Ayden Shaw

Evolution

A Sociological Study

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THALES TO LINNAEUS.

"Early ideas," says Herbert Spencer, "are usually vague adumbrations of the truth," and however numerous may be the exceptions, this was undoubtedly the case with the evolutionary speculations of the ancient Greeks. The greatness of that remarkable republic finds one of its most striking manifestations in the fact that so many great modern ideas trace their ancestry back to Greece. Sir Henry Maine, the historical jurist, said that, "except the blind forces of nature, nothing moves that is not Greek in its origin." Compared with her dreamy oriental neighbors, Greece shone like a meteor in a moonless night. As Professor Burnet says, "They left off telling tales. They gave up the hopeless task of describing what was, when as yet there was nothing, and asked instead what all things really are now," while the Oriental shrunk from the search after causes, looking, as Professor Butcher aptly remarks "on each fresh gain of earth as so much robbery of heaven."

The Greeks very largely discarded the theological mind, peopled with its pious phantasms, and sought to probe into the nature of the material universe. This is why we discover a fairly distinct, and sometimes startlingly clear "adumbration" of the theory of evolution running like a chain of gold through the immortal fragments of their greatest thinkers.

What is it that really is, and what that only seems to be? What is real, and what is only apparent? This is the theme which Greek philosophy has in common with modern thought, and this is why the remnants of Greek literature are so precious in the twentieth century.

Thales, of Miletus, in Asia Minor, is conceded to have been the founder of Greek philosophy. "He asserted water to be the principle of all things," says Diogenes Laertius, and he regarded all life as coming from water, a position by no means foreign to modern science.

Anaximander, also a Milesian and a younger contemporary of Thales, who like him flourished between 500 and 600 B. C., said that the material cause of all things was the Infinite. "It is neither water nor any other of what are now called the elements, but a substance different from them which is infinite, from which arise all the heavens and the worlds within them." "Man," he boldly asserts, "is like another animal, namely, a fish, in the beginning," a shrewd guess which is now an established fact.

Anaximenes, the third and last of the Milesian philosophers, while following his predecessors closely in time, disagreed with them as to the raw material of the universe. He declares it to be air which, "when it is dilated so as to be rarer becomes fire while winds, on the other hand, are condensed air, Cloud is formed from air by 'felting' and this, still further condensed, becomes water. Water, condensed still more, turns to earth; and when condensed as much as it can be, to stones." All of which proves that Anaximenes had a very fertile brain.

Herakleitos, one of the greatest of all Greek thinkers, lived for a time at Ephesus and expressed the following forceful opinion of his fellow citizens: "The Ephesians would do well to hang themselves, every grown man of them, and leave the city to beardless youths; for they have cast out Hermodoros, the best man among them, saying: 'We will have none who is best among us; if there be any such, let him be so elsewhere and among others.'" According to him everything comes from and returns to fire and "all things are in a state of flux like a river." Here is the intellectual ancestor of Hegel with his great saying. "Nothing is, everything is becoming." Herakleitos sagaciously observed: "You cannot step twice into the same rivers, for fresh waters are ever flowing in upon you."

Parmenides, born at Elea about 515 B. C., was poet and philosopher both, and insisted in his hexameter verse that the universe is a unity, which neither came out of nothing, nor could, in any degree, pass away, thus anticipating by over 2,000 years Lavoisier's doctrine of the permanence of matter.

Empedocles, of Akragas in Sicily, about the same time, stated this great truth with still greater force and clearness: "Fools!—for they have no far-reaching thoughts—who deem that what before was not, comes into being or that aught can perish and be utterly destroyed. For it cannot be that aught can arise from what in no way is, and it is impossible and unheard of that what is should perish; for it will always be, wherever one may keep putting it." He also endeavored to combine and reconcile the ideas of some of his predecessors, teaching that all things come from four roots—water, air, fire and earth.

Anaxagoras, born about 500 B. C., was the first Greek to suffer for science. He was brought to trial for asserting the sun to be a red hot stone, and it would have probably gone hard with him had not the mighty Pericles been his friend. If the sun was merely a fiery ball, what became of the religion founded on the worship of Apollo?

Nearly a half a century earlier Xenophanes, of Colophon, had ventilated ideas much more obnoxious to the priests. He had done for his age what Feuerbach did to the Nineteenth century—he had explained the origin of the gods by Anthropomorphism. Said he: "If oxen or lions had hands, and could paint with their hands and produce works of art as men do, horses would paint the forms of the gods like horses and oxen like oxen. Each would represent them with bodies according to the form of each. So the Ethiopians make their gods black and snubnosed; the Thracians give theirs red hair and blue eyes." Had Xenophanes lived at Athens, where a religious revival had just taken place, he would have shared the fate which later overtook the impious Socrates. Luckily for Xenophanes, in the colony where he lived "the gods were left to take care of themselves." Anaxagoras was the first to determine what causes the eclipses and the illumination of the moon:—"The moon has not a light of her own but gets it from the sun. The moon is eclipsed by the earth screening the sun's light from it. The sun is eclipsed at the new moon, when the moon screens it from us."

The Pythagoreans who must be distinguished from the medicine man Pythagoras, from whom they only take their name indirectly, and not as disciples, believed the reality of the universe was to be found in numbers. They were deceived into this absurdity by the exactness of mathematical conclusions. This was excusable among the Greeks to whom arithmetical combinations were as wonderful as electrical phenomena are to us, but its revival in our day by astrologers and theosophists has no such justification.

Socrates, born about 470 B. C., at Athens, is described as "pug-nosed, thick-lipped, big-bellied and bulging-eyed"—the very opposite of the Greek ideal of beauty. He believed that knowledge itself would bring virtue, and sought to discover the true ground of knowledge. His search brought him into conflict with the religious bigotry of his day and he was finally sentenced to death and died from drinking hemlock in 399 B. C. He wrote nothing and his work is preserved mainly through his influence on Plato.

Leukippos and Demokritos are linked together through their statements of the atomic theory, made more than twenty centuries before Dalton. They placed the permanent reality of things in numberless atoms, of which Leukippos said "there are an infinite number of them, and they are invisible owing to the smallness of their bulk."

Plato we shall pass by; his metaphysical doctrine of ideas contributed little of value to the solution of the riddle of the universe.

We now come to the great Stagirite, Aristotle, founder of the experimental school and father of natural history. Born in 384 B. C., he entered the Academy under Plato when a boy of eighteen. When he was thirty-six Plato died, and Aristotle then left Athens. At forty-one he became the teacher of Alexander the Great. He was the greatest of all the Greeks, and his studies took a wider range than had been embraced by any previous thinker.

Stageira, where he spent his boyhood, was on the Strynomid gulf, and here he observed the variations and gradations between marine plants and animals. It is an evidence of his keen insight that he classified the sponge as an animal. Compare this with Agassiz, the opponent of Darwinism, who, in the 19th century, declared the sponge to be a vegetable.

Aristotle insisted on observation and experience as the foundation of knowledge. “We must not accept a general principle from logic only, but must prove its application to each fact. For it is in facts we must seek general principles, and these must always accord with facts.” He repudiated the idea of purpose in nature, saying, “Jupiter rains not that corn may be increased, but from necessity.” He came very near Von Mohl’s protoplasm when he said, “Germs should have been first produced, and not immediately animals; and that soft mass which first subsisted was the germ.”

Passing over the much misrepresented Epicurus we come two centuries later to the illustrious Roman poet philosopher, Lucretius. In this last century preceeding the Christian era, Greece had fallen from her high estate and become a Roman province. But while Rome had annexed Greece, Greek learning had conquered the Roman mind.

Lucretius in his poem, “The System of Nature,” expounds, with great force, the atomic theory of his Greek forerunners. The first anthropologist, he comes so near to Spencer and Tylor that his ideas, and sometimes even his sentences smack of the 19th century. “The past history of man” he asserts, “lies in no heroic or golden age, but in one struggle out of savagery.” Of the origin of language he says, “Nature impelled them to utter the various sounds of the tongue, and use struck out the names of things.” Of the early struggles of primitive men he says, “Man’s first arms were hands, nails and teeth and stones and boughs broken off from the forests, and flame and fire, as soon as they had become known. Afterward the force of iron and copper was discovered, and the use of copper was known before that of iron, as its nature is easier to work, and it is found in greater quantity. With copper they would labor the soil of the earth and stir up the billows of war. Then by slow steps the sword of iron gained ground and the make of the copper sickle became a byword.” The name of Lucretius closes the long line of the evolutionary pioneers of the ancient world. There the golden vein ceases so far as thinking is concerned, not to reappear until many centuries have passed.

With the decline and fall of the Roman empire, and the rise to power of Christianity, learning was driven from Europe and found refuge among the Arabians. This brings us to the dark or middle ages. It is in the interpretation of the phenomena of this period, that bourgeois free thinkers

like Clodd and Draper break down. They tacitly assume that in Europe evolution was suspended for over a thousand years; and all because of the Christian church. They fail to recognize that deeper cause, the medieval form of wealth production, which gave the church its power to repress learning in the interest of the lords of the land, among which the church herself was greatest; owning as she did one-third of the soil of Europe.

The bourgeois radical cannot perceive that during this period social processes were being gradually transformed and that an economic foundation was being laid that would make possible the renaissance and put science in an impregnable position, and make the progressive acceptance of evolution inevitable. Engels says: “The Middle Ages were reckoned as a mere interruption of history by a thousand years of barbarism. The great advances of the Middle Ages—the broadening of European learning, the bringing into existence of great nations, which arose, one after the other, and finally the enormous technical advances of the fourteenth and fifteenth centuries—all this no one saw”.

But it cannot be denied that this was a terrible period for any thinker who had the misfortune to be born in it. All that was great and noble in the thought of Greece and Rome was rigorously suppressed. The “perfecting principle” of Aristotle was wrested to theological uses. An emaciated form of his philosophy, and a literal interpretation of the scriptures, constituted the only permissible studies. Outside this dilution of Aristotle, the only thing in Greek thought which appealed to the medieval mind was the Pythagorean mystical use of numbers. The conclusions reached by that method were truly remarkable, especially when we remember that they engaged such notable men as Augustine, the celebrated Bishop of Hippo.

These are examples: Because there are three persons in the trinity, Father, Son, and Holy Ghost, three orders in the church, bishops priests and deacons; three degrees of attainment, light, purity and knowledge; three virtues, faith, hope and charity, and three eyes in a honeybee; therefore, there can only be three colors, red, yellow and blue. Because there were seven churches in the apocalypse, seven golden candlesticks, seven cardinal virtues, seven deadly sins and seven sacraments; therefore, there could only be seven planets and seven metals. Because there were seventy-two disciples and seventy-two interpreters of the old testament and seventy-two

mystical names of God; therefore there must be no more and no less than seventy-two joints in the human body.

During this period, European cities had no paving or lighting, and one could not step from a doorway in London or Paris without plunging ankle deep in mud. They had practically no drainage and they were, at frequent intervals devastated by the plague. But the cities of Andalusia, built and governed by the Moors in Spain, were drained, well lighted and solidly paved. They had public libraries and public schools. From their medical colleges Europe obtained the only doctors it had.

In the cities of Christian Europe these enlightened people were treated like dogs, while in their wonderful cities, visiting Christians were met with a hospitality and broad toleration wholly exceptional in the middle ages.

In Europe, even toward the close of this period, broad, scientific thinking was impossible. Nicholas Copernicus, in the 16th century, afraid of the faggot, carried as a secret locked in his own bosom, that heliocentric theory which is the foundation of modern astronomy. His great disciple Giordano Bruno, for expounding that theory with rare ability, after it was revealed by the great Prussian, was hunted through Europe like a wild animal and finally burned at the stake.

For the same reason, the third person in the trinity of the 16th century's greatest thinkers, Galileo, was harassed and humiliated, and at last died a prisoner in his own house.

But all through this period, despite its intellectual stagnation, economic evolution proceeded, laying the foundation for a new intellectual superstructure. That evolution manifested itself chiefly in the rise and growth of a trading class. To the existence of such a class in its society, the Arabians owed their greater liberality, and scientific spirit. When Vasca Da Gama sailed down the west coast of Africa and around the Cape of Good Hope into the Indian Ocean, trusting to chance for the outcome of his voyage, he found the Arabians directing their vessels by a strange instrument which we now call the mariner's compass.

The merchants of Genoa and of Spain discovered that orthodox superstitions did not help but did seriously injure, their commerce. As captains for their ships they preferred for purely economic reasons, men

who had become infected with the ideas of navigation of the pagan Arabians, to men who took their ideas of the universe from the city bishop or the village priest and kept their ships close to land, afraid lest they should sail off the edge of the world, or into that great hole where the angels put the sun at night, after they had finished rolling it across the sky.

It was the growth and final triumph of this trading class, with economic interests and a mode of wealth production that demanded the liberation of science, that abolished the thumbscrew and the stake. Voltaire, Rousseau, and the encyclopaedists were obnoxious to the feudal regime, lay and clerical, because they were the prophets and mouthpieces of the rising bourgeoisie.

This class, by the emancipation of science, performed a lasting service to the human race. The society in which it predominated, at once produced a prolific crop of great thinkers. Sweden had Linnaeus, England had Lyell, Germany had Goethe; but the palm fell to France. In the revolution France had suppressed the Sorbonne, that theological institution which had always shown itself the official and bitter enemy of science, and she soon after equipped scientific expeditions, which gave her the greatest thinkers of that day—Cuvier, St. Hilaire, and, most illustrious of all that courageous pioneer of modern evolution, Jean Lamarck.

The position of the capitalist class of a hundred years ago was very different from that of today. Then it was the harbinger of progress; now it is the stronghold of reaction. Its interests then were very different from its interests now. Then it was called upon by destiny to steer society into new waters; now destiny bids it, since its task is done, to step aside that a new hand may grip the wheel. Then it fought a social order which had had its day, now it is in the midst of social forces which it cannot administer. That was its lusty youth; this is its doddering old age.

When the Bourgeoisie released science from feudal chains, it let loose a force that carried it to victory, but, at that moment, it planted the germs of its own future destruction. Today it reverses its attitude and would fain suppress science or at least prevent its reaching the proletarian brain. But alas, it is in the grip of evolutionary processes of which it is merely a part, and it is bound, more securely than Prometheus to the rock, to a mode of production which makes the education of the proletariat a relentless

necessity. The nation which keeps its working class in semi-feudal darkness is ground to pieces by the industrial competition of its neighbors—it goes to the wall in the struggle for existence. Thus, in the language of Marx, it is obliged by present necessity to dig its own future grave.

The same inscrutable power that called it forth to lead society to a new triumph, now relegates it to the rear and enthrones in its place a new class, a propertyless working class, the child of the wage system, destined to emancipate itself and, by the same stroke, the whole human race. If this be not the mission of the working class, as an instrument of social evolution, the press and platform of the Socialist movement is a useless dissipation of energy. But this is precisely what Marx proved when he laid the foundation of the Socialist philosophy.

Every year brings its quota of evidence that the working class is gathering the political capacity and the social intelligence necessary to equip it for this tremendous task.

Norway grew weary of Swedish dominance and decided to achieve national independence. At once the Swedish Bourgeoisie began to gird up its loins for a bloody dynastic war. The pampered sons of its aristocracy, unable to do anything useful, were to have glory thrust upon them, commanding, from the rear, regiments of Swedish workers to slaughter and be slaughtered by their exploited Norwegian brothers. But while these sinister preparations were in full blast, a vast army of Norwegians crossed the boundary line into Sweden and met a Swedish army of the same proportions. There was no blood-shedding for both armies were unarmed. In place of bayonets and needle guns they had their wives and children. They fraternized; they clasped hands; they tossed each other's babies in their arms. From that moment war was impossible. They carried neither the national banner of Sweden nor of Norway. Over both those great armies, now become one, singing their songs of working class solidarity, there floated the red flag of the social revolution.

LINNAEUS TO LAMARCK.

For a hundred years the word “progress” has been a word to conjure with. No proposal is too reactionary to be put forward in its name and the self-admitted conservative explains that he only wishes to “conserve” the good things which progress has bestowed upon us. It has been invoked on all sides of all questions, and no superstition was so ancient or absurd, no theory so exploded, but it could be revived under a new name and presented to the world as an infallible sign of the progress of the age.

But during the last century men have arisen, who were dissatisfied with a term that covered everything and meant nothing, and who were determined to find out what constituted progress and whether it had any existence in the world of reality. More has been accomplished in this respect during that century than in all the combined previous existence of the human race. The conception or idea of progress is the mental reflection of the process of evolution, which operates everywhere to the remotest niche or cranny in the material universe. The only difference between progress and evolution is that evolution is a more inclusive term, including as it does phenomena which we should call retrogressive.

The men who laid the foundations of modern knowledge, and imparted sense and force to hitherto meaningless terms, were they who threw aside theological phantasms and metaphysical speculations and set themselves the task of gathering the facts and ascertaining the laws of the real—the material—world. This is the method of science, and it is to this method that we owe all our knowledge of world problems.

For more than a thousand years this method was practically suspended. Any attempt, during that period, to make use of it was rigorously suppressed, except among the pagan Arabians. Biological science stood

still, scarcely even marking time. Says Packard "After Aristotle, no epoch-making zoologist arose until Linnaeus was born," a yawning chasm of thirteen hundred years.

Linnaeus, born 1707, in Sweden, was the greatest naturalist of his time and might have done greater things for evolutionary ideas had it not been for the theological influences which restrained him. But, hindered as he was, he accomplished enough to entitle him to a place among the immortals. "He found botany a chaos," says Prof. Thatcher, "and left it a unity." His contribution to science consists mainly in his system of classification and nomenclature. Before Linnaeus nobody had been able, though many had tried, to group and name animal and vegetable forms in such a manner as to rescue them from utter confusion. This is precisely what Linnaeus did when, by a happy idea, he adopted what is called the "binary nomenclature."

This great advance was by no means far-fetched; it is simply an application of the double naming everywhere in use, as in the case of Tom Smith, Fred Smith, James Smith, in which Smith is used to denote the general or family name and Fred or Tom the particular or personal. In the application of this system to species, Linnaeus reversed the order as we do when we enter the names of persons on an alphabetical list, as Smith, Fred and Smith, James. As illustrations we will take the two cases, one from the animal and one from the plant world, selected by Haeckel for the same purpose. The generic name for cat is Felis. The common cat is Felis domestica; the wildcat, Felis catus; the panther, Felis pardus; the jaguar, Felis onca; the tiger, Felis tigris; the lion, Felis leo. All these second names are the names of the six species of the one genus—Felis. As an example in botany take the genus pine. According to Linnaeus the pine is Pinus abies; the fir, Pinus picea; the larch, Pinus larix; the Italian pine, Pinus pinea; the Siberian stone pine Pinus cembra; the knee timber, Pinus mughus; the common pine, Pinus silvestris. The seven second names apply to the seven species of the genus Pinus.

But this is not all. Besides grouping the species into genera, Linnaeus classified certain genera as belonging to the same "order." Again he arranged these "orders" in "classes," all these classes belonged to one of the two great "kingdoms," vegetable and animal.

Not only was all this of great practical value but its theoretical influence has been incalculable. Linnaeus never saw, and probably would not have dared to proclaim if he had, that the resemblances which made his grouping possible, indicated a relationship based on descent from common ancestors. This was left for men of greater penetration and courage living in a less theological age. Prelates who smiled on the obscene debaucheries of Louis the XV. had Linnaeus' writings prohibited from papal states, because they proved the existence of sex in plants.

Linnaeus not only proved sex in plants but made it the foundation of his classification. He also reminds us that plants were known to be of both sexes by oriental people in early days. Living as they did on the fruit of the date-palms they found it necessary to plant male trees among the females. Their enemies in war time struck a terrible blow when they cut down the male trees, thereby reducing them to famine. Sometimes the inhabitants themselves destroyed the male trees during impending invasion, so that the enemy should find no sustenance in their country; a war measure similar to that of Russians who burned Moscow in the face of Napoleon.

In the same year that Sweden produced Linnaeus, France gave birth to Buffon. Rich and independent, he chose to devote a long life to the study of natural history. He had remarkable powers of research and displayed genius in presenting the results of his investigation. But alas! he had less courage than Linnaeus and he lived nearer that terrible enemy of eighteenth century science, the theological department of the University of Paris—the dreaded Sorbonne.

As long as he confined himself to the mere description of animals he was a pet of the church, which seems to have pleased him, but when he began to draw evolutionary conclusions of real philosophical import and value, the Sorbonne at once opened its batteries. On these occasions Buffon's retreat was prompt and unprotesting. It might be remembered as some mitigation of his cowardice that while the reign of the stake and faggot did not extend into the 18th century and there was no danger of the fate of the fearless Bruno, yet so strong was religious bigotry even in this period that Rousseau was hunted out of France, his books burned by the public executioner, and Diderot went to jail. "Hardly a single man of letters of that time escaped arbitrary imprisonment," says John Morley in his "Rousseau."

This was all very repugnant to the pride and vanity of Buffon and led him to adopt a style of writing much in vogue a century earlier when the theological hand was heavy as death. This method was to put forward the new idea as a heresy or a mere fancy, explain it, and then proceed with great show of earnestness to demolish it in favor of the orthodox view. This method succeeded admirably until it broke through the thick skulls of religious bigots that the case presented for the "heresy" was more convincing than the pretended reply.

A fine example of this appears in the fourth volume of Buffon's "Natural History." "If we once admit" says he, "that the ass belongs to the horse family, and that it only differs from it because it has been modified, we may likewise say that the monkey is of the same family as man, that it is a modified man, that man and the monkey have had a common origin like the horse and ass, that each family has had but a single source, and even that all the animals have come from a single animal, which in the succession of ages has produced, while perfecting and modifying itself, all the races of other animals.... If it were known that in the animals there had been, I do not say several species, but a single one which had been produced by modification from another species; if it were true that the ass is only a modified horse, there would be no limit to the power of nature, and we would not be wrong in supposing that from a single being she has known how to derive, with time, all the other organized beings."

There is no such clear statement of the evolutionary theory in the "System of Nature" of Linnaeus, and if Buffon had proclaimed these views as his own and courageously defended them, he would have made his name the greatest of the 18th century, and clothed himself with immortality. But the stuff of martyrs did not enter into his composition, and the very next passage to the one above, translated reads—"But no! It is certain from revelation that all animals have alike been favored with the grace of an act of direct creation, and that the first pair of every species issued fully formed from the hands of the creator."

When the Sorbonne thought it was being fooled it compelled Buffon to recant publicly and have his recantation printed. In that recantation he announced, "I abandon everything in my book respecting the formation of the earth and generally all which may be contrary to the narrative of Moses."

The impression we get from reading Buffon, is that he did not realize the importance of those great evolutionary ideas which he stated so well and repudiated as regularly. Had he done so and stood by them, he would have been the Darwin of his day, but he would in all likelihood have spent the latter part of his life in the Bastile.

Not until forty years later do we meet the real and valiant precursor of Darwin, albeit a countryman of Buffon's, but with a more profoundly philosophical mind and without his fear. This was Jean Baptiste Lamarck, born at Bazentin, France, 1744, and educated at the college of the Jesuits at Amiens. He served in the seven years war and then occupied himself studying medicine and science at Paris. He died, poor and blind, in 1829.

Lamarck boldly proclaimed his unshakable faith in the doctrine of the transformation of species, and defended it against the strong tide of popular disfavor and the overwhelming opposition provoked by the antagonism of the great zoologist Cuvier. Cuvier's opposition would have crushed a weaker man but Lamarck bore bravely up and calmly left his case for the future to decide. Cuvier held species to be constant, as was consonant with current and orthodox ideas. This made him a social favorite and the pet of the church, and honors were showered profusely upon him to the end of his days. Not so Lamarck; although born 25 years earlier, his theories were half a century in advance of Cuvier's, and he paid the penalty that has so often overtaken those pioneers whose vision anticipated the future.

"Attacked on all sides," says his friend and colleague, Geoffroy St. Hilaire, "injured likewise by odious ridicule, Lamarck, too indignant to answer these cutting epigrams, submitted to the indignity with a sorrowful patience.... Lamarck lived a long while poor, blind, and forsaken, but not by me; I shall ever love and venerate him." Another writer of that period exclaims, "Lamarck, thy abandonment, sad as it was in thy old age, is better than the ephemeral glory of men who maintain their reputation by sharing in the errors of their time." As to Cuvier, the one stain on his career is his unworthy attitude toward his celebrated opponent and fellow worker. Lamarck had, with his usual generosity, aided and favored him when he first came to the Museum of Natural History at Paris, allowing him to hold, in addition to his own chair, which was in Vertebrate Zoology, the chair of Molluscs, which was in Lamarck's special field, where he had no equal, and which was properly his. But Lamarck opposed, with great politeness and

without mentioning his name the attempt made by Cuvier to harmonize science with the orthodox theology of his day by means of that theory of "cataclysms" which in spite of its being strenuously defended by so recent a thinker as Agassiz, has been relegated to the limbo of exploded theories.

When Lamarck died, Cuvier as his most notable contemporary was called upon to pronounce his eulogy. What a miserable and unworthy performance it was! Even after death, religious antipathy—that ever-flowing fountain of meanness—survived in Cuvier's breast, and De Blainville records that "the Academy did not even allow it to be printed in the form in which it was pronounced," and it is said that portions of it had to be omitted as unfit for publication. Haeckel, speaking of Lamarck's great book, "Zoological Philosophy," complains that "Cuvier, Lamarck's greatest opponent, in his 'Report on the Progress of Natural Science,' in which the most unimportant anatomical investigations are enumerated, does not devote a single word to this work, which forms an epoch in science."

But history has reversed the scales and posterity has repaired the wrong. That theory of biological evolution, which was despised and rejected by the builders of his day has become the corner-stone of modern knowledge, while Cuvier's fantastic "Theory of the Earth" has gone to the museum of curiosities.

Lamarck's immortality is secured by his assertion and defense of the theory of descent, alone. This theory is, that all existing species have descended from ancestors who were in a vast number of cases, and ultimately in all, very different from their present representatives; that this difference is due, not to the total extinction of the previous species by "cataclysms," and the divine creation of new ones, as Cuvier maintained, but because previous species changed in adapting themselves to a changed environment.

But Lamarck has another claim to a niche in the Pantheon of Science. As the conviction gained ground that species were not fixed and immutable as they came from the hands of an alleged creator, but were the products of an evolutionary development extending through immense periods of time, another question arose and called for an answer. That question was—"By what process?"

Charles Darwin is the most illustrious of all the sons of science because he answered that question. Lamarck gave an answer, and the question as to whether that answer is entitled to be incorporated in the answer of Darwin, as a supplementary amendment is sometimes made a part of the motion, still divides the biological world into two camps. But in that controversy between the Weismannians and the Neo-Lamarckians, aptly called "The Battle of the Darwinians," no matter what becomes of the Lamarckian factor, all are agreed that the "Natural Selection" of Darwin is impregnable.

Lamarck's theory may be summed up as follows—

(1.) Every change in the environment of animals creates for them new needs.

(2.) These new needs will compel these animals to adopt new habits and discard some old ones, and these needs and habits will produce and develop new organs.

(3.) The development or disappearance of organs depends on their use or disuse.

(4.) The effects of use or disuse, acquired by animals, are transmitted by heredity to their offspring.

This fourth factor has split the biological world since Weismann repudiated it in 1883.

As a typical case of the operation of his theory, Lamarck gives the following: "The serpents having taken up the habit of gliding along the ground, and of concealing themselves in the grass, their body, owing to continually repeated efforts to elongate itself so as to pass through narrow spaces, has acquired a considerable length disproportionate to its size. Moreover limbs would have been very useless to these animals, and consequently would not have been employed because long legs would have interfered with their need of gliding, and very short legs, not being more than four in number, would have been incapable of moving their body. Hence the lack of use of these parts having been constant in the races of these animals, has caused the total disappearance of these same parts, although really included in the plan of organization of animals of their class."

The idea of the serpent getting its long body, or the giraffe its long neck, or shore birds their long legs by "stretching," has brought a good deal of ridicule upon Lamarck's theory, and that part of it has never been taken very seriously.

This mistake however, will no more affect Lamarck's title to a place among the immortals, than will the equally unfortunate theory of "pangenesis" endanger the status of his still greater successor—Darwin.

Lamarck's glory is that he boldly proclaimed and largely proved the general theory of descent—biological evolution.

We shall now proceed to a consideration of the efforts of the great savants who have succeeded him, to ascertain its processes.

DARWIN'S NATURAL SELECTION.

In the year 1906, the paper which has the largest circulation among English Socialists, "The Clarion," took a vote of its readers as to whom they considered to be the greatest man, the man who had contributed most to the progress of the race, which England had produced. By an overwhelming majority the place of honor went to Charles Darwin. That vote was as much a vindication of English Socialists as it was of the man whose name has become almost a synonym for "modern science."

Liebknecht, in his "Biographical Memoirs of Karl Marx", speaking of Marx and himself, says: "When Darwin drew the consequences of his investigations and presented them to the public, we spoke for months of nothing else but Darwin and the revolutionizing power of his scientific conquests."

Leopold Jacoby writes thus: "The same year in which appeared Darwin's book (1859) and coming from a quite different direction, an identical impulse was given to a very important development of social science by a work which long passed unnoticed, and which bore the title: "Critique of Political Economy" by Karl Marx—it was the forerunner of Capital. What Darwin's book on the "Origin of Species" is on the subject of the genesis and evolution of organic life from non-sentient nature up to Man, the work of Marx is on the subject of the genesis and evolution of association among human beings, of States, and the social forms of humanity."

Commenting on this passage of Jacoby's Enrico Ferri says: "And this is why Germany, which has been the most fruitful field for the development of the Darwinian theories, is also the most fruitful field for the intelligent, systematic propaganda of socialist ideas. And it is precisely for this reason

that in Berlin, in the windows of the book-stores of the socialist propaganda, the works of Charles Darwin occupy the place of honor beside those of Karl Marx."

Frederick Engels, in his reply to Duehring, speaks of Darwin as follows: "He dealt the metaphysical conception of nature the heaviest blow by his proof that all organic beings, plants, animals, and man himself, are the products of a process of evolution going on through millions of years. In this connection Darwin must be named before all others."

Again, in the preface to the "Communist Manifesto" speaking of the materialistic conception of history, he says: "This proposition, in my opinion, is destined to do for history what Darwin's theory has done for biology."

And speaking at the grave-side of his illustrious colleague—Marx, he said: "Just as Darwin discovered the law of development in organic nature, so Marx discovered the law of development in human society."

Says August Bebel, in "Woman," "Marx, Darwin, Buckle, have all three, each in his own way, been of the greatest significance for modern development and the future form and growth of human society will, to an extreme degree, be shaped and guided by their teaching and discoveries."

And Kautsky in his work on ethics declares that Darwin's discoveries "belong to the greatest and most fruitful of the human intellect, and enable us to develop a new critique of knowledge."

Ernest Untermann, in his latest work "Marxian Economics," well says: "Marx discovered the specific laws of social development among human beings. * * * But while doing this, it never occurred to him to disregard the results of Darwin's work. On the contrary, he knew the art of combining Darwin's results with his own, without doing violence to either."

This evidence of the general consensus of opinion among Socialist scholars as to the value of Darwin's work and its special importance for Socialism could easily be enlarged indefinitely. But enough has been cited to show that a comprehensive grasp of the Socialist philosophy implies a knowledge of Darwinian theories.

The greatness of Darwin's work has two aspects; the immense impetus he gave to the general theory of evolution, and, his discovery of its main

process, “natural selection.” In the popular mind this distinction is lost in confusion and a great army of popular but ill-informed expounders have added to the muddle. The two things although closely related—cause and effect—are yet quite distinct, and a clearer understanding of Darwin’s work is made possible by the distinction being kept in mind. The honor of having discovered “natural selection” Darwin shares with Wallace only; as a contributor to the theory of evolution, he is one of a long and illustrious line. But even here he is the greatest of them all precisely because of his specific discovery which, by explaining how evolution works—at least among living things, (biology)—has made the general theory impregnable.

Before proceeding to that specific theory let us clearly understand that evolution has ceased to be a theory merely, it is also a well established fact. Anyone who denies this has no part or lot in the intellectual life of the last half century. Such a one, as Professor Giddings recently said, “inhabits a world of intellectual shades. He cannot grasp the earthly interests of the twentieth century.”

Every science in the biological hierarchy has contributed its quota to the establishment of the theory of evolution, and that theory in return has, in one department after another, produced order and system where before nothing existed but a conglomerate mass of apparently unrelated facts. So thoroughly has the theory impregnated every branch of science that an intelligent dentist must be an evolutionist.

The chief honors fall to the two sciences Ontogeny and Phylogeny. Ontogeny deals with the history of the germ from its beginning as an egg to its full fruition as a fully developed individual or as Haeckel defines it, “the history of the evolution of individual human organisms.” Phylogeny is defined by the same authority as, “the history of the evolution of the descent of man, that is, of the evolution of the various animal forms through which, in the course of countless ages, mankind has gradually passed to its present form.”

I mention these two sciences together because it is by comparing them that their chief significance appears. It is one of the most astonishing discoveries of science and at the same time one of the most convincing proofs of evolution, that the whole process of the development of the human race from the lowest or simplest forms, which constitutes the

subject-matter of phylogeny, is reproduced in brief in the development of the embryo of the individual. This remarkable fact Haeckel named "the biogenetic principle."

Darwin's chief claim however to a pedestal in the hall of fame rests on his discovery of "natural selection."

During his memorable voyage on "The Beagle" he observed that there was no essential connection between a species' reproductive powers and the number of its population. As this discovery plays an important part in his theory we will let him speak for himself. In his "Journal of Researches" he gives the following case, with his conclusion: "I was surprised to find, on counting the eggs of a large white Doris (a kind of sea slug) how extraordinarily numerous they were. From two to five eggs (each three thousandths of an inch in diameter) were contained in a spherical little case. These were arranged two deep in transverse rows forming a ribbon. The ribbon adhered to the rock in an oval sphere. One which I found, measured nearly twenty inches in length and half inch in breadth. By counting how many balls were contained in a tenth of an inch in the row, and how many rows in an equal length of the ribbon, on the most moderate computation there were six hundred thousand eggs. Yet this Doris was certainly not very common: although I was often searching under the stones I saw only seven individuals. No fallacy is more common among naturalists, than that the numbers of an individual species depend on its powers of propagation."

This instance is moderate compared with multitudes of others. The question then arises as to why, of such a numerous progeny, only a sufficient number reach adult stage as will replace the parent stock so that population remains practically stationary.

Here Darwin became indebted to Dr. Malthus who, but for that indebtedness would have been forgotten ere this. In his "Essay on Population" Malthus points out various "checks" to the increase of population. His main theory was that the population tends to increase more rapidly than the food supply. The Reverend Doctor, having begotten twelve children of his own, felt "called" to point out to British parents the desirability and even necessity of limiting their families in the interest of society. Malthus applied his theory to human society where it is palpably false. Darwin transferred it to the natural world where it proved to be a

great truth. The obvious explanation of this paradox is: that man, by agriculture and industry, can increase his food supply to a greater proportion than any probable or even possible increase of population. Animals cannot; their food supply is beyond their control; they have no power to artificially increase the supply. This difference totally destroyed the value of Malthus' book as a treatise on political economy. His immortality is assured solely because he accidentally contributed a link to Darwin's chain.

And now Darwin has travelled on his great journey thus far: Animals propagate enormously but their population generally does not increase. The main reason for this, though there are others, is, that their number is limited by the amount of food available. Therefore, if two parents produce ten thousand only two or three individuals will reach maturity: the rest will perish. The remainder of the problem, which still remained for Darwin to solve, was: first, is there any law which determines which shall survive and which shall be destroyed; and second, if there is such a law, will that law explain and thus, at the same time, prove, the origin of new species? It is precisely because Darwin solved both points of this tremendous problem with a clear and irrefutable affirmative that he occupies the foremost place in the annals of science.

Professor John Fiske said: "There is one thing which a man of original scientific or philosophical genius in a rightly ordered world should never be called upon to do. He should never be called upon to earn a living; for that is a wretched waste of energy, in which the highest intellectual power is sure to suffer serious detriment, and runs the risk of being frittered away into hopeless ruin."

Whether Fiske was right or wrong the only pertinent point here is that Darwin was spared that necessity.

To his great task he brought a patience that is almost without parallel. One of his biographers, Grant Allen, tells us that: "His uncle and father-in-law, Josiah Wedgwood, suggested to him that the apparent sinking of stones on the surface might really be due to earthworm castings. So, as soon as he had some land of his own to experiment upon, he began in 1842, to spread broken chalk over a field at Down, in which, twenty-nine years later in 1871, a trench was dug to test the results. "What other naturalist," asks

Allen, ever waited so long and so patiently to discover the upshot of a single experiment? Is it wonderful that a man who worked like that should succeed, not by faith but by logical power, in removing mountains?"

Darwin studied domestic animals. He observed how many, and how widely different, races there are of horses, dogs, swine, poultry in general and pigeons in particular. In each instance the many varieties are derived from an original common stock, as domestic fowls from the Indian jungle fowl, and pigeons from the old-world rock-dove.

"Derived," but how—by what process? In the case of domestic creatures this was not difficult to answer. It is accomplished by breeders "selecting" the individuals to be bred from. In the case of pigeons, which Darwin laid particular stress on the fancier seemed to be able to obtain almost any kind of a bird by selecting as parents those pigeons which had the desired characteristics developed to the most pronounced degree, and then again selecting in the same way from their progeny. In this way were produced birds so different from each other and their ancestors as the tumbler, the fantail, the pouter, and about a hundred and fifty other varieties. The same with horses. If the breeder desired draught horses, he selected for parents those animals with massive shoulders and sturdy limbs. When a racer wins a "classic" race, it is at once sent to the stud-farm. Although in the zenith of its powers it races no more; it is "selected" for another and more important role—the reproduction and, it is hoped, the accentuation of the characteristics which enabled it to outrun its competitors.

All this impressed on Darwin's mind the importance of the word "selection," which appears in the title of his theory and the subtitle of his epoch-making book. Could it be possible that nature contained some principle or combination of principles, which performed among wild animals a part analogous to that of the breeder, among domestic animals? Darwin discovered that this is precisely what takes place. His famous theory may be formulated under the three following heads:

(1) Heredity.

(2) Variation.

(3) The struggle for existence, with its resultant, survival of the fittest.

Darwin requires very little of heredity, and what he does ask is beyond dispute. It is enough for his theory if like begets like and "figs do not grow on thistles."

Similarly with variation, the demands of his hypothesis are very slight. If it be conceded that variation is a fact, that offspring do vary from their parents and each other, it is enough. And who will dispute this in a world where no two creatures are exactly and in all particulars alike? The apparent contradiction that, heredity demands likeness, while variation requires difference, is confined to the surface—it is not real. The likeness is general while the difference is particular. A sheep may be born with shorter or longer legs, by variation; but it will be a sheep and not a horse, by heredity.

As an example of the working of the theory let us take Lamarck's piece de resistance, the giraffe. Lamarck says: "We know that this animal, the tallest of mammals, inhabits the interior of Africa, and that it lives in localities where the earth, almost always arid and destitute of herbage, obliges it to browse on the foliage of trees and to make continual efforts to reach it. It has resulted from this habit, maintained for a long period in all the individuals of its race, that its forelegs have become longer than the hinder ones, and that its neck is so elongated that the giraffe, without standing on its hind legs, raises its head and reaches six meters in height (almost twenty feet)."

Lamarck thought this length of neck was acquired by "continual efforts to reach," or, as Alfred Russell Wallace puts it in his criticism of Lamarck —"stretching." Many critics ventilated their wit on this theory of Lamarck's, under the impression that they were lampooning Darwin's idea.

They made a blunder similar to that of those critics of Utopian Socialism who labor under the pleasing delusion that they are riddling the theories of Marx. Professor Ritchie has preserved a couple of stanzas by a witty Scotch judge who aimed his poem at Darwin, but hit Lamarck.

"A deer with a neck that was longer by half
Than the rest of his family, try not to laugh,
By stretching and stretching became a giraffe
Which nobody can deny.

That four-footed beast which we now call a whale,
Held his hind-legs so close that they grew to a tail,
Which he uses for threshing the sea, like a flail,
Which nobody can deny."

But Darwin's theory is altogether independent of the "stretching" idea. The causes and origin of heredity and variation are up to this moment, alike wrapped in mystery. But when science succeeds in penetrating those secrets, it is extremely unlikely that Darwin's theory will be seriously weakened, no matter what the causes may prove to be.

Now about the giraffe. We will suppose, for the sake of illustration, two giraffes, a male and a female, whose necks are precisely five feet long. We will confine our illustration to the question of the neck alone. We will suppose this particular pair to give birth to a family of three. First comes heredity. All we ask of heredity is that the young shall be giraffes, not camels or any other species; and this heredity guarantees. Now comes variation. As this is an ideal case for the purpose of illustrating the theory, we will have one of the three shorter-necked than the parents, another the same length, while the third has a longer neck—over five feet.

Now comes the struggle for existence. When this family of giraffes is fairly grown and the new-comers are approaching breeding age—mark the importance of this matter of "breeding age," for the problem is to find out how nature determines which shall be bred from—they are obliged to forage for themselves. There is no pasture to graze; they live in what is almost a desert. There are few shrubs; scarcely anything but fairly high trees—from ten to twenty feet. If a giraffe breeder had this matter in hand and he wished to increase the length of the giraffe's neck, the problem would be simple. He would select number three with the longest neck, pair it with the longest necked member of the opposite sex in some other family and the trick would be done. But this is in Central Africa, where there is no

breeder to interfere, and the question is: can nature accomplish the same result without his help?

This is what happens. First the leaves are eaten from all the lower branches as they are reached with the least effort. Then they go higher and still higher until the point is reached where number one with the shortest neck cannot reach any further and the terrible struggle for existence begins. Number two sees no danger as yet and number three has things all his own way. But with short-necked number one, a tragedy has begun. Every day now sees the food further out of his reach and even number two is obliged to reach out for his supply. The breeding time is approaching but the longer necked and therefore well-fed and vigourous females will have nothing to do with this wobbley starving creature, and the longer necked, well-fed males shun the short-necked starving females. If the starving ones mate, the mother dies before giving birth to offspring, or she cannot get nourishment enough to rear her progeny; in either case there is no effective succession. So the longer-necked are the fittest and they survive. Thus does nature "select" one by the negative process of destroying the rest, in about the same way as a man "selects" one puppy in a litter by drowning the rest.

In the case of the puppies we may say "artificial selection;" in the case of the giraffe it is "natural selection." And this theory, simple as it may seem here, revolutionized Biology.

It is worthy of note that "natural" selection has many advantages over "artificial" selection. The breeder may be mistaken; he may select the wrong puppy and drown its superior. The horse that won the great race may have had a fleeter-footed companion in the same stable had the trainer known how to develop his possibilities. The gardener may have passed the best root or stem through carelessness. But nature makes no such mistakes, or if she does she eventually redeems them. Her method, while it is wholly fortuitous and unintelligent, is practically infallible. The condition of survival is, adaptation to environment. The very process of selection is, in itself, a sure test of fitness. True, moral considerations are eliminated—at least in the non-social world—yet nature offers something like a fair field and no favors. When we speak of nature's favorites, we simply mean those who are best fitted to meet her hard conditions.

Take a row of celery plants, from which future seedlings are to be "selected."

In this instance, let us suppose, the quality desired is ability to resist frost. How is the gardener to know which of fifty plants are the "best" in this respect. He has no method of finding out with any degree of certainty. But nature comes along some night with a sharp frost and "selects" ten by killing forty. And the very act of this "natural" selection proves that these ten are better able to withstand the frost than their fellows.

Breeders of white sheep who supply the white wool market have a very tangible guide—they kill every lamb that shows the least tinge of black. But even here, nature is not to be out-done. In Virginia there is—or at least was in Darwin's day—a wild hog of pure black. One of its staple foods was known as the "paint-root." Any hog with the least speck of white on its body was poisoned by this root while its all-black brothers found it a health-sustaining and succulent food.

In an environment which remained constant and where a species of animals had reached a population which strained the limits of subsistence—food supply—those offspring which most closely resemble their parents, who had won out in that environment, would again succeed and be selected. While if the environment changed—became warmer or colder for example—those descendants which happened to vary in a direction making them better able to cope with the new conditions would be selected for survival as against those who resembled their parents, which parents had survived in their day because they were adapted to the prior environment.

For example, a country is well supplied with water and it is as a consequence fertile and "green." In such a country green insects and green reptiles will be selected, because a green background will render them almost invisible to their enemies. Individuals of other colors will make their appearance by variation, but they will be such plain targets to their enemies, they will be devoured before they reach breeding age and have a chance to reproduce the variation.

But suppose desiccation (drying up) sets in. The country loses its water supply, as Krapotkin has shown to have been the case in North-West Mongolia and East Turkestan, leading to the enforced exodus of the barbarians. Now green will disappear and brown or yellow—say brown—

takes its place. While this change will not, so far as we know, cause insects and lizards to breed brown instead of green, it will ensure the survival or "selection" of such as are born brown and the destruction of those who breed true to their green ancestors. Now every atavistic return to green will be mercilessly weeded out, just as, when the country was well-watered and green, every sporadic production of brown was done to death.

This is the biological foundation of that environment philosophy which now pervades all our thinking. Change the physical environment, says the biologist, and the species will be transformed. Change the economic environment, says the Socialist, and, if you make the right change, the race will be redeemed. Both statements rest on the same fundamental laws.

As the many and highly important implications of this theory, are fully dealt with in subsequent lectures most of them will be passed here.

We may note however, that whenever any nation in the modern world, produces, in the development of its industry, a Socialistic variation, that new feature at once proves its utility and is "selected" in the Darwinian sense, because it constitutes an advantage over the previous form of social organization, in that particular. This is the reason why the trust—which is socialistic and revolutionary in its essential tendences—is always victorious, in spite of the foolish ravings of the Hearst newspapers and the antediluvian twaddle of William Jennings Bryan.

But Darwin's crowning achievement is that he made the general theory of evolution impregnable by thoroughly and conclusively demonstrating it in his own field as a naturalist. From then on it was only a question of time as to when its application would be universal.

Socialism may be defined as the application of the theory of evolution to the phenomena of society. This is precisely what Marx and Engels accomplished, and this why their work is so fundamentally opposed to the conventional theories and theological superstitious current in their time, and so fully in harmony with all the latest achievements in the scientific world. History ceases to be a meaningless mass of war and famine, bloodshed and cruelty. It becomes a panorama presenting the development of society according to laws which may be understood and with a future that may be measurably predicted.

It develops by the operation of forces that no man or class can wholly stay or hinder. The power of those forces and the direction in which they are now making has been well set forth by Victor Hugo by a very striking simile in the following passage:

"We are in Russia. The Neva is frozen. Heavy carriages roll upon its surface. They improvise a city. They lay out streets. They build houses. They buy. They sell. They laugh. They dance. They permit themselves anything. They even light fires on this water become granite. There is winter, there is ice and they shall last forever. A gleam pale and wan spreads over the sky and one would say that the sun is dead. But no, thou art not dead, oh Liberty! At an hour when they have most profoundly forgotten thee; at a moment when they least expect thee, thou shall arise, oh, dazzling sight! Thou shalt shoot thy bright and burning rays, thy heat, thy life, on all this mass of ice become hideous and dead. Do you hear that dull thud, that crackling, deep and dreadful? 'Tis the Neva tearing loose. You said it was granite. See it splits like glass. 'Tis the breaking of the ice, I tell you. 'Tis the water alive, joyous and terrible. Progress recommences. 'Tis humanity again beginning its march. 'Tis the river which retakes its course, uproots, mangles, strikes together, crushes and drowns in its waves not only the empire of upstart Czar Nicholas, but all of the relics of ancient and modern despotism. That trestle work floating away? It is the throne. That other trestle? It is the scaffold. That old book, half sunk? It is the old code of capitalist laws and morals. That old rookery just sinking? It is a tenement house in which wage slaves lived. See these all pass by; passing by never more to return; and for this immense engulfing, for this supreme victory of life over death, what has been the power necessary? One of thy looks, oh, sun! One stroke of thy strong arm, oh, labor!"

WEISMANN'S THEORY OF HEREDITY.

The weak, untrained brain must have a conclusion. It cannot reserve its decision or render an open verdict. It is completely at sea in the scientific world where the most profound savant is often obliged to say, "I don't know." In a crowded courtroom, ninety per cent of the spectators have made up their minds that the prisoner is innocent or guilty before the first witness is called or a line of the evidence has been read. He has a square jaw, or bushy eyebrows, or thick lips, or he shifts uneasily from one foot to the other, any or all which proves to the simpletons back of the rail, that he must be guilty no matter what the crime is, or what the evidence may be. If he has blue eyes and fair hair and mustache, or a pleasant manner, or pretty hands and the onlookers were to decide the matter, they would hardly convict him on his own confession. In England, a judge is not placed on the bench because he "stands in" with a ward boss, but because of his wide scholarship and systematic training, and the reason advanced for this method is, that only a scientific scholar can reserve his opinion until all the evidence is in and then, if the case demands it, render an open verdict.

With the vexed problem of heredity, which has been so much to the fore in science for the last twenty-four years, while many great thinkers have distinctly taken sides, it must be remembered that in many points of great importance, the only possible verdict on the contentions of either side, is one of "not proven."

But although this controversy has split the evolutionists into two camps, it in no way compromises the evolution theory itself. The controversy is based on the admission of all the parties to it, that evolution is granted, and the question at issue involves only a difference as to how the acknowledged results are accomplished. Evolution is no longer merely a

theory, it is an established fact, and is recognized as such by all who live in an intellectual atmosphere belonging to this side of 1859, the year of the publication of the "Origin of Species."

Neither does the result of this discussion threaten, in any way, the validity of the Darwinian theory of "Natural Selection." All the disputants are avowed Darwinians, and disagree only as to whether Darwin's theory is alone sufficient to account for the origin of new species.

Professor Packard, Lamarck's biographer, and one of his warmest admirers, at the close of his chapter devoted to the denial of "pure" Darwinism says: "We must never forget or under-estimate, however, the inestimable value of the services rendered by Darwin, who by his patience, industry, and rare genius for observation and experiment, and his powers of lucid exposition, convinced the world of the truth of evolution, with the result that it has transformed the philosophy of our day. We are all evolutionists, though we may differ as to the nature of the efficient causes."

There are now three possible positions. (1) That of the Lamarckians, pure and simple, who maintain that Lamarck's theory in itself explains all the phenomena, and that Darwin's principle of selection is not only invalid but superfluous. This school is practically extinct, though Packard often sails to its very edge in his efforts to defend his subject, as is the manner of biographers. (2) The Neo- (New)-Lamarckians who develop Lamarck's theory and add to it Darwin's selective principle as of greater, equal, or secondary importance, according as they lean the more strongly to Darwin or Lamarck. This position held the field almost alone, until Weismann fired his opening gun in 1883. He founded (3) the Neo-Darwinian school which repudiates altogether the Lamarckian factor of the hereditary transmission of acquired characters, and maintains that Darwin's theory is able to dispense with Lamarckian ideas of use and disuse.

As Weismann is the storm center of the controversy we will now examine his theory.

In 1883 Weismann became the pro-Rector of the University of Freiburg and in the hall of the University, in June of that year, he publicly delivered his inaugural lecture "On Heredity." This lecture is generally regarded as the first broadside in that war which filled with its reverberations the scientific magazines of the world for the next thirteen years. As one writer

aptly says, “The warring scientists splashed like irate cuttle-fishes in clouds of their own ink.” About 1896 however, the public grew tired of the never-ending flood of biological lore on what looked to the lay mind like an insoluble problem. The editors, with their fingers on the public pulse, cried, “A plague on both your houses,” and sent the savants to seek in their laboratories the victories denied to their pens.

As a matter of fact however, the coming struggle was foreshadowed in a paper read by Weismann at the meeting of the Association of the German Naturalists at Salzburg, two years earlier, in 1881.

This paper was entitled “The Duration of Life,” and the subject was still further developed in an academic lecture, in 1883, on “Life and Death.” These two biological contributions not only indicated the foundations of Weismann’s theory, but they threw a very brilliant light in certain very dark places. Weismann not only took up, but he solved the hitherto obscure question of the origin of death.

Johannes Muller had, as early as 1840, rejected the prevailing hypothesis which held the death of animals to be due to “the influences of the organic environment, which gradually wear away the life of the individual.” Muller argued that if this were so “the organic energy of an individual would steadily decrease from the beginning.” Everybody knows, however, that in spite of the wear and tear caused by the “environment,” be it organic or inorganic, the volume of life increases, until a certain stage is reached in all animals. But Muller had failed to fill the gap his criticism had created.

This problem Weismann solved by analysing the methods of reproduction among animals. These generally speaking are two; sexual, and non-sexual or, as it is sometimes termed, a-sexual. This latter form is the mode that prevails at the bottom of the organic scale—among the protozoa, animals consisting of a single cell. This method has a variety of forms which are classified by Haeckel as (1) self-division; (2) formation of buds; (3) the formation of germ-cells or spores. We shall here deal only with the first, self-division, or fission, which is the most universal of all methods of propagation, being the progress by which the individual cells which compose all the higher animals multiply themselves. This is the method

vital to Weismann's theory and the other two are no more than distinct modifications of fission.

When a Moneron or an Amoeba reaches a certain size, it begins to pinch in the middle like a tightly-laced corset. This increases until the creature divides into two equal halves. Each of these halves becomes a complete individual which continues to thrive until the next division takes place.

What Weismann observed as the most significant thing about this was that in this process and among these unicellular (single celled) organisms there is no such thing as natural death. Accidental death is wholesale in its proportions, but no Moneron ever dies of old age. Astounding as it may seem to the layman, the race-old, world-wide idea that death is "essential to the very nature of life itself" is here totally and indisputably overthrown.

"I pointed out," says Weismann, in the second lecture and referring to the first "that we could not speak of natural death among unicellular animals, for their growth has no termination which is comparable with death. The origin of new individuals is not connected with the death of the old; but increase by division takes place in such a way that the two parts into which an organism separates are exactly equivalent to one another, and neither of them is older or younger than the other. In this way countless numbers of individuals arise, each of which is as old as the species itself, while each possesses the capability of living on indefinitely, by means of divisions."

Among the Metazoa, i. e., multicellular or many celled animals, this immortality of the individual disappears. "Here, also," says Weismann, "reproduction takes place by means of cell-division, but every cell does not possess the power of reproducing the whole organism. The cells of the organism are differentiated into two essentially different groups, the reproductive cells—ova or spermatozoa—and the somatic cells, or cells of the body. The immortality of the unicellular organism has passed over to the former—the reproductive cells—the others must die, and since the body of the individual is chiefly composed of them, it must die also."

And so death came into the world, not by sin, as the Genesis legend reports, but through sex; a most astonishing conclusion, it may be, but one from which there is apparently no escape. Immortality still remains, it is

true, but it is not the immortality of the conscious self. Positive science, nothwithstanding all its glorious gifts, has dealt a terrible blow to those gorgeous dreams of primitive men and modern mystics; those hopes and longings which have sustained millions of our race in hours of supreme sorrow; a blow which not even the bravest has been able to receive without flinching. The only immortality of which science has any surety is that of these unconscious single cells, which make possible the reproduction of the species.

Weismann, then, divides the cells which compose the bodies of the higher animals, including man, into two distinct kinds; the somatic, or body cells and the germ, or reproductive cells. These germ cells are, so to speak, batteries in which are stored a substance which Weismann calls germ-plasm. A minutely small portion of this germ-plasm from an individual of one sex, mixed with a similar portion from an individual of the other will produce a new individual. But—and here comes the keystone of Weismann's arch—only a portion of the mixed germ-plasm is used up in the composition of the new individual; the rest is stored away in the germ-cells of the new individual for further reproduction when the time arrives. The only relation that this reserved germ-plasm has with the body cells of the new individual is that it is provided by them with room and board.

Thus, according to Weismann, from generation to generation, there is an unbroken stream of germ-plasm, and this constitutes his celebrated theory of "The Continuity of Germ-Plasm." Granted this theory as a premise, and Weismann's conclusions cannot be gainsaid. This germ-plasm being the sole "carrier of heredity," nothing that happens to the somatic or body cells can be transmitted to the progeny.

Darwin had put forward a theory of heredity which he called "Pangenesis," which made out a good case for the admission of the Lamarckian factor. According to this theory all the somatic or body cells give forth still smaller cells which he calls "gemmules." These gemmules are collected, by some process not explained, in the reproductive organs. Here they are in packets, and these "packets of gemmules" are "the carriers of heredity." One can easily see how by this process the effects of use and disuse would be transmissible for an organ shrunk by disuse would not be capably represented by an efficient delegation of gemmules at the reproductive headquarters.

Speaking of this theory, Grant Allen in his biography of Darwin says, "Let not the love of the biographer deceive us. Not to mince matters, it was his one conspicuous failure, and is now pretty universally admitted as such." It must be remembered however, that Darwin was fully aware of its purely speculative character and with his usual caution entitled it the "Provisional Hypothesis of Pangenesis."

Romanes, one of Weismann's ablest critics, compares Weismann's theory with Darwin's, and while he refuses to defend Pangenesis against Weismann's charge that it is a wholly unsupported speculation, he replies by contending that the germ-plasm theory lives in precisely the same kind of a glass house.

However that may be, it is quite clear that the germ-plasm theory completely shuts out the Lamarckian factor of evolution in all cases where propagation is sexual.

"But," say the Neo-Lamarckians, "Darwinism in itself, merely assumes variations without attempting to explain their origin. Natural selection only explains the survival of the fittest; it tells us nothing of what Prof. Cope calls the 'Origin of the Fittest.' There must be variation before selection, whence then, comes this variation?" To this question Weismann has a ready reply. "Variation is due to the blending of two wholly different kinds of germ-plasm at conception, producing at birth a result that is not, and cannot be, wholly like the contributor of either."

And now, at last, the great German is in a corner. If all variations are due to congenital characters only, and these, of course, are only possible because of the combinations secured by sexual reproduction, how do variations arise among non-sexual organisms where such combinations cannot exist?

This is indeed, a poser. But any rejoicing by Weismann's opponents is quite premature. The sagacity which set those opponents by the ears is still available. There is no attempt to untie that knot; Weismann cuts it with a knife. He empties his antagonist's sails by a smiling and gracious surrender. Below the sexually reproducing animals, he concedes the operation of the Lamarckian factor. In that unicellular world it is not a special cell that is passed on but the individual itself is continued, and of course any character acquired by the individual will be preserved along with the individual.

Thus then the region of controversy is limited to sexually reproducing organisms and we come to the field where the fiercest fight was made. Do these organisms transmit by heredity those characters or peculiarities acquired by the individual during its own life-time? To this question the Neo-Lamarckians gave a positive affirmative, which Weismann met with an unwavering denial.

Weismann challenged his opponents to produce a single demonstration of such a transmission. Here let us be clear as to what is meant by an acquired character. For illustration, let us suppose a father leaves his son an estate of a thousand acres. That is inheritance. If the son leaves his son the same one thousand acres, that is still inheritance. But if that son increases the estate, during his life-time to two thousand, the second thousand is an "acquired character" of a property nature. There the analogy ceases for there is no dispute as to his ability to transmit both thousands to his heirs by inheritance.

But with "acquired characters" of a biological nature, Weismann maintains this to be impossible. Many specific instances were put forward in refutation of this contention. Herbert Spencer cited the case of the supposed degeneration of the little toe in civilized man as a result of the shoe wearing habit. This it was urged could only have occurred through the transmission of acquired characters and not by natural selection as this diminished toe could not be of any value in the struggle for existence.

But it was shown by measuring the feet of savages, who do not wear shoes, and whose ancestors never wore them, that the small toes of savages had degenerated quite as much.

Then Cesare Lombroso entered the arena leading a camel. According to the Italian criminologist, the camel's hump had been first acquired by bearing loads and then transmitted by heredity. From the fact that the camel and the llama, which is smooth backed, have something in common, he concludes that camels are really llamas that have recently acquired a hump in the performance of their labors. Lombroso also supported his hump theory by some statements about Hottentot women having developed callouses on their hips by carrying their children on their backs. Unfortunately all Lombroso's ingenuity was wasted for we happen to possess the geological record of the camel in good condition, and from this

history we know that the "ship of the desert" had his hump before the human race appeared when according to Lombroso he should have been a smooth-backed llama. Disappointed as Weismann's critics were it was hardly feasible to argue that the camel had gotten his hump in those early times by placing loads on his own back.

It was clearly seen that if a case of the transmission of a mutilation could be established, Weismann's theory would be thereby demolished. A remarkable attempt was made in this direction in 1887 at the meeting of the Association of the German Naturalists at Wiesbaden. To that dignified gathering came Dr. Zacharias with a number of tailless cats. It was asserted that these cats had no tails because their mother had lost her tail through having it run over by a cart wheel. The examination of these specimens proved an entertaining diversion from the regular proceedings, and Prof. Eimer took them seriously enough to refer to them in a later work as "a valuable instance of the transmission of mutilations."

Weismann, however, refused to be put down. He insisted that in the absence of absolute certainty as to the cart wheel incident, they did not fulfill the first condition of scientific evidence, and Dr. Zacharias wisely admitted later, that this point was well taken. Prof. Poulton had described certain cats with extra toes which he had kept under surveillance for seven generations. "It would be equally justifiable," says Weismann, "to derive cats with extra toes from an ancestor whose toes had been trodden on, as to derive the tailless cats of the Isle of Man from an ancestor of which the tail had been cut off by a cart passing over it, and thus to regard the existence of the race as a proof of the transmission of mutilations."

Again Weismann points out that the absence of a tail may not be owing to the mutilation of the mother but to the inherent taillessness of an unknown father. He proceeds to relate how during the year that Dr. Zacharias came with his collection, "My friend, Prof. Schottlius brought me a kitten with an innate rudimentary tail, which he had accidentally discovered as one of a family of kittens at Waldkirch, a small town in the southern part of the Black Forest. A closer investigation resulted in the following rather unexpected discovery. For some time past, tailless kittens have frequently appeared in the families of many different mother cats at Waldkirch, and this fact is explained in the following manner. A clergyman, who lived for some time at Waldkirch had married an English lady who

possessed a tailless male Manx cat. The probability that all the tailless cats in Waldkirch are more or less distant descendants of that male cat amounts almost to certainty. Since a male Manx cat has reached the Black Forest, it might equally well arrive at some other place."

This very same year a popular scientific journal came to the rescue of the transmission theory with the following incident purporting to have taken place 22 years before, in 1864. "A pregnant merino sheep broke its right foreleg about two inches above the knee-joint; the limb was put in splints and healed a long time before the following March, when the animal produced young. The lamb possessed a ring of black wool from two to three inches in breadth round the place at which the mother's leg had been broken, and upon the same leg." When this incident was related to Weismann, he replied, "It is a pity that the black wool was not arranged in the form of the inscription 'to the memory of the fractured leg of my dear mother.'"

Writing in the following year Weismann says, "Furthermore, the mutilations of certain parts of the human body, as practised by different nations from time immemorial, have not in a single instance, led to the malformation or reduction of the parts in question. Such hereditary effects have been produced neither by circumcision nor the removal of the front teeth, nor the boring of holes in the lips or nose, nor the extraordinary artificial crushing and crippling of the feet of Chinese women. No child among any of the nations referred to possesses the slightest trace of these mutilations when born; they have to be acquired anew in each generation."

While it is undoubtedly true that much in Weismann's position lacks experimental demonstration, it is equally true that when the heat of the discussion somewhat subsided, his theories were well to the fore, and they have since secured a wide acceptance among competent authorities. It is hardly to be expected that his two greatest critics, Spencer and Haeckel, would look with much favor on a theory the acceptance of which would make necessary the re-writing of those many volumes which constitute their lifework. Lankester, himself no mean authority, in translating Haeckel's "History of Creation," feels constrained to say in the preface, "I feel it due to myself to state that I do not agree with him as to a very large part of his views on classification, and as to his belief in the necessity of assuming the 'transmissibility of acquired characters.' Readers who have gained an

interest in these questions from the brief statements of the present work must, without assuming that Professor Haeckel's judgment is final, go on to study for themselves the works of Weismann and others which are mentioned with perfect fairness in these pages."

And Joseph McCabe, the translator of his "Riddle of the Universe," and "Last Words on Evolution," has this to say in his introduction to the latter, written two years ago, "To closer students, who are at times impatient of the Lamarckian phraseology of Haeckel—to all, in fact, who would like to see how the same evolutionary truths are expressed without reliance on the inheritance of acquired characters,—I may take the opportunity to say that I have translated for the same publishers, Professor Guenther's "Darwinism and the Problems of Life," which will shortly be in their hands."

It must be admitted that the older view is much less favorable to the Socialist position in sociology than the later theory of Weismann. It is a matter of some satisfaction that so great a critic as Romanes concedes the feasibility of Weismann's theory while rejecting some of the conclusions which he draws from it. "If Weismann's theory is true," says Prof. David Starr-Jordan, "the whole literature of sociology will have to be rewritten!" And another writer insisted that Weismann had reopened the case for Socialism.

If it were true that the terrible results of the degrading conditions forced upon the dwellers in the slums were transmitted to their children by heredity, until in a few generations they became fixed characters, the hopes of Socialists for a regenerated society would be much more difficult to realize. In that case these unfortunate creatures would continue to act in the same discouraging way for several generations, no matter how their environment had been transformed by the corporate action of society. This much at any rate, Weismann has done for us, he has scientifically destroyed that lie.

In this respect, independent sociological experiments and investigations have arrived at the same conclusions as Weismann. Prof. John R. Commons by careful study, reached the following conclusions: That 1.75 per cent of the population of the United States are congenital defectives; that 3.25 per cent are induced defectives, that is, they have not inherited their deficiency; that 2 per cent are possessed of genius and will make their way under the

hardest conditions; that 2 per cent are below the Aryan brain level; and that the remaining 91 per cent are normal persons who are neither good nor bad, brilliant nor stupid, criminal nor virtuous, and whose future is entirely decided by the environment which surrounds them during the first fifteen years of their life.

Herman Whittaker, a magazine contributor, states that during eight years in Canada 2,000 boys taken from the London slums by Dr. Barnado passed under his observation on a farm colony. And although most of them had served terms in jail, not more than one per cent reverted to their own former habits, or the habits of their parents.

When it is charged that a transformed social environment will not solve the problem presented by the slum, the sweatshop and the jail, as Socialists assert, we are justified in nailing the statement as false, and a libel on human nature. And in so doing, we are not sentimental dreamers of dreams, crying for the moon, but rigid analysts and investigators, and, as Lassalle once proudly said, “We have behind us the science and the learning of our day.”

DE VRIES' "MUTATION."

Orthodoxy received the most stunning blow ever given it, at the hands of Charles Darwin, and it is ever on the lookout for an opportunity to make reprisals. It is only necessary for some fledgling to challenge Darwin's theory of the origin of coral reefs and offer some grotesque assumption in its place, and it is at once announced from a thousand pulpits that Darwinism,—that enemy of God and man—is dead.

Hugo DeVries, however, could hardly be called a fledgling, and the supporters of Darwin had real cause for apprehension, it would seem, when the rumor gained ground that no less a person than the Amsterdam professor had overthrown Darwin's theory, and substituted one of his own.

Alas, this latest "death of Darwinism" was no more fatal than its numerous predecessors, as the following quotation from DeVries himself will show:

"My work claims to be in full accord with the principles laid down by Darwin." And again, "To Darwin was reserved the task of bringing the theory of common descent to its present high rank in scientific and social philosophy." And, "Notwithstanding all these apparently unsurmountable difficulties, (absence of experimental evidence since gathered) Darwin discovered the great principle which rules the evolution of organisms. It is the principle of natural selection. It is the sifting out of all organisms of minor worth through the struggle for life."

The greater part of the adverse criticism, aimed at Darwinism applies only to the extravagant claims put forward by his overenthusiastic disciples; claims not to be found in the works of Darwin himself. As we shall see later, one of the greatest offenders in this respect was no less a person than the co-discoverer of the selection theory—Alfred Russell Wallace.

Of all the mischievous misconceptions of Darwin's theory none have worked so much harm as that which regards natural selection as the active and efficient cause of evolution. Although evolution is an established fact, our knowledge of its processes are incomplete and must always remain so until we have solved that most vexed of all biological problems, the "causes of variation."

As to the nature of these causes, natural selection is dumb. For its purpose, variation is simply assumed to be a fact, and Darwin's acknowledged ignorance as to how variation is brought about is expressed in the term "spontaneous variation." Until variation has played its part by producing new and various forms, selection has no function or office to perform. Then it simply decides which forms shall survive by destroying the rest. As Wigand has pointed out, selection does not do more than determine the survival of what is offered to it, and does not create anything new. As DeVries very strikingly puts it, "It is only a sieve, and not a force of nature, no direct cause of improvement, as many of Darwin's adversaries, and unfortunately many of his followers also, have so often asserted. It is only a sieve which decides which is to live and which is to die.... With the single steps of evolution it has nothing to do. Only after the step has been taken, the sieve acts, eliminating the unfit." Thus Prof. Cope's point that Darwin's theory does not explain the "origin" of the fittest, is well taken, or as Mr. Arthur Harris puts it, "Natural selection may explain the survival of the fittest, but it cannot explain the arrival of the fittest."

It was around this question of the "causes" of variation that the Neo-Lamarckians and the Weismannians fought their battle, the former insisting, as we have seen, that variation was caused by the hereditary transmission of acquired characters, while Weismann maintained that variation arose solely through the combining of two portions of differing germ-plasm contributed by two different individuals, and producing a new individual unlike either, —a "variation" from both. While whatever there was of victory fell to Weismann, neither side has experimentally proven its case, and we are still in the dark as to the "causes of variation." Our ignorance is still cloaked in the convenient word "spontaneous;" to Darwin's "spontaneous variation" we now add DeVries' "spontaneous mutation."

It is another tribute to Darwin's caution and insight that he recognized the possibility of variations arising either suddenly, as DeVries asserts they

do, or gradually as DeVries denies.

Not only did Alfred Russell Wallace seek to limit the operation of natural selection in certain fields, in order to make room for his spiritualist theories—an adventure which failed dismally—but he denied the sudden appearance of new species or sub-species, thereby restricting Darwinism, as he understood it, to the origin of new species by the gradual accumulation of those almost imperceptible variations usually described as "fluctuations." Whatever conflict there may be between Darwinism and mutation must be ascribed to Wallace. As DeVries clearly recognizes, Darwin is in no way responsible. "Darwin," says DeVries, "recognized both lines of evolution."

The difference between "fluctuations" and "mutation" is illustrated by DeVries recalling Galton's simile of a polyhedron—an example of which is a solid piece of glass covered with many small flat faces. When it comes to rest on any particular face, it is in stable equilibrium. Small disturbances may make it oscillate, but it returns always to the same face. These oscillations are like fluctuating variations. A greater disturbance may cause the polyhedron to roll over on to a new face, where it comes to rest again, only showing the ever present fluctuations around the new center. The new position corresponds to a mutation. One of the disabilities of this illustration is that some fluctuations represent a greater disturbance from the given position than some mutations. The essential difference is that in the fluctuation it rocks back again while in the mutation it remains on a new base.

Everybody has heard something of the famous evening primrose which gave DeVries his first and most conclusive evidence of mutation. At Hilversum near Amsterdam, he discovered a large number of the plants of the evening primrose, named Lamarckiana after Lamarck. It is an American plant imported to Europe. It often escapes from cultivation and in this case DeVries says it had escaped from a park. It had run wild ten years. A year after first noticing them DeVries observed two new forms which he at once recognized as two new elementary species.

In the test conditions of his own garden, in an experiment covering thirteen years, he observed over fifty thousand of the Lamarckiana spread over eight generations and of these eight hundred were mutations divided among seven new elementary species. These mutations, when self-

fertilized, or fertilized from plants like themselves, bred true to themselves, thus answering the test of a real species. DeVries also watched the field from which his original forms were taken, and saw that similar mutations occurred there so that they were not in any way due to cultivation.

Thus has the modest mutating primrose contributed its quota to the solution of that riddle of the universe which, until it is solved, will always command a paramount position in the thoughts of men.

DeVries discourages the notion that mutations are always occurring everywhere, which might seem to be one of the inferences from his theory, and his twenty-fourth lecture of the series, delivered before the University of California is entitled "The Hypothesis of Periodic Mutations." The common primrose, he says, seems to be immutable at present, and argues that it must have had a mutatory period sometime in the past, when, perhaps, the evening primrose was not mutating. He says: "All the facts point to the conclusion that these periods, of stability and mutability, alternate more or less regularly with one another."

He deals the Neo-Lamarckians a heavy blow by his denial of "direct" adaptation, and he greatly strengthens their opponents when he asserts that mutation takes place, not only in useful directions, but in all directions, leaving natural selection to destroy the unfit. This is a restatement of Darwin's conception, followed by Weismann, of "fortuitous" variations, and is contrary to the notion of Spencer and Haeckel, that variations are mainly in the direction of adaptation to environment, as a result of animals exerting themselves in that direction.

This point is well stated by DeVries in the following passage,—"This failure of a large part of the productions of nature deserves to be considered at some length. It may be elevated to a principle, and may be made use of to explain many difficult points of the theory of descent. If in order to secure one good novelty nature must produce ten or twenty or perhaps more bad ones at the same time, the possibility of improvements coming by pure chance must be granted at once. All hypotheses concerning the direct causes of adaptation at once become superfluous, and the great principle enunciated by Darwin once more reigns supreme."

Another difficulty which DeVries claims to have solved by his theory, is the supposed contradiction between the physicist and the biologist as to

the time allowed by the former and the time required by the latter, for the evolution of animals.

Lord Kelvin asserted the age of the earth to be between twenty and forty million years. George Darwin estimates the separation of the moon from the earth as having taken place some fifty-six million years ago. Gekie estimated the existence of the solid crust of the earth as at most hundred million years. Joly, by calculating the amount of dissolved salts, and Dubois by the amount of lime, estimated the age of the rivers, Joly giving as probable fifty-five and Dubois thirty-six millions of years.

"All in all," concludes DeVries, "it seems evident that the duration of life does not comply with the demands of the conception of very slow and continuous evolution." Mutation, with its sudden leaps, has no such difficulty, and,—"The demands of the biologists and the results of the physicists are harmonized on the ground of the theory of mutation."

In order properly to estimate the sociological significance of DeVries' theory it will be necessary to go back more than a century, and observe the sociological import of the leading biological ideas of that period.

And here let us remark, that nobody knows better than we do the danger of transplanting, without criticism, biological theories into the field of sociology. Nevertheless, our opponents have never lost an opportunity to twist and distort science, if perchance by any possibility it could be made to contradict anything that had so much as the semblance of Socialism. We, however, have always insisted on the weakness of reasoning by mere analogy and have kept to those general laws which have been worked out separately in sociology.

The principle now about to be applied belongs to this latter class. It is the most luminous principle ever employed in the interpretation of the phenomena of society. This principle is that the intellectual life of a people is determined by its mode of wealth production and the social classes arising therefrom.

Jean Lamarck, the first great modern apostle of evolution, died in poverty because he advocated a theory that appeared to contradict the interests of the ruling class of his time. He had against him all that survived

of feudal interests, which was intensely theological, and although his theory really favored the bourgeoisie, that class was not yet aware of it.

Cuvier was the lion of that day, for he managed the remarkable feat of adapting science to the ideas, not only of the increasing bourgeoisie, but also of the diminishing feudal power. He pleased the feudal regime, such of it as remained, by denying evolution, and endorsing its theology. This made his theories welcome also among those shrewd early capitalists, as the English, who realized more quickly than their fellows, that religious belief might constitute as great a prop for one ruling class at it had already been for another.

But in his capacity of scientific reflection of the class interest of his masters, Cuvier's masterpiece was his "cataclysmic theory." According to this theory, organisms were not the result of evolution, but they were now just as when they issued from the hands of the Creator. The difference between existing forms, and those creatures whose story is preserved in the rocks, was explained by a series of cataclysms or catastrophes by which, at certain widely separated periods, all living forms were destroyed, and a completely new stock was created to take their places.

It would be impossible to conceive a better scientific justification of the French revolution than Cuvier's theory presented. For many decades before that event these rising commercialists had groaned under the yoke of feudal dues and feudal restraints of trade. Nothing could be more to their wishes than a sudden social "cataclysm" that would destroy the feudal system with its trade despising and plundering nobility, and exalt its own trading class to fill the vacancy. And when this had been accomplished, and that same nobility had been sent to the guillotine, it was great consolation to have on Cuvier's authority, that this method of sudden violence had no less a precedent than the methods of the Almighty in suddenly destroying the living things in his own universe.

Cuvier's theory however, almost died with him, for the violent desires of the bourgeoisie were short lived. When it realized the completeness of its own victory, and that the next "cataclysm" would mean its own overthrow and the enthronement of some successor, cataclysms lost favor and were frowned down. Preachers of sudden and violent changes were now regarded as the enemies of society, and Cuvier's once lauded theory of cataclysms

was sneered at as a relic of the dark ages. What the capitalist class wanted now was peace, and long life, and above all, no disturbances.

And it was just at this point that Darwin came forward with a theory that seemed made to order. True this theory spoke of evolution and change, but the change was so slow it was impossible to notice it. A million years was as ten minutes to this theory, and if it took as long for one class in society to displace another, or for one social regime to succeed another, as it does for one species to develop from another, the capitalists and their heirs had nothing to apprehend for a thousand generations.

There was nothing sudden about this theory, quite the contrary. In fact the real difficulty was to see how anything managed to change at all.

As for that part of it which spoke of the survival of the fittest, what could be clearer than that these self-made men were themselves the fittest. It was, of course equally clear that the degraded working class, lacking the cleverness to rise, was destined to be eliminated as unfit, by the laws of nature.

For half a century this argument of slow evolution has done valiant service as an antidote for Socialism, and the present ruling class would like to retain it forever.

But no ruling class ever was or ever can be wholly omnipotent. The capitalists of to-day can no more hinder the process of social evolution, with its resulting march of ideas, than they can intercept gravitation or divert the tides. They are being driven blindly to their fate by social forces which are beyond their command.

They are in the midst of social powers which mock their puny efforts to administer. Contradictions arise which cannot continue. As soon as a capitalist country is over-stocked with wealth, poverty prepares to stalk abroad.

But amid all this confusion, something moves on, a something which we sometimes call the spirit of the age. Society grows restless and instinctively anticipates a coming change. A new class rises into prominence and begins to realize its strength and develop its intelligence.

The ruling class still proclaims its will, but cannot always execute it. Colorado, Idaho, and Haywood are proof of that. The mental development

of this new class has reached the point where it has become an intellectual factor in the national life. Its voice is listened to by publishers of books. It establishes its own press. It publishes a literature of its own. It creates its own platform. It reaches into the future and demands control of its own destiny.

And now see how all this is reflected in the scientific world. It is no longer true that species require thousands of years for the simplest change. We are now informed that change takes place by sudden leaps. At one single step a new species appears and begins its existence. There is therefore, no longer anything in biological science to contradict the Socialist position that a new society may be born of a sudden revolution.

Mutation, the savants tell us, runs in periods, alternating with periods of apparent stability. Then if we are not supported we are at any rate not contradicted, when we assert that in social development, periods of economic evolution, with apparent social stability, are followed by periods of social revolution when the entire social superstructure is transformed.

It is no longer necessary to assume countless millions of years for the evolution of living forms. A plant enjoys a period of apparent stability, then it reaches a point where it "explodes" and gives birth to new species. If a plant, why not a society? At least there is nothing in the example of the plant that will furnish an argument against such an idea.

If the history of biological science for the last half a century were to be written by a Socialist, who had no scruples about wresting the record so as to support his Socialist theories, he would have nothing to gain by changing a single line.

There is nothing in that history to contradict us when we assert the probability or the certainty, of a social revolution. Who, that looks about him, can fail to see that death is plainly branded in the brow of the existing social order? Its legal, political, and financial institutions are tied together with rotten thread. It is already outliving its usefulness, and when it goes it will have few mourners. But millions will hail with joy that social mutation which will kindle the fires of human liberty, and create, if not a new Heaven, at least, a new earth.

KROPOTKIN'S "MUTUAL AID."

Lamarck was the first to present the theory of Evolution in a thoroughly scientific manner. Then Darwin discovered "the great principle which rules the evolution of organisms"; the principle of "natural selection." Then Weismann repudiated current ideas as to how the fittest "arrived," or "originated," and presented in their place a theory of his own, which is still under discussion. DeVries raised the question as to whether new species "arrive" by a gradual accumulation of tiny changes, or by sudden leaps—mutations—and demonstrated the latter by his experiments with the evening primrose.

And now comes Kropotkin with the question, "Who are the fittest?" What constitutes the fitness, which makes for survival? Are those organisms the fittest which are constantly waging a war of extermination against every other organism in the struggle for existence, or, are those the fittest which co-operate with each other in the preservation of the common life of all?

The raising of this question brings to light another striking instance of the influence of class interests on scientific thought. It is a matter of common observation that any class, struggling for what it conceives to be its own emancipation, looks to the past for justification and precedent. In the English speaking world there is a widely prevailing opinion that the Magna Charta, extorted from King John at Runnymede, is the foundation of modern liberty.

The French bourgeoisie, struggling to overthrow the feudal monarchy, sought its justification in that "state of nature" which a despotic monarchy was said to contravene. Thus writers like Rousseau idealized nature, representing it as comparatively perfect, and declared that a restoration of

"natural rights" was essential to liberty. But when this same bourgeoisie had won its victory and enthroned itself, and instead of increasing the liberty, had in many respects, deepened the degradation of the mass of the French people, its ideas about the "state of nature" underwent a radical change. And this happened not only in France but wherever the bourgeoisie triumphed.

Now the "state of nature" was one of constant carnage; nature was "red in tooth and claw." And this chamber of horrors was supposed to support the exploitation of labor, and countenance a brutalization of childhood that constitutes the blackest stain on human history. So strong was the swirl that Huxley was swept into it; but, although he maintained the "gladiatorial" view of nature, he repudiated the social atrocities which capitalist apologists such as Spencer sought to deduce from it. In later years, Spencer partially abandoned his premise as to the animal world but, strangely enough, kept it intact for primitive man.

For this view of nature as full of nothing but darkness and cruelty, where, as Hobbes had put it, there waged "the war of every one against everybody," the great authority of Darwin was invoked. In fact, Darwin was supposed to be almost solely responsible for the theory, and its overthrow by Kropotkin was heralded by the uninformed as another of those "death-blows" of which Darwinism is thought to have received so many during the last quarter of a century.

Kropotkin, however, in his introduction, claims that the idea of mutual aid is "in reality, nothing but a further development of the ideas expressed by Darwin in the 'Descent of Man'". Darwin said: "Those communities which included the greatest number of sympathetic members would flourish best, and rear the greatest number of offspring." Kropotkin complains that Darwin did not sufficiently develop this idea, but over-emphasized the idea of "competition" for life, and this error, he insists, was further accentuated by his disciples. "It happened with Darwin's theory," he says, "as it always happens with theories having any bearing upon human relations. Instead of widening it according to his own hints, his followers narrowed it still more."

It is a mistake to suppose that Kropotkin denies the Darwinian principle of mutual struggle. "It is evident," says he, "that no review of evolution can

be complete unless these two dominant currents are analyzed. * * * The struggles between these two forces make, in fact, the substance of history." He anticipates the objection that his work only emphasizes the principle of mutual aid by insisting that the principle of struggle has "already been analyzed, described, and glorified from time immemorial. In fact, up to the present time, this current alone has received attention from the epical poet, the annalist, the historian, and the sociologist."

The main body of his book is a solid mass of evidence of the existence of mutual aid everywhere in the living world, from the lowest insects to the highest mammals; and from the first stone age to the twentieth century. It consists of eight chapters, the first two of which are devoted to "Mutual Aid among Animals."

Here, the theory of the human origin of society is utterly demolished. Complex social arrangements, popularly supposed to be limited to ants and bees, are shown to flourish everywhere, especially among birds.

With the parrot mutual aid is developed to such an extent that Kropotkin places it "at the very top of the whole feathered world for the development of its intelligence." The white cockatoos of Australia, in raiding a crop, mutually aid each other so shrewdly as to "baffle all stratagems" to thwart them. "Before starting to plunder a cornfield, they first send out a reconnoitering party which occupies the highest trees in the vicinity of the field, while other scouts perch upon the intermediate trees between the field and the forest and transmit signals. If the report runs 'all right,' a score of cockatoos will separate from the bulk of the band, take a flight in the air, and then fly towards the trees nearest to the field. They also will scrutinize the neighborhood for a long while, and only then will give the signal for general advance, after which the whole band starts at once and plunders the field in no time."

Mutual aid is very conspicuous among pelicans. "They always go fishing in numerous bands and after having chosen an appropriate bay, they form a wide half circle in face of the shore, and narrow it by paddling towards the shore, catching all the fish that happen to be enclosed in the circle. On narrow rivers and canals they even divide into two parties, each of which draws up on a half circle, and both paddle to meet each other, just

as if two parties of men dragging two long nets should advance to capture all the fish taken between the nets when both parties come to meet."

Our familiar friend, the house sparrow, is not overlooked and is said to have practiced mutual aid to such an extent as to be recognized even by the ancient Greeks. Kropotkin quotes from memory, the Greek Orator who exclaimed: "While I am speaking to you a sparrow has come to tell other sparrows that a slave has dropped on the floor a sack of corn, and they all go there to feed on the grain." Sparrows also maintain social discipline: "If a lazy sparrow intends appropriating the nest a comrade is building, or even steals from it a few sprays of straw, the group interferes against the lazy comrade." Kropotkin presents a number of well authenticated observations of the great compassion and sympathy prevailing among those wild creatures, which are popularly supposed to be always flying at each others' throats: J. C. Woods' narrative "of a weasel which came to pick up and carry away an injured comrade;" Brehm, who "himself saw two crows feeding in a hollow tree a third crow which had a wound several weeks old." Captain Stansbury, on his journey to Utah, as quoted by Darwin, "saw a blind pelican which was fed, and well fed, by other pelicans upon fishes which had to be brought a distance of thirty miles."

From these and a multitude of similar cases Kropotkin concludes that while "no naturalist will doubt that the idea of a struggle for life, carried on through organic nature, is the greatest generalization of our century, that struggle is very often collective, against adverse circumstances."

Kropotkin in concluding his consideration of animals, immensely strengthens his position by pointing out various methods by which new species may develop or old ones disappear, without the operation of a deadly competition between individuals. "The squirrels, for instance, when there is a scarcity of cones in the larch forests, remove to the fir-tree forests, and this change of food has certain well known physiological effects on squirrels. If this change of habits does not last—if next year the cones are again plentiful in the dark larch wood—no new variety of squirrels will evidently arise from this cause. But if part of the wide area occupied by the squirrels begins to have its physical characters altered—in consequence of, let us say, a milder climate or desiccation, (drying up) which both bring about an increase of the pine forests in proportion to the larch woods—and if some other conditions occur to induce squirrels to dwell on the outskirts

of the desiccating region—we shall then have a new, i. e., an incipient new species of squirrels. A larger proportion of squirrels of the new, better-adapted variety would survive each year, and the intermediate links would die in the course of time, without having been starved out by Malthusian competitors."

Again: "If we take the horses and cattle which are grazing all the winter through in the Steppes of Transbaikalia, we find them very lean and exhausted at the end of the winter. But they grow exhausted not because there is not enough food for all of them—the grass buried under a thin sheet of snow is everywhere in abundance—but because of the difficulty of getting it from beneath the snow and this difficulty is the same for all horses alike. * * * We can safely say that their number are not kept down by competition; that at no time of the year they need struggle, for food and that if they never reach anything, approaching over-population, the cause is in the climate, and not in competition."

After citing the rodents that combine to store food for the winter, or fall asleep about the time competition should set in; and the buffaloes which form immense herds to migrate across a continent to where food is plentiful; and beavers, which when they grow numerous, divide into two parties, and go, the old ones down the river, and the young ones up the river and avoid competition; after citing these and many others, he declares the mandate of nature to be: "Don't compete!—competition is always injurious to the species, and you have plenty of resources to avoid it! * * * Therefore combine—practice mutual aid! That is the surest means for giving to each and to all the greatest safety, the best guarantee of existence and progress, bodily, intellectually, and morally."

The third chapter deals with "Mutual Aid Among Savages." Here we meet the question as to whether the family is an ancient institution, antedating the tribe and clan or whether it appeared at a much later date as an outgrowth of the clan. Kropotkin takes the latter view as advocated by Morgan, Bachofen, Maine, Lubbock and Tylor, and rejects the former as presented by Starcke and Westermarck.

The savage of anthropological research is shown to be a very different creature from the blood-thirsty monster of popular tradition. "Sometimes he is a cannibal, it is true, but not often, and then it is closely associated with

economic necessity, and is abandoned when food becomes plentiful." The custom of leaving old men in the woods to die, is bad enough, but not so bad as supposed. They usually carry the old man with them in their migrations until he himself grows tired of being a burden and begs to be killed. When this point is reached, he is given more than his share of food, and left in the woods to die, because no one has the heart to kill him. Infanticide is practiced from the same motive which induces savages to take all kinds of measures for diminishing the birth-rate—they cannot rear all of their children. In times of plenty it disappears. It was when these customs were enveloped in a religious halo and preserved as sacred ceremonies, after all necessity for them had disappeared, that they attained their most revolting characters.

He believed in revenge but it was to be strictly measured by the offense. It must be an eye for an eye and a tooth for a tooth; not a head for an eye, or an eye for a tooth. He only killed his enemies, and he always, at all costs, defended the members of his own tribe. "Within the tribe everything is shared in common; every morsel of food is divided among all present; and if the savage is alone in the woods, he does not begin his meal until he has loudly shouted thrice an invitation to any one who may hear his voice to share his meal."... "If he infringes one of the smaller tribal rules, he is prosecuted by the mockeries of the women." "When he enters his neighbors' territory he must loudly announce his coming, and if he enters a house he must deposit his hatchet at the entrance. If one shows greediness when spoil is divided all the others give him their share to shame him." Scolding and scorning are greatly condemned. Their children are not very quarrelsome and very rarely fight. The most they may say, is, "Your mother does not know sewing," or "Your father is blind of one eye."

The savage identified his interests with those of his tribe; he was no individualist, and under no circumstances would he have consented to child labor.

When we reach the barbarians, who are considered in the fourth chapter, we enter the historical period. At first sight, mutual aid seems to be non-existent at this period. Here there seems to be nothing but battle and bloodshed. But the reason is not far to seek; it is because, until recently historians regaled us exclusively with what has been aptly called, "drum and trumpet history." "They hand down to posterity the most minute

descriptions of every war, every battle and skirmish, every contest and act of violence, every kind of individual suffering; but they hardly give any trace of the countless acts of mutual support and devotion which every one of us knows from his own experience * * * The annalists of old never failed to chronicle the petty wars and calamities which harrassed their contemporaries but they paid no attention whatever to the life of the masses, although the masses chiefly used to toil peacefully while the few indulged in fighting."

But Sir Henry Maine in his work on the "Origin of International Law," has fully proved that "Man has never been so ferocious or so stupid as to submit to such an evil as war without some kind of an effort to prevent it." And he has shown how exceedingly great is "the number of ancient institutions which bear the marks of a design to stand in the way of war, or to provide an alternative to it."

A pregnant suggestion is offered as to the causes of that great migration of barbarians which resulted in the overthrow of the Roman empire. "It is desiccation, a quite recent desiccation continued still at a speed which we formerly were not prepared to admit. Against it man was powerless. When the inhabitants of North-West Mongolia and East Turkestan saw that water was abandoning them they had no course open to them but to move down the broad valleys leading to the lowlands, and to thrust westward the inhabitants of the plains." And so the one great war recorded of the barbarians, was thrust upon them by absolute physical necessity.

The barbarians had no social problem, for that private property in the means of life which constitutes the foundation of modern individualism, and from which the degradation and poverty of modern civilization results, was unknown among them. They were communists. The interest of one was the care of all. Nothing was owned privately until it reached the very point of consumption and not always then, as food was largely eaten at communal meals. This social form still survives especially in Russia, and Kropotkin says: "The sight of a Russian commune mowing a meadow—the men rivalling each other in their advance with the scythe, while the women turn the grass over and throw it up into heaps—is one of the most inspiring sights; it shows what human work might be and ought to be. The hay, in such case, is divided among the separate households, and it is evident that no one has the right of taking hay from a neighbor's stack without his

permission; but the limitation of this last rule among the Caucasian Ossetes is most noteworthy. When the cuckoo cries and announces that spring is coming, and that the meadows will soon be clothed again with grass, every one in need has the right of taking from a neighbor's stack the hay he wants for his cattle. The old communal rights are thus reasserted, as if to prove how contrary unbridled individualism is to human nature."

When the early Christians "had all things in common," they were not reaching forward to modern Socialism; they were harking back to this primitive communism which shed its joy and plenty on the sons and daughters of men for a thousand generations. These barbarian communists were thorough democrats, and their folkmotes, where everybody gathered and had their say, were the only semblance of government they possessed, and so thoroughly were its decisions respected that no officers were needed to enforce them. They were also our superiors not only in refusing to work their children, but also in scorning to beat them. They said: "The body of the child reddens from the stroke, but the face of him who strikes reddens from shame."

The two chapters on "Mutual Aid in the Medieval City" treat the guild as the chief manifestation of the principle during this period. A picture is presented, in some detail of the struggle of the free cities against the increasing encroachments of the centralizing states. The medieval cities are finally defeated, the guilds destroyed, but the indestructible principle of mutual aid takes on new forms and accommodates itself to new conditions.

This brings us to the closing chapters on "Mutual Aid Among Ourselves." The first of these two chapters is devoted almost entirely to the mutual aid habits and institutions which still survive in the present day villages of Russia, Switzerland, France and Germany. The last chapter takes up really modern instances of the principle, the first and most important are the Labor unions and their strikes, Co-operative societies, Life-boat associations, Charitable organizations.

The illustration of this principle which is cited first after the Labor union is the Socialist movement. Kropotkin presents his conception of the Socialist movement as a manifestation of mutual aid in existing society in the following eloquent passage:

"Every experienced politician knows that all great political movements were fought upon large and often distant issues, and that those of them were the strongest which provoked most disinterested enthusiasm. All great historical movements have had this character, and for our own generation Socialism stands in that case. 'Paid agitators,' is, no doubt, the favorite refrain of those who know nothing about it. The truth however, is that—to speak only of what I know personally—if I had kept a diary for the last twenty-four years, the reader of such a diary would have had the word 'heroism' constantly on his lips. But the men I would have spoken of were not heroes; they were average men, inspired by a grand idea. Every Socialist newspaper—and there are hundreds of them in Europe alone—has the same history of years of sacrifice without any hope of reward, and, in the overwhelming majority of cases, even without any personal ambition. I have seen families living without knowing what would be their food tomorrow, the husband boycotted all round in his little town for his part in the paper, and the wife supporting the family by sewing, and such a situation lasting for years, until the family would retire, without a word of reproach, simply saying: 'Continue; we can hold out no more!' I have seen men, dying from consumption, and knowing it, and yet knocking about in snow and fog to prepare meetings within a few weeks from death, and only then retiring to the hospital with the words: 'Now friends I am done; the doctors say I have but a few weeks to live. Tell the comrades I shall be happy if they come to see me.' I have seen facts that would be described as 'idealization' if I told them in this place; and the very names of these men, hardly known outside a narrow circle of friends, will soon be forgotten when the friends too have passed away. In fact, I don't know myself which most to admire, the unbounded devotion of these few or the sum total of petty acts of devotion of the great number. Every quire of a penny paper sold, every meeting, every hundred votes which are won at a Socialist election, represent an amount of energy and sacrifices of which no outsider has the faintest idea. And what is now done by Socialists has been done by every popular and advanced party, political and religious, in the past. All past progress has been promoted by like men and by a like devotion."

A REPLY TO HAECKEL.

The revolt against "authority" has been carried to ridiculous extremes. The Manchester school individualist, Herbert Spencer, and the metaphysical egoist, Max Stirner, would alike agree to the reduction of all authority to the smallest possible residue. The most reckless of their disciples, having shut out from their thoughts all communication with the world of reality, would make it impossible for six men to pull effectively on a rope because five of them would be obliged to recognize the authority of the sixth, when he, at the proper moment, should call "Heave, ho."

To thinkers of this order, music would be impossible. Who could imagine a radical individualist bowing to a waved stick and recognizing the highly centralized authority of the "leader." The music of the logical, authority-repudiating individualist, would be the haphazard beating of the tom-tom of the East Indian, and not the highly regulated strains of a modern orchestra.

This folly is equalled, if not out-done, by those who refuse to recognize authority in science and thought. When a man claims to have a new and fundamental discovery in astronomy, and at the same time speaks slightingly of the researches of physicists such as Newton, Kant, and Laplace, it is fairly safe to conclude that you are listening to a fool who has nothing to say worthy of a second thought. Not until one has trodden every rung of the ladder which has been previously trodden, is he able to mount a step higher. And it is the performance of this task, wholly, or at least in the first part, that constitutes the one so doing an "authority."

How often does one hear an addle-brained, know-nothing say: "I recognize no authority; I think for myself." How shall one think without ideas? And how is it possible to obtain ideas apart from the acquisition of

knowledge? And where can knowledge be obtained except from those who have it?

All "authority" in science and thought is founded on knowledge of the subject in question. Socialists quote Karl Marx as an authority on political economy, because his writings prove that he knew more about the production and distribution of wealth than any man of his century. Lavoisier is an authority in chemistry, because he know more about the composition of substances than any three of his contemporaries.

But much confusion has been wrought, by men of undisputed authority in their own field, pronouncing positive verdicts in departments where their opinions had no value. What a great composer has to say about the value of a certain note must be respectfully considered as being of importance, but, unless he has studied geology, his opinions on the probable origin or age of the Rocky Mountains will have no more value, and may have less than those of the policeman on the nearest corner.

An excellent example of the confusion which may arise in this way, was given to the world in 1877, at the Congress of Naturalists held at Munich in September of that year. At that time the naturalists of Europe were divided into two opposing camps, one accepting and the other rejecting the Darwinian theory of "natural selection." The leaders of both divisions were Germans, though a preponderance of the Germans favored Darwin, whilst the French, still under the influence of, or agreeing with, Flourens, although he had been dead a decade, were almost unanimously opposed.

The honors of leading the fight for Darwinism, at the Munich Congress, fell to Haeckel, and on the 18th of September he threw down the gage in a brilliant address in which he defended the ideas of the great Englishman. Haeckel also advocated the teaching of evolution in the schools. The battle raged back and forth between the two armies, until Virchow, the great pathologist, dropped a bombshell in the Congress by boldly asserting: "Darwinism leads directly to Socialism."

Here biological arguments ceased. The only thing in order was to clear the skirts of Darwinism of the terrible charge of being socialistic. Of course this task fell to Haeckel, and he was loyally assisted by Oscar Schmidt.

Writing in "Ausland" two months later Schmidt said: "If the Socialists were prudent they would do their utmost to kill by silent neglect, the theory of descent, for that theory most emphatically proclaims that the Socialist ideas are impracticable."

Haeckel replied to Virchow at some length, and as that reply is rather difficult to obtain I will give it here in full as quoted by Ferri, and translated by Robert Rives La Monte:

"As a matter of fact, there is no scientific doctrine which proclaims more openly than the theory of descent, that the equality of individuals, toward which Socialism tends, is an impossibility, that this chimerical equality is in absolute contradiction with the necessary and, in fact, universal inequality of individuals.

"Socialism demands for all citizens equal rights, equal duties, equal possessions and equal enjoyments; the theory of descent establishes, on the contrary, that the realization of these hopes is purely and simply impossible; that in human societies, as in animal societies, neither the rights, nor the duties, nor the possessions, nor the enjoyments of all the members of a society are or ever can be equal.

"The great law of variation teaches—both in the general theory of evolution and in the smaller field of biology where it becomes the theory of descent—that the variety of phenomena flows from an original unity, the diversity of functions from a primitive identity, and the complexity of organization from a primordial simplicity. The conditions of existence for all individuals are, from their very birth, unequal. There must also be taken into consideration the inherited qualities and the innate tendencies, which also vary more or less widely. In view of all this, how can the work and the reward be equal for all?

"The more highly the social life is developed, the more important becomes the great principle of the division of labor, the more requisite it becomes for the stable existence of the state as a whole that its members should distribute among themselves the multifarious tasks of life, each performing a single function; and as the labor which must be performed by the individuals, as well as the expenditure of strength, talent, money, etc., which it necessitates, differs more and more, it is natural that the remuneration of this labor must also vary widely. These are facts so simple

and so obvious that it seems to me every intelligent and enlightened statesman ought to be an advocate of the theory of descent and the general doctrine of evolution as the best antidote for the absurd equalitarian, utopian notions of the Socialists.

"And it was Darwinism, the theory of selection, that Virchow, in his denunciation, had in mind, rather than the mere metamorphic development, the theory of descent, with which it is always confused! Darwinism is anything rather than socialistic.

"If one wishes to attribute a political tendency to this English theory—which is quite permissible—this tendency can be nothing but aristocratic; by no means can it be democratic, still less socialistic.

"The theory of selection teaches that in the life of mankind, as in that of plants and animals, it is always and everywhere a small and privileged minority alone which succeeds in living and developing itself; the immense majority, on the contrary suffer and succumb more or less prematurely. Countless are the seeds and eggs of every species of plants and animals, and the young individuals who issue from them. But the number of those who have the good fortune to reach fully developed maturity and to attain the goal of their existence is relatively insignificant.

"The cruel and pitiless 'struggle for existence' which rages everywhere through animated nature, and which in the nature of things must rage, this eternal and inexorable competition between all living beings is an undeniable fact. Only a small picked number of the strongest or fittest is able to come forth victoriously from this battle of competition. The great majority of their unfortunate competitors are inevitably destined to perish. It is well enough to deplore this tragic fatality, but one cannot deny or change it. 'Many are called, but few are chosen!'

"The selection, the 'election' of these 'elect' is by absolute necessity bound up with the rejection or destruction of the vast multitude of beings whom they survived. And so another learned Englishman has called the fundamental principle of Darwinism 'the survival of the fittest, the victory of the best.'

"At all events the principle of selection is not in the slightest degree democratic; it is, on the contrary, thoroughly aristocratic. If then,

Darwinism, carried out to its ultimate logical consequences, has, according to Virchow, for the statesman ‘an extraordinarily dangerous side’ the danger is doubtless that it favors aristocratic aspirations.”

And now let us turn to the closing pages of the second volume of Haeckel’s valuable work, “The History of Creation.” We shall find it interesting and instructive to observe the nature of the argument which he there uses with great effect against Virchow. Virchow had delivered his celebrated address at Berlin, which closed as follows: “It is absolutely certain that Man is not descended from apes.”

Haeckel takes this up, gives a resumé of the facts known to zoology on this point, and then winds up with the following: “In view of this state of affairs, we zoologists, recognized as authorities on the subject, may surely ask, How can many so-called anthropologists still maintain that there exists no sort of actual proofs of the ‘Derivation of Man from Apes’? How can Virchow, Ranke, and others, who are not zoologists, in the speeches they annually deliver at anthropological and other congresses, continue to declare that this ‘Pithecoid thesis’ is an empty hypothesis, an unproved assertion, and a mere dream of the philosophers of nature? How can these anthropologists still continue to ask for ‘certain proofs’ of this thesis when proofs with all the clearness that could be desired lie before them, and are unanimously recognized by all zoologists? As regards Virchow’s often quoted declarations against the Pithecoid thesis, they have obtained great favor in wide circles, only because of the high authority this famous naturalist enjoys in an entirely different domain of science. His ‘cellular pathology,’ his ingenious application of the cell-theory to the whole province of medicine, introduced a grand advance in that branch of science thirty years ago. This great and lasting service rendered by him has, however, no connection whatever with the unyielding and negative position which, unfortunately, Virchow persists in assuming towards the doctrine of evolution.”

It probably never occurred to Haeckel that the argument which he here uses to meet Virchow’s opposition to evolution, would serve quite as effectively as a reply to his own opposition to Socialism.

As regards Haeckel’s “often quoted declarations against” Socialism, “they have obtained great favor in wide circles, only because of the high

authority which this famous naturalist enjoys in an entirely different domain of science. His biogenetic principle, discovered in embryology, "introduced a grand advance in that science thirty years ago. This great and lasting service rendered by him has, however no connection whatever with the unyielding and negative position which, unfortunately," Haeckel "persists in assuming towards the doctrine of" Socialism.

Haeckel's complaint that Virchow could not judge the merits of evolution because he was not a zoologist, is well taken. But the Socialist has as good or better right to assert that Haeckel was incapable of estimating the relationship of Socialism to Darwinism, for he certainly knew a good deal less about Socialism than Virchow knew of zoology.

This is precisely the trouble with Haeckel's criticism of what he calls Socialism. Of the theories of Karl Marx and the modern scientific Socialists, he knew absolutely nothing. The Socialism he condemned had been abandoned by the Socialists themselves, nearly thirty years before his criticism was made.

"Absurd equalitarian notions," granted; but they were not even the sole property of the utopian Socialists. They borrowed them from the bourgeois revolutionists of 1789. It was they who boasted of the equality they would set up. That equality, which, as Engels says, only "materialized in bourgeois equality before the law."—"The equality before the law of all commodity-owners." It was this struggling bourgeoisie that adopted as its catch-words, "liberty, fraternity, equality," and applied them to a typical bourgeois use when they inscribed them above the entrances to French prisons.

A significant clause in the second sentence of Haeckel's criticism is, "in human societies as in animal societies," the duties, etc., of the members cannot be "equal." The only possible point this could have as a criticism of Socialism, would be its use to deny the possibility of abolishing social class divisions. There is nothing to show whether Haeckel intended it to have such a specific application, but as any other application it might have could be in no way opposed to the Socialist position, I need only show its failure in that regard.

"Bee" society may be said to have class divisions, and it must be conceded that these classes cannot be abolished by anything that could, by any stretch of the imagination, be called "bee socialism." But the reason for

this is not far to seek and, when found, it makes any argument by analogy, against Socialism, impossible. Bee workers are "physiologically" incapable of discharging any other function in bee society. They are females, incapable of maternity. As a result of this the queen bee is obliged to shoulder the whole burden of the reproduction of the species, and she is specialized in this direction to such an extent, that she could not possibly be a worker. The drone, as the male breeder, is in the same fix, and the popular notion that they are useless loafers, has its origin in the bee custom of applying the boot, or something worse, to all superfluous members of the drone class.

"A hive of bees," says Prof. Huxley, "is an organic polity, a society in which the part played by each member is determined by organic necessities. Queens, workers, and drones are, so to speak, castes divided from one another by marked physical barriers."

Says Ernest Untermann in his fine chapter on this question, in "Marxian Economics": "Every textbook on natural history describes the different orders. For instance, the societies of bees are 'monarchies', those of ants 'republics'. But in either case, biological variation determines the form of these societies. Queen bees, drones, and workers are of organically different structure and equipped with different specialized organs. The queen bee is equipped only for the duties of conception and the laying of eggs. The drone cannot perform any other function but that of fertilizing the queen. The worker alone has organs for gathering flower dust, honey, and manufacturing wax." Class divisions in bee society are therefore "biological" and not economic. But Haeckel's comparison ignores this vital distinction. Before this argument can be used against the Socialist advocacy of class abolition, it must be shown that a queen cannot wash clothes with starvation as an alternative, and that a pleb woman could not wear a coronet, should her father invest in a busted duke.

True there are other animal societies which have no such biological division. But these have no private property in the means of life, and therefore no classes. Pelicans and crows recognize only three grounds as justification for idleness—infancy, old age and sickness or accident.

A recent Socialist writer said: "Take two babies together—the worker's baby and the parasite's baby. There they are, both of them, out of the great

mystery. Examine their soft little bodies. Do you see spurs on the one and a saddle on the other? And yet, one is to grow up a profligate loafer, and the other a starved and beaten worker. One to rot at the top; the other to be stunted and oppressed at the bottom."

Of course these two babies would not be equal, either actually or potentially, but is that any reason why they should be given an unequal start? How are we to find out which is the best in any sense, if a multitude of opportunities open to the one are to be closed to the other?

And here Haeckel's implied parallel breaks down once more. In nature the strong and capable survive in the struggle for existence; nature gives something like a fair field and no favor. But in capitalist society, a puling son of a rich father is coddled to maturity, and reproduces others of his kind; while the lusty child of a worker is murdered by poisonous milk, or debarred from marriage by low wages.

In nature, "fittest" does not mean best in any moral sense, except indirectly, as that the practice of certain moral principles in animal societies may constitute, or add to, fitness. But in present society in a vast number of instances, fitness does not mean "best" even to the extent that such a word may be used in the natural world.

A real estate "shark" is a libel on the fish. An indispensable qualification in business is to have few scruples and be a first-class liar. Honesty and suicide are synonymous terms.

The statement that natural selection "favors aristocratic aspirations," involves the same fallacy. It assumes that aristocrats are on top because of fitness to be there. Recent revelations in Berlin indicate that the aristocrats of Haeckel's own country are "fittest" for the garbage can.

Haeckel's main position is that "the struggle for existence" in nature is a justification for "competition" in society. To begin with, Kropotkin has shown that Haeckel grossly misrepresents nature when he speaks of "the cruel, pitiless 'struggle for existence' which rages everywhere throughout animated nature" and "between all living beings." When this is used as a defense of present society, it is equal to saying that human society should seek its models among the lowest forms of organic life rather than the highest. Haeckel's position was taken by Spencer and received the

following clever reply from Prof. Ritchie: "The struggle among plants and the lower animals is mainly between members of the same species; and the individual competition between human beings, which is so much admired by Mr. Spencer, is of this primitive kind."

Kropotkin says: "If we ask nature 'who are the fittest, those who are continually at war with each other, or those who support one another?' we at once see that those animals which acquire habits of mutual aid are undoubtedly the fittest."

As to the desirability of that "pitiless struggle," Huxley pertinently says: "Of all the shapes which society has taken, that most nearly approaches perfection in which the war of the individual against the individual is most strictly limited."

Whatever may be the truth among the protozoa, we are safe in applying to society the statement of Ruskin: "Co-operation is always and everywhere the law of life; competition is always and everywhere the law of death."

Human society eventually reaches a point of development where nature's haphazard ways are interfered with, and man arranges means to an end. Professor Schiaparelli thought he saw canals on Mars, and inferred intelligent inhabitants. The difference in water-ways, between blind nature and a designing intelligence, is the difference between a rambling river and a straight canal.

Now human society has arrived at a stage where its consciousness of itself and the possibility of self-arrangement, becomes a factor. This is a tremendous step forward, and its future possibilities seem to be illimitable. Before this can be largely effective, however, it will be necessary to thoroughly understand all fundamental social laws.

We had no rod to rule the lightning until we knew the laws of its movement. There will be no real airship until we master the laws of aerial flight. Socialism solves the social problem, not because it has, but because it is, an explanation of the laws of social development in general, and of existing society in particular. On these laws our faith is founded. By consciously arranging the social institutions which so profoundly affect our lives, in harmony with these laws, we shall cease to be the slaves of a blind necessity.

As Engels has well said: “Man’s social organization, hitherto confronting him as a necessity imposed by Nature and history, now becomes the result of his own free action. The extraneous objective forces, that have hitherto governed history, pass under the control of man himself. Only from that time will man himself more and more consciously, make his own history—only from that time will the social causes set in motion by him have, in the main and in a constantly growing measure, the results intended by him. It is the ascent of man from the kingdom of necessity to the kingdom of freedom.”

SPENCER'S "SOCIAL ORGANISM."

The crowning generalization of modern thought is that which presents the Universe as a unity, inter-related in all its parts. By it, the defenders of dualism are discredited, and their theological, metaphysical philosophy is thrown aside. It is no longer God and Man, nor even Man and God, but Man only, with God an anthropomorphic shadow, related to man not as his creator, but as created by him. God and Man are not "two," but in reality "one."

Modern science has reversed the order of their appearance, and also the order of their dependence. That which seemed to our primitive ancestors a living reality, a separate and independent being, proves, when submitted to the tests of anthropology and psychology, to have been a creature of their own dreams.

And thus, as a result of scientific research into the origin of dualism and the nature of dreams, as Professor Clifford says: "The dim and shadowy outline of the superhuman deity fades slowly from before us; and as the mist of his presence floats aside, we perceive with greater and greater clearness, the shape of a yet grander and nobler figure—the figure of him who made all Gods and shall unmake them. From the dim dawn of history, and from the inmost depths of every soul, the face of our father man looks out upon us, with the fire of eternal youth in his eyes, and says: 'Before Jehovah was, I am.'"

The thinker who would expand his intellectual wings in this monistic atmosphere, must possess not only a "discriminating" mind, but also, as Marcus Hitch suggests, a "unifying" mind. There are two errors he must avoid; the creation of distinctions that do not exist and the ignoring of distinctions that do.

The chief sinner against this first canon of dialectical thinking is our old friend the theologian. When the evolutionary naturalists demonstrated the hopeless untruth of his "revealed" legends about the origin of men and things, he sought refuge in the ingenious theory that these fables while scientifically indefensible were, notwithstanding, spiritually true. In short, scientific truth and spiritual truth were so distinct as to have no vital relations. These "artful dodgers" have relieved controversial literature of much of its wonted heaviness and contributed generally to the gaiety of the nations.

Socialists have always been among the first to enjoy these entertaining performances, and it seems like divine retribution when these same theological and "Reverend" persons tumble over into the Socialist camp and bring their obsolete methods of thinking with them.

They dub themselves "Christian" Socialists and proceed to show that "Socialism is a philosophy concerning the social and economic life of man, and not the religious at all." When Marx declared that political and legal and other social institutions and ideas were the result of economic conditions and class interests, religious institutions and ideas were, of course, exempt.

After a mental contortion like that, what is to prevent a reconciliation between the 17th century twaddle of the methodist pulpit and the materialist conception of history?

Those who break the second canon given, are not all theologians. Among those who ignore distinctions that do exist, the biological sociologist is entitled to conspicuous mention.

August Comte, who "attempted to make of sociology a sort of transcendental biology," had at least this excuse that he wrote his positivist philosophy before Darwin published his "Origin of Species" and, therefore, while biology was yet in long clothes and sociology was unborn. Although Comte is generally regarded as the founder of sociology, these limitations made it impossible to do little more than invent the name and foresee its possibility.

These excuses, however, can scarcely be invoked for Haeckel, who, as we have already seen, wholly ignored in his inferences, fundamental

differences between the division of labor in animal societies and that division in human societies. Haeckel's biological sociology conveniently overlooks the rather important fact that while a working bee can not by any possibility act as a drone, the working man has at least no physical disabilities to prevent him from doing anything that pertains to the role of a prince. Reasoning by analogy is always dangerous, especially when the analogy itself breaks down.

While it is well to keep these rules in mind, it must be conceded that their critical application is somewhat limited when we come to Spencer's famous analogy between animal organisms and human societies. The "synthetic" philosopher was much Haeckel's superior in sociology, and he possessed an immense fund of biological lore that was unavailable to Comte writing a quarter of a century earlier.

Thus Spencer seems to recognize that his essay on "The Social Organism" is largely an ingenious analogy, from which conclusions must be drawn with caution. Not that bourgeois scientists have always exhibited a very scientific temper in this regard. On the contrary they have, on every possible occasion, proclaimed that certain alleged truths in physics or biology were in irreconcilable contradiction to certain Socialist conclusions in sociology.

But we may find a key to Spencer's chariness in the matter of drawing conclusions in the rather surprising fact, which will appear presently, that the one legitimate conclusion which the analogy will thoroughly sustain, is an exact contradiction to all that Spencer had ever proclaimed on social questions.

The essay itself, like a great deal of Spencer's writing, is prolix and wearisome, so we shall select only his most important and striking comparisons.

The introduction is excellent and has for its text Sir James Mackintosh's great saying—great in his non-evolutionary age though very common-place today—"Constitutions are not made, but grow." He then declares "the central idea of Plato's model republic" to be "the correspondence between the parts of a society and the faculties of the human mind."

Hobbes, the philosopher of Malmesbury, comes next with his celebrated "Leviathan." Hobbes sought to establish a still more definite parallelism; not, however between a society and the mind, but between a society and the human body. Hobbes' "Leviathan" was the Commonwealth and he "carries this comparison so far as to actually give a drawing of the Leviathan—a vast human-shaped figure, whose body and limbs are made up of multitudes of men."

Spencer criticizes these analogies of Plato and Hobbes in detail, but finds the chief error of both writers to consist in the assumption by both "that the organization of a society is comparable, not simply to the organization of a living body in general, but to the organization of a human body in particular. There is no warrant whatever for assuming this. It is in no way implied by the evidence; and is simply one of those fancies which we commonly find mixed up with the truths of early speculation." But, insists Spencer: "The untenableness of the particular parallelisms above instanced, is no ground for denying an essential parallelism; since early ideas are usually but vague adumbrations of the truth."

Lacking the great generalizations of biology, it was, as we have said, "impossible to trace out the real relations of special organizations to organizations of another order." Therefore he proposes "to show what are the analogies which modern science discloses."

Spencer then discovers four points in which an individual organism and a society agree, and four in which they differ. The points of agreement are:

(1.) "That commencing as small aggregations, they insensibly augment in mass; some of them eventually reaching ten thousand times what they originally were."

(2.) "That while at first so simple in structure as to be considered structureless, they assume in the course of their growth a continually increasing complexity of structure."

(3.) "That though in their early, undeveloped states, there exists in them scarcely any mutual dependence of parts, their parts gradually acquire a mutual dependence; which becomes at last so great, that the activity and life of each part is made possible only by the activity and life of the rest."

(4.) "That the life of a society is independent of, and far more prolonged than the lives of any of its component units; who are severally born, grow, work, reproduce, and die, while the body politic composed of them survives generation after generation, increasing in mass, in completeness of structure, and in functional activity."

The four points of difference are:

(1.) "That societies have no specific external forms."

(2.) "That though the living tissue whereof an individual organism consists, forms a continuous mass, the living elements of a society do not form a continuous mass; but are more or less widely dispersed over some portion of the earth's surface."

(3.) "That while the ultimate living elements of an individual organism are mostly fixed in their relative positions, those of the social organism are capable of moving from place to place."

(4.) "The last and perhaps the most important distinction is, that while in the body of an animal only a special tissue is endowed with feeling, in a society all the members are endowed with feeling."

It is worthy of note that, while Spencer finds the parallelisms to increase in significance the more they are examined, the differences tend to break down when they are worked out in detail.

The advantage which Spencer had over Plato and Hobbes is very clearly seen in the first and fourth parallelisms, neither of which could have been made until twenty-one years before, when in 1839, Theodore Schwann developed his great theory that the body is an organized society of interconnected cells. "The importance of this theory," says Professor Thatcher, "can hardly be estimated. It gave an entirely new view to animal and vegetable life." At any rate, it served Spencer greatly in this essay.

The next ten pages are devoted to organic development from the protozoa, the lowest tiny animal forms, to crustacea—crabs etc.,—which are materially higher in the animal scale. This development is marked by increasing mutual dependence of parts and a growing division of labor. It is compared to the development of society from primitive Bushmen to the early Anglo-Saxons, during which corresponding phenomena are traced.

He escapes Haeckel's blunder at least to the extent of calling the two divisions of labor by their proper names. Among animals it is the "physiological" division of labor; in society, the "economical" division of labor. Whether he would have been able to still perceive that distinction in dealing with those ant and bee communities where Haeckel got lost, there is nothing to show.

Spencer's middle-class predilections come out strongly, and a very pretty physiological justification is provided for that wholly admirable section of the community.

The first step in the development of an embryo is its division into two main layers of cells—the mucous layer and the serous layer. The mucous layer, that fine inside skin of the body so to speak, absorbs nutriment. But that nutriment must be transferred to the serous layer which builds up the nerves and muscles. Presently there arises between these two a third—the vascular layer. Out of this third layer the chief blood vessels are developed and these vessels serve to transport the nutriment from the inner or mucous layer, which gathers it, to the outer or serous layer, which uses it for the whole organization's upbuilding.

"Well," says Spencer, "may we not trace a parallel step in social progress? Between the governing and the governed, there at first exists no intermediate class; and even in some societies that have reached considerable size, there are scarcely any but the nobles and their kindred on the one hand, and their serfs on the other; the social structure being such that transfer of commodities takes place directly from slaves to their masters. But in societies of a higher type, there grows up, between these two primitive classes, another—the trading or middle class. Equally at first as now, we may see that, speaking generally, this middle class is the analogue of the middle layer in the embryo."

It is a pity to disturb this serene complacency, by pointing out that the real transporters of commodities are not the members of the middle class who, as a rule, do little and live well, but that section of the working class which mans freight trains, drives teams and shoves trucks. As for that "higher" class of cells which receives these commodities and consumes them while usefully engaged in building up the nervous and muscular system; such comparison could only apply to society's brain workers, and it

contains no justification for the useless parasitic type represented by such charming persons as Harry Thaw and Reggie Vanderbilt.

Another very interesting point is Spencer's physiological vindication of profit. The limbs, glands, or other members of an animal are developed by exercise. But in order "that any organ in a living being may grow by exercise, there needs to be a due supply of blood." All action implies waste; blood brings the materials for repair; and before there can be growth, the quantity of blood supplied must be more than is requisite for repair.

"In a society it is the same. If to some district which elaborates for the community particular commodities—say the woolens of Yorkshire—there comes an augmented demand; and if in fulfillment of this demand, a certain expenditure and wear and tear of the manufacturing organization are incurred; and if, in payment for the extra quantity of woolens sent away there comes back only such quantity of commodities as replaces the expenditure, and makes good the waste of life and machinery; there can clearly be no growth. That there may be growth, the commodities obtained in return must be more than sufficient for these ends; and just in proportion as the surplus is great will the growth be rapid. Whence it is manifest that what in commercial affairs we call profit, answers to the excess of nutrition over waste in a living body."

This is "physiological" political economy with a vengeance and shows to what straits bourgeois apologists are reduced to find a justification of that exploitation of labor which is the only source of profit. In concluding this point Spencer seems to satirize his own position and at the same time gives something that looks very much like a socialist explanation of panics. He says: "And if in the body politic some part has been stimulated into great productivity, and afterwards can not get paid for all its produce, certain of its members become bankrupt, and it decreases in size."

The truth of the whole matter is that Spencer is wholly at sea the moment he touches political economy, and in place of some elementary knowledge on that subject, we have the obsolete theories of the Manchester School proclaimed in the name of physiology.

Then follows a series of very ingenious comparisons. Following Liebig, he compares coins to blood corpuscles calling the later blood-discs to enhance the analogy and concludes: "throughout extensive divisions of

the lower animals, the blood contains no corpuscles; and in societies of low civilization, there is no money."

Then the development of blood vessels in lower animals is compared to the development of roads in primitive societies; their greater perfection in higher animals comparing with the railroads which more effectively convey food stuffs to the centers of population. Amid much that is fantastic and tedious, he says: "And in railways we also see, for the first time in the social organism, a system of double channels conveying currents in opposite directions as do the arteries and veins of a well-developed animal."

"We come at length," says Spencer, "to the nervous system." This is by far the most interesting item in Spencer's catalogue, because it is here that the evolutionary philosopher and the Manchester School politician come into open contradiction.

"We have now to compare the appliances by which a society as a whole, is regulated, with those by which the movements of an individual creature are regulated."

Beginning with the nervous systems of lower animals he discovers their inferiority to lie in the absence of a controlling center. The lower Annulosa is composed of a series of ring-like segments. Each ring has its own nerve ganglia linked by connecting nerves, but "very incompletely dependent on any general controlling power. Hence it results that when the body is cut in two, the hinder part continues to move forward under the propulsion of its numerous legs; and that when the chain of ganglia has been divided without severing the body, the hind limbs may be seen trying to propel the body in one direction, while the fore limbs are trying to propel it in another."

As we move up in the animal world the nervous system culminates in a centralized brain, and similarly as society becomes more complex, government appears.

And now the great apostle of the non-interference of government with the life of society is driven into the glaring contradiction of contending that the highest animal organization is that in which the brain, which he compares to government in society, interferes and controls most effectively.

"Strange as the assertion will be thought," he says, "our Houses of Parliament discharge, in the social economy, functions which are in sundry

respects comparable to those discharged by the cerebral masses in a vertebrate animal." Strange indeed! Especially to Mr. Spencer's disciples.

Then Mr. Spencer discovers that the kind of brain activity displayed by the highest animals best compares with that form of government called "representative."

He says: "It is the nature of those great and latest-developed ganglia which distinguish the higher animals, to interpret and combine the multiplied and varied impressions conveyed to them from all parts of the system, and to regulate the actions in such a way as duly to regard them all; so it is in the nature of those great and latest-developed legislative bodies which distinguish the most advanced societies, to interpret and combine the wishes of all classes and localities and to make laws in harmony with the general wants."

It would seem from this that, a society whose government represents only the interests of a handful of the community while the great majority are uncared for, is suffering from social paralysis.

Before we pass to the next chapter where we shall examine the position presented in "The Man Versus The State" we will observe one break in Spencer's analogy which he fails to notice.

When the brain of an animal is wrecked the animal dies; it has no choice. But when the brain of a society fails to represent the interests of the mass of the people who compose that society, or when the social brain runs amuck and invites disaster, society may take its choice, it may elect to die or—it may get a new brain.

SPENCER'S INDIVIDUALISM.

Individualism is dead.

As a theory, it has gone with Stahl's "Phlogiston," Cuvier's "Cataclysms," and Goethe's "Theory of Colors" to the museum of history. The revolution in philosophy, which covers the nineteenth century and reaches back into the closing decades of the eighteenth, has met and overthrown it at every point. Today it lingers in the world of thought a reminiscence of a prior stage of social development, as the imperfect remnant of the "third eyelid" remains in our bodies a surviving rudiment, a legacy that links us with our extinct ancestors of the silurian age.

The greatest name ever thrown into the scales for Individualism and against Socialism is that of Herbert Spencer. He has the reputation of having been the greatest Individualist of all times.

Many people, including Socialists, who are not familiar with the works of Spencer wonder how it comes to pass that the great evolutionary philosopher could defend a theory so obsolete and anti-evolutionary as Individualism. With this problem solved, Individualism is practically disposed of—at least, its greatest prop is gone.

All careful students of the works of the "Synthetic" philosopher, eventually recognize the dual personality of Mr. Spencer; the "Dr. Jekyll" of evolution, and the "Mr. Hyde" of Individualism.

The last chapter dealt mainly with the former; this chapter will treat chiefly of the latter.

Mr. Spencer's chief utterances against what he conceived to be Socialism and in favor of Individualism are to be found in a volume of four essays entitled, "The Man Versus the State." In this book Mr. Spencer

complains bitterly of the rapid extension of government interference in the England of his day. He declares these "Acts of Parliament" to be a greater and greater restriction of the individual rights of the citizen.

Here are a few of the Acts which Spencer denounced: An Act directing the Board of Trade to record the draught of sea-going vessels leaving port, and another to fix the number of life-boats and the life-saving appliances such vessels should carry. An Act making illegal a mine with a single shaft: The inspection of white lead works to compel the owners to provide overalls, respirators, baths, acidulated drinks, etc., for the workmen: Providing for the inspection of gas works: Making compulsory regulations for extinguishing fires in London; Taxing the locality for local drainage; That bake-houses should have a periodical lime washing, and a cleaning with soap and hot water at least once in six months; To secure decent lodgings for persons picking fruit and vegetables for public consumption; To provide free compulsory education and public schools; The Public Libraries Act; All the Factory Acts limiting child labor or enforcing the protection of dangerous machinery; The Preservation of Seabirds Act; The establishment of state telegraphy; Proposals to feed children; Government endowment of scientific research; etc.

All these measures, and many others of similar nature, excited the indignation of the greatest prophet of Individualism because, forsooth, they modified somebody's right to do as he pleased about something. Luckily for England, Mr. Spencer and a handful of his individualist disciples stood alone, while the electorate carried these laws through their highest tribunals.

One can imagine the "joy of living" in an individualist arcadia fashioned after Mr. Spencer's own heart. A working man would be able to take up the occupation of a sailor. He could embark on the rotten old tub of some greedy shipowner, insured for many times its value, loaded to the gunwales and sure to sink when it got out of sight of land to where the water was a little rougher than plate glass. Of course he would be living under a system of "voluntary co-operation" and "freedom of contract" and if he didn't wish to go to sea he could stay at home and—starve. There would be very little work in port unloading ships, as so many of them would never return to be unloaded. When the insurance money was paid the shipowner could give a banquet and hold forth on the individual right of the

sailor to get drowned in the interests of commerce without the government meddling about life boats and other expensive and nonsensical appliances.

If he preferred to work on "terra firma" he might get a job in a mine with only one shaft which in case of firedamp would be converted into a furnace. Then as there would be no way to get out, no socialistically inclined person would be able to dispute his individual right to stay in. If he preferred the white lead industry he might "get in" there, and there being no respirators, baths, or acidulated drinks he could be a physical wreck in a year and a corpse in two. Or he might try the gasworks and, there being no inspectors, there would be nothing to interfere with his individual right to be asphyxiated in an oven or roasted in a retort.

As wages would be small, unions not being individualist institutions, he might get a cheap room in the top of an hotel without fire escapes, in a town with no fire engines. He could live cheaply on bread from bakehouses that never knew lime washings and had not seen hot water or soap for over six months, and eat fruit and vegetables handled by people who were not troubled with decent, let alone sanitary, lodgings.

He would have the liberty to stay at manual labor as there would be no public schools or libraries to assist him to qualify for any profession such as, for instance, journalism. This would, no doubt, be a blessing in disguise, for if he became a writer, instead of following the brilliant example of Mr. Spencer, he might misuse his powers to the detriment of the race by advocating the limitation, or even the abolition, of child labor. If he married he might be at liberty to sew on his own buttons, his wife having left her fingers among the cogs of uncovered machinery.

Such would be the social heaven, operated on the principles of the "Manchester" school of politics, which mark the high-water of Individualism, and of which Herbert Spencer was the chief apostle.

Compare this attitude of mind with that of the Utopian Socialist, Robert Owen, over whom Spencer had the advantage of the lapse of a period of seventy years. In 1815 Owen convened a large number of cotton manufacturers at Glasgow, Scotland, to consider the state of the cotton trade which was then in great distress. To that conference he presented two proposals; one to help the masters, the other to benefit the workers. The first was that they should petition parliament for the repeal of the tariff on raw

cotton; the second that they should request parliament to shorten the working hours, and otherwise improve the conditions of workers in the mills. The first proposal carried unanimously, but the one on which Owen's heart was set, was not even seconded.

Knowing as he did the terrible condition of the English working class of that period, the callous brutality of these rapacious masters roused him to irony and defiance. He delivered an address to the conference which he had printed and spread broadcast in every corner of the country.

This is how the lion turned on the jackals:

"True indeed it is that the main pillar and prop of the political greatness and prosperity of our country is manufacture, which, as now carried on, is destructive of the health, morals, and social comfort of the mass of people engaged in it. It is only since the introduction of the cotton trade that children, at an age before they have acquired strength or mental instruction, have been forced into the cotton mills—those receptacles, in too many instances, for living, human skeletons, almost disrobed of intellect, where, as the business is often now conducted, they linger out a few years of miserable existence, acquiring every bad habit which they may disseminate throughout society. It is only since the introduction of this trade that children and even grown people were required to labor more than twelve hours in a day, not including the time allotted for meals. It is only since the introduction of this trade that the sole recreation of the laborer is to be found in the pothouse or ginshop, it is only since the introduction of this baneful trade that poverty, crime, and misery have made rapid and fearful strides throughout the community.

"Shall we then go unblushingly, and ask the legislators of our country to pass legislative acts to sanction and increase this trade—to sign the death warrants of the strength, morals, and happiness of our fellow-creatures, and not attempt to propose corrections for the evils which it creates? If such be your determination, I, for one, will not join in the application—no, I will, with all the faculties I possess, oppose every attempt made to extend the trade that, except in name, is more injurious to those employed in it than is the slavery of the poor negroes in the West Indies, for deeply as I am interested in the cotton manufacture, highly as I value the extended political power of my country, yet knowing as I do, from long experience both here

and in England, the miseries which this trade, as it is now conducted, inflicts on those to whom it gives employment, I do not hesitate to say: Perish the cotton trade, perish even the political superiority of our country, if it depends on the cotton trade, rather than that they shall be upheld by the sacrifice of everything valuable in life."

Compare these noble utterances of the great-souled utopian Socialist with the sneers at the most unfortunate element of the working class which disfigure the pages of "The Man Versus the State" and let the Individualist take whatever satisfaction he can get from the contrast.

But Spencer's reactionary views did not stop with opposition to every attempt to alleviate the condition of the wealth producers of his day.

As an individualist, he would tolerate no "government interference" with the rights of individuals who wished to shoot sea-birds which they could not get, but which usually flew out to sea, and died floating, with a broken wing. Why should these lofty minded people be interfered with? Were they not the prototypes of our own Roosevelt, who is always ready to manifest his love of nature by killing everything in sight?

What a pity these individualists were not allowed to have the British telegraph system managed by a gang of financial pirates like the owners of the "Western Union" and the "Postal" of this country.

State repression of knowledge having proved such a bad thing in the middle ages, state encouragement of learning must of course, needs be equally bad in the nineteenth century. "Government endowment of research," indeed! Not for the individualist champion. And yet England holds the world's honors in biology, because of Darwin, whose opportunity came through the government exploration of "The Beagle," and Huxley, who began his brilliant career with the government expedition of the "Rattlesnake." As England led the world in the middle of the century so France had held first place during its first quarter, and that because the French government sent out scientific expeditions to the tropics, which, on their return loaded down the shelves of the "Jardin des Plantes" with specimens which made possible those greatest of her thinkers, Lamarck, Cuvier and Geoffrey St. Hilaire.

When the feeding of school children is thrown as a charge against Socialism, we are proud to plead guilty. It is our glory that the only cities in the world that have no starving children behind school benches are those cities such as Lille, Ivry, Montlucon, etc., with a Socialist majority in the town councils, which removed the disgrace.

Such then were the arguments of this flag bearer of Individualism, who has supplied the opponents of Socialism with objections these thirty years. His individualist philosophy is now so thoroughly discredited as to call for no answer were it not for the fact pointed out by Huxley, that erroneous ideas do not die just simply because they have been killed.

It is not necessary to wheel into position the heavy artillery of Marx to overthrow this house of cards. Spencer is a sufficient reply to Spencer.

Here is the great contradiction. Spencer, the great biologist, says the brain is to the animal what the Government is to a society. (1) The more effectively and completely the brain controls the members composing the animal body, the higher its place in the organic scale. (2) The less effectively and completely the Government controls the members of the body politic the better will be the society.

Sociological literature has failed to produce any individualist champion able to reconcile this astonishing contradiction. And so there it stands plainly before the eyes of Mr. Spencer's readers.

"Suppose," says Professor Huxley, "that, in accordance with this view, each muscle were to maintain that the nervous system had no right to interfere with its contraction except to prevent it from hindering the contraction of another muscle; or each gland, that it had a right to secrete, so long as its secretion interfered with no other; suppose every separate cell were left free to follow its own "interest" and laissez-faire lord of all, what would come of the body physiological? The fact is that the sovereign power of the body thinks for the physiological organism, acts for it, and rules the individual components with a rod of iron. Even the blood corpuscles can't hold a public meeting without being accused of "congestion"—and the brain, like other despots whom we have known, calls out at once for the use of sharp steel against them."

This is the rock upon which Spencerian Individualism struck and went to pieces, independently of those great forces, which I shall point out, that made for its disintegration.

These two contradictory positions are the upper and nether millstones between which the individualistic philosophy of Anarchism is ground to powder. Socialists are not stupid enough to argue that because society can get along without a king therefore an orchestra should have "no head." We are also able to distinguish between "the state" which Socialism will abolish, and the "administration of industry" which it will establish.

Every step forward in modern thought has emphasized the importance of that factor called "environment." The evolution philosophy is an environment philosophy. Lamarck, the greatest pioneer of modern science, makes a change of environment the prime necessity of organic development. Darwin makes environment the selective factor in "Natural Selection" and in this he is supported by every living biologist of note. Karl Marx paralleled these great advances by discovering that every political philosophy takes its origin in some particular economic environment. This is true of Socialism and Individualism alike.

And so if we wish to understand the historic significance of Individualism we must go back to the period of its birth and examine the social processes of production of that day. This takes us back to the early years of the 19th century.

In the closing half of the 18th century, laborers individually owned the small and crude tools by which they made their living. In this stage of social development the laborer owning the tools he used, appropriated the result. There was here no contradiction and whatever notion of justice is supposed to inhere in the "individual ownership of the means of production" derives its whole force from the economic status of the worker of this period. If that status had remained unchanged, Socialism would never have been heard of. But in the process of evolution the truth and justice of the 18th century became a lie and a social wrong in the 19th.

This transformation was wrought by the development of machinery. It was impossible for every individual worker to own a large machine, and so some men became toolless wage laborers employed by the owners of machinery. This is the beginning of the present labor problem and here

arises the struggle in the world of ideas between the philosophy of Individualism and that of Socialism.

Let us examine the vital change which had taken place even before we reach the middle of the last century. Now, one man uses the tools, but another owns them and appropriates the result. And this is the economic foundation of the class war between the exploited wage worker and the exploiting capitalist.

But the individualist theories proper to the 18th century, and its mode of wealth production, passed over into the 19th where their economic justification had ceased. As the fortunate individual owners of machinery found themselves growing rich at a great rate apart from their own individual efforts, they became enthusiastic supporters of "Individualism" and eventually founded the "Manchester" school of politics, which had Herbert Spencer as its chief mouth-piece and Henry George as a somewhat belated trumpeter.

In this heyday of Individualism the "rate of profit" was at its highest, one Lancashire cotton spinner boasting of one thousand per cent. But the social hell in which the English working class of this period lived is without parallel in modern times. Its system of child labor, as recorded in the government blue books as well as already shown by Owen, was indescribably horrible, but the manufacturers were opposed to "government interference" and the individualist philosophy and its bogey of "paternalism" was their craven plea.

With the grouping of the workers in factories production became socialized, and now came this contradiction, production was social while ownership and appropriation were individual. The Socialists of that period rightly maintained that society should either go back in production to the individual form so as to be in harmony with the existing individual form of ownership and appropriation, or it should adopt social ownership and social appropriation to harmonize with the already existing social production.

But the wheel of history never revolves backward, and the latter solution is destined ultimately to prevail. Social evolution has already carried us far in that direction. With the organization of capital individual ownership disappeared and class ownership has taken its place. The struggle of the 20th century is not a struggle between individuals, it is a

struggle between classes, and so Individualism has lost its meaning—it is defunct.

With the disappearance of the economic foundation of Individualism, and the overthrow of the philosophic superstructure erected thereon, all its watchwords have lost their power to charm. Free trade, free labor, free contract, free competition; all these are the lingering and belated echoes of a day that is gone.

"Free trade" was the protest of the rising capitalist class against the trammels placed upon its commerce by the feudal regime. Now it appears in a new role; it is the cry of the small capitalist against those "predatory trusts" which discovered that competition is not the life but the death of trade, and are using protection to destroy their weaker fellow-robbers.

"Free labor" was the demand of the capitalist that the serf should be released from the soil in the country so that he might be available for exploitation in the factory, in the city. In England an attempt has been made to give this defunct phrase a new lease of life by the "Free Labor Association" an organization which had this in common with our "Citizen's Alliance" that it sought to encourage the dear good workingman to keep out of the "tyrannical" labor unions.

"Freedom of contract" or, as it is sometimes called "Voluntary Co-operation" never existed in capitalist society and has never been anything but a grim joke or a plain lie. Where is the freedom or voluntaryism of the worker who must work for what he can get or starve like a dog in the street?

The effects of "free Competition" in England in the early days of capitalism, where it was most free, were such that none but a fiend would wish them recalled. The "might have been" halo with which present day individualists seek to surround this principle, is a midsummer night's dream that never had any existence in the world of reality and can never be realized, except in the phantasmogoria of their own ideological imaginations.

Individualism in all its forms has become an anachronism. The deified ego of Max Stirner, which imagines itself sitting enthroned on the pinnacle of the universe, directing the motions of the planet Jupiter by crooking its little finger, is an ideological phantasm, which has no connection with the

solid earth. The flowery exhortations of Emerson, to live a noble life in ignoble surroundings, is an invitation to attempt what is, for the mass, impossible. Any philosophy which proposes to save the individual without transforming his social environment stands condemned by modern science.

If, with a society more highly organized than any known to history, we still have anarchy in the production and distribution of our wealth, the remedy is, not less social organization, but more. If with all our dental science toothache still exists, the cure is not fewer dentists, but more dentistry. The need of to-day is not less society, but more social organization. There is no hope in going back to the small production of sixty years ago as Hearst and Bryan desire. Increasing the number of bandits in any society is not the concern of their victims. The golden age of labor is not in the past but in the future. The labor problem cannot be solved by going back to the scramble of the hog-pen or the methods of the jungle. There is no succour in flying at each other's throats in the name of business.

Freedom cannot live in a society rent by class wars. Her conquests are only possible with a humanity united to subdue the cosmic world by which it is interprenetrated and surrounded.

Happily for us, society evolves independently of anybody's opinion. Our opinions follow blindly and gropingly in the rear. The opinions of individualists do not manufacture social laws, according to certain ethical requirements; they interpret and explain those laws which they discover in operation. The fundamental question is not, "is Individualism better than Socialism?" but "Is society moving in the direction of the one or the other?"

To answer this question it is only necessary to compare the world of to-day with that of ten or even five years ago. America moves steadily toward Socialism, while Europe advances in great leaps. Every civilized country tells the same story, and the recent development of Finland and Austria astonished the world.

Society moves forward, as irresistibly as the ocean tides, and it moves in a direction predicted by those greatest thinkers of this or any age—the men who linked their lives with the blood and the tears and the struggles of half a century in the greatest cause that ever throbbed in the brain of man—the cause of Socialism.

10

CIVILIZATION—WARD AND DIETZGEN

One of the darkest curses that has fallen on the working class is its being shut out of the wondrous world of modern thought. The great gates of the Temple of Science are clanged in its face, and its mind is fed on the theological garbage of the Middle Ages. In the school, the press, and especially the pulpit, ideas are gravely presented as serious truths, which are known by all university men to be thoroughly exploded lies.

A twentieth century newspaper will brazenly devote a whole page to presenting, with pictorial illustrations, alleged recently discovered proofs of the truth of that Genesis legend which has done such loyal service to the ruling class by stultifying the brains of its victims. These hypocritical displays are never publicly contradicted, although every man with the least smattering of scientific knowledge, including the editors, knows how utterly false they are. These worthies indulge in a sly grin and lower one eyelid, for it is generally understood among them that the great donkey—the working class—will only consent to carry everybody's burdens in addition to its own, just so long as it is kept in childish ignorance of everything it ought to know.

And this is not all. Now that a great body of workingmen are discarding these ancient lies, and groping for those great truths that contain the germs of their redemption, the official savants, true servants of the ruling class, twist and warp their own science in order to make it contradict every working class idea.

This attitude of the time serving intellectual lackeys of the professorial chairs has brought with it another blighting curse—it has made a considerable number of working men suspicious of modern science itself. It

is an old-time tragedy, this breaking with one's best friend because of the groundless calumnies of an interested enemy.

This terribly mistaken antagonism to science has unfortunately found its way, in some measure, into the Socialist movement, though happily, increasing acquaintance with Socialism's classic literature is breaking it down. In this connection the following passage from the pen of Isador Ladoff is very pertinent:

"Rationalistic modern Socialism is based, not exclusively on certain economic theories and maxims, as some narrow-minded 'Socialists pure and simple' think and would fain make us believe, but on the broad foundation of modern science and thought. The economic theories peculiar to modern Socialism are derived from the application of the results of the achievements of modern knowledge and philosophy to the field of social economics. The trouble with the 'Socialists pure and simple' is in the extreme limitation of their mental horizon. They happen to know, or rather imagine they have mastered Marxian economics, while modern science and philosophy remains to them a sealed letter. That is why they get irritated whenever and wherever they meet in the socialistic press an article containing something else than the everlasting parrot-like repetitions of pseudo-socialistic commonplaces and shibboleths. Every attempt to present to the attention of the readers of socialistic publications, glimpses of the radiant world of science and philosophy, leading up to socialistic ideas and ideals in all their world-redeeming significance, appears to the simpleminded and superstitious simon-pure Socialists as an attack on somebody or something, as a heresy and heterodoxy of some kind. To such people the religion of science is the religion of ignorance and vice versa, ignorance is their religion and science."

The use of science and philosophy by the ruling class as a pretence for the appropriation of the lion's share of the wealth produced by labor does not prove that workingmen should abandon philosophy as useless to their cause. On the contrary, as Dietzgen says: "Philosophy is a subject which closely concerns the working class," and he adds: "This, of course, does by no means imply that every workingman should try to become acquainted with philosophy and study the relation between the idea and matter. From the fact that we all eat bread does not follow that we must all understand milling and baking. But just as we need millers and bakers, so does the

working class stand in need of keen scholars who can follow up the tortuous ways of the false priests and lay bare the inanity of their tricks."

It is quite clear that working men, instead of underestimating the value of mental training, should remember what a terrible weapon it has proved in the hands of their enemies. It is precisely because the workers have lacked this weapon, that in spite of their overwhelming numbers and physical strength, they have always been outwitted. "The emancipation of the working classes," concludes Dietzgen, "requires that they should lay hold on the science of the century."

Lester F. Ward, whose theories we shall now examine, warns us against the erroneous supposition "formerly quite prevalent," that "science consists in the discovery of facts." He maintains that "there is not a single science of which this is true, and a much more nearly correct definition would be that science consists in reasoning about facts."

We may recall here that learned body which sneered at Darwin as "a mere theorizer" and conferred its honors upon an unknown man who had collected some facts about butterflies but had carefully avoided "reasoning about them." Of course the value of this reasoning is that it leads to the discovery of those laws or generalizations which reveal the relation of the facts to each other, and thus enables us to appreciate their real significance.

Therefore we might venture to push the matter a little further and define science as the discovery of laws. But for the uniformity and invariability of physical phenomena, astronomy would be impossible. The discovery of evolution laid the foundations of modern biology. Dalton's theory of atoms and Lavoisier's permanence of matter emancipated chemistry from the superstitions of alchemy.

Ward is therefore on solid ground when he maintains that "the indispensable foundation of all economic and social science" consists in the fact that "all human activities and all social phenomena are rigidly subject to natural law." It is just the difficulty of discerning uniform laws amidst the highly complex phenomena of society that delays the proper development of sociology, although, as we have seen, this difficulty is materially augmented by the class interests at stake.

Again, just as biology was hindered in its growth by the doctrine of special creations and, still earlier, Copernican astronomy was checked by the geocentric theory, so now the progress of sociology is restrained by the doctrine of divine providence. Believers in divine providence are well represented by the Hindoo who in his lesson on English composition spoke of his father as having "died according to the caprice of God which passeth all understanding."

It is precisely because "caprice" can not be understood and cannot therefore, be made the basis of prevision, that it can not be admitted into the domain of science. Science, as Starcke well said, is founded on "faith in the universality of causation." If the activities of men and the policies of nations are not ruled by cause and effect a science of society is impossible.

And yet, contends Ward, it was the very adoption of this "altogether sound abstract principle" that "led to the greatest and most fundamental of all economic errors, an error which has found its way into the heart of modern scientific philosophy, widely influencing public opinion, and offering a stubborn resistance to all efforts to dislodge it."

And now we come to the keynote of Ward's whole system and at the same time to the point where he completely breaks with the biological sociologists. The error, which Ward attributes to them all, the refutation of which is the main object of his work, is described as follows:

"This error consists in practically ignoring the existence of a rational faculty in man, which, while it does not render his actions any less subject to natural laws, so enormously complicates them that they can no longer be brought within the simple formulas that suffice in the calculus of mere animal motives. This element creeps stealthily in between the child and the adult, and all unnoticed puts the best laid schemes of economists and philosophers altogether aglee. A great psychic factor has been left out of the account, the intellectual or rational factor, and this factor is so stupendous that there is no room for astonishment in contemplating the magnitude of the error which its omission has caused."

This is the foundation stone of Ward's sociology. With great care he elaborates the vital difference between the economy of nature with its blind forces, and the economy of society with its mental arrangement of means to

ends. He marshals that well-known array of facts which prove the tremendous waste continually going on in the natural world.

According to M. Quatrefages, two successive generations of a single plant-louse would cover eight acres. A large chestnut tree in June contains as much as a ton of pollen. Considering the size of pollen-grain the number on such a tree would be next to inconceivable. Burst a puff-ball and there arises from it a cloud that fills the air for some distance around. This cloud consists of an almost infinite number of exceedingly minute spores, each of which should it by the rarest chance fall upon a favorable spot, is capable of reproducing the fungus to which it belongs.

And yet in spite of all this enormous reproductivity the population of these species remains practically stationary. Ward objects very strongly to this insane waste of nature being set up as a model for human society, and he is entitled to the sympathy of Socialists who have always protested against the planless anarchy of capitalist production, which however, bad as it is, can hardly be considered a circumstance compared with the random waste of nature.

"The waste of being," says Asa Gray, "is enormous, far beyond the common apprehension. Seeds, eggs, and other germs, are designed to be plants and animals, but not one of a thousand or a million achieves its destiny." And Gray quotes with approval from an article in the Westminster Review: "When we find that the sowing is a scattering at random, and that for one being provided for and living, ten thousand perish unprovided for, we must allow that the existing order would be considered the worst disorder in any human sphere of action."

Ward, of course, takes the same view: "No one will object to having nature's methods fully explained and exposed, and thoroughly taught as a great truth of science. It is only when it is held up as a model to be followed by man and all are forbidden to 'meddle' with its operations that it becomes necessary to protest. I shall endeavor still further to show that it is wholly at variance with anything that a rational being would ever conceive of, and that if a being supposed to be rational were to adopt it he would be looked upon as insane."

"Such," says Ward, "is nature's economy. How different the economy of a rational being! He prepares the ground, clearing it of its vegetable

competitors, then he carefully plants the seeds at the proper intervals so that they shall not crowd one another, and after they have sprouted he keeps off their enemies whether vegetable or animal, supplies water if needed, even supplies the lack of chemical constituents of the soil, if he knows what they are, and thus secures, as nearly as possible, the vigorous growth and fruition of every seed planted. This is the economy of mind."

And now Ward presents a truth that is very familiar to all Socialists—that the difference between an animal living in a state of nature and man living in human society, is that man is a tool using animal. This use and development of tools is due to that application of reason called the inventive faculty, which no other animal possesses. "The beaver indeed, builds dams by felling trees, but its tools are its teeth, and no further advantage is taken than that which results from the way the muscles are attached to its jaws. The warfare of animals is waged literally with tooth and nail, with horn and hoof, with claw and spur, with tusk and trunk, with fang and sting—always with organic, never with mechanical weapons."

And because man can invent tools and improve them he has an immense advantage over other animals. It is this advantage which the biological sociologists have overlooked. But this advantage makes an incalculable difference. The fundamental difference is, that "the environment transforms the animal, while man transforms the environment."

What, then, is civilization? It is human development beyond the animal stage. What it its chief factor? It is psychic—the application of "mind" to the problems of life.

Now we see still further how Ward is irresistibly driven, by the logic of his position, to Socialist conclusions. He sees that another striking difference between irrational nature and rational society is that nature is competitive, while society is increasingly co-operative. And this co-operation is due to the greater development of that psychic factor, which is the chief instrument of civilization and leads men to avoid waste.

Turning now to "Pure Sociology," we are told that the subject-matter of sociology is "human achievement." When we ask, in what does this achievement consist, we are informed that: "Achievement does not consist

in wealth. Wealth is fleeting and ephemeral. Achievement is permanent and eternal."

Again the sum total of the things which constitute achievement may be summed up in the one word "inventions."

Achievement with Ward is another name for civilization. Page after page is given to an enumeration of its particulars,—music, painting, poetry, exploration, industry and many other things which we have not space even to mention. The one thing that is vital here is that "achievement," while it does not include perishable wealth, nor yet the actual, perishable machinery by which the wealth has been produced, does nevertheless undoubtedly include that something described by Socialists as the "process of production."

This is of prime importance because now when we turn to Ward's "Applied Sociology," we find that not only achievement, but "improvement" is the theme of that branch of the science.

And now listen to this great American sociologist, who has so far outstripped all his contemporaries as to be practically without a rival, this thinker whose monumental works have gained him an international reputation; listen and compare what follows with the hocus-pocus that usually comes from the official chairs:

"The purpose of applied sociology is to harmonize achievement with improvement. If all this achievement which constitutes civilization has really been wrought without producing any improvement in the condition of the human race, it is time that the reason for this was investigated. Applied sociology includes among its main purposes the investigation of this question. The difficulty lies in the fact that achievement is not socialized. The problem, therefore, is that of the socialization of achievement.

"We are told that no scheme for the equalization of men can succeed; that at first it was physical strength that determined the inequalities; that this at length gave way to the power of cunning, and that still later it became intelligence in general that determined the place of individuals in society. This last, it is maintained is now, in the long run, in the most civilized races and the most enlightened communities, the true reason why some occupy lower and others higher positions in the natural strata of

society. This, it is said, is the natural state and is as it should be. It is moreover affirmed that being natural there is no possibility of altering it.

"Of course all this falls to the ground on the least analysis. For example, starting from the standpoint of achievement, it would naturally be held that there would be great injustice in robbing those who by their superior wisdom had achieved the great results upon which civilization rests and distributing the natural rewards among inferior persons who had achieved nothing. All would assent to this. And yet this is in fact practically what has been done. The whole history of the world shows that those who have achieved have received no reward. The rewards for their achievement have fallen to persons who have achieved nothing. They have simply for the most part profited by some accident of position in a complex, badly organized society, whereby they have been permitted to claim and appropriate the fruits of the achievements of others. But no one would insist that these fruits should all go to those who had made them possible. The fruits of achievement are incalculable in amount and endure forever. Their authors are few in number and soon pass away. They would be the last to claim an undue share. They work for all mankind and for all time, and all they ask is that all mankind shall forever benefit by their work."

And so Ward's conclusion is that the greatness of the present consists in that mass of achievements called civilization, among which are those inventions which have so wonderfully increased the capacity of social labor in its production of wealth. And the hope of the future lies in the socialization of those achievements so as to make their rich fruits the common heritage of all mankind. There are no Socialists who will quarrel with these conclusions.

We will now briefly compare this position with that of the great German thinker, Joseph Dietzgen, who at the international congress at The Hague, in 1872, was introduced by Karl Marx to the assembled delegates with these words: "Here is our philosopher." Of course we shall only deal with his theories here as they relate to the conclusions reached by Ward.

"All exertion and struggle in human history" says Dietzgen, "all aspirations and researches of science find their common aim in the freedom of man, in the subjection of nature to the sway of his mind."

This is, as we have seen, precisely Ward's idea of what constitutes the substance of civilization.

"Man, to be sure," says Dietzgen, "is still dependent on nature. Her tribulations are not yet all overcome. Culture has yet a good deal to do; aye, its work is endless. But we have so far mastered the dragon, that we finally succeeded in forging the weapon with which it can be subdued; we know the way to tame the beast into a useful domestic animal."

What is this "weapon" which humanity has forged and which constitutes the possibility of its salvation? "This salvation," says Dietzgen, "was neither invented nor revealed, it has grown of the accumulated labor of history. It consists in the wealth of to-day which arose glorious and dazzling in the light of science, out of human flesh and blood, to save humanity. This wealth in all its palpable reality, is the solid foundation of the hope of social-democracy."

And here lest there should seem to be a plain contradiction between Dietzgen and Ward, we will go further and see that Dietzgen, like Ward, does not mean merely those items of wealth which happen to be in existence in the shape of tangible commodities.

"The wealth of to-day does not consist in the superb mansions, inhabited by the privileged of society, nor does it consist in their costly apparel, or in the gold and precious stones of their jewelry, or in the heaps of goods peeping through the show windows of our great cities. All that as well as the coin and bullion in the trunks and safes form but an appendix or, so to speak, the tassels and tufts, behind which is concealed that great and real wealth—the rock on which our hope is built.

"What authorizes the people to believe in the salvation from long ages of torture—nay, not only to believe in, but to see it, and actively strive for, is the fairy-like productive power, the prodigious fertility of human labor. In the secrets which have been wrung from nature; in the magic formulas by which we force her to do our wishes and to yield her bounties almost without any painful work on our part; in the constantly increasing improvement of the methods of production—in this I say consists the wealth which can accomplish what no redeemer ever could."

And Dietzgen, like Ward, protests against this great legacy of history, this vast accumulation of the results of the combined social labor of a hundred generations, being the sole property of those "who never achieved anything!"

Dietzgen, like Ward, sees that the great problem which confronts the race is to break down those intolerable bars which prevent humanity from entering into its just inheritance.

To this great and culminating task man must bend all the powers of his mind. Now he has reached the point where the gates of liberty begin to yield and with one grand, united effort may be thrown wide open so that all the sons and daughters of men may finish the long centuries of misery and freely enter in.

To continue this senseless oppression longer would be the summit of stupidity.

"Consider the frugal needs of our people and at the same time the fertility of labor, and ask yourselves if mere instinct alone would not be sufficient to teach us how to supply adequately our needs with the help of the existing means of production?"

To make these "means of production the property of society" is then the problem of Ward's applied sociology and Dietzgen's social democracy alike. According to both, this emancipation of the mass of the people from the last form of slavery is the one consuming task of civilization.

And the psychic factor, the consciously reasoning brain of man is, according to both, to be more than ever the instrument of "achievement."

To Dietzgen especially, the time is rotten-ripe for the great change.

"The salvation of humanity is involved in this question. It is so great and sublime that all other problems which time may bear in its folds must wait in silence. The whole of old Europe is waiting with bated breath the fulfilling of the things which are coming.

"Oh, ye short-sighted and narrow-minded, who can not give up the fad of moderate, slow, organic progress! Do you not perceive that all your great liberal passions sink to the level of mere trifling, because the great question of social salvation is on the order of the day? The calm precedes the tempest. History stands still, because she gathers force for a great catastrophe."