

About the Origin of Organic Beings

by
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On the present State of the Report on Science & Religion
About the Origin of Organic Beings

Talk given at the General Assembly of Catholic Committees of Nord and Pas-de-Calais held in Lille on November 16, 17, 18 and 19, 1878, by Mr. A. Bechamp, Designated Dean of the Private Catholic Faculty of Medicine, former Professor of Chemistry at the Medical Faculty in Montpellier, Correspondent of the National Medical Academy, etc.

Lille, L. Quarre, Librarian, Grande Place, 61.

Your Eminence,
Gentlemen:

Before talking about the subject that I intend to discuss before you, I have the duty to explain how I have the honor to be at the place where I am at this moment and to talk before an assembly so eminent and distinguished as yours.

Is it to the member of the Catholic Committee of Montpellier where he left so dear and so living friendship, or the former professor of the old and renowned Medical Faculty which he left with torn heart that this honor has been done? I would not know. But what I know, I found myself a little while ago in the company of charming spirits who are so numerous in the town of Lille, and the conversation was naturally brought to the grave scientific questions which are debated daily around us. I had the temerity to express an opinion, and one of the charming spirits to whom I was speaking, who has all my esteem, found that I should repeat before you what I so badly expressed before him.

The task is daunting, to accomplish it would take the talent of a speaker and God did not give me that gift, so if I do not reach the goal that your friend proposed for my efforts. I beg you not to blame me for having perhaps over estimated my capacity, but he who did violence to me. Here I am, there is no going back: I am in the water, I must try to reach the shore. May God help me!

We have asked, Gentlemen, if there is a christian science? For us the answer would not be doubtful, for we know that all possible science of the Word, "The Word which is the true Light which enlightens every man who comes in this world!" But alas! No one at home and in Europe believes this necessary truth any more. Moreover, there are scholars who claim to ruin it by science: they dare to maintain that we are the enemy of the science: we, who founded it!! According to the comment of a respected scholar and a great-hearted man (1) they say about us with audacity: "You are not free, you are hemmed into the inflexible limits of orthodoxy, you do not have the necessary independence for the pursuit of the truth: you are afraid of the truth, consequently of the science which is its expression. "Yes, this is what some scholars are not afraid to state.

I would like to have the power to prove that this statement is monstrously wrong. We are not free! We are afraid of the truth. But who has laid the foundations of the sciences? What names among humanity do the founders of these sciences bear? Cite for me one truly great man who has professed not to believe in God, and since the advent of our Lord Jesus Christ, who has been Christian! In the brilliant light of history, we can read those famous names because they shine brightly! Yes, all the great founders of the sciences were Christians or forerunners of Christians!

Of whom are we afraid, in what we are not free? I am going to tell you.

Before all, we are afraid of error and lies. We are afraid of the false science, which denies the Word made flesh, because it mutilates the truth and the reason, and, by the same token, diminishes man. We are afraid because it ends up teaching the young, which simultaneously corrupts their intelligence and their hearts.

But we love the truth, because it set us free from error; "Veritas liberabit vos" (the truth shall set you free). We are only afraid of the liberty which degenerates into licence and denies the everlasting truths
1- Dr. Lefebvre of the University of Louvain.

which are the inheritance and the safeguard of mankind. Yes, we do not feel free to love falsehood and to hate the truth. We are not free to what the law of God forbids and not to do what it commands, that is not to hate error and not to love truth with passion, to love it and defend it as far as to bravely face unpopularity.

That is what we are afraid of and in what we are not free.

But we feel comfortable and free to move in every direction in the field of creation, as far as the Light of this Word which illuminates us, entering with a pure heart and right intentions. We freely follow the great Christian and French method, the true scientific method with which our great men have endowed the scholars and, from which we Christians, will never deviate and which we ceaselessly improve. This method consists in not throwing words around, and not making cheap hypothesis, and walking unceasingly from the known to the unknown, in taking experience for our continual guide, and using it unceasingly to control without respite all views of the mind, and considering the same object from all aspects in order not to be taken in by the imagination, in visualizing the same fact from every side, from all view-point before reaching conclusion (1).

We know how to use induction and to adapt ourselves to a famous lady, a Russian worthy of being French and to write in our language, a friend of the great J. de Maistre, Mrs. Svetchine, who said these profound words: "When considering two truths which seem opposed, we should not touch one or the other, but say to ourselves there is a third one, still in God's secret and which will be revealed to reconcile them."

Gentlemen, not only do Christians love science, but in general they know best how to honor it. It is by not following their method that we go astray. All contemporary mistakes in experimental science matters have their source in misunderstanding of this method. We always suppose, and from suppositions to suppositions, we end up by concluding without proof. We wondered if the work you do, the fruitful creation of the Catholic University, had some reason to exist. Your efforts and those of our bishops, your broadmindedness, your presence here confirms it sufficiently. Yes, for the native country and to put up a barrier to the barbarism which appears, it is advisable. The interest of science and civilisation that senseless people compromise, when they propose that the Church is the enemy, indeed it is in their interest that this work prospers. Its action will work beneficially; in a parallel direction to the one of the University where such noble spirits work at the same task that we do, the triumph of the splendor of the truth, the spreading of Christian and French science.

1- It is necessary here to reproduce the following passage from a writing by Lavoisier. It is because we get too far away from the spirit of this method that today so many theories are gradually given as proven truths. In the preliminary discourse of his treatise on Elementary Chemistry, Lavoisier expresses himself as follows "In the practice of sciences, the false judgments which we bear concern neither our existence nor our well-fare. No physical interest obliges us to correct ourselves. On the contrary the imagination which tends to carry us continually beyond the truth, the pride and self confidence, which are capable at inspiring us, entice us to reach conclusions which do not spring directly from the facts; in such a manner we are inclined to seduce ourselves. Therefore it is not surprising that in physical sciences in general we often come to suppositions rather than conclusions: that the suppositions, passed from one age to another, become more and more imposing by the weight of authority which they acquire and that they become finally adapted and adopted as basic verities, even by very good minds. The only way to prevent those divergences consists in suppressing or at least in simplifying as much as possible the reasoning which comes from us and which alone can lead us astray, to continually put it to the test of experimentation, to keep only the facts which are the data of nature, and which can not deceive us: to look for truth only in the natural linkage of experiments and observations the same way the mathematicians reach the solution of a problem by the simple ordering of data and in reducing the reasoning to such simple operations and to such short conclusions that they never lose sight of the evidence which serves as their guide.

"Convinced by these, I imposed a law upon myself to proceed only from the known to the unknown, not to deduce any consequence which does not derive directly from experiments and observations, and to link up facts with chemical truths in the most correct order to facilitate intelligence."

Gentlemen, not only do Christians love sciences, but in general they know best how to honor it. It is by not following their method that we go astray. All contemporary mistakes in experimental science matters have their source in misunderstanding of this method. We always suppose, and from suppositions to suppositions, we end up by concluding without proof. We wondered if the work you do, the fruitful creation of the Catholic University, had some reason to exist. Your efforts and those of our bishops, your broad-mindedness, your presence here confirms it sufficiently. Yes, for the native country and to put up a barrier to the barbarism which reappears, it is advisable. The interest of science and civilisation that senseless people compromise, when they propose that the Church is the enemy, indeed it is in their interest that this work prospers. Its action will work beneficially; in a parallel direction to the one of the University where such no-spirits work at the same task that we do, the triumph of the splendor of the truth, the spreading of Christian and French science.

The highest purpose of experimental science is to discover the laws that govern the material world and to penetrate the mystery of the origin of matter. God himself has mustered men to this noble study. He gave the world to their curiosity and to their discussions. But in order to move in these darkneses, His goodness did not leave them without guide. Instinctively, each man, each being knows what he should know to pursue and to reach the end for which he has been created. The first paragraph of a famous book, the first article of our Symbol has as its object to teach us on the origin of the world. For almost 19 centuries, the Christians, the most humble as well as the most famous ones, believe and affirm this great truth: in the beginning God extracted from nothingness the matter to make worlds, and, what is the most marvellous, every living being on this earth.

The scientists, in their patient research, had an inkling of the unity of the plan of creation as a revelation of the intervention of an intelligence which is self aware and which achieves a project in conceived liberty. How does it happen that the established sublimity of this harmony, which provokes in the most lofty spirits a such profound feeling of admiration, only provokes for others the denial of the personality, the liberty and the wisdom of the Almighty? One might say that the work of the Divine Craftsman appeared beautiful and harmonious to some, the more others denied and insulted His power. I do not have to study what is the origin of this astonishing contradiction, how some scientists are lead to God by the study of nature, that is to say how, according to St Paul, some rise up with a wonderful leap, from the beauty of things created to the splendor of the things uncreated, whereas others use it to abase themselves in the negation of the supernatural (1). But I intend to demonstrate that science, the work of the best intelligences of our time and of all time has as a result, not to contradict the first article of the Creed, but to affirm it by an ensemble of the most admirable demonstrations. The progress of the experimental sciences leads precisely to recognizing the fact of creation "ex nihilo" (from nothingness), as a necessity on the contrary those who deny this truth are people behind the times, who bring us back to the ignorance of 24 centuries ago. In reality, it is the Christians who have best studied nature: matter itself has been known only in the Christian centuries, freed from mistakes and prejudices of former centuries (2).

It is useless to recall in an assembly such as this one, that the philosophy from Socrates, Plato, and Aristotle is like the gateway to Christian philosophy.

The inspiration of those great spirits has been so wonderful that history has been tarnished by the name of sophists, their contradictors. Yet how wrong they were about the great fact of the creation.

About 500 years B.C., two contrary doctrines were conceived to explain the world

The leaders of the spiritual doctrine are Anaxagoras (500), Socrates (470), Plato (429), Aristotle (324), Cicero (106).

The leaders of the materialist doctrine are Leucippus (500), Democritus (470), Epicurus (341), and Lucretius (95). Let us look into the essence and the results of these doctrines. If Anaxagoras, Socrates, Plato have been lead to conceive of God as being distinct from the world, they nevertheless admitted that God

-1 This cannot pertain to matter: for a chemical whole cannot be in one sense and in contrary sense at the same time. 2- The world itself is known only since the advent of Christ J. deMaistre points out that, according to St. Martin "all the great navigators are Christians."

and matter are coeternal. According to Plato, God and matter are the principle of things and ideas.

But we must recognize that these great men did not really understand matter: with respect to matter, their opinions, all speculative, were based only on crude and superficial observation of things. Consider Anaxagoras, he conceives homoeometry and supposes that the universe is made of diverse elements as numerous as he observed substances of different appearance. According to his doctrine, gold, for example, is made of golden elements: a muscle of muscle elements: bone of small bones or bone elements, etc. and these diverse elements, first confounded in the chaos, have been divided and sorted out by a supreme intelligence, so that homogeneous things assemble to form bodies which are perceivable by our senses.

However a little scientific and experimental observation of nature occurs at about the same time as Plato. Empedocles admitted four elements: fire, air, water, earth, and two principles or prime causes: friendship (which combines the elements), and hatred, (which separates them), to explain the universe. I say that there is something there that is careful observation. In the destruction of wood by combustion, he saw flame (fire), smoke (air), liquid (water), and ashes (soil). The doctrine of the four elements, long ascribed to Aristotle and, thanks to his genius, long prevalent, thus entered into science and philosophy; while it is incomplete analysis, it is still analysis and a fact will always be true.

Aristotle, for whom God is the center from where the motion proceeds, from where everything starts and where all aspires, is the first scientist, according to Cuvier, who really created the method of observation, who founded experimental science. We should not stop repeating it! Aristotle is a spiritualist whose philosophy had some quasi-Christian opinion. We are not surprised that Saint Thomas held him in great esteem.

And why we would not prompt it out? It was necessary to arrive at the time of Aristotle to see science seeking to become experimental; there is the first effort by man to come out from vagueness and to observe nature itself! Now, we will see, how never faster the conquests of science came after the advent of Christ. However it may be man, left to his own efforts, but guided by spiritual philosophy, succeeded in making Aristotle's work the most encyclopedic and the most experimental of antiquity. Aristotle's doctrine, despite everything, deserves to be compared with the spiritual doctrines of modern times.

The materialists' philosophy is so different. A completely imaginary concept from Leucippus gave them what they needed to explain the formation of universe. It supposed that the last parts of everything are made by hypothetical bodies, because of their extreme smallness, we understand as indivisible. These are atoms, so called because of the characteristic of being indivisible that we impart to them. Epicurus adopted the doctrine of Leucippus and at the same time denied the immortality of the soul. However a vacuum and atoms are sufficient for the founder of atomism to constitute the universe. Really, it was not difficult! Atoms, infinite in number, are, in addition, endowed with eternal motion. By their fortuitous combination, they have formed all bodies.

The atomism of Epicurus has been extended to its final conclusion by Lucretius in a famous poem. The poet of atoms ended up in the most abject materialism and in the most revolting egoism. We come to regret that so great a poetic talent should disgrace himself, but in his manner, it was a rational consequence; he lived according to his principles.

Lucretius lived towards the end of the Republic. We know that was the consequences of this detestable teaching; and is it not worthy of attention that materialism always marks the end of civilizations, and becomes the precursor of decadence. Ah! Christians, you have to elevate science in order to elevate France and save civilization one more time.

If Plato acknowledged that matter is coeternal with God, Lucretius considered it as the only eternal thing. Atoms have all the aptitudes and are everything; he recognizes eternal nature in them, in addition to solidity, indivisibility, motion and form. Motion is not only one of their characteristics, it is essential to them.

There would be a curious work to do on Lucretius in comparison to the modern materialists. It seems that, here like the latter, the great poet has the Bible in mind when he shouts:

"Divinity itself cannot grow being from nothing (1)". It is like a protest and, in every case, the opposite view to the Mosaic affirmation.

But what did Lucretius know about matter which allowed him to form an opinion on the constitution of the body?

Since atoms formed the latter by their accidental combinations, he seems to assume a particular matter for every being; indeed, does not he say that "if something should beget from nothing, beings of every kind could be born without distinction from all kind of bodies without having a need for special germs. Man could be born in the waves, fishes and birds in the earth, cattle could spring from the clouds and wild beast, children of chance, could be equally happy in civilized lands! All of the products of nature come from determined seeds: they only sprout and show themselves in locations where they find the matter and elements which suit them. And it is for this reason that everything cannot come from everything. The permanence of elements subjects bodies to slow progress; while growing, they keep their characteristics, obvious proof that every being has its own matter which helps to nourish it and develop it."

No, the ancients only had false ideas about matter: atomism knew no more; it is only a chimerical concept. We try to rejuvenate it today but an authoritative scientist described it appropriately in saying of it that it is scientific mysticism.

Indeed, there are still some scientists who believe in the indestructible and irreducible nature of atoms; with them they build the world, and, if they consent to admit God as prime, unique and universal cause, it is merely in the manner of Plato. Fortunately these new kinds of mystics are deeply opposed in our country; and the Normal School which has done everything to put the Church out the University, now deserves our greatest sympathy to the fight of some of its professors against the Germanieness of some French chemists!

After the advent of our Savior, the culture of sciences took a great expansion. The reason for this remarkable change certainly lies in the separation of the supernatural. Certainly the Christian Creed changed the misguided opinions relating to the origin of things. One believed in the creation by God; theology was born and, at the same time, the experimental sciences. Lavoisier rejuvenated the face of the science by refusing to consider atomism as useful. It is worthy to note that the new atomism arose in foreign countries and the most firm minds in France refuse to endorse it

The matter was examined in itself as the work of the Creator. It is wonderful to see, that as soon as the world gets a little rest, and scientists pay attention to the study of matter; longingly they reject the erring ways of ancient science and look to discover the truth, no more by abstract reasoning or by speculation, but by experience. However, the true experimental method, especially the chemists' method, was formulated much later, so much it is true that the yoke of the ancients was difficult to throw off and burdensome falseness to uproot. Lucretius had admitted as many different bodies as there are beings. Buffon still believed, in XVIII century, that the matter of organized beings was universally wide-spread under the form of organic molecules, ready to breed here a plant, there an animal. He even assumed that if the living world would come all at once to be annihilated, the organic molecules would be sufficient to reproduce it. It is that this famous scientist believed, as everybody else at that time, in organic matter, of a special nature, without definite tie with the rest of the universe. It is no wonder that Buffon believed in the theory of spontaneous generation, just as Lucretius. Strange conception, according to which a being born by itself, without parents from surrounding and organic matter, without other intervention except by genetic and imaginary faculties by which we suppose to be gratuitously endowed! Buffon, however, did not go as far as Lucretius, who admitted a period of youth, during which the earth grew men, giving them milk from her breasts, as we see mushroom grow! In an other connection with a system of germanic fabrication, the system of phlogistic by Stahl, impaired, from almost a century, the progress of chemistry and science.

Lavoisier came at last. He looked at matter straight on and put it in its place. He proved, by comprehensive studies and admirable determinations, that the doctrine of transmutation and that of phlogistic, were equally wrong. The matter is at last clearly defined by its experimental characteristics, its ponderability, its autonomy, its personality and its indestructibility by the means with which man disposes. A principle, smar-

tly put to light, by Mr. Dumas, helps him as guide. To wit: matter, through of all its manifestations, stays identical to itself; there is equally between the quantity which enters into a reaction and the combination produced. From this moment, atomism and phlogistic have lost their empire. We could revive them, but never as founded on experimentation. Lavoisier finally discovered what we subsequently call simple bodies. The universe is composed with simple bodies isolated or combined in thousands and thousands of ways. He found that what we call organic matter is itself composed of few of those simple bodies. He discovered carbon which, with hydrogen, nitrogen and oxygen, and some others, perhaps a dozen, help to form the bodies of most living beings on this earth: plants, animals, man himself. After these noteworthy works, modern sciences definitely took form and we are witness to its magnificent developments. If I had time I would show you that our sun, the most distant stars, even the nebula are made with Lavoisierian simple bodies like those which form our earth. Even hydrogen and nitrogen have been observed by their rays, meteorites fallen from the sky contain carbon. Spectroscopy, as we call it, the instrumental method which allows us to analyse the stars, by the rays of the light spectrum, has also allowed us to discover not only new terrestrial metals, but in the sun, a new metal unknown on the earth, helium.

Well, if 64 or 65 simple bodies form the mass of the earth, the sun and the stars, 16 are used to form the matter of organized beings. As to the matter purely organic of these beings, four: carbon, hydrogen, nitrogen and oxygen, combined two by two, three to four, four to four suffice to form it. Lavoisier taught us in this manner to define organic matter, not by its origin, which does not define anything, but by its composition. Organic matter is a combination of carbon, a chemical compound as any other. And this definition, which should have diverted so many misunderstandings, is not yet sufficiently known. When we will have better reflected, materialists will be the laughing stock of science.

But Lavoisier has noted something more. He foresaw and almost proved afterwards, that plants live and grow by the matter they form in their own tissues with the help of mineral elements of atmosphere and soil, so carrying out true synthesis. He has also foresaw that in the natural order of creation, that his noble intelligence knew how to understand and admire, plants functioned to make organic matter with the help of mineral matter, and that animal, on the contrary, nourish themselves only with organic matter formed by plants, to bring them back, by a true phenomenon of combustion, to the state of mineral matter. This astonishing and splendid relationship which had not even been thought in antiquity, as we have seen, that we even were unaware in the mid XVIIIth century which claimed to be so enlightened, has been brought to light, even experimentally by Mr. Dumas and his friend Mr. Boussingault, without knowing the document in which Lavoisier had written down his thought.

However Lavoisier, in spite of the evidence of his demonstrations, had not been understood by his contemporaries (often the contemporaries resist evidence), but scientists well subsequent to his time, Bichat (1) around 1800, still believed and taught that the animal matter was used to feed and tend plants. He did not understand yet the order of subordination from animals to plants, he did not know that without plants, animals would disappear quickly from the earth.

There is more; the old mistake of Lucretius and Buffon was still accepted as true, in 1813, by two scientists, one chemist, Lasaigne, and one physiologist, Lenset, who, in a work done together, taught that organic matter, widely prevalent on earth, helped to give birth to all beings from the monad to men (2).

It is true that the relation which came out from Lavoisier's work, has been completely known in 1840 in a memorable lesson at the school of medicine of Paris (3). It is there that Mr. Dumas said: "The earth would be depopulated if, for only one year, the plants would cease to prepare our food and that of all animal kingdom. Cut off the plants, and animals perish in a dreadful famine: organic nature itself disappears as a whole in a few seasons".

Well! Gentlemen, this experimental truth which could not be scientifically publish until 1840 years

- 1- In the traities on life and death.
- 2- Researchs on digestion.
- 3- Static chemical of organized beings.

after Jesus Christ, had been, as we will see, seventeen centuries before by the one who had predicted the coming of our Savior. But Moses' work was left misunderstood as that of Lavoisier had been before Mr. Dumas revealed to the astonished world. This is what happened: a truth announced 1700 years before the Christian era, misunderstood or unknown for so long a time, was only scientifically confirmed 3540 years later. You see by this that the reality of what I said a little while ago, matter has been known in the Christian centuries!

The Christians who believed in inspiration and in the truthness of the Holy Scripture, were right to believe, despite the lack of experimental proof, that the theologians themselves did not understand very well of the depth of the truth that Moses wrote in his book. Certainly scientists who tried to penetrate the mystery of the bond which binds the mineral kingdom to the vegetable kingdom and finally to the animal kingdom and to know the essence of organic matter, did their work without preoccupying themselves if they were going to quash or confirm the biblical account. That is what all scientists should do: the big thing is, they must be sincere and not reach conclusions without providing themselves with all kinds of proof. And, as I am talking about this grave question of sincerity of the scientists in their works, I will recall the story of the two zodiacs of Denderah and Esneh. Philosophism claims that they showed the weakness of Moses' chronology; they traced back at 8000 years and 1500 years. Now, we find that they did not even have 1800 years and that, far from being before the flood, they were posterior to the Christian era.

Another fact proves how much we must be prudent, above all when we have made a reputation and it is imperative when we want to conclude against the biblical account. Everybody knows today Mr Boucher de Perthes' effort to prove the reality of the existence of antediluvian man or quaternary. We did not omit to give that fact as opposed to the mosaic tradition. This, yet, substantiated entirely that Cuvier was wrong when he denied the existence of man of the fossil-bearing strata. We also wrote a lot about what we have called the ages of chipped stone. Did Moses know something about it? Let us examine this closer. Probably we do not find, in the Bible, that men made weapons with stone, instruments with bones or horns. But I believe that even Genesis has not been understood. But rather, Tubal-cain said to have taught men the art of working with bronze and iron. The order is distinctly pointed out: bronze before iron; it must have been so, for you have to have more extensive knowledge to extract iron from ore than to extract copper and tin from theirs. The age of bronze and iron are therefore absolutely shown. What is it to say? Before Tubal-Cain, they did not know metals! Now, there are at least seven generations from Adam to Tubal-Cain. It is a long time. During all that time have poor humans been unarmed? But to defend themselves, to hunt, to clothe themselves and to build shelters, they needed weapons and tools? What arms and tools did they use? Moses did not say, but modern research has told us about it. The fact to have named the one who had rendered so great a service to his fellow men sufficiently points out that, in his time, the tradition was still alive. In the meantime notice the scientific precision of enumeration: bronze before, iron after! Thus in my opinion the discoveries which have confirmed Mr. Boucher de Perthes' work, far from revealing the weakness of Moses' account, but confirms it resoundingly.

Let us not cease to repeat: scientists, every time they follow the experimental method without bias, will be sure not to lose their way and they will feel free and at ease in their research. The Church has strictly made known "that there can never be any true disagreement between faith and reason (1)". It does not forbid the sciences to use, each in its own field, its own principles and its own method," it only tries "to stop opposition to divine teaching, to avoid injecting mistakes in them or having exceeded their limits, to annex themselves and revolutionize the field of faith (2).

It is not doubtful, alas, that many scientists try to have people believe that their works are contrary to the teaching of the Church, to biblical revelation, to intend to undermine at the base the affirmation of Genesis; a famous system, completely in accord with all the assumptions of ancient materialism and, thereby, retrograde, claims that everything in the universe, is the fatal product of activities that science establishes in

1- Nulla unquam inter fidem et rationem vera dissention esse potest (Fidei catholica, C.IV)

2- See on all of this a fine report by P. Carbonelle, to the science of the scientific society of Brussels, (inaugural meeting).

matter: it is the system of the evolutionists.

I have sustained, in previous publications (1) that this system is not experimental or scientific. I want now to demonstrate that Genesis, by the present state of science, which is most strictly devoid of hypothesis, is alone in agreement with the data of the scientific method about the origin of matter and beings.

No one doubts that we do not know the intimate nature of matter, that we know nothing experimentally about its origin; this is undeniable. We can recognize only one thing, that it forces itself upon our observation and too often deminates us.

Thus far, nothing could settle this redoubtable alternative: creation 'ex nihile' (from nothing) according to the Scriptures, or eternal matter, according to the sophists. In this respect, we simply have affirmations: the whole is to know which one of both is the truest to the thoughts of the great men. To settle the question, we can always have recourse to the AUTHORITIES.

Now the most indisputed AUTHORITIES emulously affirm the creation of matter by God. A famous scientist, in a declaration of exceptional conciseness, has said, after several others of the same family: "The worlds have not been created just as they are and of whole cloth, neither in their whole, nor in their parts; this affirmation is today so elementary, that I do not have to stop myself even an instant. The MATTER from which they are formed could only have been created, in the literal sense of the term. Now, what is the literal sense of the term? I open the dictionary and I read: "To create, v. tr. To pull out something from naught. God created the sky and the earth... Latin: creare, same root as the "Zend Kere", to do; Sanskrit, Kri, to do."

And the scientist adds:

"Matter, force, the human soul... have only been created with their essential characteristics, their properties, their faculties... Here below, man will certainly never have the most distant idea of this act of the Creator, he can only establish its prime necessity."

Now, who speaks this way, Gentlemen? It is not one of us. It is a scientist who does not have our ideas, but he is a first class scientist and an honest man who in the foregoing did not boast and who knows what he said. It is Mr. Hirn, mathematician, astronomer, and physicist of high talent.

The highest authorities of science so affirm that matter has been from nothing.

The question actually is to know if, taking matter as a given, is it sufficient for everything, if by itself, virtue of its essential characteristics, forces, properties of which it has been endowed by its creator, it can without any intervention, by evolution or otherwise, produce all the bodies, chemical compounds, organized beings that we observe on the earth.

That all phenomena which are in the field of pure physics and chemistry, naturally spring from matter this could strictly be supported, though even in connection with this, certain properties or reactions could only be revealed in matter thanks to the intervention of somebody. It is certain, for instance, and to stay in the field of chemistry, that, in actual order of the creation, some combinations, even purely mineral, would not happen without the intervention of man, and, which is to be noted from a scientist, I quote some examples among thousands. Berthelot made potassium chlorate; Gay-Lussac, cyanogen; Faraday, ethylene "biodure" (bromide?); Louis Jacques Thenard, hydrogen peroxide; Mr. Paul Thenard, amidogen of phosphorous; Mr. Dumas, trichloroacetic acid and many other compounds by substitution; Dulong, what we call nitrogen chloride, dangerous compound to handle which was the cause of losing an eye and a finger, etc. These compounds, remarkable from so many points of view, could they be formed alone? Certainly not! If

1- On the circulation of carbon in nature and on the intermediaries of this circulation, 1867.

The "microzymas" in their relations with fermentation and with physiology 1875. Lesson given to the Medical Faculty of Montpellier, on the origin of the essence of matter in the present state of science, 1875-76.

The evolutionary system according to experimental science, 1876, in Review of natural sciences by Dubrueil.

Memoires of generations said to be spontaneous and on ferments. In annals of the Linnean Society of Maine et Loire, 1863.

these renowned men did not put their hands to it, if they did not learn to bring together the conditions of their formation, should they even have been formed? It needed the intervention of man to do it; now man is surely somebody, and, in addition, an intelligence. We must therefore say that this intelligence has done this and that it has been, in some degree, in its own turn a creator. Without doubt these renowned men did not create the characteristics that they brought in action and which allowed matter to form these new compounds; but at last they forced them to be put in action: their will and their intelligence have helped in the work. The intervention of man is so necessary that for three quarters of century, we believed that organic compounds could not be produced by means of synthesis. It needed more science to know how to reunite the conditions of this synthesis of a superior order. Many French geniuses have cooperated in this work, and the one who has conceived the general method that chemists apply today is Mr. Berthelot. It is his intelligence which intervened and has rendered possible what was not before, except for a very few organic compounds. And, we must say aloud, he was not an atomist; as the greatest chemical discoveries of the century are not the work of atomists, also the discovery by Mr. Berthelot does not proceed from their principles.

I would like to show you now how God, having created matter, put himself to work to join together certain conditions which unite these characteristics in action; to make with them the organized world, as we say it, as we have seen happen by evolution, that is by spontaneous generation.

All educated men know the biblical account of the creation, but it seems to me, at the chemical and organic point of view, few understand it. I do not know if I understand more, but it seems to me also that it is possible to show the marvellous harmony of this account with the consequences which follow the most delicate works of these last years concerning organized beings. I believe to have, for my part, contributed to accomplishing some progress concerning the structure and the origin of those beings, and I would like to show them to you in their applications to these delicate questions.

Many have dared to attack the work of Moses. They have written that Genesis is in formal contradiction with experimental science. They take advantage of the smallest facts, not to discuss, but to mock this marvellous work. It is German protestants sure enough, who have supported that Genesis is not a historian account, but a poetic revery, a fable, a more or less ingenious cosmogonical hypothesis.

Orator, poet, philosopher, historian, legislator, theologian, prophet, Moses has been all of that to a supereminent degree. Was he a scientist? I am going to leave his inspiration out of account to look only at his science as a chemist and a naturalist, even as a physiologist. From this research it will emphasize that he is even to day, more modern, so even that is not enough, from an experimental point of view, even more recent, newer, than those scientists who attack him and believe themselves to be more advanced.

In reading Genesis, which is an admirable story as much as a beautiful book, we must always remember it was intended not to the scientists, who are often obstinate in their pride, but to the Jewish people, that is, an ignorant people as are all peoples taken in mass. Now, if we wanted as Christians, to day, to narrate the wonder, the miracle of the creation of organized beings, the greater miracle of man, who, in short is the fruit of the incarnation of the reason in the animal word, we will not do otherwise and certainly less well than Moses.

Why should we be silent? From the chemical point of view, we are formed of matter for the same reason as all living beings which inhabit the earth, the waters or air. It is a question of knowing whether Moses saw it and told it like us. It is still a matter more than that: it is a question of knowing if Moses, true and great scientist that he was, put us in our place. As being formed of matter, we can be only mineral, vegetable or animal. Well! we must recognize without detour, by our structure and our organization, by our way of nourishing and reproducing, we belong to the animal kingdom; but if by this ensemble we belong to that kingdom, and in this kingdom, to the sub-kingdom vertebrates and to the class of mammalian; and if, with Pascal we recognize easily that we are not angels, we affirm also and boldly, with the same famous philosopher that we are not beast. Now, it is not doubtful that Moses has seen clearly that if man is animal he did not say it so bluntly, but he has put man and animals on the same line, as to certain necessities, and as we will see, he tells us also that if God had made alliance with man, he had also made alliance with the animals by virtue of his structure and the condition of his existence, He no less put man apart, as He had put apart

the kingdoms, the branches, the classes, the species, not by name, but in affirming separate creations. I say separate and wished-for creations, not by product of chance.

Nowhere in Genesis do we see the least track of this strange doctrine of heterogeneity, doctrine from which man would be the fatal product of peculiar activities of organic matter, in the youth of earth, as we see growing mildews of mushrooms from a pile of organic matter in decomposition (1). And, as I speak about that doctrine, let me tell you that it is the base of all materialist doctrines and that it is professed, or at least that it was still a little while ago, in spite of evidence which contradict its reality, by an esteemed scientist in the camp of Moses' adversaries and why would I not name him, and as he pretends that his opinion is a scientist's opinion? Yes, Mr. Braca, who admits spontaneous generation as a law, does not take into account experiences which have established that he was wrong: "There are, said he, some difficult minds who, putting aside the question of feeling, wait before expressing their decision, that we have found the germ of a great number of beings of whom the origin is until now completely unknown (2).

There are others who, referring to successive periods where innumerable animal or vegetable species appeared or disappeared at the mercy of changing conditions of the planet, and asking by what veto of destiny organic matter would have been deprived all of a sudden of the plastic characteristics which it enjoyed for millions of years. For those, spontaneous generation, far from being as somebody said it, a physiologic scandal, is in perfect harmony with the laws which have, since the origin of beings, presided over the development of life on earth; sure in the past, it is likely in the present, and it will be until all phenomena that we ascribe to it, have been linked, by direct and unanswerable proofs, to a method of generation which has evidently followed after it, and which only keeps what it has produced.

Neither do we see any where in Genesis, this other doctrine so closely linked to the precedent and which is no less a physiologic scandal than all beings proceeding by evolution of the brute matter, from a flake of albumin as they say and which they call a moneron. It is that doctrine which affirms that man has for ancestor some monkey which itself has for ancestor some other animal and, step by step, all the way to raw matter. It is a variant of the system of evolution which I already talked about, the transformism whose head is now Mr. Darwin, but that the Germans claim as the natural fruit of the genius of their race.

No, these doctrines are not in Genesis. Moses knew matter too well to reach similar nonsense.

Now that I have told you, as succinctly as I could, the state, not the science which is impersonal, but the state of mind of the scientist, in the past and in the present, we easily recognize the double current which carries humanity along: the spiritualistic current which elevates and the materialistic current which abases. There still is an accomplished great progress from Plato to Mr. Hirn and to the philosophers or scientists who think like him. The first one could not rise to the notion (3) of the creation ex nihilo: the other admits it as a scientific necessity; it undoubtedly is a very great fact that a scientist, a man, ends to a such consequence and reaches to that level.

Well! This notion was held, almost 4000 years ago, by Moses. I only touch the scientific doctrine of that great man: but I say that it is unknown or wrongly understood by contemporary scientists, when they do not fight against it with weapons which are unfortunately not very courteous, if not dishonest.

Genesis, I hasten to declare, is not a book of scientific statement. There is no biblical physics, chemistry, physiology. Moses relates how things have been done in their sequence; he gives the achieved results, that is all. The question is whether the achieved results are true in the field of science and according to chemistry. For instance, in Genesis, mention is made of the organized beings; it does not say anything on

- 1- MM. Joly and Parchet have admit that spontaneous generation of infusoria is preceded by putrefaction of matter.

- 2- Somebody has shown the germs of this great number of beings of which Mr. Braca speaks; they have shown them active, evolving, but we do not want to see them. We have people who are blind by choice, who obstinately persist in not seeing in "microzymas" of bacteria or infusoria.

- 3- In the Evenings of St-Petersburg, J. de Maistre said: "We make an obvious confusion of the idea or of the simple notion with information." To have the notion is not to affirm: it is the aptitude to conceive the truth in order to affirm after.

organic matter; the question is whether it is how things must have arrived and if the book points it out with enough clarity. It is what we are going to examine.

I am going with you, Gentlemen, in the light of experimental science, to comment on a few verses of the three first books of Genesis. We are going to witness the imposing spectacle where the stage is prepared on which must appear actors of incomparable activity; Matter made ORGANIZED AND ALIVE in a prodigious quantity of beings of different species.

God creates matter the worlds.

And at first, is it not worthy of notice that this is where the historian starts, scientifically. Before sculpting a statue, the sculptor get the block; his genius will get the statue out of it. Indeed, Moses, in this so different from Plato, affirms that the Eternal artist got first the materials of the work that He has conceived, and said: "In the beginning He created the heavens and the earth."

Such are the first words of Genesis. In the beginning, at an undetermined epoch, as remote and as long as it could possibly be, God created matter and, with it, the starry world and the earth. Laplace's genius has explained how, according to the laws of mechanics, the physical forces put by God in matter, each following its species, and by His will bringing in to play formed from a cloud cosmic and incandescent matter, the sun and all the solar system.

But how was the state of our globe in that period? Listen!

The earth was arid, empty, desolate, uninhabited; the darkness enveloped it in all parts. But this is only, according to the Hebraists, a very poor translation of the hebrew text. To represent this state of the planet, Moses uses the word "tohu-bohu", which is untranslatable, and which has passed in the French language as the expression of supreme confusion and disorder. In fact, astronomers and geologists let us admit that the earth during a long period of time, was a mass in fusion, incandescent, at so high temperature we cannot at all represent it, surrounded by a thick atmosphere, dreadfully different from ours and incapable of allowing a ray of light to cross it. What was the duration of "tohu-bohu"? Nobody knows. But this is the confusion of science, it is narrated conclusion, in short, in the first verse of Genesis.

The second verse let us observe in one phrase the divine work: God works with matter.

The earth being sufficiently cooled down, as the astronomers admit without hesitations, new characteristics appeared in matter under new states: the mists wide-spread in the atmosphere condensed. How long did this cooling last? We do not know. For what reasons did it happen? We do not know. If it was at a steady pace, it must have been very long! But it is certain that disturbing influences occurred, by accident or at will? Who knows? What is incontestable, is that science has established a period that it calls glacial contemporary to the wandering blocks and to the production of moraines, it is even likely that this period preceded the time where man was put on earth. Now we did not explain how this prodigious cooling of the globe happened, was it a geological phenomenon or an astronomical one (1)? We do not know: we know it only by the results! Whatever the case, after prodigious changes, necessary if not desired, the waters condensed into vast sheets, and, said Moses:

"And the spirit of God moved upon the face of the waters". But this translation does not give the idea of the hebrew text. Some commentators, more particularly Mgr. Meignan, point out the hebrew verb that we translate by "moved" the way it is used means "to incubate".

"The spirit of God Moved upon the face of the waters" "The spirit of God incubated the waters"

And the bishop adds: "the mysterious work of the creative Spirit, principle of all life, according to the expression of the Psalmist, is represented to us by the figure of the incubation."

I would like to show that there is more than one figure. It is extremely remarkable that this phrase occurs immediately where the waters are spoken of and before the surface of the earth received light.

"The Spirit of God incubated the waters" expresses explicit again the direct and completely particu-

1- The ice-age is understood with difficulty by our current knowledge about astronomy. If the earth has been an incandescent element which gradually cooled down, as we say about the sun. How could it produce a period of cold between two durations of heat? According to Lyell, human remains can be found only after the ice-age: man did not exist before, from the same scientist, not during.

lar intervention of the divine intelligence: it is, in my opinion, an expression chosen on purpose, profoundly experimental, that I would like to emphasize as much it appears deserving to me.

We have seen that the heterogenists admit the spontaneous generation of living beings as a necessary consequence of plastic or "gebescic" properties which they suppose, without cause, organic matter to be endowed with. But the scientists who think so, forget that organic matter does not come to be by itself! Even to day, in this well-informed century, they do not have the power to make that which they call plastic. Are they unaware that it ought to reunite conditions of a very particular order to produce by total synthesis, not from slime, starch or egg white, but from the least complicated organic compounds those, precisely, to which they themselves rightly deny the alleged plastic properties! But at the geologic era which preceded the time where Moses shows us the Spirit of God intervening, the elevated temperature of the globe stood against generation and against existence of organic matter which they suppose to be plastic!

But the best certified facts establish, without the least doubt, that the most plastic matter that is well known, to be able to beget life, and all the conditions of generation of the organisms when they are brought together stays steril; their alleged genescic faculties do not come into play. We can not even see to come into being a slightly elevated organism, but the most weak infusorian, the littlest mycrozuma. But we forget that by the most rigorously experimental science, there is no self existent organic matter. We must continue to assert that what we call organic matter is only a chemical combination like any other, formed with some simple bodies, whence carbon is part of them and is the basic element, that is a combination which is mineral by its components. It is to have wrongly defined organic matter that we make such deplorable confusion. It is because Moses knew without doubt, by an abstraction done from inspiration, that organic matter is not a special essence, does not make itself all alone, and being done it can not by itself organize and so come to the state of a living being, that he shows us the spirit of God intervening as agent. At last, it is because the creator Spirit intervened that there was no spontaneous generation, as there is no spontaneous statue, clock or machine

How much they speak to us about changing conditions of the planet! Matter, since the time of its creation, did not obtain new properties and did not lose any. To produce, to day as then, organic matter and organize itself, it needs direct intervention of an intelligence or of wished for and realized onditions once for all. We shall see in which apparatus the conditions of the synthesis of organic matter have been brought together.

After creating matter, the worlds and the earth, the Eternal wants to populate this one. But to create this population He needs some special materials. After having made them, He ought to make the instrument in which those materials will form without ceasing and will so perpetuate what had been created. "The Spirit of God incubating the waters" is this not the divine Intelligence reuniting the chemical conditions with which He formed the germs of the organized world? And in the present state of the earth, as before, are vegetables not the apparatus where the matter takes form and builds up, perpetuates them and allows the rest of the beings to perpetuate? I have not sufficiently pointed out that every living germ springs up and develops in aqueous medium, in darkness and at a suitable temperature which varies with each kind. We can not see above all that the natural origin of organic matter, the place of its formation, of its complication and of its simplification to become again mineral, is an organized being, a living machine where are reunited conditions that the chemist realizes with difficulty and often does not.

But therefore notice, oh! lovers of matter, that it is not capable of doing anything alone. Consider the egg that the hen just layed. In order that it becomes a chicken, though all necessary matter and yet other things be in it, it needs the hen to incubate or somebody to take its place. The hen incubates its eggs! What does that mean? Examine closely; look with what care it does, how it bulges and bristles in order that all the eggs be equally warm and surrounded with air, how it turns its eggs with its beak, in order that all parts be subjected to that sweet and equal warmth that its body develops: how the poor beast hastens to come back when it goes to take some food and how it assembles all the brood under its wings and brings back to the center the eggs which are too far! Most certainly, without all those cares the most perfect and freshest eggs, would stay sterile and their matter would become horrible to see and to smell. Does the hen knows what it

does? Therefore, who acts through the hen? If it is not the Spirit who acted in the beginning!

But the physiologist himself, when at the example of the Egyptians of ancient centuries, makes eggs to artificially hatch, does he not take care to place the eggs in an atmosphere which renews itself, on cotton, at constant temperature, which he only obtains with hardly less difficulty than the hen, and in a way that all parts be equally warmed up? And if this result is not obtained or is not desired, other way he obtains nothing or he makes monsters. Yes, all of this is necessary for the eggs to hatch.

The eggs, though it contains all the necessary matter, organic matter already organized to a certain degree, yet it would not produce the bird under the reunion of all those conditions realized with care and continuity.

But the chemist, when he wants to succeed with an experiment, is forced to give attention, to bring in all conditions of success and a degree of suitable warmth in a necessary time. But the chemist and time are they not factors to obtain results? Well! does not Moses indicate all of this? Does he not show that there was a work of particular order? There has been work, in this admirable as much as mysterious creation, that the science calls by the same name the act of the chemical combination. There is work in all transformation of matter and this work is always caused and desired. In saying that the Spirit of God incubated the waters, Moses expressed with clarity that he worked! And the accomplished work of an order purely chemical when mineral matter is made organic, is of transcendent order, when the latter is made organized and living.

Incubating is, therefore, a work and an art! It is a wonder that a simple bird knows how to assemble the conditions for hatching. For a long time people believed that only birds were capable of doing it; to the point that they regarded as a fable what Diodorus reported from the Egyptians that they knew the art of artificially hatching eggs. Yes, the meaning of the verb that Moses uses is profound! The action of hatching is a mysterious action an intimate work which, in the full sense of the word, is a creation. A creation, because if there is in the fertilized egg an animal, this animal is only in potential, as say the metaphysicists. Matter is so weak, indeed, that if the order which is there is slightly disturbed, all physical conditions being beside reunited, the animal does not develop. It is that in the egg itself there is creation of all parts and entirely of the animal. In the current language to uncubate means to maintain, secretly, with care and mystery, to prepare in silence and without appearing. In the egg which is incubated, God still works, still in mystery, it is him who there prepares, in silence, as in the beginning, without appearing, the conditions of the organization, of the structure and finally the birth of the new being. And now, does it not seem to you, as it does to me, Gentlemen, that the sacred Writer, in using the expression has admirably described the work of the increate Intelligence, producing as a synthesis, of a sublimity without parallel, organized matter under the form of germs of incomparable fecundity, from where must come out, thanks to the same mysterious intervention, the future living world? And we must mention one final time, that it is in the bosom of the pristine waters that came about those uncomprehensible creations. Who is the chemist or the physiologist who took a little care of the conditions of birth of the most humble organisms, as are the infusoria and their germs, the microzymas, who are unaware that these formations come about only in the bosom of liquid mass?

From the second verse of Genesis, Moses shows us God's action under a new light; and the expression he uses to represent it happens to be of a close and scientific exactness.

I said, Gentlemen, that God created the organized world under the form of germs and not beings of whole cloth.

Once upon a time, said Viennet, in one of his fables,
The hen and the egg quarrel
To whom must, by right of birth,
Be chief of their species.

And the poet considering in his turn the dispute of the philosophers, exclaims:

But we will never finish, and I say with regret,
That if it pleases The One who commands the tempests,
Who fixed the sun in the center of the palnets,
To reveal to us his secret! (1) See next page the foot notes.

But it seems to me that God's secret has been revealed! There is a passage in Genesis which is relevant in this respect: it is said there that the plants have been created before they came out from the ground. Gaudichaud, the famous botanist, who did so much research on the question, has expressed it in precise term: "God, after creating the world, wanted to make land fertile with divers elements. With his powerful hands He spread infinite germs, plants and animals, which went to populate the earth and the waters, from the tops of the highest mountains to the most profound oceans." (2). That God made the germs before the beings which make seeds and eggs, this seems natural to physiologists, but it does not matter: the mystery is the same. There is, indeed, such a distance between the mineral kingdom and living kingdoms, that the human spirit can not cross it, he stays confounded before such grandeur and as though suspended over the abyss which sets them apart. Before this great mystery, the wise man exclaims.

"God can do more than man can understand!" (3)

Nevertheless, it is after this incubation and, surely when the germs have been produced that
God created the plants.

God said: "Let the earth bring forth grass, herb yielding seed, and the fruit tree yielding fruit after its kind, whose seed is in itself upon the earth: and it was so."

The germs formed in the bosom of waters, each after its law, developed as soon as the conditions would have been realized by the withdrawal of waters. And the biblical expression: the plants yielding seed, seed distinguished from grain, has a cardinal importance. Gaudichaud conceived the simple plant form as reducible to which he called the "phyton", and going farther (4), he supposed that a living cell, isolated, coming from any plant and brought to the conditions which are most favorable to vegetation, can continue to live, to grow and at last become a complete plant, that is to say an embryo (every bud begins by a "phyton") which will belong to the plant group from where comes that cell, and precisely to the same species. I ask you, could Moses render the idea in fewer words that Gaudichaud conceived in carefully studying the method of propagation of plants? In all the force of fact and thought, every plant which has neither leaf, nor flower, nor fruit, contains within itself its seed! Let us yet remark that earth was commanded to grow grass and trees! Why, if it was not already created; which will be specified further by Moses.

It matters little, for the object that I have in mind, that geology teaches us that it was the most simple form of plant which appeared first: the work is the same from the point of view of the result to attain. Now this result has a double object: render the atmosphere capable of maintaining the life of animals and giving them food. On the first point, Adolphe Brongniart has supposed and calculated, what appears to agree with the data of geology and with certain modern experiments that the atmosphere, at that time, was loaded with carbonic acid, favourable to spreading luxuriant vegetation that science establishes as very harmful or fatal for certain animals which could not survive.

It is worthy to note that, if the plants have been created as a group, God made two attempts to create animals.

God created the aquatic animals.

God said: "Let the waters bring forth abundantly the moving creatures that hath life, and fowl that may fly above the earth in the open firmament of heaven. And God created great wales and every creature that moveth, which the waters brought forth abundantly, after their kind. And God blessed them, saying. Be fruitful, and multiply, and fill the waters of the sea."

God created the animals of the earth,

saying: "Let the earth bring forth the living creature after his kind, cattle, and creeping thing, and beast of the earth after his kind: and it was so."

At last God created man.

And God said: "Let us make man in our image, after our likeness: and let them have dominion over

1 - Book reviews of meetings of the Sciences Academy, L. XIV, p. 971.

2 - The hen and the eggs, fable by Viennet, In annal of the Linean Society of Maine et Loire, 7th year.

3 - Gaudichaud, book reviewss of meetings of the Academy of Sciences.

4 - Imitation of Jesus Christ, L. IV, Ch. XVIII.

the fish of the sea, and over the fowl of the air, and over the cattle, and over the earth, and over every creeping thing that creepeth upon the earth.”

“So God created man in his own image, in the image of God created he him, male and female created He them.”

“And God blessed them, and God said unto them, Be fruitful, and multiply, and replenish the earth, and subdue it: and have dominion over the fish of the sea, and over the fowl of the air, and over every living thing that moveth upon the earth.”

Such is the order of succession which is revealed by Genesis in the creation of animals and man.

The plants having been produced and an abundant as well as fertile vegetation having spread over the earth, the waters, and the sea, the atmosphere having become pure enough to allow animals to breathe, each in its medium, the animal kingdom was created in several times, as the conditions and the necessities of existence of those divers classes have been assured.

I will come back, with Moses, to the particular circumstances of the creation of man. But it is impossible not to be stricken with wonder by the care that the sacred Author takes to distinguish what concerns the treatment of man, and to set him apart in recording his resemblance with an ideal and superior type, who must be other than the Creator himself. While it is commanded to the earth to grow plants, to the waters to produce animals, as if their germs had just to hatch and to develop; while it is incessantly repeated that the plants and the animals have been created after their kind, insisting, in a way, of the fact of required and irreducible specificity; it is not surprising that Moses affirms, three times, to come back to it again, that God made man as a special creation, without a determined bond with the rest of animality as to the resemblance?

Yes, all this is extremely worthy of attention, and Gaudichaud, who had been so stricken by the splendors of his relations, was right to say: “the philosophers of our time, some proving that man did not leave any vestiges in the primitive grounds, and the others that the simplest plants have preceded the most compound plants, came, during our days, to give the sanction to science at the great creative epochs of the first ages, he added: “Each century brings its progresses, and each progress of the human spirit is a new proof in support of eternal verities.

Talking about that citation, here comes a remark which looks to me to have a certain importance. The earth was ready to receive its master; the required conditions for the harmonic development of man and all his faculties have been realized: he was placed there to be the dominator. Well! was that moment so limited that the apparition of man was totally separated from the creation which had preceded? In the Bible, the creative action is continuous: *Spiritus dei ferebatur super aquas*. And if the moment where man was put on the earth is indicated by one day, nothing specifies that the quaternary animals existed at the same time. Man is the last to come on the earth: there what Moses wanted to make clear. The discovery of the man fossil-bearing strata contradicts “the philosophers of our time” who have claimed to prove that man did not leave any vestige in the bowels of the earth, even Cuvier himself, who denied his existence; but that does not interest Moses. The philosophers and Cuvier were wrong, that is all.

After the coming of man, the work of the creation was complete: but it will only be achieved later, as Moses formally said it, as we will see. Before, let us ask if Moses had motives to affirm as he did, and if those motives have some scientific foundation.

Whether we debate as much as we want on the duration of days or ages of the creation, it is not less certain that geology establishes periods which are inscribed in ineffaceable references, in the bowels of the earth. It is certain that God took the full time in the service of his work; time intervenes in incontestable way in creative action as in all incubation. With the idea we have of the omnipotence of the creator Being, God, without doubt He could do everything in one instant. But Genesis states that God wanted time to be a factor in his work, and the intimate history of matter shows us that Moses was right. After all, everything which concerns the material relations in the creation of living beings is purely of physical, chemical and physiologic order. Now, chemical actions, as well as physiologic ones among other conditions of their realisation, require concurrence of duration. In all operations of chemistry, whether mineral, organic, or physi-

cal chemistry, time is a necessary factor, which is even in a certain relation with the reactive components: in such way that it takes less time to produce 20 gr. of compound, fully equal as a matter of fact, than to produce 200 gr. When in the studies on the development of infusoria, we put their germs in a suitable medium with the necessary organic matter, we need also, with the other conditions of temperature, to take into consideration time. And so it is with the development of all germs. Therefore, even on this point, the account of the creation is in perfect harmony with the data of experimentation.

One more time, God could create everything in one moment; Moses did show it to us in putting the time to his work, and this is perfectly scientific.

God could create plants at the same time as animals; Moses did show us that the latter were created after the former, and it is in harmony with geology, or rather geology confirmed it. But Moses teaches us something more. He formally expresses it: if the plants were created before the animals, it is by a motive of finality. Listen to Genesis:

"I have given you every herb bearing seed, which is upon the face of the earth, and every tree, in the which is the fruit of a tree yielding seed; to you it shall be meat. And every beast of the earth, and every fowl of the air, and to everything that creepeth upon the earth, wherein there is life."

So plants were created before animals and man, in order that the latter have enough to eat.

In the divine plan the plants must have preceded animals, not only, as we believed, to purify the atmosphere, this goal could be reached by purely chemical means; but mainly because without them the conservation of animal kingdom, in the decreed plan, became impossible. The plant kingdom preceded the animal kingdom because it was necessary. And this remark is not beside the point. I do not want to come back on what I said a while ago; that nobody believed or had any doubt that this dependence was as close and as necessary as it is. For those who believe in spontaneous generation, it is however not unnecessary to insist. They need organic matter to give some appearance of truth to their system. Now science has established, by some experimental demonstrations of the greatest strictness, that organic matter, without plants, would be absent from the globe

You know that we say about an animal, that he is herbivorous or carnivorous. But of what is a plant nourished to grow or to multiply or to perpetuate? Bichat believed, yes, we must repeat, Bichat himself taught that animals supply plants the elements of their growth! Lavoisier had an inkling of the truth, and here is an abridgement of the document from which I have spoken: "the plants take in the air which is around them, in water, and, in general, in the mineral kingdom, the necessary materials for their organisation. The animals nourish themselves with plants or other animals, which have been themselves nourished with plants, so that the materials which form them are always the last result, pulled from air and from the mineral kingdom."

The works of Mr. Boussingault and Mr. Dumas, among a great number of other scientists, have established, on an absolutely solid basis, a given seed, that we sprouted in a soil without organic matter at all and completely sterile, as clean and calcined sand, crushed glass, etc. develops into a complete plant, which can produce its flower and its fruit. The quantity of organic matter has increased during vegetation. The soil not being able to furnish anything, therefore everything comes from the air and water with which we water it. We have made sure that in watering that sterile soil, and the plant which sprouts, with certain saline and mineral solutions, the vegetation can be as active as in the most manured soil. The plants are therefore organisms of particular order, and Bichat was wrong again when he wrote what I am going to report:

"It seems, he thought, that the plant is the sketch, the canvas of animal, and that to form the latter, it took only to coat that canvas with an apparatus of exterior organs, proper to establish relations." (1)

No, it is not that. It would not be sufficient to supply a plant with organs which would allow it to put itself in relation with the other beings to make an animal. And here is why: it is because the function of a plant, on its whole and in its end is not reducible to the animal function. There is complete opposition between the function of the two living kingdoms. The plants are apparatus of synthesis in which the organic matter is formed with the help of mineral elements from the air, water and soil. Animals are apparatus of

1 - Bichat, Physiologic Researchs on life and death, p. 2.

analysis, in which the organic matter is brought back, by a true combustion to the state of mineral matter. The animals feed themselves with plants. Plants feed themselves with mineral matter. If animals are herbivorous or carnivorous, the plants are "mineralivorous."

I said before that the rich vegetation that geology establishes in primitive periods, had for result to reduce the carbonic acid in the atmosphere at that time and to make the earth habitable for animals. Some have believed later that current plants were destined to purify the atmosphere, whose air is continually polluted by animal breath, by combustion in the countless homes which are in activity on all points of the globe, as well as emanations of carbonic acid from the ground. This point of view has been victoriously refuted by the famous scientist who has said: "It is not to purify the air that animals breath, that plants are above all necessary to animals; it is to supply to them above all and unceasingly, organic matter ready to assimilation. There is therefore a service which is doubtless necessary, but so distant from us that our gratitude is so little that plants render to us, in purifying the air which we breath. There is another one so close that if, during only a year, we would be lacking, the earth would depopulate, it is the one that these same plants render to us in preparing our food and that of all the animal kingdom. It is in this above all that we find this linking of both kingdoms. (1)

The circle is therefore this: plants make organic matter with mineral matter, animals eat this organic matter and give it back to mineral kingdom. This relation, Moses did not express it in those terms; he could not do it. But, in affirming that plants have been made first, to serve as food to animals and to man, he spoke a scientific truth which has been understood only 4000 years after.

Well! in spite of Moses' brilliant affirmation and the admirable demonstration whose subject it has been, there are scientists who believe they are doing the work of progress, yes if it is not to give to themselves the satisfaction to contredit the biblical account (2). Ignorance or bias, there is no other alternative! No, it can not be carnivorous plants, in the chemical and physiological sense of the expression, because it would be a vicious circle; since animals draw all their flesh from plants and do not possess any particular power to produce organic matter! Moses, obviously, as I said before, is more experimental, newer and truer than those authors.

In the second book of Genesis, Moses comes back on the account of the creation of plants and man. It seems really that it is on the points which have been attacked the most, but which in the divine plan represent that which is most necessary, that most repetitions come. I have already made the remark on the relative insistence to the production of plants. Moses comes back to reveal to us a particularity on which I have your attention. He exclaims: "Such has been the origin of the sky and the earth, and it is so that they were created the day where the Lord created one and the other one and that he created all the plants of the field BEFORE THEY CAME OUT THE GROUND, and all herbs of the field BEFORE THEY SPROUTED.."

I am asking, could Moses express more strongly the fact of the creation of the plant kingdom in the state of germ or seed?

Likewise, after having so well emphasized the creation of man, Moses comes back with detail. And to insist with more strength on this creation, as on the event of something superior to what has been done theretofore, he speaks to us of a special matter and of a particular formation; he adds to the preceding accounts the following verse: "The Lord God formed man from OF THE DUST OF THE GROUND; and breathed into his nostrils the breath of life, and man became a living soul."

What does the new expression "of the dust of the ground" mean? We will come back later on, after we meditate on another very remarkable verse in this second chapter which is: "And out of the ground the Lord God formed every beast of the field, and every fowl of the air; and brought them unto Adam to see what he would call them; and whatsoever Adam called every living creature, that was the name thereof.

"And Adam gave names to all cattle, and to the fowl of the air, and to every beast of the field; but for Adam there was not found an help meet for him."

This leads to make two remarks. At first that Adam did not find among the beings which he has

1 - Dumas, Chemical static of organized beings.

1 - I have disproved this mistake in a letter to Mr. Ch. Cavalier. In annals of Society of Horticulture.

named any who looked like him and beside that he was the only one of his species, but also of his sex. Would not that be a physiological mystery of exceptional depth? We will try to penetrate it.

In the second place, this account shows that, according to Mose, man with more than opinions; can raise himself to the truth of science. It may be that, during the age of Adam's innocence, before the fall, man was naturally sharper than we and that, according to a profound observation of the author of the *Evenings of Saint Petersburg*, he naturally saw the effects in the cause, whereas all, alas! we all are reduced to climb with difficulty from the effects to the causes. This certitude, that we are capable to raise ourselves to the truth and that we can arrive at affirming it surely and scientifically, is denied by free modern thought, when it dares to sustain that there is no truth in the human spirit; that all our theories, that we take for absolute theories, are only hypotheses; and that all real notion is only relative, etc. But it is not so that men think who respect reason; true scientists, those who are not in sophistry, affirm, as Moses, that they are not dupes of illusion when they take experiments and reason to reach the truth. And I do not resist the pleasure of reading to you a very significant passage of a famous naturalist, who had the courage to separate himself from his friends to sustain, to affirm what we affirm with all the great men and with Moses.

In his beautiful book "The Species and the Classification in Zoology", Agassiz is asking if the division into sub-kingdoms, classes, orders, families, kinds, and species, which is the result and the expression of scientists' works on animal kingdom is natural or artificial? Are these cuts a pure fabrication of the human mind, looking to classify his knowledge so as to cover more easily the whole to facilitate later research? Or have they been established by the divine intelligence as the categories of his thought?" "For me", answers Agassiz, "it looks undeniable that this order, this arrangement, result of our studies, are based on natural reports, on primitive relations of animal life; that these systems, designed by us under the name of great masters of the science, who first of all, proposed them, are really only the translation into man's language of the Creator's thoughts. If such is really the case, is not this faculty of human intelligence to adapt itself to the facts of the creation, by virtue of which it instinctively reaches, without being aware of it, to interpret God's thoughts, is it not the most conclusive evidence of our relationship with the divine Spirit? Should not this spiritual and intellectual relation with the All-Mighty cause us to think deeply? If there is some truth to the belief that man has been made in God's image, nothing is more advisable for the philosopher than to strive, for the study of the operations of his own spirit, to draw near the work of the divine Reason! Let him learn, in seeing through the nature of his own intelligence, to better understand the infinite Intelligence of which his own is only an emanation! Such a recommendation can at first sight, appear disrespectful. But who is really humble? The one who, after seeing through the secrets of creation, the classes following a formula which he proudly calls his scientific system, or the one who, reaching the same goal, proclaims his glorious relationship with the Creator, and, full of ineffable gratitude for a gift so sublime, strives to be the complete interpreter of the divine Intelligence, with which he may, even more he is ordained by the laws of his being to enter into communion. Behold how superior men speak; we are proud to follow the footsteps of those noble intelligences who endeavour our unceasingly to lift us up, with a magnificent impetus, to carry us toward the One who is our God and our Father".

Let us come back now, to Moses' account to fathom its depth, regarding man's creation. The inspired historian, after having recounted that man had been formed from the dust of the earth and to note that Adam had realized that he was not only alone of his kind, but without aid to accomplish the law of multiplication, reveals to us, admirable mystery, how was created the mother of human race.

Woman's creation.

"And the Lord God, from the rib he had pulled from Adam, formed the woman and brought her to Adam."

I repeat it, should not this be a physiological mystery of a rare delicacy? Let us try to fathom it, as much it can be, with help of certain data of science, remembering that each time that the latter has lifted a corner of the veil, it allowed to see a new enlightenment of God's face.

In beginning to talk to you about the creation of living beings, I used the expression: "matter created organized and living." To express the fact of organization, that is to say of the edification of the living being,

I frequently used the word structure; it was in order to indeed to indicate that it needed the intervention of an independent and unknown factor of the matter. Scientist often have strange illusions and make peculiar confusions. Some talk about living matter, without epithet, and who indifferently use the words organized matter, animal matter, plant matter, in speaking of animals and plants. There are also some who claim that it can have organization without structure: and live by the unique assistance of a more or less great number of chemical and divers compounds, at will mixed or combined following a method that we call "by reciprocal dissolution;" there are others who confound the formation of what, in the alchemists' language, we call the Dianna tree, fruit of actions purely chemical and physical; with the development of a true plant. It is from such misuse of words and coarse resemblances that arise, too often, all the costs of certain productions that we pompously call modern science. But, in pronouncing those last words, did not I overshooted the mark? I am almost afraid I did! However listen, it is an ingenious physicist who speaks: "you see" said he, "on this screen the picture of a show-bottle which contain a solution of silver nitrate and this of two conducting wires of a battery which are in. I close the circuit, and the electric current immediately travels through it. You see appear and develop, starting with one of the wires, a magnificent tree of silver. The branches divide and the twigs covering with leaves. This metallic tree has done its grow in one minute, and it seems as perfect in its details as can be a true plant (1). Really, it is pure logomachy! There is no tree, no branche, no twig, no leave, no growth! There is hardly the appearance of a tree, as certain fantastic figures that we see in clouds have the appearance of man or animals; and the growth that speaks the physicist scientist is the same order of a pile of sand which grows by the addition of the same matter. But those forms that you compare to a vegetation are only cristalizations, results, not of a growth, but a juxtaposition of metallic and cristalized molecules, which have nothing in common to the development of a living being to which you compare them improperly.

What idea should we do, chemically or physiologically, of the living organization? To this double point of view, a living organism is, in all the force of term, an apparatus which has a definite physiological and chemical function. Yes, we have to highly affirm: a living apparatus and not a living matter. There is no living matter! There is no relation, of any order, between any chemical compound, even organic, or any mixture of those compounds and a living and organized apparatus. There is even no relationship between the nature of the matter which constitutes them and the functions of those organisms. I explain myself: like metals and the other materials which can enter in the fabrication of a watch, a clock or a machine are not this watch, this clock or this machine, so also the matter helps the edification of organs and elements of organ of a plant or an animal, is not this animal or this plant.

The watch, abstraction made from nature of the material which is in it, is all in the spring, the wheels, the dial, the needles and the law which has been imposed to it by the will of the one who has conceived the plan and has executed it. With the same materials, will make all machines that his genius can invent, and in each the material will obey to the law which has been imposed upon it. And in order that that watch, that machine achieves the purpose for which it was made, still requires that somebody rewinds the springs and puts it in motion

It is the same thing for a living apparatus. Such an apparatus, abstraction made of the matter which constitutes it, is all in the mechanism, in the function which it accomplishes, in the law which has been imposed, the nature of the matter does not do anything. We have seen it, a small number of simple bodies are necessary and enough to constitute the two living kingdoms and these simple bodies are found, the same, in all members of the two kingdoms; with them have been formed more than 100,00 species of plants, more that 100,000 species of animals and a great number of species of infusorians. The naturalists have distinguished them by characteristics pulled from all the particularities of the exterior conformation, from the number and from the order of their parts, from the anatomical structure and even histological. But there is something more profound than all of this, something to we do not think about when we write on these high questions: it is the purely chemical function. We must emphasize it.

I already said somewhere else (1), organic matter is devoid of structure, and that which is organizable is, besides, without the crystalized property, which is another way to demolish affinity... from Mr. Tysdall. The organized being, to the contrary is an edifice of definite structure, but without geometric and regular forms as the crystal. In what therefore consists the organisation, the structure? For the most sincere scientists, a living being is formed of what we have called "element of formation, constituent parts of the form, anatomic elements or figures, cells." In a composed organism, the elements of formation are the last organic units, we all call them cells. The cells therefore are the elementary forms whose assembly and the metamorphosis form an animal or plant body. Besides, according to most authors, the cells are the smallest organized bodies which possess a center of activity, bringing all the parts to itself and to its needs. But the cell itself, as all anatomical elements, is reducible to a more simple form, that somebody that I do not want to name in front of you, has called the microzymas. We will see later what is the importance of the discovery of microzymas. Now, the anatomical elements, the cells, the microzymas ahead, chemical or physiological apparatus are useful to build all living machines, are composed by the same simple bodies, often by the same chemical, organic or mineral compounds, they are no more simply chemical matter.

These cells, this microzymas are endowed with special functions, each after its own kind, they are the place, the laboratory where, in every being, organic matter elaborates or changes itself, falls into decay, according to the conditions where they are placed, whether by nature, or by the chemist, or by the physiologist. There is therefore something more profound than the structure itself not only in a constituted organism, but in what there is unbound in the anatomical elements, the cells themselves, specifically in the microzymas which are the factors. This something is the function which lies in the detail and as a result, in the whole. Now, it is demonstrated that the microzymas, although morphologically identical and of similar composition, are of varied function in the different centers of organization of a same organism, plant or animal, "microphyte" or microzoarian, tissue or element of tissue. It is in this whole that consists the notion of organized matter (2). I know well that everybody does not partake yet of this way of seeing, but that will happen, for all of this is experimental and founded on direct observation. What is therefore the prevailing opinion at this moment, concerning the formation of anatomical elements?

In the current state of science, we have two theories to explain the formation of the visible elements of living organisms: the cellular theory and the theory of protoplasm such of the blastema is only one particular case.

The evolutionist system makes the best of the two theories. According to the adherents of the cellular theory, matter rises gradually to the level of cell. It is spontaneous generation in all its rawness.

According to the followers of the theory of protoplasm, things take place otherwise. Protoplasm is an organic liquid, more or less complex and viscous, which can be totally soluble in water, devoid of all structure (3). Protoplasm is reputed to be living, although not visible, in it, the visible cells or elements of the organization take form from all the pieces, then, step by step, the most simple living being and, by evolution, all the others. It is as you see it, under another form, triumphant spontaneous generation. It goes without saying that we admit, gratuitously, it is true and without proof, that organic matter of protoplasm took form alone, before the coming of plant kingdom. We must admit it when we want to do without the Creator. It is under a new form, in the two theories, the old mistake of Lucretius and the atomists

1- The evolutionist system, to the regret of the experimental science, in review of natural sciences of Dubreuil (1876).

2- See on all this the Memoires already indicated and, besides! Mr. Raitus: Theory of the microzoarians Theoretical and practical study of the "pyogenese" (pyo = presence of pus), in thesis of the faculty of Medicine of Montpellier for 1874. Mr. J. Bechamp: About the microzoarians and about their functions at different ages, in thesis of the Faculty of Medicine of Montpellier 1873.

3- Protoplasm: used especially to designate the liquid contained in the cavity of the cells or in the embryonic cells, when the embryo does not yet have blood. This liquid is susceptible, as the plasma of blood, to produce the materials for birth of other anatomical elements.

It is by virtue of this theory that an English physiologist expressed the following statement: "the human organism (and consequently all organisms), has its origin in the egg, is an assemblage of corpuscules of protoplasm, and each organ is in the same way an aggregation of the same kind. "But what is a corpuscule of protoplasm if, as they uphold, it is a liquid, a matter devoid of organization and of structure. Once more, what is it? If it is demonstrated that there is no life without structure! No, it is a gratuitous assertion. Here is the true: what in the egg we consider as protoplasm, conceals life in something already organized, visible, active and capable of multiplying as everything which is alive, which is the microzoarian. And it is that demonstrated presence, constant, necessary, of the microzoarians, which brushes aside all hypotheses concerning the origin of organization, which these are the microzymas which exist in it by myriads, which, the circumstances being propitious, when the time had come, will produce in the egg, in the impregnated seed the anatomical elements, the cells, certain tissues, and step by step all organization and all organism, according to the law which has been imposed to the egg, to the seed, to the bud, each after its kind. Yes, they are the microzoarians, which are before the cell, which persist and live after the destruction of the cell and organisms, which are necessarily in all medium which is capable of producing a cell, which prevent us from saying with truth that protoplasm and matter in general, in so far as chemical compound or mixture, is alive. It is the presence of microzoarian as a factor of the cells and tissue, it is the notion of structure, which let us understand why and how such a seed, such an egg, are already, virtually, such a plant, such an animal. The nature of matter does not count for very much! It is what I want to render seizable by two or three chosen examples among thousands. Consider, please, the seeds of dioecious plants. These seeds have been formed in the same plant, in the same female plant, from the same matter, in the same matter, these seed being sown in the same soil, will produce some male plants, other female plants. Consider also a monoecious plant: the same plant will produce on the same stem male flowers and female flowers: some will produce the fertilizing pollen, others the ovule to be fertilized. And the miracle is even greater when the male and female organ are in the same flower, taking the matter not only to the same source, but in the same place. But the notion of structure and of function explain many other particularities: here are two plants of the same family, we could take the same kind, a quinquina and the madder: the first will produce quinine and the cinchonin, two alkaloids that the last will never produce, but will supply to industry a coloring and precious matter, the alizarin, substance that chemists know to synthetically produce only for a little while. But in the same plant, we can find some opposite characteristics even more distinct: the juice, which flows out of incision done to the capsule of the somniferous poppy, produces opium, which contain many alkaloids which are heroic medicine and deadly poisons; the seed which is contained in the capsule produces to the contrary, a soothing oil and nutritive and abundant materials, without trace of the alkaloids which are in the opium. The matter is even far so little yet in an organism, that the chemist can even change the function, such plant which is cultivated in certain conditions is venomous; it is alimentary in others. The common vetch, being in a dark cave, will produce a great quantity of "asparagine" of asparagus; it will not produce any in ordinary culture! Once more, there is, in the organized being, something more profound than matter, form and structure: it is the physiological and chemical function, required, which has been imposed. And all of this primitively derives from properties which have been devolved to microzoarians, which are not only endowed with physiological and chemical activities, but factors of cells and tissues. In such a manner that, without doubt, a cell can originate in a similar cell, but these cells have for factors the microzoarians each after its species. Now all microzoarians devolve from another microzoarian; the microzoarians are therefore the beginning of all organisms; they are also the end. When after death all has disappeared of a organism, the form with the life, the microzoarian stays, it does not die; it stays endowed with chemical activity, and even physiological, since it is still capable of being used as the germ of something! Of what? To the vibrios and to bacteria, those living agents which, with it, are used, in last analysis, each after its species, to bring all organic matter back to the mineral state!

When herefore Moses affirms that God created man from a special matter which he calls dust of the earth, we can, without temerity, sustain that there was something more than what was used to form plants and animals; an organic matter more delicate containing some micorzoarains of a determined order and spe-

cial function. But in the dust of the earth at that time was there what I just supposed? I do not know, but I believe so. What is certain, is in examining the dust of the earth to day, we easily discover a host of those forms that the physiologists call molecular granulations and which are only some microzoarians of the same form, endowed with similar activities to those microzoarians of animals and of man himself. We discover them even in the sediments and the rocks of paleozoic terrains (1). Nevertheless, Genesis teaches us; to make man in his image, the Creator used a special matter and fashioned it and animated it. And this is in harmony with the facts. Which gives to this manner of thinking a greater possibility, it is that Genesis teaches, symbol of fact and tenderness of heart that to form the mother of mankind, God wanted to use a matter much more noble, more elevated in organization as in quality, than what he used to create the other animals, Adam himself. It is certainly remarkable that Moses shows us God obtaining for the work of incubation which I spoke, materials which appear more distant from the mineral matter even to use Adam's matter to create the woman. It is possible that God, in that miraculous and original incubation created some microzoarians of every species and that it was only when their perfection reached the desired degree, that he created Adam, taking them from him to create Eve. To create a woman, God took some microzoarians from human matter!

And now, Gentlemen, it seems to me that I kept my word; I showed you that Moses is really more experimental in his affirmations that those who set up as contradictors of his account, and that I only have a little more to do to achieve my demonstration.

They claim, according to the German evolutionist system and the Darwinian transformism, that all beings originate from the same primordial form. But it is there a system which lacks proofs, does not proceed from experimentation, and with which they strive as Mr. Darwin's disciples do. To violently try to frame the facts (2). They denied the species in natural history. Agassis wrote a full book to defend reality against those who denied it. We have seen with what insistence Moses affirms it. To contradict Moses and the almost unanimous approval of the greatest naturalists, the founders of our classifications, they stick to some accidents of the form, they stick as far as pretending to demonstrate in the human race some differences which destroy the species, and which, with the destruction of species, they tend to the negation of the divine brotherhood; sad doctrine which would legitimate the slavery that Christianity tried with difficulty to eradicate. But, I have demonstrated, there are differences more profound than the accidents of form.

The species differ much more by their functions, which originate by those of their microzoarians than the exterior variation of form and structure.

Man did not originate from another animal species; this has been demonstrated by the works of the most eminent scientists, and Moses affirms in so original a manner, that after having thought about it all doubts disappear. All in short showing that man is a learning being, as when after the fall he teaches us that:

"Unto Adam also to his wife did the Lord God make coats of skins, and clothed them." No less does he say, from the first moment of human creation, that the latter received the order to subdue the earth and all beings which live on it. He has dominion over them, as a matter of fact, so much that he often transforms them, not only the earth, but plants and animals. "He sees in nature only flexible springs, such they must be adapted as much it is necessary to the action of free beings, which frequently combine on earth with the material laws of nature (2)." And in the transformations for he brings about on living beings as on matter, we do not want to see that it is him, his will which acts. "See," said with reason J. de Maistre, "in how many matters and to what point we have influenced on the production, and I will add, on the interbreeding of animals and plants. A graft, for instance, is or is not an evident law of nature, following whether man exists or does not. "We return against him, against his divine origin, his own conquests, we would almost say his own creations.

1- A. Bishop on the geologic microzoarians of divers origins. Reports of meetings of the Academy of Sciences.

2- I am afraid that we deny this assertion. It is however a very great truth. Here is in what term Agassis has judged Darwinism: "I have," said he, "for Darwin, all esteem that we must have...But I consider as a (footnote continued on page 23)

Among the animal species, man is so fully alone in his species that since no beaver, no swallow, no bee (no monkey), wants to know more than its precursors, and since all beings are peaceful at the place which they occupy (1), he, as obeying his law, and against himself, dashes towards the fields of light, wanting always to know more and alas! misusing his knowledges, when he has renounced loving God, to lower himself and to get spoil more and more in bestiality.

The works of some naturalists (the less trustworthy, as a matter of fact) tend, indeed, to derive more and more the human nature from animal nature. If they only would to do it in the field of physiology, they would be right! But they pretend to let everybody admit, that even the divine side of human nature, intelligence and mind derive from animality and the characteristics of matter. It is the problem of materialism. It really seems that, according to these naturalists, to be a conquest of science, supposedly modern, that the necessary and scientific closer approach of man and the animal kingdom. In reality they deceive themselves I already said that experimentation, to the zoologic point of view affirms this closer approach. Let us see what Moses, in his original way, thought about this matter.

For some motives known by God, the flood was decided in the eternal Councils. From the geologic point of view, it seems that creation received its last complement only after this great event. It seems that if the work was accomplished at the moment of the creation of man, it was not really completed and not sufficiently stable until after the cataclysm which destroyed the human race, except for one family. After the flood, God repeated to men whom he had saved: "And you, be ye fruitful, and multiply, bring forth abundantly in the earth, and multiply therein."

And immediately, God adds these memorable words, which no longer concern man alone: "And I, behold, establish my covenant with you and with your seed after you; And with every living creature that is with you, of the fowl, of the cattle, and of every beast of the earth with you; from of that go out of the ark, to every beast of the earth. And I will establish my covenant with you; neither shall all flesh be cut off any more by water of a flood."

I am asking, in what way could Moses energetically express the physiologic analogy of the human and animal nature. Who is closer to the scientific truth, Moses, who affirms that it is not unworthy to God to make a covenant with the animals, after having it done with man, or those naturalists who belittle everything towards unrefined matter. In the past we could not write a book of philosophy without putting a chapter on the beast's soul. Let us ask, now, who is closer to the truth, the one who does not hesitate to attribute a soul to animals, or the other who denies immortality of the human soul in binding both to the physical force of matter.

(Continued footnote from page 23) duty to persist in the opposition that I always did to the doctrine which carries to day his name. I look at this doctrine as opposite to the true methods which Natural Science must take pattern, as pernicious and fatal to the improvement of this science... What Darwin has presented as the theory on the origin of species, is not the gradually gained result from laborious researches, applying himself to the solution of some points of detail to then rise to a general and comprehensive synthesis: no it is a doctrine which from the conception goes down to facts, and looks for facts to sustain an idea... The fundamental idea which Darwinism rests on, is that the organized beings which succeed in direct descendance, far from necessarily reproducing the essential characteristics of their ancestors, tend to differ. (The same does not reproduce the same, said Nuttall). Until our days all physiology has admitted as an axiom based on experience of all times, that the descendants of all living beings having the faculty to reproduce were the living image of begetters and that even the fertility of those beings was the guarantee of the conservation of types. This notion is furthermore confirmed by this other fact that, in the result of mixture of species, we recognize the relating part of each author who has contributed to the production of the new being. From these two facts, for which nothing until now could shake the science... I can not figure out where the Darwinian school has dug up the facts on which it pretends to place its reliance to affirm that, far from to be constantly alike, the organized beings of successive generations tend to differentiate themselves more and more each other..." (From the species, etc. P. 375 and 377).

1- J. de Maistre, Evenings od St-Petersburg, 1st and 2nd talks.

But this justify us stopping for a moment. Note, Gentlemen, that the Lord having said that he was going to make a covenant with us and with animals, repeats it and add: "I will make a covenant with you, and all living flesh shall be cut off no more by the waters of a flood."

"All living flesh." What does means that? No, no, it is not the matter which is in us, it is with something which is in us, it is with something which has matter as a support, but it is not the matter, with which God made the convenance. It is with all living flesh and not with plants for instance.

I do not want to make here a dissertation on vital force, which is to say on the question of knowing if life is a special force "evoked," as wrote a friend of mine (1), "at the origin of things, to the same title of physical and chemical force and the physical force," vital force which he ensures being "autonomous and never reducible to the physical chemistry forces, though closely mixed with them by the fact of its rapport with the bodies, organized matter, it is true, but matter which only differ by the arrangement and by the temporary characteristics that life gives to it, from the unrefined matter from where it comes and to which it is intended to go back to for a time. I do not know if there is a vital force "which pre-exists the organs and gives them some characteristics which are not those of unrefined matter, but indeed some special characteristics of living beings and which are lent to organized matter for a definite time that the conditions of the medium prolong or shorten." No. I do not know and I do not need it. But I know without doubt for the chemical and also physiological point of view, a plant, an animal, man himself, are apparatus which have themselves the germ of their specific reproduction in which organic matter, by a phenomenon called nutrition, according to chemical laws, form by synthesis or destroy themselves by analysis. God in making those apparatus, endowed them with properties and special functions, each after its kind. These properties have matter for support, in the organized element, but are independent from matter, as we have seen. Really, there is no reason to create without necessity a special force; or else if we have supposed it, we have to suppose as many kinds as there are plant and animal species, each species having its individuality and its special function. In the plants, beyond the law of specificity which has been imposed on each of them, there is only the function of nutrition; and chemically, in so far as apparatus of synthesis, they are apparatus of reduction. Likewise in animals beyond the law of required specificity, there is the function of nutrition and chemically, in so far as apparatus of analysis, they are apparatus of oxidation but in animals, including man, there are functions of relations, of affection, there is will, love, hatred.

There are some who want to confound man within animality. It would be true if we add that humanity is the incarnation of reason within animality. Man differs from animals only by the intelligence and by the power that he wields over them to transform them, on himself by the perfectibility of his mind. Somebody wondered by what concurrence of circumstances man ranked above animals. The question is beside the point, it is the expression of a mistake. Man has been superior over them since the beginning by his intelligence. Man has not even become more intelligent that he was a thousand years ago. The genius of the one who ventured to try to fix thought by hand -writing was certainly as great as the genius of any modern inventor; and the "letters" recognize that the literary works of antiquity give up nothing to the most beautiful ones of the most beautiful modern epoch.

Moses, in bringing animals closer to man and in saying that God made a covenant with them, did not certainly want to sustain that God made covenants with their matter otherwise he would have included the plants, which are also alive, but with something similar in animals and man. In saying that all flesh which is alive would not perish by the waters of the flood, he clearly indicates by those words that it was the animated flesh: plants do not have life in the same sense. It is Agassis' way of seeing, who, in an admirable passage, on the greatest Christians, exclaims: "If it is demonstrated that premeditation has preceded the act of the creation, we would have finished once for all, with the sad theories which send us back to the law of the matter to have the explanation of all the marvels of the universe, and, banishing God, leave us in the presence of monotonous and unchanging action, of physical forces subduing every thing to an inevitable destiny." And he adds: "I make reference here only to the materialists' doctrines. I think however useful to add that certain physicians, (Mr. Tyndall, for instance) that we would offend in taking for materialists, are not very far from

1 - Mr. Professor Foussagrives.

believing that everything is explained, because they recognized the regulative laws of the physical world and proclaimed that these laws were established by God. The phenomena of the inorganic world reoccupy them uniquely, as if the world did not contain any living beings, and as these living beings do not differ at all from inorganic beings. These physicians take for a causal relationship the intellectual bond that we observe between the phenomena of a same series; they do not want to perceive any difference between confusion and action which is free, independent, master of itself, of a supreme intelligence. For them, the most light illusion to the existence, in the animal kingdom, of an immaterial principle that they recognize other than in man, is pure mysticism."

I do not certainly pretend to call upon Moses' authority to sustain that the beasts have an immaterial soul. I want to remark that science, in one of its most famous representative, leads to distinguishing animality by something distinct which does not come from matter! Yes, those whose intelligence has not become absurd by the sophisms of materialism ending up at that inevitable consequence, far from reducing everything to materialism and to fate.

Once more, in what I want to say, I did not pretend to sustain that scientists had to search for their demonstrations in the Holy Scriptures, not even some proofs in support of their speculations, for, I have said it I repeat it, the Scriptures do not have the pretention to be a scientist treatise. But I wanted to communicate something of the conviction which is in my mind before it is in my heart, that the Catholics, while in searching, according to the will of God, the mysteries of creation, are right to firmly attach themselves to the the infallible teachings of the Church of Peter's charter.

J. de Maistre has made the remark: "we have called in testimony against Moses' history, chronology, astronomy geology, etc. The objections have disappeared before true science."

Moses' contradictors, beaten on the ground of history, of chronology, of astronomy, of geology, have thrown themselves into chemistry and physiology. Now, on this new ground, it could accept the fight, let us not cease to say again, that is really more scientific and experimental, more modern and newer than those who attack its account. Let us say again therefore, with the famous author of "The Evenings of St Petersburg," that "those were greatly wise who despised the objections before all examination or who examined them only to find the answer, but without doubt never there was one."

At the origin of all sciences, I already made the remark, we find a believer and it is in the Christian centuries that the sciences have taken the greatest developments. Moses, in affirming that God created everything with number, weight and measure, that there is geometry everywhere in nature, has been the precursor of the great men who have founded the exact sciences and who, after Lavoisier, have founded chemistry on rigorously mathematical bases and data. In following Moses' teachings, we find ourselves in tune with all those great discovers of the human spirit in all order of our knowledges and in all times, namely Socrates, Plato, Aristotle, Hippocrates, Laenec, Cruveilhier, Saint Paul, Saint Thomas d'Aquin, Malebranche, Bossuet, Fenelon, Ravignan, Lacordaire, Montalambert, Gratry, Cusa, Copernicus, Galileo, Kepler, Newton, Descartes, Pascal, Leibnitz, Cauchy, Linne, Jussieu, Cuvier, the two Bongniarts, Gaudichaud, Blainville, Gratiolet, Elie de Beaumont. Agassis, Lavoisier, Berthelot, Gay-Lussac, Ampere, Thenard, Chaptal, Biot, Faraday, etc.. These are, Gentlemen, the geniuses who have founded the sciences; they did not doubt the existence and Omnipotence of the One who has created everything in his love and in his freedom. Even to day, is it not the most famous of all contemporary chemist who has said, with his high authority, his indisputable competence and his great heart, that the civilizing role of the Church rests on three ideas which, in spite of the senseless efforts, perish no more the unity of God, the unity of man, the immortality of the soul. (1)

1- Dumas: Opening address at the Academie Française.