Physical beings act on the senses. The impressions of these beings stimulate perceptions of them in the understanding. The understanding is concerned with its perceptions in only three ways, according to its three principal faculties: memory, reason, and imagination. Either the understanding makes a pure and simple enumeration of its perceptions through memory, or it examines them, compares them, and digests them by means of reason; or it chooses to imitate them, and reproduce them through imagination. Whence results the apparently rather well-founded general distribution of human knowledge into history, which is related to memory; into philosophy, which emanates from reason; and into poetry, which arises from imagination.

Memory, from which comes History
History concerns facts, and facts concern either God, or man, or nature. The facts which concern God belong to sacred history. The facts which concern man belong to civil history, and the facts which concern nature belong with natural history.

**History: I. Sacred. — II. Civil. — III. Natural.**

I. Sacred history is divided into sacred or ecclesiastical history. The history of prophecies, where the account has preceded the event, is a branch of sacred history.

II. Civil history, that branch of universal history, cujus fidei exempla majorum, vicissitudines rerum, fundamenta prudentiae civilis, hominum denique nomen et fama commissa sunt, is divided, according to its object, into civil history proper and literary history.

The sciences are the work of the reflection and of the natural light of men. Chancellor Bacon was therefore justified in saying in his admirable work De dignitate et augmento scientiarum that the history of the world without the history of scholars is the statue of Polyphemus with his eye torn out.

Civil history proper can be subdivided into memoirs, antiquities, and complete history. If it is true that history is the portrayal of past times, antiquities are the sketches of it, which are almost always damaged, and complete history is a painting, for which memoirs are the studies.

III. The divisions of natural history derive from the existing diversity of the facts of nature, and the diversity of the facts of nature from the diversity of the states of nature. Either nature is uniform and follows a regular course, such as one notes generally in celestial bodies, animals, vegetables, etc.; or it seems forced and displaced from its ordinary course, as in monsters; or it is restrained and put to different uses, as in the arts. Nature does everything, either in its ordinary and regular course, or in its deviations, or in the way it is employed. Uniformity of nature: the first part of natural history. Errors or deviations of nature: the second part of natural history. Uses of nature: the third part of natural history.

It is useless to expand on the advantages of the history of uniform nature. But if we are asked what purpose the history of a monstrous nature can serve, we will answer: to pass from the prodigies of nature's deviations to the marvels of art; to lead nature further astray or to put it back on the right road; and above all to temper the boldness of general propositions, ut axiomatum corrigatur iniquitas.

As for the history of nature applied to different uses, one could make a branch of civil history of it; for art in general is human industry applied to the productions of Nature by virtue of man's needs or his
extravagance. Whichever it is, that application is made in only two ways: either in bringing natural bodies together or in separating them. Man can do something or can do nothing according to the possibility or impossibility of joining or separating natural bodies.

The history of uniform nature is divided, following its principal objects, into: celestial history or history of the stars, of their movements, sensible appearances, etc., without explaining their cause by systems, hypotheses, etc. (It is a matter here only of pure phenomena.) Into meteorological history such as winds, rains, tempests, thunder, aurora borealis, etc. Into the history of the earth and the sea, or of mountains, rivers, streams, currents, tides, sands, soils, forests, islands, configurations of the earth, continents, etc. Into history of minerals, into history of vegetables, into history of animals. Whence results a history of the elements, of the apparent nature, sensible effects, movements, etc., of fire, air, earth, and water.

The history of monstrous nature should follow the same division. Nature can perform prodigies in the heavens, in the atmosphere, on the surface of the earth, in the interior of the earth, at the bottom of the seas, etc., in everything and everywhere.

The history of nature applied is as extensive as the different uses that men make of her productions in the arts, trades, and manufactures. There is no result of the industry of man which cannot be related to some production of nature. The arts of the minter, of the beater, spinner and drawer of gold, of the burnisher, etc., can be related to the working of gold and silver and the use to which they are put; the arts of the lapidary, the diamond cutter, the jeweler, the engraver of precious stones, etc., to the working of precious stones and the use to which they are put; iron forging, lock-making, edge-tool making, the manufacture of arms, the manufacture of small arms, cutlery-making, etc., to the working of iron and the use to which it is put; glassmaking, plate-glass making, mirror-making, glazing, etc., to the working of glass and the use to which it is put; the arts of the chamois-maker, the tanner, the skin dresser, etc., to the working of skins and the use to which they are put; extracting and milling of wool and silk, the arts of the drapers, trimming-makers, braid-makers, button-makers, workers in velvets, satins, damasks, brocaded materials, linenettes, etc., to the working of wool and silk and the uses to which they are put; to the working and use of soil: clay pottery, faience, porcelain, etc.; to the working and use of stone: the mechanical functions of the architect, the sculptor, the stucco-maker, etc.; to the working and use of woods: joinery, carpentry, inlaid work, toy-making, etc.; and thus with all the other arts, which number more than two hundred. The Preliminary Discourse has shown how much we have proposed to treat each one.

Such is the whole historical part of human knowledge that is to be
related to the memory, and should be the primary material of the philosopher.

**Reason, from which comes Philosophy**

Philosophy, or the portion of human knowledge which should be related to reason, is very extensive. There is almost no object perceived by the senses which has not been transformed into a science by reflection. But in the multitude of these objects there are some which stand out by their importance, *quibus abscinditur infinitum*, and to which all the sciences can be related. These principal categories are God, to the knowledge of whom man is elevated by reflection on natural and sacred history; *man*, who is certain of his existence through internal sense or consciousness; *nature*, the history of which man has learned through the use of exterior senses. *God, man, and nature* will therefore furnish us with a general division of *philosophy* or of *science* (for these words are synonyms); and *philosophy* or *science* will be *science of God, science of man, and science of nature*.


I. The natural progress of the human mind is to rise from individuals to species, from species to genera, from closely related genera to distantly related ones, and to create a science at each step; or at least to add a new branch to some science already in existence. Thus the concept, which we meet in history and which sacred history announces to us, of an uncreated and infinite intelligence, etc., and that of the created, finite intelligence united to a body which we observe in man and which we suppose in the brute, have led us to the concept of a created, finite intelligence having no body; and from there to the general notion of the spirit. Moreover, since the general properties of beings, spiritual as well as corporeal, are *existence, possibility, duration, substance, attribute*, etc., these properties have been examined, and from them has been created *ontology*, or the *science of being in general*. Therefore, we have had, in an inverted order, first *ontology*; then the *science of the spirit*, or *pneumatology*, or what is commonly called *particular metaphysics*. And that science is divided into the *science of God* or *natural theology*, which it has pleased God to correct and to sanctify by *Revelation*, whence comes *religion* and *theology proper*; whence through abuse comes *superstition*. Into *doctrine of good and evil spirits*, or of *angels* and of *demons*; whence comes *divination* and the chimera of *black magic*. Into the *science of the soul*, which has been subdivided into *science of the reasonable soul*, which conceives, and *science of the feeling soul*, which is limited to sensations.

II. *Science of Man*. The divisions of the science of man are derived from the divisions of his faculties. The principal faculties of man are the
understanding and the will; the understanding, which it is necessary to
direct toward truth; the will, which must be made to conform to virtue.
The one is the object of logic, the other is that of ethics.

Logic can be divided into art of thinking, art of remembering one's
thoughts, and art of communicating them.

The art of thinking has as many branches as the understanding has
principal operations. But four principal operations are differentiated in
the understanding: apprehension, judgment, reasoning, and method.
One can relate to apprehension, the doctrine of ideas or perceptions;
to judgment, that of propositions; to reasoning and to method, that of
induction and of demonstration.

But in demonstration, either one goes back from the thing to be
demonstrated to the first principles, or one descends from the first
principles to the thing to be demonstrated; whence are born analysis
and synthesis.

The art of remembering has two branches, the science of memory
itself, and the science of supplements to the memory. Memory, which
we have considered at first as a purely passive faculty and which we
are considering here as an active power which reason can perfect is
either natural or artificial. Natural memory is a reaction of the organs,
artificial memory consists in prenotation and in emblem; prenotation,
without which nothing in particular is present in the mind; emblem, by
which the imagination is called to the aid of the memory.

Artificial representations are the supplements of memory. Writing is
one of these representations; but one uses either common characters
or special characters in writing. The collection of the first is called the
alphabet; the others are called cipher. Whence are born the arts of
reading, of writing, and of deciphering, and the science of orthography.

The art of transmitting divides into science of the instrument of
discourse and science of qualities of discourse. The science of the
instrument of discourse is called grammar; the science of the qualities
of discourse, rhetoric.

Grammar is divided into a science of signs, of pronunciation, of
construction, and of syntax. Signs are articulated sounds; pronunciation
or prosody, the arts of articulating them; syntax, the art of
applying them to different intentions of the mind, and construction, the
knowledge of the order which they should have in discourse, founded
on usage and on reflection. But there are signs of thought other than
articulated sounds: namely, gesture and characters. Characters are
either ideograms, or hieroglyphics, or heraldic signs. Ideograms, such
as those of the Indians, which each indicate an idea and which it is
consequently necessary to multiply as many times as there are real
beings. Hieroglyphics, which are the writing of the world in its infancy. Heraldic signs, which form that which we call the science of heraldry.

It is thus to the art of transmitting that criticism, pedagogy, and philology should be related. Criticism, which restores corrupted parts in the writing of authors, provides editions, etc. Pedagogy, which treats of the choice of studies, and of the manner of teaching. Philology, which is concerned with the knowledge of universal literature.

It is to the art of embellishing discourse that one should relate versification, or the mechanical part of poetry. We will omit the division of rhetoric into its different parts, because no science or art derives from it, if not perhaps pantomime, from gesture; and from gesture and from the voice, declamation.

Ethics, which we have made the second part of the science of man, is either general or particular. The latter is divided into natural, economic, and political jurisprudence. Natural jurisprudence is the science of the duties of man alone; economic, the science of the duties of a man as a member of a family; political, that of the duties of a man in society. But ethics would be incomplete if these factors were not preceded by that of the reality of moral good and evil; of the necessity of fulfilling one’s duties, of being good, just, virtuous, etc. Such is the object of general ethics.

If one considers that societies are obliged to be virtuous no less than are individuals, one will see the birth of the duties of societies, which could be called the natural jurisprudence of a society; economics of a society; interior and exterior commerce of land and sea; and politics of a society.

III. Science of Nature. We will divide the science of nature into physics and mathematics. We again draw this division from reflection and from our tendency to generalize. Through the senses we have received the knowledge of real individual things: sun, moon, Sirius, etc., stars; air, fire, earth, water, etc., elements; rain, snow, hail, thunder, etc., weather; and so forth throughout the rest of natural history. We have at the same time received knowledge of abstractions, color, sound, taste, odor, density, rarity, heat, coldness, softness, hardness, fluidity, solidity, rigidity, elasticity, weight, lightness, etc.; shape, distance, movement, repose, duration, extension, quantity, impenetrability.

We have observed through reflection that some of these abstractions, such as extension, movement, impenetrability, etc., are applicable to all corporeal individuals. We have made them the object of general physics, or the metaphysics of bodies; and these same properties, considered in each individual thing in particular, with the varieties which differentiate them, such as duration, resilience, fluidity, etc., are the
object of particular physics.

Quantity, another more general property of bodies which supposes all the others, has formed the object of mathematics. We call quantity or size everything which can be augmented or diminished.

Quantity, the object of mathematics, could be considered either alone and independent of real and abstract individual things from which one gained knowledge of it, or it could be considered in these real and abstract beings, or it could be considered in their effects investigated according to real or supposed causes; this reflection leads to the division of mathematics into pure mathematics, mixed mathematics, physicomathematics.

Abstract quantity, the object of pure mathematics, is either numerable or extended. Numerable abstract quantity has become the object of arithmetic, and extended abstract quantity, that of geometry.

Arithmetic is divided into numerical arithmetic or arithmetic by figures, and algebra, or universal arithmetic by letters, which is nothing else but the calculation of magnitude in general, and whose operations are properly arithmetical operations indicated in an abridged manner; for, to speak precisely, there is no calculation except by numbers.

Algebra is elementary, or infinitesimal, according to the nature of the quantities to which one applies it. The infinitesimal is either the differential or integral: differential, if it is a matter of descending from the expression of a quantity which is finite, or considered as such, to the expression of its instantaneous increment or diminution; integral, if it is a matter of returning from that expression to the finite quantity itself.

Geometry either has for its original object the properties of the circle and straight line, or it embraces all types of curves in its speculations; which differentiates it into elementary and transcendent.

Mixed mathematics has as many divisions and subdivisions as there are real beings in which quantity can be considered. Quantity considered in bodies insofar as they are mobile or tend to move is the object of mechanics. Mechanics has two branches, statics and dynamics. Statics has for its object quantity considered in bodies in equilibrium, and only tending to move. Dynamics has for its object quantity considered in bodies in motion. Statics and dynamics each have two parts. Statics is divided into statics proper, which has for its object quantity considered in solid bodies in equilibrium and only tending to move; and into hydrostatics, which has for its object quantity considered in fluid bodies in equilibrium and only tending to move. Dynamics is divided into dynamics proper, which has for its object quantity considered in bodies in motion; and into hydrodynamics, which
has for its object quantity considered in fluid bodies in motion. But if quantity is considered in waters that are in motion, hydrodynamics takes then the name of hydraulics. Navigation can be related to hydrodynamics, and ballistics or the shooting of bombs, to mechanics.

Quantity considered in the movements of celestial bodies produces geometric astronomy; whence comes cosmography, or the description of the universe, which is divided into uranography, or the description of the heavens; into hydrography or the description of waters; and into geography; whence comes further chronology; and gnomics, or the art of constructing dials.

Quantity considered in light produces optics. And quantity considered in the movement of light produces the different branches of optics. Light moving in a direct line, optics proper; light reflected in one and the same medium, catoptrics; light broken up while passing from one medium to another; dioptrics. It is to optics that one should relate perspective.

Quantity considered in sound, in its vehemence, its movement, its degrees, its reflections, its velocity, etc., gives acoustics.

Quantity considered with respect to air, its weight, its movement, its condensation, rarefication, etc., gives pneumatics.

Quantity considered in the possibility of events gives the art of conjecturing; whence is born the analysis of games of chance.

The object of the mathematical sciences being purely intellectual, we should not be surprised at the precision of its divisions.

Particular physics ought to follow the same divisions as natural history. From the history, perceived by the senses, of the stars, their movements, sensible appearances, etc., reflection has gone on to investigate their origin, the causes of their phenomena, etc., and has produced a science which is called physical astronomy, to which one should relate the science of the influence of the stars, which is called astrology; whence come physical astrology and the delusion of judiciary astrology. From the history, perceived by the senses, of winds, rains, hail, thunder, etc., reflection has gone on to investigate their origins, causes, effects, etc., and has produced the science which is called meteorology.

From the history, perceived by the senses, of the sea, earth, rivers, streams, mountains, tides, etc., reflection has turned to investigating their causes, origins, etc., and has given birth to cosmology, or science of the universe, which is divided into uranology, or science of the heavens; into aerology, or science of the air; into geology, or science of the continents; into hydrology, or the science of waters. From the
history of mines, perceived by the senses, reflection has gone on to investigate their formation, the working of them, etc., and has produced the science called mineralogy. From the history of plants, perceived by the senses, reflection has gone on to investigate their economy, propagation, culture, vegetation, etc., and has engendered botany, of which agriculture and gardening are two branches.

From the history of animals, perceived by the senses, reflection has gone on to investigate their preservation, propagation, use, organization, etc., and has produced the science which is called zoology; whence have come medicine, veterinary medicine, horsemanship, hunting, fishing, and falconry; simple and comparative anatomy. Medicine (according to the division of Boerhaave) is occupied either with the constitution of the human body and reasons concerning its anatomy, whence is born physiology; or it is occupied with the way of preventing illnesses, and is called hygiene; or it considers the sick body and treats of causes, of differences, and of symptoms of maladies, and is called pathology; or it has for its object the indications of life, of health, of sicknesses, their diagnosis and prognosis, and takes the name of semiotics; or it teaches the art of healing and is subdivided into diet, pharmacy, and surgery, the three branches of therapeutics.

Hygiene can be considered relative to the health of the body, to its beauty, or to its strength, and is subdivided into hygiene proper, cosmetics, and athletics. Cosmetics will give orthopedics, or the art of procuring a good conformation for the members of the body; and athletics will produce gymnastics, or the art of exercising them.

From the experimental knowledge or from the history, perceived by the senses, of exterior qualities which are sensible, apparent, etc. of natural bodies, reflection has led us to the artificial investigation of their interior and hidden properties; and this art is called chemistry. Chemistry is the imitator and rival of nature: its object is almost as extensive as that of nature itself; either it decomposes beings, or it re-compounds them, or it transforms them, etc. Chemistry has given birth to alchemy and to natural magic. Metallurgy, or the general art of treating metals, is an important branch of chemistry. Further, one can relate dyeing to that art.

Nature has its deviations, and reason has its abuses. We have related monsters to the deviations of nature; and it is to the abuse of reason that one should relate all the sciences and all the arts which show only the greediness, the wickedness, and the superstition of man, and which dishonor him.

Such is the whole of the philosophic part of human knowledge which is to be related to reason.
Imagination, from which comes Poetry

History has for its object individual beings, which exist at present or which have existed in the past; and poetry has for its object imaginary individual beings, which are the imitation of historical beings. Therefore it should not be astonishing that poetry follows one of the divisions of history. But the different genres of poetry, and the difference of its subjects, offer us two very natural divisions. The subject of a poem is either sacred, or it is profane; either the poet speaks of past things, or he makes them present, putting them in action; or he gives body to abstract and intellectual beings. The first of these types of poetry will be narrative; the second, dramatic; the third, parabolic. The epic poem, the madrigal, the epigram, etc. are ordinarily narrative poetry. Tragedy, comedy, opera, pastoral, etc., are dramatic poetry; and allegories, etc., are parabolic poetry.


We mean here by poetry only that which is fiction. As there can be versification without poetry, and poetry without versification, we have thought that we should regard versification as a quality of style, and consider it as belonging to the art of oratory. On the other hand, we will relate architecture, music, painting, sculpture, engraving, etc., to poetry, for it is no less true to say of a painter that he is a poet, than to say of a poet that he is a painter, and of a sculptor or an engraver that he is a painter in relief or in depth, than of a musician that he is a painter through his sounds. The poet, the musician, the painter, the sculptor, the engraver, etc., imitate and counterfeit nature; but one uses discourse, the other, colors, the third, marble, bronze, etc., and the last, the musical instrument or the voice. Music is theoretical or practical, instrumental or vocal. With regard to the architect, he imitates nature only imperfectly by the symmetry of his works. (See Preliminary Discourse.)

Poetry has its monsters as nature does. One should include in this number all the productions of the deranged imagination, and these productions can exist in all the genres.

Such is all the poetical part of human knowledge, which one can relate to imagination, and the end of our genealogical distribution (or, if you will, our world map) of the sciences and the arts, which we would fear perhaps we had made too detailed, were it not of the most fundamental importance to know well the object of an ENCYCLOPEDIA ourselves, and to expose it clearly to others.