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**EVOLUTION AND CHRISTIANITY**

**A Thesis**

**Presented to the Faculty of  
the Department of Philosophy of Religion  
of Asbury Theological Seminary**

**In Partial Fulfillment  
of the Requirements for the Degree of  
Bachelor of Divinity**

**by**

**Henry Howe Howell**

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## CHAPTER I

### THE PROBLEM STATED AND DEFINITIONS OF TERMS USED

Biological evolution, from the time it began to receive serious consideration by scientists of the eighteenth century until the present day, has been a problem to the theologian and to the church layman. Since evolution and the Bible both deal with the problem of origins, the Christian has been torn between two voices--the voice of science and the voice of revelation. Many great men have maintained that there is no conflict between science and religion, and that when rightly understood the one should supplement the other. Also it has been pointed out repeatedly that religion treats of the moral nature of man and that science is entirely amoral. Likewise, scientists and theologians have both declared that the Bible is no text book of science, and should not be considered as such. In the light of all these declarations the thinking Christian still cannot help raising questions. He knows that if they are true declarations, evolution should then, within the Church, stand or fall on its own merit.

#### I. THE PROBLEM

Evolution and the Church. Historic Christianity posits God as the Creator and Sustainer of all life, this doctrine being based on the Biblical record. Biological evolution, in general, teaches that man and all living organisms are the products of a gradually unfolding process which started in the geologic past by the creation or

spontaneous generation of some single-celled organism which possessed the potentiality of evolving upwards. Man's mind and religious or moral nature are a part of the evolutionary process. The Bible is primarily a record of the development of man's religious and moral nature.

The thinking Christian thus sees within the Church two conflicting schools of thought, the one considering the Bible as the revealed word of God, and the other considering it as a record of man's growing conception of God. The question is asked: are the two views mutually exclusive, or can they be harmonized? There could be some truth in both points of view.

The contemporary Christian also knows that the Church in ages past adapted a too literalistic interpretation of the Scriptures. At one time she maintained that the earth was flat; in another instance she insisted that the earth was the center of the universe and that the Copernican theory could not be true. Yet when factual verification of these theories was presented, there was a reluctant but rather speedy acceptance of the truths. The Christian then wonders why a great branch of the Church today still questions the validity of the theory of evolution when so many distinguished scientists believe it to be a fact. Is this just another instance of the backwardness on the part of a group within the Church? It seems logical that after one hundred years of fact finding, every branch of the Church would have been forced to accept the truths of evolution; yet why do evangelical Christians in general continue to reject it as a fact? If evangelical

Christianity continues to reject arbitrarily new truths she cannot long endure. History clearly teaches that truth ultimately triumphs, and that those who cling to the false pass off the scene. But the thinking Christian, if he reads the times aright, is aware of an increasing interest in evangelical Christianity. The emphasis has shifted to Neo-orthodoxy, and it may shift further towards the orthodoxy of the evangelicals. The sinfulness of man, the sovereignty of God, and the authority of His Word are receiving a fresh emphasis. The Ecumenical movement and the Inter-seminary movement are seeking to hear again the voice of evangelical Christianity.

The thinking Christian also notes that the unrest within the Church is paralleled by a spirit of uncertainty among the leading scientists of the day. Science seems to be less sure that fixed natural laws can explain all the phenomena of the physical world. They are admitting that there are certain barriers beyond which the mind of man cannot probe.

Statement of the problem. Therefore, the Christian concludes that he is living in a period of history where there is much confusion among men. He is inclined to agree with the victorious generals of World War II that the hope of the world rests with the Church; but his problem is, in what brand of Christianity does the hope of the world rest. This problem he feels he must study and decide for himself. He knows that liberalism was an outgrowth of evolutionary teachings as applied to religion, and he knows that orthodoxy still favors



creationism and is prone to reject evolution; therefore, it was the purpose of this study to see what attitude the thinking Christian should take towards the question of evolution. Specifically, should the Christian (1) accept it as a fact; (2) assume a compromising position; (3) reject it in its entirety; or, (4) take an agnostic attitude towards it?

## II. DEFINITIONS OF TERMS USED

Biological evolution. The definitions of evolution are many and varied. This in itself bespeaks of uncertainty on the part of scientists with regards to evolution. The greatest differences in definitions arise from the various interpretations explaining how evolution operates. The majority of biologists today have come to accept evolution as a fact. The fact which is accepted is that all of the present animal and plant species on earth have evolved from lower forms of life. Evolution then means general progress along lines of increased specialization. In the beginning there were single-celled organisms; these in turn gave rise to metazoan organisms of a primitive type, which in turn gave rise to more complex organisms. The most highly specialized of all animals is man.

Fixism or creationism. Opposing the view of evolutionary origins is that of fixism or creationism. Fixism is the belief that the Creator made each species of animals on earth, and gave to it the power to bring forth fruit after its kind--lions always bringing forth

lions, and sheep, sheep.

Liberalism or liberal Christianity. Liberal Christianity is that branch of Christianity which treats the Bible as any other book of history. The method of studying any historical book should be that of "rational empiricism." The recorded events which pass this test are to be considered as authoritative. The life of Jesus, and other Biblical characters, must therefore be considered scientifically, as should the lives of all other religious leaders. Since the supernatural has no empirical reality, it cannot be considered as historical; but it may be considered as suprahistorical. The voice of science is authoritative regarding all natural phenomena. God is still giving guidance to Biblical scholars as to what elements of the record are out of place or are to be abandoned.

Orthodoxy or orthodox Christianity. Orthodox Christianity is that branch of Christianity which feels that the Bible cannot be treated as any other book of history. It is a unique book which centers about a unique personality, Jesus Christ. Because of His personality the whole of the biblical record becomes credible. Every jot and tittle of the extant versions is not inspired; rather, the Bible is considered as the inspired Word of God which unfolds the divine redemptive plan. The ultimate will of the Father is revealed by His Son, Jesus Christ, the God-man, who was a historical character whom men worshiped before His death and after His resurrection. Faith in Him as Lord and Saviour of all mankind has been the cornerstone of orthodoxy from the beginnings

of Christianity in the first century. Supernatural events are real and have a place in history; therefore, the miracles of the Old Testament and New Testament are considered as facts. Faith and rationality are both equally real. The voice of science is not always authoritative.

Inescapable presuppositions. Whenever any study is instigated which has some religious significance, there are certain inescapable presuppositions. For example, when a problem of Christianity is being considered the investigator must make a decision regarding the occurrence of miracles. He must decide whether the miracles recorded as facts in the Bible are true, or whether they can all be explained in the light of natural phenomena known to take place today. If the possibility of miracles is accepted, this possibility becomes a presupposition of the investigator; if they are considered impossible of occurring, their impossibility becomes a presupposition.

### III. ORGANIZATION OF THESIS

In trying to determine what should be the attitude of the Christian towards evolution, an historic approach was considered as the best method. The following major topics were studied: (1) the basic theories of evolution; (2) the reaction of scientists to these theories prior to 1900; (3) evolution since 1900; and finally (4) general conclusions.

## CHAPTER II

### BASIC THEORIES OF EVOLUTION

There are three basic theories of organic evolution. These theories are usually associated with the names of three men. With the name of Lamarck is associated the theory of "the inheritance of acquired characteristics"; with the name of Darwin, "the theory of natural selection"; and with the name of De Vries, "the mutation theory." None of these theories can be said to be truly original with these men. A brief account of the tenets of each theory follows.

#### I. LAMARCK'S THEORY

Chevalier de Lamarck (1744-1829) was greatly influenced by the works of Buffon (1707-1788), the first great biologist to take issue with Linnaeus (1707-1778), the father of modern taxonomy. Linnaeus firmly believed that species were divinely created and immutable. Lamarck and Buffon felt that all systematic classifications were arbitrary products of human thought, and that if care was not taken, arbitrarily drawn species lines might violate the laws of nature.

To Lamarck all of life was "motion," and he looked on it as a mechanical process. Spontaneous generation is continually taking place under the influence of heat, light and electricity in humid climates. Lowest animal and plant forms come into existence out of inanimate matter. Life then begets life; higher forms arise from simpler forms. His theory as to how life-forms brought forth new

life-forms was that a change in the environment brought about a change in the habits of the animal, and certain organs became more specialized or depressed. The adaptation thus acquired was then passed on to its offspring. For these reasons Lamarck's theory of evolution became known as "the inheritance of acquired characteristics."<sup>1</sup>

## II. DARWIN'S THEORY

The "theory of natural selection" was actually not first conceived by Charles Darwin (1809-1882). A. R. Wallace (1823-1913), working independently and at the same time, hit upon practically the same explanation for the many varieties of life in the animal and plant kingdoms. In 1858 Darwin and Wallace decided to publish their theory as joint essays in the Linnean Society Journal.<sup>2</sup> A year later Darwin followed this introductory essay with his monumental work On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life. Shortly after its publication it became one of the most discussed books of the century. It is in this work that he presents his theory of natural selection to the public and makes a vigorous defense for it.

Briefly Darwin's theory was this: In nature there is much variability of species; even within species there is variation.

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<sup>1</sup> Erik Nordenskiöld, The History of Biology (New York: Tudor Publishing Company, 1936), pp. 324-25.

<sup>2</sup> Charles R. Darwin, The Origin of Species, (New York: A. L. Burt, c. 1861, a reprint from the sixth London edition), p. xv.

living organisms have tremendous capacities of reproduction, and far too many are being produced to survive. Consequently there is a struggle for existence, and the principle which Malthus<sup>3</sup> applied to human populations can likewise be applied to the whole animal and vegetable kingdoms--namely, that populations are determined by this struggle for existence. At this place some of Darwin's own words are appropriate:

As many more individuals of each species are born than can possibly survive; and as, consequently, there is a frequently recurring struggle for existence, it follows that any being, if it vary however slightly in any manner profitable to itself, under the complex and sometimes varying conditions of life, will have a better chance of surviving, and thus be naturally selected. From the strong principle of inheritance, any selected variety will tend to propagate its new and modified form.<sup>4</sup>

The less fit are not favorably modified and they perish without progeny. Darwin thus bases his theory on the inheritance of slightly favorable modifications, or variations, which result from the struggle for existence. It can be seen that both Darwin and Lamarck agree in making environment the chief arbiter of modification.

### III. DE VRIES' THEORY

Hugo De Vries (1848-1935), the Dutch biologist, saw that the traditional Darwinism did not solve the problem of evolution. He saw that in nature species remained constant, and he felt that man would never be able to actually see the slight transitions whereby one

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<sup>3</sup> Rev. T. Malthus, Essay on the Principle of Population. 1826.

<sup>4</sup> Darwin, op. cit., p. 4.

species is converted into another. Yet he believed that such conversions did take place. In trying to find a suitable solution he came across a theory of sudden changes of species mentioned by Kolliker (1817-1906). This idea seemed to offer to De Vries the possibility of adjusting the Darwinian inconsistency.<sup>5</sup> In seeking to find proof he started experimenting with the evening primrose (Oenothera lamarckiana), which had been introduced from America; and after several years of experimentation he observed nature suddenly producing what he thought to be a number of new species, each with definite characteristics. These results were enough evidence for him to boldly advance his "mutation theory"<sup>6</sup> as to how species in general have arisen. Nordenskiöld expresses part of the views of De Vries thus:

All fresh characters have thus been formed as a result of mutations; between the mutations a species survives with its characters unchanged; the slight variations that occur daily in the life of the species have no effect on evolution, because they are not hereditary, ... As many steps as an organism has made from the beginning, so many mutation periods must have occurred.<sup>7</sup>

De Vries believed that in former times mutations took place far more rapidly than they do at present; by saying this he did not have to make the earth as old as the Darwinians had made it.

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<sup>5</sup> Nordenskiöld, op. cit., p. 587 f.

<sup>6</sup> Hugo De Vries, Die Mutationstheorie, Leipzig, 1901.

<sup>7</sup> Nordenskiöld, op. cit., p. 588.

## CHAPTER III

### THE IMMEDIATE REACTIONS OF SCIENTISTS TO THESE THEORIES

As was stated in the introduction to Chapter II, none of the basic theories of evolution were entirely original with the men who first promulgated them. Similar ideas had been in the minds of other scientists of the day, and some of the ideas were already in print. When the theories of Lamarck, Darwin, and De Vries became known, each theory had outstanding defenders and opponents. Some scientists would accept a theory in part and then make his own personal additions and modifications; others would accept it "in toto," and still others could see no grounds at all for a theory of evolution. Because of the great interest stirred up by these theories, nearly all scientists had to sooner or later take sides. In this treatment only the views of a few outstanding men can be touched upon. The reaction to each theory will be discussed separately.

#### I. THE REACTION TO LAMARCK'S THEORY

Lamarck's theory did not receive any wide-spread acclaim until the end of the nineteenth century. This was due largely to the influence of Cuvier (1769-1832). Cuvier was a capable leader and a personal friend of Napoleon. His pupils and other biologists followed after him, and in general accepted his teachings.<sup>1</sup>

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<sup>1</sup> Erik Nordenskiöld, The History of Biology (New York: Tudor Publishing Company, 1936), pp. 252 f.



Where Lamarck maintained that the geological periods extended over a great length of time, Cuvier believed that the earth's development took place during a fairly limited space of time. To explain the vast differences between fossil and living forms, he advanced his "catastrophe theory" through which he sought to prove that the changes in flora and fauna were the result of great catastrophes in prehistoric time. All life died suddenly, and a new succession of life forms took place. Cuvier also believed in the immutability of species, and he rejected Lamarck's assumption that new species were formed through change of habits and environment. Thus he stood diametrically opposed to Lamarck.

Cuvier should not receive all the blame or credit for the temporary shelving of Lamarck's teachings. When Lamarck's theory was first published in 1808,<sup>2</sup> the time was not quite ripe for such a forthright and unorthodox concept of nature. As the nineteenth century progressed it became the century for progress. The faith of the people soon came to be built around progress. To be progressive was to be liberal. If the theory of the inheritance of acquired characteristics had been made public in 1850 it would likely have received wide acclaim. Instead, the theory of natural selection rather timely appeared in 1859, and Darwinian evolution became world-famous. Evolution and progress came to be considered as almost synonymous terms.

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<sup>2</sup> Chevalier de Lamarck, Recherches sur l'organisation des Corps Vivants. 1808.

Ernst Haeckel (1834-1919), who championed Darwinism in the latter part of the nineteenth century, considered Lamarck as one of the fathers of evolution. He took Lamarck's mechanical theory of life and incorporated it into the Darwinian idea of natural selection. Darwin himself had always rejected a mechanical theory of life per se; however, Lamarck's idea of Nature being a machine which gradually evolves all of life fits neatly into a materialistic philosophy of life.

Among the works of other scientists on evolution, that of the geologists needs to be considered. Sir Charles Lyell (1797-1875), considered by many as the founder of modern geology, was greatly interested in the theory of evolution. Prior to Darwin's works on evolution, he criticized Lamarck's theory of species modification by saying that any change in the conditions of life would give certain species an advantage over others, and any adaptability assumed by Lamarck would never be realized. "If a lake were to be converted into a swamp, already existing marsh plants would be ready to overrun its area, while the aquatic plants would die out before they had time to adapt themselves to swamp conditions."<sup>5</sup> Lyell criticized Lamarck's idea that Nature just evolved special organs when they were needed by showing that Lamarck never attempted to find out the origin of a single vital organ. Lyell also rejected Lamarck's theory that the animal world in past ages consisted of entirely different species from those in modern times, on the basis that he himself had found mammal and

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<sup>5</sup> Hordenskiold, op. cit., p. 457.

reptile fossils extending back a considerable period in geological time. He also rejected the catastrophe theory of Cuvier because he felt sufficient proof was lacking to substantiate the arguments.

Another geologist who wrote on the theory of evolution was Hugh Miller (1808-1886). Louis Agassiz (1807-1873), the great biologist, valued Miller's friendship highly and looked upon him as one of the outstanding geologists of the day. In the history of geology Miller receives very little mention in comparison with Lyell. Could it be because he openly opposed the current evolutionary theories, and thus seemingly blocked the wheels of "progress"?

Miller's best known work was The Foot-prints of the Creator,<sup>4</sup> which was written to refute the evolutionary teachings of his day --especially the Vestiges of Creation, published anonymously in 1844. The Vestiges promulgated afresh the development hypothesis of Lamarck and others. In his refutation Miller tells how his study of the fossil fishes of Scotland clearly shows that the early fishes were high in intelligence and organization. He then deals with specific fishes mentioned in support of the development theory, and concludes that the small size of the specimen under discussion was simply due to their immaturity. He devotes four chapters to controverting the arguments pressed into service by the "development" men from

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<sup>4</sup> Hugh Miller, Foot-prints of the Creator, or, The Asterolepis of Straness. (Boston: Gould and Lincoln, 1861), 331 pp. (First published in London.)

geological fossil flora.<sup>5</sup> They claimed they had found transitional plants between the marine and terrestrial floras. Miller could find none of these connecting links. To Miller, Lamarck was a skillful botanist and conchologist but not acquainted with geology.

In the last chapter of Footprints the geological record is logically tied in with the Bible story of creation. There were stages of creation comparable to the days of Genesis I--elevatory first going forth after each dynasty, all biological elevation being simply the effect of creation. Tied in with the dynasties "there was the manifestation of a downward tendency towards the degradation of monstrosity."<sup>6</sup> Creation ceased with the creation of man.

By introducing a tendency towards degradation Miller pointed out that this "principle" can be taken by a ingenious theorist to get up as unexceptionable a theory of degradation as of development. He considered monstrosities to not breed true, but always tending back towards the normal species type. He firmly believed that the principle of degradation did exist, and he based this principle on the homological symmetry of class organization and the fact that monster families occur.<sup>7</sup> Miller by admitting such regression was actually embracing a limited theory of evolution within classes.

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<sup>5</sup> Miller, op. cit., Chapters 10-13.

<sup>6</sup> Ibid., p. 350.

<sup>7</sup> Ibid., pp. 185 ff.

Such a theory was a forerunner to the polyphyletic theories of the twentieth century.

The death knell of Lamarckianism came when the works of August Weismann (1834-1914) and Louis Pasteur (1822-1896) were published. The theory of the inheritance of acquired characteristics was absolutely proved untenable when Weismann published his Ueber Heredity at Jena in 1896. Weismann established the continuity of the germ plasma which made the germ cells the bearers of heredity. As outside influences could not effect the germ plasma, somatic adaptations could not be inherited. In the 1860's spontaneous generation had been disproved by Pasteur with his fermentation experiments. Cultures did not decay unless contaminated with bacteria.

## II. THE REACTION TO DARWIN'S THEORY

In The Origin of Species Darwin attempted to answer all possible objections to a theory of natural selection. As proofs of evolution he used homology, rudimentary organs, embryological resemblances, and reversions which had been observed in domestic animals, other animals of the world, and in the paleontological record. He attempted to satisfactorily explain the origin of the eye and other body organs. His theory was an advance over Lamarck's in that he stressed the importance of certain prototypes, or common ancestors in kingdom development.

Among the first to associate themselves with Darwin was the aging Sir Charles Lyell. In 1883 he published a book entitled Geological Evidence on the Antiquity of Man, and in it he gave support to Darwin's theory of natural selection by citing some geological and paleontological evidences based upon similarities between living and extinct elephants of the Tertiary period. Lyell concluded this book by defending Darwinism against the accusation that it would lead to materialism. Darwin appreciated Lyell's support.<sup>8</sup>

Thomas H. Huxley (1825-1895) became one of the most zealous defenders of Darwinism. In his youth he was an opponent of Lamarck's theory of evolution, and he believed in the immutability of species. Yet strangely, when Darwin moved on the scene, he was one of the first to accept his teachings, and early took part in the controversy over The Origin of Species. Huxley did not agree entirely with Darwin, especially regarding the fact of the cumulation of small variations to produce a noticeable new type; for he knew that short-legged sheep appeared suddenly in America. However, on the main points of Darwin's theory they were in complete agreement. Huxley even controverted with Gladstone, one of the greatest of England's statesmen, on evolution.<sup>9</sup>

Mention has already been made how Ernst Haeckel championed Darwinism on the continent in the latter part of the nineteenth century.

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<sup>8</sup> Nordenskiöld, op. cit., p. 485.

<sup>9</sup> Ibid., p. 490.

It was in 1858 that he first expounded the theory of natural selection at a German scientific conference, and it soon enjoyed wide acceptance in Germany.<sup>10</sup> Using this theory as his stepping stone for the development of his own naturalistic philosophy, he arrived at a mechanical monism. He had a blind faith in his power of "mechanical causality" to explain everything. He even asserted that no essential difference existed between animate and inanimate objects.<sup>11</sup>

While Haeckel was the first biologist to draw a genealogical tree to show a common origin for different life forms, this device has since been employed many times. Scientists have rightly accused his drawings of being too schematic and without a trace of scientific value. Haeckel's most important and far reaching contribution to evolutionary thought was his "biogenetical principle," or recapitulation theory, "ontogeny recapitulates phylogeny." This theory was an outgrowth of his embryological studies. In this theory the development of the embryo becomes an abstract of the history of the genus. This theory influenced biological literature for nearly fifty years. Muller, Meckel, Chambers, Miller, Darwin, and Agassiz also had made mention of embryological homologies, but did not press the evidence to such an extent as Haeckel. Numerous twentieth-century scientists have pointed out that the theory poses more problems than it can answer.<sup>12</sup>

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<sup>10</sup> Hordenskiold, *op. cit.*, p. 510.

<sup>11</sup> *Ibid.*, p. 513.

<sup>12</sup> George O'toole, The Case Against Evolution (New York: The Macmillan Company, 1926), pp. 224 ff.

Haeckel vigorously attacked both the Church and the State, as they stood for the old line of things. Progress, evolution, new philosophies were the order of the day. By boldly proclaiming the new order, Haeckel succeeded in doing for Germany what Darwin, Spencer, and Huxley did for England--making evolution the touchstone of progress. Other fields of thought gladly took up the evolutionary cue proclaimed by the biologists.

Herbert Spencer (1820-1903) interpreted Darwin's theory of natural selection in his own way. He could not understand how an evolutionist and geologist could assume that the earth consisted of layers similar to those of an onion, and that fossils would be deposited universally and synchronously. Spencer did make much of natural selection and "survival of the fittest," and he incorporated both ideas in his philosophy of First Principles.<sup>13</sup> He has been called "the most consistent philosopher of evolution which that period produced."<sup>14</sup>

The outstanding scientist to oppose the teachings of Darwin was Louis Agassiz (1807-1873). He not only opposed the teachings of Darwin, but the development theory in general. He and Darwin had the utmost respect for each other, and remained friends to the last.<sup>15</sup>

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<sup>13</sup> Herbert Spencer, First Principles (New York: P. F. Collier and Son, 1902), 680 pp. (First Published in England in 1861).

<sup>14</sup> Hordernfield, op. cit., p. 493.

<sup>15</sup> Elizabeth C. Agassiz, Louis Agassiz, His Life and Correspondence (New York: Houghton and Mifflin and Company, 1885), p. 647.



Agassiz had received the M. D. degree at Zurich and the Ph. D. degree at Munich both by the time he was 24 years old. In addition when he finished at Munich he said that he "know every animal, living and fossil, in the museums of Munich, Stuttgart, Tübingen, Erlangen, Würzburg, Karlsruhe, and Frankfurt."<sup>16</sup> In 1846 Agassiz moved to America and became a professor at Harvard College; he was both a zoologist and a geologist.

Elizabeth Agassiz, his wife, wrote a biography and compilation of her husband's correspondence shortly after his death.<sup>17</sup> She related how other biographers said it was difficult to see why Agassiz did not support evolution. He often said, "the history of the individual is the history of the type."<sup>18</sup> This remark was based upon his embryological observations, and his conclusion was tantamount to belief in the biogenetic principle, but limited to within a class. Haeckel did not restrict the principle; all class lines were crossed. With Agassiz the coincidence between geological succession, embryonic development, zoological gradation and the distribution of animals in the past and the present rested upon an intellectual coherence and not upon a material connection.<sup>19</sup> In this conviction he remained unshaken through out his lifetime, even though the development theory came up for discussion under various aspects during that time.

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<sup>16</sup> Agassiz, op. cit., p. 157.

<sup>17</sup> Ibid., 648 pp.

<sup>18</sup> Ibid., p. 371.

<sup>19</sup> Ibid., p. 372.

"Belief in a Creator was the keynote of his study of nature."<sup>20</sup>

Agassiz made the same criticism that Spencer did regarding the impossibility of universal and synchronous fossil deposition. In a letter written to Adam Sedgwick in 1845, who had become alarmed over the increased interest in the development theory speculation, Agassiz gives his own interpretation of an apparent instance of development among the lizards:

As evidence of the fixity of generic types and the existence of a higher and free causal power, I have made use of a method which appears to me as a process of reasoning. The series of reptiles, for instance, in the family of lizards, shows apical forms with rudimentary feet, then with a successively larger number of fingers until we reach, by seemingly insensible gradations, the genera *Anguis*, *Ophisaurus*, and *Pseudopus*, the *Chamaesauria*, *Chirotes*, *Bipea*, *Sepo*, *Scincus*, and at last the true lizards. It would seem to any reasonable man that these types are the transformations of a single primitive type, so closely do the modifications approach each other; and yet I now reject any such supposition, and after having studied the facts most thoroughly, I find in them a direct proof of the creation of all these species. It must not be forgotten that the genus *Anguis* belongs to Europe, the *Ophisaurus* to North America, the *Pseudopus* to Dalmatia and the Caspian steppes, the *Sepo* to Italy, etc. Now I ask how portions of the earth so absolutely distinct could have combined to form a continuous zoological series, so strikingly distributed, and whether the idea of this development could have started from any other source than a creative purpose manifested in space? These same purposes, this same constancy in the employment of means toward a final end, may be read still more clearly in the study of the fossils of the different creations. The species of all the creations are materially and genealogically as distinct from each other as those of the different points on the surface of the globe. I have compared hundreds of species reputed identical in various successive deposits,--species which are always quoted in favor of a transition, however indirect, from one group of species to another,--and I have always found marked specific differences between them."<sup>21</sup>

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<sup>20</sup> Agassiz, *op. cit.*, p. 372.

<sup>21</sup> *Ibid.*, pp. 389 f.

He thus makes it emphatic that he could find no evidences of evolution among the lizards.

Agassiz gained his earliest renown by working on the classification of fossil fishes. In the same letter mentioned above he has this to say regarding fossil fishes furnishing proofs of evolution. He is answering the question, "Can the fishes of the Old Red (Sandstone) be considered the embryos of those of later epochs?"

Of course they are the first types of the vertebrate series, including the most ancient of the Silurian system; but they each constitute an independent fauna, as numerous in the places where these earlier fishes are found, as the present fishes in any area of similar extent on our sea-shore to-day. I know one hundred and four species of fossil fish from the Old Red, belonging to forty-four genera, comprised under seven families, between several of which there is but little analogy as to organization. It is therefore impossible to look upon them as coming from one primitive stock. The primitive diversity of these types is quite as remarkable as that of those belonging to later epochs. . . .<sup>22</sup>

The above passage clearly shows the problems involved when one goes to searching for a common ancestor. Just which one of the 104 species of Old Red fishes was the common ancestor of modern fishes? How can anyone be dogmatic here when the many diverse forms of modern fishes are considered?

Rudolph Kolliker (1817-1906) was another scientist who was a great admirer of Darwin. He was Swiss, and for over fifty years was Professor of Zoology at Wurzburg, Germany. In The History of Biology

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<sup>22</sup> Agassiz, op. cit., p. 391.

Nordenskiöld tells how Haeckel clearly stated his likes and dislikes of Darwinism.<sup>23</sup> He liked the way Darwin sought to base his theory upon experiments--something his predecessors had failed to do--and he liked the way descent was made the foundation thereof, so that the life-forms might be considered as a series of evolutionary phenomena. The weak points Haeckel found in Darwin's theory are listed below:

1. Its teleological conception; the principle of finality as applied to life-forms.
2. The absence of transition forms between the species, both extant and fossil.
3. The lack of proof that characterizes the entire hypothesis of selection.
4. The circumstance that nothing is known of unfertile variety-hybrids, which would nevertheless be bound to appear somewhere if varieties were transitions to species.<sup>24</sup>

These are the same valid objections other scientists had raised, and for which the modern scientists who cling to Darwinism still have no answer.

Haeckel held that it was possible to imagine other ways of evolution. For him a creation of all species was untenable, but it was conceivable either that all organisms had arisen, each out of its own primary form, or that the species came into existence through one primary form or through a few. He considered the latter alternative more probable,<sup>25</sup> and in so doing approached the more modern idea of polyphyletic evolution.

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<sup>23</sup> Nordenskiöld, op. cit., p. 481.

<sup>24</sup> Ibid.

<sup>25</sup> Ibid.

### III. THE REACTION TO DE VRIES' THEORY

The mutation theory of De Vries is a twentieth century product, and its merits are still under consideration. When introduced in 1902, it immediately met with violent opposition from the loyal Darwinists, because it denied the heredity of slight variations and their consequent selection, and maintained the immutability of species between mutations.

De Vries was one of the scientists who helped to rediscover Mendel's laws of inheritance, but he would not let them apply to his mutation theory which had been based upon his experiments with Oenothera. Later experiments on the same plant proved that Mendel's laws did apply, and that what De Vries saw was only fresh combinations of characters that already existed in the main species.<sup>26</sup>

De Vries did make a notable contribution to biological history, as it was later proved that mutations do occur in nature. More important still is the fact that he shifted the interest from contemplation on "the origin of species" to an emphasis upon the development of species characters. Along with Mendel he becomes a pioneer in modern heredity.

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<sup>26</sup> Hordenskiold, op. cit., p. 583.

## CHAPTER IV

### EVOLUTION SINCE 1900

With the opening of the present century a change began to take place in the methods of studying evolution. The largely speculative method of treating it as a problem of history became gradually and yet only partially replaced by experimental methods. This change was brought about by a combination of factors. Perhaps the rediscovery of Mendel's laws of inheritance played the most important role, by making it possible to study evolution under conditions of controlled experimentation.

#### I. REDISCOVERY OF MENDEL'S LAWS OF INHERITANCE

Johann Mendel or Gregor Mendel (1822-1884) was an Austrian monk who devoted himself especially to the study of mathematics and natural science. His world fame rests upon his careful experiments with the hereditary phenomena of garden peas. Darwin was a good observer of nature but a vague and obscure describer. In Mendel is found the unusual combination of keen observation and accurate description. He crossed white-flowered peas with red-flowered peas and got red hybrids throughout; then when he allowed these hybrids to fertilize themselves, the succeeding generations turned out to be colored in a peculiar way. For every three red individuals there was one white. Such whites when self-fertilized produced only white offspring, and one-third of the reds likewise remained constant. The remaining two-thirds of the reds,

when self-fertilized, repeated the above mentioned color ratio. From his experiments with peas and other garden plants Mendel was able to establish several basic laws of heredity. These are the laws of dominance, segregation, and independent assortment.

Sadly enough, the value of Mendel's painstaking experiments did not receive their due recognition while he was alive. The scientific world was too busy in its speculations on origins, progress, and missing links to give much thought to any laws of inheritance which bespoke of species being confined to certain bounds.

In 1900 "three observers--De Vries, Correns, and Tschermak--simultaneously pointed out the agreement between Mendel's observations and their own results. Thenceforward Mendel's name has been one of the best-known in biology."<sup>1</sup> While De Vries believed that Mendel's laws did not apply to mutations, it was soon shown to be otherwise.

In the previous chapter mention was made that De Vries' mutation theory marked a forward step in the methods of evolutionary speculation. His conclusions were based on experimental methods, just as had been Mendel's. Where Mendel had been primarily interested in the problems of inheritance, De Vries was interested in finding the mechanics which might explain evolution.

With the rediscovery of Mendel's laws, interest in heredity began to grow. Mendel had already furnished a pattern for experi-

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<sup>1</sup> Erik Nordenskiöld, The History of Biology (New York: Tudor Publishing Company, 1936), p. 591.

mentation. T. H. Morgan, in the first chapter of his book, The Scientific Basis of Evolution, mentioned the names of two other men, along with those of Mendel and De Vries, who contributed valuable evidence which furnishes biologists today with the ideas for an objective discussion of the theory of evolution.<sup>2</sup> These men were Johannsen and Sutton. Johannsen experimented with pure lines in 1903; and in the same year Sutton first pointed out that the chromosome mechanism of the maturation stages of the egg and sperm-cell supply a mechanism that accounts for the laws of heredity which Mendel had discovered. From such beginnings at the first of the twentieth century, the study of evolution by more exact methods has shown substantial progress.

## II. RECENT TRENDS IN EXPERIMENTAL EVOLUTION

The majority of geneticists agree that mutations do occur, and much of the recent experimental work has had to do with the artificial induction of mutations and the observance of their offspring. The interpretations by geneticists of observed hereditary phenomena are not always in agreement; yet, most of them do feel that in mutations significant evidence is furnished for evolution. The following paragraphs will be devoted to studying the works of some of the outstanding geneticists of the past twenty years.

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<sup>2</sup> Thomas H. Morgan, The Scientific Basis of Evolution (New York: W. H. Norton and Company, Inc., 1935), p. 15.



Thomas H. Morgan (1866-1945) is best known for his work with the fruit fly, Drosophila. This fly is a prolific breeder and has only eight chromosomes. In addition it is easily reared in the laboratory and mutations occur frequently. Morgan found that the viable mutant occurrence is about once in five to ten thousand flies. "Beyond these visible mutant changes there are lethals which are ordinarily overlooked."<sup>5</sup> He did not state the average number of lethals.

As the result of his experiments with Drosophila, Morgan advanced the gene theory of heredity. This theory was based upon certain changes which were demonstrated to take place in the nature of chromosomes. Elementary genetics teaches that the number of chromosomes is constant for each species of animal and plant. The size and shape of the chromosomes is also constant. There are also two of each kind of chromosome in each cell; one has come from the mother and one from the father. The members of each pair are alike in size except for the sex chromosome, in which the members may differ in size and shape, or one member of the pair may be absent in one sex. Genes are supposedly the determiners of heredity, and they are extended at intervals along each chromosome. They cannot be seen, nor is their chemical composition known. It must be supposed that when the chromosomes divide each gene is divided into equal halves, and then that it has the power to grow to its original size before the next cell division. Elementary genetics also teaches that the sex cells have only half the number

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<sup>5</sup> Morgan, op. cit., p. 134.

of chromosomes of regular somatic cells; sex cells undergo a reduction division. These are the tools with which the geneticist works. Heredity is thus a cellular phenomenon.

Morgan and other workers knew of over five hundred mutants in the vinegar fly, Drosophila.<sup>4</sup> In their observations they became able to fix the approximate location of a given mutant gene on a chromosome. When it could be so demonstrated the mutation was referred to as a "point mutation."<sup>5</sup> Morgan felt that point mutations are of common occurrence, but he admitted that the proof would be hard to secure. "Nevertheless, in most cases where it has been shown that a variant differs from other members of the same race or species by a single hereditary factor, it is probable that the difference is due to one mutant change, and may be provisionally accepted as the result of a point mutation."<sup>6</sup>

These point mutations Morgan was willing to make the stepping stones of evolution. In doing this he pointed out the problem posed by the occurrence of recessive mutations which result from X-ray treatment: are they due to losses of genes? As proof that they might not be due to loss of genes he told how other workers secured reversions to normal after X-ray treatment, and also reversions. On the other hand, he brought out that some point mutations may well be

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<sup>4</sup> Morgan, op. cit., p. 33.

<sup>5</sup> Ibid.

<sup>6</sup> Ibid.

real losses.

Evolution itself has sometimes been downhill--i.e., towards simplification. . . . The absence of wings in some insects, the loss of legs in whales, and many other changes of this kind are known. . . . It might be assumed that such large losses are sometimes connected with the degradation of certain genes. In fact, most geneticists are ready to admit that genes may be lost at times, and there are several instances known where this may have occurred. From still another point of view it may be argued, since there is demonstrable evidence that pieces of chromosomes are lost or translocated, that it may well happen that individual genes drop out at times.<sup>7</sup>

Here, Morgan is admittedly standing on uncertain ground. In the quoted passage the word "may" occurs four times and the word "might" once.

As to how genes are built up into more complex types so that progression may take place he is equally uncertain. Here he is willing to consider the gene as a complex chemical molecule with the possibility of changing at times into new molecular combinations that give new chemical compounds. It was further acknowledged that, "we know very little at present about the conditions under which the protein compounds of the body are built up, but we do know that they are synthetically reconstructed in the body, and to a limited extent in the laboratory."<sup>8</sup> He infers then, if compounds are built up in the body, could not the same constructive changes take place in the germinal materials.

Morgan thus brings out that gene changes probably occur at random, and may be progressive or regressive. His conclusion is:

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<sup>7</sup> Morgan, op. cit., p. 57.

<sup>8</sup> Ibid., pp. 53 f.

In the light of our present knowledge concerning mutation, inadequate though it may be, it seems that the progressive steps occur in a change now in this gene, now in that. Large numbers of genes appear to be contributory to the evolutionary advances. This inference presents again the pictures of random changes in the genes, rather than progressive change in any one gene. It is only the end-stages that have survived that give the impression of a straight line of advance (orthogenesis).<sup>9</sup>

One of the best work Morgan did was the studying of various hereditary phenomena which did not seem to follow Mendel's laws of inheritance. He and his fellow workers did much toward the establishing of the facts of linkage, crossing over and translocations. Linkage may be said to take place when certain pairs of characters enter a cross together and then tend to remain together in later generations. Linked genes are carried in the same chromosome. Linkage and crossing over are correlative phenomena. Crossing over is the interchange of materials between members of the same pair of chromosomes; consequently, cross-overs sometimes restrict linkage.<sup>10</sup> Morgan observed that sometimes a piece of chromosome became detached and was added to some other chromosome. This process he called "translocation."<sup>11</sup> Here the total number of genes was not changed, but their location and linkage to other genes was affected.

In setting out to prove that the gene theory furnishes the most scientific basis of evolution Morgan did not hesitate to point out the problems time and time again which critics might raise. In the work

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<sup>9</sup> Morgan, *op. cit.*, pp. 58 f.

<sup>10</sup> *Ibid.*, p. 70.

<sup>11</sup> *Ibid.*, p. 79.

with Drosophila he found that certain mutations tended to re-occur more frequently than others, and that frequently some mutations mutated back to normal.<sup>12</sup> It was also learned that the mutants are no better suited than the original type to the natural environment in which they exist; some did have at least as good a survival value as the original type.<sup>13</sup> Another related fact which the study of mutations revealed was that, "In a number of species, where the records are on a large scale (Drosophila, sweet peas, maize), the majority of new mutants are recessive to the wild-type. In other words, the wild-types are largely dominant to the new mutant genes."<sup>14</sup> A critic could take these facts and ask, how can mutants then be appealed to as the source of new species? To answer these objections Morgan mentions several theories that other workers (Fisher, Wright, Haldane) had advanced to explain how a recessive mutation could become partially dominant and still be recessive to the wild type. There was very little agreement among the three theories.<sup>15</sup> Morgan himself did not seem to take sides; he simply ignored the possible facts of the critics and clung to the idea that somehow recessive mutants had to become dominant in order that evolution might be explained.

To further make the gene theory of evolution logical Morgan

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<sup>12</sup> Morgan, op. cit., pp. 134 f.

<sup>13</sup> Ibid., pp. 139 f.

<sup>14</sup> Ibid., pp. 141 f.

<sup>15</sup> Ibid.

believed that hybrid sterility did not furnish proof that the parents were always "true species." He tells how all degrees of success are found in different crosses. "Infertility does not then appear to be an event that has been prepared for or evolved to prevent crossing, but a natural consequence of differences of various kinds between the different types."<sup>16</sup> In another place he said,

Let it be admitted that, while we cannot give a completely satisfactory answer to this question, the situation has so changed in recent years that geneticists no longer feel there is here any serious difficulty, but rather a scholastic distinction that arose when species were regarded as specially created.<sup>17</sup>

A doorway with the importance of hybrid sterility enables the evolutionist to closely relate all species.

Since the gene theory accounts only for the origin of point mutations, some other theory was necessary to account for the preservation of point mutations in order that evolution might be carried forward. Morgan felt that a modified theory of natural selection would furnish the means for preserving genetic mutants. Hence, his theory of evolution may be termed "neo-Darwinian."

It may be said in conclusion regarding the work of Morgan, that he placed too much confidence in the fact that point mutations could account for the great diversity of forms in the animal and plant kingdoms. The changes he had seen take place within species and

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<sup>16</sup> *Ibid.*, p. 106.

<sup>17</sup> *Ibid.*, p. 106.

subspecies crosses might be able to explain the diversification of species, but they cannot explain the origin of widely diverse families, orders, and phyla. Some of the living geneticists disagree with the neo-Darwinism of Morgan for exactly the same reason.

Richard Goldschmidt (1878) is Professor of Zoology in the University of California. He was one of the first scientists to point out the shortcomings of the neo-Darwinism of the Morgan school. In his book, The Material Basis of Evolution,<sup>18</sup> he went to great length to prove that something more than point mutations is necessary to account for the great jumps between classes and phyla. Although he spoke frequently of the shortcomings of the Morgan type of neo-Darwinism, he avoided mentioning the name of Morgan in connection with it. Nor did he include any of Morgan's works in his lengthy bibliography. In stating the problem at the beginning of his book Goldschmidt challenged the neo-Darwinists to explain the evolution of the following features by accumulation and selection of small mutants:

hair in mammals, feathers in birds, segmentation of arthropods and vertebrates, the transformation of the gill arches in phylogeny including the aortic arches, muscles, nerves, etc.; further, teeth, shells of mollusks, ectoskeletons, compound eyes, blood circulation, alternation of generations, statocysts, poison apparatus of snakes, whalebone, and, finally, primary chemical differences like hemoglobin vs. hemocyanin, etc.<sup>19</sup>

He also said that corresponding examples could be given from the plant

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<sup>18</sup> Richard Goldschmidt, The Material Basis of Evolution (New Haven: Yale University Press, 1940), 423 pp.

<sup>19</sup> Ibid., p. 7.

kingdom.

To account for the evolution of all animals and plants Goldschmidt subdivided evolution into "microevolution" and "macroevolution." Microevolution he made synonymous with neo-Darwinian evolution. He defined and limited it thus,

Microevolution . . . is a process which leads to diversification strictly within the species, usually, if not exclusively, for the sake of adaptation of the species to specific conditions within the area which it is able to occupy. . . . Subspecies are actually, therefore, neither incipient species nor models for the origin of species. They are more or less diversified blind alleys within the species. The decisive step in evolution, the first step toward macroevolution, the step from one species to another, requires another evolutionary method than that of sheer accumulation of micromutations.<sup>80</sup>

The above passage shows that he is expecting his theory of macroevolution to account for the great steps in evolution.

As a starting point for proofs of macroevolution he told of the work of various biologists with some of the animals on islands of the Pacific. These biologists found evidences of evolutionary processes in recent geological time, with distinctive genera having arisen from some ancient original pair. After presenting these insular evolutionary facts, Goldschmidt concluded that the neo-Darwinian interpretation was unfeasible in the light of so many diverse genera occurring almost simultaneously; and also,

As the geneticist is unable to accept the Lamarckian viewpoint, there is only a single solution left: the origin by large steps, our systemic mutation, which leads at once so far toward the new

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<sup>80</sup> Ibid., p. 183.



type that selection can immediately be efficacious, and which permits a large evolutionary process to take place in a time as short as, or even shorter than, is ordinarily required for the production of a subspecies.<sup>21</sup>

When he said that there was "only a single solution left" he evidently forgot that one of the biologists he had just previously quoted from had mentioned another possible solution. He quoted at great length from Willis, who had studied the flora of Pacific islands; and it was evident that Goldschmidt was indebted to him for many of his ideas regarding macroevolution. Willis had said that the change from one species to another must have been in one or, at most, a few large steps, changing many or all characters of the plant at once. Willis also felt that in the light of contemporary Mendelian experimentation his proposition would go without demonstration by verified fact. Therefore, Willis continued,

What I contend is that neither of the extreme suppositions --Special Creation and Natural Selection--contains all the truth, and that therefore this, or similar, compromise between them is rendered necessary by the present condition of our knowledge.<sup>22</sup>

Willis by no means was leaning towards the idea of Special Creation, but he did have to admit that the idea was not to be passed off too lightly. It is this idea of Special Creation which Goldschmidt prefers to completely ignore all through his book. In the final conclusion he told how he disliked to encounter the idea that life

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<sup>21</sup> Ibid., p. 216.

<sup>22</sup> Ibid., p. 218. (Goldschmidt citing J. C. Willis, The Origin of Species by Large, Rather Than by Gradual Change and by

phenomena are infinitely more complicated than those of inorganic nature and that they required a metaphysical interpretation. He preferred to maintain that all life phenomena were based on simple principles, and that "a simplistic attitude is not a flaw but the ideal goal for a theory in science and, therefore, also for a theory of evolution."<sup>23</sup>

Goldschmidt was careful to emphasize that "direct genetic information steps almost at the point where macroevolution begins,"<sup>24</sup> but he said further,

No evolution is possible without a primary change within the germ plasma; i.e., predominantly within the chromosomes, to a new stable architecture. But there is also another side to the problem. The germ plasma controls the type of species by controlling the developmental process of the individual. Whatever may be our conception of the germ plasma, mosaic of genes or chromosomal pattern, the specificity of the germ plasma is its ability to run the system of reactions which make up the individual development, according to a regular schedule which repeats itself, caeteris paribus, with purposiveness and orderliness of an automaton. Evolution, therefore, means the production of a changed process of development, controlled by the changed germ plasma, as well as the production of a new pattern of germ plasma.<sup>25</sup>

With such a working theory, the question then arises as to what will alter the regular schedule which repeats itself within the germ plasma. Goldschmidt turned to the field of endocrinology and hormones, where he felt that a considerable amount of evidence had been gathered to support a theory of macroevolution.

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<sup>23</sup> Goldschmidt, op. cit., pp. 396 f.

<sup>24</sup> Ibid., p. 250.

<sup>25</sup> Ibid., p. 251.

The different types of giants and dwarfs show the strange morpho-genetic effect upon all types of organs, including the brain, which is exercised by the presence, absence, insufficiency or hyperproduction of certain hormones, or by a change in the coordination of the whole endocrine system. It has been frequently emphasized that similar types occur as hereditary monstrosities in animals and that, therefore, in the latter cases it may be assumed that the genetic change (mutation) acts via a changed condition in the hormonal equilibrium.<sup>26</sup>

It was also pointed out that some workers consider the endocrines of some of the races of dogs to be abnormal in many different ways, "so that the conclusion seems justified that the mutational changes act via endocrine disturbances."<sup>27</sup>

Goldschmidt felt that he secured similar information from the study of insect metamorphoses. He learned that growth and molting were regulated by hormones, and his general conclusion was "that a single genetic change affecting the mechanism of hormonal control may have been responsible for the initiation of the whole series of adaptational changes."<sup>28</sup>

In criticizing Goldschmidt's scholarly presentation of the theory of macroevolution, he should receive due credit for pointing out the inadequacy of the gene theory of accounting for the great differences between phyla, classes, and orders. Goldschmidt feels that evolution must be made logical, and macroevolution is his offering. He spoke the truth when he emphasized the lack of adequate genetical

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<sup>26</sup> Ibid., p. 279 .

<sup>27</sup> Ibid., p. 281.

<sup>28</sup> Ibid., p. 289.

facts to support his theory. He is standing on uncertain ground with regard to the idea of genetic, hormonal control. Such examples give no indications of great leaps forwards or backwards. All breeds of dogs still freely interbreed; so can the giants and pygmies of Man. It then seems that the possible examples of macroevolution which he gave could have just as readily been considered as examples of neo-Darwinian point mutations. Therefore, his theory of macroevolution seems to bring not much more satisfaction than have other mutation theories--they all fail to offer a sound basis for the great differences between phyla, classes, and orders. Time alone will tell whether the doubt will stand which he tacked upon the classical gene theory.

Albert F. Blakelee (1878) has perhaps been the outstanding geneticist to conduct research in the artificial induction of polyploidy. Much of his work has been with the plant Datura, Jimson weed. In one of his recent publications<sup>29</sup> he gave the following definitions in connection with polyploidy.

The term ploidy indicates duplication and is used in relation to number of chromosomes. Thus the sex cells which have only one chromosome of a kind may be called monoploid; the body cells which have two chromosomes of a kind are diploid; those with four of a kind are tetraploid, and so on to hexaploid, octoploid and higher orders of the polyploid series.<sup>30</sup>

Usually any number of chromosomes above the diploid number are referred

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<sup>29</sup> Albert F. Blakelee, Effects of Induced Polyploidy in Plants. Vol. IV, pp. 163-201. Jacques Cattell, editor, Biological Symposia, 14 Vols.; Lancaster, Pa.: The Jacques Cattell Press, 1941.

<sup>30</sup> Ibid., p. 163.

to as polyploid.

Blakeslee told of a number of methods available now for obtaining plants with doubled chromosome number. Heat and many chemicals have been used successfully. Among the chemicals, colchicine has been found to be the most effective and simple stimulus to chromosome doubling.<sup>31</sup>

Chromosome doubling does produce conspicuous effects on plants; of most interest to the layman is the increased size of flowers. New floral types are also sometimes produced, as are also larger fruit and seed.<sup>32</sup>

The artificial induction of polyploids can thus be of economic value. Blakeslee mentioned the following instances: "Spontaneous doubling of chromosomes to form multiple diploids from sterile species hybrids has been the origin of the best varieties of oats, wheat, tobacco and cotton."<sup>33</sup>

It was found that occasionally sterile hybrids can be made fertile by doubling the number of chromosomes. "After the chromosomes of such sterile hybrids are doubled each chromosome has a mate from its own species with which to pair, and the hybrid becomes a fertile double diploid."<sup>34</sup> The best varieties mentioned above came from such

<sup>31</sup> *Ibid.*, p. 183.

<sup>32</sup> *Ibid.*, pp. 184 ff.

<sup>33</sup> *Ibid.*, p. 190.

<sup>34</sup> *loc. cit.*

hybrids. Blakeslee considered that this was one of the most fruitful sources of new species in nature.<sup>35</sup> It is possible that new species within a genus may be accounted for in this way, but there is no evidence that new genera can come about in this manner.

The artificial increasing of chromosome numbers frequently has had bad results. This also has evolutionary significance. In Datura Blakeslee and his associates found no support for the belief that increased chromosome number facilitated crossability. He said,

The evidence seems to indicate that tetraploidy tends to offer a block to crossability between species. To the extent which this is the case tetraploidy can be considered to have evolutionary significance in bringing about biological isolation of types evolved through chromosome doubling.<sup>36</sup>

He did not say that this blocking effect would make it very hard for the tetraploids to get started in an environment where they are competing with the naturally-prolific diploid species.

Where Goldschmidt entirely discredited the gene theory,<sup>37</sup> other geneticists have not gone that far. Huxking considered opinions on the nature both of the gene and of gene mutations to be in a state of flux. In his experiments with polyploids he tried to demonstrate a physical basis for the changes; and if he failed he then tried to determine if they could be gene mutations.<sup>38</sup> He rarely found gene

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<sup>35</sup> Ibid., p. 189.

<sup>36</sup> Ibid., p. 199.

<sup>37</sup> Goldschmidt, op. cit., p. 247.

<sup>38</sup> C. L. Huxkins, Polyploidy and Mutations. Vol. IV, p. 137. Jacques Cattell, editor, Biological Symposia, 14 Vols.; Lancaster, Pa.: The Jacques Cattell Press, 1941.

mutations in polyploids, and he was of the opinion that mutations in polyploids were predominantly due to "chromosome aberrations which give rise to new combinations and new balances, but which are not likely to yield radically new characteristics."<sup>39</sup> In other words, his conclusion is similar to Huxley's; polyploids can produce new species, but they are new variations on an old theme. Polyploidy thus, likewise, does not account for the great differences between genera, families, orders, classes, and phyla.

A summary of the discussion of recent trends in experimental evolution.

I. From Morgan.

A. His assertions regarding evolution.

1. Mutations do occur within species, and can be artificially induced by X-ray.
2. Lethals are ordinarily overlooked.
3. The gene theory of inheritance offers a possible explanation for occurrence of mutations.
4. Point mutations furnish possible stepping stones for evolution.
5. For there to be progress, genes must be built up into more complex genes. Morgan considered the gene as a complex chemical molecule with the possibility of changing into new molecular combinations that give new compounds.
  - a. No experimental proof is available to show that such a phenomenon has ever occurred within the chromosome.
6. Degrees of hybrid sterility are possible proofs of evolution.

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<sup>39</sup> Ibid., p. 147.

### B. Weaknesses involved in his assertions.

1. Certain mutations tend to re-occur.
2. Frequently some mutations mutate back to normal.
3. Mutants are usually not as well suited to the natural environment as the original type.
4. The majority of new mutants are recessive to the wild-type.
  - a. Evolution cannot be explained unless the new mutants become dominant.
5. Hybrid sterility is not to be lightly passed off as a valid species test.
6. The gene theory can never account for the origin of widely diverse families, orders, and phyla.

## II. From Goldschmidt.

### A. His assertions regarding evolution.

1. Point mutations are not enough to account for the great jumps between classes and phyla. The evolution of all plants and animals must be accounted for.
2. The gene theory of inheritance is untenable.
3. A theory of "microevolution" and "macroevolution" will account for the totality of life.
  - a. Microevolution will account for the diversification within the species.
  - b. Macroevolution will account for the origin of large leaps towards new types. Here there will be systemic mutations.
4. The systemic mutation is probably a change in the molecular pattern of the chromosome, which may be likened to the long chain molecule of a protein, where transformation of proteins, proteinase and amino-acid residues takes place.
5. The flora and fauna of remote Pacific Islands furnish some evidence of macroevolution.
6. Hormones play an important role in effecting individual development as instigated by the germ plasm.

### B. Weaknesses of his assertions.

1. Direct genetic information stops almost at the point where macroevolution begins. (Goldschmidt was careful to mention this.)



2. His theory of systemic mutations which are brought about by a change in the molecular pattern of the chromosome is without factual proof.

a. Basically this is the same idea of a complex chemical change taking place within the germ plasma to bring about a new mutation. Morgan applied it to the gene and Goldschmidt to the chromosome.

3. The possible examples he gave of systemic mutations within insects were not of sufficient phylogenetic import to be able to account for the great steps between family, order, class, etc.

4. By maintaining that all life phenomena require no metaphysical interpretation, he is unjustly placing his own powers of mind and feeling in the same category with all other physical phenomena. Such a simplistic attitude is not necessarily the one ideal goal for a theory of science, but it is for a theory of evolution. The new physics has swung far away from the idea that all phenomena can be accounted for by formula.

5. His theory of macroevolution seems to bring hardly any more satisfaction than do other mutation theories when it comes to explaining the origin of hair in mammals, feathers in birds, compound eyes, etc.

### III. From Blakeslee.

1. Polyploidy may account for the origin of certain species.

2. But, it cannot account for the great differences between genera, families, orders, classes, and phyla.

### III. THE SPECIES CONCEPT

Melville H. Match (1898), Professor of Zoology, University of Washington, has written a discussion of The Logical Basis of the Species Concept.<sup>40</sup> He observed that there is no self-evident natural

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<sup>40</sup> Match, Melville H., The Logical Basis of the Species Concept. Vol. IV, pp. 223-242. Jacques Cattell, editor, Biological Synthesis, 14 Vols.; Lancaster, Pa.: The Jacques Cattell Press, 1941.

system of classification. "The taxonomist announces that there are no categories except those aggregates of the lesser categories brought together by him as a result of comparison with a type."<sup>41</sup> Thus taxonomy becomes almost entirely a nominalistic system. Hatch was of the opinion that this nominalism was forced on the taxonomist as a result of his endeavor to stabilize his nomenclature. He also pointed out that, "A further powerful nominalistic influence is represented by the absence of any general agreement among taxonomists as to the details of their classifications."<sup>42</sup> Hatch's observation had been that when two systems of classification were in agreement, it was prima facie evidence that one of the systems did not represent an original study. He said further,

In connection with my teaching and my research I have made a study of categories at every level of our classification from kingdoms and phyla at the top to genera, species and varieties at the bottom. The structural features of the individual plants and animals are objective, and certain broad features of our classification are passed on from author to author. But, as to what the limits of the several categories are, as to just how much a particular branch of the tree is to be a phylum, a class, an order, a family, a genus, or a species, I find no fixed objective criteria whatsoever. These depend on the opinion, almost the whim, of the individual taxonomist, . . .<sup>43</sup>

Thus all efforts of classification become purely subjective and nominalistic.

Hatch did bring out that a nominalistic interpretation of species

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<sup>41</sup> Hatch, op. cit., p. 228.

<sup>42</sup> Ibid., p. 229.

<sup>43</sup> Ibid., pp. 229 f.

may accrue certain advantages. First, it kept the mind centered on the individual data themselves, which is true to the spirit of modern science. Second, it recognized the categories as simply generalizations in the minds of the individual taxonomists.<sup>44</sup>

With the possibility of so many differences of opinion in taxonomy, it then becomes a difficult task to determine the most suitable meaning for species. Hatch gave several possible definitions:

It is, apparently, a by-product of the evolutionary process, an accidental concomitant of the circumstance that as the living organism extends itself in time and space, the chain of its continuity with its predecessors becomes broken here and there. Species are the result.<sup>45</sup>

A species is, primarily, composed of those specimens which, upon examination, the taxonomist believes to be conspecific.<sup>46</sup>

A species is a series of individuals more closely resembling each other than the individuals of any other species.<sup>47</sup>

The species, then, is one thing and one thing only, namely, the concept that the taxonomist develops on the basis of his data, but with the important qualification that it is subject to modification as more data accumulate or as those data that we do have are better understood.<sup>48</sup>

If Hatch considered any definition to be adequate, it is the last one given above; for it is the one which becomes the working definition of the taxonomists.

All of these definitions, then, are based on concepts. There-

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<sup>44</sup> Ibid., p. 232.

<sup>45</sup> Ibid., p. 233.

<sup>46</sup> Ibid., p. 230.

<sup>47</sup> loc. cit.

<sup>48</sup> Ibid., p. 234.

fore, Hatcher pointed out that there is an inner mystery to a species. Here, "One approaches the sanctum sanctorum of the living organism itself."<sup>49</sup> After all descriptions by the taxonomist, the ecologist, the physiologist, and the embryologist are in, the organism itself still eludes the mind of man. "The initial, the sole mystery is the living organism. ("Living" not underscored by Hatcher.) The species is the chance result of the individual's efforts to extend itself."<sup>50</sup> But what of the organism itself? Hatcher said, "an organism is a system existing for its own increase and perpetuation."<sup>51</sup> When the individual organism thus becomes simply a part of a great evolutionary system, it can in reality never be considered apart from that system. Any efforts on the part of scientists to consider individual organisms and their inter-relationships then becomes nominalistic. Hatcher was ever careful to recognize this dilemma, and he made room for it; but he failed to consider the possibility that there could be, at least, a few Divine Creations which have actual existence within themselves.

In making room for the nominalistic dilemma Hatcher went on to say that man can never possess absolute certainty about the validity of any given species; but, "we do possess probability, and the more frequently a given species has been recognized the more likely it is to

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<sup>49</sup> Ibid., p. 233.

<sup>50</sup> loc. cit.

<sup>51</sup> loc. cit.

be valid."<sup>52</sup> When frequent recognition becomes the test of validity, the task of the taxonomist becomes protean.

There are many different meanings applying to the species concept. Hatch listed eleven legitimate meanings. All of them were nominalistic because he had to reject the more realistic interpretations "on the grounds that they transcend experience in an unwarranted fashion."<sup>53</sup> The eleven meanings he listed was a series, "ranging from very well-established species like man and the domestic animals, through the well-known species of the ordinary taxonomic study, down to those that are tentative only."<sup>54</sup> It was interesting to note that he considered most tentative those species which are known only through fossil fragments. Odd plates, scales, teeth, bones, etc., do not furnish the paleontologist too much to go on; but that is about all they have to use. Hatch told of errors and triumphs that stand to the account of paleontologists. For an example of each he included the following sentence: "If the fossil ape Henry Fairfield Osborn described from Colorado proved to be only the tooth of a pig, the Peking man, Sinanthropus pekingensis, was correctly diagnosed from an identical fragment."<sup>55</sup> This sentence could also be taken that Hatch is poking fun at the fragmentary identification of the Peking man.

Hatch believed that the fertility-sterility test presented an

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<sup>52</sup> Ibid., p. 236.

<sup>53</sup> Ibid., p. 241.

<sup>54</sup> loc. cit.

<sup>55</sup> Ibid., p. 240.

objective method of demonstrating species validity, the basic assumption being that two stocks are not conspecific if they are unable to hybridize or if they produce hybrids that are themselves sterile. With such an objective test of species one can then look upon the species category as somewhat different from the categories above or below it in the scale. The other categories (genera, families, etc.) are dependent for their recognition upon direct subjective observation alone. It was pointed out that in practice the fertility-sterility test has been tried on so few species. The problems involved are transcendent. Consider "the experimental breeding of whales!"<sup>56</sup> Therefore, Hatch insisted that the species problem was essentially the same as that involved in the other categories.<sup>57</sup>

In the discussion of the work of Mayr, mention was made of the fact that he did not consider the fertility-sterility test a valid test of species.<sup>58</sup> Here it seems that taxonomists are willing to accept its validity.

Hatch concluded his paper on the species concept with a little philosophical advice to the would be taxonomist. First, the taxonomist should remember that only the individual specimens have any reality. Secondly, he should not forget that he is doing the classifying--"superimposing, as it were, logical forms of his own invention upon the

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<sup>56</sup> Ibid., p. 235.

<sup>57</sup> Ibid., pp. 234 f.

<sup>58</sup> Gr. p. 33.

heterogeneous material that he is studying."<sup>59</sup> Thirdly, he should "remember not to be led astray by the nominalistic procedure that he as a law abiding taxonomist will find it expedient to use. Though equal in law, his species are far from equal in fact."<sup>60</sup> Hatch then went on to tell why, and give his final advice.

What possible equality can there be between a species of continental distribution, on the one hand, and one confined to a single valley, an isolated mountain range, or a tiny island, on the other? Let him remember that many of his species will be tentative. . . . Let him remember, finally, that the main obligation of all science is to its data, and that a few data carefully marshalled are better than much questionable theory.

Accordingly, the species is no hard glistening tangible thing like the atom of classical physics. It is, rather, like the Schrodinger atom, a thing of mistiness and definition. One can be fairly sure when one is getting pretty close to one, but never certain that one is actually there!<sup>61</sup>

#### Summary of Hatch's observations.

1. There is no self-evident natural system of classification.
2. Taxonomy is almost entirely a nominalistic system, because there is no general agreement among taxonomists as to the details of their classification.
3. Species represent at least a plateau in the evolutionary process.
4. To the taxonomist, the species is the concept that he develops on the basis of his data, but which is subject to future modification as more data accumulates.
  - a. Species then become a series of individuals more closely resembling each other than the individuals of any other species.

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<sup>59</sup> Hatch, op. cit., p. 241.

<sup>60</sup> Ibid. cit.

<sup>61</sup> Ibid., pp. 241 f.

5. The boundaries of many species are hard to determine by purely subjective methods.
6. The fertility-sterility test offers the best objective test for the determination of co-species. (It has already been shown that geneticists do not all accept the validity of this test.)
7. The more frequently a species is recognized the more likely it is a valid species.
8. Species determined from paleontological fragments should be considered among the most tentative of all species.
  - a. If this is true, not too much confidence can be placed on the validity of extinct species where sufficient data are lacking. Fragments of early man fall in this category.

#### IV. THE EVOLUTION OF MAN

Scientists who try to determine the origin of man and trace his pre-history are called anthropologists or archaeologists. They have to base their conclusions largely upon unearthed human fossils and artifacts which are sometimes found with them. To be an anthropologist or archaeologist, training is needed in the fields of geology, paleontology, ethnology, and comparative anatomy. These subjects enable one to readily differentiate any animal fossil bone that might be found and to tie all finds in with the geological record and the pre-history of man.

Prior to the latter part of the nineteenth century there had been very little paleologic exploration. As the interest in evolution grew, there was an increased amount of exploration. Haeckel's Natürliche Schöpfungsgeschichte, published in 1868, and Darwin's The Descent of Man, first published in 1871, were written to convince people that man was



most likely the co-descendant with other species of some ancient, lower and extinct form. These two books greatly influenced other scientists to start looking beneath cave floors and in river valleys for fossils of so-called missing links.

The following pages will be devoted to reviewing some of the important writings of archaeologists and anthropologists. Anyone who sets out to find missing links does so with the presupposition that evolution is a fact. A comparative study of the writings of anthropologists reveals that these investigators have reached many different conclusions regarding the origin of man. Therefore, in reviewing the writings efforts will be made to point out some of the inconsistencies and weaknesses in the conclusions these men reach.

Charles Darwin. The previously mentioned Descent of Man, by Darwin, spurred anthropologists on to many new endeavors. This book never received the recognition that The Origin of Species did, but it gave a considerable boost to the evolutionary teachings which The Origin had already introduced. In The Descent Darwin presented his ideas as to how the theories of natural selection and sexual selection applied to man. In this book it is stated that man had a "lowly origin" and that the fossil record of missing links was scarce. Darwin was quite confident that such links would be found. Such confidence was the only cue progressive scientists in a progressive age needed. The search for "the missing link" or "links" was on.

Regarding man's origin, Darwin had to say:

By considering the embryological structure of man--the homologies which he presents with the lower animals--the rudiments which he retains--and the reversion to which he is liable, we can partly recall in imagination the former condition of our early progenitors; and can approximately place them in their place in the zoological series. We thus learn that man is descended from a hairy, tailed quadruped, probably arboreal in its habits, and an inhabitant of the Old World.<sup>1</sup>

In the Introduction to the Descent of Man Darwin stated that his conclusion regarding the quadruped descent of man was nothing new.

The conclusion that man is the co-descendant with other species of some ancient, lower, and extinct form, is not in any degree new. Lamarck long ago came to this conclusion, which has lately been maintained by several eminent naturalists and philosophers; for instance, by Wallace, Huxley, Lyall, Vogt, Lubbock, Murcher, Hille, and especially by Haeckel.<sup>2</sup>

He does not mention that his Origin no doubt spurred some of these men to draw up human family trees, especially Huxley and Haeckel.

The weak points in Darwin's theory of evolution have already been pointed out in Chapter II.

Louis Agassiz. While Professor of Zoology at Harvard College, Agassiz gave frequent thought to the origin of the human race; but, according to Mrs. Elizabeth Agassiz, his wife, he did not put his thoughts in writing. While Agassiz did not believe in evolution, she said of him, "It was Agassiz's declared belief that man had sprung not from a common stock, but from various centers, and that the original

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<sup>1</sup> Charles Darwin, The Descent of Man (New York: Hurst and Company, 1874), p. 633.

<sup>2</sup> Ibid., p. 19.

circumscription of these primordial groups of the human family corresponded in a large and general way with the distribution of animals and their combination into faunas."<sup>3</sup> He never followed this line of investigation closely. Although Agassiz favored the Divine creation of all species, his idea of man's origin is certainly not Scriptural.

George O. MacCurdy. The twentieth century has seen the development of many outstanding American archaeologists, anthropologists, and ethnologists. The first anthropologist to be considered is George Grant MacCurdy (1863). MacCurdy was a professor at Yale University and Curator of Anthropology there. He spent thirty years in gathering data for his two-volume classical work, Human Origins,<sup>4</sup> supplementing field observations with studies in the principal museums. In these two volumes MacCurdy endeavors to cover the organic evolution of man, as well as his cultural evolution. The theme of cultural evolution receives fuller treatment than that of organic evolution. At the beginning of Volume I there is an excellent glossary. This is followed by a rather complete history of the development of archaeology as a science in which various human fossil finds are discussed.

In his evolutionary tree MacCurdy does not try to take the human stem further back than the lemureids of Eocene time. "It was

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<sup>3</sup> Elizabeth Agassiz, Louis Agassiz, His Life and Correspondence. (New York: Houghton and Mifflin and Company, 1885), p.497.

<sup>4</sup> George O. MacCurdy, Human Origins. (New York: D. Appleton and Company, 1928), 2 Vols., 428 and 478 pp.

the special cultivation of vision that differentiated the lemur from their ancestors and opened the way for a period of brain elaboration that eventually culminated in man."<sup>5</sup> He did not go into detail here, and state what kind of eyes improved vision. Complex eyes are present even in squids (Mollusca).

The work abounds with illustrations of prehistoric art and artifacts. There are also photographs of many human fossils "in situ," showing the stratification above them. To help make the story more convincing, all illustrations are so placed as to fit in with orderly evolutionary development.

These books also contain appendices which are of much value to archaeologists. One appendix gives the stratigraphy of paleolithic sites by countries. The explorer, date, and culture sequence are also given. References to explorations are listed. A second appendix is a repertory of paleolithic art, likewise given by countries.

Too little mention is made of the problem fossil finds which do not conveniently fit his family tree. He feels that the proof for cultural evolution is stronger than that for physical evolution, because no part of man's anatomy can compare with flint or stone, bronze or iron, in imperishability. This is a well taken point, but such relics can be made to fit a developmental scheme just as easily as can fossils. The case is different where the stone, bronze or iron has writing or

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<sup>5</sup> Ibid., I, 2.

hieroglyphics on it which definitely tie it in with some other contemporary civilization. In such instances one is dealing in the realm of history.

MacCurdy in a most scholarly fashion proves that man evolved through a stone, a bronze and an iron age. Epoch I of his Bronze Age began about 2500 B.C.,<sup>6</sup> and his Iron Age about A.D. 1300.<sup>7</sup> All through this work he also makes dogmatic statements about the physical evolution of man, but in the final chapter he weakens these statements when he again tries to build up his case for cultural evolution. "Thus it is that in the physical evolution of man we are not only dependent upon the osteologic record but even this record is woefully fragmentary."<sup>8</sup> On the strength of his cultural observations he does not limit Quaternary man to one species, Homo sapiens, but he classifies various races as species. He speaks of Homo sapiens, Homo mediterraneus, and Homo nordicus,<sup>9</sup> the specific name denoting the area where that species ranged. This classification has received very little support from competent archaeologists.

Henry F. Osborn. Another outstanding archaeologist who did considerable research on human fossils was Henry Fairfield Osborn (1857). Osborn held many important scientific positions, among which were:

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<sup>6</sup> Ibid., II, 185.

<sup>7</sup> Ibid., p. 237.

<sup>8</sup> Ibid., p. 291.

<sup>9</sup> Ibid., p. 292.

Research Professor of Zoology, Columbia University; Senior Geologist, United States Geological Survey; and President of the American Museum of Natural History. He was the author of the widely acclaimed book on prehistoric man, Man of the Old Stone Age, which was written 1915-1918. In 1927 he wrote a sequel to the above book, and named it, Man Rises to Parnassus,<sup>10</sup> which was first presented as a series of six lectures delivered to the students of Princeton University on the Louis Clark Vauxen Foundation. Here are expressed his latest views on the subject of archaeology.

Man Rises to Parnassus is non-religious, but scientific. The title was taken from Aeschylus' Prometheus Unbound. This Greek poet, living in the fifth century B.C., wrote of the rise of man to Parnassus. Osborn reasoned that the Greeks foresaw this rise and that the geologic record of the prehistory of man proves it.<sup>11</sup>

According to Osborn, primitive man dates back to Upper Pliocene time (c. 1,400,000 years).<sup>12</sup> In his evolutionary tree of the human family he includes the usual ancestors, such as Java man, Piltdown man, and Neanderthal man. A more detailed discussion of these stock ancestors will be included in the review of one of the more recent works

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<sup>10</sup> Henry F. Osborn, Man Rises to Parnassus (Princeton, N. J.: Princeton University Press, 1928), 226 pp.

<sup>11</sup> Ibid., p. 17.

<sup>12</sup> Ibid., p. 24.

on anthropology, Mankind So Far,<sup>13</sup> by William Howells.

Osborn had a modified Lamarckian theory of the inheritance of acquired adaptations.

Lamarck was right in a secular or geologic sense when he said that organs were acquired when animals "strive for them"; they are first acquired as non-hereditary modifications; in the course of ages they are acquired as true hereditary adaptations. . . . Individual choice of habit and of habitat, with men as with animals, has been the polestar of the rise of man.<sup>14</sup>

This differs from Lamarck's theory in that ages are required instead of a few generations to bring about the inheritance of adaptations. As an example of evolution at work Osborn tells how the digestive tract, dentition and jaw musculature of the Eskimo is extremely modified by their diet. He does not mention that the young of the Eskimo is like the young of other peoples in dentition and musculature. These limited variations acquired by the Eskimo are not inherited, since in order for traits to be inherited there has to be a change in the germ plasma. He also has no grounds to make the polestar of the rise of man and animals the choice of habit and habitat. Man is the only animal that can adjust himself to almost any kind of environment. With some few exceptions, animals have a rather limited choice of habitat, environment being thrust upon them.

Osborn's full conception is,

That the rise of man is due to four sets of causes acting coincidentally; namely, heredity or predisposition, habit or

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<sup>13</sup> William Howells, Mankind So Far (Garden City, N.Y.: Doubleday, Doran and Company, 1944), 518 pp.

<sup>14</sup> Osborn, op. cit., p. 208.

individual adaptation, the rigors or clemency of the environment, and the animal or human life by which man is surrounded.<sup>15</sup>

He says the Greeks had a similar idea, and he quotes some more of Prometheus to prove it. In this "full conception" he is not consistent with what he had previously written about Lamarck. With Lamarck he believes that first non-heritable modifications are acquired. Then he believes that in the course of ages these modifications become true hereditary adaptations. In his "full conception" he has all four sets of causes acting coincidentally; then if heredity acts coincidentally with the acquiring of a modification, an hereditary adaptation would immediately come about. This would then have to be considered a mutation. Also he has no evidence to support his inconsistent idea that the germ plasm is slowly modified, and then slowly adaptation becomes apparent in the offspring.

In his museum work Osborn supervised the construction of family trees for various animals, including one for man. To make evolution clear, all kinds of postures and strained re-creations were used. For these Osborn has often been criticized as having too vivid an imagination.

Richard S. Lull. The next scientist whose works should be considered is Richard S. Lull (1867), one-time Professor of Paleontology at Yale. One of his best known books is Ancient Man,<sup>16</sup> which was

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<sup>15</sup> Ibid., p. 203.

<sup>16</sup> Richard S. Lull, Ancient Man (New York: Doubleday, Doran and Company, Inc., 1929), 152 pp.



written about 1927. In the foreword of this book Lull says that he made diligent use of the works of Osborn, Tyler, Gregory, and MacCurdy. His view of man's ancestry and origin is largely in line with theirs.

Lull takes the origin of man as far back as possible. "Man comes from a very ancient lineage, his forbears going far back into the dim vistas of geologic time."<sup>17</sup> Next he tells just how far back. "That life origin occurred but once, most scientists agree, and that from this primordial organic material all forms of animal and plant life arose in the course of ages is also an accepted belief."<sup>18</sup> He could have gone all the way and said that this primordial organic material rose out of inorganic matter. He considers that all primates came from a common ancestral stock dating back about sixteen million years. He even mentions that some paleontologists include the great apes under the Hominidae. "Whatever his prejudices may be, how one would describe the common ancestor and leave the word ape or apelike out of his description I do not know."<sup>19</sup>

As further evidence of how this man is really gripped by the idea of evolution, there follows a few random quotations.

Back of this common ancestor lie other primitive and yet more primitive primates. . . . Probably in Triassic time, toward the beginning of the Mesozoic, the mammals themselves arose out of the reptilian stock. Of mammalian origin much that is theoretical has been said, though little actually proved.<sup>20</sup>

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<sup>17</sup> Ibid., p. 11.

<sup>18</sup> Ibid., p. 12.

<sup>19</sup> Ibid., p. 13.

<sup>20</sup> Ibid., p. 15.

Man, the ultimate form, has existed some half-a-million years, probably more, and for the last twenty-five thousand of these seems to have slowed down, at any rate in his physical evolution to a condition of little, if any, change.<sup>21</sup>

The human pedigree has been sketched in a broad way, but something more as to human origins seems called for, although it is of necessity highly hypothetical, since direct evidence is yet extremely scanty. . . . Man's relationship with the great apes is established from several distinct lines of evidence, brain, and other internal organs, skeleton, posture, and hands and feet, both in their framework and musculature, and even in the arrangement of the skin ridges of palm, sole, and digits, in other words, the fingerprint method of identity used in criminology.<sup>22</sup>

All scientists have not accepted the lines of evidence mentioned in the last paragraph, just as they have not accepted that all life arose from some primordial organic material.

Lull also gives his interpretation of the fossil skeletal record of man, and likewise deals with the cultural evolution of man as is shown by the Stone, Bronze, and Iron Ages. The center of human dispersal he places somewhere in central Asia north of the Himalaya uplift.

Kirtley F. Mather. Kirtley Mather, (1893), Professor of Geology, Harvard University, is another outstanding scientist who has shown an interest in the history of primitive man. In his book Sons of the Earth<sup>23</sup> he accepts the age of the earth which the radio-active time-keepers, uranium and lead, reveal. "Man's ancestors are prehuman

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<sup>21</sup> Ibid., p. 20.

<sup>22</sup> Ibid., p. 21.

<sup>23</sup> Kirtley F. Mather, Sons of the Earth (New York: W. W. Norton and Company, 1930), 210 pp.

beings that appeared at the close of Tertiary time, around 2,000,000 years ago."<sup>24</sup> Evolution, to Mather, has not been progressive for all creatures. To express this thought he gives his scientific conclusions a Scriptural turn.

Progress is apparently selective; many may be called, but certainly only a few are chosen. . . . At no time has the process of evolution guaranteed success to any species, if success be measured in terms of progress or improvement. It has simply guaranteed change--a change which has sometimes been for better but has often been for worse; and the species which have changed for the better have thereby passed out of existence. It may almost be said that the most successful species have been the shortest lived. To pass on the torch of life to a higher level, the torch-bearer must become extinct.<sup>25</sup>

In light of the above quotation, the ape that passed on the torch to the first prehuman being must have been the shortest lived of all creatures--the cranial capacity was more than doubled, that is, if the fossil record is accepted. In the great apes of today the largest capacity is 500-600 cc.<sup>26</sup> The brain case of the Java or Trinil Ape Man, considered by many to be the oldest of human skulls, appears to have been about 900-1000 cc.<sup>27</sup> The skulls of other primitive man were much larger.

William Howells. William Howells (1908), Research Associate, American Museum of Natural History; and Assistant Professor of Anthro-

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<sup>24</sup> Ibid., p. 101.

<sup>25</sup> Ibid., p. 210.

<sup>26</sup> George E. O'Toole, The Case Against Evolution (New York: The MacMillan Company, 1936), p. 274.

<sup>27</sup> William Howells, Mankind So Far (Garden City, N.Y.: Doubleday, Doran and Company, Inc., 1944), p. 138.

pology at the University of Wisconsin, has written one of the more recent books on anthropology, Mankind So Far.<sup>28</sup> In this book he attempts to summarize the anthropological findings of the past and to bring them up to date. It seems to be a fair and interesting summarization. The author does not hesitate to state the limitations of the data in the various links of human evolution.

Huxley states that man "blossomed suddenly in a few million years . . . upon a stem of anthropoid apes. . ."<sup>29</sup> In another place he brings out that there is no actual evidence for man's existence prior to the Pleistocene, or the last million years.<sup>30</sup> He believes that "evolution is a fact, like digestion."<sup>31</sup> It cannot be seen working but it does work. He feels that Darwin made evolution respectable, even though he thinks his theory of natural selection is out of date. As to Darwin's greatness he wrote, "Darwin was a great scientist, and for better or for worse he was responsible for much of the philosophy of our times."<sup>32</sup> On the same page it is admitted that naturalists are still in the dark as to the mechanics of evolution, and that the theories of Darwin, Lamarck, De Vries, and others are still being re-worked. He considers man as a generalized animal with further pos-

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<sup>28</sup> Ibid., 312 pp.

<sup>29</sup> Ibid., p. 3.

<sup>30</sup> Ibid., p. 104.

<sup>31</sup> Ibid., p. 5.

<sup>32</sup> Ibid., p. 6.

sibilities of evolution. Specialization stops evolution to a higher plane.<sup>53</sup>

There follows a brief summary of the fossil evidence for five of the most frequently mentioned ancestors of modern man, as given by Howells.

1. Pithecanthropus erectus, Java Man or Trinil Ape Man—middle Pleistocene. A brain pan and teeth, plus a thigh bone forty-five feet away on the same level, all found by Dubois in 1877. In 1936-37 Von Koenigswald found another skull. Three more have been found since then. None of the skulls were complete. (Howells does not emphasize this feature.) The brain case appears to have a capacity of about 900-1000 cc.<sup>54</sup> The fossils are definitely man and not monkey. (Weidenreich, who examined the skulls more recently figured the brain case at 775-850 cc.)<sup>55</sup> There was little brow and a very thick skull.
2. Sinanthropus pekingsis, Peking Man. The best known fossil man, except for the Neanderthals. There are fragments of forty individuals, which include six good skull vaults and many jaws and teeth. The skull is thick and with some brow, and its capacity is about 800 cc. larger than the Trinil skull. All fossils were from one cave. Sinanthropus was likely cannibalistic.
3. Erectus dawsoni, Piltdown Man. Piltdown Man is represented by fragments of only one skull. The scientists had a hard time getting together on the size of the skull; they finally agreed that it was about 1350 cc.<sup>56</sup> The skull wall was very thick, but the foremen magnum and mastoid process, and the muscle markings at the base of the neck are just as ours. Most authorities agree that he was living at the time of Neanderthal and Peking man.<sup>57</sup> If so, this hurts the "family tree for man more than all the other fossils put together."<sup>58</sup>

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<sup>53</sup> Ibid., p. 11.

<sup>54</sup> Ibid., p. 136.

<sup>55</sup> Franz Weidenreich, Apes, Giants and Man (Chicago: The University of Chicago Press, 1946), p. 93.

<sup>56</sup> Howells, op. cit., p. 159.

<sup>57</sup> Ibid., p. 154/

<sup>58</sup> Ibid., p. 160.

4. Homo neanderthalensis, Neanderthal Man--c. 100,000-50,000 B.C. Neanderthal man is found in all Europe, North Africa, Near East, and Uzbekistan. They are the true cave men; their dead were buried in cave floors. They lived in the fourth glacial advance. Many skulls and skeletons have been unearthed. Their brain was perhaps a little larger than ours. The skull was huge and thick, with heavy brows. The head was not balanced like ours, "but hung forward in a distinctly primitive fashion."<sup>39</sup> This is shown by the tilt of the foramen magnum.

There have been problem Neanderthals. Other skeletons were found outside of caves, and "anthropologists are to a great extent still up in the air"<sup>40</sup> over the significance of all so-called Neanderthals. How do they relate to us? They were very primitive in body structure, but their brain structure and culture are not to be pitied.

5. Homo sapiens, all living men--upper Paleolithic, 50,000-8,000 B.C. The brain case of sapiens is only half as thick as that of the Java or Peking Man. The brow ridges are pure vestiges.<sup>41</sup> The Cro-Magnons were sapiens. The Grimaldi and Wadjak skulls hint that Negroes and Mongoloids were also present. The Swanscombe and Mount Carmel skulls pose problems rather difficult for the anthropologists to answer. They cannot be put out of, or in Homo sapiens.<sup>42</sup>

To show how confused anthropologists are when it comes to the origin of Homo sapiens, and just where he branched off the Homidic tree,

The question is: Where had he been keeping himself? . . . If we are going to be receptive and believe all the evidence which says that ours is no new species, then we have this species in Europe (or at least England) in the second interglacial, replaced in the third by the Neanderthals, and returning after this usurpation to the ancestral demense again during the fourth glacial. This is a little hard on the imagination.<sup>43</sup>

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<sup>39</sup> Ibid., p. 167.

<sup>40</sup> Ibid., p. 170.

<sup>41</sup> Ibid., p. 183.

<sup>42</sup> Ibid., pp. 201 ff.

<sup>43</sup> Ibid., p. 209.

Then he gives what he calls a "rather lame and purely speculative answer." It is indeed so speculative as to not warrant its inclusion here. Then follows the words of a typical person bitten by the evolution bug: "The background of Hom sapiens remains a great problem, though a single skull might solve it." Note the word "single."

In the next paragraph he poses more of the problems, but still bugs to evolution.

But problems are almost all that fossil humanity has given us. Look back at some of them. What, really is the Piltdown skull? Why has Neanderthal Man alone such a peculiar skeleton? What are the Skhul people? What about the Steinheim skull and the faceless phantom of Swanscombe? If experts do not agree, it is not their fault. We will have to find more fossils than we have now, and that is what we look forward to. There is plenty of excitement in the hunt for ancient man.<sup>44</sup>

The final chapter of Mankind So Far is called "1492 to 1,000,000 A.D." This is the modern and future period of Man. Man "has come ahead of him in which to proceed with his evolution, which has so far been rapid."<sup>45</sup> Evidently Howells does not think much of the Biblical account of the day of judgment, for on the final page of the book he says, "Let us not, therefore, imagine that man may look forward only to some kind of a day of judgment."<sup>46</sup> Here he is thinking about those "sons" ahead in which man is to proceed with his evolution, and in the words of Poe, "merely this and nothing more."

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<sup>44</sup> Ibid. cit.

<sup>45</sup> Ibid., p. 305.

<sup>46</sup> Ibid., p. 312.

Franz Weidenreich. Perhaps the most recent publication by an outstanding anthropologist is the book Apes, Giants and Man by Franz Weidenreich,<sup>47</sup> of the American Museum of Natural History. Part of the research for this book was done at the famous Cenozoic Research Laboratory at Peking, China, which is one of the world's best equipped laboratories for osteological research. This book presents five lectures Weidenreich delivered in May, 1945, at the University of California under the Charles M. Hitchcock Endowment. The lectures had to be non-religious.

In the introductory remarks the author states that the characteristic features of fossil man may be easily traced to modern man.<sup>48</sup> Also in the introduction he proposes a new theory, that is, that all the living forms of mankind, and also the past forms whose remains have been recovered, must be included in the same species. If Linnaeus' taxonomical principles were followed, this would eliminate all the generic names found in paleontological writings. Rather than do this and bring about confusion in the entire literature dealing with early man, Weidenreich decided it best to continue using the old names.<sup>49</sup> As one reads the book, it is apparent that this one species has done a lot of evolving.

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<sup>47</sup> Weidenreich, op cit., 115 pp.

<sup>48</sup> Ibid., p. 2.

<sup>49</sup> Ibid., p. 3.



Weidenreich is familiar with all the recent human fossil finds in the period just prior to World War II, and in this work he tries to close in some of the gaps in the evolution of man as interpreted in the light of these more recent discoveries. The main gaps he filled in are among what he calls the Archanthropinae, "ancient man," consisting of the various Pithecanthropus finds, and two new giants of the earth. These giants he considers the most primitive of the fossil remains. He has closely tied them in with the apes: "the archanthropine skull shows the basic characteristics of the simian state in a more definite way."<sup>50</sup> All through the book he compares the skulls of ancient man with that of a female gorilla. His middle group he calls the Palaeanthropinae, "old man"; the pedigree of man here also has many gaps. All gaps are filled in the Neanthropinae, or "recent man."

It was the finding of bone fragments of some giant men from ancient Java that really served as the inspiration, or excuse, for this book. Forty years ago Weidenreich says that some anthropologists were saying that pigmies were the first human beings; now it is giants. In 1937 and 1938 G.H.R. Von Koenigswald found jaw and skull fragments of what appeared to be a giant man or men, and he sent casts of his finds to Weidenreich. The war came on and no one knows what happened to von Koenigswald. Weidenreich secured the permission of the Dutch govern-

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<sup>50</sup> Ibid., p. 31.

ment to publish his findings as based upon the casts sent him by von Koenigswald. It is interesting to note that at first Weidenreich doubted that the first jaw find was human.<sup>51</sup> When he received the cast of the small piece of a lower jaw, he changed his mind and agreed with von Koenigswald that it was human. A reconstruction of the jaw showed that the owner had to be bigger than any living gorilla.

As further proof that "there were giants in the earth," he reconstructed a Chinese giant from fossil teeth found in Chinese curio shops. This Chinese giant was twice as large as a male gorilla.<sup>52</sup> In all of this he seems to be straining to fill in a gap in the evolution of man with something rather startling. He admits, however, that "it may be that the giants are only variations--whether local or more widely spread, remains, as yet, undecided."<sup>53</sup> He wants to make the giants more primitive than Pithecanthropus because their jaws and skull bones are thicker and more massive. The stratigraphy of the Java finds furnished no help to him in fixing the age of the giants;<sup>54</sup> especially if stratigraphical evidence was needed to make them more primitive. With crushed and broken fossil fragments he has very little evidence to propose that man's ancestors were giants. Yet he says, "The discovery of the Java man, first made by Dubois in 1892, shifted the question of

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<sup>51</sup> Ibid., p. 51.

<sup>52</sup> Ibid., p. 61.

<sup>53</sup> loc. cit.

<sup>54</sup> Ibid., p. 62.

the missing link out of the stage of pure speculation into that of facts."<sup>55</sup>

Ann. Giant and Man has a number of good photographs to show the relation of these primitive skulls to the simian skull. The female gorilla's skull he used to illustrate the relationship is never shown in a clear frontal view, which would show the large keel down the middle of the cranium. This is one of the most common tricks of anthropological photography.

The last two chapters of the book are devoted to discussing the classification and origin of the human races, and the human brain and skull. Regarding the origin of the human races, Weidenreich feels that it has always been the nature of man to interbreed, and that it would be hard to give a good definition of a race.<sup>56</sup> In this he is in agreement with Westermarck in his exhaustive work, The History of Marriage.<sup>57</sup> Weidenreich is also of the opinion that the seroanthropologists have no real proof that races may be classified by blood tests, as shown by the subgroups recently discovered within the groups.<sup>58</sup>

In the final chapter, which deals with the human brain and skull, Weidenreich brings out that all evolutionists agree that the evolution

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<sup>55</sup> Ibid., p. 66.

<sup>56</sup> Ibid., p. 91.

<sup>57</sup> Edward Westermarck, The History of Human Marriage (New York: Allerton Book Company, 1922), Vol. II.

<sup>58</sup> Weidenreich, op. cit., p. 80.

of man aims toward, above all else, the enlargement of the brain. He points to the fact that the human brain is not the largest brain in the animal kingdom. "The brain of an elephant is more than four times heavier and correspondingly larger than that of man, while that of a whale is almost ten times larger."<sup>59</sup>

To further show that figures do not always tell the truth as to man's superiority when it comes to comparing his brain with that of other animals, Weidenreich gave the following facts:

However, if, instead of the absolute weight of the brain, its weight in proportion to the weight of the body is taken into account, the figures are quite different. In man 1 gm. of brain correlates with about 46 gm. of body, but in the elephant the correlation is 560 gm. of body, and in the whale 8,300 gm. of body. Yet in spite of this the relative size of the human brain, man is not the brainiest creature. He is surpassed by the capuchin monkey of South America, which has 1 gm. of brain for each 17.8 gm. of body.<sup>60</sup>

Then too, there is great variation in the size of the skull of modern man. The capacity of the skull of modern man varies from 910 cc. to 8,100 cc., if exceptional cases with lower or higher values or obviously pathological cases are neglected.<sup>61</sup> The cranial capacity of man has not increased any since the Neanderthals, in fact there might be a slight decrease. He says, "The human brain case attained its greatest evolutionary expansion during the Neanderthal phase and has undergone a

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<sup>59</sup> Ibid., p. 92.

<sup>60</sup> Loc. cit.

<sup>61</sup> Loc. cit.

distinct diminution since.<sup>62</sup> This is then a paradox of evolution, which he explains by saying that instead of an increase in capacity there has been a change in the form of the brain case. "The ideal form of that of early man looks like a loaf of bread. The ideal form of that of modern man, however approaches a globular shape. . . . In other words, the height of the Neanderthalian brain is, in all cases, inferior to that of modern man."<sup>63</sup> He attributes this change, which is an advance, to an increase of the number of cells in the cortex and their differentiations. An increase in the number of cells would not necessitate any enlargement of the brain case nor reveal any trace on the inside of the cranial cavity as far as the fissuration is concerned. This led him to conclude:

The most important achievements in the phylogenetic development of the brain, therefore, escape our observation. . . . The fact that mental qualities--at least those of a higher order--are hidden, so to speak, in the interior of the brain should make us cautious and suspicious of any attempt to read special mental qualities from the general form of the skull and head or from certain bony structures visible on their exteriors.<sup>64</sup>

In other words, you cannot draw any conclusions about a man's brain simply by measuring his bald cranium, nor does the inside of the cranial cavity reveal much more. Weidenreich is definitely guessing.

In a summary paragraph he reiterates:

The characteristic transformation of the human skull which has gone hand in hand with evolution consisted, in the first phase, of an expansion of the brain case. When the Neanderthal phase

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<sup>62</sup> Weidenreich, op. cit., p. 94.

<sup>63</sup> Ibid., p. 95.

<sup>64</sup> Ibid., p. 99.

was reached, the expansion stopped and the further development of the brain case went in the direction of brachycephalization (the increase in breadth and decrease in length). . . . The increasing brachycephalization is, therefore, an indication that evolution still goes on.<sup>65</sup>

This last conclusion he based upon skull measurements from humans of the Iron Age down to today. The measurements were by other anthropologists and ethnologists in recent years. By no means are all people today brachycephaloids. Weidenreich noted that in Germany and Switzerland in particular, brachycephalization seemed to be increasing; but his facts are everywhere inadequate. In no instance does he know whether any specifically mentioned brachycephaloid was a criminal or a genius, nor does he bother to include figures as to the number of brains measured. It is safe to assume that they were not enough to draw conclusions for the entire history of man.

Conclusions drawn from the writings of these men.

1. Evolution is a fact.
2. Man has been on the earth a long time—500,000 to 2,000,000 years.
3. His ancestors were simian.
4. There are many fossil links missing in man's family tree.
5. The found links are considered as proof of evolution, but they pose many unanswerable problems.
  - a. These problems are well stated by Howells.

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<sup>65</sup> Ibid., p. 110.

6. Anthropologists are confident other links will be filled in as the search continues. (This confidence seems to be an obsession with them which leads them to read too much into the facts at hand.)
7. A comparison of the cranial capacity of ancient man with that of modern man does not furnish adequate proof of evolution.
  - a. The skulls of living men show as great a range as do those of fossil men.
  - b. Weidenreich makes much of this point so that he can introduce his theory of increasing brachycephalization to explain what he considers the more recent turn of evolution.
8. Back of the Neanderthals the fossil record is not very adequate, but the technique of bone identification and reconstruction has been so perfected that an entire human skull can be reconstructed from a jaw fragment; and with a fossil tooth almost the same thing can be done.
  - a. However, investigators appear to differ markedly on the appearance of these reconstructions.
9. None of the anthropologists offered the same explanation of the evolutionary processes. Some of them did not even attempt to explain the hows, admitting that the old theories are still being reworked.
10. There is disagreement as to whether the physical evolution of man is continuing.

## CHAPTER V

### EVOLUTION AND CHRISTIAN PHILOSOPHY

This study has shown that most of the scientists who have attempted to trace the history of evolution have been prone to philosophize regarding man's past, present, and future life upon earth. In trying to philosophize about the history of the totality of life one cannot escape taking one of two presuppositions: the history of life is either absolute creativity, the appearing of the new without adequate antecedents or grounds; or it is a series of effects springing from a cause whose nature these effects more or less reveal.

Those who adopt the first presupposition can give no intelligible answer as to the cause of the new, or the increase. The "more" it seems is to be accounted for simply by the fact that so much time has elapsed. There are many evolutionists who take this point of view. Others would make evolution itself "creative". Alexander, Bergson, and Morgan may be listed here. With these men God practically becomes evolution itself; He is process. But this in itself is a negation, because what is a modus operandi can never become any sort of substantial reality. Can the utterly nonexistent become existent purely by virtue of a method? All that can be said of evolution is that it is a possible method.

Evolution is certainly not a proved fact, for too many scientists throw water on their own fact. As another example, Horation H. Newman, Professor of Zoology, University of Chicago, in his book, The Gist of Evolution, said:



The evolution theory is not merely a 'guess.' It is supported by an immense array of evidence and has withstood the severest criticism of the scientific world for three quarters of a century. It is now one of the best established of scientific laws.<sup>1</sup>

Then three pages later he wrote: "A timely warning to the lay reader of this little book may not be amiss. Do not expect too much in the way of cogent or direct proof of evolution."<sup>2</sup> Again, on the final page of the book: "The scientific study of evolution is in its infancy."<sup>3</sup> Similar contradictions were found in the works of Thomson,<sup>4</sup> Conklin,<sup>5</sup> and Huntington.<sup>6</sup>

At this place it seems that the thinking Christian cannot help but agree with Minin Lewis that,

The only possible way of making creation by evolutionary method a credible conception is by postulating a reality which works by this method. Evolution as itself the creative force, able to produce something from nothing, the sole cause of all the rich variety of existence, is not only not intelligible--it is one of the most amazing proposals ever entertained by the mind of man.<sup>7</sup>

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<sup>1</sup> Moratio H. Newman, The Gist of Evolution (New York: The Macmillan Company, 1926), p. 38.

<sup>2</sup> Ibid., p. 41.

<sup>3</sup> Ibid., p. 151.

<sup>4</sup> J. Arthur Thomson, Science and Religion (New York: Charles Scribner's Sons, 1923), 278 pp.

<sup>5</sup> Edwin C. Conklin, The Direction of Human Evolution (New York: Charles Scribner's Sons, 1931), 247 pp.

<sup>6</sup> Ellsworth Huntington, Main Springs of Civilization (New York: John Wiley and Sons, Inc., 1942), 606 pp.

<sup>7</sup> Edwin Lewis, God and Ourselves (New York: Abingdon-Cokesbury Press, 1931), p. 238.

Some of today's outstanding scientists are not the hard-headed materialists of former years. They are quite willing to admit that in life's continuous ascent the laws of chance and probability have been frequently flouted and disobeyed. Some of them would rather attribute this unknown factor to "anti-chance" than to God. Either this unknown agency had to be admitted or else they had to confess that in spite of all their study of evolution they knew nothing.

With Sir Arthur Eddington a scientist of note is found who for the first time ties in science, mysticism and religion. Sir Arthur, in the light of the new findings of physicists and astronomers, casts doubt this way and that. The illusory universe he has studied remains a mystery to him; yet he feels that, "Life would be stunted and narrow if we could feel no significance in the world around us beyond that which can be weighed and measured with the tools of the physicist or described by the metrical symbols of the mathematician."<sup>8</sup> He even gives encouragement to the anti-evolutionists:

If you genuinely believe that a contra-evolutionary theory is just as true and as significant as an evolutionary theory, surely it is time that a protest should be made against the entirely one-sided version currently taught.<sup>9</sup>

Lecomte du Nouy in his much-discussed book, Human Destiny.<sup>10</sup>

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<sup>8</sup> Arthur S. Eddington, The Nature of the Physical World (New York: The MacMillan Company, 1929), p. 324.

<sup>9</sup> Ibid., p. 92.

<sup>10</sup> Lecomte du Nouy, Human Destiny (New York: Longmans, Green and Company, 1947), 289 pp.

is a great believer in the evolutionary process and in God, but for him Christ does not seem to be the Saviour, but the perfect ideal for men to follow. At times he borders on "creative evolution":

The omnipotence of God is manifested by the fact that man, descended from the marine worms, is today capable of conceiving the future existence of a superior being and of wanting to be his ancestor. Christ brings us the proof that this is not an unrealizable dream but an accessible ideal.<sup>11</sup>

Thus modern man becomes the ancestor of some future God. Most Christians are unwilling to accept such a belief.

The scientist or person who adopts the second presupposition, which is by far the most logical, believes that life and history are to be regarded as the manifestation in time of a reality which exists out of time, and which would still exist even if there was no manifestation in time. "The creative source must be adequate to the created issue."<sup>12</sup>

The geological record and the Biblical revelation clearly teach that there was an increasing richness and variety of life forms on earth. Yet, the highest and the lowest forms both manifest an intelligent source, but the highest forms more fully reveal the source. "So every first is the promise of its own last; every Alpha presages its own Omega."<sup>13</sup>

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<sup>11</sup> Ibid., p. 197.

<sup>12</sup> Lewis, op. cit., p. 236.

<sup>13</sup> Ibid., p. 238.

The Christian does not have to accept that God created by the evolutionary method. Lewis in God and Ourselves did go that far with the evolutionists.<sup>14</sup> He posits that all of life is "a search and a discovery"—a discovery of the real. He considers that the lower life forms were ever able to reach out because of "divine discontent enshrined within their hearts,"<sup>15</sup> and thereby the waiting reality was discovered. When the great gaps of evolution are considered, the "divine discontent" within each life form seems an inadequate cause for the great leaps forward, for the discontent would have to have tremendous upsurges from time to time from the Godward side to account for the leaps. In these instances evolution as a method of operation fails to furnish an entirely adequate solution to the problem of creation—unless it be admitted that some higher power intervened to cause the upward leaps.

Moral religion and moral science. Here the Christian raises the same question that was mentioned in the introductory paragraph of this thesis: If the study of evolution is a science, and science is amoral, how can the moral nature of man be tied in with evolution? It is too much a stretch of the imagination to say that the moral can be made to fit into the amoral; but when man becomes the result of a process, and it is a fact that he is a moral creature, of necessity then

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<sup>14</sup> Ibid., p. 238.

<sup>15</sup> Ibid., p. 238.

this moral nature must be part of the process; or else it must be admitted that it is divinely imparted. Of course most evolutionists are unwilling to admit a sudden divine impartation, and what is supposedly moral science becomes natural science, for in the modus operandi of evolution man was wrought with a moral nature. Liberal Christianity, being based upon a progressive philosophy, readily accepts such a view. With the orthodox Christian it is not so, for by making evil the result of following his animal instincts, evolution does away with the Biblical story of man's fall from a higher state and with his need of redemption. Herein lies the greatest anti-orthodox teaching of evolution. Christ's sacrificial death and resurrection has nothing to do with man's redemption and resurrection. Man saves himself and society only as he turns away from his selfish animal instincts.

The orthodox Christian would say that a person can believe in evolution and still be a Christian, but he cannot be a Christian and accept all the materialistic implication which go so readily with evolution as process. The true Christian must be willing to attribute the unexplainable events of earth, such as atomic energy, electronics and the great gaps of evolution, to God. He must also accept the fact that Christ is another intervention of Deity, and that His entire teachings must be heeded, or Christ becomes a mere creature of evolution. Christ stated quite clearly that He must be believed in as Son of Man and Son of God, and as Saviour, Redeemer, and Lord. All through His ministry He was trying to make His disciples see that through faith in Him and through the power of the Holy Spirit they could be united to

God in a spiritual tie that transcended all bounds of time and space. This spiritual union with the Divine was the goal of both God and man; and it still is today, even though vain man only feigns to seek this one "tie that binds." When the spiritual bond between God and man is completed, man begins to see and to sense for the first time the workings of the will of God in the whole of creation. In the personality who attains unto the greatest gift of God there beats within the breast more than the desire to keep the commandments of the Father and make certain correct moral choices whenever opportunity presents. A Spirit-given perfect love is there, a holy love. The holiness of God is part of the very nature of such a personality, for the Holy Spirit dwells within.

It seems well to raise the point here that perhaps both the scientists and the religionists have arbitrarily drawn a line between the so-called moral and amoral. To the non-Christian and liberal Christian this line is likely to be real. However, many liberal Christians and all orthodox Christians agree that God created numerous life forms or set His natural laws in operation for a purpose--an end product, moral man. It would then seem that this gives the whole of animate and inanimate nature a moral significance, and that this universe can be called a moral universe. Further, whenever man sets out to discover the secrets of nature he cannot escape having a moral relationship with them. If man is commanded, "whatsoever ye do, do all to the glory of God,"<sup>16</sup> it then seems that every thought and motive in the hearts and minds of men

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<sup>16</sup> I Cor. 10.31. Cf. also Col. 3.17; I Pe. 4.11.

must have some moral significance to God. If "the whole of creation groaneth and travaileth in pain together until now,"<sup>17</sup> awaiting the revealing of the sons of God made possible through the sacrificial death of Jesus Christ, does not this death which was fraught with moral implications carry over into nature? When Christ entered triumphantly into Jerusalem prior to His crucifixion, He was asked to rebuke His disciples for singing Hosannas to their King. Straightway, He answered: "If these should hold their peace, the stones would immediately cry out."<sup>18</sup> This certainly seems to teach that the Saviour, nature, and man are all intimately bound together. In this instance, nature was there to acknowledge the tremendousness of the event had man himself failed as to do. Nature is always ready to point out to man something of the nature of God, "for the invisible things of Him from the creation of the world are clearly seen, being understood by the things which are made, even His eternal power and Godhead."<sup>19</sup>

The man who has come to the place where he does everything to the glory of God, can study the sciences and perform experiments for the glory of God. As he works he ever sees the handiwork of the Creator in nature. The great gaps and unknowables cause him to stand in greater awe and to manifest a greater love for his Creator. He senses ever afresh his own responsibility of stewardship for the whole of creation

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<sup>17</sup> Rom. 8.22.

<sup>18</sup> Luke 19.40.

<sup>19</sup> Rom. 1.20.

with which he comes in contact. He wants to use every invention of man and discovery of science for the good of mankind and for the glory of the Father in Heaven.

The scientist who is Christian and full of perfect love has come to realize that God has never tried to lift man out of the "natural" in order to speak to him. In line with Romans 1,20, Edwin Lewis has summarized how God uses the natural:

Whatever can affect a person at all can affect him for God's purposes. He would reach into our inmost being to possess us there. But he does not do this from outside life's ordinary processes; he does it from within them.

This machinery of the 'natural,' to call it that, is of God's ordaining. It is his instrument for producing and nurturing souls. He himself dwells in the very center of the machinery, and he dwells there by the Spirit. Why is he there? He is there in order to get at us. Objects and events, books and pictures, sea and mountain, friendship and love, . . . all things that normally belong to life constitute so many avenues through which the Holy Spirit would find his way to the spirit of man.<sup>80</sup>

The scientist with perfect love is doubly conscious of the things mentioned above, and countless others besides. To him they are avenues through which God can work His purposes in the lives of men. He knows that man must yield to keep the avenues open and develop a sensitiveness to the Spirit's voice. Most of all, he has learned that the Bible is the greatest of avenues through which the Spirit can work. First, this Spirit, as an unknown power, convicted him of a spiritual need and pointed him to Christ. When he cried unto Him as Saviour and Lord, the

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<sup>80</sup> Edwin Lewis, The Ministry of the Holy Spirit (Nashville: Tidings, 1944), p. 95.



Father heard his cry and gave him unto the Son, and then the Spirit witnessed with his spirit what it was to be a son of God, to be united with the divine. Life took on new meaning. He longed to know more about the God whom he now worshiped and adored. Spiritual truths about his own salvation were revealed to him. By willing to keep all avenues open to the voice of the Holy Spirit, there was pointed out a more excellent way, the way of perfect love. Later, when he presented himself as "a living sacrifice, holy, acceptable unto God," and asked for the gift of the Holy Spirit, he too received this gift as he tarried in prayer before the Lord. Perfect love was given unto him, and this is the experience of the Spirit's complete control--a completed union of the human with the Divine. In the perfection of love the scientist found the crown which the Spirit had worked so long and patiently to give him. More than that, such love is the evidence of His abiding presence. Now he senses Jesus Christ as "Immanuel," or God-with-us.

Having this blessed gift, the scientist recognizes that the tragedy of our date conscious age is that the "natural" avenues too often become the clogged avenues of his fellow scientists. "Vehicles that do not convey. . . . Eyes that see only the palpable. . . . Love that corrupts."<sup>21</sup> Clogged avenues only serve to resist the Holy Spirit's strivings.

In conclusion, the scientist would have never known the purposes

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<sup>21</sup> Ibid., p. 96.

of God upon earth, had he not one day met Jesus Christ and had an experience of God. Everything then seems to center in Christ. The Bible teaches that Christ was the creator of the trinity.<sup>22</sup> Paul said, "And He is before all things, and by Him all things consist. . . . For it pleased the Father that in Him should all fullness dwell."<sup>23</sup> Jesus himself said, "All power is given unto me in heaven and in earth."<sup>24</sup> In light of such Omnipotence, the Gospel is no little Gospel; and Christ is truly unique.

Contemporary astronomers are toying with the idea that Earth is the possible center of the heavenly systems. Today, if this earth be the center of the universes, and man be the highest creature of earth, and all things consist in Jesus Christ who satisfies to the uttermost, surely it is to Him that all men must turn who would enjoy the greatest privileges of life.

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<sup>22</sup> John 1.3; Col. 1.16.

<sup>23</sup> Col. 1.17, 19.

<sup>24</sup> Math. 28.18.

## CHAPTER VI

### CONCLUSIONS

The thinking Christian has learned from this historic study of evolution that:

1. Evolution started as an outgrowth of German rationalistic philosophy.
2. Evolution is based upon the "principle of the minimum," or a monistic metaphysics. This principle simplifies or unifies causation by eliminating all that is superfluous in the way of explanation. It is a principle frequently used to an advantage in scientific experimentation.
3. The idea of evolution, or "progress," spread into all fields of thought the last half of the nineteenth century, and is responsible for much of the philosophy of our times.
4. The basic theories of Darwin, Lamarck, and De Vries are still being reworked. The "how" of evolution is therefore unknown.
5. The sciences of genetics, biology, geology, and paleontology fail to offer objective proofs for any of the great upsurges of evolution, such as hair in mammals, feathers in birds, compound eyes, man's brain, etc.
6. The fossil record of man fails to prove that man has evolved from primitive ancestors. Human fossils have posed more problems than anthropologists have been able to answer.
7. Outstanding scientists boast loudly of the fact of evolution, and then turn around and throw water on their fact.

8. Evolution is not a proved fact. The seven points listed above discredit its factualness.

9. Evolution itself cannot be "creative." When it is made creative, God becomes "process." This in itself is a negation, because what is a modus operandi can never become any sort of substantial reality. The utterly nonexistent cannot become existent purely by virtue of a method.

10. Therefore, all that can be said of evolution is that it is a possible method.

11. If evolution is the method of creation, some modified theory should be advanced which will better satisfy the evidence at hand.

12. Atomic power, electronics, and the unexplainable gaps of evolution should cause all scientists to worship God.

13. The worshipping of God should lead to a union of man's spiritual nature with the Divine Nature. This is the goal of both God and man.

14. This union is a conscious experience of God. All men must have such an experience before they can have a true concept of the spiritual realities which are bound in with the whole of creation. The head and whole body must be turned toward God, and faith must be exercised in Jesus Christ as Lord and Saviour, before there can be such an experience.

15. The spiritual union is not qualitatively completed until perfect love is shed abroad in the heart of the believer by the power of the Holy Spirit. All scientists should let God's Spirit

lead them to this crown.

16. The scientist cannot truthfully call the Christian foolish who still believes that God created the millions of kinds of life forms on earth today, for he cannot prove that He did not create them.

17. For the present the Christian may adopt an agnostic attitude towards evolution. Genetics and fossil study may bring to light objective proofs of evolution.

#### **SELECTED BIBLIOGRAPHY**

## A. BOOKS

- The Holy Bible, (Authorized Version, 1611),  
London: Collins' Clear-Type Press, 1915.
- Agassiz, Elizabeth C., Louis Agassiz, His Life and Correspondence.  
New York: Houghton and Mifflin and Company, 1936. 647 pp.
- Conklin, Edwin C., The Direction of Human Evolution. New York: Charles Scribner's Sons, 1931. 347 pp.
- Darwin, Charles, The Origin of Species. New York: A. L. Hart, c. 1931,  
a reprint from the sixth London edition. 505 pp.
- \_\_\_\_\_. The Descent of Man. New York: Hurst and Company, 1874. 544 pp.
- du Rouy, Leconte, Human Destiny. New York: Longmans, Green and  
Company, 1947. 289 pp.
- Haddington, Arthur S., The Nature of the Physical World. (The Gifford  
Lectures, 1927). New York: The MacMillan Company, 1929. 338 pp.
- Goldschmidt, Richard, The Material Basis of Evolution. New York:  
Yale University Press, 1940. 423 pp.
- Gracner, Th., An Investigation and a Criticism of Evolution.  
Milwaukee, Wisconsin: Northwestern Publishing House, 1934. 156 pp.  
(First published in May, 1931.)
- Hall, D. W., Science, Its Effect on Industry, Politics, War, Education,  
Religion and Leadership. Brooklyn, New York: Chemical Publishing  
Company, 1944. 114 pp.
- Howells, William, Mankind So Far. Garden City, New York: Doubleday,  
Doran and Company, Inc., 1944. 312 pp.
- Huntington, Ellsworth, Mainstays of Civilization. New York: John  
Wiley and Sons, Inc., 1942. 608 pp.
- Jeans, Sir James, Physics and Philosophy. New York: The MacMillan  
Company, 1943. 216 pp. (Printed 1942 in England).
- Lewis, Edwin, God and Ourselves. New York: Abingdon Cokesbury Press,  
1931. 311 pp.
- \_\_\_\_\_. The Ministry of the Holy Spirit. Nashville, Tennessee:  
Tidings, 1944. 159 pp. (A reprint of The Revival Pulpit, August-  
September issue, 1944. )

- Lull, Richard Swann, Ancient Man. New York: Doubleday, Doran and Company, Inc., 1929. 152 pp.
- MacGarity, George Grant, Human Origins. New York: D. Appleton and Company, 1926. 2 Vols., 425 and 478 pp.
- Mather, Kirtley F., Sense of the Earth, The Geologist's View of History. New York: W. W. Norton and Company, 1930. 210 pp.
- McCann, Alfred Watterson, God--or Gorilla. New York: The Devin-Adair Company, 1922. 359 pp.
- Miller, Hugh, The Testimony of the Rocks, or Geology in its Bearings on the Two Theologies, Natural and Revealed. Boston: Gould and Lincoln, 1858. 502 pp.
- \_\_\_\_\_, Foot-prints of the Creator, or, The Asterolepis of Stromness. Boston: Gould and Lincoln, 1861. 331 pp.
- Millikan, Robert Andrews, Evolution in Science and Religion. New Haven: Yale University Press, 1927. 95 pp. (Terry Lectures for that year.)
- Morgan, Thomas Hunt, The Scientific Basis of Evolution. New York: W. W. Norton and Company, Inc., 1935. (First edition 1938). 297 pp.
- Nelson, Byron Christopher, After Its Kind. Minneapolis, Minn.: Augsburg Publishing House, 1927. 214 pp.
- Newman, Horatio M., The Gist of Evolution. New York: The Macmillan Company, 1926. 151 pp.
- Nordenskiöld, Erik, The History of Biology. New York: Tudor Publishing Company, 1934. c. 600 pp.
- Osborn, Henry Fairfield, Man Rises to Paradoxia. Princeton, N. J.: Princeton University Press, 1928. 226 pp.
- O'Toole, George Barry, The Case Against Evolution. New York: The Macmillan Company, 1926. 572 pp.
- Schack, Albert P., Evolution--Examined in the Light of Revelation and Reason. New York: Frederick M. Hitchcock, 1926. 121 pp.
- Spencer, Herbert, First Principles. New York: P. F. Collier and Son, 1902. 550 pp. (First published in England in 1841).
- Sweet, Louis Matthews, To Christ Through Evolution. New York: George H. Doran Company, 1923. 351 pp.



- Thomson, J. Arthur, Science and Religion. New York: Charles Scribner's Sons, 1925. 278 pp.
- Tute, Sir Richard Clifford, After Materialism—What? New York: E. P. Dutton and Company, Inc., 1945. 212 pp.
- Weidenreich, Franz, Apes, Giants and Man. Chicago: The University of Chicago Press, 1946. 115 pp.
- Westermarck, Edward, The History of Human Marriage. 3 vols. 5th ed. rewritten. New York: Allerton Book Company, 1928.

#### B. PARTS OF SERIES

- Blakeslee, Albert F., Effects of Induced Polyploidy in Plants. Vol. IV, Jaques Cattell, editor, Biological Symposia, 14 vols.; Lancaster, Pa.: The Jaques Cattell Press, 1941. pp. 183-201.
- Match, Melville H., The Logical Basis of the Species Concept. Vol. IV, pp. 223-242. Jaques Cattell, editor, Biological Symposia, 14 vols.; Lancaster, Pa.: The Jaques Cattell Press, 1941.
- Huskins, C. L., Polyploidy and Mutations. Vol. IV, pp. 133-147. Jaques Cattell, editor, Biological Symposia, 14 vols.; Lancaster, Pa.: The Jaques Cattell Press, 1941.