselves compounds, and that by a process of mixing and decomposing one could get practically any desired substance. Of course, he knew very little about the laws of chemical affinity, but what must be admired is the courage with which, through experimentation, he overthrew the alchemists' position. Chemistry was not witchcraft with him, but one of the many manifestations of the force of natural laws; holding itself to no caprice save that of Nature herself.

His knowledge of Physiognomy, our modern criminology, is well known. For months he searched through the streets of Milan for a face vile enough to be used as the Judas for the painting of "The Last Supper." The impatient prior of Santa Maria complaining to the Duke, could get no satisfaction, for Leonardo informed his patron that if the prior would not cease disturbing him, he would be forced to make the prior's face serve for that of Judas. For weeks he would follow persons with either pleasant or ugly faces, trying to analyze them, and to discover the secret of their attraction. He would collect a number of individuals and make them drunk, only to study the various shades of expression that they assumed.

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In Optics he tried to use the physical formulas that he invented. He knew of the diffraction of light through lenses and found that according to regular methods an image upon the retina is inverted. He could not explain the mental process that erected the inverted image, and so concluded that the "vitreous humor" of the eye diffracted the refracted rays, and through a process of double refraction brought and erected the image.

It would be tedious to explain the different machines that he invented. Most of them were given practical test in his day, for they were always the outcome of a necessity. He understood applied mechanics so well, even its mathematics, that by a process of adjusting the six simple machines, he obtained wonderful results. His appliances were used in building, in warfare, and on the sea. Founders and casters profited by his devices. Miners owe to him the inextinguishable lamp that is to-day used in almost all mines, and will be employed until electricity supplants it. Divers owe to him a helmet with air tubes, by means of which they can go to the bottom of the waters. Gunners owe to him an advanced form of cannon that fired grape-shot. He built military roads; he made topographical maps for generals to use in choosing their places for defence and fighting. He studied the course taken by an explosive shell and discovered its double action. One might go on without pause and enumerate the wonderful things which he did after he grasped the fundamental laws of dynamic physics, and it is scarcely surprising to learn that he knew the motive power of vapors nearly two centuries before Watts. He used steam to discharge cannon, to pump with and to move a ship (Codex Atlanticus).

He wrote a treatise on architecture, artistic and constructive, arranging it in a most methodical way. He laid out a town with its principal streets, its town hall, church, etc., and then made drawings for the various buildings necessary. He began with the palaces and followed much of the tradition of the day; constructing his buildings about an open court, and placing the customary galleries around the space. He usually put an arcade on the roof of his buildings, and made arches, internally and externally, do all the supporting. His most interesting problem, however, was the
church, and here he introduced many novel features. He seems to have been much inspired by Alberti, whom he considered one of the best informed men of his time. His favorite church plan was a decorative Greek cross, resplendent with niches and chapels. Many of his plans resemble snow-flakes, and in the elevations he grasps and completely treats the intrinsic problem of the Dome.

Even in church architecture he uses his inventive powers, and goes so far in breaking the tradition of eight hundred years as to suggest that preaching should be done in a building separate from the church. The pulpit was to be in the center and the apse was to contain the seats arranged in amphitheatre form about the rostrum. This is one of the most startling innovations in the history of art. For eight hundred years churches had been built after one set type, and then came a man simple and scientific enough to say that the best form of a church is a theatre. Tradition in Leonardo's hand had only its intrinsic worth. Sentiment in building he had none. One of the most beautiful of his sketches is the design for a mortuary chapel upon a hill-top. Its proportions are exquisite and architecturally it is finely treated with a double order. Its plan is also very interesting, recalling the star-shaped snow crystals. The churches planned by Leonardo resemble Santa Maria dei Miracoli at Venice (barrel vault) and Santa Maria in Carrignano at Genoa. In construction he understood the theory of the arch, both erect and inverted, and made elaborate drawings upon the resistance of beams, and the breaking moment of stones, with special reference to niches. There is, however, not a single building in existence that, with certainty, can be ascribed to him. What is most interesting and fascinating about his theoretic investigation, is his successful treatment of the dome, one of the most difficult problems in architecture. In fact it may be generally stated that he grappled from the start with the difficult problems, and let the simple ones care for themselves.

He left some notes on sculpture in which he warns sculptors from copying the antique. They should be natural, taking only what intrinsically belongs to sculpture from ancient times. The ancients taught that drapery must echo the form and enhance its charms. With Leonardo drapery dares not be clothing. He
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wrote also upon music and musical instruments, but his most popular treatise is his book on painting. It has been the well-spring of information to painters and draughtsmen since it was written and for a long time it was the only thing known of him. It outlines a course of instruction beginning with geometric drawing and passing through the gamut of artistic effort, practically and aesthetically considered. The whole tone of the work is an admonition to be natural and unaffected; to seek the essential idea in a composition, to give this idea unity by making all action and expression converge to central thought. He teaches perspective and is the first to use light and shade as a means of expressing distance. He investigates the effects of shadows on colors and shows why everything seems blue in the distance. He completely mastered aerial as well as linear perspective, and his treatise is full of the keenest observations. He shows that colors should be mixed carefully, and seems to have been the first to designate colors as primary, secondary and tertiary. Of course, his primary colors are yellow, blue and crimson, because he discovered combinations in painting, and not with colored lights.

His book divides into five heads: 1, Drawing; 2, Invention; 3, Light and Shadow; 4, Colors and Coloring; and, lastly, a few miscellaneous observations how to express the turmoil of battle, the calm of a peaceful landscape. He also speaks of the propriety of colors for different compositions and the expression of terror in horrified faces.

Finally, in his philosophic doctrines, he deduces the conclusions from his life work by insisting that nature unerringly rules the world, and that every event is due to the operation of a definite natural law. This position made him proof against the many obstacles thrown in his way and gave him that stolidity of character that robs all his work of the element of personality.

He was not a theologian, and Vasari even goes so far as to say that he was an unbeliever. This is perhaps not so, for he devoutly mentions God several times in his manuscripts. He was, however, by no means a good Catholic.

He wrote a great many maxims and morals in the form of allegories and fables and his manuscripts contain many draw-
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ings illustrative of these. He was also a humorist and shows many humorous points in the lives of his contemporaries.

After all that has been said, a conclusion as to his value may be drawn. Judged by his work there seems to be but one result. He showed that men must aim at universality, to be in the full sense of the good English term, men of integrity. He tried to show that the trend of human intellect is toward the recognition of unity in the laws of nature. He began by studying a few things and concluded by having studied more than any one else before him; simply because his craving for the comprehension of Nature led him on. He was the embodiment of the Renascence. The new feeling for light aroused men to thought and action. Since Leonardo's time, philosophers have been grappling with the same questions that he did and in most cases have come to the same conclusions. He seems to have stood above the world, merely acting his part as any other mortal, but endowed with a higher spirit. He is an example for the emulation of men: first on account of his undaunted search for the truth; secondly for his perseverance and inexhaustiveness; lastly for his courage and freedom from prejudice. Goethe might have had him in mind when he makes Faust say: "What thine ancestors have left to thee, earn, that thou mayest possess it." He was a free man because he obeyed Wisdom's counsel to deserve his freedom and his life by daily conquering them.

[EDITOR'S NOTE.—In an age so devoted to science, so rich in discovery, so successful in application of natural law to practical purposes as our own, it is not strange that Leonardo da Vinci should be viewed as a new light; that he should be recognized as a scientist who lacked only the environment, companionship and encouragement necessary to his fullest development. The Leonardo of Mrs. Jamison and the handbooks of Italian art is now a person of slight comparative importance, of outworn attractions, like the hero of an old style romance created for the delight of a past generation. It is not even the Leonardo of Burkhardt and Symonds who so powerfully attracts the readers and thinkers of the moment. It is a soul renewed and exalted, that is now imagined as once ani-
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mating that contemplative countenance made familiar by the statue in the great square of La Scala theatre at Milan.

This new Leonardo has recently been made the subject of two remarkable books: the one, "Spirals in Nature and Art," being intensely clever and really scientific, although its author, Mr. Theo. Andrea Cook, disclaims for it the latter quality. The second book, by the Russian, Dmitri Merejkowski, in the favorite literary form of our times, that is, the pysicalogical novel, is one that naturally commands a much wider circle of readers. It is a subtle and scholarly work, showing a rich, patiently-acquired knowledge of the Renascence, used pictorially, it is true, but without that sense of proportion and sacrifice of detail which characterizes the work of the highest artists.

So there results a series of sketches: studies of courts, tyrants, wars, of the popolani or Italian plebs, of the bottega or typical studio of the Renascence, of the monastic life, Savonarola, the child crusaders, the holocaust of the Vanities, the ordeal by fire, and much other material that is familiar to the reader of ordinary culture. These scenes are used as a background for the principal character, Leonardo, whether he is represented, as is most often the case, in action: creating, inventing, arguing, writing treatises, in intercourse with his patrons, pupils or with children, or whether, in any special scene, his bodily presence is wanting, but his dominant influence is felt, just as a Wagnerian leit motif represents the personality of a hero who is, for the moment, absent from the stage.

These studies, graphic and laborious, are not well coördinated. Furthermore, they have a certain grossness,—perhaps it were better to say brutality, although of course in the artistic sense of the term—which is displeasing in pictures of Italian life. They are weighted by the heaviness of a Northern mind.

But these defects only detract from the beauty and distinction of the work. They do not invalidate it as a document, for such it must be considered. It is a piece of evidence without falsification, growing out of the examination of Leonardo’s extant works and writings; agreeing with the most recent discoveries made regarding him; possessing, also, another sure indication of truthfulness: that is, its similarity to other writings upon the same subject
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produced independently and at wide distance apart by men of other nationalities. Merejkowski’s portrayal of Leonardo particularly agrees with the character sketched by the author of “Spirals in Nature and Art;” although the latter writer is a strict logician, proceeding cautiously step by step, as he advances an argument to prove that certain celebrated, beautiful and complicated spiral forms in French castle architecture are based upon the convolutions of certain rare sea-shells; that these forms were studied by Leonardo, as is evidenced by his writings; that the architect of the spirals is nameless; that Leonardo was resident in the locality of the castles at the time of their construction; finally, that no other architect of the time, French or Italian, could have produced such brilliant results of daring experimentalism.

Around this idea of experimentalism as a focus—because the desire to discover, to penetrate, to grasp, was the mainspring of Leonardo’s life and action—Merejkowski arranges all his thought-material to the detriment of the narrative, but to the great advantage of the character-study, as the reader will realize if he sets himself to recall the book, after its impression has crystallized within his mind. Even the individual who reads for pastime, rather than for instruction, will possess a clear-cut portrait of a supreme genius; one who faltered and vacillated, it is true, but who did this because he lacked the proper environment and companionship for success; one who resembled as a brother that other scientist, Paracelsus, recently rehabilitated from the charge of charlatanism through the initiative of Robert Browning and his followers.

An example of Merejkowski’s treatment of Leonardo is found in the early portion of his book, under the caption: Ecce Deus—Ecce Homo—1494. Here, as often, an excerpt from the great Italian’s writings becomes the text for an extended narrative and criticism. The quotation, showing at once the scientist and the dreamer, is full of interest in these days of experiment in the same direction. It reads: “If the eagle can sustain himself in the rarest atmosphere, if great ships by sails can float across the waves, why can not likewise Man, by means of powerful wings, make himself lord of the winds, and rise, the conqueror of space?” Then follows the description of Leonardo’s machine, devised like a bird, and
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quite the forerunner of the modern conception of an air-ship. The laborious mathematical calculations, the enthusiasm which extended to the workman employed in the construction and sufficed to overthrow his reason, the sleepless nights of the inventor can not be laughed to scorn, since in our own time we have a parallel case, differing only because of the freer and happier conditions of modern times. We are not yet permitted to read the story of Professor Langley, but we may be sure that it contains reflections of exaltation and of disappointments similar to those which vitalize the pages to which Leonardo confided his musings upon aerial propulsion.

Into the same chapter are crowded examples of Leonardo's other characteristics—of his genius, his temperament, of the thousand and one small things that in the aggregate made up his personality. Indeed, nothing beyond this chapter were needed to finish and round what is perhaps the best character-sketch of this baffling genius that has ever been given to the world. His was not "a dual personality," as we are wont to say of individuals of strongly-marked qualities hostile to one another. He was, so to speak, a multiple man, as many-sided and as brilliant as a diamond, flashing out rays into the darkness of the ignorance about him; lacking only the tenacity which is born of encouragement; above all things a lonely soul appointed by nature for investigation rather than faith, for complete celibacy of life and thought. His efforts were, therefore, sterilized in some measure, but he approached more nearly than any other man of his time to the comprehension of Natural Law. The spiral line—the line of flame and smoke—which he so assiduously sought throughout his art, is no mark in him of a soul affinity. It is not typical of a destructive and elusive spirit. The true Leonardo was no trifler and visionary, as certain critics would have us believe. He was almost alone in his knowledge, and almost sublime in his loneliness.]