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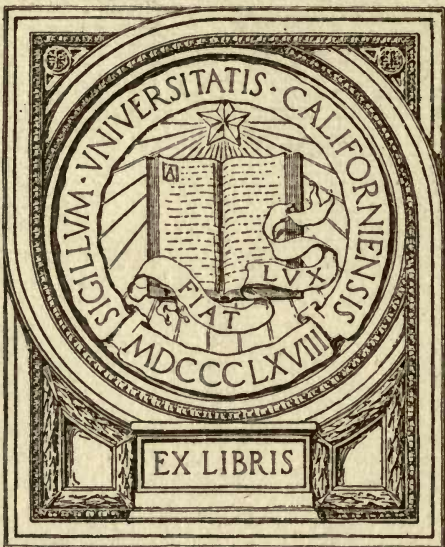
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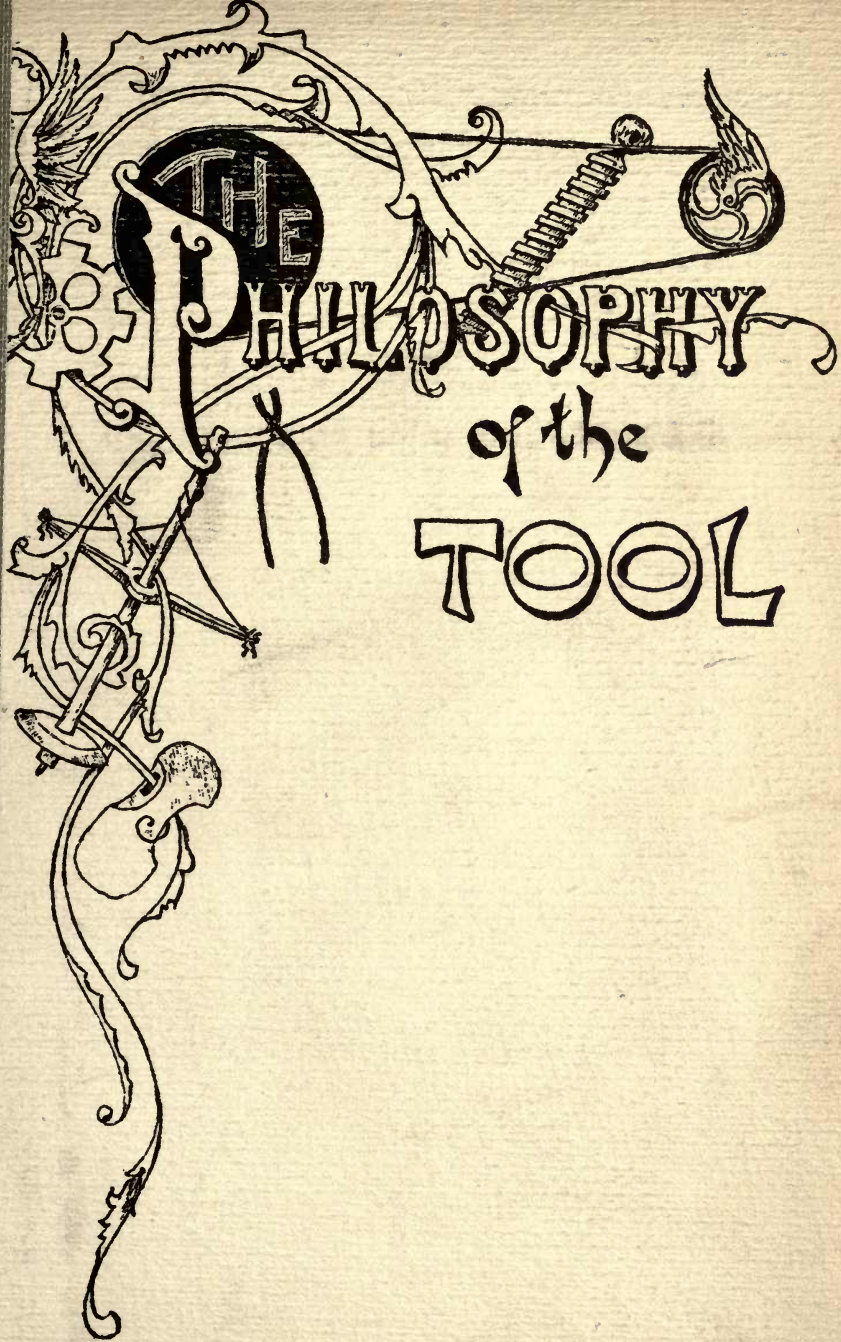
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THE PHILOSOPHY OF THE TOOL

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# THE PHILOSOPHY OF THE TOOL

BY  
DR. PAUL CARUS

A LECTURE DELIVERED ON TUESDAY, JULY 18, 1893, BEFORE THE  
DEPARTMENT OF MANUAL AND ART EDUCATION OF  
THE WORLD'S CONGRESS AUXILIARY

"MAN IS A TOOL-MAKING ANIMAL."—BENJAMIN FRANKLIN



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## THE PHILOSOPHY OF THE TOOL.

MAN, according to the Bible, is created in the image of God. By natural science he is classified as *homo sapiens*. Aristotle defines him as ζῶον πολιτικόν. Theologians say : the distinctive feature of man is religion. Students of ethics find that man alone can form ideals ; man, accordingly, is a moral being. Philologists, like Noiré and Max Müller, say, man is a speaking animal, for “reason is speech,” a truth which appeared quite obvious to the Greek mind which for “word” and “reason” employed the same term, λόγος. And our own great countryman, Benjamin Franklin, gave expression to the energetic spirit of American industry by saying : “Man is a tool-making animal.”

Are these definitions contradictory, or do they agree? Are they, perhaps, corollaries of one and the same truth viewed under different aspects? And if they are, must we regard some of them as penetrating deeper into the mystery of the nature of man than others? Perhaps we shall find every one of them useful in its way when we endeavor to go to the bottom of the problem.

The biblical definition is rather broad and vague. It is adapted to suit men of very different views, and

can be interpreted, in the light of various God-conceptions, in various ways. The difficulty is, it requires more explanation than it gives ; but let us not for that reason think the less of it. The naturalist simply labels the class and the family of man. Aristotle's definition applies to one very important but not an exclusive quality of human beings, for there are other social animals than man. No one calls ants or bees human beings, although they certainly lead a social life and possess institutions quite analogous to cities and states. The philosopher's definition is quite correct ; reason is the distinctive feature of man, and the philologist's explanation of reason as the product of language removes that mystery that might be attached to reason. Yet Franklin's description of man, although not made with any intention of theorising, is the most striking one of all ; for it suggests that man's reason developed *by the exercise* of reason. The organ was created by its function. *Applied* reason made of man a rational being. Work has been the great educator of mankind, and the employment of tools was the school through which man had to pass.

It is ordained that in the sweat of his face man shall eat his bread, and how often do we complain that this is the order of nature ! We are too apt to believe that work is a curse, when really it is a blessing. For in truth our civilisation of to-day is the product of work, and the human soul with its rationality, its ethics, its ideals, its grandeur, has become what it is only through

constant struggles, tribulations, anxieties, and by constantly toiling onward in the road of progress.

Toil is wholesome, it demands great efforts and rouses man's energy. Yet it is not the purpose of life, nor does it constitute the human of man. Toil is the common lot of all creatures ; toil tries their souls, and sifts from among them the strong for survival.

The human of man is his method of toiling ; it is his economy of rendering his work more effective, call it the rational method, call it the systematical or scientific method, call it the divine or God-imitating method, call it morality or whatever you please ; philosophers call it reason, but reason is most certainly a method of work ; aside from work it would be a mere Vanity Fair, and it manifests itself most obviously in the use of tools.

Anthropologists and ethnologists have devoted much study to the tool, and many of them have made it the chief object of their inquiries. Their labors are not wasted, for indeed, the use of tools forms, as it were, an anthropometer wherewith to measure the manhood of man and to determine the degree of human civilisation. Tell us what tools a nation uses and we shall be able to give a fair estimate of its intelligence, culture, and morality.

\* \* \*

The English word *tool* is derived from the Anglo-Saxon *tól*, which is a contracted form of *tawil*. The verb *tawian*, connected with the Gothic *taujan*, means

to prepare, to make, its root being the same as in the Greek *τυγχάνειν*, *τυχή*, etc., and the German *taugen*, *tüchtig*, etc.

The German word *Werkzeug* is of a much later origin, but that, too, expresses the same idea ; it is derived from *wirken*, to work ; it is the instrument for performing work.

What is a tool ? A tool is any implement employed for rendering work effective. Work fills the gap between the needs of the worker and his purposes ; it bridges the chasm between a desire and the thing or state of things desired ; and a tool facilitates the performance of work, it helps us to execute the motions necessary for reaching the end in view.

Thus, tools exist only where there is a purpose, and the use of tools is always a mechanical operation. On the one hand, the use of tools implies purpose-ensouled creatures, i. e., beings who feel their wants and make efforts to supply them ; and on the other hand, tools are possible only in a world in which there is action and reaction, in which push and pressure take place, and where push against push, pressure against pressure, produces what we call resistance, i. e., a world, the interrelations of which can be described in mechanical laws, or briefly, in a world whose constitution is mechanical.

Tools extend the sphere of our existence. Hammers, spades, axes, are prolongations of our hands ; the dairy, the bakery, the kitchen, are, as it were, appen-

trices to our digestive organs, to the teeth and the stomach; engines and railroads are wings on our feet; and machines of all descriptions are tools that have become independent, but still remain our faithful servants. Their work increases our powers and widens our dominion in nature. Every invention and perfection of tools and machines represents a growth of power, so that the muscular energy of our body has in time become an insignificant item in the total amount of the forces at our command.

\*       \*       \*

The traditional contempt for the mechanical originates in regarding the tool as a passive instrument. The tool does not in itself possess will or life, but is made subservient to the purposes of the man who uses it. Taking this view, the habit of calling a thoughtless man's work "mechanical" is justified. Mechanical denotes the machine-like routine performed without feeling, without consciousness of purpose, without any knowledge of the why and the wherefore.

We speak of a weak character as being a mere tool in the hands of others. This usage of the word is perfectly legitimate; but we should be careful lest this view of the tool should lead us to underrate either the tool itself or the mechanical factor which gives value to the tool.

While the tool is only a passive instrument, the use of the tool is an action, and has from the beginning been conceived as an action. It is a remarkable fact

to which Noiré calls attention that the names of tools are always descriptive of the work performed by them, while those of most utensils are derived from the processes by which they are produced.

Noiré says, that the tool, as we positively know, always appears in the oldest conceptions as something active. The shears, the hoe, the needle, the knife, are named from the work they perform.

Noiré says :

“Not every activity deserves the name of work. Activities which serve the preservation of life, as eating, drinking, walking, running, repulse of hostile and destructive powers, are to be excluded. The idea of work implies something lasting, something creative.

“Lazarus Geiger has proposed a good classification of human activities. He distinguishes between tools, utensils, and weapons. Not having given, at the same time, his reason, he provoked much criticism from reviewers who did not understand his ideas.

“Those three categories form an analogon to the famous conception of the Hindu religion according to which the active All-being of the world manifests itself in three factors, as Brahma the creator, Vishnu the conservator and sustainer, and Siwa the destroyer. This trinity necessarily originates in human thought. It has its root in the conditions of life and in its manifestations.

“The tool corresponds to the creative principle. The utensil serves the preservation of life. We shall

never speak of cups, tables, beds, or chairs as tools, while the weapon is the destroyer.

“This, of course, does not exclude the possibility of the same thing filling all these functions ; an axe may serve as a tool and as a weapon. The stick employed for walking is a utensil ; for defense, a weapon.

“Thus we understand why utensils almost always are regarded as passive and named from the way in which they are produced, while tools are conceived as active. Weapons are sometimes actively, but mostly genetically named. The use of cutting or tearing tools as weapons almost suggested itself. In such a case the weapon naturally kept the name it had as a tool. However, the sword, (German, *Schwert*) as Geiger observes, is always represented as something smooth and sharp. The Latin *gladius* is connected with *glaber* and the German *glatt*. The spear (German, *Speer*) is so called from sharpening the point. *Schaft* (Middle High German, “arrow,” Modern German, “the pole of a lance”) is called from *schaben*, to rub off (a word preserved in the English “to shave”) ; the bow (German, *Bogen*) from “bow,” (German, *biegen*) to bend.

“In the face of such facts, which are beyond any doubt established by the science of language, it is inconceivable how any priority to the tool could be claimed for the weapon.”\*

\* Noiré has given us, in the book from which this passage is quoted, a most admirable sketch of the importance of the tool in the evolution of mankind. It is one of those books which none should leave unread.

The tool was the first instrument used by man. The usage of the tool taught man to employ instruments as weapons and to make utensils.

But the importance of the tool is greater still.

Only by handling tools did man learn to appreciate the effect of work ; and experience with the effect of work taught him slowly, very slowly, the import of the mechanical in nature.

What is the mechanical ?

The mechanical is, as it were, mathematics in motion, and the mechanical in nature is the *raison d'être* of its own glorious order, its wonderful regularity and systematic constitution that allows us to trace its uniformities and to formulate them into natural laws.

The mechanical is often contrasted with mental activity. And, indeed, there is a difference between the purely mechanical, i. e., machine-work, or lifeless motion, and thought, which latter is a peculiar kind of living and feeling motion. But to bring the mechanical into antagonism with thought or contrast it with organised life as something that is contradictorily different from it, is a gross misstatement of the case, for the psychic life of feelings manifests itself in motions. Organised life is not, as has been maintained, a break in the mechanical constitution of the universe ; it is not an exception to the laws of motion. If this were so, the harmonious unity of the world would be changed into a mysterious duality.

Feelings, to be sure, are not motions, nor are ideas



motions ; but when a sentient being feels, and when a rational being thinks, there are motions taking place in the nervous substance of its brain, and all these motions are mechanical events, which, as such, conform as strictly to the same laws of mechanics as any other motions in the world,\* and reason itself is in a certain sense mechanical, for reason originates with thought-operations, (which are the psychical aspect of brain motions,) *under the constant influence of those mechanical uniformities* which surround us, and which, in a word, we may call the cosmic order of the universe.

\*       \*       \*

Man's reason and the origin of his reason remained a deep mystery until we became acquainted with the mechanism of reason. We learned to understand that a rational being is in possession of a tool of reason ; and this tool of reason is language. Says Noiré, "Man thinks because he speaks," and Max Müller repeats the same idea in the motto, "No reason without language, no language without reason."

Words are sounds to which special meanings are attached, and these meanings are called ideas. Sounds become words when they symbolise objects or events or qualities of objects, or relations among objects, and the human soul is a system of sentient symbols.

Now, the sentient symbols are interrelated in a soul ; there are innumerable interactions taking place among

\* See for particulars *The Soul of Man*, pp. 1-22, a view which is summarised and further explained in *The Monist*, Vol. III, No. 4, pp. 112-115.

them; and these interactions are called "thought," while the norm which must regulate our thought so as to correctly represent the surrounding world is called "reason."

The life of organisms, including the action of the brain, far from being a break in the mechanical laws of the universe, should be considered a higher, a more perfect, and more complete degree of the mechanical. Our tools and machines are only in part mechanical; their mechanical properties are their soul, and their soul does not permeate their entire existence in the same way as the souls of animals and plants do. Says Leibnitz, strikingly: "A machine ceases at certain limits to be a machine; it becomes mere material, be it iron, wood, copper, or something else, while organisms remain 'machinal' throughout, even in their very infinitesimal parts." (Quoted by Noiré, *loc. cit.* p. 61.)

\* \* \*

Man's reason has been developed by working with tools, but the possibility of tools depends in its turn upon man's ability to handle tools. In order to handle things, we must take hold of them; and in order to take hold of them, we must have at our command a mechanical contrivance which may briefly be designated as a tongs.

Tongs are possible in this mechanical world of ours because pressure and counter-pressure can hold tight, and, as it were, take captive such things as are coherent. We cannot seize air or water by tongs, but

we can seize meat, or wood, or iron ; and the potentiality of what, in a general way, we call tongs is an important feature of the mechanical constitution of the universe.

Nature has formed many kinds of tongs, the jaws of animals, the bills of birds, the tip of the elephant's trunk, and the hands of anthropoids as well as of human beings. But none of them is so perfectly adapted for using tools as the hand.

Man owes the formation of his hands, not to his own merits, but to the happy circumstance that at a certain period of his development he had to seek shelter and food on trees. His upright gait, as well as the opposition of the thumb to the four fingers, are but the natural result of climbing habits. Man's anterior extremities had in a still remoter period of his existence served mainly as motor organs. Not having sharp claws as the cat, those individuals alone that developed the tongs qualities of the hand, so as to easily take hold of the branches above, had a chance of survival, and this tongs-organ, once developed, could be used for any other purpose as well.

The hands are superior to the elephant's trunk, because they are two coöperating tongs, while the elephant's hand, as the Hindu calls the trunk, is single. Furthermore, hands possess great advantages over the bills of birds and the jaws of animals of prey, because the work of hands is carried on under the constant supervision of the eyes. The eyes can watch the hands ;

they greatly aid in regulating and adjusting the actions of the hands, and, what is of greater consequence still, this condition affords a training in observation. The changes wrought being an object of interested attention, are noted and teach a lesson in reflection. We learn to look upon the events which we bring about as transformations, and thus acquire an insight into the nature of causation in which our own activity operates as the cause that produces the effect.

The development of reason depends so much upon the proper mechanical employment of our hands that we even to-day use the words "to grasp," "to conceive," "to comprehend," as expressions denoting the most important mental act of a rational cognition. Comprehension means literally a seizing of the several things at once, so as to handle them as we want.

\* \* \*

The hand is a tool ; and Aristotle calls it with truth, "the tool of tools," for without the hand man could never have handled other tools. Moreover, language is a tool, also ; and truly of language, too, we can say that it is "the tool of tools," even in a higher degree and with a deeper sense than of the hand ; for without language, man could never have invented tools, without language he could never have reasoned.

We might train monkeys to handle tools, but we cannot train them to invent tools. All animals lack that tool of tools, i. e., rational thought, which enables

man to handle concepts and to interconnect them in his imagination.

Not only the speech of our common day parlance is a tool, but also the more perfected language of algebra. Algebra is a machinal contrivance of mental operations to facilitate calculations. The whole mechanism is spiritual. We operate with symbols which have some fixed meaning, but the work performed is entirely mechanical. During the operation we do not in the least think of the significance of the symbols, and retranslate them into their meaning only in the end when the result is obtained. Supposing that the data from which we started are true, and that our operations are performed with rigid correctness, the result will be perfectly reliable.

Thus, we can calculate in a few minutes an algebraic example, starting with equations that represent certain values. During the calculation we are unmindful of the significance of the symbols; and the result when read in the sense which was given to the equations at the start, affords us a wonderfully accurate information concerning things which we did not know before. Either we could, by any direct experience, not know the result at all, or perhaps only after many scrupulous investigations, and even then not with the same accuracy.

Is not this wonderful indeed? How such mental operations are possible, and how they, although purely mental, can give us real information concerning the

outside world, has puzzled the greatest philosophers. It is the bottom problem of philosophy ; and it is the same problem as this : How is the construction of machinery at all possible ?

The exact agreement of the first printed Bibles made people believe that they had been produced by witchcraft. In the same way, it is surprising that a purely mental operation can be used to determine certain features of real things, but the fact is, these mental operations are analogous to, and can appropriately represent, the operations that take place, or may take place, in the objective world. Our mind is a product of operations ; it grew by mental functions, and it grew unconsciously according to the same laws of mathematics and mechanics which regulate all possible happenings in the cosmos, determining the paths of celestial bodies, as well as the atomic construction of crystals, plants, and animals. Our mind developed in the same way in which the regularities which we are so fond of admiring originated in the surrounding world.

All events that take place in the world are separations and combinations. Now, when we let our mind perform its natural operations, the same as those which are an inalienable and intrinsic quality in all events that happen, we can construct in our mind relations analogous to those which obtain in reality ; and by knowing the products of mental operations, we can describe and predict their correspondent realities.

That all the wonderful achievements of mathe-

matics in motion, as realised in machines, and of the mathematics of reason, as realised in the mechanism of our mind, are possible, is due to the consistency of nature. A sameness of operation produces a sameness of result. And this consistency is unalterable and eternal; it is the most obtrusive and significant feature of the world. It is all-pervading and determines the character of the universe.

The presence of this feature makes of existence a cosmos—an orderly whole, regulated by laws; its absence would throw it into confusion; without it the world would be a chaos. But in fact we cannot even picture in our fancy a world without it; and thus we recognise in it the key to the harmony that obtains in the laws of mind as well as in the laws of nature in general, and we need no longer wonder at the agreement of mind with nature, as did Kant, for the laws of mind are only a reconstruction of certain purely formal laws of existence. The formal laws of mind, such as obtain in the purely formal systems of thought,—in geometry, algebra, and formal logic,—are made, it is true, independently of sense-experience; they are not direct copies of our surroundings, but they are built by the functions that were furnished to the mind by nature.

\* \* \*

It is quite legitimate to speak of the hand as a tool, and of language as a tool, for they are tools as much as a comptometer, a typewriter, tongs, or an ax. But

they are tools of a special kind; they are more than tools, they are organs. In other words, they are parts of ourselves, they are living tools. That which is generally meant when we speak of tools is the lifeless mechanical contrivance invented to make the work of living tools more effective.

The history of tools, and of their inventions, is the history of the growth of the human mind.

Inventions are not (as the term seems to mean) haphazard findings. If that were so, invention would be a matter of luck, and the Indians might as well as the Europeans have invented printing.

Miss Olive Schreiner makes the dreamy shepherd-boy on a South African farm ponder on the invention of a shearing-machine, and Bulwer Lytton lets a savant in the time of Warwick, the king-maker, invent a steam-engine. Other historical novel-writers, such as Ebers in his Egyptian novels, are guilty of similar anachronisms. We might as well suppose that the inventor of the needle had at once thought of inventing the sewing-machine. But there are no jumps in progress, and the evolution of the mind is not less continuous than the rest of nature.

The history of inventions represents a ladder on which we can always reach only to the next rung. The possibility of making each step is, upon the whole, definitely determined by the laws of existence.

Nature, as it were, leads man onward, step by step, as if she pursued a special and well-calculated method



of education. The mechanical contrivances to be invented are suggested by our surroundings, and man finds them as soon as he reaches a stage of maturity that enables him to detect them.

In one sense, we can say man is throughout self-made. He had to climb the ladder of evolution, and every one of his bodily and mental qualities is acquired by himself. In another sense, we can say that man is nothing through himself; nature has made him. She led him step by step to find that which alone made him such as he is—a rational being, a tool-making creature. Those who deviated from the path prescribed by nature, were hopelessly doomed to extinction. The path is prescribed in general outlines only; it admits of infinite variations in all its details, but certain general conditions are rigid and do not allow of any deviation.

The earliest inventions are the best evidences of the fact that nature invents through man. The invention of pottery, for instance, apparently came about by man's attempts to heat liquid food in his drinking vessels, viz., in skulls and gourds. When exposed to the fire, the vessels began to burn, and to protect them against the fire they were covered on their outside with clay. There can be no doubt that for a long time vessels to be used for cooking were such clay-covered skulls and gourds, for great numbers of them have been found in various districts which testify to this fact. That the skull or the gourd was not an essential

part of the cooking-vessel was perhaps, as we say, accidentally discovered, i. e., not by forethought or reflection through a process of reasoning, but simply through the virtual experiences that the gourd within the clay rotted away or wore off, while the clay cover not only remained serviceable, but proved superior to other vessels that still contained their gourds. And thus the pot was invented, not by the wisdom of man, but by nature, who, as it were, taught man an object-lesson ; and man's merit consists only in having attained through previous similar object-lessons the ability to understand the lesson.

How long it sometimes took men to learn a lesson taught by nature is difficult to say. But certain it is, that even to-day all inventions are made in the same way. Nature teaches the lesson, and we are her disciples. The higher we rise, the quicker can we climb ; and this produces the impression that we could climb in any direction we please ; but we cannot, and our inventive geniuses are only the better disciples of nature, our great and kind teacher.

A very important progress is marked in the transition from the hunting stage to the nomadic era of mankind ; and several hypotheses can be made as to how it was effected. It is generally assumed that the hunters, having killed a cow or a sheep, might have easily caught their young ones and taken them to the camp of the tribe. This is not probable when we consider the temper and intelligence of the men at

that period. We might almost expect that a cat would spare and feed the young birds in the nest, after having caught and eaten the mother.

There is another and more probable solution of the problem.

The Deer Park Cañon, in La Salle County, Illinois, received its name from its being used by the Indians to keep deer in it, which in times of great need could easily be killed. It is a big natural enclosure, from which the deer, if the exit were well guarded, could not escape, and where they found sufficient food, water, and shelter. It must have been more difficult to hunt an animal than to chase it into the cañon, where herds of deer could be kept without trouble.

The Indians who lived on this continent when the white man came, had been taught the lesson; but had not yet learned it. Nature had shown the red man that he could keep herds; he actually kept herds of deer in the natural enclosure of Deer Park; and yet he had not as yet become a shepherd or a nomad. He still remained a hunter.

\* \* \*

The constitution of nature being such as to confine the possibility of progress to certain prescribed paths, explains in a natural way the oft-noted fact that the same inventions are sometimes made almost simultaneously by different men—a fact which otherwise would be very mysterious. Thus Newton and Leib-

nitz invented the infinitesimal calculus independently of each other, and Laplace propounded the nebular hypothesis which forty years before him had been set forth by Kant, though it is certain that Laplace had never heard of Kant's proposition.

In the field of inventions similar instances are not less frequent.

Moreover, we can say that man was destined on this earth to develop into such a being, or at least almost such a being, as he is now. We cannot deny the possibility that other animals might have developed into rational beings, but through the fulfilment of the conditions for attaining to rationality, they would have become very much like men.

In Noiré's excellent book on the tool, we find the following suggestive passage :

“The bear presents many similarities to man. He  
“walks on soles—a circumstance which qualifies him  
“for an upright gait so that he can easily be trained  
“to dancing. In decisive moments of struggles he  
“rises upon his hind legs in order to use effectually  
“his front paws and teeth. In other respects, too, he  
“is interesting to mankind, for our most ancient an-  
“cestors have struggled mainly with him for the pos-  
“session of regions and dwelling places. Such were  
“the very oldest and most momentous warfares, the  
“final outcome of which secured to man the sole do-  
“minion over the earth and all its inhabitants. The  
“bear had no disposition for a higher evolution ; the

“social instinct, and above all that wonderful organ  
“of creative activity, the hand, were lacking in him.  
“Those warfares, accordingly, constitute a struggle of  
“spiritual superiority against brute force in which the  
“robber-system succumbed.” (P. 88.)

Without considering the context in which Noiré thus mentions the bear, we use this passage to explain nature’s method of compelling her creatures to develop towards a definitely prescribed ideal.

The bear might have been victorious in these antediluvian struggles, but he could only have gained the victory, if, like the anthropoids, he had lived a social life, so as to feel the want of communication and develop language—a life which alone affords the effectual advantage of mutual assistance. The anthropoids, in their turn, might have in the meantime lived lonely lives as do animals of prey. And, furthermore, if the bear had been a social being, if, consequently, he had been victorious, if he had thus far developed on the straight and narrow path that leads up to the evolution of reason, he might have had other chances, too, to acquire those qualities which distinguish man now. He might, by his climbing habits and by common work, also have developed hands. With the habit of covering his body his hair would have gone; with the increase of intelligence his forehead would have protruded and his jaws would have receded, which would have arranged the parts of his head in a superordinate position, and, upon the whole, he would have more

and more approached the human form man possesses now.

It is a strange fact that all the human races tend to develop toward a common type, in stature as well as face and proportion of limbs; and it is not less remarkable that the development of tools, too, as for instance, at the present date, the construction of dynamos and motors, makes towards a certain ideal. When an invention is made, such as the bicycle or the typewriter, we find very soon a great variety of them in the market. By and by, however, they begin to approach one another in form, and in the end when all the patents have expired, one looks very much like the other, even in the arrangement of apparently accidental qualities.

There are no prototypes of things such as Plato conceived in his "ideas," but there is, after all, something analogous to prototypes. The universe possesses a definite constitution which, upon the whole, determines the nature of its creatures and offers a premium to those who, each one in his line, resemble their ideal most closely.

\* \* \*

Nature's ideal in the domain of mentality is reason, and there is no possibility of any variation. There is but one reason, and should upon other planets other rational beings develop, they will have to develop the same kind of reason. They will have to invent tools, tongs, hammers, axes, and machines, the essential

mechanical contrivances of which will have to be the same as in our tools, only their accidental attributes will vary according to conditions. Therefore the quintessence of the soul of man has become and must have become such as it is. The possibilities of going astray on the road of progress are innumerable, and the chance of hitting the right road is but one among many. Thus the old truth is seen in a new light :

“Strait is the gate and narrow is the way which leadeth into life, and few there be that find it.”

But this strait gate and narrow way leads to life only because it is the directest approach to the rational and ethical ideal of nature. The human of man, his reason, his ethics, his soul, is predetermined by the deepest constitution of being.

Man's similarity to God manifests itself chiefly in his invention of tools. Nature's phenomena are a constant creation of new forms and man is the only creature which has learned to create. Man imitates God by calling into existence forms that never existed before ; and thus man, the creator-creature, is moulded into the image of nature's divinity. In other words, the old biblical truth holds good still :

“God created man in his own image, in the image of God created he him.”

\* \* \*

Science is so often, but always erroneously, regarded as the destruction of religion ; but science only destroys the accidental features of religion and leaves the essen-

tial ones stand. Instead of destroying, it purifies religion.

What is true of the ideal prototype of man and of machines, is true also of religion. There is an ideal prototype of religion too ; and this ideal prototype of religion is not a mere dream. The development of religion shows a constant advance, and all honestly religious people are, in their spiritual evolution, consciously or unconsciously, approaching this common goal. The nature of our religious ideal is foredetermined as much as man's reason and his methods of inventing tools.

Science is not the enemy of religion, but its sister and co-worker. Science, as the inquiry into truth, must ultimately lead to the establishment of a religion of truth,—a religion not built upon any pretenses of special revelations, but upon the facts of reality, preaching to man the great moral commands which are (not less than reason and the potentiality of tools) ultimately founded in the immutable and eternal constitution of the universe.



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The religion of science regards as the essence of the various religions their ethical spirit and not their creeds, not their church institutions, not their rituals. Creeds, church institutions, and rituals, nay, the very name of religious denominations, may vary according to historical traditions, taste, and individual opinion. But the essence of religion can be one only, and must remain one and the same among all nations, in all climes, and under all conditions. The sooner we recognise what this essence of religion is, the better it will be for mankind, for progress, and for human civilisation.

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The intention of every religion is to be the religion of truth, and the aim of every church is to resemble as closely as possible the invisible church. The Religion of Science teaches man the method of realising the highest religious ideal, and the devotees of all religious denominations, Freethinkers if they are serious not excluded, will find that by adopting the principles of the Religion of Science, they remain faithful if not to the letter yet most assuredly to the spirit of that religion in which they have been educated.

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