

*The*  
*TRANSFORMIST*  
*ILLUSION*



DOUGLAS DEWAR

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*Title:* The Transformist Illusion

*Date of first publication:* 1957

*Author:* Douglas Dewar

*Date first posted:* Jan. 6, 2022

*Date last updated:* Jan. 6, 2022

Faded Page eBook #20220107

This eBook was produced by: Stephen Hutcheson, John Routh & the online Distributed Proofreaders Canada team at <https://www.pgdpcanada.net>

The  
TRANSFORMIST  
*ILLUSION*

By  
DOUGLAS DEWAR

DEHOFF PUBLICATIONS  
Murfreesboro, Tennessee  
1957

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PRINTED IN THE UNITED STATES OF AMERICA

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# INTRODUCTION

James D. Bales

Douglas Dewar is well known to many Americans who have delved into the literature against the theory of evolution. For around fifty years he has been a student of the subject. Around forty years or more ago he wrote, with Mr. Finn, a work which accepted a theory of evolution while rejecting Darwinism. Finally his continued study of the facts drove him to the conclusion that the theories of evolution are false. In recent years he has had published a debate with H. S. Shelton, *Is Evolution Proved?* Only last year his debate with J. B. S. Haldane, one of England's leading biologists, came from the press. It is called: *Is Evolution a Myth?* Dr. L. M. Davies cooperated with Dewar in this debate.

There have been some delays in the publication of this book. Mr. Dewar, in August, 1951, added some additional material in the appendices.

I am happy to have a part in bringing this book to the reading public. A careful weighing of Dewar's arguments and facts is expected and invited.

James D. Bales  
American Secretary of the Evolution  
Protest Movement  
Harding College, Searcy, Arkansas

## SPECIAL NOTICE

In the Spring of 1957, Dr. Douglas Dewar died without having lived to see this book in print. His many friends on many continents will cherish this production even more. "He being dead yet speaketh."

The Publishers

## PREFACE

In my “Difficulties of the Evolution Theory” published in 1931 I tried to show that the difficulties which beset the theory of organic evolution are so formidable as to render it desirable, if not to abandon the theory, at least to supplement it by a theory of special creation.

Dr. A. Morley Davies in his scholarly book entitled “Evolution and Its Modern Critics,” published in 1937, sought to meet most of the difficulties cited by me and set forth a number of facts deemed by him to support the theory.

In 1938 I published a rejoinder to Dr. Morley Davies entitled “More Difficulties of the Evolution Theory.” Dr. Davies has not pursued the discussion.

“Difficulties of the Evolution Theory” has been out of print for some years, and I have been urged to bring out a new edition. But recent discoveries and a change in biological outlook, to say nothing of the existence of the two later books just mentioned, would entail the rewriting of practically the whole of “Difficulties” and the inclusion of much of “More Difficulties.” Accordingly I have written an entirely new book, which brings my earlier books up-to-date and states the case against evolution as it stands in 1948.

I have called this new book “The Transformist Illusion,” because today it is obvious that the theory of evolution as held by Darwin and his followers is an illusion.

Biology is still in so backward a state that its students are not in a position to offer a scientific explanation of the world of life. It is, however, sufficiently advanced to enable us to say with certainty that it is an illusion to believe that the blind forces of nature are responsible for the origin of life and the development of all organisms now living from one-celled ancestors by the accumulation of small variations during a period extending over millions of years.

It is high time that biologists and geologists came into line with astronomers, physicists and chemists and admitted that the world and the universe are utterly mysterious and all attempts made to explain them have been baffled.

Douglas Dewar

October 31st, 1948



# Chapter I

## BIOLOGY VIS-A-VIS THE PHYSICAL SCIENCES

From time immemorial there have been two schools of thought regarding the origin of the world of life—the creationist and the evolutionist. Until the majority of men of science became victims of Darwinian sophistry the creationist school had the greater number of adherents.

There is this difference between the two schools of thought; the Creationists do not hope to understand how God created the animals and plants, the Evolutionists, on the other hand, hope to discover not only the natural forces which they believe caused life to arise and assume its present diversities, but how these forces have accomplished this feat. So far this quest has been entirely unsuccessful, and there is no prospect of success ever being achieved.

## THE ORIGIN OF LIFE

At the outset the evolutionist encounters the supreme difficulty of accounting for the origin of life. So great is this difficulty that Professor J. B. S. Haldane, declined to debate evolution with Col. L. M. Davies and myself, unless the question of the origin of life on the earth were excluded from the debate.

All agree that there was a time when life cannot have existed on the earth.

The Creationist asserts that the first living organisms were created miraculously, the evolutionist that they originated in the natural course of events, as the result of the interplay of forces or the fortuitous concourse of atoms and molecules. The latter view, unlike the former, can be tested experimentally. If in the past inorganic matter became transformed into a living organism, it ought to be quite easy to repeat the process in the laboratory. We know the chemical elements and compounds of which the bodies of animals and plants are composed. The biochemist has all these at his disposal. He can take any combination of them he chooses. Thanks to the apparatus at his disposal he can provide these compounds with any kind of environment he pleases, subject them to any sort of atmosphere, and degree of temperature and pressure, to any description of light or to complete darkness, to electric or galvanic treatment, to cosmic rays, to ultra-violet or ultra-red rays, to X-rays and emanations from any radio-active mineral.

Nevertheless, so far all attempts to convert inanimate compounds into living matter have ended in failure. I doubt whether any scientific man today expects to be able to do so, because the extraordinary complexity of even the most minute living organism is realized. Gager truly remarks that the simplest cell, the unit of every organism, has a structure compared to which that of a modern printing press or a watch is simple and clumsy.

The notions that life originated on the earth as the result of the interplay of the blind forces of nature or of a fortuitous concourse of atoms, and thus were brought into existence filter-passing viruses, which in turn gave birth to living organisms, has been made to look ridiculous by recent researches of physicists and chemists.

Dr. Charles Eugene Guye, a Swiss mathematician, calculated the probabilities of a single protein molecule coming into existence by chance, and the amount of material which would have to be shaken together to do this. He published the results of his calculations in "L'Evolution Physico-chimique" (1942).

His conclusions have been recorded in simple English by du Nouy in "Human Destiny" (1947) and by Prof. V. H. Mottram in a B. B. C. broadcast printed in "The Listener" of April 22nd, 1948, and again in "Science and Religion" Vol. I, p. 154.

I take the liberty of quoting the following passage from the broadcast: "The probability against proteins 'happening' is very great indeed. If you read in the paper that the odds against a horse in for the Derby are 100 to 1 against, you don't consider that that horse has much chance of winning. But the odds against winning the protein stakes are much higher. Not 100 to 1 against, but 100 multiplied by itself 160 times to 1 against. Some odds that! Also the amount of material necessary to produce that one molecule is much greater than the material comprising the whole universe. Sextillion sextillion sextillion times greater. For it to occur on our small planet it would need endless years—10 multiplied by itself 243 times in years. But as the earth has been going as a place life can inhabit only a thousand million years, it does not look probable that even simple proteins can be manufactured by chance."

In reply to the question put by the Editor of "Science and Religion": "Might not a molecule of protein have been made quite early in the shuffling process?" Prof. Mottram replied: "Yes, but hardly two or three, let alone the million molecules essential for the manufacture of a virus organism or a gene."

In the course of his broadcast Mottram also said: "I do not want to be violent or dogmatic, but I cannot see the viruses as the missing link between

inanimate matter and living matter. Nor can I believe that proteins can be put together by chance from molecules of carbon, hydrogen, nitrogen, oxygen and sulphur, even given all geological time to do it in. And even if proteins could be made by chance from inanimate matter, that does not solve the problem of how inanimate matter became alive. Proteins are dead enough, and it is only when the spirit of life breathes on them that these dry bones live!”

## ENTROPY AND EVOLUTION

Before considering the biological and geological objections to the theory of evolution, let us notice yet another non-biological objection. This is the sharp contrast between the scientific outlook of the physicists, chemists, astronomers and mathematicians on the one hand and that of the biologists and geologists on the other. According to the former “the Universe is like a clock which is running down.” (Jeans in “Eos, or the Wider Aspects of Cosmogony”, 1928). The evolutionist biologists and geologists, however, seem to regard the organic world as a clock which is being wound up, or winding itself up.

If both groups of scientists be right, then within the great clock (the Universe) which is running down, is a tiny clock (the living world) which is winding itself up. On the face of it this is a most unlikely state of affairs. As the chemist, Dr. Robert E. D. Clark puts it (*Trans. Vict. Institute* (1943) p. 63): “If in past ages complex organisms ever did evolve from simpler ones, the process took place contrary to the laws of nature, and must have involved what may rightly be termed the miraculous.”

The theory of organic evolution, then is diametrically opposed to the law of entropy, on which all the physical sciences are based.

Clark has dealt with this in his Darwin: “Before and After,” which appeared in May 1948. This is a most important book and a most formidable attack on the theory of evolution. I take the liberty of reproducing from pp. 162-63 the following passage:

“The violent clash between evolution and the entropy principle began to be vaguely suspected at the end of the nineteenth century. Thus, in his essay on *Evolution and Ethics* (1894). T. H. Huxley pointed out that all man-made things lose their organization—with the passing of time bridges fall and turn to ruin; even a garden will never stay neat and tidy of its own accord, but requires constant intelligent attention. The ‘general cosmic process’, in fact, was one in which order produced disorder, but evolution somehow worked in the opposite direction. In this way, so he supposed, the cosmic process was opposed to itself just as, when one pulls a piece of string and breaks it, our

two arms are in antagonism, yet both arms derive their energy from the same original source.

“Today we know that crude analogies about the breaking of string can do nothing to save the situation. Evolution seems hopelessly at variance with fundamental scientific principles. At this point, however, those who are determined to believe in evolution as a creative process may reply as follows. They are certain that evolution has occurred, for the highly organized animals in existence today were not in existence in remote geological time: but that is no reason why they should be forced to explain *how* it happened. The ‘how’ may safely be left to future research: meanwhile, facts must be accepted.

“Though plausible enough, this evasion cannot stand. The theory of a rising level of organization in evolution is so directly contrary to the presuppositions of all scientific thinking that it cannot be left to future discoveries to effect reconciliation by ‘filling in details.’ If it is true that biology forces us to accept this interpretation of evolution—and all biologists are not convinced that this is so—then, if no explanation is forthcoming, let it be admitted candidly that evolution has occurred in the face of all the laws of nature; let it be admitted that theologians are right in insisting that, if the process took place at all, it was God-guided and was, in fact, equivalent to a whole series of creative acts.”

Clark closes the chapter on “Evolution and Physics” as follows:

“Look your difficulty straight in the face—and pass on! . . . is exactly the attitude which many moderns still adopt towards evolution. Whole books are written on the subject in which the real issues involved are never so much as mentioned. The situation is little short of fantastic and it seems clear that a reaction is more than due.”

Having shown why scientists who are not biologists regard the theory of organic evolution as an illusion, let us now examine the theory from the standpoints of the palaeontologists and the biologists.

## Chapter II

### THE NATURE OF THE EVIDENCE OF THE FOSSILS

The theory of organic evolution must stand or fall according as the evidence of the fossils is for it or against it. Every other kind of evidence that can be adduced is subsidiary; it can only confirm or strengthen the testimony of the fossils; it cannot invalidate this testimony.

The failure to recognize this fact is the reason why Transformism has not been relegated to the museum of exploded theories.

Future generations will comment on the fact that almost every adherent of the theory of organic evolution, when setting forth the evidence for the theory, assigns a minor place to the evidence of the fossils. For example in the latest (1944) edition of Thomson's "Outlines of Zoology," the evidences for evolution are given the following order (1) Structural, (2) Physiological, (3) Historical.

The reason for this seemingly strange way of supporting Transformism is that the fossils are hostile witnesses. *Not a single fossil of vital importance for the support of the theory has come to light.*

Robert Chambers, who forestalled Darwin in the modern revival of Evolutionism, rightly, in his "Natural History of Creation," made the fossils the principal witnesses for his theory. He devoted the first 100 of the 286 pages of his text to "The wondrous section of the earth history which is told by Geology." But his book, although it went through eleven editions exercised very little influence, because of the unfavorable evidence of the first-hand witnesses, the fossils. Darwin appreciated this fact, and so kept the fossils in hiding as far as possible. He devoted the first part of his "The Origin of Species" to persuading his readers that there is no limit to the extent to which variations can be piled up, one on top the other, generation after generation, by the ceaseless action of that wonderful agent, Natural Selection. When Darwin does call the fossils as his witnesses he impresses on his readers that their testimony is of little account because the geological record is extremely fragmentary. He wrote (p. 289): "I look at the geological record as a history of the world imperfectly kept, and written in a changing dialect: of this history we possess the last volume alone, relating to only two or three countries. Of this volume only here and there a short chapter has been preserved, and of each page, only here and there a few lines."

As geologists and palaeontologists are men of science, it was but reasonable to expect that they would have set themselves the task of trying to discover whether or not Darwin had correctly appraised the geological record. In fact they have accepted his dictum without question. Equally strange is it that biologists seem to have accepted without question Darwin's views regarding the struggle for existence. So far as I am aware, the late Mr. G. A. Levett-Yeats and myself are the only people who have attempted to discover the extent to which animals are fossilised and the extent to which fossils that have been laid down have been subsequently destroyed.

The explanation of this behavior seems to be that Darwin's theory appealed greatly to the great majority of biologists and geologists who were unwilling to look a gift horse in the mouth and so refrained from giving the evolution hypothesis the severe scrutiny for which it called. That the above is the correct explanation is indicated by the fact that a paper by the late Mr. G. A. Levett-Yeats and myself giving statistics showing the extent to which mammals have been fossilised was rejected by the Zoological Society of London, on the ground that "this kind of evidence leads to no valuable conclusion." In the eyes of the transformist evidence unfavorable to the transformist concept is valueless. Our paper showed that, as regards mammals, the record is far less imperfect than evolutionists make out, hence it was far from welcome to the Zoological Society. The gist of the rejected paper appears in the "Transactions of the Victoria Institute" for 1932. Here are the totals brought up to date.

## STATISTICS RELATING TO MAMMALS

### I

Type of Mammal	Number of Genera Now Living	Percentage of These of Which Fossils Have Been Found
Land	408	61.10
Marine	41	75.61
Volant (Bats)	215	25.56
TOTAL	664	50.14

The low percentage of genera of bats of which fossils have been found is due to the fact that flying animals are less liable than the other kinds to meet

with accidents of a kind likely to result in the bodies being fossilised, and that the great majority of genera of bats live in the Tropics in which very little geological exploration has been made.

II  
Statistics By Continents.

Continent	Number of Genera of Land Mammals Now Inhabiting It	Percentage of These Genera of Which Fossils Have Been Found
Europe	48	100.00
North America	71	95.76
South America	86	77.90
Asia	134	72.65
Africa	145	61.38
Australia	48	56.27

The varying percentages seem to reflect the extent to which the several continents have been explored geologically.

The above figures indicate that in the course of its existence every genus of land mammal having hard parts is likely to leave its fossil record in the rocks.

The table below gives the number of fossils of mammals which I have found record in various periods of the Tertiary Epoch in Europe and North America:

Number of Genera of Non-Violent Land Mammals Known to Have  
Lived at Various Stages of the Tertiary and Quaternary in  
Europe and North America

Stage	North America	Europe
Now Living	72	48
Pleistocene	117	68
Upper Pliocene	52	47
Middle Pliocene	28	48
Lower Pliocene	67	88
Upper Miocene	61	82
Middle Miocene	54	59
Lower Miocene	63	52
Upper Oligocene	61	43
Middle Oligocene	66	41
Lower Oligocene	61	80
Upper Eocene	46	68
Middle Eocene	80	38
Lower Eocene	78	24
Upper Palaeocene	60	
Middle Palaeocene	68	14
Lower Palaeocene	32	

The above statistics suggest that in the case of animals having hard parts, the geological record is fairly complete during the Tertiary Epoch. I have not been able to do much work in connection with the earlier periods of the fossil record. I have however compiled the following tables of the fossils of Molluscs living in the British Islands and in the seas near their coasts, of which I have found records.

## BRITISH MOLLUSCS



Class of Molluscs	No. of Genera Now Living	No. of Genera Now Living of Which Fossils Have Been Found	Percentage of Living Genera of Which Fossils Have Been Found
Lamellibranchiata (bivalves)	67	67	100.00
Gastropoda			
Polyplacophora	1	1	100.00
Prosobranchiata	77	76	98.70
Opisthobranchiata	57	11	19.30
Pulmonata	25	19	76.00
Scaphopoda	2	2	100.00
Cephalopoda	11	3	27.30
	---	---	-----
Total	240	179	74.58

#### BRITISH MOLLUSCS HAVING EXTERNAL SHELLS

Number of genera now living	No. of These of Which Fossils Have Been Found	Percentage
187	176	94.20

#### FOSSILS OF BRITISH MOLLUSCS

Period	Number of genera of which fossils have been found.
Pliocene	173
Eocene	138
Cretaceous	95
Jurassic	64
Triassic	41
Permian	33
Carboniferous	31
Devonian	19
Silurian	16
Ordovician	6
Cambrian	1

The figures relating to the Molluscs are of those inhabiting a very limited area, but they cover the whole of the Primary, Secondary and Tertiary Epochs. It should be noted that probably, next to the Brachiopods the Molluscs are the animals of which the fossil record is most complete. Similar Tables compiled for echinoderms, corals, sponges and crustaceans would almost certainly show a smaller percentage of fossils.

Even so, these figures show several features unfavorable to the evolution theory. The chief of these is the great stability of genera among the molluscs. For example, we know that no fewer than 16 of the genera now living in the British area existed in the Silurian period, that is more than 300 million years ago, according to the latest method of dating rocks. This fact puts the transformist into a dilemma. If the destruction of rocks originally laid down in the Silurian period has been great, then these 16 Silurian genera represent only a small fraction of the genera of British molluscs now living which existed in the Silurian period. If 90 per cent of the original Silurian rocks have been eroded away, then about 160 of the 187 present British genera must have persisted from the Silurian period onwards! There is no getting away from the proposition that either the fossil record of the molluscs is fairly complete, or the great majority of the genera of molluscs have persisted unchanged for more than 300 million years, and the transformist hypothesis collapses!

Let us now consider one of the main features of the geological record. The sudden appearance in the rocks of a great and varied assembly of fossils at the beginning of the Cambrian period, contrasted with the apparent complete absence of fossils in all the earlier rocks.

## Chapter III

### THE LACK OF PRE-CAMBRIAN FOSSILS

At the beginning of the Cambrian period a great marine fauna appears abruptly; this includes, in addition to a recently reported vertebrate (a supposed fish scale),<sup>[1]</sup> fossils of members of all the other great groups, or phyla, of the animal kingdom, those of each group representing most of its classes and orders.

The supposed evolution from one-celled ancestors of all these complicated Cambrian animals; radiolarians, foraminifers, sponges, corals, jelly-fish, graptolites, starfish, sea-cucumbers, trilobites, phyllopods and molluscs must have occupied a period at least as long as the Primary, Secondary and Tertiary periods added together. If, therefore, such evolution took place, the rocks underlying those laid down in the Cambrian Period should be richly fossiliferous. This is not the case; not one of these rocks has yielded what is undoubtedly a fossil.

In the words of Dr. Percy Raymond, the sudden appearance of this Cambrian fauna in the rocks presents a constant challenge to the evolutionist.

For over seventy years the earth has been ransacked in the hope of finding Pre-Cambrian fossils. Every discovery bearing the remotest resemblance to an organism or an organic product has been carefully preserved and minutely examined. Some enthusiasts have found what they deem to be Pre-Cambrian fossils, but nearly all these have been almost unanimously rejected.

In what follows I have drawn largely on the Presidential Address to the Palaeontological Society of America delivered by Dr. Percy Raymond in 1935.

The first to be discovered of these supposed Pre-Cambrian fossils was named *Eozoon canadense* by Dawson, who regarded it as a giant foraminifer. For years this was generally accepted as a fossil, by Darwin among others.

This view is no longer tenable. Dr. Raymond writes (Bul. Geo. Soc. Amer. Vol. 46, p. 378): "It is obvious that *Eozoon* is the product of two periods of alteration of the original sediment and can by no possibility represent an organic structure. There seems not the slightest chance that it can be organic."

Nor is this all, blocks of limestone enveloped in molten lava at Monte Somma, Vesuvius, have, by the absorption of silicates, developed into typical

Eozoon! But, so great is the desire to discover Pre-Cambrian fossils that recently attempts have been made to revive Eozoon as a plant fossil.

Needless to state Sir Albert Seward in his discussion of supposed Pre-Cambrian fossils in his "Plant Life through the Ages" does not mention Eozoon.

In 1906 Walcott described seven genera and a number of species of what he believed to be the products of calcareous (Blue-green) algae from the Precambrian of North America. These he has named *Collenia*, *Newlandia*, *Camasia*, *Kimieyia*, *Greysonia*, *Copperia*, and *Weedia*. The structure of these, however, is unlike the product of any known alga, and, as Raymond remarks, while it is always possible in the case of Ordovician and more recent deposits containing secretions of algae, to identify at least the genus of the alga, this is not the case with Walcott's supposed fossils. In Raymond's view, the most that can be said for these is, "if organic, it is more likely that they are calcareous algae than anything else." Hortedahl extinguishes even this ray of hope by demonstrating that precisely similar concretions have been found in situations that preclude their being made by organisms. Further Liesegang has shown that such structures can be made artificially in the laboratory. Moreover, Adam Sedgwick pointed out that there is no end to the forms assumed by dolomite structures.

These remarks seem to dispose of the branched stemlike forms found by Dr. Metzger in the Pre-Cambrian dolomites of Finland, which he calls *Carelozoon jaticulum*. This supposed fossil is not mentioned by Dr. Raymond, possibly for the above reasons, and also because the deposit in which it occurs underlies unfossiliferous sandstones. Like some of the other supposed Pre-Cambrian fossils, this occurs in rocks very much earlier than the Cambrian.

Walcott in 1915 and Gruner more recently have described what they believed to be the remains of bacteria in the Pre-Cambrian of North America. Walcott, as Raymond points out, "makes no argument in favor of the identification and leaves it to be accepted on faith that an organism without hard parts and less than .001 millimetre in diameter could be preserved in identifiable condition from Pre-Cambrian time to the present." This criticism applies with greater force to Gruner's finds, which are from much older rocks; Sir Albert Seward writes: these finds "though worth recording are by no means convincing."

The structure found by Sederholm in Finland, which he names *Corycium enigmaticum* and deems to be a product of some unknown plant, is not noticed by Raymond. Seward describes it as a problematical body and thinks

it is inorganic. The last of the supposed Pre-Cambrian plant fossils consists of some carbonaceous material found near Prague by Dr. Krausel. He thinks it is part of a conifer-like plant: it has been named *Archaeoxylon krasseri*. Seward writes of it: the weak point is that its Pre-Cambrian age has not been proved and its structure is too imperfect to admit of any satisfactory determination.

Turning now to the supposed animal fossils, that named *Orthoceras* on the supposition that it is a mollusc, found in the Pre-Cambrian Waterberg Sandstones of South Africa, has proved to be an inorganic concretion.

Gregory and Barrett assert (“General Stratigraphy” p. 23), “The Torridon Sandstone of Loch Broom contains grains of phosphate with well preserved organic canals.” No name is given to this supposed fossil, nor are the reasons stated for the supposition that the canals are organic. This may be why Raymond does not notice the supposed fossil.

Cayeux believes he has discovered in the Pre-Cambrian rocks of Brittany a collection of fossils composed of 45 species of radiolarians, 6 of foraminifera and some sponge spicules. The supposed radiolarians are from .001 to .022 millimetre across and so had to be magnified from 1,000 to 2,300 times to enable an artist, who had never seen a radiolarian, to draw them. He copied what he saw. The smallest known Cambrian radiolarian is ten times the size of the largest of Cayeux’s finds. Rust waxes sarcastic over them. He has never succeeded in getting more than 5 species of Palaeozoic radiolarians on 1,000 slides, whereas Cayeux got 41 species of his on one slide! Moreover, unlike Rust, Cayeux, although he got so many specimens on one slide, never succeeded in obtaining a cross section of any of them!

As to Cayeux’s foraminifera, these are very minute, the largest having a diameter of barely .01 millimetre. Dr. Raymond points out that some of the specimens cannot possibly represent foraminifera, because of the new chamber is not formed over the principal opening of the preceding one; for this reason he rejects them.

What Cayeux deemed spicules of sponges and structures found in the Laurentian of New Brunswick by G. F. Matthew and thought by him to be sponge spicules—are pronounced by H. Rauff to be of inorganic nature (*Neues Jahrbuch für Mineralogie*, 1896).

*Atikokania* found in the Steeprock Limestone of Ontario, deemed by A. C. Lawson and C. D. Walcott to be a peculiar kind of sponge, is not accepted as a fossil by Raymond, and E. S. Moore, who later searched these rocks diligently for fossils, found in them nothing which seemed indubitably organic. He concludes his report thus (*Trans. Roy. Soc. Canada*, (1938) p. 15): “However much the writer believes in the existence of life at a very early

period in Pre-Cambrian time, he was unable to verify the existence of fossils in this series.”

Walcott has described in Pre-Cambrian rocks what he believes to be the tracks and burrows made by some kind of worm. This view can neither be proved nor disproved.

Perhaps the most discussed supposed Pre-Cambrian fossil is that named Beltina by Walcott who discovered it in the Belt Series of North America. He found large numbers of this structure, which he deems to be mostly parts of the integument of an Eurypterid (a kind of Crustacean). Some he deems to be appendages of this supposed creature. Of these he has drawn a picture which is reproduced on p. 245 of Professor J. W. Gregory’s “The Making of the Earth,” where Beltina danai is described as “the chief member of the oldest known fauna!” This volume forms one of the Home University Library of Modern Knowledge. Of these “fossils” Raymond writes: “The supposed test is extremely thin and in most cases without any regular outline. A very few fragments selected from thousands do remotely resemble Eurypterids. This may be said of four of the thirty-one specimens figured by Walcott.” Raymond rejects the idea that these structures are part of an Eurypterid, nevertheless he considers them organic, but of algal origin. He is more favorably impressed by a Beltina found by Stuart Weller, which, he writes, “not only seems to have a definite outline but shows surface markings, and, being found in an arenaceous limestone, retains the original convexity. Its resemblance to an abdominal segment of the Mid-Cambrian Sidneya is very marked and there can be little doubt that it is a fragment of an Arthropod. Somewhat less satisfactory, but still fairly satisfactory, are the specimens figured from the Algonkian on the continental divide of Alberta. They may, I think be accepted as evidence of the presence of Arthropods in what may be part of the Belt Series. Unfortunately these finds cannot be fully accepted until checked by future discoveries.”

Tillyard, however, writes (David and Tillyard’s “Memoir of Fossils of the late Pre-Cambrian from the Adelaide Series” p. 90): “They may well have been organic remains, but they appear to me to resemble torn parts of a marine alga rather than animal remains of any sort whatever . . . it seems clear that the Arthropod nature of Beltina is not yet established . . . I understand that a number of palaeontologists who have seen the actual fossils of Beltina consider that they may be the remains of a marine alga, this is certainly the impression formed on my own mind.”

Curiously enough Professor Seward does not mention Beltina in his “Plant Life through the Ages!” As I have not seen the actual fossils, I am not able to judge them, but the illustrations are certainly not convincing.

My reasons for rejecting Beltina as a fossil are: first, as we have seen, inorganic structures occasionally assume very curious shapes.

A classical example of this is afforded by what appears to be the fossilised leather sole of a shoe in a Triassic rock. The sole “fossil” appears to be that of a child’s shoe, size 13. The sole is completely silicified and is harder and more compact than the rock itself. It seems to have a double line of stitches, one line close to the outside edge and the other parallel at a distance of one third of an inch. The edges of the sole are rounded off smoothly as if cut by an expert cobbler. The right side of the heel seems to be worn more than the left. Does this mean that men who wore a modern type of shoe lived in the Triassic period or that the “fossil” is an inorganic concretion resembling a sole? Every one believes the latter. Professor W. D. Matthews writes “It is the most perfect piece of natural mimicry I have seen,” and Dr. H. P. Whitlock describes it as the most deceptive specimen he has come across.

Secondly, Walcott has found thousands of these Beltinas—an *embarras de riches*. If they be parts of an Arthropod, large numbers of this animal must have lived in the Pre-Cambrian Seas, and in that case, as numerous fossils of Trilobites, almost complete apart from the appendages, have been found, the same thing ought to have happened in the case of Beltina in Pre-Cambrian rocks. The failure to discover anything approaching a complete fossil of this supposed animal disposes of its claim to be an animal fossil as effectively as Cayeux’s failure to cut any cross-sections when making his slides disposes of his supposed radiolarians.

Thirdly. The deposit holding the Beltinas is overlain by some 5,000 feet of shales and limestone which are completely devoid of fossils.

Fourthly. As Beltina is so numerous in the Belt series, if it were an organism its fossils should occur in other formations in North America. But they do not.

As Dr. Raymond makes no mention of the supposed Pre-Cambrian fossils described by David and Tillyard; apparently he does not accept them as such, or the rocks in which they were found as of Pre-Cambrian date. The Adelaide Series in which these fossils occur is believed by Howchin and others to be, not Pre-Cambrian but, Lower Cambrian. As the upper part of the series is certainly Cambrian and there is no unconformity in the series, it is probable that all of it is Cambrian. These fossils are said to be algae, giant Eurypterids of very primitive structure, giant annelids having fin-like appendages, small pteropods and other forms. The illustrations of the supposed Eurypterids given by David and Tillyard in their volume are not at all convincing. In my

opinion it requires considerable exercise of imagination to see in them resemblances to an Eurypterid.

The rocks in which these supposed fossils occur are readily accessible, and when describing them in 1929 David expressed the hope that later geologists would find more satisfactory fossils in these deposits. So far no such finds have been reported.

Another supposed fossil, not noticed by Raymond, is a strange looking object having many appendages, named *Xenusion auerswalde*. The finding of this in a glacial erratic in North Germany is recorded by J. F. Pompecki. This is described in the "Zoological Record" for 1927 under the heading *Crustacea* as "an enigmatical organism of uncertain affinities."

Apart from its curious appearance, doubt is cast upon the supposed Pre-Cambrian age of the formation from which the erratic is thought to be derived—the Algonkian Dala Sandstone of Central Sweden. Frodin asserts that this sandstone is of much later date. This is presumably the reason why Raymond does not mention *Xenusion*. F. E. Zeuner, however, gives a picture of it on p. 350 of "Dating the Past" (1946) and describes it as "a representatives of a group intermediate between annelid worms and Arthropods." He however puts a? against it being of Upper Pre-Cambrian time.

In conclusion mention must be made of *Brooksella canyonensis*, which was found in 1935 in the red sandstone of the Nankoweap middle group of the Grand Canyon by C. E. van Grundy. This supposed fossil is fully described by R. S. Bassler in 1941 in No. 3104 of the Proc. of the U. S. National Museum. Some believe this object to be the impression of a jelly-fish. Others assert positively that it is a fossil. However, the leading authority on jelly-fish, Dr. G. Stiasny, is very doubtful of its being a fossil. He says that the furrows it shows do not represent radial canals and the pouches are not stomach pouches. If it be a jelly-fish it is quite unlike any known Cambrian form.

The above descriptions may be rather wearisome to many readers, but in view of the great importance of the subject, I think them necessary in order to show how unconvincing are the supposed Pre-Cambrian fossils. Contrast the abundant clear-cut fossils found in the Cambrian with the indefinite, problematical Pre-Cambrian structures, which, except in the case of *Beltina*, or Tillyard's supposed Eurypterid, are either supposed secretions, or marks made by animals or plants, or organisms that fit into no known group of animals or plants. The wish seems to be father to the thought that these are fossils.



Contrast these objects with the hundreds of thousands of Cambrian fossils. I have records of no fewer than 1,119 genera of Cambrian animals of which fossils have been described. These must be represented by more than 5,000 species.<sup>[2]</sup>

This does not mean that only 5,000 undoubted Cambrian fossils have been found or are known to exist; in the case of some genera thousands of their fossils have been collected. Some Cambrian formations must hold millions of undoubted fossils. Take for example the Limestone strata on the left bank of the Thornton River in N. W. Queensland, forty feet thick which, to quote Dr. Whitehouse (Vol. XII Memoirs of the Queensland Museum), are “closely packed with fossils of the Echinoderm Cymbionites, weathering out beautifully on the surface.” He gives a photograph of this Cambrian limestone 5½’ x 3½’ in which some 60 complete specimens of this animal are shown. “The limestone” he writes “with specimens crowded as richly and as well-preserved may be traced continuously around the contour of these hills. Following it is like walking over thickly strewn embedded marbles. . . . Twenty-four feet above this rich band occurs the bed, five feet thick, with Peridionites (another genus of Echinoderm). This is packed almost as tightly as the other . . . and they . . . too . . . weather out in relief. Between the two horizons are other echinodermal horizons, greatly crowded with ossicles that, however, do not stand out with naturally etched surfaces. Thus, what echinoderm types occur in them is unknown.”

Admittedly the above are exceptionally rich beds, but Cambrian rocks rich in fossils are known to exist in more than 100 localities in various parts of the earth. Cambrian rocks containing numerous fossils occur in Wales, North and Central England, Scotland, Ireland, Denmark, Norway, Sweden, the Baltic Provinces, Esthonia, N. W. Russia, Poland, Bohemia, France, Spain, Portugal, Sardinia, Morocco, Siberia, Manchuria, China, Korea, Yunnan, India, Indo-China, Mesopotamia, Sinai, North and South Australia, New South Wales, Tasmania, in twenty of the United States of America, in New Brunswick, Alberta, Quebec, Newfoundland, Labrador, Alaska, Argentina, and Bolivia.

In view of the above facts I find it impossible to believe that abundant fossils would not have been found in many parts of the world in Pre-Cambrian rocks had there been life on the earth while these rocks were being formed. But according to all evolutionary and transformist theories the earth must have been thickly populated by animals during a long period prior to the Cambrian. Consequently it is obviously incumbent on evolutionists either to give up their theory or show how it is compatible with the lack of definite Pre-Cambrian fossils.

Let us examine the various attempts that have been made by evolutionists to solve this problem.

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- [1] This was found by W. L. Bryant in Vermont U. S. A. He named it **Eoichthys**. Dr. F. A. Bather doubts if this is a fish scale. He thinks it is Probably part of an echinoderm (**Eocystis**).
- [2] See my paper “The Earliest Known Animals” (**Trans. Vict. Inst.**, LXXX, 1948).

## Chapter IV

### EVOLUTIONISTS' ATTEMPTS TO ACCOUNT FOR THE LACK OF PRE-CAMBRIAN FOSSILS

1. Formerly it was supposed that all the Pre-Cambrian rocks had become so metamorphosed and altered in the course of time that all the fossils they originally contained have been destroyed. We now know that, although many of the ancient rocks have been metamorphosed, a number have not. There exist in many parts of the world Pre-Cambrian sedimentary rocks, unmetamorphosed, undisturbed and eminently fitted to hold fossils. Examples of such are the Torridon Sandstones of Scotland, 8,000 feet thick, the Green Shales of Brittany, 17,000 feet thick, the Huronian Series of Canada, 18,000 feet thick, the Belt Series of North America, 40,000 feet thick and the Cuddapah Series of India, 20,000 feet thick. Some of these Pre-Cambrian rocks are so perfectly preserved that they retain impressions made on their soft surface by drops of rain and ripple marks such as may be seen today on the sea shore.

The following are the more recent explanations of the lack of Pre-Cambrian fossils:

2. Before the Cambrian age all aquatic animals lacked shells or integument, or possessed shells so fragile and easily decomposable as to have left no traces in the rocks.<sup>[1]</sup> In order to account for this strange state of affairs the following alternative suggestions have been made:

(a) In Pre-Cambrian times the calcium content of the sea was too low to admit of the secretion by organisms of calcareous shells. This is ruled out by the great quantities of limestones in Pre-Cambrian rocks.

(b) Professor Daly suggests that, although the sea contained abundant calcium, marine animals could not make use of it, because the only scavengers that existed to destroy dead organisms were bacteria which liberated sufficient ammonia to precipitate the calcium in the sea and so prevented animals using it to make shells. This theory, which involves the belief that in the immense period before the Cambrian during which animals lived no carnivorous animals existed, is refuted by the fact that the Trilobites, so abundant in the Cambrian period, were scavengers.

(c) Dr. Lane's theory is that the Pre-Cambrian Seas were acid, and this acidity prevented the formation of calcareous shells.

(d) Another suggestion is that all the Pre-Cambrian animals were vegetarians; in consequence shells were not needed for protection, and it was not until shortly before the Cambrian period that carnivorous Trilobites evolved and multiplied greatly, owing to unlimited supplies of defenseless food; then in self-defense many of the animals preyed upon by Trilobites developed shells!

(e) Professor W. K. Brooks' theory is that Pre-Cambrian animals lacked shells because they lived in the surface waters where shells would be detrimental on account of their weight.

(f) Dr. P. Raymond's theory is a modification of that of Brooks, viz. that all Pre-Cambrian animals were fast moving creatures and it was only at the beginning of the Cambrian that many adopted sessile or sluggish habits, and in consequence developed shells.

I find it exceedingly difficult to believe that scores of different kinds of animals—animals belonging to various Orders and Classes—with one accord suddenly began to secrete shells.

Further objections to all the above theories are, first, many of the Cambrian animals were so constituted as to render a shell or a test a *sine qua non* of existence. Secondly, even if all Pre-Cambrian organisms were devoid of shells, they ought to have left fairly numerous traces in the well-preserved sedimentary rocks, seeing that perfect impressions of jelly fish are not very uncommon in sedimentary rocks, and tracks, burrows and borings of soft-bodied animals are abundant.

3. Pre-Cambrian sediments contain no fossils because they were laid down in the sea, and Pre-Cambrian life was confined to fresh water. Walcott and Chamberlin hold this theory. The former believed that life originated in fresh water; the latter thinks living organisms originated on land in the soil and migrated first to the rivers and then to sea, and did not reach the latter until the Cambrian Period.

As all Pre-Cambrian continental rocks have almost certainly been destroyed by erosion, it is not possible to prove that in Pre-Cambrian times the rivers and lakes did not teem with life. But fatal objections to this theory are the great diversification of the Cambrian fauna and the fact that some Cambrian genera are widely distributed. Thus had the Trilobite, *Olenellus*, evolved in some river and migrated thence into the sea, it ought not to appear simultaneously in rocks so far apart as North America, Scotland and Siberia, and its ally, *Redlichia*, in China and South Australia. Nor should the Lower Cambrian coral, *Archaeocyathus*, make its appearance simultaneously in the Mediterranean and South Australia. Another fatal objection to this theory is

that in the Cambrian deposits fossils of Echinoderms are numerous. These animals are exclusively marine.

No living or extinct Echinoderm is known to have lived in fresh water. Is it credible that the Echinoderms and other groups that are exclusively marine have completely deserted fresh water in which some members of all the other groups of animals now exist?

4. Grabau's theory is diametrically opposed to the foregoing. It is that the Pre-Cambrian rocks are devoid of fossils because they were laid down in fresh water at a time when all life was confined to the sea! This theory is easily disposed of. In the first place, as rocks exposed to the atmosphere are rapidly weathered away, it is highly improbable that a number of fresh water formations, one 40,000 feet thick, have been preserved until the present time. In the second place, all the Cambrian rocks known to us seem to have been laid down in the sea. We have noticed ([p.115]) how numerous and widespread these are. Is it credible that not a single rock laid down in the sea in the period immediately preceding the Cambrian has been preserved? Thirdly, the abundance of limestones and cherts in Pre-Cambrian rocks points to their being of marine origin.

5. Mr. Bradley imagines ("Parade of the Living", 1913) that a period lasting millions of years separates the latest Pre-Cambrian rocks period deposited on top of them, they have been first tilted and then any living organisms had evolved, "lands were lifted high above the seas" all the world over.

The erosion of these land masses to sea level occupied millions of years. While this erosion was proceeding the Cambrian fauna evolved in the sea, and, when the seas invaded the land, they brought with them the animals of which fossils occur in the Cambrian rocks. While there is no geological evidence in support of this theory, there is a piece of evidence fatal to it, viz. in certain localities there is no apparent unconformity between the Cambrian rocks and those underlying them. It is important to lay great stress on this fact, because assertions to the contrary are sometimes made in popular books. Thus, we are told in "The Science of Life": "A long gap of time seems to have elapsed between the laying down of the latest Proterozoic and of the earliest Paleozoic rocks. In no part of the world have sediments been found which bridge this gap, and that it was long is shown by the fact that wherever Proterozoic rocks are found with the rocks of the next period deposited on top of them, they have been first tilted and then worn down to a flat surface again, The material thus eroded away must have been carried off and laid down somewhere in the seas of the ancient world: and yet no trace is known to us from the earliest Cambrian."

The truth is that some of the Cambrian rocks rest on tilted earlier formations, but this is not always the case. Thus, Dr. A. H. Rastall writes (*Encyclopedia Britannica* Vol. 10, p. 168): “The stratified rocks of the latest Pre-Cambrian times were very like those of the earliest Cambrian times, and in some cases there is little physical break between them.” For example, in the Kimberley District of Australia the Lower Cambrian rocks rest conformably on the Pre-Cambrian Nullagrine Series of sandstones, limestones, conglomerates and lava flows.

In Adelaide, writes Dr. C. E. Tilley (*op. cit.* Vol. 2, p. 705), “owing to the difficulty of defining the base of the Cambrian it is uncertain whether this ancient tillite (the Sturtian) is Lower Cambrian or late Proterozoic in age.” To come nearer home, Messrs. Gregory and Barrett write (“General Stratigraphy” p. 52): “The Cambrian beds of the Lake . . . possibly should include the lower unfossiliferous part of the Skiddaw Slates.”

6. Recently in a debate I asked Mr. J. McCabe what explanation he had to offer for the lack of Pre-Cambrian fossils. He replied that the Cambrian Period was preceded by a great Ice Age and no one knows where life was living at the time.

The above are all the attempts I have come across of evolutionists to explain the unfossiliferous nature of the Pre-Cambrian rocks. None of them holds water and some are fantastic. The mere fact that so many theories have been propounded shows the greatness of the difficulty to be met and the amount of attention that has been paid to it. Every one who holds any of these theories necessarily rejects all the others: I have no hesitation in rejecting them all.

In my opinion the unfossiliferous nature of the Pre-Cambrian rocks is fatal to the theory of evolution. Darwin appreciated this. He wrote in the first edition of “*The Origin of Species*”: “But the difficulty of understanding the absence of vast piles of fossiliferous strata which on my theory no doubt were somewhere accumulating before the Silurian Epoch is very great . . . The case at present must remain inexplicable; and may be truly urged as a valid argument against the views here entertained.” In the last edition of his book he wrote, (p. 287): “Nevertheless the difficulty of assigning any good reason for the absence of vast piles of strata rich in fossils beneath the Cambrian System is very great . . . The case at present must remain inexplicable; and may be truly urged as a valid argument against the views here entertained.”

This piece of evidence against the theory of evolution is far greater today than it was in 1859 on account of our increased knowledge of the palaeontological record. The rocks cry out “Creation!”

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[1]

To support the theory that Pre-Cambrian animals lacked shells, it has been asserted that the shells of all Lower Cambrian animals were very thin and chitinous. This is inaccurate. Some of the shells of the Molluscs and Brachiopods in the Lower Cambrian rocks are thick and Calcerous e.g. some species of Hyolithus, Salterella, Salopiella, etc.

## Chapter V

### THE SUCCESSIONS OF THE FAUNAS

We have noticed that the fossils known to us show that more than 5,000 species of animals lived in the Cambrian period, that these represented all the phyla, except possibly the vertebrata, and that they were spread all over the earth. All of them seem to have lived in the sea, and, so far as is known, all except one, *Spirillina groomii*, are now extinct, as are nearly all the genera, most of the families and orders and a few of the classes, but all were of existing phyla.

These facts suggest the following questions:

(1) Is the reason why all known Cambrian fossils are marine organisms that (a) no land or fresh-water organisms were then in existence, or (b) these existed but all the rocks which held their fossils have been weathered out of existence?

(2) Are the species of animals now existing of which no Cambrian fossils have been found (a) modified descendants of animals that lived in Cambrian times, or (b) are they later creations, or (c) unmodified descendants of Cambrian forms of which all the early fossils have been weathered out of existence?

Nearly all present-day biologists would say that the correct answers to these questions are 1.a and 2.a. A few would say that 1.a and 2.b are the correct answers. Hardly any would give 1.a and 2.c as the correct answers. Nevertheless it is possible that these are the correct ones, because the answers 1.a and 2.a and 2.b are based on the assumption that the fossils found in the rocks of each geological period include representatives of *all* the classes of plants and animals existing in the period, and that the absence of fossils of a class denotes that the class in question had either not yet come into existence or had become extinct.

But these assumptions seem unjustified for two reasons: First, most of the marine rocks known to us contain much terrigenous material, and the distance to which this can be carried by currents is limited. The bulk of the marine deposits accessible to us seem to have been formed within two or three hundred miles of land, and in consequence the *fossils they hold are all of organisms which lived near some coast*. Further, there is evidence that most rocks devoid of terrigenous matter, e. g. chalk and some limestones, were laid



down near land. Thus the known marine fossils represent, not all kinds of marine organisms, but only those living near land.

Secondly, most of the ancient rocks have disappeared because all rocks exposed to the atmosphere are subjected to continuous weathering. No land deposit can persist longer than a few million years unless it become submerged beneath the sea and there protected from sub-aerial denudation. A rock laid down on low ground or near the sea has a fair chance of eventually becoming submerged; one formed at high elevations has not. In consequence *almost all the older fossiliferous land rocks that still exist were laid down at low elevations and the fossils they hold are those of lowland plants and animals*. It is doubtful whether any high level deposits formed before the Tertiary epoch exist today. Thus the early land fossils now in existence represent, not all classes of plants and animals, but merely those of the lowlands.

The absence of fossils of any class of organism in the known rocks of any period, such as fossils of flowering plants in the Triassic, may denote that these plants did not then exist, or merely that none of them lived in the areas where the known Triassic rocks were laid down. According to the theory of one creation the latter is the correct explanation.

In brief this theory is that all the main types of living beings were brought into existence by one creative act in considerable numbers, each type in the parts of the earth that were then best suited to its habits. For example, flowering plants, and mammals and birds among vertebrates, being adapted to cool or cold conditions, were created in the polar regions and elsewhere on tablelands and hills, and the bony fishes in the polar seas and open oceans. Pteridosperms, among plants, and reptiles and amphibia, among vertebrates, being adapted to a hot or a warm climate, were created in the tropics and elsewhere on lowlands, and the cartilaginous fishes in tropical and coastal seas. In the long course of the history of the earth this distribution underwent great changes in consequence of what Joly describes as “great cycles of world-transforming events” which caused the extinction of many kinds of animals and plants and a vast amount of migration culminating in the survival of only the types now living and their present geographical distribution.

In each of these cycles of world-transforming events, writes Joly (“The Surface History of the Earth,” p. 85): “the succession of events is the same. The continents sink relatively to the ocean. The waters flow in over the lower levels, vast areas become covered by transgressional seas. These seas persist over very long periods—fluctuate in area—advance and retreat many times, but always still advancing until at length a time is reached when retreat overtakes advance, and little by little the land advances again. And now a

strange climax is attained. Just when the seas have been most enduring mountains begin to rise . . . the uplift may amount to many thousands of feet. Then succeeds comparative repose. Evidence of cold climatic conditions often attends the period of greatest continental elevation. These conditions generally pass away after some thousands of years, telling of renewed sinkings of the land, and this period of very slow sinking endures over millions of years, approximating ever more to the time when once more the seas shall flood the continents, and so the cycle of events begins all over again. This extraordinary history is no myth. It has been traced in many parts of the world.”

The cold periods mentioned by Joly have probably exercised a more profound effect on the life of the earth than have the advances and retreats of the sea. It is my belief that these cold periods have been interruptions of a secular cooling of the climate of the earth. This is not the view of some authorities, but it is supported by such facts as: fossils of corals occur in Cambrian rocks of Alaska (Lat. 65° N.), in the Silurian of the New Siberian Islands and the Carboniferous of Siberia. Fossils of amphibia occur in the Devonian rocks of Greenland, those of reptiles in the Permian of the North of Scotland, and in the Triassic of Spitzbergen. Fossils of the mudfish *Ceratodus*, now confined to the tropics, occur in the Jurassic rocks of Spitzbergen. The fossils further show that a rich flora flourished in Greenland in the Cretaceous period, and that turtles, crocodiles and palms lived in England in the Eocene period. Large areas of the Arctic and Antarctic regions now ice-bound formerly supported a rich flora and fauna.

Whether or not there has been a secular cooling of the earth is immaterial to the theory of one great creation, but the cold periods are of the greatest importance to it. A considerable fall of temperature in a locality results in either the extinction or the emigration of all the local plants and animals unable to tolerate the fall. Those in the warmest parts are killed off, there being no warmer place to which they can move. These cycles explain the fact that the fossils show that every locality has been occupied by successive floras and faunas, each of which generally lacks some components of its predecessor and has new components which are clearly not modified descendants of those of its predecessor in that locality, unless modified beyond recognition. Often no species or genus is common to the two. Thus, to quote the French palaeontologist, Arambourg, “the idea of migration is forced upon us, because at certain epochs faunas not descended from those they replace in the locality appear suddenly. This fact is very marked in marine faunas. These, so to speak, faunic waves which roll in in the course of stratigraphic history generally coincide with the great phenomena of the

relative displacements of seas and continents.” These new types must be either immigrants or new creations. It is here contended that they were all immigrants from the open seas or from higher ground.

Nor is this all. Geologists are of opinion that during geological time there has been a succession of world-revolutions, each of which began with a period of mountain-building or orogenesis, followed by a long period of subsidence, of, to quote Joly (*op. cit.* p. 132) “slowly increasing and transgressional seas, characterised by sedimentary deposition in the geosynclines, and finally of retreat of these seas culminating in the period of mountain-building.

“Sonder in a recent study of the phenomena attending and leading up to a revolution recognizes (1) a long continental stage: (2) a period of submergence by oceanic transgressions: (3) one of fluctuating levels: and (4) one of emergence and mountain-building. His recognition of a fluctuating (*Wechsel*) stage is of interest, although fluctuations attending the submergence of the continents have long been recognized. Applying these views to geological history, he allocates the events of the cycles as follows:

Cainozoic—Emergence and Mountain-Building.

Cretaceous—Maximum Transgression and Fluctuations.

Jurassic—Submergence.

Triassic—Continental Period.

Upper Carb and Permian—Emergence and Mountain-Building.

Devonian—Submergence.

Lower O. R. S.—Continental Period.

Late Silurian—Emergence and Mountain-Building.

Cambrian—Submergence.

Eo-Cambrian—Continental Period.”

From the foregoing it will be seen that geologists believe there was a period of submergence lasting about 80 million years during the Jurassic and Cretaceous periods, and an earlier one of about the same duration during the latter part of the Devonian and most of the Carboniferous periods.

In consequence we should have expected one during the Ordovician with emergence in this period and a still earlier emergence in the middle of the Cambrian period. But there are no signs of these. It is suggested that these emergences did take place, but all signs of them have disappeared owing to the fact that the land which emerged at those times has been eroded out of existence during repeated exposures to the atmosphere.

Let us now make a brief survey of the record of the fossils in an attempt to ascertain which of the above theories they best fit—that the organisms now

living are completely transformed descendants of Cambrian forms, i.e. the evolution theory, or the creation theory of successive creations since the Cambrian period, or the other creationist theory that living plants and animals are little-modified descendants of the creation at the beginning of the Cambrian period.

## AGE OF THE VARIOUS PERIODS

(Estimates by Prof. Arthur Holmes, "Physical Geology," 1944)

Epoch	Period	Age of Period (in millions of years)	Duration of Period
Tertiary	Pliocene	15	14
	Miocene	35	20
	Oligocene	50	15
	Eocene	70	20
Secondary	Cretaceous	120	50
	Jurassic	190	30
	Triassic	190	60
Primary	Permian	220	30
	Carboniferous	280	60
	Devonian	320	40
	Silurian	350	30
	Ordovician	400	50
	Cambrian	500	100

If the evolution theory be true, the record of the fossils should exhibit the following features:

I. Every class, order, family and genus would make its appearance in the form of a single species and exhibit no diversity until it has been in existence for a long time.

II. The flora and fauna at any given geological horizon would differ but slightly from those immediately above and below except on the rare occasions when the local climate suddenly changed if the sea flowed over the land, or the sea had retreated.

III. It should be possible to arrange chronological series of fossils showing, step by step, the origin of many of the classes and smaller groups of the animals and plants. By means of these fossil series it should be possible to draw up a pedigree accurately tracing the descent of most of the species now living from groups shown by the fossils to have been living in the Cambrian period.

IV. The earliest fossils of each new group would be difficult to distinguish from those of the group from which it evolved, and the distinguishing features of the new group from which it evolved, and the distinguishing features of the new group would be poorly developed, e.g. the wings of birds or bats.

## THE CAMBRIAN FOSSILS

We have already seen that the fossils of the Cambrian period show none of the above four features. At its opening we are confronted with fossils of which the species, genus, family, order, class and phylum are as sharply defined as they are today. As we pass from horizon to horizon we see much replacement of species and genera, and the first appearance of some families, orders and classes, but no evidence that any genus, or larger group is the modified descendant of a group of which fossils occur at any earlier horizon.

Let us now see what the fossils of later periods show. It is possible to notice only the most outstanding features of the panorama presented by the geological record. The entrances and exits of the various kinds of animals on the stage of the coastal seas are very numerous. Thus Zittel's Textbook of Palaeontology shows that no fewer than 31 families of molluscs make their first appearance in the Ordovician period and 23 in the Silurian, while in the latter nearly as many families seem to have become extinct, their fossils have not been found in later rocks. The abruptness with which new Classes and Orders of animals make their first appearances in the rocks known to us is one of the most striking features of the geological record.

## THE ORDOVICIAN FOSSILS

The earliest known fossils of the following occur in Ordovician rocks:

- (1) Two classes of Echinoderms—the Blastoidea and the Echinoidea.
- (2) 14 families of the Crinoidea.
- (3) 19 families of Bryozoa (sea-mats).
- (4) 14 families of Trilobites.
- (5) The Ostracodes (water-fleas).
- (6) The Cirripedes.
- (7) 2 orders of Ostracoderm fishes. (These fish lack jaws and paired fins).

No fossils have been found linking any of the above with earlier forms. The nearest approach to a connecting link is the Blastoid genus *Asteroblastus*, of which the breathing organs are diplopores, like those of some of the Cystoidea, whereas the breathing organs of the other Blastoids take the form of hydrospires.

This is claimed as evidence that the Blastoids evolved from the Cystoidea. But there is no reason why some Blastoids may not have been created with diplopores and some with hydrospires. Two kinds of breathing organs occur in Cystoids, so why not in Blastoids? If the earliest Blastoids breathed by diplopores what can have caused them to replace these by blastopores? The supposed transformation would seem to be highly improbable. What the transformist badly needs are fossils strictly intermediate between Cystids and Blastoids.

This sudden unheralded appearance of new classes, orders and families exhibiting all the characters that distinguish the group to which each belongs and the non-discovery of any fossils linking them with other groups can only mean that the late arrivals were created in, or migrated to, the localities in which their earliest known fossils occur. As the new groups appear at irregular intervals it is almost certain that they were denizens of the open sea which migrated to the coastal seas in consequence of climatic or other environmental changes.

It is of course open to the evolutionist to believe that these immigrants had all evolved from other kinds of animals in their earlier surroundings. But he has then to account for the fact that these immigrants and their descendants have undergone no transformations since their first appearance.

## THE SILURIAN FOSSILS

In the Silurian rocks the following make their first appearance, in every case unheralded:

- (1) A class of Echinoderms (the Ophiuroidea or Brittle Starfish).
- (2) 2 orders of the Echinoidea.
- (3) An order of Ostracoderms.
- (4) A sub-class of Fishes—The Elasmobranchs or Selachians. (These have both jaws and fins)
- (5) The Scorpions. (2 genera in the Upper Silurian of Europe and U. S. A.)

No fossils have been found intermediate between any of the above and another group of animals.

The living scorpions are all land animals. As the existence on land in the Silurian Period of so advanced an animal as a scorpion is embarrassing for the

evolutionists, some of these maintain that the Silurian scorpions lived in the sea and breathed by gills, which later became transformed into lung-books so that the scorpions became terrestrial creatures without undergoing any change in appearance! This fantastic theory, however, seems superfluous. There is evidence that during the Silurian period the land had a considerable population of plants and animals. For example fossils of the land plant *Hostimella*, which occurs in Middle Devonian rocks of Bohemia and Scotland, have been found in Middle Silurian (Tranjilian) beds near Melbourne in Australia.

Then there are the Plant Beds (Fern Ledges) of St. John's Country, New Brunswick (which on stratigraphic grounds seem clearly to be Upper Silurian) hold fossils of no fewer than 19 genera of land plants common in rocks of the Middle Devonian period, also of amphibia, snails, myriapods and winged and wingless insects of kinds common in the rocks of the Carboniferous period. As none of these animals are supposed to have evolved before the Devonian period, evolutionists assign these beds to the Devonian or even the Carboniferous period. However Drs. L. W. Bailey and G. F. Matthew deem them on geological grounds to be of Upper Silurian date (Trans. Roy. Soc. Canada, Series II Vol. XII, 1918-19). In that case the earth was well stocked with a land flora and fauna in the Silurian period, and these St. John beds have been preserved from the fate of most land beds of the Silurian period, and have survived until today. There are probably other cases of such early beds having been preserved, but the fact is not recognized because men obsessed by the evolution theory persist in dating rocks by the fossils they hold, on the assumption that these fossils evolved on some date fixed by them in accordance with current theories of evolution.

That these highly-developed land animals and plants existed in Silurian times, is quite in accord with the fact that the date of the first appearance in the rocks of any group has to be pushed back as new discoveries are made. In my "Difficulties of the Evolution" theory, I stated that the amphibia and insects first appear in Carboniferous rocks. It is now known that undoubted fossils of both these classes of animals occur in Devonian rocks. Undoubted fossils of insects—spring-tails—have been recorded from Devonian rocks, as have fossils of two amphibians, *Ichthyostegopsis* and *Ichthyostega*, in Upper Devonian deposits of Greenland. Before these two fossils were found in East Greenland by Saeve-Soderbergh a few years ago, the only known trace of a Devonian amphibian was a footprint in a rock to which the name *Thinopus antiquus* had been given. The only part of the body of these Devonian amphibia (*Stegocephala*) known is the skull. There is no question that these skulls are those of amphibia, but transformists try to make out that they are

links between fishes and amphibia. Thus Professor Camille Arambourg writes (*Encyclopedie Francaise*, Tome V, p. 5-34-16): "In the Upper Devonian of the East Coast of Greenland have been found two crania in perfect condition, manifestly those of amphibia, and which the constitution is altogether quite near to the cranium of the Crossopterygians (*Osteolepis*) on account of the disposition of the bones of the roof of the palate, the position of the external and internal nostrils, the presence of a preoperculum, the trace of mucous canals. *Ichthyostega* and *Ichthyostegopsis* constitute an intermediate stage between the Stegocephalians and more ancient aquatic forms from which are descended also the Crossopterygians (fringe-finned ganoids) and the Dipneusts (lung-fishes). Their limbs unfortunately are not yet known."

As *Osteolepis* lived almost, if not quite contemporaneously with these two amphibia, Arambourg dare not say that it is their ancestor, but, because these Devonian amphibia have skulls having some features in common with *Osteolepis*, he regards them as a link between some ancient hypothetical fish and the Triassic Stegocephalians. Even before the discovery of the fossils of these two amphibia transformists made much of the resemblances in the skulls. On page 833 of the *Encyclopedia Britannica* (1929) Dr. G. K. Noble gives drawings of the side view of the skull of the fish *Osteolepis* and of the Amphibian *Palaeogrynus*, of which fossils have been found in the Coal Measures at Fife, and drawings of the palate view of the skull of the Crossopterygian fish *Eustenopteron* found fossil in Canada in an Upper Devonian rock and the amphibian *Iphetes* from the Coal Measures of Nova Scotia. He also details the differences between the fish and the amphibian skulls. He candidly admits, and the drawings show considerable differences between the two skulls, differences, which "would seem to preclude the osteolepids from immediate ancestorship," to the amphibia, but he regards the former as collaterals of ancestors. The similarity, be it remarked, is confined to the skull. Similarity of an organ or a structure in two animals does not necessarily indicate that they are closely related. As we shall see ([p.247]) tracheae constitute the breathing organs of *Peripatus*, the millipedes, centipedes, insects, spiders, scorpions and wood-lice, while nephridia of similar type occur in *Amphioxus* and *Polychaete* worms. The hind limbs of the Dinosaur *Iguanodon* resemble those of the kangaroo; in the primate *Tarsius* and the marsupial *Dromicia* the second and third toes have curious and almost identical claws which are used as a toilet comb. No one believes that the above features denote kinship. Moreover the osteolepids possess fins while the *Embolomeri* have legs. These organs differ so greatly in anatomy and function that I cannot believe that one evolved gradually from the other.



The limbs of every amphibian and ground vertebrate have to be jointed to perform their function, hence they bend at the elbow and wrist or knee and ankle, as the case may be. The fins of fish are not jointed, indeed it would be harmful if they were. There is no known fish of which the fins are jointed like the leg of an amphibian. The fossil fish of which pectoral fin is the least unlike an ambulatory limb, is the Crossopterygian *Sauripterus taylori*; this has no joints, nevertheless it is cited as evidence for transformism. The accompanying sketch of its fin is based on a drawing by Adams and Gregory. Beside this is placed the typical ambulatory limb. This shows the amount of change that must take place in order to convert a fin into a leg. The known fossils show that the limbs of the earliest amphibia were no more like fish fins than are those of the frog. Some of these had five toes, others three. *Thinopus* had but three, which is very surprising in view of the large number of terminal rays in the fin of a fish, if amphibia evolved from fishes.

These facts, coupled with the much greater mechanical and physiological difficulties that would have to be overcome before a fish could become gradually transformed into an amphibian, render it almost certain that the resemblances between the skulls of the Osteolepids and the Embolomeri are not a sign of kinship. So varied are the forms of life that such resemblances are inevitable, evolution or no evolution.

## THE DEVONIAN FOSSILS

In the Devonian rocks the Pisces—a sub-class of fishes make their debut in the form of the Dipnoi and the ganoids (Enamel-scaled fishes). The latter occur in the Devonian rocks as the Crossopterygii and the Chondrostei (cartilaginous ganoids). Thus the Devonian rocks have yielded fossils of the following types of fishes: (1) The armoured jawless Ostracoderms, (2) Selachii (sharks, etc.), (3) Lungfishes, (4) Crossopterygii, (5) Chondrostei. Each of these groups makes its first appearance fully developed, no fossils have been found linking any of them with any other kind of animal, and the idea that all are derived from a common ancestor is not backed up by an iota of evidence. Apart from the amphibia mentioned above, the only fossils of Devonian land animals that have been recorded are a few insects, millipedes, molluscs and crustaceans: one of these last is *Esteria*, which still lives in saline springs in deserts. But the fossils show that land plants existed in great diversity in the Devonian period. The vegetable kingdom is divided up into 18 classes of plants; of these 12 now exist, the other six have become extinct. Yet, in the earliest known land rocks, those of the Devonian period, have been found fossils of 10 or perhaps 11 classes, and six of the classes of which fossils have been found in Devonian rocks are still living, viz. algae, fungi, *Equisetums* (horse-tails), *Lycopodiums* (club-mosses), *Filicales* (ferns) and

Gymnosperms (the group which includes the pines). The known Devonian pines differed from those of today in that their seeds were in catkins and not in cones, and their leaves were broader than pine “needles.” The branches, like those of our pines, were all near the summit of the trunk. The Devonian algae and fungi differed little from those now living; the ferns were like those of today, but more robust; the club-mosses and horse-tails were mostly much bigger than any now living; some were tall trees. One difference between the earliest known land flora and that now living is that so far it has yielded no fossils of mosses, liverworts or flowering plants, which form the greater part of the present-day flora. This sudden appearance in the earliest known land rocks, of so vast a variety of plants, including those of all but three of the classes of land plants now living, is most unfavorable to the transformist hypothesis.

We have seen how abruptly the Cambrian marine fauna made its appearance and we suggested that this points to a great creation of these animals at the beginning of the Cambrian period. Does the sudden appearance of a host of plants in the Devonian rocks known to us mean that there was a great creation of land plants in the Devonian period? This is possible, but, in my view, improbable, because the Cambrian rocks lie on top of masses of unfossiliferous rocks, while nearly all the Devonian rocks overlies rocks rich in fossils, most of which are of animals which lived in the sea.

Unless the Fern Ledges of New Brunswick are of Silurian age the Devonian rocks we have been considering are the earliest land rocks which have persisted until the present time; all older than these have been destroyed with their fossils. This explains the abrupt appearance in the rocks of a great Lepospondyli flora composed of seed plants, ferns, lycopods and horse-tails (*Equisetums*).

## THE CARBONIFEROUS FOSSILS

In the Carboniferous rocks fossils of amphibia and insects are numerous and the earliest known fossils of spiders occur. The Carboniferous amphibia belong to two orders—the Lepospondyli or Aistopoda and the Phyllospondyli or Microsauria. These are represented by no fewer than 14 families, and, strange to say, one of these—the Dolichosomidae are of snake-like form and lack all traces of legs or limb-girdles. Now, if all the amphibia be derived from a common ancestor, which had evolved from a fish, the fins of the fish in question must have become converted into jointed legs for locomotion on land, and the pectoral and pelvic girdles of the fish must have become modified accordingly. Having performed this great feat and so become adapted to walking on land, a descendant of this father of all amphibia must

have acquired a snake-like body and scrapped all four of its hardy-acquired legs, also its pectoral and pelvic girdles! Having undergone this second transformation, the amphibian must have split up into two genera, one of which in the latter part of the Carboniferous period had a range extending from Ireland to Ohio. All these transformations, if ever effected, must have been spread over a period of many million years. Not a single fossil of any of this long line creatures, at first partly fish, partly amphibia, then gradually becoming snake-like and losing their legs, has been found. It may safely be said that such a fossil never will be found, because the imagined transformations cannot have been effected gradually.

Almost equally unfavorable to transformism are the Carboniferous fossils of the Class Arachnida, which includes the spiders. We have seen that a fossil of a mite occurs in a Devonian rock. In the Carboniferous rocks fossils have been found not only of the mites, but also of 11 other orders, including those of web-spinning spiders, whip-scorpions, and harvestmen, very like those now living. Today only 9 orders of Arachnida are living, three fewer than the number which, as the fossils show, existed in the Carboniferous period. Thus, far from having undergone evolution since their first appearance in the rocks, the Arachnida have undergone degeneration. Nor is this all. The earliest known fossil of a spider was provided with spinnerets just like those of spiders living in our gardens today. They include members of two of the three sub-orders of spiders. Presumably these early spiders used their spinnerets to spin webs to catch insects. If the evolution theory be true these spinnerets ought not to have come into existence until long after insects had evolved, but they appear in the rocks simultaneously.

The Carboniferous fossils include those of no fewer than twelve orders of insects. All these, except the blackbeetles, have become extinct. Most of them had well-developed wings. No fossil has been found linking any of them to any other class of animals.

The gradual conversion of some aquatic organism into an insect and the diversification of this into twelve orders must have required many millions of years, and the fact that no fossils have been found of any of the billions of pro-insects, which must have existed if the supposed evolution took place, is fatal to the transformist hypothesis.

Handlirsch has tried to minimize the great diversity of the Carboniferous insects. He pointed out that the forewings of them all were as diaphanous as the hind ones, and he invented new names for the Carboniferous Ephemeroidea and Blattoidea, viz. Protoephemeroidea and Protoblattoidea, in order to make it appear that the insects have changed considerably since the Carboniferous period. It is true that these insects, or at any rate those of which

fossils have been found, represent only 12 orders as opposed to the 32 now living. But he has overlooked the fact that the known Carboniferous fossils are only those of swampy coast lands. Fossils of the larvae of 120 species of these have been found, nearly all of which are aquatic. A few of the Carboniferous insects were larger than any now existing; one of the dragonflies had a wing-span of 28 inches. This suggests devolution rather than evolution! Some of the Carboniferous insects had legs made for jumping like those of locusts. One genus apparently spun a web like a spider, as the first pair of legs was provided with a spinning apparatus.

To the evolutionist the Carboniferous would seem to be a period of wonders. In it there was, according to him, a veritable orgy of evolution. Two classes of invertebrates discovered how to exist out of water, and one of them acquired wings and blossomed out into twelve orders: some fishes converted themselves into amphibia, and scarcely had this been accomplished, when one or more of these amphibians performed the great feat of becoming reptiles, reptiles belonging to three of the five sub-classes of which they are made up. Each of these sub-classes has a different basic type of skull. In the *Anapsida* the skull roof is solid and there is no opening behind the eye. In the *Synapsida* the skull is perforated by a hole behind the eye low down, bounded above by the postorbital and squamosal bones. In the *Parapsida* there is behind the eye an upper opening bounded below by the post-frontal and supratemporal bones. In the *Euryapsida* the skull is perforated by an upper opening behind the eye bounded below by the postorbital and squamosal bones. In the *Diapsida* the skull is perforated behind the eye by an upper and a lower opening, separated by the postorbital and squamosal bones.

If all the reptiles be derived from a common ancestor, the transformists have the problem to solve of discovering why these different openings arose in the skull. At present we are concerned with the fact that fossils of the first three of the above sub-classes have been found in Upper Carboniferous rocks. The upper Carboniferous Anapsid fossils belong to the order Cotylosauria, of which fossils have been found in North America and Europe; the Synapsid fossils belong to the Order Pelycosauria and have been found in North America. The Parapsid fossils belong to the order Mososauria and have been found in Brazil and South Africa.

Some of the Pelycosaurs were of remarkable appearance, in that the vertebrae of the neck and back had dorsal spines nearly two feet long, forming a great crest along the back. Some of these creatures attained a length of fully nine feet. Even more remarkable were the Parapsid Mososauria of which Dr. E. H. Colbert writes ("The Dinosaur Book," 1945); "The Mososauria were late Carboniferous reptiles of aquatic habits whose fossils

have been found in South Africa and Brazil. The combination of long jaws and pointed teeth suggests that this was a fish-eating animal. There was a tapering flexible tail which was evidently deep and narrow—the type of tail that one might expect to find in a swimming animal. Moreover the limbs were modified to form paddles . . . Thus it would seem that Mesosaurus lived in the water, and it is indeed doubtful whether this little reptile ever ventured on to the land. In spite of this adaptation to life in the water there are certain things about the Mesosauria that point to their descent from thoroughly terrestrial reptiles, e. g. vertebrae like those of Cotylosaurs; therefore, it seems probable that at a very early stage in the history of the land vertebrates certain primitive Cotylosaurians abandoned the land life to which their Labyrinthodont ancestors had so slowly and with such a great struggle attained.”

If the doctrine of transformism be true the ways of animals in the past were indeed strange. Fishes which had laborously turned their fins into legs and become amphibians lost no time in ridding themselves not only of their newly-acquired legs, but of their limb girdles, lock stock and barrel. Again, no sooner had certain amphibians acquired the power of producing eggs that could be incubated out of water than some of them took to living in water.

Further, if all the Upper Carboniferous reptiles evolved from a common ancestor, that first-of-all-reptiles must have been in existence in the Cambrian period, unless the transformation had been effected with almost miraculous rapidity. Again, terrestrial rocks formed in the Devonian and first half of the Carboniferous period have not revealed a single fossil of any of the three lineages connecting the Anapsids, Synapsids, and Parapsids (to say nothing of the Euryapsids and Diapsids) with this hypothetical ancestor. Yet from the moment of their first appearance each of these sub-classes has left numerous fossils.

Mention must here be made of Seymouria, an animal which lived in the Permian period, and of which the whole skeleton is known. Some authorities deem this to be a reptile, others an amphibian. This is cited by evolutionists as a transitional form—half-amphibian, half-reptile.

But, we must remember that the main differences between reptiles and amphibia are in their physiological characters and the nature of their soft parts, and the fossils convey no information regarding these.

I do not consider Seymouria a transitional form—because (1) The great improbability that an amphibian became gradually changed into a reptile. (2) The known fossils of Seymouria were laid down at a time when three orders of reptiles not only existed but were spread over both hemispheres. Had Seymouria been found in an early Carboniferous rock, it would have been a

more useful witness for the transformists. (3) In view of the great diversity of the Permian reptiles and amphibia, the fact that some aquatic reptiles and amphibia resembled one another in some respects does not necessarily denote blood relationship. Today some amphibians, such as the newts and *Amblystoma*, are not unlike lizards in form.

In view of the above facts it is submitted that the correct attitude towards *Seymouria* is to regard it as an amphibian (*Stegocephalian* or *Labyrinthodont*) of which several skeletal parts bear a resemblance to those of certain reptiles. This is the view of nearly all evolutionists (for example, Berg, Sushkin, Broom, Williston). But, of course these, being good transformists, regard these resemblances as a case of converging evolution, or convergence, which is one of the many forms of evolution, such as explosive evolution, invented in order to account, on the transformist hypothesis, for resemblance between animals which cannot be nearly related to one another.

## THE PERMIAN FOSSILS

In the Permian rocks five new orders of reptiles make their first appearance, of which one, the *Chelonia* (Turtles and Tortoises) is an *Anapsid*, one a *Synapsid*, one a *Euryapsid* and two belong to the *Diapsida*. Thus, by the end of the Permian period all the sub-classes of reptiles were in existence. *No new sub-class of reptiles has appeared since the Permian period.* No fossils are known linking any of these five orders of reptiles with any other group. If the evolution theory be true, each of them must have had a long line of ancestors linking it with the order from which it evolved. This is particularly the case with the *Chelonia* which are very widely separated from all other kinds of animals. They may be described as animals that live in boxes. The body is encased in a shell composed of dermal bones, attached to the vertebrae and the ribs, provided with apertures through which head and limbs can protrude. The limb girdles are unique in that they lie entirely within the ribs. The Openings through which the fore-legs protrude are situated so far forward that the humerus (upper arm bone) has to be twisted to allow the protrusion of the limb. That the legs of an ordinary reptile could gradually have become twisted in this manner seems highly improbable. Palaeontology does not require us to believe that this took place gradually, because the earliest known *Chelonian* fossils exhibit all the characteristics of the group, including the ventral plastron, dorsal shield and curiously-placed and shaped limbs. Nor are any fossils known linking these with any other reptile.

“No order of reptiles of the past or present” writes Williston (“Water Reptiles of the Past and Present,” p. 216) “is more sharply or unequivocally distinguished from all others than the *Chelonia* or *Testudinata*. No other order

has had a more uniformly continuous and uneventful history, and of none is the origin more obscure. The first-known members of the order . . . were turtles in all respects . . . Relationship with other reptiles they really have none.”

The absence of fossils intermediate between the Chelonia and ordinary reptiles is evidence against the doctrine of evolution as strong as negative evidence can be, because, again to quote Williston, “the remains of no other air-breathing vertebrates are so omnipresent in the rocks as those of turtles.” Is it credible that, while fossils of the fully-formed Chelonia occur in abundance from the Permian onwards, not a single fossil is known of the thousands of ancestors that must have existed if the evolution doctrine be true?

## THE TRIASSIC FOSSILS

In the Triassic rocks the great order of the Dinosaurs makes its first appearance; four other orders also appear for the first time: the Rhynchosauria, Nothosauria, Plesiosauria and Ichthyosauria. The last three are composed entirely of aquatic animals, and one family of the of the Rhynchosauria—the Thalattosauria—is also aquatic.

If all the reptiles be derived from a common ancestor, it follows that these four groups of reptiles deserted the land almost immediately after the reptiles had freed themselves from the necessity of laying eggs which can develop out of water, and their bodies become modified in consequence. But no fossil has been discovered of any of the transitional forms that must have existed for millions of years. As usual the fossils give the lie to the transformist doctrine.

In all these aquatic reptiles the bones of the fore part of the limb are flattened to serve as paddles. In the Thalattosauria and the Nothosauria the elbow and wrist joints are flexible and the digits exhibit the same number of bones as do land reptiles. In the Plesiosauria there is no flexible joint at the elbow or knee, and the bones in the digits exceed in number those of land reptiles. The tail seems to have acted as a fin-like propeller. In some species the neck was ten times as long as the head.

In the Ichthyosauria the limbs were as rigid as, and broader than those of Plesiosaurs, and the bones of the wrist and digits were pressed together to form a mosaic composed of a large number of bones. Thus in the limbs of these reptiles there were bones of a kind found in no other reptile. The condition is much like that found in the limbs of whales. The snout was long and attenuated; the tail was long and bent down at some distance from the tip to support a ventral tail fin. Some of the later Ichthyosaurs attained a length of

forty feet. As a fossil of an Ichthyosaur has been found with six embryos within the ribs, it would seem that the eggs hatched out in the water while still within the mother. The Ichthyosaurs and the Plesiosaurs seem to have been cosmopolitan, and, as many of their fossils have been found, the non-discovery of any ancestors suggests that they had none. Williston writes of them (*op. cit.* p. 112); “it may now truthfully be said that of no group of extinct reptiles do we have a more complete and satisfactory knowledge than of the Ichthyosaurs. Nevertheless we have yet very much to learn about the order Ichthyosauria as a whole—whence they came and how they originated: what their nearest kin were among reptiles and, especially more about the connecting links between them and terrestrial reptiles. They have as an order so isolated a position, and are so widely separated from all other reptiles in structure, that they have long been a puzzle to Palaeontologists. Like the whales and other cetaceans among mammals, we know the Ichthyosaurs well in the plenitude of their power and the fulness of their development, but have yet only an imperfect knowledge of their earlier history, and none whatever of their earliest.”

Although the Ichthyosauruses were more fully aquatic than the Plesiosaurs, and the latter more aquatic than either the Nothosauria or the Thalattosauria, there is no question of the Ichthyosaurs having evolved from the Plesiosaurs or the latter being derived from either of the other two groups. There is no more reason for thinking that such transformations occurred than there is for believing that whales are derived from sea-lions or seals, and these from sea-otters. Just as these marine animals today fill different niches in the animal kingdom, so did the marine reptiles of the Triassic and Jurassic periods.

The Dinosaurs are composed of three sub-orders—the Theropoda, the Sauropoda and the Orthopoda, all of which comprise quadrupedal and bipedal forms.

They make their first appearance in rocks of the Upper Triassic period in the form of six families of the order Theropoda; and all seem to have been bipedal. Their mode of appearance is exceedingly difficult to reconcile with the theory that all the Dinosaurs evolved from a single ancestor, as is shown by the table:



Name of Family	Localities in Which Fossils Occur in Upper Triassic Rocks
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Plateosauridae	Germany, France, South Africa
Anchisauridae	United States, Brazil, England, India, Australia
Zanclodontidae	England, Switzerland, Germany, South Africa
Hallopodidae	United States, Germany, England
Podokesauridae	United States, Scotland
Coeluridae	Germany

As the transformists believe that Dinosaurs evolved from quadrupedal ancestors, they must conclude that before the end of the Triassic period, a bipedal sub-order had evolved and split up in six families, all of which, except the Coeluridae, had spread over an immense area; one family ranging from South Brazil, through the U. S. A., England and India to Australia, and two from Germany to South Africa; and all this evolution and spread of the Theropodal Dinosaurs has left no mark in the shape of a fossil, or, if it has, no such mark has been discovered. Nor is this all. The transformist has to believe that, after they had become bipedal, some species in each sub-order reverted to quadrupedal locomotion!

Equally unfavorable to the evolution theory is the way in which the Sauropod and Orthopod Dinosaurs first appear in the rocks in the Jurassic period. As shown by the following table:

	Localities in Which Fossils Occur in Jurassic Rocks
Name of Order and Family	

### Sauropoda

- |                    |  |
|--------------------|--|
| 1. Cetiosauridae   | Europe, U. S. A.                       |
| 2. Brachiosauridae | U.S.A., England, Madagascar, Australia |
| 3. Morosauridae    | U.S.A.                                 |
| 4. Atlantosauridae | U.S.A.                                 |
| 5. Diplodocidae    | U.S.A.                                 |

### Orthopoda

- |                       |                                      |
|-----------------------|--------------------------------------|
| 1. Hypsilophodontidae | U.S.A., East Africa                  |
| 2. Iguanodontidae     | England                              |
| 3. Stegosauridae      | U.S.A., England, France, East Africa |

These first appearances are not easy to account for on the theory of successive creations. On that of one creation in the Cambrian period each family of Dinosaurs was created in the locality of which the climate best suited its constitution, that is on fairly high ground, in various parts of the world, and, as in the course of the ages, the climate became progressively cooler, many kinds of animals became extinct because they could not tolerate the lower temperature, and they were replaced by animals which migrated from higher ground.

On this theory the Dinosaurs migrated to the lowlands (where their fossils have been found) during the Triassic, Jurassic and Cretaceous periods. After this they themselves became extinct. Fossils of them in the highlands have not been found because the rocks which held them have been eroded away as the result of having been long above sea level.

Another group which makes its first appearance in the Trias is the Dibranchiata (Cuttle-fish and squids). The earliest fossils known of these are called Belemnites. No known fossils throw any light on the origin of this group of molluscs.

Before leaving the subject of Triassic fossils, mention must be made of a number of fossils found in these rocks which some believe to be those of mammals. These are all very fragmentary, mostly fragments of lower jaws or isolated teeth. One is of the greater part of a skull.

These are:

1. Tritylodon, which consists of much of a skull found in the Karoo formation of South Africa.
2. Triglyphus, this consists of tiny quadrangular teeth each having two or three rows of tubercles, found near Stuttgart.
3. Microlestes, small isolated teeth found in Somersetshire and Wurtemberg.
- 4 Dromotherium, a minute lower jaw found in North Carolina.
- 5 Microconodon, a minute lower jaw found in North Carolina.
- 6 Trilobodon, a tooth found in South Africa.
- 7 Karoomys, a tooth found in South Africa.

Of the above, Nos. 1 and 2 are placed in the Mammalian order Allotheria in Zittel's Palaeontology . . . Deperet and others, however, regarded them as reptiles. In the case of Tritylodon, further scanty remains were found in Somerset in 1939 and these include much of a lower jaw; as this is composed of several bones, there can be no doubt that Tritylodon is a reptile. W. G. Kuhne describes these new finds on p. 589 of Vol. 10 of the "Annals and Magazine of Natural History" (1943).

As regards the other supposed Triassic mammals, G. G. Simpson, who has made a careful study of them, asserts definitely that Nos. 4 and 5 are reptiles, and this view seems to be generally accepted. As regards the other fossils he says, rightly, that they are so fragmentary that it is impossible to assign them with any confidence to mammals. Clearly then the safest course at present is to keep an open mind as to whether or not the fossils known to us show that mammals were in existence in the Triassic period.

## THE JURASSIC FOSSILS

In the Jurassic rocks occur the earliest known fossils of: Crabs and Lobsters.

Two orders of Amphibians; The Urodela (tailed forms, such as newts) and the Anoura (tailless forms, such as frogs).

The Pterosaurs or Pterodactyls.

The Mosasauria or Pleurosauria.

Birds.

Three orders of supposed mammals: Triconodontia, Pantotheria and Symmetrodonta.

Not a single fossil has been found which throws light on the origin of any of the above groups.

As regards the Amphibians, all the three orders of which fossils occur in Palaeozoic rocks seem to have become extinct during the Triassic period, while the Urodela and Anoura first appear in the latter part of the Jurassic period. Their earliest known fossils differ in appearance very little from those now living. Some, however, were much larger than any now existing. *Cryptobranchus* of the Miocene was over five feet in length.

The Pterosaurs or Pterodactyls were winged reptiles, and seem to have flown as well as birds or bats do. Among their peculiarities were:

1. The outermost wing-finger, which supported the great wing membrane, was very long. The other fingers were short.
2. As in birds, many of the bones were hollow and filled with air.
3. The shape of the skull was quite unlike that of other reptiles, being more like that of a bird.
4. As with birds, the head was carried at a right angle to the neck.
5. As in birds the breast bone had a keel to which were attached the powerful wing muscles.
6. The shape of the brain resembled that of a bird.

Despite all these resemblances, few believe that pterodactyls are ancestors of birds. There are profound anatomical differences between the two. These resemblances are due to the fact that both had wings.

Although pterodactyls are so sharply marked off from all other reptiles, the fossils have yielded no examples of reptiles intermediate between a pterodactyl and an ordinary reptile. The earliest known fossil is a full developed pterodactyl. Its wing finger is relatively as long as that of the latest species. "Pterodactyls" writes Seeley ("Dragons of the Air" (1901) p. 229) "show singularly little variation in structure in their geological history. The earliest known fossils had long tails, some of the later ones had short tails or were tailless. The later ones had fewer teeth than the earlier ones, indeed some were toothless. Some of the later forms were no bigger than sparrows, while one, *Pteranodon occidentalis* had a wing-expanse of eighteen feet!"

The Mosasauria were aquatic reptiles, which like the earlier ones appear in the rocks unheralded, well-adapted to life in the sea. The body was long and attenuated; that of one fossil measured fifty feet. The legs were paddles, the limb-bones were short, and the digits long and flattened. The skull was lizard-like in shape, but the lower jaw, as in the case of snakes, was attached to skull in such a way that the mouth could open very widely and so swallow very bulky quarry.

From Upper Jurassic deposits of Bavaria two remarkable fossils have been unearthed—the earliest birds known to us. These resemble one another very closely, so that some deem them to be different species of the same genus; others put them in different genera and call one *Archaeopteryx* and the other *Archaeornis*. The former is exhibited in the Natural History Museum at South Kensington. The latter used to be in the Berlin Museum. Let us hope that it has survived the last war. These two birds differ in structure from any other known bird, living or extinct. The long tail contained about twenty vertebrae, each of which bore a pair of feathers. The neck vertebrae were fewer in number than those of any other known bird. Each jaw exhibits thirteen teeth implanted in sockets. *Archaeornis* has abdominal ribs. Each digit is furnished with a claw projecting beyond the wing. The existence of these claws suggests that the wings may have been used both as flying and climbing organs. The feathers of the wing and tail are as perfectly developed as those of any modern bird, and the legs and toes are very like those of a crow.

Because of the desperate shortage of, or rather complete lack of fossils of vital importance to the evolution theory. i. e. of fossils of animals intermediate between highly specialized types and their supposed generalized ancestors, such as turtles, pterodactyls and whales, and fossils linking families, orders, classes and phyla with one another, the evolutionists have made much ado about what they imagine are the reptilian features of *Archaeopteryx*. Some have gone so far as to describe this bird as a feathered reptile! There is hardly a feature of *Archaeopteryx* which some transformist has not deemed to be reptilian. Let us examine these alleged reptilian features:

1. The skull. Dr. Morley A. Davies chides me on p. 191 of his “*Evolution and its Modern Critics*” for omitting to mention in my “*Difficulties of the Evolution Theory*” “the thoroughly reptilian skull.” Dr. Davies seems to have been misled by the ardent transformist Heilmann who, in his “*History of Birds*,” writes (p. 36):

“We may now stop talking about ‘the missing link’ between birds and reptiles. So much so is *Archaeornis* that we may term it a warm-blooded reptile disguised as a bird.”

I deem the skull typically avian and I believe that this opinion is shared by the vast majority of evolutionists who have gone into the matter. “The skull,” writes Sir A. Smith Woodward (Zittel’s “*Textbook of Palaeontology*,” Vol. 2, p. 436), “is shaped like that of a typical bird, its constituent elements being fused together and its quadrate free.”

2. "The simple vertebrae devoid of saddle-shaped articulations." It is true that vertebrae having saddle-shaped articulations are found only in birds; but this is not necessarily an avian character; cormorants, darters, gulls and some parrots do not show it.

3. The non-pneumatic bones. Pneumatic bones are not a prerogative of birds. They are possessed by some reptiles, e. g. pterodactyls and Dinosaurs. Some birds do not possess them. e. g. swallows, martins, snipe, canary, spotted flycatcher, black-headed bunting.

4. The teeth. Although no living birds possess teeth, all the known birds of the Cretaceous and Jurassic periods had teeth. On the other hand, some reptiles lack teeth, for example the turtles and tortoises, and some pterodactyls.

5. "The vertebrae on the long tail are not fused." In fact they are not completely fused. A long tail is not a character of reptiles. Some pterodactyls, in the words of Seeley, "had tails so short as to be inappreciable." These last two features, teeth and number of vertebrae in the tail, may vary in closely-allied forms. Some whales have teeth, others lack them. Some monkeys are tailless, others have very long prehensile tails.

6. "The metacarpals are not fused." This is hardly correct. According to Pycraft ("History of Birds," p. 374) these bones seem to have been fused in Archaeopteryx, but not so completely as to obliterate the tell-tale sutures (lines of junction). Moreover the metacarpals of the extinct Eocene bird *Gastornis*, were not fused.

7. "The sternum is far more reptilian than avian." This assertion occurs on page 821 of Thomson's "Outlines of Zoology" (1944). It is pure guesswork, because the sternum of this bird is not known! On the same page of the above book is the statement: "The sternum is not clearly known!"

8. "The pectoral girdle is far more reptilian than avian." This statement is made on Page 821 of the above named work, and is not accurate. On p. 436 of the 2nd Vol. of Zittel's "Palaeontology" we read: "In the pectoral arch the long and slender scapula (shoulder-blade) is essentially bird-like."

9. "The pelvic girdle is far more reptilian than avian." This assertion occurs on the same page as the two preceding. Its value may be gathered from the following extract of the article "Archaeopteryx" by W. P. Pycraft in the last edition of the British Encyclopedia: "The pelvis (hip bone), although emphatically avian in type, presents many peculiar and interesting features. Of these one of the most striking is seen in the pubes which meet towards their hinder ends to form an elongated triangular plate; restorations which

have been made of the pelvic girdle have left out of account the probable cartilaginous areas of the binder borders of the ilium and ischium, seen in the late embryonic and early post-embryonic pelvis of modern birds. When these are added a much more familiar look is given to the whole structure. The foot of *Archaeopteryx* is profoundly interesting, since, had it alone been found, it would have been regarded as that of a small corvine bird. This means that it had already become transformed into the typical 'passerine' type of foot adapted both for perching and walking."

The best evidence that *Archaeopteryx* is not a genetic link between reptiles and birds is the fact that the bird does not hint at, much less suggest, the order of reptiles that gave birth to the birds. Climbing lizards, *Pseudosuchia* (primitive crocodiles), *Pterodactyls*, *Bipedal Dinosaurs* have all been suggested as ancestors of *Archaeopteryx*. Vialleton truly writes ("L'Origine des Etres vivants" (1930) p. 110): "Clearly *Archaeopteryx* in no way enlightens us how a reptile could be converted into a bird and, above all, how it would be possible to acquire gradually and by gradations realized in the course of life, the capital differences in the skeleton, locomotion, the development, the nutrition and calorification which characterize birds."

In the middle and later Jurassic rocks have been found fossils of a number of lower jaws and part of an upper jaw of what appear to be small mammals. Most of these have been found in England, some in the U. S. A. These fossils are deemed to include representatives of three extinct orders or sub-orders of mammals: (1) The *Allotheria* or *Multituberculata*. These seem to have had habits like those of rats as the front teeth were adapted to gnawing; each of the cheek teeth has many cusps. (2) The *Triconodonta* which had well-developed canine teeth, while their grinding teeth each had three cusps arranged in a row longitudinally. (3) The *Pantotheria* or *Trituberculata*. These were very small animals of which the lower grinding teeth had very sharp cusps. We know nothing of these creatures except teeth and jaws. The number of incisors (front teeth on each side of the jaw) varies from one in *Plagiaulax* to 4 in *Amphitherium*. All seem to have had 1 canine tooth on each side of the jaw, except *Plagiaulax* which had none. The number of premolars varied from 3 to 5 and that of the molars from 2 to 8. No fossils are known linking any of these to earlier forms. This, however, does not prevent transformists from asserting dogmatically that these were derived from those reptiles in which the teeth, instead of all being alike, as is the case with the majority of reptiles such as lizards and crocodiles, were differentiated, like those of most mammals into incisors, canines, premolars and molars. In addition to their mammal-like teeth, these mammal-like reptiles, variously known as

Theromorpha, Anomodontia or Therapsida, had legs which, instead of being asplasy as in most reptiles, were placed vertically as in mammals, so that the animal when standing was raised well above the ground. Dr. R. Broom writes of these ("The Mammal-like Reptiles of South Africa and the Origin of Mammals" (1932) p. 330): "In considering the various orders and sub-orders of the mammal-like reptiles it will be observed that we have a most varied assemblage of animals from little forms as small as a mouse to others larger than a rhinoceros. The differences in structure are greater than those found among mammals, and if we only knew mammals by their bones we might readily have classified them as forming two orders and a number of sub-orders of the Therapsids."

The above statement shows, first, how little information the fossils give us about the soft parts and physiological characters of animals, and secondly, that there is abundance of fossil material from which transformists can select the reptile from which they imagine mammals to be descended! Despite this no one has ventured to name any known fossil as almost certainly the ancestor of the mammals. Most transformists select the order from which they would derive the mammals. The order most favored is the Theriodontia because their teeth come nearest to the mammalian type. Of the families making up this order Dr. Broom and his followers have selected the Ictidosauria, which lived in South Africa in the latter part of the Triassic period. Broom's reasons for this belief are that the quadrate bone is small, and the dentary large, occupying three fourths of the jaw, while the other five bones are small and lie in a groove in the dentary. But the dentary, as it holds the teeth, is invariably the largest of the jaw bones.

This is what he has to say about the imagined conversion of an Ictidosaurian into a mammal (*op. cit.* p. 315): "The changes that converted them, or one of them, into a mammal may have been a change of diet. The snapping jaw had to be converted into a masticatory jaw, and, as the quadrate became more or less fixed to the squamosal (i. e. the bone in the skull of the reptile on which the quadrate articulates), it kept with it the articular and other little bones of the jaw, and the dentary became comparatively free and formed a new hinge with the squamosal. The small bones, no longer moving with the jaw, became modified as parts of the auditory apparatus . . . the changes by which the articular became the tympanic (the bone encircling the ear and to which the ear drum is attached in mammals), in my opinion originated after the small bones had left the jaw, and can be fairly easily imagined."

In order that the reader, who is not a biologist may appreciate the improbability of the transformation alleged to have taken place. It should be noted that among the skeletal differences between mammals and reptiles are:



—(1) In reptiles the drum of the ear is connected with the tympanum by a single rod-like bone, known as the columella: in mammals the connection is by a series of three bones, called the stapes, malleus and incus, because in shape they resemble respectively a stirrup, a hammer and an anvil. (2) In every reptile the articulation of the lower jaw with the skull is not direct, but through the intervention of a bone called the quadrate: in every mammal the articulation is direct—there is no quadrate bone. (3) In every reptile each half of the lower jaw is composed of several bones. In every mammal each half of the lower jaw is composed of one bone—the dentary.

Transformists, then, believe that some reptile scrapped the original hinge of its lower jaw and replaced it by a new one at a different point. Then some of the bones on each side of the lower jaw broke away from the biggest one. The jaw bone to which the lower jaw on each side was originally attached is supposed to have forced its way into the middle part of the ear, dragging with it three of the lower jaw bones, and these together with the reptile middle ear bone formed themselves into a completely new outfit.

The transformists believe that, while all these structural alterations were going on in the bones of the jaw and ear, a new and most complicated structure—the Organ of Corti, peculiar to mammals and their essential organ of hearing, developed in the middle ear. This organ comprises *inter alia*, some 3000 arches placed side by side so as to form a tunnel. Until complete, or nearly complete, this complicated organ and its supply of hundreds of nerves would be useless. Dr. Broom does not suggest how this organ arose, what caused it to be formed, or how the incipient mammals contrived to eat while the jaw was being rehinged, or to hear while the middle and inner parts of the ear were being rebuilt.

The above changes appertain only to head and jaw, and are insignificant in comparison with the changes in the breast and hip-girdles and ankle and wrist, the blood system, digestive tube, breathing apparatus and body covering before a reptile could become a mammal.

It is indeed pathetic that educated men should believe that changes such as the above took place in the past by the slow action of natural forces.

## THE CRETACEOUS FOSSILS

In the Cretaceous period the following make their first appearance:

The sub-class of fishes known as the Teleostei, or bony fishes, to Which a very large proportion of present-day fishes belong.

Three new Orders of birds.

The Angiosperms or Flowering plants.

Placental Mammals.

As regards the fishes, in the Jurassic a number of new families of sharks and cartilaginous fishes make their first appearance as do the Chimeras. In the Cretaceous the bony fishes make their first appearance in considerable variety, in all 16 new families appearing; these all belong to the sub-order Physostomi i. e. fishes in which the air bladder, where it exists, is connected with the gullet by a tube. These earliest bony fishes of which four families occur in Lower Cretaceous rocks as far apart as Europe and Queensland, include the herrings and eels.

No fossil is known linking any of these with any earlier forms.

Similarly no fossil is known linking with Archaeopteryx, the three orders of birds which appear in Upper Cretaceous rocks. These Cretaceous birds all have teeth, in some the teeth were implanted in separate sockets, in others in a common groove. One of these orders—The Hesperornithiformes seem to have lacked the power of flight. As Archaeopteryx had this power, if the evolution theory be true, it would seem that some very early birds threw away their hardly-acquired powers of flight! But the evolutionist has to expect this kind of thing, as it is so common.

The earliest known fossils of the sub-class of mammals known as the Placentalia occur in uppermost Cretaceous rocks, and so far their fossils have been found only in Mongolia. They belong to the Order Insectivora to which the shrews, moles and hedgehogs belong.

The most striking event of the Cretaceous period is the sudden appearance of the Angiosperms (Flowering plants) in the form of both the Monocotyledons and Dicotyledons.<sup>[1]</sup> This appearance was accompanied by the extinction of a number of the older types of plants, notably the Bennettiales and most of the groups of reptiles. The mosses also first appear in the Cretaceous period. These great changes in the flora and fauna seem to have been caused by the great event which brought about the Cenomanian transgression of the sea, with all the bony fishes which for the first time seem to have become abundant in coastal seas. The flowering plants seem to have immigrated from the North polar regions. In the Lower Cretaceous rocks of Greenland and Western Siberia occur, mixed with many types of Jurassic plants, fossils of about twenty kinds of flowering plants including those of the poplar, plane, cinnamon and breadfruit. The fossils of the Middle Cretaceous deposits of the U. S. A. and Portugal show that the flowering plants constitute 30 and 35 per cent of the local flora. In the Upper Cretaceous deposits of New Jersey and Dakota the percentages were 70 and 90. In the rocks of Dakota

have been found fossils of 132 species of flowering plants representing 64 families.

Before the end of the Cretaceous all the Dinosaurs, Pterodactyls, Ichthyosaurs, Plesiosaurs and Thalattosaurs had become extinct.

## THE EOCENE FOSSILS

One of the biggest changes in the faunas that have taken place was that which marks the beginning of the Tertiary Epoch. The break between the Cretaceous and the Eocene faunas is as great as that between the Permian and the Triassic.

The complete lack of fossils linking a host of early Tertiary animals with earlier groups is one of the most serious objections to the theory of evolution.

In the Eocene 27 families of physoclyst<sup>[2]</sup> bony fishes made their first appearance, these include cod, flatfishes, swordfish, pipe fish, flutemouths, sea bream, wrasse, mackerel, gobies, blennies and angler fishes. It should be mentioned that the forerunners of these had made their first appearance in the Upper Cretaceous, including perches and horse mackerels.

Even more remarkable than this influx of fishes is the number of mammals which make their first appearance in the Eocene. We have seen that the placental mammals first appear in the Upper Cretaceous, in the form of a few species of the order Insectivora. In the earliest part of the Eocene, now styled the Palaeocene, appear suddenly four new orders of placental mammals—the Creodonta, Condylarthra, Amblypoda and Taeniodonta—all of which became extinct long ago. No fossils are known linking them with any earlier forms. The Creodonts were carnivorous and some regard them as a sub-order of the Carnivora. The Condylarths were also probably carnivorous, but their toes terminated in hoofs. The Amblypods were hoofed animals of heavy build: some had sabre-like upper tusks and several horns on top of the head; a few of them were bigger than the rhinoceros. The Taeniodonta or Ganodonta were heavily-built sloth-like animals. Hard upon the heels of these new Palaeocene animals appeared suddenly in the lower Eocene Carnivores (Fissipedes), Odd-toed ungulates, Even-toed ungulates, Hyracoidea, Edentates, Rodents, Proboscidea, Cetacea (Zeuglodontia and Toothed Whales), Sea-cows, Bats, Primates, Pangolins, Aard-varks, (all of which still exist) and the following orders now extinct: Litopterna, Typotheria, Entelonychia, Astrapotherioidea, Toxodontia, Pyrotheria and Embrithopoda.

Considerations of space render it impracticable to describe all these extinct orders which were represented by animals of size varying from that of a rabbit to that of a rhinoceros.

The sudden appearance of this enormous variety of placental mammals including such exceedingly specialized forms as bats, cetacea and sea-cows, all fully formed and endowed with all the characters of their order, coupled with the total lack of any fossils linking any of them with any other family of itself suffices to explode any theory which supposes that all these orders gradually evolved from a common ancestor.

The birds are equally unfavorable to the evolution theory. We have seen that all the known Cretaceous birds had teeth. Of these seven genera have been described. All these seem to have become extinct by the end of the Cretaceous. In Lower Eocene rocks fossils have been found of nine genera of birds, not one of which had teeth. These include a gull, heron, hawk, pelican and tropic bird (none of which belong to genera now living) and two large flightless birds, bigger than ostriches, one of which, *Diatryma*, stood seven feet high. There is no known fossil intermediate between any of these and any earlier bird known to us. The evolutionist has to suppose that at the end of the Cretaceous period all the different kinds of birds completely lost their teeth, also that one of the Eocene birds—the pelican-like *Odontopteryx*—greatly missed its teeth and so grew false ones in the form of bony denticles along the edge of the jaws!

The only groups of placental mammals of which the earliest known fossils occur in rocks later than those of the Eocene period are the whalebone whales, the pinnipeds (seals, sea-lions and walruses), the monkeys, apes and man, and most primitive of all mammals, the Monotremes (duck-billed platypus and the echidna or spiny anteater).

Needless to say, no fossils have been found linking any of these groups with any other.

In the case of man numerous enthusiasts imagine that they have discovered fossils connecting man with a non-human ancestor. None of these can bear close scrutiny.

So far the fossil record has not yielded one of the scores of fossils which the theory of organic evolution imperatively demands.

The above survey of the successions of the faunas in the past demonstrates clearly that the fossils do not fulfill Nos. I and IV of the conditions which are a *sine qua non* of the truth of the evolution theory in any form. As to I, far from each class, order, family and genus appearing in the form of a single species, more often than not new classes and orders appear in the earth's crust in great variety. As to condition IV, the earliest fossils of each group should have only some of the characteristics of the group and also some of the group from which they have evolved. The fossil record shows that the

earliest known fossils of each class and order are not half-made or half-developed forms, but exhibit, fully developed, the characteristics of their class or order. Any changes undergone by a great group after it has appeared are comparatively insignificant. For examples the pterodactyls, turtles, ichthyosaurs, bats, cetaceans, sirenia, seals, etc, when they first appear exhibit all the characters which distinguish their class or order and after that undergo hardly any change.

As regards condition No. 11, the flora and fauna of any horizon should invariably differ very little from those of the horizon immediately above and below. We have seen that very often this condition is not fulfilled, as is shown by the number of new families which appear at some horizons. It is true that in the majority of horizons the fauna and flora differ but little from those of the horizons immediately above and below, but the exceptions are very numerous. This is shown by the following tables compiled from data given in Zittel's "Textbook of Palaeontology."

TABLE 1

Showing the most remarkable sudden replacements of Invertebrate Faunas.

Name of Group	No. of families living in the Carboniferous	No. of families living in the Jurassic	No. of families common to the two Periods
Crinoidea	16	9	Nil
Echinoidea	5	10	1
Other Echinoderms	18	8	1
Ammonoidea	12	22	Nil
Nautiloidea	15	2	Nil
Cephalopoda	27	28	Nil
Insecta	12	17	1

TABLE 2

Showing the most remarkable replacements of Vertebrate Faunas.

Name of Group	No. of orders living in the Permian	No. of orders living in the Jurassic	No. of orders common to the two Periods
Amphibia	3	2	Nil
Reptilia	9	8	Nil
	No. of orders living in the Jurassic	No. of orders living in the Eocene	No. of orders common to the two both
Mammalia	4	20	Nil
	No. of families living in the Palaeocene	No. of families living in the Oligocene	No. of families common to the two Epochs
Placental Mammals	14	61	3
			(All belonging to the Order Insectivora).

TABLE 3

Showing remarkable replacements of Genera of Crinoids.

No. of Genera Recorded in		No. of Genera Common to the Two Periods
Ordovician	Silurian	
4	51	4
Silurian	Devonian	
51	56	12
Devonian	Carboniferous	
56	72	15
Carboniferous	Permian	
72	2	Nil
Permian	Triassic	
2	5	Nil
Triassic	Jurassic	
5	15	1

The natural interpretation of the above facts is that either there have been great waves of migration leading to displacement of faunas in various localities, or there have been extinctions and new creations.

D'Orbigny, after he had studied and arranged 1,800 fossils, came to the conclusion that "from the first to the latest epoch of the animated world we see appear at all points of it, at one and the same time, a great multitude of different species belonging to all branches of the animal kingdom, of which there are no signs in the preceding periods." He was of the opinion that in the past there have been twenty-seven distinct creations, each creation occurring after the previous one had perished.

He recognized that in the strata peopled by a later creation a few fossils of previous creations occur. He regarded the rare forms found in two stages of the earth's history as those that had perchance survived the catastrophe, or, more usually as dead shells that had become mixed with the littoral fauna of a later stage.

Since d'Orbigny's day later discoveries have shown that more species and genera pass from one to another of his stages than he thought. Nevertheless, as Deperet remarks, "the observations of d'Orbigny are exact in their broad lines, and the sudden replacing of marine faunas when passing from one stage to another, must be considered almost a general rule."

In my view the fossils compel us to believe either that there have been new creations since the Cambrian period or that the replacements of faunas in the rocks known to us are all due to replacements of extinct animals by immigrants from the open sea or from localities of which the sedimentary rocks have not been geologically explored, either because they are inaccessible or have been weathered out of existence.

Our brief survey of the fossil record has demonstrated that the fossils most certainly do not satisfy the third of the conditions which must be satisfied before the transformist hypothesis can be accepted. It is certain that there is no series of fossils which illustrate step by step, the origin of any Class, or Order of animals from any other group, and in my view, this is true of the Family. I maintain that in the present state of knowledge it is not possible to arrange a genealogical series of fossils proving, or making it almost certain, that any species has in the past undergone sufficient change to transform it into a member of another family. Indeed it is open to doubt if there is any fossil *proof* that any animal has in course of time become so modified as to justify us in believing that it has become a different genus. In this connection let me quote the following statement of Sir A. Smith Woodward (Zittel, "Textbook of Palaeontology" (Vol. III, 1925) p. 295):

"It is particularly surprising to find in Europe at least the origin of a new genus from a geologically older genus exceptional."

At one time it was fashionable to draw up pedigrees based on fossils showing the derivation of one type of animal from another. As more fossils are discovered, instead of these early pedigrees being confirmed and strengthened, they are abandoned. For example, in the recently published 3rd Edition of H. H. Swinnerton's "Outlines of Palaeontology," the only phylogenetic tree which was diagramized for a major group in the 1st Edition has been left out. A reviewer in "Nature" (1948) writes: "Such 'trees' are sought after by many students, but, with increasing knowledge, these are frequently found to have been built on shifting sands and presumably the ammonite 'tree' of the first edition has proved no exception."

Although transformists have abandoned the practice of drawing up pedigrees, they continue to tell us that group A is probably descended from group B. They feel it incumbent on themselves to act thus, because as Maurice Thomas rather caustically remarks, "If one is a transformist, one has to assign an ancestor to every species, even if it be the beast of the Apocalypse."

Here is a typical transformist assertion. Writing of the Carnivora Prof. W. D. Matthew said ("Encyc. Brit." (1929) Vol. IV, p. 900): "The ancestry of



many of the modern genera can be traced back through the Pliocene, Miocene and Oligocene into or towards a common ancestral stock which appears to be fairly represented by the Eocene family Miacidae of the Primitive Carnivora or Creodonta.”

When making this assertion Matthew probably felt that he was on sure ground, because all pedigree-makers are agreed that the modern Carnivora are derived from the Miacidae. Evidently he was not acquainted with a paper entitled: “On the Minute Structure of the Teeth of Creodonts, with especial reference to their suggested resemblances to Marsupials” by C. S. Tomes (P. Z. S., 1906). In this paper Tomes wrote (p. 45): “It might have been expected that there would be but little variety of structure in the teeth of animals belonging to the same great groups, for it is not easy to see how this should have been affected by the ordinary processes of selection. It might have been thought that so long as a tooth was strong enough, sharp enough and well adopted in external form to its work, its structure would matter little and would remain constant. But it was shown by my father, the late Sir John Tomes, that by a mere examination of sections of the enamel it was possible in the cases of rodents, not merely to pronounce that the enamel was that of a rodent, but, in a large number of instances, to refer it correctly to a particular family of rodents, or to a group of rodents . . . Similarly my father showed that the enamel of Marsupials presented characters very unusual in placental mammals and therefore almost characteristic of Marsupials, whilst the Carnivores also presented well-marked characteristics.”

In view of the above C. S. Tomes thought it “well worth while” to examine the enamel of some creodont teeth. To his great disappointment it proved to be not intermediate between that of Marsupials and modern Carnivores. He writes: “So far as the structure of the enamel may be taken as evidence, with one exception, no Creodont presents any greater resemblance to Marsupials than do the recent Carnivores.” This exception is afforded by the Miacidae. Tomes was surprised to find that the enamel of the only Miacid he examined—*Didymictis*—is actually simpler than that of other Creodonts and of most recent carnivores. This means that the family from which evolutionists are agreed that the Carnivores have originated is the one in which the enamel is least like that of the Carnivora. Nor is this all. Tomes found that the enamel of *Cynodictis* is very like that of *Didymictis*. He was thus forced to conclude that “as *Cynodictis*, at all events, appears to be nearer to the true Carnivora than are the Creodonts, the simplicity of its enamel, as compared with theirs may point to its lying not quite in the same line of descent.”

The above discovery, further, does not accord with the theory that Cynodictis is the common ancestor of the dogs and the raccoons.

Had Tomes' research shown that the enamel of the teeth of the Miacidae was intermediate between that of the Marsupials and the Carnivora there can be no doubt that the discovery would have been hailed with delight by transformists, and have been cited in every textbook. But, as things are, the discovery has been given no publicity, so that Matthew evidently did not know of it. What is more amusing, is that a posthumous edition of C. S. Tomes "Manual of Dental Anatomy," edited by Dr. W. H. M. Tims and Mr. A. Hopewell Smith makes no mention of the peculiar enamel of Cynodictis, nor is Tome's paper from which we have quoted included at the end of the chapter dealing with dental tissues. The paper in question is mentioned in chapter XVI, as is the fact that in respect of enamel the Creodonts stand no nearer to the Marsupials than do the modern Carnivores, but nothing is quoted regarding the enamel of Cynodictis and Didymictis.

Formerly transformists made great capital out of teeth as evidence for evolution. This is not the case today. A close study of the teeth of sharks seems to have caused two zoologists to reject the theory of evolution, viz. F. G. Cawston, M. D., F. Z. S. and the Belgian zoologist E. S. Casier.<sup>[3]</sup>

Dr. A. Morley Davies, in his valuable and most interesting book, "Evolution and its Modern Critics" (1937), disputes my contention that there is no fossil evidence showing that any family has evolved from any earlier family, and adduces evidence which he considers shows that certain families are descended from earlier ones.

This will be considered in Chapter VI.

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[1] A few fossils have been recorded in Jurassic rocks.

[2] Teleost fishes in which the air bladder is not connected with the gullet.

[3] See the Evolution Protest Movement pamphlet, "The Evolutionary Theory in Its Relation to Tooth Replacement" (1948).

## Chapter VI

### THE ORIGIN OF FAMILIES

Dr. A. Morley Davies, (*op. cit.* pp. 50-87) adduces evidence which he believes shows that, *inter alia*, the following families are descended from earlier ones:

#### FAMILIES OF MAMMALS

The Equidae (horse family).

The Halicoridae (sea-cow family).

#### FAMILIES OF MOLLUSCS

The Anomiidae (a family of oysters).

The Limnaeidae (a family of fresh-water snails).

The Cypraeidae (the cowrie family).

The Rudists (a family of bivalves).

The Nassidae (the dog-whelk family).

The Nuculidae (the nut-shell family).

Dr. Morley Davies selected the mammalian families because these have been dealt with in my “Difficulties of the Evolution Theory.”

That the other families cited by him are all of molluscs is accounted for by the fact that Dr. Davies is an authority on molluscs, indeed he is President of the Malacological Society of London.

As it is impracticable here to give in detail the evidence adduced by Dr. Davies, I hope that all interested in the controversy will consult Dr. Davies’ book, which was published at the low price of 7/6 by Thomas Murby and Co., 1 Fleet Lane, London, E. C. 4. This is a book of 277 pages with 30 excellent illustrations and diagrams.

The following rejoinder to Dr. Davies’ contentions is virtually a reprint of Chapter VI of my “More Difficulties of the Evolution Theory.”

### THE ORIGIN OF FAMILIES

I agree with Dr. Davies in the matter of the differences of opinion among taxonomists as to what constitutes a natural family. This fact alone suffices to

prevent me from asserting that the family, or any other taxonomic group, constitutes the unit of creation.

Nevertheless, Dr. Davies's criticism of my views is based on the assumption that I deem the natural family to be the unit of creation. (See p. 8). In my "Difficulties of the Evolution Theory" I set forth briefly Vialleton's theory that the greater groups of the animal kingdom down to sub-orders or super-families can only have originated from earlier ones by a special sudden change at an early stage in the course of the development of the embryo, which absolutely excludes the process of phylogenetic development required by the doctrine of evolution. I then suggested that, in order to make theory fit known facts, it is necessary to adopt a provisional hypothesis such as that of Vialleton, adding (D. p. 158) "Such a course would certainly stimulate research. It would lead to systematic efforts to discover the extent to which organisms are proved to have undergone evolution in the past. When this is determined we shall know precisely what evolution has to account for." That was written in 1930. Since then I have begun to suspect that the units of creation may be more restricted than those suggested by Vialleton. A paper of mine read to the Victoria Institute in 1932 contains the following passage: "The proposition I submit for your consideration is the changes that have been effected gradually in animals are strictly limited and do not transgress the limits of the natural family." I did not say "the family of modern systematists." I also asserted that it is not possible with the known fossils to constitute a single phylogenetic series linking a member of any mammalian family with a member of any other family. I am now inclined to think that this assertion may be extended to animals other than mammals.

This is to assert, not that the family is the unit of creation, but that there is no fossil PROOF that any family is derived from an earlier one. I might perhaps venture to go a little farther. There does not appear to be any proof, experimental or fossil, that all the species which constitute a family are derived from a common ancestor. For all we know at present, each family may have been created, not as a single pair but as a collection of pairs, each a little differently constituted, and each the ancestor of a lineage which has undergone more or less modification in the course of time.

On the other hand, should it later be demonstrated, either by experiment or an undoubted genetic series of fossils, that a member of a natural family can be, or has been, converted into a member of what all agree to be a different family, then, but not until then, it will have been demonstrated that the units of creation are greater than the natural family.

Dr. Davies disagrees with me; in his view there exists fossil evidence—perhaps I should say proof—that families have originated by a process of

evolution from other families. He adduces evidence in support of his view. Let us examine this.

## THE EQUIDAE OR HORSE FAMILY

Dr. Davies devotes 14 pages of his book in endeavoring to demonstrate that the Equidae are derived from an earlier family; nevertheless he does not venture to name a non-equine ancestor of the Equidae. He gives what may be described as circumstantial evidence. He expresses the opinion that Eohippus, which many suppose to be an ancestor of Equus, is less like Equus than it is like Homogalax (Systemodon), Lophiodon and Hyrachyus, which no one includes in the Equidae and which are deemed to belong to other families, and he argues (E. p. 64) "the acceptance of Eohippus as ancestor to Equus seems logically to involve the broad relationship of all the Perissodactyls." He further expressed astonishment that I should "strain at an Acila and swallow an Eohippus." I will deal first with the second statement. I neither strain at the one nor swallow the other. I merely point out that there is no fossil proof that Acila and Nucula, two genera of the family Nuculidae, are derived from a common ancestor, although they both have been long in existence. I do not admit that Eohippus is an ancestor of Equus, nor do I deny this. I wrote (D. p. 107) of Eohippus and other supposed later ancestors of the horse: "so far no fossils have been found connecting them with the horse of today. Some of them may be actual ancestors of the living Equus, but that has yet to be proved." To this statement I still adhere. I do not think it impossible that, as environmental conditions changed, members of the Equidae increased in size, that their teeth developed high crowns and their central toes grew in magnitude at the expense of the others; the known fossils suggest that this may have happened.

As regards the derivation of the Equidae from an earlier family Dr. Davies is commendably cautious. He thinks that there is much to be said for the classification adopted in 1889 by Lydekker and Nicholson in which are included in one family, styled the Lophiodontidae, what I deem to be a heterogeneous collection of Eocene mammals, viz. Eohippus, Epihippus, Orohippus, Colodon, Lophiodon, Helateles, Homogalax, Hyrachyus and Tetraclaenodon. If this classification be accepted, then the fossils indicate that the Equidae are derived from an earlier family and Dr. Davies has made his point. But, in my view the Lophiodontidae do not constitute a natural family, and I believe that the majority of those who have considered these Eocene mammals will agree with me.

Prof. W. D. Matthew, whom Dr. Davies mentions with approval, would divide this assembly into no fewer than three super-families—the Hippoidea,

the Tapiroidea and the Rhinocerotidea; while Prof. Romer, who also is commended by Dr. Davies, divides these animals into three sub-orders. It is true that Romer expresses the opinion ("Vertebrate Palaeontology," p. 323) that Eohippus "without doubt is Very close to the roots of the whole Perissodactyl stock," but opinions, even of evolutionists, are not proof. Neither Romer nor anyone else, so far as I am aware, has dared to name any fossil as the ancestor of the Perissodactyls.

We must bear in mind that in few of these early Eocene mammals is the full skeleton known, and the parts that are known exhibit considerable diversity. All these genera appear to have the same number of upper teeth, but this is not so in the case of the lower teeth. Thus, Colodon has two incisors on either side, most of the others have three. Colodon and Lophiodon exhibit only three premolars, the others have four.

In some of the genera the lower molars have oblique transverse crests, in the others these crests are at right angles to the axis of the crown, in yet others they are V-shaped.

As regards the upper jaw the last two premolars of Helateles exhibit a supplementary crest, in Colodon the last three display this feature.

Clearly then there is no fossil *proof* that the Equidae are derived from any earlier family. This, I think, is equally true of the Tapiridae and Rhinocerotidae. Dr. Davies, however, has drawn up a pedigree in which he shows Homogalax (Systemodon) as the common ancestor of these two families. I doubt whether many evolutionists accept this.

Professor Romer writes (*op. cit.* p. 330): Homogalax is "close to the ancestry of the Tapiridae, if not the actual ancestor," but he does not consider this genus to be ancestral to the Rhinocerotidae; according to him, the latter group are derived "from some of the smaller and more primitive rhinoceroses of the Eocene, and through them from the primitive Perissodactyl stock," a guarded guess.

Dr. Stamp writes (B. vol. 8, p. 632): "Tapirs were foreshadowed by Systemodon and similar forms (Palaeotherium, Palaplotherium); the peccary-like Hyrachtherium was the forerunner of the horse. Hyrachyus was a primitive rhinoceros." These are all guesses.

As regards the slenderly built Hyrachyus, Dr. W. K. Gregory writes (B. vol. 17, p. 530): "none of the known species of Hyrachyus were directly ancestral to the line running to the later rhinoceroses." That the hornless Aceratherium is ancestral to Rhinoceros (which is known to have existed as

early as the Lower Miocene) seems highly improbable, and Deperet does not admit it.

Thus, the best that can be said for the alleged ancestors of the Tapiridae and the Rhinocerotidae is that, if these be derived from earlier families, the genera cited are more likely than any others known to us to be their ancestors, or close relatives of these. I have no hesitation in asserting that it has not been proved that these supposed ancestors are in fact such.

#### THE HALICORIDES OR SEA-COW FAMILY

When criticising (D. p. 59) the series of fossils arranged by Professor O. Abel in support of the theory that the Sirenia (Halicoridae) and the Ungulata are derived from a common ancestor, I gave seven reasons for my belief that Abel's series is not a generic one.

1. The pelvis of the Manatee does not fit into the series and bears no resemblance to that of an ungulate. Dr. Davies meets this by saying that, if we assume that in the Manatee two of the three bones of which the pelvis was originally composed have almost disappeared while the ischium has retained its original size, then what remains of the pelvis of the Manatee bears an unmistakable resemblance to the ischium of *Moeritherium*. If we assume that the reduction of the pelvis took this peculiar course which, by the way, is not in accordance with the views of Kraus, the pelvis of the Manatee fits fairly well into Abel's series; but then the question arises: why has the ilium disappeared almost completely in the Manatee while it has persisted with comparatively little reduction in the Dugong?

2. There is no proof that the later members of Abel's series are descended from the earlier. Save admitting that *Eotheroides* (*Eotherium*) is more probably a cousin than a parent of *Eosiren*. Dr. Davies does not deal with this point. Let me elaborate it. As Dr. Davies has published (E. p. 89) illustrations, drawn to scale, of the hip-girdles of the members of Abel's series, the reader is in a position to judge of the probability of the series being a truly genetic one. He will at once notice the peculiar changes that are supposed to have taken place in the size and shape of the pubes, in the proportions, shape and curvature of the ilium and in the situation of the acetabulum.

The rather pointed pubes of *Moeritherium* is supposed to have been larger and less pointed in *Eotheroides*, to have reverted to something like its original form in *Eosiren*, to have retained this form in *Halitherium*, and then almost to have vanished in *Metaxytherium*.

The upper part of the ilium of *Moeritherium* has a slight backward bend; the ilium of *Eotherium* is clubshaped and straight, that of *Eosiren* is shorter

and tapers at the end, that of Halitherium is longer, more slender and has a slight forward bend, while that of Metaxytherium is stouter and ends in a blunt expansion.

The acetabulum occupies a posterior situation in Moeritherium, a median one in Eotheroides, an anterior one in Eosiren, a posterior in Halitherium and a median in Metaxytherium. Moreover, having thus migrated forwards and backwards, it disappeared in the Dugong!

The above is a strange course to be taken by a bone which has become useless and is disappearing. I submit that the particular form of the bone in each genus is an adaptation to the functions it performed.

3. Eosiren lived too shortly after Eotherium to allow sufficient time for the alleged conversion. With this Dr. Davies is inclined to agree. Thus, this link of the pedigree falls out.

4. It is improbable that the obturator foramen disappeared earlier than the acetabulum. Dr. Davies suggests that the latter may have persisted because the femur articulated with it. I agree.

5. The gradual transformation of a land mammal into a sea-cow or whale would necessitate a series of intermediate species unable to walk or to swim properly!

6. There are no known animals, living or extinct, anatomically midway between these aquatic mammals and land mammals. To this objection Dr. Davies replies (E. p. 93): "The absence from the geological record of transitional forms between the Sirenia and the land mammals from which they should be derived is admittedly 'a difficulty of the evolution theory.' The same is the case with the Cetacea and the marine reptiles (Chelonia, Ichthyosauria, Plesiosauria): in all these cases, although the earliest known fossils are nearer to the supposed ancestral land-animals than the later ones, there is a wide gap left." I assert that the earliest known turtles and the earliest known cetaceans were fully adapted to an aquatic life. It is true that the head and teeth of the earliest known cetaceans, Zeuglodon, are more like those of a land mammal than are those of any living whale, but there is no reason why a marine mammal should not have been created having such a head.

Dr. Davies continues: "In the case of flying vertebrates I shall suggest (Chap. VI) that the earlier transitional forms were tied to an arboreal life. It may be that an analogous explanation must be accepted for these aquatic mammals—that in their early phase they were confined to fresh waters and that there are no freshwater deposits known of the place and period of their early evolution. In particular there is good reason to believe that both Cetacea



and Sirenia originated in Africa and no fresh-water Upper Cretaceous or Tertiary deposits earlier than the Upper Eocene are yet known there.”

This might account for the absence of fossils ancestral to the Cetacea and Sirenia, but it does not apply to the turtles, the Ichthyosaurs, the Plesiosaurs, and particularly the Order or Sub-Order of sea-serpents known as the Mosasauria or Pythonomorpha, which appears suddenly in the Upper Cretaceous, in the shape of four families, in North America, Europe, North, West and South Africa, and New Zealand.

A very serious objection to the doctrine of transformism is the total lack of fossils between the animals of which the gradual evolution seems impossible and their supposed generalized ancestors.

Dr. Davies makes no attempt to explain why the Right Whale, the Cetacean most highly adapted to an aquatic life, has inside the body, bones corresponding to hind leg bones, while some Cetaceans lack these.

In reply to Dr. Davies’ assertions that Eotherium has a pelvis exhibiting “the normal characters of a land-animal” and “differs little from the pelvis of the earliest known Proboscidian, Moeritherium of the Upper Eocene,” let me quote Vialleton (M. p. 377): “The pelvis of Eotherium is represented in a vertical position, whereas, if it be truly constructed like that of an ungulate, it ought to be very oblique, at 45 degrees, which greatly changes conditions, because if it have this inclination and the same muscular relations as in the ungulates, it would no longer be in accord with the rest of the skeleton of a sirenian. In effect in this last the sacral region is very short (a single vertebra), the chevron bones begin from the second caudal vertebra: with the length of the ilium and the inclination of the bone, a large part of the pelvis, perhaps all of it behind the acetabulum, would be placed at the level of or above the first caudal chevron, the natural orifices would thus be situated farther back than usual and the organs that abut on them would be singularly incommoded by the muscles of the tail. Further it should be observed that the obturator foramen is relative small, the ischium is already abnormally large, and lastly the pubis does not appear to be at all bent inwards to form a symphysis; so that it may be asked whether the comparison of the pelvis of Eotherium with that of an ungulate is quite justified, and whether we have not here to do simply with one of the aberrant forms of the pelvic bones which Kraus shows to be different from one another in the single genus *Manatus*. Indeed, as he shows, there is as much difference between the pelvis of a male and that of a female of the same size as there is between those of *Eosiren* and the *Dugong*.”

Vialleton concludes: “In face of these observations may not one be permitted to ask if there is not merely a purely superficial resemblance

between the pelvis of Eotherium and that of the proboscidian ancestors from which it is supposed to be derived?"

The above is necessarily very technical, but the general reader will be able to appreciate that there is no proof that Eotherium is closely related to Moeritherium, that it is an ancestor of the living Sirenia, or that the other members of Abel's series constitute a true lineage. In short, it is not proved that the Halicoridae are derived from an earlier family.

#### SOME MOLLUSCAN FAMILIES.

The other families of which Dr. Davies tries to establish the evolutionary origin are those of molluscs. I submit that these animals are peculiarly unfitted to afford help in settling the evolution-creation controversy.

Their fossil remains are confined almost entirely to their shells, which are the houses they secrete for themselves. The outward form of the shell, particularly that of sessile animal, is affected by the nature and amount of food available, the chemical content of the surrounding water, its temperature, degree of muddiness, etc., and the density of the population.

Thus the shell of one and the same species may assume a great variety of form. An excellent account of the variability of the shells of molluscs, is given by Dr. Cooke in the second volume of the "Cambridge Natural History," illustrated by a picture (here reproduced) showing the shells of 19 varieties of the dog-whelk (*Purpura lapillus*) living in different parts of the British Isles. These shells differ in size, shape, proportions, relative size of opening, length of spire, and thickness and roughness of the shell. Nor is *Purpura* unique. F. P. Marrat is of opinion that all of the 150 described species of another genus of dog-whelk—*Nassa* belong to one and the same species!

There can be little doubt that a great many of the described species of molluscs are not entitled to this rank. Hazay was able to rear *Limnaea peregra* from *L. ovata*, and *ovata* from *peregra*, by the simple device of placing the eggs in still or running water. If, in course of time, conditions of life in a locality change, the shells of the molluscs able to exist in the new conditions are liable to become modified.

A classic case of this is afforded by an Upper Miocene deposit at Steinheim, generally believed to have been laid down in a lake of which the water gradually became warmer and more saline owing to the intrusion of hot springs.

Among the molluscs inhabiting this lake was the snail, *Planorbis multiformis*, so named on account of the many varieties of it found in the

Steinheim deposit. The genus still persists, and several species occur in ponds in this country and are popularly known as ram's horns or trumpet-snails.

Hilgendorf, who made a special study of these Steinheim Planorbis, described no fewer than 19 varieties, or species. Some of the shells are flat discs, the coiling being all in one plane, the diameter of the chamber of others increases with the age of the animal, the shells of others assume a spiral form, some are like the shell of the whelk, in shape. Hilgendorf found in the lowest layers of the deposit only two varieties, both having flat disc-like shells, but in the higher zones less-flat forms appear and, two-thirds of the way up, cone-shaped shells. Later flat shells reappear, some of which are very like the shells in the lowest layer. Hilgendorf called these later flat forms *P. revertens*, deeming the earlier changes to have become reversed in them.

The differences between a flat-shelled form as *P. tenuis*, a slightly spiral such as *P. elegans* and the cone-shaped one such as *P. trochiformis*, are so great that some might deem them to belong to different genera.

Hilgendorf believes the majority of these Steinheim shells to be derived from the form he styles *P. aequeumbilicatus*, being doubtful about four of the varieties, viz. *P. parvus*, *P. minutus*, *P. crescens* and *P. costatus*, which, however, he does not include in his pedigree. (Fig 3.)

Hyatt, however, who later examined these fossils, drew up a very different pedigree, (Fig 4). He derives all these varieties from *P. levis*, which he thinks had split up into four varieties before it migrated to the lake in which the fossils were laid down.

Queenstedt and Sandberger, who examined the fossil bed, considered that the faunas of the various layers are not so clearly defined as Hilgendorf makes out, and Hyatt agrees.

Queenstedt went so far as to say that the occupants of these shells had not lived in this hypothetical lake, but the shells, after the death of their occupants, had been carried to the place where they were buried, that the assembly is a composite one.

More recently, however, Gottshick has expressed the opinion that Hilgendorf was right.

This collection of fossils demonstrates the difficulty of determining the genetic connections of the successive fossil assemblies in any locality.

If we accept Hilgendorf's view, the changes undergone by the shells were later reversed, and, therefore, are examples, not of evolution, i.e. the conversion of one type into another, but merely of the reaction Of a species to

changing environmental conditions. Berg, however (“Nomogenesis” p. 230), accepting Hilgendorf’s interpretation, cites this as an example of reversed evolution. I consider this an abuse of terms.

In this connection the reaction of some Scottish red deer imported into New Zealand is of great interest. These deer, thanks to the superabundant food in their new habitat, soon attained a great size and developed magnificent antlers. Later, when owing to their rapid increase in numbers, competition for food became intense, the deer failed to retain their immense size and great antlers, and reverted almost to the Scottish type. This is not a case of evolution and reversed evolution, but of the reaction of an animal to its environment.

Varying environmental conditions account for many, but not all, of the cases of diversity of shell-form displayed by the same species of mollusc. Ingersoll found that of *Heliconia trivolvis* in small ponds and lakes of Colorado scarcely two specimens are alike and many of them resemble other and altogether different species. (“Darwinism” p. 44.)

It would thus seem that some species are of a composite character, comprising elementary species.

Nor is this all, similarity of shell form does not necessarily denote close kinship, nor does dissimilarity necessarily exclude close kinship.

Semper, an authority on marine molluscs, writes (“Animal Life” p. 457): “Zoologists and geologists alike are wont to regard all the land mollusca, or rather their shells, as peculiarly fitted to indicate the affinities and relationship of living and extinct faunas. Now, I do not dispute that they are sometimes of the greatest utility in this respect, but I must here express my conviction—a conviction derived from years of study of the animals as well as of their shells—that in many cases we have absolutely no right to avail ourselves of the shells of the land mollusca for such comparisons; and, moreover, their classification by the shells, which is universally adopted by conchologists and geologists, and which they have accepted as a natural one, is absolutely and totally worthless and unnatural. Thus, every argument based on the assumption that the genera and sub-genera as at present distributed are natural divisions, indicating the true affinity of the species they include, must be purely imaginary, mere castles in the air (such, for example, as *Geotrochus*, *Bulimus*, *Rachis*, *Homorus*, *Hapalus*, *Nanina*, *Leucochroa*, etc., etc.; comp. Wallace *Geog. Dist. Animals*, II p. 512 *et seq.*)”

As specific cases Semper cites (1) the Philippine genus *Cochlostyla* “of which the shells are so excessively variable—in spite of the similarity of structure in the animals themselves—that no conchologist could possibly

describe the genus from the shells.” (2) “Hitherto we have always had a genus under the name of *Vitrina*, but species were included in it which belong, not merely to different genera, but even to different families, e.g. the *Zonitidae* and the *Limacidae*.”

Haeckel writes (“Symtematische Phylogenie”): “The shells of Molluscs are for the most part of little morphological value and do not permit the drawing of any conclusion regarding the organization of the soft-bodied creatures that secrete these shells. Snails of very different body build may manufacture altogether similar or hardly distinguishable shells. On the other hand, nearly related snails often construct very different shells; one constructs a very well developed one, another a rudimentary shell, another none at all. This applies equally to mussels and cephalopods.”

In the light of the above facts, let us consider the examples of evolution cited by Dr. Davies.

#### THE FAMILY ANOMIIDAE.

Dr. Davies states that some systematists divide up the family of oysters styled the Anomiidae, into two families—the Anomiidae and the Placentidae, the latter group comprising the window-pane oysters. If this sub-division be accepted and he can show that an *Anomia* evolved into a *Placenta*, then he has proved the origin by evolution in nature of a new family. He tries to show that this transformation has been effected. On page 76 he figures a living species of *Anomia*, a living species of *Placenta*, two fossil species, *Carolia placunoides*, from the Eocene of Egypt, and *Indoplacuna sindiensis* from the Miocene of India, which he deems to be transition forms between *Anomia* and *Placenta*. He also mentions that *Carolia placunoides*, found in Eocene Moqattam beds of Egypt, displays a great deal of variation, some forms being more placuna-like than others. He also cites an undescribed *Carolia* from the Eocene of India, intermediate in form between *Anomia* and *Placuna*. If then he be right, *Placenta* would seem to have evolved twice over in the Eocene, once in Egypt and once in India. Moreover, from the much earlier bed, the Lower Cretaceous Entaw group of Mississippi and Alabama, a fossil *Placenta* has been described, called *Placuna scabra*.

The fact that the *Carolias* in the Moqattam beds displayed so much variation seems to indicate a case of a sedentary form reacting to an unfavourable environment and its shell, in consequence, assuming curious forms. Such reactions among sessile bivalves, are not uncommon (vide p. 187). Moreover the structural gaps between the various members of the series depicted by Dr. Davies are considerable; it is therefore open to doubt whether they are a true genetic series.

Fortunately, however, it is possible to put Dr. Davies' theory to an experimental test, because both *Anomia* and *Placenta* are living genera. If in nature the former becomes transformed into the latter, it ought to be possible, by selecting suitable *Anomias*, to repeat the process in the laboratory. If this can be done and the *Placentas* so produced do not yield fertile progeny when crossed with the parent Species, geneticists will have performed a great feat, for they will certainly have converted one genus into another, and those systematists who are generally known as "splitters" will assert that a new family has been produced in the laboratory. Until this can be accomplished, I think it legitimate to doubt whether the supposed transformation has really been effected.

#### THE CYPRAEIDAE AND THEIR ALLIES

I am indebted to Dr. Davies for calling my attention to the interesting paper on the Cypraeacea (Procs. Malacol. Soc. Vol. XXII. 1936), in which Dr. Schilder sets forth the results of his careful study of the fossil cowries.

He deems these animals to constitute a stirps, which is equivalent to a sub-order. Having little first-hand knowledge of the Mollusca, I am not qualified to criticise his classification, and I accept it, although his families seem to be rather restricted. It affords support to the thesis that there is no fossil proof of the derivation of any natural family by evolution from an earlier one.

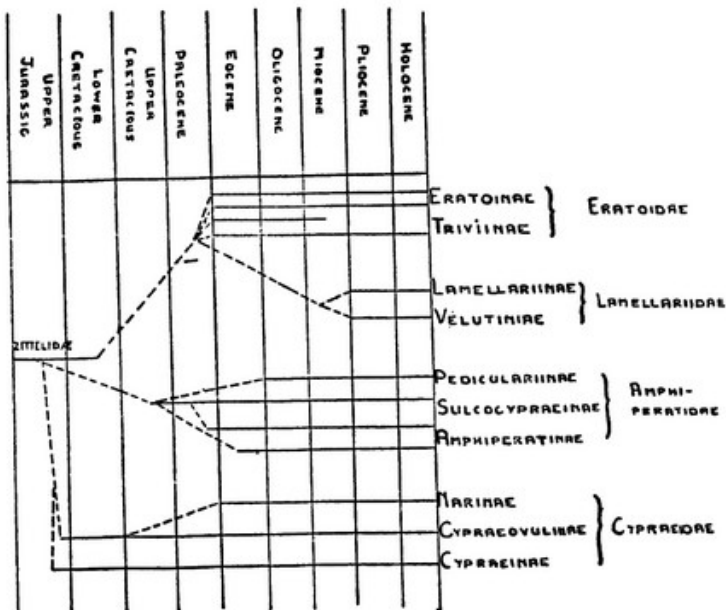


Fig. 5  
DISTRIBUTION IN TIME OF THE CYPRAEACEA  
(Adapted from Schilder)

Here is his classification:

#### Stirps Cypraeacea

Super Families	Families	Sub-Families
Lamellarioidea	Zittelidae	Eratoinae
		Triviinae
	Eratoidae	Velutiniinae
		Lamellariinae
	Lamellariidae	Amphiperatiniinae
Cypraeoidea	Cypraeidae	Sulcocypraeinae
		Pediculariinae
		Narinae
		Cypraeovulinae
		Cypraeinae

Dr. Schilder has drawn up a pedigree which, in that it shows all the genera, gives more detail than is necessary for our purpose. I therefore produce (Fig. 5) a pedigree in less detail, showing only the families and sub-

families. The heavy lines indicate the period during which each family is known to have existed; the broken lines linking the families represent lines of ancestors imagined by Dr. Schilder, but of which no fossils have been found. Thus the heavy lines represent ascertained facts, and the broken lines Dr. Schilder's opinions.

It will be observed that three genera appear in the Upper Jurassic. The first of these is *Zittelia*, belonging to the extinct family *Zittelidae*. The second and third represent two sub-families of another family, the *Cypraeidae*. Dr. Schilder believes that these originated from the ancestors of the *Sulcocypraeinae*, which are in turn derived from the *Zittelidae*, but this is based on surmise, as no fossil of the *Sulcocypraeinae* is known before the Upper Cretaceous.

The family *Amphiperatidae* appears in the Cretaceous in the form of three genera belonging to the sub-family *Sulcocypraeinae*, which Dr. Schilder would derive from the *Zittelidae*. The family *Eratoidea* appears in the early Eocene as four genera representing both its sub-families. These appear simultaneously in the European and Australian regions. As these Eocene *Eratoidea* are hardly less distinct morphologically each from the other than are the genera now living, Dr. Schilder believes the family originated in the Upper Cretaceous. The *Lamelliariidae* appear in the Miocene in the form of one genus; this is followed in the Pliocene by a genus representing the other sub-family. Dr. Schilder deems them to be derived from an ancestor common to them and the *Eratoidea*.

Thus there is no fossil proof that any of the families or sub-families of the *Cypraeacea* are derived from an earlier family.

It should be noted that there is nothing unusual in the manner in which the various families of the *Cypraeacea* appear in the rocks known to us, i.e. as two families in the Upper Jurassic, the other three families appearing later, i.e. in the Upper Cretaceous, the Eocene and the Miocene.

Thus, in the case of those Orders of the *Pisces* which include more than one family, 8 make their appearance in the form of 1 family, 9 in that of 2, 2 in that of 3, 1 in that of 4, while the great Order *Beryciformes* makes its appearance in the Upper Cretaceous in the form of six families. How are we to interpret this manner of appearance in the rocks known to us?

The evolutionist presumably believes that all these families evolved from a common ancestor in localities of which no rocks laid down during the period of this evolution have been discovered and, after their evolution, migrated to the areas in which their earliest fossils occur. It is open to the Creationist either to believe of any given family that it migrated from the



locality in which it was created to where its known fossils occur, or that it was created in this latter locality.

#### THE LIMNAEIDAE AND VALENCIENNESIA

The fossil evidence shows that some Limnaeids and other fresh water molluscs during the late Miocene and Pliocene in parts of Eastern Europe lived in water that became increasingly brackish.

Many of these molluscs contrived to maintain themselves for a long time in this unfavourable environment, but the beauty of their shells suffered in consequence; first corrugations appeared on these, then, apparently as the result of modifications of the respiratory system, the shells gradually developed siphonal grooves; later, at a comparatively early period of life, the secreting areas of the mantle became affected, with the result that the shell ceased to develop its normal elegant coiling and assumed monstrous proportions, as is shown in *Valenciennesia limnaeoides* of which Dr. Davies shows a picture.

Changes of a similar nature seem to have taken place in a number of lineages or species of this genus, and also in the genus *Taia*. The changes in some of the Limnaeid shells were so considerable that some regard one type, *Velutinopsis*, as a new sub-genus, and *Valenciennesia* as a new genus. Dr. Davies would apparently go farther and regard the last as belonging to a new family, despite the fact (see p. 157) that the shell is not a safe criterion on which to base classification.

I have not had the opportunity of examining these fossil Limnaeids, but Gorjanovich-Kramberger's account shows that they assumed so much variety of form that it is not possible with any certainty to make up genetic series out of them. Thus, *Valenciennesia* exhibits three main types with intermediaries between each; one having strongly-marked pulmonary grooves, another having them feebly-developed, a third showing no trace of a groove.

I gather that Dr. Davies deems *Velutinopsis* intermediate between *Limnaea* and *Valenciennesia* and *Velutinopsis pancici* to be derived from *L. rugosa*, and *Valenciennesia limnaeoides* from the first; but this does not seem to be the view of Gorjanovich-Kramberger, who drew up a pedigree showing that *Limnaea undulata* threw off three lines: *V. pancici*, *L. amplecta* and *V. limnaeoides*. This merely bears out the extent to which these pedigrees are subjective to the feeling of each observer.

This is, however, a detail. There seems little room for doubt that the shells of various molluscs underwent change as a result of the unfavourable conditions to which their owners were exposed, and that these changes

resulted in the production of monstrosities, such as those shown by the legs of men suffering from elephantiasis. These monstrous forms were all short lived; all have long ago become extinct, while the Limnaeidae which were not subjected to these bad conditions left descendants resembling themselves, now living in all parts of the world. Had Valenciennesia persisted until today, or, any rate, for a long period, before becoming extinct, it might be contended that it was not a monstrosity. Were it now living and had it been infertile when crossed with Limnaea, then Dr. Davies might fairly have claimed to have adduced fossil evidence of the origin of a family from an earlier one by a process of evolution. As it is he has adduced a beautiful example, not of evolution, but of the effect of unfavourable conditions on the shells of certain Limnaeids.

### THE RUDISTS

The Rudists are composed of five families. Of the group as a whole Mr. L. R. C. Cox writes ("The Evolutionary History of the Rudists" Proc. Geol. Assn. (1933) p. 379): "We can only conjecture from what parent stocks the Rudists are derived." The first family to appear in the rocks known to us is the Diceratidae, represented by the genus *Diceras* in the Upper Jurassic (Corallian). For all the fossils tell us this genus may have been created in the locality in which its earliest fossil occurs. Each of the families, Monopleuridae and Caprinidae, appears simultaneously in Europe and Texas in the latest Jurassic or earliest Cretaceous. The Radiolatidae make their appearance simultaneously in Europe and Texas in the Middle Cretaceous (Albian). The Hippuritidae turn up suddenly in the Upper Cretaceous (Turonian) in various parts of the world: Europe, Sicily, Algiers, Asia Minor, Persia, Jamaica and Guatemala. Mr. Cox hazards no conjecture as to the derivation of the Diceratidae, Caprinidae and Hippuritidae, but he believes that the Monopleuridae are derived from the Diceratidae and the Radiolatidae from the Monopleuridae. Let us examine these views.

Mr. Cox's opinion that the Monopleuridae are derived from the Diceratidae is based on the fact that the earliest known genus of the former, *Valettia*, has two well-developed hinge-teeth on the left valve, and one well-developed and one ill-developed (Mr. Cox describes it as "vestigial") tooth on the right valve. This "vestigial" tooth "disappears" in the later Rudists, affording, according to Mr. Cox, "clear evidence that the change in hinge structure is due to atrophy of one of the teeth of the right valve and the development of a tooth in the left valve which had hitherto been rudimentary."

In the majority of the Diceratidae the right valve has two hinge teeth with a socket between them for the insertion of the single tooth of the left valve. This type of dentition is said to be "normal." In some Rudists the left valve had the two teeth and the right the single tooth. This is the "inverse" type of dentition. Mr. Cox believes that, for some unknown reason, a member of the Diceratidae gradually developed a second tooth on the left valve, while one of the teeth on the right valve became degenerate and disappeared, and that *Valettia* is a species in a transitional condition. I do not believe that this gradual transformation occurred. The Rudists seem to have been endowed with the capacity for developing two teeth in each valve, but, as three functional teeth suffice, only three develop. The potentiality of producing two teeth in each valve was a device enabling the two teeth to be developed in whichever valve these were required, and these developed in the valve by which the animal was attached to a foreign object. In the living Chamidae, whose hinge-arrangement is like that of the Rudists, either the left or the right valve is attached, and the attached valve invariably exhibits the two teeth. As the Diceratidae were usually attached by the left valve, this had the two teeth, but in the later species which were attached by the right valve, this had the two teeth. Mr. Cox does not name the species of the Diceratidae believed by him to have given rise to the Monopleuridae, and I submit that there is no fossil or other proof of such derivation.

Mr. Cox asserts that the Radiolatidae are "clearly derived from *Agria*," one of the Monopleuridae. He does not name the species to which he thinks *Agria* gave birth, nor does he describe *Agria*, which is not figured in Zittel's *Palaeontology*. Dr. W. H. Dall, who wrote the account of the Rudists in that textbook, considers that the Monopleuridae, supposed by Mr. Cox to have given birth to the Radiolatidae, are rather far removed from the latter, as he places them in different super-families. He classes the former among the Chamaceae and the latter among the Rudistaceae.

Thus Mr. Cox's view as to the origin of the Radiolatidae is conjectural.

I submit that the known Rudist fossils afford no evidence of the origin of a new family by a process of evolution.

#### THE NASSIDAE OR DOG-WHELK FAMILY

Dr. Davies cites the Nassidae as evidence, not of the evolution of a family from a pre-existing one, but of our imperfect knowledge of the *Palaeontological* record.

The Nassidae, however, deserve mention in connection with the supposed evolutionary origin of new families, because they illustrate the proposition: if

the evolution theory be true, then all major evolution, as opposed to mere differentiation, has taken place in localities which have not been geologically explored.

According to Dr. Davies the earliest known fossil of this family is of the genus *Brachysphingus* of the sub-family *Dorsaninae*, which makes its appearance in the Palaeocene in California and possibly in the Paris basin, followed shortly after by the genus *Molopophorus*. These genera exhibit all the distinctive characters of the *Nassidae*, and Dr. Davies does not suggest any earlier genus or family from which they evolved. In the middle Eocene a species of the sub-family *Coptaxinae* makes its first appearance in the Paris basin. In the upper Eocene the third sub-family, the *Nassinae*, makes its appearance “approximately at the same time in Java and Peru.” Later this sub-family became widespread and exhibited great variety.

Each of these sub-families appears to have originated in the sea at some distance from land, and, as conditions became favourable in the coastal seas, to have migrated to the localities in which the earliest known fossils have been found. The evolutionist supposes that all these sub-families are descended from a common ancestor, which is itself derived from the common ancestor of all the Metazoa.

The scientific creationist is far more cautious. He points out that the *Nassidae* have undergone very little, if any modification since they first appeared, that the genera *Dorsanum*, *Nassa* and *Bulla* have all persisted since the Eocene. This being so, there is no valid reason for supposing, in default of fossil evidence, that these genera underwent great transformations before their first appearance.

Until further fossil evidence be found the Creationist declines to express an opinion as to whether the family, or each sub-family or even each genus was separately created. I leave it to the reader to judge which attitude is the more scientific.

The above, then, are the attempts made by Dr. Davies to adduce fossil proof of the origin of a natural family from an earlier one. I maintain that in none of the cases is the attempt successful.

## THE NUCULIDAE

Dr. Davies’ most interesting account of the *Nuculidae* contains much that is new to me. It illustrates the unsatisfactory state of Zoological classification and nomenclature. As the various categories family genus, species and the like mean one thing to one zoologist and another to another, it is clearly

impossible for a Creationist, no matter what his particular views are, to express in scientific terms what the units of creation are.

Under the mistaken impression that I assert the zoological family to be the unit of creation, Dr. Davies charges me with having proved too much in showing that no matter how far we trace them back, *Nucula* and *Acila* show no signs of merging into one another, unless I regard them as belonging to different families.

He puts to me a question which I as a creationist, did not expect, viz: What kind of blending or transition between these two forms I would expect. The answer is that I do not *expect* to find such blending.

If each family be a special creation, I see no reason why it should not be created as a group of genera or species.

We have to learn much before we can hope to elucidate the question of the units of creation. The first step in attempting this is for a number of zoologists to shake off the incubus of transformism, and to realize that it is the highest degree improbable that all living organisms are descended from a common ancestor.

As regards *Acila isthmica*, I cannot see any insuperable physiological or mechanical reason why its teeth may not be derived from the more usual short teeth, either as a mutation or gradually. I do not say that this has been effected. I do not know. As regards the date of the first appearance of *Nucula*. When looking for examples of genera that have persisted over long periods I consulted Zittel's *Palaeontology*. It now appears that *Nucula* has been subjected to treatment meted out to many genera of late years.

I speak feelingly on this matter, because, as an ornithologist, I am exasperated by the frequent changes that are made in the scientific names of birds.

Dr. Davies says that the first records of fossils are often made by geologists with only a very general palaeontological training and these naturally refer them, if they possibly can, to some known genus. Doubtless some fossils have been thus wrongly classified; but subsequent investigators appear to have erred in the opposite direction, with the result that new genera have been instituted on inadequate grounds, or, perhaps I should say, in order to bring the animals into line with evolutionary concepts. Persistent types in a supposed world of perpetual flux demand explanation, not always easy to find; hence the desire that these types should be few and far between.

This assigning of new names to genera has roused many protests from men of science. Professor McCready Price quotes the following extract from

a letter of “a geologist . . . whose work on the Palaeozoic fossils is recognized on both sides of the Atlantic,” (“Evolutionary Geology”, p. 187): “Some geologists make it a point to give a new name to all forms in Palaeozoic rocks; that is a name different from those of modern species. I was taken to task by a noted Palaeontologist for finding a Pupa (a kind of land snail) in Devonian beds; but in which I could not find any point in which it differed from the modern genus.”

My friend Mr. G. K. Hebbert, whose special subject is Lepidoptera, writes in a private letter “Every one appears to re-classify the fossil insects according to their own theories about evolution,” and again “The rule for insects seems to be that anything older than Oligocene you are free to place in any Order that may suit your private theories.”

These complaints are not all confined to private letters. Heilprin writes (“Distribution of Animals” p. 183): “However divergent be the views of authors on the matter of relationship, it is practically certain that numerous forms of life, exhibiting no distinctive characters of their own, are constituted into distinct species for no other reason than that they occur in formations widely separated from those holding their nearest of kin.”

In the same work Heilprin gives (p. 282) an account of the way in which insects originally deemed to be Devonian were hoisted up into the Carboniferous and entirely reclassified. Hagen placed these ancient insects in the modern groups: Libellulae and Neuroptera. But Goldenberg, Brongniart and Scudder, asserting that they were all synthetic types, constituted for them a new order, the Palaeodictyoptera; these insects are now not true Neuroptera, Orthoptera and Hemiptera, but neuropterid, orthopterid and hemipterid Palaeodictyoptera! This procedure was justified by the assertion that all these are more closely related to one another than “any one of them is to that modern group to which it is the most allied and of which it was with little doubt the precursor or ancestral type (Scudder).”

Heilprin asks “Surely it will not be contended that Palephemera and the highly specialized Titanophasma are more nearly related to each other than they are to the modern families, Libellulidae and Phasmidae, not to mention the orders to which these belong; and if this be so, why should they be referred to the one loose comprehensive group rather than to the several groups which they immediately represent?” Handlirsch, more recently, has accepted Scudder’s view; I am not competent to decide which view is correct, but there can be no doubt that the view of Scudder and Handlirsch is the one that coincides with the evolutionary concept. I wish to emphasize the way in which nomenclature and classification are today dominated by philosophical considerations.

This is equally true of the periods to which fossiliferous rocks are assigned. Some of these early insect fossils occur in the Little River Group of St. John, New Brunswick. This formation, we read (Z. vol. 1. p. 820) “was formerly regarded as of Devonian age, but is now assigned on the evidence of Palaeobotany to the lower Productive Coal Measures (Carboniferous).” This is because the plant fossils in it are like those which occur elsewhere in Carboniferous rocks. But the geological evidence points very strongly to the formation being of Upper Silurian Age. Dr. L. W. Bailey in his Presidential address to the Geological Section of the Royal Society of Canada in 1919, said: “It is to be noted that the view they are Carboniferous rests solely on palaeobotanical grounds, while no one who has actually studied the ground has yet reached any other conclusion than that they are really older than the formation last named.” (See p. 133) But so far as I am aware, all who have written since 1919 treat the fossils in these rocks as carboniferous; to do otherwise would raise many difficulties for the evolution theory.

We must now return to the renaming of fossils by evolutionists. Scores of examples could be cited. Here are a few.

Heilprin (*op. cit.* p. 138) states that the living mollusc genus, Nautilus has persisted almost unaltered from the Silurian period until today. Barrande laid great stress upon the sudden appearance, in the full plenitude of their power and side by side, of the distinctive genera of the cephalopods (Orthoceras, Cytoceras, Bathmoceras, Nautilus) in the Lower Silurian. Then Hyatt came along and decreed “there are no true species of Nautilus in Palaeozoic rocks.” (Proc. Boston Soc. Nat. Hist. XXII, p. 253, 1883).

In consequence all the species of Nautilus found in Palaeozoic rocks had their names changed, some are now assigned to the genus Plectoceras, others to Litoceras, and yet others to Endolobus.

Davidson writes in his review of the British fossil Brachiopods (Palaeon. Soc. Rep. 1884): “the resemblance between the recent Rhynchonella nigricans and some Cretaceous and Jurassic forms is so great that we are at a loss to define their differences.” Dr. Davies tells us (“An Introduction to Palaeontology” p. 36) “the Palaeozoic and Triassic forms have been separated off into separate genera, the sorting of the Jurassic and Cretaceous species is only begun.”

In the Palaeozoic rocks a number of fossils have been found which used to be described as those of pteropods by all palaeontologists. Thus Dana writes in the 4th edition of his Manual of Geology, (1896) in which some of these fossils are figured: “Other eminently characteristic (Cambrian) molluscs are the pteropods of the genera Hyolithes and Hyolithellus.” The genus Hyolithes

is known to have persisted until the Devonian Period. Dr. Davies writes ("Introduction to Palaeontology" (1920) p. 121): "among the fossils from the Middle Cambrian of British Columbia, Mr. Walcott has found a Hyolithes showing swimming organs closely resembling those of modern pteropods," and we "find in the Devonian rocks abundant shells indistinguishable from those of the modern pteropod *Styliola*."

But pteropods are what evolutionists describe as "very advanced" types of molluscs, hence their presence in the earliest known fossiliferous rocks is not in accordance with the doctrine of evolution; moreover, some evolutionists, including Dr. Davies, are convinced that the pteropods are derived from the supposedly more primitive opisthobranchs, which are not known earlier than the Carboniferous Period. Obviously the evolutionists have to adopt some device to bring the above facts into line with the concept of evolution. Broili has offered a solution of the problem, and Dr. Davies is among those who have accepted the solution, which is the simple device relegating the Palaeozoic pteropods, bag and baggage, to another order or class—the Conularidae. Mr. G. C. Robson writes (B. vol. 10, p. 69): "It is better to accept Broili's verdict. Nevertheless, if these remains are subsequently proved to be those of pteropods, and if the hiatus in time between their appearance and that of the other Opisthobranchia is not merely due to the imperfection of the geological data, then we shall be driven to one of the two very interesting conclusions. It will be necessary to assume either that the Thecosomata (i.e. pteropods) were developed directly from the primitive streptoneuran stock and are not from the Opisthobranchia, as is usually believed, or that the Cambrian Thecosomata have nothing to do with modern 'Pteropoda,' but represent an early essay in pteropod-like specialisation."

Doubtless one of the reasons for the popularity of the evolution theory among biologists, is that it offers great scope for one's ingenuity in explaining away facts that do not readily fit the theory.

When a persistent type baffles the efforts of systematists to change its name, the evolutionist may make it conform to the transformist doctrine, by asserting that the type in question has evolved on more than one occasion!

Mr. F. Chapman discovered in the Cambrian deposits of Malvern a fossil Foraminifer, *Spirillina groomii*, and Messrs. Heron-Allen and A. Earland found this creature alive off the West of Ireland. As the idea of a species existing unchanged from Cambrian times onwards is difficult to reconcile with the transformist concept, L. Rhumbler considers that, not only *Spirillina* but also *Ammodiscus*, and *Girvanella* found from the Silurian upwards, have arisen several times. L. Berg thinks that the cirripede crustacean *Pyrgoma* which occurs in the Devonian and Tertiary deposits has evolved twice over. If



the same species can be evolved from different ancestors, there can be no certainty that any two very similar animals are nearly related.

In my view it is unfortunate that the great "Fossilium Catalogus," now under preparation is being compiled entirely by adherents of the doctrine of evolution. This is an example of the way a Science suffers when it adopts a creed. If every fossil could be scrutinized by experts, some of whom accept transformism and others do not, the value of the catalogue would be greatly enhanced.

## Chapter VII

### EVOLUTION WITHIN THE FAMILY

We have now to consider evolution within the family which I prefer to call differentiation. This includes the origin of new species and genera.

Do the fossils prove or suggest that such changes have been effected in the past? Dr. Morley Davies is of Opinion that they prove this. He may be right. I am not prepared to say that he is wrong, but I do not think that he has proved this, at any rate in the case of genera.

He seeks to establish the following instances of evolution within the family:

1. The evolution of the various genera of horses.
2. The evolution of the Viviparid Molluscs in the Levant during the Pliocene period.
3. The evolution of Gryphaea, Exogyra and other Oysters.
4. The evolution of the Mollusc Inoceramus.
5. The evolution of Volutocorbis and Volutospina.
6. The evolution of Syringothyris.
7. The evolution of the coral Zaphrentes.
8. The evolution of the sea-urchin Micraster.

Let us consider each of these.

### THE HORSES

Every textbook makes great capital out of what is described as the evolution of the horse. This is deemed the best fossil evidence of evolution. But, this evidence at the best is only of evolution within the family, or mere differentiation, because the changes the fossils are supposed to prove are merely from one member of the horse family to another member of the same family. It is true that the earlier pedigrees drawn up by transformists were much more ambitious, since they showed that the horse family is derived from Phenacodus, which belongs to a different sub-order of ungulates (hoofed animals), the Condylarthra, which is now extinct.

The fossils of Phenacodus occur in a Lower Eocene deposit in Wyoming, while fossils of true horses were known from Lower Eocene beds in England and France—Hyracotherium and Propachynolophus.

As these European fossils were of Lower Eocene date, like those of Phenacodus, it is surprising that the latter should have been deemed by transformists as ancestor of the former. They apparently justified this by saying that the Lower Eocene beds of the U. S. A. may have been much older

than those of Europe. However the discovery of a fossil of *Eohippus* which was clearly a horse, in the same bed that held *Phenacodus* compelled even the transformists to strike out the latter as an ancestor of the horse of today. To make good this loss a few enthusiasts substituted for *Phenacodus* another animal of the same family, *Tetraclaenodon*, as its teeth are rather like those of *Hyracotherium*, although this genus occurs in Lower Eocene deposits they are not the same beds as those of *Eohippus*, and some teeth of this creature have been found in earlier beds. i. e. those of the Middle Palaeocene period.

Sir Arthur Smith Woodward goes so far as to place *Tetraclaenodon* at the head of a pedigree of the horse on p. 158 of Vol. III of Zittel's Textbook of Palaeontology (1925), which he writes: "may most nearly represent the pedigree of the Equidae." But, so far as I am aware no one today accepts *Tetraclaenodon* as an ancestor of the horse (*Equus*). *Eohippus* and *Hyracotherium* of the Lower Eocene are now generally admitted to be the earliest members of the horse group known to us. This being so, the horses, as usual, make their first appearance in the rocks not in the form of a single species, but in some diversity. In this case suddenly in the Lower Eocene appear in the U. S. A. the genus *Eohippus* represented by 13 species and the genera *Hyracotherium* (represented by two species) in the Lower Eocene of England and *Propachynolophus* (also represented by two species) in the Lower Eocene of Rheims and Erquellines.

The fact that, as we have seen, no fossil has been found which can be ancestral to any of these three genera is very significant in view of the abundance of fossils of horses in Eocene and most later rocks. No fewer than 20 genera of horses representing some 300 different species have been described.

The failure to discover any fossils ancestral to the horse cannot be satisfactorily accounted for by our lack of knowledge of the Palaeocene rocks, i. e. those immediately preceding the Lower Eocene, because a considerable number of fossils of mammals have been found in these, especially in the U. S. A.

G. G. Simpson, who has made a special study of these fossils, writes ("Bull, U. S. National Museum," No. 169 (1937) p. 69): "Knowledge of the general composition of the Middle and Upper Palaeocene mammalian faunas of North America as a whole may now be considered very good. It is probable that we have representatives of almost all the orders and families and a large majority of the genera that occurred on this continent during that time . . . The collecting areas certainly were part of a unified North American land mass in the Palaeocene, extending more than 1,200 miles north and south, and were

probably central on that land mass, ideally situated for a representative sample of the whole North American fauna.”

Were these early horses created in the Eocene period in the localities in which their earliest known fossils occur, or were they immigrants to Montana and Northern Europe from some northern locality? At present we are not in a position to answer this question, but the latter seems the more probable explanation. As regards limbs and toes, the early horses were much like the tapirs now living, and it may well be that, like tapirs these early horses were denizens of swamps and marshes and fed on succulent vegetation, for the mastication of which their teeth were well adapted. There is abundant evidence that in the Cretaceous-to-Pleistocene period the climate in the northern hemisphere became less and less warm. A fall in temperature entails migration of many plants and animals to warm localities.

We have now to see whether the known fossils justify the view that the horse *Equus* of today. (i. e. horses, asses, zebras and quaggas) is descended from one of the Lower Eocene horses. Let us first note the main difference between *Eohippus* and *Equus*.

EOHIPPIUS—Size, that of a fox.

EQUUS—All dimensions about 4 times as great.

EOHIPPIUS—Eye midway between tip of snout and back of head. Orbit about half ringed by bone.

Cheek teeth very low-crowned. Upper premolars simpler than molars.

Enamel forms flat covering to dentine.

Radius and ulna (bones of the forearm) not fused and equally developed.

Foreleg has four digits and hind three.

EQUUS—Eye twice as far from tip of snout as from back of head. Orbit completely ringed by bone.

Cheek teeth very high-crowned. Premolars like molars, except first premolar which is very small or absent. Enamel enfolded longitudinally and hollows within folds filled with cement.

Radius and ulna fused, ulna very slender at the lower end.

One digit to each foot.

The above are the main skeletal differences. The teeth of Eohippus were adapted to feeding on soft herbage; those of Equus are adapted to feeding on tough silicon-impregnated grass. For this reason the grinding surface, like a good grindstone, is uneven, presenting rows of very hard enamel, less hard cement and comparatively soft dentine. The legs and feet of Eohippus were adapted to soft marshy ground, those of Equus are designed for locomotion on hard ground.

So far as we know the feet of horses, all those living in the early Eocene period had 4 toes on the front feet and 3 on the hind. In the middle and late Eocene this seems to have been the case, except with Palaeotherium, which had three toes on each foot. All the Oligocene horses of which the feet are known had three toes on each foot all reaching to the ground. The Miocene horses had three toes on each foot but the side ones did not reach to the ground. The earliest known horse having one toe on each foot makes its appearance in the Pliocene, and the lateral toes in the three-toed species are small.

Speaking generally, the earlier horses were the smallest and the latest the biggest. Thus Eohippus was about the size of a fox, but Palaeotherium magnus of the Oligocene was as big as Equus, and Palaeotherium curtum was about the size of a pig.

The known fossils show gradual change from low-crowned to high-crowned teeth. The latter type of teeth first occurs in Merychippus of the Middle Miocene.

As a great many fossils of horses have been found, representing more than 250 species, evolutionists, by picking out fossils, have arranged what they believe to be genetical series, illustrating the gradual evolution of the one-toed horse. I have seen more than a score of these pedigrees, all different, and in all of which bigger or smaller gaps occur.

Of the 18 or so genera intermediate in time between the early Eocene and the present day only 10 are presumed to be genetically intermediate between Eohippus and Equus, the other 8 are deemed to be off-shoots of the main stem.

Here is a table compiled by W. D. Matthew in the Quarterly Review of Biology in the year 1926.

AMERICAN FOSSIL HORSES (W. D. Matthew. Q. Rev. Bio. 1926)

Period	Name of Bed	Names of genera of fossil horses
Pleistocene	Nebraska, Texas, New	(10) Equus
Pliocene	Mexico, Montana	(9) Plesippus
Lower Pliocene	and Deep River	(8) Protohippus,
Upper Miocene	Harrison and John Day	Pliohippus,
Middle Miocene		Hipparion, Titanothera
Lower Miocene	White River	(7) Merychippus, Oreodon
Upper Oligocene		(6) Parahippus, Protoceras
Middle Oligocene	Uinta	(5) Miohippus
Lower Oligocene	Bridger	(4) Mesohippus
Upper Eocene	Blanco	(3) Epihippus
Middle Eocene	Wasatch	(2) Orohippus
Lower Eocene	Glacial and Interglacial	(1) Eohippus

(Note. As the above formations are in various localities their ages are largely determined by the fossils they contain.)

Two of the 20 odd pedigrees, one drawn up by Matthews and the other by Dr. Morley Davies, are shown in Figs. 1 and 2.

Note that in his pedigree Dr. Davies includes Nos. 1 to 7 of the genera named in the above table, Protohippus as No. 8, and omits Plesippus, which he may well include in Equus.

Dr. W. D. Matthew has drawn up a very different pedigree. (Fig. 2.)

It will be observed that Dr. Matthew differs from Dr. Davies in the following matters. (1) He does not deem Orohippus and Epihippus to be ancestral to Mesohippus, hence in his pedigree there is a great gap between this last and Eohippus. (2) He does not consider that Miohippus is ancestral to Parahippus, and thus leaves a considerable hiatus between Mesohippus and Parahippus; in other words he inserts one intermediary between Eohippus and Parahippus, while Dr. Davies inserts four. (3) He regards Pliohippus as

intermediate between Merychippus and the modern type of horse, regarding Protohippus as a side line. Dr. Davies does the reverse.

As I have seen neither the fossils concerned nor the rocks in which they occur, I am not able to judge as to the relative merits of the above two pedigrees. But it is clear that one must be incorrect; both are hypothetical.

Dr. Matthew in his table does not actually connect Equus with any of the genera, but in his later note on fossil horses (Enc. Brit. Vol. XI, p. 757) he says that Equus is probably derived from Plesippus.

It is interesting to notice that Prof. J. A. S. Watson ("Enc. Brit.," Vol. XI, p. 757) does not believe that Equus is descended from any American horse. He writes: "Despite a great deal of antiquarian research and much ingenious speculation there remain a good many unsolved riddles connected with the origin and early history of the horse. The most complete series of fossils have been found in North America. It appears, however, that the real birthplace of the tribe was in Asia, and that North America was populated by successive waves, which crossed over by the land-bridges existing in Tertiary times. Horses survived in North America throughout the Pleistocene period, but at the end of that epoch the whole tribe died out."

Thus we see that the supposed line of ancestors of Equus breaks down at the point when we seek for an immediate ancestor of Equus!

Another weak point in these pedigrees is that the series are all of genera. Now the genus is a fairly big group. Thus in the case of Eohippus no fewer than 13 species have been described. Fossils of this genus have been found only in Lower Eocene rocks of the U. S. A., while in the U. S. A. all the known fossils of horses in Middle Eocene rocks are of Orohippus, of which the known fossils represent no fewer than ten different species, nevertheless it is not possible to point to any particular species of Eohippus as being nearer to Orohippus than any other, nor is it possible to name any species of Protohippus as being the more like Eohippus. In other words it is not possible to arrange a chronological series of the known fossils of Eohippus, each member of which is a little more like Orohippus than its predecessor, until we reach a fossil of which it is difficult to say whether it be an Eohippus or an Orohippus. This is equally true of all the other terms of the series.

The above considerations make it clear that the most that can be said for a pedigree deriving Equus from Eohippus is that it is not contradicted by the fossils, indeed they lend slight support to it. Clearly then to assert positively that the modern horse is descended from Eohippus is at the best to state as a fact that which is merely not improbable. This does not prevent very many evolutionists writing as though the descent were proved.

It is this that elicited the rebuke of Deperet (“Transformations of the Animal World” p. 105): “The supposed pedigree of the Equidae is a deceitful delusion, which simply gives us the general process by which the tridactyl hoof of an Ungulate can transform itself, in various groups, into a monodactyl hoof, in view of an adaptation for speed; but in no way enlightens us on the palaeontological origin of the horse.”

Deperet is probably right in thinking that the fossils show how a tridactyl foot may be converted into a monodactyl one. But certain considerations indicate that this statement is premature.

1. Although it is true that all the earlier horses known to us have more than one toe, and the earlier the horse the greater the number of toes, we must bear in mind that the rocks are to some extent dated by their horse fossils (vide p. 143). Thus, if it be ruled that every formation that holds a one-toed horse cannot be earlier than Pleistocene, clearly all supposed older rocks must contain horses having more or less well-developed lateral toes.

One is inclined to ask, are all the rocks that contain horse fossils correctly dated, do the horse fossils really show this gradual and orderly reduction of toes?

2. The extinct family Litopterna is believed by evolutionists to resemble the Equidae in the loss of toes. But in them the one-toed genera appear early, thus *Thoatherium* of the Miocene is more completely one-toed than the modern horse, since it lacks splint bones; on the other hand the latest fossil of the group, *Macrauchenia* of the Pleistocene, has three well-developed toes. In Miocene and Pliocene times there lived one-toed Litopterna, and three-toed forms having the lateral toes ill-developed and those with them well-developed. In their case, then, if the reduction of toes did occur gradually, we must assume a number of lineages in which the loss took place at greatly varying rates.

3. Although the camels have a long fossil history, the earliest as well as the latest exhibit only two toes. If, then, they are descended from five-toed ancestors, all except the middle pair seem to have been completely lost before the Later Eocene.

4. It is possible to form a pedigree deriving *Equus* from an ancestor having four front toes and three hind ones composed of genera that lived in Europe, almost all different from the American. The Europe series begins with the Lower Eocene *Hyracotherium* (which some would include in *Eohippus*), followed by *Pachynolophus*, then by *Anchitherium*, then *Hipparion* and finally *Equus*. This series is not quite so complete as the



American. But it must mean, if it be in any way genetical, that *Equus* has evolved independently in Eurasia and in North America.

5. Since the Palaeocene Period 37 new families of mammals make their appearance in the rocks of Europe and North America. There is no fossil proof of the origin of any of these from any other known family. They seem to be immigrants from the north; they make their appearances at various times. From this it is not unreasonable to suppose that the various types of horses found fossil in Europe and North America may likewise have been immigrants from the North, and that the one-toed species were the latest immigrants. It may be that all along there have existed one-toed horses, those having the lateral toes well-developed and those having these ill-developed.

6. All these horses known to us are either have brachydont or hypsodont teeth. The former were low-crowned and suitable for animals which subsisted on soft vegetation. The hypsodont teeth were all high-crowned and were suitable for animals which subsisted on grasses which are impregnated with silica.

The horse having brachydont teeth all had at least three toes on each foot, all of which reached to the ground in normal circumstances, while the brachydont horses had either only one toe, as in the living horse, or, if they had three toes, the lateral ones did not normally reach the ground showing that they were adapted to life on hard ground, and quite unfitted to marshy ground.

The horses are divided into four sub-families:

1. The Hyracotheriinae, which lived from the early Eocene and became extinct in the Lower Oligocene.

2. The Palaeotheriinae, which also became extinct in the early Oligocene.

3. The Anchitheriinae which made their appearance in the Oligocene and persisted into the Pliocene.

4. The Equinae, which first appear in the Middle Miocene of North America, and are still living.

Groups 1, 2 and 3 had brachydont teeth, while group 4 had hypsodont teeth.

The earliest of the horses having hypsodont teeth known to us is *Merychippus* which makes its first appearance in the rocks of the Middle Miocene period and persists into the lower Pliocene. Its fossils have been found only in North America. As it differs considerably from all the genera known to have preceded it, there seems little doubt that it immigrated to

North America from some unknown locality and that its advent coincided with the first appearance of fossils of grasses.

There are two theories which seek to account for the origin of these grass-eating horses; the first is that it was the evolution of the grasses which caused brachydonts to evolve into hypsodonts. As Scott puts it: (“A History of Land Mammals” p. 200): “Because of the minute particles of silica which they contain the grasses are very abrasive and rapidly wear down the teeth of grazing animals. In adaptation to this new source of abundant and nutritious food supplies many different animals developed a form of tooth which was fitted to compensate by growth for the loss through abrasion.” Among these were the horses.

The other theory is that these hypsodont teeth have characterized some kinds of horses ever since the family was created and that the reason none of their fossils have been found before the Miocene is that none of the localities to which grasses were originally confined have been preserved owing to their having been weathered out of existence.

In the present state of our palaeontological knowledge it is impossible to say which of the above views is the correct one.

Those who believe that *Equus* is descended from *Eohippus* do not seem to realize that if their belief be correct, the theory of organic evolution collapses. *Eohippus* lived in the early part of the Eocene period. i. e. about 60 million years ago according to the commonly adopted method of estimating the age of the rocks.<sup>[1]</sup>

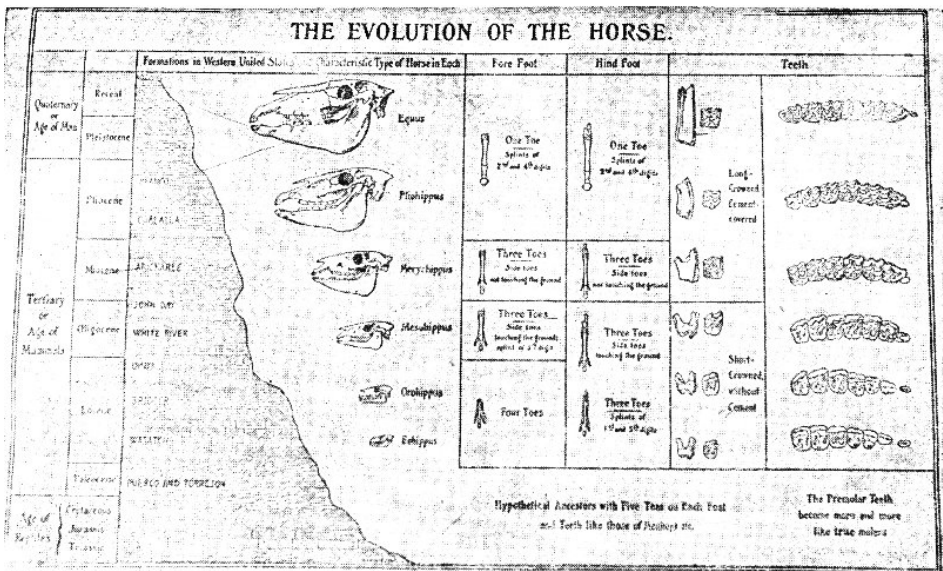


Fig. 23. Evolution of the horse, (From Matthew, W. D., Quarterly Review of Biology, v. 1.)

Dodson, Edward O. 1952. A Textbook of Evolution. W. B. Saunders Company, Philadelphia. p. 84.

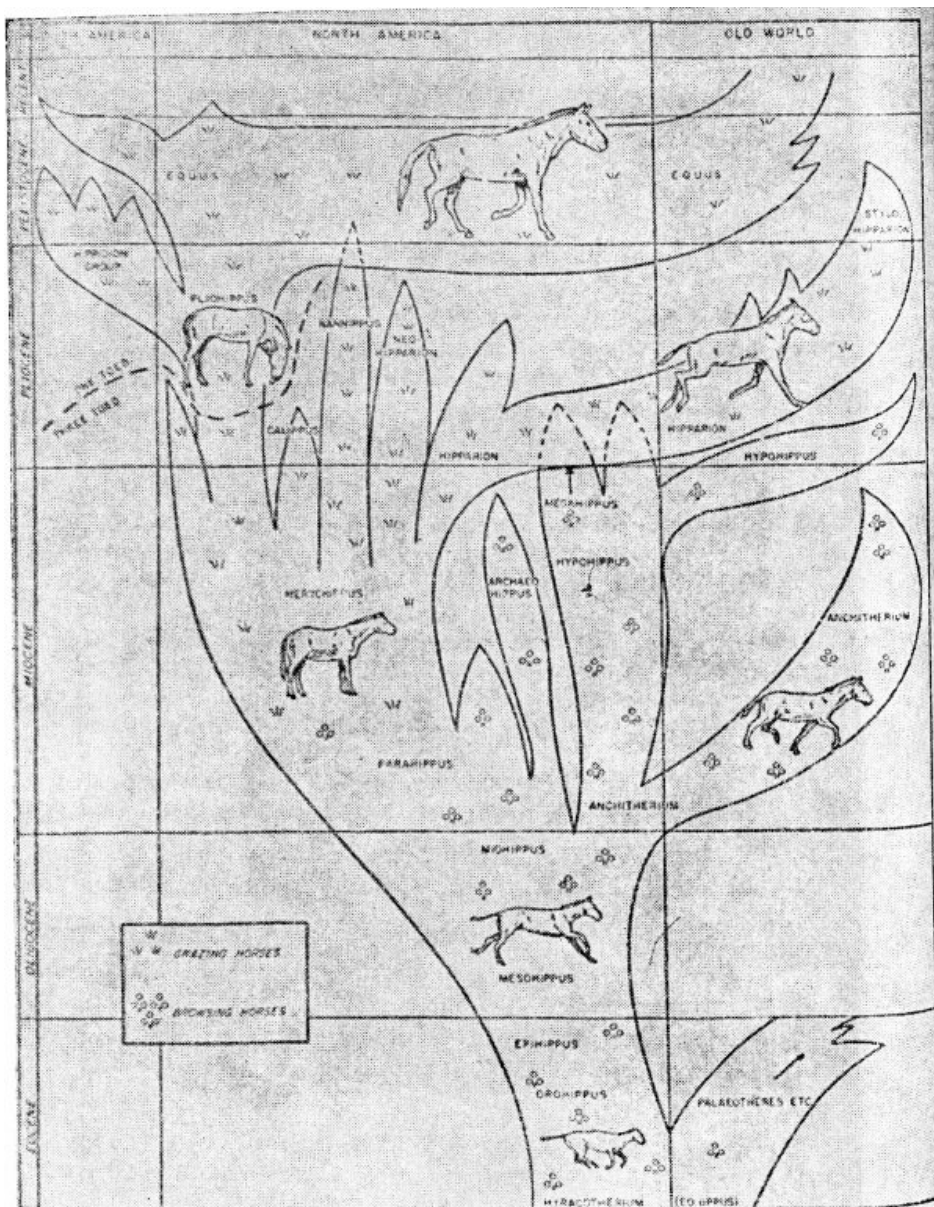


Figure 12.7. A schematic representation of the evolution of the horse tribe, showing the geographic distribution of the different forms, and their mode of securing food by browsing or by grazing. (From G. C. Simpson, by permission of the Oxford University Press.)

Dobzhansky, Theodosius, 1955. Evolution, Genetics And Man. John Wiley and Sons, Inc., New York. p. 303.

It matters not if the above estimate of the duration of the Tertiary period be too high or too low, because it represents a definite fraction of the time during which the earth is calculated to have been in existence. If Eohippus lived 30 million years ago then, the maximum age of the earth is 1,500 million years. Thus the fossils of the horse tell us that the time which has elapsed since the beginning of the Cambrian period is too short to allow a rat-like creature to evolve into a cat-like one, in other words for a new order of animals to evolve.

## MODIFICATIONS OF THE VIVIPARIDS IN THE LEVANT DURING THE PLIOCENE

We have noticed how readily the forms of the shells of molluscs react to environmental conditions. (p. 157).

The fossils show that Viviparids were abundant in the Levant during the Pontian, Cimmerian, Rumanian and Slavonian periods. In the earliest of these their shells were smooth and rounded; they became first more expanded, then keeled, and eventually the keels exhibited tubercles. There can be little doubt that these modifications were the consequences of environmental changes, although there may have been replacements owing to migration. The modifications in question seem to have been mere somatic reaction to an unfavorable environment and not evolution, because (1) the original smooth type of Viviparid still exists, while the "evolved" types are mostly extinct, (2) other molluscs in the locality became modified in a similar manner; some of these were different genera and even of a different family. Neumayr records (N. p. 283) that in the genera *Melanopsis*, *Bythinia*, *Neritina*, and the bivalve, *Unio*, the shells became thicker and developed ribs and nodules. He attributes these changes to the freshening of the water. (3) The extinct genus, *Tulotoma*, seems to have undergone similar modifications, as does the viviparid, *Margarya*, in a drying lake in Yunnan.

Bateson showed (Phil. Trans. R. S. 1889, p. 297) that, as the lakes near the Aral Sea dried up and so became saltier, the shells of the cockle (*Cardium edule*) living in them became progressively smaller and thinner, and on the inner side of the shell grooves developed between the ribs. Dall records that as the lakes in Utah, Nevada and California dried up, the sculpture of the shells of all the Molluscs in them became more complicated.

It is improbable that the change in the salinity of the water was the direct cause of these shell modifications. Bateson expressed the opinion that nutrition had something to do with them. In each case the modification was evidently a reaction to unfavorable conditions.

Dr. Davies quotes (E. p. 127) Annandale's statement (Proc. R. S. Ser. B. Vol. 96. 1924): "In certain regions of the earth's surface there is or has been some influence at work which has produced a similar collective peculiarity in the shells of the Viviparidae on diverse occasions and in different parts of the world. In many countries there is no evidence that anything of the kind occurred." Annandale suggests it may be due to some chemical stimulus. He expresses the belief that these environmental influences, if exerted for a sufficiently long time, affect the germ plasm and thus new species may arise.

In this connection he makes some interesting observations on the allied genus *Taia*. It is possible to arrange the shells of individuals of this genus living in Burma in ascending order according to the roughness of the shell and thus form a series the first three members of which, found in Upper Salween, Annandale deems to be varieties of the species *T. naticoides*; the last three of the series, taken from various parts of Lake Inle, he regards as separate species: *T. shannensis*, *T. littoralis* and *T. intha*. *T. naticoides*, the smoothest-shelled species, usually found in swamps, backwaters and canals, is very variable; the three types of its shell, viz. almost smooth, having simple ridges, having nodular ones, constitute the first three of his series of six. He deems these mere varieties, because shells in the same spot and in precisely the same environment show considerable individual variations in sculpture. It should be noted that the few fossil shells of *Taia* found in an old lake bed have highly sculptured shells; therefore, the evolutionist has to regard the *T. naticoides* now living as more primitive, less evolved than the fossil ones. Annandale considers the last three of his series to be, not varieties of *naticoides*, but different species, because they differ in the form of their radulae and gill filaments and in the structure of their central nervous system, also in the number of complete embryos they produce. *Naticoides* may have more than 30 embryos, but one race usually has six: *shannensis* has, as a rule 5, *littoralis* has usually three, sometimes 5, and *intha* only one. It is submitted that these differences of themselves are insufficient to entitle the races to specific rank. The difference in the number of embryos certainly does not; one race of *naticoides* produces five times as many as another. Again, the shrimp, *Palaemonetes varians*, has two varieties or races: *P. v. microgenitor*, which lives in the sea and produces about 320 eggs in the year, and *P. v. macrogenitor*, which lives in fresh water and lays only 25 eggs; the eggs of the latter are three times the size of the former. The differences between *shannensis*, *littoralis* and *intha* appear to be modifications resulting from different environmental conditions. *Shannensis*, which has the least rough shell, lives among the floating islands that form a ring round the lake; *littoralis*, which has a rougher shell, occurs on the outer margin of these

islands, while *intha* having the roughest shell, inhabits the clear waters in the central part of the lake.

Of these four types of shell, *naticoides* is the most variable, *shannensis*, less variable, *littoralis* more constant and *intha* least variable. It may be noted that fossils of *naticoides* have been found in two recent beds in the same locality, one of peat and the other of clay; the fossils in the two beds differ slightly from one another.

Annandale agrees that the differences between these four types are due to environmental conditions, he thinks that favorable environment induces sculpturing. The most sculptured form, *intha*, lives in remarkably clear water of which “the temperature apparently varies little and it is not as a rule subject to violent agitation through storms. There is a fairly abundant growth of algae on which *Taia* feeds, but this growth is not apparently inimical to animal life as too great a proliferation of freshwater algae frequently is. *T. intha* has no enemies, so far as I could discover, except a leech . . . which is often present in its branchial chamber. It has practically no competitors for food . . . *T. shannensis* lives in very different conditions. The water is dark and much contaminated with rotting vegetation . . . There is abundant shelter, but, on the other hand, wading birds which might spread cercarial infection among the molluscs, as well as feeding on them, are common, and also predacious fish . . . competitors for food . . . are plentiful, but the conditions are on the whole more stable than in a mere swamp. In the intermediate zone inhabited by *T. littoralis* conditions are intermediate.”

My view is the fact that *intha* has so few competitors indicates an inclement habitat, in which it contrives to exist, and this has resulted in its highly sculptured shell and the small number of eggs it produces. But this is a detail. The matter of importance is that the modifications of these *Taias* appear to be a direct effect of the environment. In default of evidence as to whether these forms will interbreed if afforded the opportunity, we cannot be sure if they are all of one species or not.

In this connection two other facts have to be considered. The first is: near the Inle Lake “there are two localities at which large deposits of *Taia* shells have been found. One is in a couple of limestone caves . . . into which . . . shells have been washed through holes in the roof. Here three species of *Taia* (*T. obesa*, *T. conica*, and *T. cylindrica*) were found, different but quite analogous to the three Inle species. No information was obtained as to their original provenance, and in the circumstances it is not surprising that they were all mixed together. Recent examination of much larger series than I had before me in describing the shells confirms my belief that they are quite distinct specifically. (Annandale.)” The last statement is rather surprising in

view of the great variability of the shells of many molluscs, and those of *Taia* in particular.

The other fact is that *Vivipara* having ridged shells are now living in various localities, e. g., Assam, Burma, Malay Islands, Celebes and the Philippines.

It is submitted that these *Viviparids* afford an illustration, not of evolution but of the manner in which the appearance of the shell varies with environmental conditions. Whether Annandale is right in thinking that peculiar environmental conditions, if they persist sufficiently long may eventually change the nature of the germ plasm of organisms subjected them has yet to be demonstrated. We know that external conditions affect the form of individuals, but there is no proof in any case that the changes so brought about have persisted long after the causes effecting them have ceased to operate. Nor is there any proof, or even evidence, that external conditions can so affect the germ plasm of individuals that these are sterile when crossed with individuals of their species which have not been subjected to such external conditions. The results of genetical work indicate that the fundamental character of the gametes, or reproductive cells, is affected little, if at all, by environmental conditions.

#### GRYPHAEA, EXOGYRA AND OTHER OYSTERS

Dr. Davies cites the extinct oyster *Gryphaea*, known as the devil's toenail, as an example of "evolution" within the family. He describes (E. p. 130) the modifications whereby the comparatively flat *Ostrea irregularis* seems to have become transformed into the much curved *Gryphaea arcuata*, and gives pictures illustrating this. He writes: "It seems possible that these changes are adaptations time after time in different stocks during the Jurassic period. The end-forms of each lineage seem to have become extinct, but their striking features, differing so much from those of ordinary oysters, has led to their being united as a separate genus *Gryphaea*. This is a good example of a 'polyphyletic genus,' due to parallel development."

I maintain that this is a case, not of evolution, but of abnormal growth of the shell resulting from the environment becoming increasingly unfavorable.

Dr. Davies makes no mention of other types of abnormal development of the shell, such as the *Exogyra* type in which the curved beak is twisted to one side.

I take the liberty of quoting the following passage from Professor Neaverson's invaluable "Stratigraphical Palaeontology" (p. 146): "It must be remembered that while such forms as oysters are very common in nearly all



Mesozoic deposits, their investigation is beset with great difficulties, owing to the extraordinary variation in the form of the shell. As Woods says in his study of the Cretaceous Lamellibranchs: 'The variation has been brought about by changes in the physical condition of the habitat, and particularly by differences in the character of the surface to which the left valve is fixed; it is found that the mode of growth and ultimate shape of the shell are determined mainly by the size, shape and position of the attached surface, so that commonly any one species shows an amazing variety of forms which can, however, be linked together by a large series of specimens.' The ostreid group has been subdivided into numerous 'genera,' of which *Ostrea*, *Alectryonia*, *Exogyra* and *Gryphaea* are most commonly cited. The characters on which these series are based have probably arisen several times during the history of the group. Exogyroid oysters are marked by a tendency for the shell to bend laterally and thus to show a twisting of the umbonal region. Gryphaeate oysters tend to thicken the left (attached) valve and reduce the area of attachment. Some forms usually classed as *Alectryonia* have radial folds, whose presence gives similarity of appearance but does not necessarily indicate close relationship."

In some cases the abnormality became so great that the shell could not open properly; this of course meant extinction. Dr. W. D. Lang has suggested that these abnormal forms became extinct through secretion of a superfluity of calcium carbonate. This may have been the case and the cause of this excessive secretion been exposure of the oyster to unfavorable conditions. It would seem that these abnormal types of oysters are comparable to the monstrous shapes assumed by goldfish reared in insufficiently oxygenated water. (see p. 198). They afford examples of unsuitable environment.

In this connection it is important to bear in mind, first, that the parent type *Ostrea* has persisted and flourishes today while the "evolved" types became extinct long ago. Secondly that the *Ostrea* type of shell is capable of assuming a great variety of shapes; considerably more than fifty extinct species are known and the specific names of these indicate the divers forms assumed: *acuminata*, *biauriculata*, *carinata*, *compressirostra*, *deltoidea*, *falcata*, *quadruplicata*, *sellaeformis*, etc. Thirdly, that *Ostrea*, *Exogyra* and *Gryphaea* may occur in the same formation, indicating that all types did not react in the same way to environmental conditions.

## INOCERAMUS

The extinct bivalve *Inoceramus* is cited by Dr. Davies as an example of "evolution" within the family. Professor H. Woods' paper (Q. Jour. Geo. Soc. (1912) Vol. 68, pp. 1 to 20) on this subject is very interesting. The history of

this genus, so far as it is known, is like that of many others that have become extinct; in the greater part of the period during which it is known to have existed, it is very stable, then, shortly before its extinction, while it is, so to speak, in its death throes, it assumes various strange forms. It is thus described by Professor Woods: "Although the genus *Inoceramus* is found in deposits as early as the Lias, yet it is represented by comparatively few species until the close of the Lower Cretaceous Period, after which it underwent rapid evolution so that many species and varieties were developed; but, so far as we know, none of these survived the Cretaceous Period or left descendants." In the above passage I would substitute for "after which it underwent rapid evolution so that many species and varieties were developed" the following: "after which its environment became increasingly unfavorable, in consequence its shell assumed many strange forms."

In the course of these changes, the valves, particularly the left, assumed abnormal shapes and departed more and more from the flattened oyster type, and this necessitated changes in the hinge.

Professor Woods is of opinion that the forms in which the valves, while retaining their original shape, developed radial folds, e. g. *etheridgei*, *tenuis*, *concentricus*, *subsulcatus* and *sulcatus* are derived from *Inoceramus salomoni*, of the Lower Spirillina *groomii*, while those of which the left valve increased in size, curled over the right valve and, in some cases, developed radial folds, are derived from *I. necomiensis*. He has drawn up a pedigree according to his views, which he admits is to some extent guesswork. Assuming that his pedigree is correct; this, I submit, is not a case of evolution, but of reaction of various lineages to environmental conditions which became progressively unfavorable and eventually unendurable, so that the genus died out. All the later forms are abnormalities. We must bear in mind that organisms attached to fixed foreign bodies are completely at the mercy of the conditions prevailing at the spot where they are fixed. As in the case of the *Viviparids* and of *Exogyra* and *Gryphaea*, so, in that of *Inoceramus*, similar changes occur in a number of different species. Professor Woods remarks: "It is interesting to note that radial folds have developed independently in several groups of *Inoceramus*;" he names five of these. The genus in North America underwent changes similar to those of the British species.

## VOLUTOCORBIS AND VOLUTOSPINA

Since 1909, when Dr. Burnett Smith wrote his paper entitled "Phylogeny of *Volutilithes*," this genus has been split up, in my opinion unjustifiably, into the two genera, *Volutocorbis* and *Volutospina*.

A glance at Plate III in Dr. Davies' book purporting to illustrate the "evolution" of the Volutidae in the Eocene seems to indicate very clearly modification resulting from unfavorable environment. It was therefore with considerable interest I consulted the above paper (Proc. Acad. Sci. Philadelphia, Vol. 58), in order to ascertain the views of the author. I find that these largely coincide with mine. He writes (op. cit. p. 73) it is evident that the deposits in which the shells under consideration occur "were formed in a great shallow arm of the sea whose waters were sometimes fresh or brackish and at others salt"—an environment not favorable to marine animals. "The marine faunas" he writes, "which from time to time invaded this Lignitic Gulf brought with them, at first species and races of Volutilithes with normal aspect. Those forms which were subjected to the conditions of the Lignitic eventually followed a course of evolution which was a direct reflection of their unfavorable environment. The races of *V. petrosus* at Bell's Landing, Wood's Bluff and Hatchetigbee Bluff make such a series in which the senility becomes more and more extreme with the course of time. Occasionally throughout the later lignitic, as at Yellow Bluff, we find a race which has migrated from a more favorable environment; which resembles the primitive races of earlier lignitic waters . . . The grade of phylogenetic development which the Yellow Bluff assemblage has attained also indicates that a normal slow and even evolution has been going on in one locality, while at the same time, rapid senile evolution has taken place among those subjected to unfavorable conditions in another region."

Had I written the above passage, I would have substituted "degeneration" for "evolution" and "less unfavorable" for "more favorable," because that the comparatively shallow sea outside the Lignitic was not really favorable and the Volutilithes living in it were slowly degenerating is rendered clear by the fact that one of the two species still living, viz. *V. abyssicola*, found in relatively deep water near the Cape of Good Hope is, to quote Burnett Smith, "quite close in its grade of evolutionary development to the ancestral *V. limopsis* of remote Eocene time." This would not have been the case if evolution be a normal state of affairs; the species would not have remained unchanged during the whole of the Tertiary Period. Nor is this all: Volutilithes displaying a callus, like that on the specimen figured by Dr. Davies, occur in the Miocene of Europe. Dr. Burnett Smith deems this a case of parallelism; I submit that it is rather one of similar reaction to unfavorable conditions.

### SYRINGOTHYRIS

Dr. Davies writes (E. p. 129): "The brachiopods of the Carboniferous Limestone also show evolutionary series, of which one—that of Syringothyris—is illustrated in Plate IV., upper figure." If this series be evolutionary, the

evolution took a curious course, because the middle term is not intermediate in form between the upper and lower. Dr. Davies does not name the species depicted, but the bottom one appears to be *S. principalis*, the middle one *S. cuspidata* mut. *cuspidata*, and the top one *S. elongata*, all of which are figured by Dr. F. J. North on Plates XI and XII of Vol. 76 of the Quarterly Journal of the Geological Society. But he regards these three not as parent, child and grandchild, but as parent (*principalis*) and two children. This, however, is a trifle.

As the mode of life of brachiopods is similar to that of sessile molluscs, it might be supposed that their shells are very variable. This is the case. Thomas writes of the fossil *Producti* (Mem. Geolog. Survey, Palaeontology, Vol. 1. pt. 4. p. 253): "It is becoming more and more recognized that possession of similar features alone may be misleading and an insufficient criterion for the estimation of species. Externally the individuals may be morphologically almost indistinguishable and yet belong to totally different lines of development and therefore to different genera." Dr. North states (*op. cit.* p. 212) that this is equally applicable to the *Spiriferids* to which *Syringothyris* belongs.

This genus affords an excellent illustration of the changes undergone by the shell of an organism exposed to increasingly difficult environmental conditions before it dies out. Dr. North writes (*loc. cit.* p. 181): "The genus illustrates in an interesting way some of the principles of evolution. The (phylogenetically) young stage with small and simple forms is represented by the earlier mutations of *cuspidata* and *elongata*: the adult stage in which the full size is attained and all the characters are mature, is seen in the mut. *exoleta* and, in the Canina Zone, in representatives of *S. elongata*: while phylogenetic old age with 'exaggeration and perelaboration,' followed quickly by extinction, was reached (in normal limestone deposits) in the *Dibunophyllum* Zone, but was, in certain areas, hastened by the special conditions accompanying the formation of 'reefknolls'."

What the fossils here show is two lineages of the brachiopod *Syringothyris principalis* living first in fairly favourable conditions, then in very favourable ones; after which the conditions become increasingly unfavorable and finally unendurable. The shells reflect these changes. The varieties of the shells from start to finish do not appear to be greater than those exhibited by the living dog-whelk, *Purpura lapillus*. I submit that it is a misnomer to call such modification evolution.

The horse will have to look to his laurels and produce a few more fossil links if he is not to be ousted from his proud position as chief witness on behalf of Evolution. Of recent years his position has been seriously challenged by the Carboniferous coral, *Zaphrentis* and the Cretaceous sea-urchin, *Micraster*. These two have recently been selected as affording the best testimony on behalf of evolution by such authorities as Professor D. M. S. Watson ("Palaeontology," B. vol. 17, pp. 108-110,) Dr. Bather (Proc. S. W. Nat. Union (1931) p. 35,) and Dr. Davies. Let us now examine *Zaphrentis*. As Prof. Watson in the article cited above gives a picture illustrating the "evolution" of *Zaphrentis*, the general reader has some opportunity of forming an opinion regarding this.

I regret to have to decry *Zaphrentis*, and to say that, through no fault of his own, he is not a satisfactory witness. In the first place he is an extinct coral, hence his testimony is confined to his hard parts, that is to say his skeleton which is outside his body and secreted by this. Thus, like the shell of the sessile mollusc, the hard parts of the coral are very variable owing to being so much at the mercy of the condition of the surrounding water.

The second defect of *Zaphrentis* as a witness is that it is a genus that exhibited a great diversity of form, and several varieties or "species" are sometimes found in the same locality. Curiously enough in the issue of the Quarterly Journal of the Geological Society (1910) in which appears Mr. R. G. Carruthers' paper describing the evolution of *Zaphrentis* there is immediately following it a paper by Mr. A. Wilmore on the Carboniferous limestones of part of Yorkshire, in which he records his discovery in the deposits of one quarry of fossils of no fewer than five species of *Zaphrentis*, all different from those described by Mr. Carruthers, and one of these species, *Zaphrentis amplexoides*, exhibits a number of features associated with different genera.

With these preliminary remarks in mind let us see what the 1200 *Zaphrentis* fossils from Scotland, examined by Mr. Carruthers tell us. The changes which he believes have taken place are so small that I find no difficulty in believing that they may have taken place in genetical series. They consist chiefly of the shortening and thinning of the septa and of changes in the shape of the cardinal fossula, which is a groove in the floor of the chamber in which the coral polyp lived.

The *Zaphrentis* fossils examined by Carruthers occur in the following beds, arranged in descending order, No. 5 being the latest to be deposited:

5. Millstone Grit
4. Upper Limestone Group
3. Lower Limestone Group
2. Lawson Limestone
1. Cementstone Group

A long interval elapsed between the deposition of the Lower and the Upper Limestone, during which the sea receded and seams of coal composed of land plants were laid down. This freshwater formation contains no fossils of *Zaphrentis*, as the latter inhabited the sea. Thus, there is no continuity between the marine fauna of the Lower Limestone and that of the Upper. The fossils in the latter were all immigrants from the sea.

Mr. Carruthers' supposed evolutionary series begins with *Zaphrentis delanouei*, and ends with *Z. disjuncta* with *Z. paralella* and *Z. constricta* coming in between. It should be noted that the four members of this series are not very sharply defined; there is a little overlapping.

Of 1200 fossils collected by him not a single specimen of *disjuncta* and only one of *constricta* was found in the earliest formation—the Cementstone group, but 74 *delanouei* and 33 *paralella* were obtained from it. In the next deposit, the Lawson Limestones, all of the 55 fossils found were of another species of *Zaphrentis*—*Z. lawsonensis*—a form that occurs in one of the other deposits dealt with by Mr. Carruthers. In the Lower Limestone group he obtained only 2 fossils of *delanouei*, and 22 of *paralella*, as against 474 of *constricta* and 168 of *disjuncta*. In the Upper Limestone no fossil of *delanouei* and only 1 of *paralella* was found, as opposed to 40 of *constricta* and 271 of *disjuncta*.

Mr. Carruthers interprets the above facts as: *delanouei* evolved into *paralella*, the latter into *constricta*, and *constricta* into *disjuncta*. He supposes that some individuals evolved faster than others.

The facts are open to a very different interpretation, viz. that the above four "species" are not genetically connected, that the conditions of the locality were at first favourable to *delanouei* and *paralella*, and then became gradually unfavourable to them, but favourable to *constricta* and *disjuncta*, in consequence the latter gradually replaced the former.

Points in favour of Carruthers's view are (1) the various forms sometimes overlap, (2) the great variability of the genus.

Points in favor of the other view are (1) in every locality at least two of his species occur together, while in three different localities, viz. East Barns Quarry, Duloch Quarry and North Mine Quarry all four occur, (2) all his four

species are replaced by a fifth in the Lawson Limestone, (3) in the Upper Limestone Group the percentage of *disjuncta* rises considerably as we pass from East to West. Carruthers suggests three possible ways of meeting this difficulty to his theory: (a) The western limestones may be of slightly later date than the eastern. (b) The assumption of the *disjuncta* habit may have arisen, not so much from an inherent cause, as from some change in the physical environment, for instance a shifting ocean-current advancing slowly from west to east. (c) The forms defined as *Zaphrentis disjuncta* may in reality belong to two branches, that prevalent in the west diverging from the original *constricta* stock more rapidly than the eastern form. (4) Fossils of *constricta* have been found in Westmoreland and probably Derbyshire, and those of *disjuncta* in Cheshire.

From the foregoing it is apparent that it has not been proved that the later members of Carruthers series are derived from the earlier ones.

Moreover, we have no means of knowing whether or not the later forms of *Zaphrentis* would have yielded offspring had they been mated with earlier forms.

## MICRASTER

Micraster is a better witness than *Zaphrentis* because the changes it exhibits are those of its organs and not merely of its habitation, and it is not so prolific in species as *Zaphrentis*.

Dr. Rowe collected some 2000 fossils of this sea-urchin from the Middle and Upper Chalk of England and recorded the horizon at which each was found. He then took the dimensions of each specimen and noted its peculiarities. He thus discovered that 18 characters could be recognized in the test or integument, each of which changed in a definite direction in course of time.

Thus the circular mouth gradually assumed a crescentic shape, a lip grew over it, the grooves in the anterior petal became more and more pronounced, the smooth surface between the pores became granular, and so on. Although these changes were observed in all specimens they were effected earlier in some than in others. As there is every grade of transition between the earliest and the latest conditions of each of the characters, there can be little doubt that the changes occurred; but it is probable that there existed several lineages of *Micraster*, each of which changed at a different rate. Systematists have described the earliest of these *Micrasters* as *Micraster cor-bovis*, those in the middle period as *M. prae-cursor* and the latest as *M. cor-anguineus*, but it is impossible to draw definite lines between the three types.

Professor MacBride is of opinion that the above changes were adaptations to the sea-urchin's burrowing deeper in the sea floor as time went on. Thus, it became necessary for the creature to hold the mud away from the gills by developing the carina or crest carrying a fan of curved spines. I am inclined to agree, and so apparently is Dr. Davies. The sea floor seems to have become progressively softer, causing the sea-urchins to sink deeper into it.

A species that persists for a long period is likely to encounter changes in environmental conditions from time to time, just as a widely-spread species does from place to place at any given period. Even as such differences in the case of the latter result in the development of geographical varieties or races, so in the former they produce what we may term temporal races or varieties. This is what we find in *Micraster*; *cor-bovis* may be regarded as an early race and *cor-anguineus* as a late one.

It may be asked: should not these, on account of their differences, be regarded as temporal species rather than races? May it not be said that in the course of time one species of *Micraster* changed into another? To this question it is only possible to give the reply "We do not know, because we have no means of ascertaining, first whether *cor-bovis*, if crossed with *cor-anguineus* would have yielded fertile offspring, or, had the conditions that led to the formation of *cor-anguineus* been reversed, whether the latter would have gradually reverted to *cor-bovis*. But we can say that, so far, no breeder, scientific or otherwise, has succeeded in producing an animal variety which is not perfectly fertile when crossed with the parent form, although some of these varieties differ greatly in appearance from the parent."

Thus the results of genetical work lead us to doubt whether *cro-bovis* and *cor-anguineus*, despite their differences in form, belong to different breeding species.

We know that all species experimented on are capable of assuming considerable variety of form. Some breeds of pigeon differ from others in appearance more than some wild species differ from other wild species. We do not know what has caused the blue-rock pigeon to vary or mutate so as to give rise to all the domestic breeds, but we do know that the form of every organism, although determined mainly by its hereditary outfit, is affected by external influences. As Robson and Richards put it ("The Variations of Animals in Nature," (1936) p. 19): "That animals are more or less 'plastic' or modifiable by the environment in their structure, reactions, and physiological properties and activities is a fact of general knowledge."

An instance of this plasticity of the organism came to my notice in India. Ordinarily the stem of the rice plant attains a length of three or four feet, but



when planted in a depression which becomes a small lake during the rainy season, each rice plant, in order to keep its head above the slowly rising surface of the water, grows a stem which may attain a length of twenty feet or more. Seed from such heads when sown in an ordinary paddy field produces plants having a stem of normal length.

Schmankewitsch discovered that the three crustaceans named *Artemia milhausenii*, *Artemia salina*, and *Branchipus* are the same species which take the first form in very salt water, the second in moderately salt water, and the last in fresh water.

Change of food may greatly modify the form of an animal. Kukuchi discovered (Jour. Fac. Sic. Imp. Univ. Tokyo, 1931) that the rotifer, *Brachionus pala*, when fed with the alga *Scenedesmus*, grows spines, and that this effect is reversed if the spiny form be fed on *Polytoma*.

There is abundant evidence that unfavorable environmental conditions may exercise considerable effect on the form of an organism. Semper found ("Animal Life," p. 161) that the shell of the common pond snail, *Limnaea stagnalis*, if raised in crowded conditions does not attain its normal dimensions: to attain the proper size (18 inches) each individual requires 2000 cubic centimetres of water; the shell of individuals allowed only 100 cc. attained a length of only 6 inches.

The familiar gold fish is derived from the greyish crucian carp (*Carassus auratus*). A number of varieties of this have been bred. According to Tornier these breeds are the result of insanitary conditions under which gold fish are reared in China. The following passage is from Professor MacBride's very interesting article in "Evolution in the Light of Modern Knowledge": "Tornier discovered that the Chinese breeders rear their fish under the most insanitary conditions. In winter they are kept in small earthenware pots ranged by hundreds on shelves in dark and ill-ventilated huts, and in summer they are transferred to small dirty tanks overgrown with weed. In these tanks they spawn and much of the spawn dies, but amongst the portion that survives monstrosities of all degrees of intensity appear, and the most striking of these are selected as founders of the fancy breeds. In view of these facts Tornier has put forward the view that all the features in which these breeds depart from the normal type—elongated fins, doubled fins, absence of fins, protruding eyes, puffed skin, and short deep shape—are due to the same cause, viz. the weakening of the vital powers of the embryo by the abstraction of the necessary oxygen at an early and critical period of development."

Whether or not Tornier's theory as to the causes of the changes in goldfish be correct, there is no doubt that unfavorable conditions may exercise

considerable effect on the form and organization of individuals affected without changing these into new breeding species. All the varieties of goldfish are fertile *inter se* and with the parent type.

In view of these facts and the various forms assumed by the shell of the dog-whelk (*Purpura*), (see p. 157) it would be hazardous to assert that the earlier and later forms composing the fossil series of *Micraster* and other invertebrates cited by Dr. Davies are not, in each case, members of one and the same physiological species.

How then are we to deal, as regards nomenclature, with extinct types that have undergone changes like those exhibited by *Micraster*, *Zaphrentis*, etc.?

The present Linnaean system is designed for organisms in existence contemporaneously. It seems advisable that, when dealing with species in time, we should give a non-committal name to each lineage of which there is unequivocal evidence, thus the *Micraster* lineage under discussion might be given the names of its earliest terms: *M. cor-bovis-cor-anguineus*. Probably the number of such undoubted lineages would not be very great. We should have to distinguish between them and such hypothetical lineages as are afforded by the pedigrees drawn up by Dr. Davies for *Equus* and *Halicore*. In the case of *Micraster* the fossils present a continuous series from *cor-bovis* to *cor-anguineus*, each term of which merges into its successor so gradually that in some specimens it is not easy to determine the term to which they should be assigned. Very different is the case of *Equus*. (See p. 143).

The most that can be said of the so-called pedigree of the horse is that possibly each member of the series composing it was derived from the preceding member.

Even if it were proved that *Micraster cor-bovis* would not have produced fertile offspring if crossed with *cor-anguineus*, i. e. that they are good physiological species, it would not be legitimate to infer therefrom that fish have in the past been changed by degrees into elephants. There would be no more justification for this than to infer that a man can run 100,000,000 yards in 11,000,000 seconds because he has been timed to run 100 yards in 11 seconds. Nevertheless this is what evolutionists do. (See p. 73). Dr. Davies does more. He writes (E. p. 124): "The rate of change shown by these forms is far too slow to account for the evolution of the genus *Micraster* itself from one of the earliest Irregular Echinoids which lived a little before the middle of the Jurassic Period. Rapid evolution must have occurred during critical periods when conditions were rapidly changing." Because *Micraster* is seen to undergo modifications at a slow pace to infer that formerly it must have undergone them more rapidly is tantamount to assuming in the above

illustration that the man ran the 100,000,000 yards at a much greater pace than he had run 100 yards! To assert that rapid evolution *must have* taken place is to beg the question. Indeed, it may be that the changes to which the *Micraster* fossils testify were unusually rapid because the environment in which they lived underwent rapid changes.

Dr. Davies' statement illustrates the effects of the adoption by biologists of the creed that there is practically no limit to the amount of transformation of which some organisms are capable. I submit that the correct scientific attitude is to make no assumptions, except purely as hypothesis, and to determine by experiment, observation and strict fossil proof what changes can be, or have been, effected.

The amount of actual change demonstrated by the known fossils is in every case inconsiderable and this is equally true of genetical experiments.

#### AN ANALYSIS OF THE CASES OF EVOLUTION CITED BY DR. DAVIES

The cases of evolution adduced by Dr. Davies may be thus classified:

##### I. THE "EVOLVED" ARE STILL LIVING AND THE PARENT TYPES EXTINCT

Equidae    Certain Viviparids

Nassidae    Certain Volutilithes

In all the above cases the supposed evolution has not been proved. In none of them is it possible to name a fossil ancestor generally acknowledged to belong to another family.

##### II. THE "EVOLVED" AND THE PARENT ARE BOTH LIVING TODAY

Placenta

The derivation from of Placenta from *Anomia* is not proved.

##### III. THE "EVOLVED" ARE EXTINCT AND THE PARENTS STILL LIVING

Valenciennesia    Halicoridae

Gryphaea            Cypraeidae

In these cases the supposed evolution is clearly degeneration preparatory to extinction.

##### IV. BOTH "EVOLVED" AND PARENT ARE EXTINCT

Rudists            Zaphrentis  
Syringothyris   Inoceramus  
                    Micraster

In the first three of these the supposed evolution was clearly degeneration, and this may well be true of the last two.

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[1] See Appendix. As Eohippus is a member of the horse family—the Equidae, 60 million years have not been long enough for a new family to evolve in a quickly-evolving group of animals. It would take at least ten times as long, or 600 million years, for a new order to evolve and 6,000 million years for a new class to originate by evolution. But, on the highest computation, the earth has not been in existence as long as 3,000 million years—Thus the horse fossils demonstrate that the earth has not existed nearly long enough to admit of the evolution of the existing animals and plants from one-celled ancestors.

## Chapter VIII

### ALLEGED FOSSIL LINKS BETWEEN MAN AND NON-HUMAN ANCESTORS

In Chapters XIV and XVIII I shall try to show that the facts of embryology and comparative anatomy are most unfavorable to the theory that man gradually evolved from a non-human ancestor.

In this chapter I propose to show that the known fossils are equally unfavorable to this theory. This task is rendered unnecessarily difficult, because the extant accounts of most of the known fossils are unreliable for the following three reasons:

1. Most modern zoologists and anthropologists show the greatest eagerness to prove that they are descended from some kind of anthropoid ape, and to find the “missing link.” In consequence, to quote Professor H. H. Woollard (“Science Progress” July 1938): “When a new fossil has been discovered, the discoverer has been unable to resist the temptation of asserting that his fossil, if ape-like, presented all sorts of human characters, and, if human and clearly modern in character, it possessed all sorts of simian characters, more or less hidden and elucidated only by minute examination.”

2. Zoologists and Anthropologists are nearly all obsessed by the idea that “man emerged from apedom” at a very recent date. For this reason, so far, every fossil which is clearly of man of modern type found in any Pliocene or earlier deposit is rejected, on the ground that the deposit in which the fossil was found has been incorrectly dated, or that the fossil was part of a man buried by his fellow men—an intrusive burial.<sup>[1]</sup>

3. When a fossil is discovered of what appears to be a very primitive type of man, the evolutionist seems unable to resist the impulse to assign an unduly early date to the deposit in which the fossil occurs, so as to allow sufficient time for its becoming transformed into modern man.

I have done my best to overcome these difficulties when compiling the tables that follow. Nevertheless I am not at all sure that the fossils which find place in them are all correctly dated. Some dates will probably have to be revised in consequence of future discoveries.

Almost the only general statements that can be safely made in the present state of knowledge are:

(a) No evolutionist who values his reputation will name any known fossil and say that, while not human, it is an ancestor of *Homo sapiens*.

(b) All the known fossils of higher Primates found in deposits earlier than those of the Pleistocene period are few and fragmentary, and all of them could be packed in a single travelling trunk.

Table I  
EOCENE, OLIGOCENE AND MIOCENE FOSSILS OF  
ANTHROPOID APES

Genus	Locality	Nature of Fossil
EOCENE		
Pondaugia	Burma	One Molar Tooth
OLIGOCENE		
Parapithecus	Egypt	Nearly Complete Lower Jaw
Moeropithecus	Egypt	Two Lower Molar Teeth
Propithecus	Egypt	Half of a Lower Jaw
LOWER MIOCENE		
Limnopithecus	Kenya	Part of a Left Lower Jaw
		Part of a Right Lower Jaw
Xenopithecus	Kenya	Part of Left Lower Jaw With 3 Molar Teeth
Proconsul	Kenya	Left Upper Jaw With Teeth and Broken Lower Jaw With Most of the Teeth, Found by Hopwood
		Complete Lower Jaw, Some Ankle Bones and Isolated Teeth, Found by Leakey

## MIDDLE MIOCENE

Dryopithecus	Europe, Africa, Asia	Several Jaws and Parts of Jaws, an Upper Arm Bone, Found in France
		A Thigh Bone Found in Germany
		Some of these fossils occur in Lower Pliocene deposits.

## UPPER MIOCENE

Sivapithecus	North India	Most of Two Lower Jaws and Isolated Teeth
Brahmapithecus	North India	Left Half of Lower Jaw With Two Molar Teeth and Roots of a Molar and Premolar Tooth
		Part of Right Half of Upper Jaw Holding 2 Molar Teeth
Griphopithecus	Europe	One Molar Tooth
Palaeosimia	North India	One Molar Tooth
Hylopithecus	North India	One Molar Tooth
Pliopithecus	Europe	An almost Complete Lower Jaw

### *Notes on Table 1*

1. Note that all the above creatures are known only by teeth and parts of jaws, except Proconsul, of which some ankle bones are known, and



Dryopithecus, of which the upper arm bone and the thigh bone are known. Also the skull (see Appendix IV).

2. It is doubtful if Pondaugia is the tooth of a Primate.

3. Few, if any, authorities deem Parapithecus, Moeropithecus, Limnopithecus and Xenopithecus ancestral to man or any existing ape.

4. The tooth named Palaeosimia is deemed to be that of a gibbon, while Grhipopithecus, Hylopithecus and Pliopithecus are believed to be teeth of gibbons.

5. So far as I am aware no one deems Brahmapithecus an ancestor of man.

6. We are thus left with Propliopithecus of the Oligocene, Proconsul of the Lower Miocene, Sivapithecus of the Upper Miocene and Dryopithecus, which lived from the Middle Miocene to the early Pliocene, as possible ancestors of man.

Let us examine the case made for each of these.

**PROPLIOPITHECUS.** This consists of half of a lower jaw two inches long. Gregory regarded this as the ancestor of both man and the anthropoids. Sergi deemed it ancestral to man but not to the apes. Keith deems it to be ancestral to the gibbon, but not to man. Le Gros Clark holds that it is related to an ancestor of the anthropoids, but not of man or any living anthropoid. Schepers deems it too specialized to be an ancestor of man.

In the article "Primates" in the Ency. Brit. Vol. 18, p. 40 Gregory and McGregor write: "The earliest known forerunner of the gibbons and possibly also of the great apes and man is the fossil lower jaw named Propliopithecus haeckeli from the Lower Oligocene of Fayum, Egypt."

Most anthropologists refrain from expressing an opinion.

**PROCONSUL.** Hopwood deems this creature an ancestor of the Chimpanzee. Leakey, however, asserts ("Times" of London Aug. 23rd 1946) that Proconsul was "a near approach to the ape-like creature from which the human stem eventually was evolved."

SIVAPITHECUS. Pilgrim, who discovered this fossil, deems it “the most likely human ancestor known to us” (“Palaeontologica Indica”, 1927). If Pilgrim be right then the canine and first premolar must have been shifted inwardly and the muzzle contracted before it became human. Gregory, Keith and most authorities reject Sivapithecus as a possible ancestor of man.

DRYOPITHECUS. Osborn, W. K. Gregory and G. Pinkley write (“The Age of Man” p. 8): “The genus Dryopithecus was a primitive anthropoid ape from the Mio-Pliocene of India and Europe. So far as is known it forms an *approximate* ‘structural ancestor’ for both apes and man.” Pilgrim, on the other hand, asserts that the length of the molar teeth and of the junction of the right and left halves of the lower jaw definitely exclude Dryopithecus from Man’s ancestry. Keith deems it a definite link between Chimpanzee and Gorilla. Smith Woodward, however, writes (Zittel “Palaeontology” Vol. 3, p. 28): “Dryopithecus approximated the Chimpanzee in size, and may be the common ancestor of the latter and the orang.”

From the foregoing it is clear that none of the known fossils of Eocene, Oligocene or Miocene date is accepted by more than a few evolutionists as an ancestor of man. This is a matter of great importance, because, as we shall see, there is good fossil evidence that man of modern type, *Homo sapiens*, was in existence in the early part of the Pliocene period, if not even earlier. Therefore all the Pliocene and Pleistocene fossils which have been paraded as fossil links between man and an ape-like ancestor are clearly nothing of the kind, unless it be that man arose *per saltum*, i.e. some non-human creature gave birth to a human being.

Let us now notice the Pliocene fossils of Man and anthropoid apes.

Table II  
PLIOCENE FOSSILS OF MEN AND ANTHROPOID APES

Genus	Locality	Nature of Fossil
LOWER PLIOCENE HUMAN FOSSILS		
Homo sapiens	Italy	A skull and fragments of Bones of four individuals
Homo sapiens	U. S. A.	A Skull
LOWER PLIOCENE ANTHROPOID APES		
Ramapithecus	North India	Right half of Upper Jaw and left half of Lower Jaw
Sugrивapithecus	North India	Left half of Lower Jaw
Anthropodus (Neopithecus)		A Molar Tooth

D. G. E. Lewis who found the Ramapithecus and Sugrивapithecus fossils does not consider either to be an ancestor of man. Schlosser named the last Anthropodus, because the tooth bears resemblance to a human tooth, but it is smaller and narrower than any known human molar.

We must now deal with the two human skulls, of which the antiquity is not accepted by most evolutionists.

THE HUMAN REMAINS FOUND AT CASTENEDOLO in Italy. A very good account of the discovery of these fossils is given on pp. 335-338 of Sir Arthur Keith's "The Antiquity of Man." He tells us how in 1860 Professor Ragazzoni, when looking for fossils of Pliocene molluscs in a pit, discovered the greater part of a human skull which Was "coated and impregnated by the clay and shells of the strata between which it lay." In order to make sure that the skull had not been buried by men, Ragazzoni carefully examined all the strata above the skull, and found that these had not been disturbed. He then searched further and found a few other fragments of the skull. His colleagues did not believe that the skull was a genuine fossil. But in 1880 one of his friends who did believe, excavated the pit at a spot about twenty paces from that at which the skull had been found, and at the same level exposed numerous fragments of the skeletons of two children. These he left in position

for Ragazzoni to see. Here again the overlying strata were found intact. Professor Sergi, shortly after this, examined the site and the fossils and was convinced that Ragazzoni was right and that the fossils in question afford proof that man of modern type was living in the Pliocene period. Sergi found that the remains were those of a man, a woman and two children. The skull of the woman was sufficiently complete to enable Sergi to estimate its brain capacity. This was found to be about 1340 cc. which is the average of the skull of a present-day European woman.

Sergi's insistence compelled French anthropologists to take the matter up. Most of these remained sceptical but Quatrefages and Hamy agreed with Sergi and Ragazzoni. Quatrefages wrote ("Les Races Humaines"): "there exists no serious reason for doubting the discovery, and, if made in a quaternary deposit, no one would have thought of contesting its accuracy. Nothing can be opposed to it but theoretical *a priori* objections similar to those which long repelled the existence of Quaternary man."

THE CALAVERAS SKULL. This was dug up from a bed of auriferous gravel in Calaveras, a county of California. This gravel holds numerous fossils of mammals, all of species now extinct, and a few, such as Mastodon and Hipparion, of extinct genera, which indicates that these gravels are of early Pliocene date. In addition to these fossils they hold a number of stone implements made by man, including a number of mortars. In 1866 a human skull of modern type was found in this gravel. Professor Wright in an article in THE CENTURY of April 1891 wrote: "In February 1866, Mr. Mattensen, a blacksmith employed his spare earnings in driving a tunnel under the portion of the Sierra lava flow known as Bald Hill. At a depth of 150 feet below the surface, of which 100 feet consisted of solid lava, and the last fifty of interstratified lava, gravel and volcanic tuffs, he came upon petrified wood, and an object which he at first took for the root of a tree, thickly encased in cemented gravel. But seeing what he took for one of the roots was a lower jaw, he took the mass to the surface and gave it to Mr. Scrivner, the agent of an express company, who, on perceiving what it was, sent it to Dr. Jones, a medical gentleman of the highest reputation, now living at San Francisco, who gave it to Professor Whitney, who visited the spot, and after a careful enquiry was fully satisfied with the evidence. Soon afterwards Professor Whitney took the skull home with him to Cambridge, where, in conjunction with Dr. Wynam, he subjected it to very careful investigation to see if the relic itself confirmed the story told by the discoverer, and this it did to such a degree that the circumstantial evidence alone places its genuineness beyond all reasonable doubt."

It should be mentioned that in addition to this skull, other fragments of the human skeleton and of the skull had been found in this locality.

Nevertheless most zoologists and anthropologists refuse to accept this fossil, because to do this would upset prevailing theory. As Prof. W. H. Holmes put it: "To suppose that man could have remained unchanged physically, mentally, socially, industrially and aesthetically for a million years, roughly speaking (and all this is implied by the evidence furnished), seems in the present state of our knowledge hardly less than admitting a miracle."

Here then we have evidence, as good as most evidence furnished by fossils, that men of modern type existed both in Europe and North America in the first half of the Pliocene period. This being so, it is futile to look for fossils of non-human ancestors of man in any deposits laid down in the Pliocene or Pleistocene periods. Primate fossils of these periods, however interesting, can have no bearing on the origin of man, and there is no valid reason why such fossils should not be treated in the same way as any other fossils.

Unfortunately the majority of zoologists and anthropologists act as if the Castenedolo and Calaveras human fossils did not exist. No mention of them is made in any recent books published before the last war on the origin of man. To the best of my knowledge the last book (apart from Keith's "Antiquity of Man") in which these fossils are mentioned is Keane's "Ethnology" written in 1895.<sup>[2]</sup> Moreover Keith does not refer to them in any of his later writings, although in this work the following passage occurs (p. 334): "As the student of prehistoric man reads and studies the records of the 'Castenedolo' find, a feeling of incredulity rises within him. He cannot reject the discovery as false without doing injury to his sense of truth, and he cannot accept it without shattering his accepted beliefs. It is clear that we cannot pass Castenedolo by in silence: all the modern problems relating to the origin and antiquity of modern man focus themselves round it."

In dealing with the later Pliocene fossils we are confronted with a new difficulty, viz. the fact that the boundary between the Pliocene and Pleistocene deposits is disputed. The refusal to believe that man of modern type was in existence even in the latter part of the Pliocene period is in part the cause of this dispute.

In 1932 Dr. L. S. B. Leakey found at Kanam in East Africa a fossilized human jaw of modern type in a deposit which also held a tooth of an extinct species of *Elephas*, and one of an extinct Genus—*Dinotherium*.

As all other known fossils of *Dinotherium* occur in Miocene or early Pliocene beds, it would seem that the owner of this jaw lived in the Pliocene period. But, to ease matters, as this jaw differed a little from the jaw of man now living, Leakey thought that the owner of the jaw should be deemed a new species of *Homo*, accordingly he named the jaw *Homo kanamensis*. But, even if not of the species *sapiens*, man of modern type had no business to be in existence in Pliocene times, according to the accepted theory. Accordingly doubt was cast on the supposed antiquity of the deposit, and the Royal Society of London deputed Prof. P. C. Boswell to visit East Africa and look into the matter. He reported that he was unable to identify the site, but, as the geological strata of the locality are liable to 'slipping,' they are unreliable for dating the fossils they hold. So that *H. kanamensis* should not be cited as evidence of the existence of man in the Pliocene period. Then it occurred to Leakey that in order to retain the antiquity of his fossil, all that was necessary was to make the Pleistocene period begin earlier than the date up to then accepted. As long ago as 1911 Haug in his "*Traite de Geologie*" proposed a new definition for the Pleistocene period in order to obviate further confusion, and render the dating of any given deposit child's play. Leakey promptly adopted Haug's definition which he states thus ("*Adams Ancestors*" (1934) p. 25): "If members of one or more of the genera *Elephas*, *Bos* and *Equus* (however primitive) occur in a deposit, that deposit is Pleistocene rather than Pliocene." Leakey added: "Let me say at once that this definition is quite contrary to that used by the majority of geologists in England today, and that its adoption means that I use the term Lower Pleistocene for a whole series of deposits which members of the Geological Survey of Great Britain, as well as other geologists, call Upper Pliocene."

Accordingly Leakey in "*Adam's Ancestors*" speaks of the Kanam jaw as being Lower Pleistocene. This means that any one looking up this jaw in Leakey's book would note that it was found in a Lower Pleistocene deposit without realizing the unusual meaning given to the term.

It is of interest that Dr. A. Tindell Hopwood adopts Haug's definition in his "*Fossil Elephants and Man*" (Proceedings of The Geologists' Association, 1935). For myself, I protest against this new definition, express surprise that any one has accepted it, stress the confusion the change of definition must cause, and point out its absurdity. I regard it as a case of putting the horse before the cart and of arguing in a circle. You first date the rocks by the fossils they hold, then date the fossils by the rocks in which they are found! As geological research results in frequent pushing back the date of the first appearance of many kinds of animals, new discoveries are likely to put back the date of the beginning and to curtail the length of the duration of the

Pliocene period. Finally, in order to demonstrate that Pliocene man is a myth, all that is necessary is add the genus Homo to Bos, Elephas and Equus in the new definition of the Pleistocene period!

Under Leakey’s definition the last four series of the following table would probably be included among the Lower Pleistocene fossils.

Table III  
LATE PLIOCENE FOSSILS OF ANTHROPOID APES AND MEN

Name	Locality	Nature of Fossil
Simia (Orang)	North India	A Tooth
Homo sapiens	England (Foxhall)	A Lower Jaw
Homo sapiens	Italy (Olmo)	A Skull
Homo kanamensis	East Africa	A Lower Jaw
Homo dawsoni (Eoanthropus)	England (Piltdown)	A Skull
Pan (Chimpanzee)?	England (Piltdown)	A Lower Jaw
Australopithecus?	South Africa	A Skull
Plesianthropus?	South Africa	Skulls and perhaps other bones

The first fossil of Homo sapiens in the above list consists of a lower jaw found in a sand pit at Foxhall, near Ipswich in 1863. This jaw is said to have been found in what is known as the coprolite stratum, which was almost certainly deposited during the latter part of the Pliocene period. This fossil was rejected for the reasons given for rejecting the Castenedolo and Calaveras fossils. It has mysteriously disappeared, but a drawing of it made by Dr. R. K. Collyer, which was published in the Anthropological Review of 1867, shows that the jaw was of modern type.

The second fossil of Homo sapiens in the above table which consists of the greater part of a skull, was found in 1867 when a cutting was being made for a new railway at Olmo near the river Arno. The skull and its surroundings were described by Cocchi, Curator of the Museum of Geology at Florence. The skull was embedded in a stratum of blue clay 50 feet beneath the surface. In the same deposit were fossils of a number of animals of extinct species, and in a stratum a few feet higher was found the tooth of an Elephant (Elephas meridionalis) which seems to have become extinct towards the end of the Pliocene period. The skull is of modern type and Sergi estimated that

its brain capacity was over 1500 cc. and so above the average of the present-day European. Apart from Keith's "Antiquity Of Man" the most recent book in which I can find mention of this fossil is Keane's "Ethnology" (1901). Keane expresses no opinion on the fossil; he contents himself with quoting Salmon as writing "judgment must be suspended on this find, surrounded as it is by so much doubt."

The jaw known as *Homo kanamensis* has already been noticed.

We now come to the next item in the table: *Homo dawsoni* or *Eoanthropus*, which, for reasons to be given below, had better be taken in conjunction with the fossil jaw which is named *Pan* in the Table. These two fossils, both of which are believed by most evolutionists to belong to the same species, consist of the greater part of a skull, a lower jaw and bits of a second skull and a molar tooth. Now the skulls, although very thick, are undoubtedly those of a man of rather unusual type, while the jaw is very like that of a chimpanzee. If the skull and the jaw belong to the same species, then we have a fine example of a transitional form, of a creature who has acquired a human skull while still retaining its ape jaw. Thus it was but natural that transformists jumped to the conclusion that the jaw belonged to the skull, so these fossils were named *Eoanthropus*—the dawn man. But a few people do not believe that the jaw and skull are of the same species and regard the skull as that of a man of rather unusual type whom they call *Homo dawsoni*, after the discoverer of the fossil, while they name the jaw *Pan vetus*, deeming it that of a chimpanzee.

Needless to say that there has been much discussion about this fossil or fossils which could have been avoided had biologists not declined to accept the fact that men of modern type were in existence at the time when the Piltdown fossils were laid down, so that, even if *Eoanthropus* had the jaw of an ape, he cannot have been an ancestor of man. Even so it will be helpful to deal at some length with these Piltdown fossils.

One of the difficulties the student encounters in dealing with man and his hypothetical ancestors is the fragmentary nature of the known Primate fossils. It is not until well on in the Pleistocene period that we have any fossil approaching a fairly complete skeleton, and, except in the case of men who have been buried by their fellows after death, even in the Pleistocene rocks fossil skeletons are very rare. In fact all the much paraded missing links seem to be made up of bits of skeletons which belong to more than one genus! Thus the assumption that *Pithecanthropus*, *Sinanthropus* and *Plesianthropus* walked upright is based on the supposition that a number of isolated bones found among a mass of bones in a cave belong to the same species.



Let us now consider the Piltdown fossils.

Mr. C. Dawson seeing men digging gravel for road repairs asked them to look out for fossils in the gravel. In consequence the men found a piece of a fossilized skull. Three years later they came upon another piece of a human skull. After that the men were paid to look carefully for further fossils and Mr. Dawson and Sir Smith Woodward shared in the search. Then more skull fragments were found and part of a lower jaw. From the fragments discovered attempts were made to reconstruct the skull, which, although the bones are unusually thick, is clearly human, while the jaw is like that of an anthropoid ape. Both Woodward and Keith tried to reconstruct the skull. Woodward's reconstruction gave it a capacity of 1070 c.c., while that of Keith made it about 1400 cc., or the size of that of modern man.

It should be mentioned that in addition to the above fossils the gravel pit yielded two teeth of a hippopotamus and two teeth of a beaver.

In 1915, i.e. two years later, in a field two miles from the gravel pit, were found a piece of the back of a human skull and a piece of the forehead and a first lower molar tooth, also a molar tooth of a rhinoceros. These skull bones were so like those found in the gravel pit as to render it certain that they were of the same species, but it is doubtful if the tooth belongs to the same species as the gravel pit jaw.

Its measurements show that it is more human and less ape-like than is the corresponding tooth in the gravel-pit jaw.

#### Measurements of the First Lower Molar Tooth

	Modern Savage	Gravel-pit fossil	Field fossil	Chimpanzee
Length	13	12.5	13	12
Width	11.5	11	11	10.5

It would seem that, at the time the Piltdown fossils were laid down, men, apes, beavers, hippopotamuses and rhinoceroses were all living on the banks of the Thames, and their remains after death were washed by a flood to the spot where their fossils were found. Wishful thinking has caused zoologists to attribute the jaw of an ape to a human being and call it Eoanthropus!

It will be observed that I have put a? against Australopithecus and Plesianthropus, because Broom believes that the former existed in the Pliocene period and that the latter may have done so. This is not the prevailing opinion, but, as an expedition from the U. S. A. is now searching for Primate fossils in the caves where the fossils of these apes occur and

which contain the bones of a great number of other mammals, it should be possible, after these have been examined, to make a definite pronouncement regarding the dating of these South African apes.

Meanwhile I propose to consider them along with the other Early Pleistocene fossils.

Table IV  
EARLY PLEISTOCENE FOSSILS OF MEN AND  
ANTHROPOID APES

Name	Locality	Nature of Fossil
Australopithecus	South Africa	Greater part of skull and lower jaw
Plesianthropus	South Africa	Most of skull including the upper jaw In addition to these have been found in the same cave most of a pelvis, the lower end of a thigh bone and two wrist bones which Broom thinks appertain to the skull.
Gigantopithecus	South China	Three isolated molar teeth
Meganthropus	Java	A fragment of a jaw with 3 teeth
Pithecanthropus robustus	Java	Considerable part of skull and fragments of upper and lower jaw
Homo Modjokertensis	Java	A skull
Homo sapiens	East Africa (Kanjera)	A lower jaw
Homo sapiens	France (Abbeville)	A lower jaw
Homo sapiens	France (Clichy)	A skeleton
Homo sapiens	England (Galley Hill)	A skeleton
Homo sapiens	U. S. A. (Natchez)	A pelvis
Homo sapiens	S. Australia (Keilor)	A skull

AUSTRALOPITHECUS AFRICANUS. This fossil is the skull of an immature ape found by a quarryman at Taungs in South Africa. Professor R.

A. Dart, who deemed it a missing link, described the skull in "Nature" of Feb. 7th 1925, where he wrote: "Unlike Pithecanthropus, it does not represent an ape-like man, a caricature of precocious hominid failure, but a creature well advanced beyond modern anthropoids in just those characters, facial and cerebral, which are to be anticipated in an extinct link between man and his simian ancestor." Dart's views did not appeal to many, but another South African Dr. Robert Broom agreed with Dart and set about searching for other fossils of this type. In 1936 he found in a cave at Sterkfontein a skull and three teeth which he deemed to belong to a near relative of Australopithecus, and which he named Plesianthropus.

PLESIANTHROPUS TRANSVAALENSIS. In the same cave Broom found later the lower end of a thigh bone, and two wrist bones which he thought belonged to the skull, and from the thigh bone he deemed that this creature, which he designates an ape-man, walked upright. Since then Broom has found other bones, including a pelvis which he thinks are those of Plesianthropus, despite the fact that the caves hold fossil bones of quite a variety of mammals, including those of Baboons. These and fossils of Paranthropus were exhibited at the Pan African Congress held at Nairobi in January 1948 and Broom induced some of those present, including Prof. Le Gros Clark, to believe that these apes are ancestors of man; and in the summer of 1948 Dr. C. L. Camp and Dr. Frank Peabody of the University of California searched for fossils in association with Dr. Broom, and these have found further fossils of thigh bones. As the search is still continuing, it is not necessary to say more here, except to mention that the brain capacity of this creature was about one third of that of modern man, and that if the thighs and pelvis are correctly attributed to the owner of the skull then the creature was far shorter than the smallest known human pigmy. This creature has been lionized by its admirers to an extraordinary degree. Whenever Broom has found a new fossil of it, if only a tooth, the fact is cabled to the popular papers. When I pointed out to Broom that neither this creature nor Paranthropus could be an ancestor of man since man of modern type was in existence long before they were. He replied: "The age of the Sterkfontein ape-man is not known for certain. He might have been upper Pliocene or he might have been Lower Pleistocene . . . When we speak of Plesianthropus as a found 'missing link,' this does not mean that man came from even that species. We only mean we have a member of the family from one of whom man arose. The family may have survived from the Lower Pliocene to the middle Pleistocene. Many may have risen from a Middle Pliocene species. Plesianthropus may have been a species that survived with little change into the Pleistocene." Here Broom ignores the fact that the Castenedolo skull

occurs in a Lower Pliocene deposit, so that he lived some 4 million years before Plesianthropus!

**GIGANTOPITHECUS.** The three teeth which compose this fossil were found by von Koenigswald in drug stores in Canton and Hong Kong, where they were used for making aphrodisiacs. These teeth are said to have come from caves in South China in which were found teeth of a tapir and the extinct elephant *Stegodon*, dug up from the “Yellow Deposits” which are of Lower or Middle Pleistocene age. The roots of two of these teeth have been gnawed away by some animal. The teeth are of immense size. According to Professor Weidenreich (“Science”, 1944) the volume of the crown of the largest—a third molar—is about six times greater than that of modern man and about twice the size of that of a gorilla. Von Koenigswald deems the tooth to be that of a very big ape; Weidenreich, however, thinks that the owner was a giant man and the fossil should be named “Gigantanthropus.”

**MEGANTHROPUS PALAEOJAVANICUS**, found by von Koenigswald in Java in 1941, is a fragment of a jaw holding three teeth. It is thought to be human, although in the words of Weidenreich (*op. cit.* p. 480) it “exceeds by far in size, especially in thickness, all that is known of any fossil or human jaw, including the famous Heidelberg jaw. Contrarily to the latter, the teeth of the new jaw participate in the gigantism. It is, however, not so great as *Gigantopithecus*.”

**PITHECANTHROPUS ROBUSTUS**, also found in Java by von Koenigswald, consists of fragments of the upper and of the lower jaw and a considerable part of the right side of the middle of the skull, which is very massive and thick. It is deemed to be a large species of *Pithecanthropus*.

**HOMO MODJOKERTENSIS.** This fossil is the skull of a young ape, found in Java by von Koenigswald. Some deem it the skull of a young *Pithecanthropus erectus*.

**HOMO SAPIENS (Kanjera).** This fossil consists of a lower jaw found by Leakey in East Africa in 1932.

**HOMO SAPIENS (Abbeville).** This fossil consists of a lower jaw dug up in 1863 by Boucher de Perthes from a stratum of black sand and gravel 16½ feet from the surface of the Moulin Quignon pit, along with implements of Acheulean culture, so that the jaw is clearly that of an early Pleistocene *H. sapiens*. This was accepted by all the French anthropologists, but the Englishmen rejected it. They did so because of its alleged antiquity and because a fossil tooth in association with the jaw was found on analysis to have as much as 8 per cent of animal matter. For about 20 years the jaw was included in the French lists of Pleistocene human fossils, but not in the

English lists; then the French became converted to the belief that Neanderthal man (who was of much later date) was ancestral to *H. sapiens*. So for some sixty years the Abbeville jaw has been almost universally ignored.

Sir Arthur Keith, however, was bold enough to rescue the jaw from oblivion. He wrote ("The Antiquity of Man" (1925) p. 274): "Were our predecessors right in rejecting the Abbeville mandible? I think not. Boucher de Perthes gives the most circumstantial account of its discovery. There is not a single point mentioned by Busk or by Falconer which makes its antiquity impossible. It was almost an isolated case in 1863, but since then the discoveries at Galley Hill, at Bury St. Edmunds, at Clichy and at Grenelle have been made. Our predecessors were largely influenced by prejudice. We have seen how modern man appeared suddenly in Europe at the end of the Mousterian period. Was this his first appearance in Europe or was it a reappearance? Time will probably show that the pioneer of Abbeville was not only right about the human implements of the terraces, but also about the human remains. He died in 1868: it was not until 1908 that a statue was erected to him in Abbeville."

HOMO SAPIENS—The CLICHY SKELETON. The Clichy skeleton was discovered in 1868 in a gravel pit in Paris. As the gravel held some fossils E. Bertrand used to visit it frequently to see the fossils that had been found. On April 18th 1868 he was told that the labourers had exposed parts of a skeleton. He at once examined it. It was embedded 17 feet below the surface in the fourth layer from the top. Bertrand being satisfied that the strata above the skeleton had not been disturbed since their disposition gave an account of his find to the Anthropological Society of Paris in 1868. Keith writes (*op. cit.* p. 276): "The antiquity and authenticity of the Clichy skeleton was accepted by all the authorities in France except one—M. G. de Mortillet, who believed that the workmen at the pit had deceived M. Bertrand." The clear-sighted Professor Hamy had no doubt as to any of the facts relating to the discovery. In his excellent treatise on Ancient Man ("Precis de paleontologie humaine" (1870)) he records all the essential facts bearing on the authenticity of M. Bertrand's observations . . . "Can we suppose that the workmen at Galley Hill and at Clichy had a supernatural knowledge and implanted these two similar but peculiar varieties of man in the same geological stratum, and in the midst of the same ancient, Palaeolithic culture?"

Judging by the way these fossils are ignored by evolutionists it would seem that they answer Keith's query in the affirmative!

HOMO SAPIENS—THE GALLEY HILL SKELETON. In 1885 a workman, when removing gravel from a gravel pit at Galley Hill on the Thames in Kent, came upon a skeleton about 8 feet below the surface.

Noticing that the earth overlying the skeleton had not been disturbed the man realized that the skeleton could not have been buried by men, and asked Mr. Heys, a schoolmaster, and Mr. Elliott, a printer, to inspect the pit side. "This," wrote Mr. Elliott "presented an unbroken face of gravel, stratified horizontally in bands of sand, small shingle, gravel and, lower down, beds of clay and clayey loam, with occasional stones in it—and it was in and below this that the remains were found. We carefully looked for any signs of the section being disturbed, but failed, the stratification being unbroken." Heys wrote "No doubt could possibly arise to the observation of an ordinary intelligent person of their disposition contemporaneously with that of the gravel, for there was a bed of loam, in the base of which these human relics were embedded. The underneath part of the skull, as far as I could see, was resting on the sandy gravel. The stratum of loam was undisturbed. This undisturbed state of the stratum was so palpable to the workman that he said, 'The man or animal was not buried by anybody'." Nearby at the level of the skeleton were remains of extinct mammals and palaeolithic implements. Thus the date of the skeleton is clearly early Pleistocene. As to the fossil itself, Keith writes: ("The Antiquity of Man" p. 260): "The skeleton does not show a single feature which can be called neanderthaloid, nor any simian feature which is not also to be seen in the skeletons of men of modern type." The height of Galley Hill man was about 5 ft, 3 in. and his skull capacity that of the average European today. But the idea of the existence of *Homo sapiens* in the early Pleistocene, i.e. earlier than Neanderthal man and of those much-advertised links between ape and man—the Pekin man and the Java ape-man—is so shocking to the majority of modern zoologists and anthropologists that many of them insist that, despite appearances, the Galley Hill man was buried by his fellows. This entails the belief that after burial all the strata on top of the skeleton became weathered away until the skeleton became exposed to the air, and the erosion continued until all the earth surrounding the skeleton was washed away, leaving the skeleton undisturbed. Then the skeleton remained thus without being damaged or washed away and without decomposing until, as the result of a change in its course, the river flowed gently over the exposed skeleton, gradually covering it with sediment, so that it became buried a second time, and became covered with eight feet of gravel, and lay thus until 1888 when it was exposed by the gravel digger. Thus it has come to pass that men of science unwilling to believe that, in the words of Keith, Man has undergone only minor changes in structure for some 4000 generations, accept the above fantastic farrago of coincidence and improbability.

It is but fair to state that some zoologists and anthropologists have accepted the Galley Hill skeleton. Examples of these are Sollas and Coon.

HOMO SAPIENS (Natchez). This fossil consists of a pelvis associated with fossils of Mastondon, Megalonyx (an extinct sloth) and other extinct mammals. This pelvis is so modern in form that, according to Keith ("Antiquity of Man" (1925) p. 467), Lyell thought it must have slipped from a recent Indian grave in the loess deposit, and subsequently have become mingled with the bones of extinct animals. He admitted that this was rather a far-fetched theory!

HOMO SAPIENS (Keilor). This was found in 1940 in a sand pit in South Australia. It consists of a skull, a limb bone and fragments of other bones. It was 18 feet below the surface in an undisturbed deposit, so there is no reasonable doubt of its antiquity.

We must now notice the Middle Pleistocene fossils, despite their being comparatively recent, because they include the fossils of the Java ape-man and Pekin man, which have been so widely proclaimed as ancestors of Homo sapiens.

#### MIDDLE PLEISTOCENE FOSSILS OF MAN AND ANTHROPOIDS

*Paranthropus robustus.*

*Pithecanthropus erectus.*

*Sinanthropus pekinensis*

*Homo soloensis*

*Homo heidelbergensis*

*Homo sapiens.*

PARANTHROPUS ROBUSTUS. In 1938 a schoolboy picked up at Kromdraai in South Africa a considerable part of a skull and jaw of a large ape which had been dug out of a cave. He brought these fossils to Broom who pronounced the bones to be those of a creature of the same family as Australopithecus and Plesianthropus. Further search in the cave produced fossils of the lower end of the upper arm bone and of the upper part of an ulna (the larger of the two bones of the forearm). Broom jumped to the conclusion that these bones belonged to the same species as the skull and jaw, despite the fact that along with these fossils were those of the bones of baboons, hyaenas, porcupines, other rodents, antelopes and horses.

As these ape bones were massive Broom named their possessor *Paranthropus robustus*. He held that this creature was an ape-man less human than *Plesianthropus*, but which walked more upright than *Plesianthropus* did. Broom, like so many other anthropologists seems to think that the ancestors of man were able to overcome the laws of gravity and walk semi-upright! Recently some zoologists have appreciated the impossibility of a semi-upright



posture; these believe that man's upright posture was acquired *per saltum*, was in fact an aromorphosis, which is in fact a special creation! Broom estimated that the cranial capacity of Paranthropus was about 640 cc, i.e. less than half that of modern man, but as the creature is supposed to have attained a stature of only 4 feet, this fact does not deter Broom and others from crediting this creature with the ability to kill small baboons by knocking them on the head with sticks or stones and then cracking the skull to extract the brain! Dr. Schepers, who collaborated with Dr. Broom in the preparation of "The South African Fossil Ape-men—the Australopithecinae" writes (p. 253): "these fossil types were capable of functioning in the erect posture, of using their hands in a limited sense for skilled movements not associated with progression, of interpreting their immediately visible and audible environment in such detail and such discrimination that they had the subject matter for articulate speech well under control, and of having developed motoric centres for the appropriate application; they were also capable of communicating the acquired information to their families, friends and neighbours, thus establishing one of the first bonds of man's complex social life. With all these attributes they must have been virtually true human beings, no matter how simian their external appearance may have remained." In comparison with this encomium of these apes Broom's tribute seems rather meagre. He writes (p. 142): "The discovery of these South African ape-men has for the first time thrown definite light on how man arose. They show us what man's immediate ancestors were like." The above quotations suffice to show that the volume in which they occur, published by the Transvaal Museum, affords highly entertaining reading.

PITHECANTHROPUS ERECTUS. The story of the fossils which have been named *Pithecanthropus erectus*—the Erect Ape-Man is so strange and throws so much light upon what I may term the transformist mentality that I feel constrained to outline it here to the best of my ability.

Dr. Eugene Dubois, a young Dutch military surgeon, before he went to Java in 1889, in consequence of having read an article in a Java natural history journal, promised his fellow students that he would bring back from Java the "missing link." He certainly did his best to fulfill his promise. From 1890 to 1894 he spent much time in looking for fossils and so many did he find that, on his return to Holland, he brought with him about 215 packing cases containing these. Before he left Dubois published in Batavia an account of some of the Primate fossils he had found which he called "*Pithecanthropus erectus*, A Transition Form from Java." In this he described his find of a skull cap, and a tooth, and at a distance of 12 to 15 metres? from these a thigh bone. Dubois showed these fossils and gave an account of them to the Third

International Congress of Zoologists at Leyden in September 1895. As the skull cap and tooth seemed to be those of an anthropoid ape and the thigh bone that of a man, the nature of the owner of the bones aroused much interest and led to a long discussion. The only member of the assembly who asserted that the skull and the thigh bone did not belong to the same species was the great Virchow. Of the remaining 12, 3 declared that the bones belonged to a low race of man, 3 declared them to be those of a large man-like ape, while 6, including Haeckel, asserted that they belonged to an intermediate form which directly connected man with the anthropoid apes. In justice to those who expressed the last opinion, it must be said that at that time it was believed that man had only recently migrated to Java from the mainland, and Dubois kept from them the fact that he had found there fossil skulls of big-brained men and other human remains! Moreover he told the Congress that the fossils he showed them were of the Pliocene period. It should also be mentioned, that Dubois was very secretive about his other finds; he kept them under lock and key and occasionally produced some new fossil from his collection. The reason why Dubois withheld all these facts was that their disclosure would have seriously damaged his claim to have discovered the “missing link.” As it was, his discovery created world-wide excitement. Dubois himself had a picture drawn of *Pithecanthropus* dressed up in the style of a “masher” of those days. In a very short time *Pithecanthropus* became lionized like a human hero. “People” wrote G. K. Chesterton, “talked of *Pithecanthropus*, as of Pitt, or Fox, or Napoleon. Popular histories published portraits of him like the portraits of Charles the First and George the Fourth. A detailed drawing was reproduced, carefully shaded, to show the very hairs of his head were all numbered. No uninformed person looking at his carefully lined face would imagine for a moment that this was the portrait of a thigh bone; of a few teeth and a fragment of a cranium.”

Haeckel stated at the Fourth International Congress of Zoology at Cambridge in 1898, and in his subsequent book, “The Last Link”: “*Pithecanthropus* of Dubois is truly a Pliocene remainder of that famous group of highest Catarrhines which were the immediate pithecoïd ancestors of man. He is indeed the long-searched for ‘missing link,’ for which in 1868, I myself had prepared the hypothetical genus *Pithecanthropus*, species *Alalus*.” Meanwhile Dubois had produced at intervals two more teeth which he ascribed to *Pithecanthropus*.

In 1906 Frau Lenore Selenka fitted out an expedition to look for more fossils of *Pithecanthropus* on the site marked by Dubois. This expedition during 1907-8 moved 10,000 cubic feet of earth and found many fossils, but

none of *Pithecanthropus*. The expedition however was able to show that the deposit in which the *Pithecanthropus* fossils were found was probably of middle Pleistocene and not Pliocene date. Further, about 2 miles from the *Pithecanthropus* site was found a human tooth, and splinters of bone and tusks which apparently had been made by man, also charcoal. This tooth was at that time regarded as the earliest known fossil of man. Frau Selenka came to the conclusion that *Homo* was contemporary with *Pithecanthropus*, which had no place in the ancestry of man.

But even so, the majority of anthropologists believed *Pithecanthropus* to be the missing link. Some of these must have been rather shocked when Dubois produced in 1920 a number of fossils of big-brained men which he had found in Java before he discovered the *Pithecanthropus* remains. These were found at Wadjak, sixty miles from the site of the *Pithecanthropus* fossils. It is estimated that the cranial capacity of one of these human skulls was 1550 cc. and that of the other 1650. That of the Malay today varies from 1350 to 1450 cc. The reason why Dubois disclosed at this late date his discovery of these skulls was the publication of a paper by Dr. S. A. Smith on the discovery of a fossil skull of a man at Talgai in Queensland which Dubois deemed to be a descendant of the race of men which the Wadjak skulls represent. In my view the delay of 25 years in announcing the discovery of the Wadjak skulls is most discreditable. Keith, however, takes a more lenient view. He writes ("Antiquity of Man" p. 441): "We may doubt if Dr. Dubois' reticence was politic, but we cannot doubt his honesty; the Wadjak fossils were discovered under the circumstances told by him. There can be no doubt that if, on his return in 1894, he had placed before the anthropologists of his time the ape-like skull from Trinil side by side with the great-brained skulls from Wadjak, both fossilized, both from the same region of Java, he would have given them a meal beyond the powers of their mental digestion. Since then our digestions have grown stronger."

In 1924 Dubois produced the fossil of part of a lower jaw which he had found in Java in 1890, and told the Royal Academy of Science at Amsterdam, that he had come to the conclusion that *Pithecanthropus* should be deemed a member of the family Hominidae. Today this view is held by quite a number of evolutionists: Later Dubois produced from his collection four more fossil thigh bones, which are considered to be human.

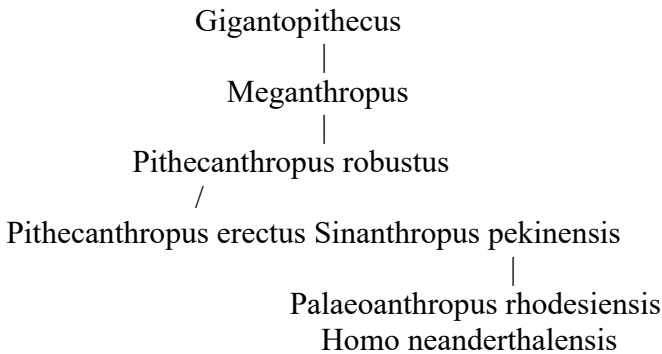
In 1932 Oppenoorth recorded finding in Java of parts of eleven skulls and fragments of a shin bone at Solo in formations of rather later date than those that held *Pithecanthropus*. The average capacity of these skulls is about 1,100 cc. That of the skull of *Pithecanthropus* was about 800 cc. That of modern man generally lies between 1250 and 1500 cc.

Opponoorth named these Solo fossils *Homo soloensis*. Weidenreich however would not allow him human status and would call him *Pithecanthropus soloensis*, as he regards him as “an enlarged *Pithecanthropus*,” but he allows that he has some Neanderthal characters and that the shin bones attributed to him are human in form. Von Koenigswald and Weidenreich say (“Nature” (1939) p. 928) they regard *Pithecanthropus* and *Sinanthropus* as prehomnids and *Homo soloensis* as a representative of the following evolutionary stage. They add “furthermore we know that the Wadjak man of Java represents another early form of recent man, whose upper jaw (Wadjak II) displays in some respects a most surprising resemblance to the *Pithecanthropus* upper jaw.” Between 1936 and 1941 von Koenigswald found a number of Primate fossils in Java. In 1936 he found at Modjokerto the Skull of a young individual which he deems either an anthropoid or a man more primitive than Neanderthal man. This he named *Homo modjokertensis*. Weidenreich thinks it should be called *Pithecanthropus modjokertensis*.

In 1936 Koenigswald found at Sangiram in Java a lower jaw of *Pithecanthropus* and a skull smaller than that found by Dubois, and in 1938 and 1939, further fragments of *Pithecanthropus* Skulls. The skull of which the fragment was found in 1939 is so thick that Koenigswald named it *Pithecanthropus robustus*. (This has been noticed under Lower Pleistocene fossils.) In 1941 he found the very big jaw which he named *Meganthropus palaeojavanicus* (also mentioned above).

**SINANTHROPUS PEKINENSIS.** All the fossils attributed to this species have been found in two caves at Choukoutien near Pekin. They consist of bits of six Skulls (some representing considerable parts of the skull), seven fragments of thigh bones, two fragments of upper arm bones, a piece of a collar bone, a bone of the wrist, and a number of isolated teeth. These fragments, all of which have been examined and described minutely and photographed from every possible angle, are believed to belong to more than 40 individuals. These bones are mixed up indiscriminately with those of a dozen or more different kinds of animals. All have been gnawed, probably by hyaenas. The long bones have been broken in order to get at the marrow and holes have been bored in every skull to get at the brain. Along with these bones have been found human artefacts and the remains of hearths. Clearly then human beings were in existence at the time the owners Of these bones lived. Naively do most authorities believe that *Sinanthropus* made the artefacts, and the fires, and ate the marrow and the brain he had extracted. In other words *Sinanthropus* is supposed to have been a cannibal. I submit that it is more probable that *Sinanthropus* was the victim of human beings who ate

flesh. This refusal to acknowledge the existence of man before the end of the Pleistocene period has, I submit, mislead our biologists. Some, however, for example, Boule, say it is rash to deem *Sinanthropus* the monarch of Choukoutien, Since he is found in the aspect of common game like the animals associated with him. In this connection the size of the brain of *Sinanthropus* is of importance. In a great monograph in *Palaeontologica Sinica* Weidenreich estimated the capacity of the three most complete skulls as 950cc? 1000cc? 1025cc? Nevertheless W. Howells writes (“Mankind Thus Far” (1946) p. 144): “The brain capacity was probably something between 1,100 and 1200, on an average for males (let us say 1,150 for a single figure).” Weidenreich in his “Apes, Giants and Man” (1947), suggests (p. 30) the following pedigree:



But Weidenreich thinks that *Gigantopithecus* should be called *Gigantanthropus*. Thus he derives modern man from giants, while Broom derives him from dwarfs! Weidenreich writes (*op. cit.* p. 59): “The molars of *Gigantopithecus* (which is all we know of this creature) are more than one third larger than those of *Meganthropus*, the Java giant, and almost twice as large as those of the big *Pithecanthropus* . . . Since both the *Gigantopithecus* teeth are primitive to the same degree, it is obvious that size and primitiveness go hand in hand. In other words the giant from the Hong Kong Chemist’s shop and the giant from Central Java are in the same evolutionary line; the more primitive the forms, the more gigantic are their dimensions.” As to what these dimensions were, writes Weidenreich, is “a very ticklish question.” (p. 61) “It may not be far from the truth if we suggest that the Java giant was much bigger than any living gorilla and that the Chinese giant was correspondingly bigger than the Java giant, that is one and a half times as large as the Java giant and twice as large as a male gorilla.”

Needless to state Weidenreich does not believe that Broom’s African apemen are ancestral to man. “I am” he writes (*op. cit.* p. 22) “of the opinion that they are not in the human line but are a special group which has preserved

some of the original characters of the common stock from which man, as well as the other anthropoids, originated. These characters have been lost by that group which differentiated in the direction of the living anthropoids, while they have been maintained and perfected in the line that led to man.”

The humour of the situation is that man of modern type was almost certainly in existence before the earliest of Weidenreich’s series of man’s ancestors. In this connection, let me say that Rhodesian man, called by Weidenreich *Palaeoanthropus rhodesiensis* appears to have been contemporaneous with Neanderthal Man and to have lived in the middle stone age. J. Desmond Clark reports (“Times” August 4th, 1948) that chemical analysis of his bones show that he was a contemporary of animals found along with him and not of earlier date as the enormous size of its bones led earlier anthropologists to believe.

**HOMO HEIDELBERGENSIS.** This fossil consists of a massive lower jaw with the chin poorly developed, found at Mauer near Heidelberg 80 feet below the surface. As no implements or fossils have been found in the deposit that held the jaw, it is not possible to date it even approximately. Because the jaw is so big, some believe it to be Early Pleistocene.

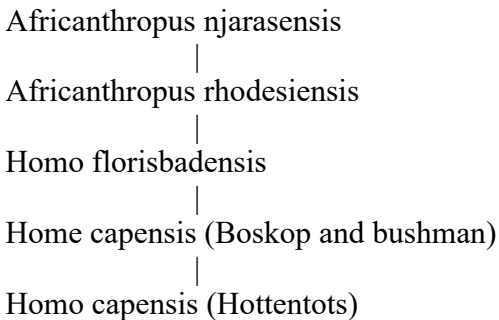
**HOMO SAPIENS.** The comparatively few finds of man of modern type in Middle Pleistocene deposits include:

1. About a third part of a skull of modern type found in association with Acheulean implements at Bury St., Edmunds, England.
2. A frontal bone found in association with remains of the cave hyaena and the hippopotamus at Mount Denise, Central France.
3. Some skulls and skeletons found at Grenelle near Paris. These are very like those of modern Lapps.
4. The back part of a skull of which the bone is very thick, like that of the Piltdown skull, found at Swanscombe in Kent.
5. A human pelvis, associated with fossil bones of *Megalonyx* (an extinct sloth). Mastodon and other extinct mammals, found at Natchez, Mississippi.
6. Two skeletons (without heads) associated with teeth of *Megalonyx* and mastodon, and in the case of one skeleton, with pottery and flint implements, found at Vero in Florida. The two skeletons are of different periods, the older one may be early Pleistocene.

## LATE PLEISTOCENE FOSSILS OF MAN

The fossils of *Africanthropus njarasensis* and Rhodesian Man are apparently of late Pleistocene date, although according to evolutionist theory they ought to have lived in Pliocene times.

*Africanthropus njarasensis* consists of nearly 200 pieces of a skull found in 1935 at Lake Njarasa in Kenya, which Leakey believes to represent a creature closely related to *Pithecanthropus*. Ruggles Gates believes that *Homo sapiens* is a super-species comprising a number of species corresponding to the primary races: *Homo africanus* (Negroes), *H. mongoloideus* (Yellow races), *H. caucasus* (whites), *Homo capensis* (Hottentots), each of which has arisen independently from a different ancestral species. Acting on this belief Gates regards *Africanthropus njarasensis* as the ancestor of the Hottentots. Here is his suggested pedigree (“Human Ancestry” (1948) p. 167):



Compare this with Weidenreich’s pedigree given above (p. 134).

Rhodesian Man. This individual is known by, or has been synthesized from a skull and various bones obtained piecemeal from the Broken Hill mine in Rhodesia. Hooten thus describes him (“Up from the Ape” (1931) p. 346): “wholly simian brow-ridges and frontal region, great face and jaws with a human-shaped palate and degenerate teeth, and a small brain of inferior human pattern, modern pose of head and apparently upright posture.” Like many other fossils of men this one has puzzled evolutionists. As we have seen both Weidenreich and Gates have given him different ancestors and descendants, and each has given him a different name. Pycraft called him *Cyphanthropus*, because he thought he walked with a stooping gait! Most authorities call him *Homo rhodesiensis*. In any case, he is far too recent to be an ancestor of *Homo sapiens*.

Home Sapiens. Comparatively few fossils of man of modern type have been found, and these have been on continents other than Europe. The following fossils have been found in late Pleistocene deposits:

*Fossils of Homo sapiens recorded from Asia and Africa*

1. Two skulls found in Java in 1890 and 1891 by Dubois at Wadjak. These are very big, the cranial capacity of one being estimated at 1550 cc. and the other 1650 cc. Today the cranial capacity of a Malayan skull varies from 1450 to 1550 cc. The jaw of these Wadjak men did not protrude more than does that of the Malay today.

2. A skull of modern Australian aboriginee type found at Aitape, New Guinea.

3. A skull of a boy of about 15 years old found at Talgai, Queensland, associated with fossils of extinct marsupial mammals. This may be of Middle Pleistocene date. The cranial capacity is about 1300 cc. The skull is massive and the jaw more protruding than in any race of man now living.

4. A skull of an adult found at Cohuna, Queensland. The jaw protrudes less than the Talgai jaw. The cranial capacity is estimated at 1260 cc. Both this skull and No. 2 are of the type of the present-day Australian aboriginee.

5. The roof and part of the side of the skull and part of the lower jaw were found at Boskop in South Africa. The cranial capacity is estimated to be 1600 cc. which is bigger than that of the average European today. The skull is the bushman type.

### *Fossils of Homo sapiens recorded from North and South America*

The number of these is considerable, most of which have been rejected owing to the influence of Hrdlicka, who, being obsessed by the notion that *Homo sapiens* evolved from Neanderthal man, has refused to admit that man of modern type existed in America or anywhere else before Neanderthal man. He examined all the supposed finds in the New World, including, of course, Calaveras, and Natchez fossils. Doubtless he was right in rejecting some of these finds, but he was certainly wrong in rejecting many of them. There can be no doubt that man existed in America side by side with a number of animals which became extinct at or before the end of the Pleistocene period. So far as I have been able to make out the following human fossils are probably of Pleistocene date:

(An account of these and other fossils is to be found in Ruggles Gates' "Human Ancestry" (1948) pp. 274-329.)

### *North America*

1. A skeleton of a woman found in an asphalt pit at Rancho-La-Brea in California, associated with bones of mastodon and other extinct mammals.



2. A skull and numerous bones found at Melbourne in Florida, associated with fossils of extinct Pleistocene mammals and an arrow head.

3. Human bones associated with bones of an extinct ground sloth in Mercer's Cave, Calaveras County.

4. A skull and other bones associated with extinct Pleistocene mammals in the Hawver Cave (Eldorado County).

5. Parts of a human skull associated with remains of extinct mammals in a cave near El Paso, Texas.

The above list does not include several instances where arrow heads and other human implements were found associated with extinct mammals, or human remains found in deposits believed to be Pleistocene but in which no fossils of other animals have been found.

### *South America*

1. A skull of a woman found at Punin in Ecuador at the same level as fossils of bones of a mastodon and an extinct species of horse. This skull is said to resemble that of the present-day Australian aboriginee.

2. A fragment of a skull found at Buenos Aires associated with the bones of extinct mammals. This fragment is like that of the present-day American Indian.

3. Human bones in a cave at Lagoa Santa in Brazil associated with those of extinct mammals. These remains are like those of present-day South American Indians.

4. A skeleton found associated with extinct Pleistocene animals in a cave eight miles from Lagoa Santa . . . The brain capacity is small and the forehead low.

5. In a railway excavation 25 miles from Rosario were found parts of four human skeletons, associated with implements and the carapace of the extinct armadillo Glyptodon and an extinct species of bear. These skulls are like those of present-day South American Indians.

6. A skeleton associated with a number of extinct Pleistocene mammals found at Fontezuelas near Rio Arrecifes. It is of very small stature, about 4½ feet.

HOMO NEANDERTHALENSIS. Neanderthal man is the last of the species of the genus Homo to appear, and he seems to have overrun Europe and western Asia before he was replaced by Cromagnon man who is clearly a race of H. sapiens.

The late appearance of Neanderthal man is most unfavourable to the evolution theory. His stocky build, great protruding jaw, rather receding and projecting brow-ridges are just what might have been expected of a creature which was emerging from apedom, and had his fossils been found only in Pliocene or early Pleistocene deposits, he would have served well as a genetic link between ape and man.

As Neanderthal man was the predominant race of man in Europe during the latter part of the Pleistocene period most of the fossils of men discovered were provided by him, and therefore it was thought that he was the earliest and most primitive of all the types of mankind.

Moreover his ape-like features were grossly exaggerated by some of Darwin's followers. For example Professor William King wrote ("Quarterly Journal of Science", 1864, p. 88):

"The Neanderthal skull is so eminently simian that . . . I am constrained to believe that the thoughts and desires which once dwelt within it never soared beyond those of the brute." T. H. Huxley asserted that Neanderthal man walked with a slouching gait and bent knees. We now know that his brain was rather larger than that of the average European today, that he buried his dead and was a skilled craftsman and that his posture was fully erect. This last fact was definitely proved by the discovery of a fossil near Rome which showed that the foramen magnum was situated as in man today and not farther back as had been imagined. Nevertheless textbooks still repeat the assertion that he could not stand completely erect. For example William Howells writes ("Mankind so Far", 1946, p. 168): "He had little of a lumbar curve in the spine and this, together with his bowed thigh bones, indicates that he stood and walked with a slumpy, round-backed, bent-kneed stance, and that he could not have stood at attention to the satisfaction of a drill sergeant if he had tried." This assertion is supported by a drawing (which I believe to be incorrect) showing how differently Neanderthal man and *Homo sapiens* stood!

So convinced were anthropologists that Neanderthal man is an ancestor of modern man and a link with the ape, that all fossils of man of modern type found in Pleistocene deposits were received with incredulity and most were rejected. As Prof. E. A. Hooten well puts it ("Apes, Men and Morons" (1938) p. 107): "The Western European classic Neanderthal type was altogether a too complete answer to Darwinian prayer . . . Heretical and non-conforming fossil men were banished to the limbo of dark museum cupboards, forgotten or even destroyed."

The foregoing facts render it almost certain that man did not evolve from some lower animal. As the fossils give no help whatever to the evolution theory, it is not surprising that evolutionists, although agreed that man did so evolve, are by no means agreed as to the kind of creature from which man is descended; indeed it is scarcely an exaggeration to say in this matter: *quot homines tot sententiae*. In consequence it is not easy to classify the many different views of man's origin. The following classification is as accurate as I can make it.

At the outset let me say that this classification makes no attempt to distinguish between the majority of transformists who believe that man's emergence from the beast was very gradual and those who believe that man rose more or less suddenly.

The View of the first group is thus expressed by Sir Arthur Keith ("Darwinism and What it Implies" p. 5): "If we could summon back to the world of today all the extinct kinds of apes and man which have flourished and passed away during the three past geological ages and marshal them in serried ranks according to the respective periods at which they lived, we should have under our eyes an unbroken series of forms linking the brain of the lowest ape to that of the highest man."

The minority view is thus expressed by F. E. Zeuner ("Dating the Past" (1946) p. 381): "The evolution of man also may be regarded as characterized by an aromorph<sup>[3]</sup>, namely his erect posture." Similarly F. Wood Jones writes ("Hallmarks of Mankind" (1948) p. 79): "The human orthograde bipedal habit and posture . . . was an aromorph in its own right, an achievement of considerable importance, since it was not the product of the other human characteristics, it was the initiator of them all."

## EVOLUTION THEORIES REGARDING THE ORIGIN OF MAN (HOMO SAPIENS)

### CLASS I

#### MAN EVOLVED FROM A LEMUR-LIKE ANCESTOR

##### *Group I*

All races of men are derived from the same species of anthropoid ape (Monophyletic Origin).

- (a) From an unknown kind of ape (Darwin). (b) From a Dryopithecus-like ape (Haeckel). (c) From a Sivapithecus-like ape (Pilgrim). (d) From an Australopithecus-like ape (Broom, Schepers, Le Gros Clark, later view)

(e) From a gorilloid ape (Gregory, Morton, Schultz). (f) From a brachiating ape (Keith, later view).

### *Group II*

Different races of men are derived from different kinds of apes (Polyphyletic origin).

White man and chimpanzee derived from one kind of ape; Negroes and gorillas from a second kind of ape; Mongolians and oranges from a third kind of ape (Ardt, Kurz, Crookshank).

The primary races of man now living, which should be deemed species, not races, have arisen independently from different species in different continents (Gates).

### *Group III*

Man and anthropoid apes are derived from a common ancestor and are separate from all other Primates.

(a) From a Simian of later date than Propiipithecus (W. K. Gregory (later opinion), Elliot Smith (later view), Buxton, W. L. Straus).

(b) From Propiipithecus (W. K. Gregory, earlier view, Leakey).

(c) Man branched off from the Lemur stem before the appearance of Propiipithecus (Keith).

### *Group IV*

Man descended from a Lemuroid without passing through an ape stage (Haacke).

## CLASS II

### MAN EVOLVED FROM A TARSIOD ANCESTOR

#### *Group I*

Man passed through an anthropoid stage (Elliot Smith, earlier view, Hooten).

#### *Group II*

Man did not pass through an anthropoid stage (Wood Jones).

## CLASS III

Man evolved from a New World (Platyrrhine) monkey (Hubrecht).

#### CLASS IV

Man evolved from a Prototarsioid (Le Gros Clark).

#### CLASS V

Man evolved from a reservoir of generalized Archae-primata, from which arose in the Eocene bipedal *Anthropomorpha primitiva*, which gave birth to Pithecoïd homunculi from which man emerged (Schepers).

#### CLASS VI

Man evolved from an upright ancestor early in the Tertiary Period (Osborn).

#### CLASS VII

The human stock branched off from the main Primate stock before the Lemurs and Tarsiers evolved.

This is Sera's theory. According to him the Order of Primates (from Which he excludes Lemurs) is formed of six independent branches:

- (1) represented by the Polynesians but by no anthropoid ape; (2) represented by the Mongols and the Orang; (3) represented by the Caucasians and the Persians but no anthropoids; (4) represented by the Europeans and the fossil ape *Dryopithecus*; (5) represented by Negroes, the chimpanzee and most gibbons; (6) represented by the Bushmen, the Andamanese, the gorilla and the syndactylous gibbons.

#### CLASS VIII

Man branched off from the other Vertebrates as far back as Palaeozoic times; the group to which he belongs had opposable thumbs and great toes. This group rose higher in the scale than all others because of its big brain. One branch of this stock gave rise to the Australian aborigines and bushmen, a second gave rise to Neanderthal man, the Negroes, the gorilla and the chimpanzee, a third branch gave birth to the gibbons and *Pithecanthropus*, and the fourth developed into all the other types of man and the orang. This is Klaatsch's theory.

#### CLASS IX

Man is derived from the most primitive mammal, and his line did not pass through a lemur-or tarsier-or anthropoid stage. This is Westenhofer's theory.

#### CLASS X

The six types of man cited by Sera above, each evolved independently of one another from different lumps of amorphous matter in the sea, which independently formed themselves into multicellular animals, each of which, by processes like those that occur in the development of embryos, followed by changes such as occur in larvae, eventually developed each into a different type of man. This is Sergi's theory.

I submit that the following extract from a leaderette in THE TIMES of February 5th 1947 is a fitting conclusion to this chapter:

"Future generations looking back at all the strangeness of this age will see nothing so queer as the present-day eagerness to claim kinship with the Bundrer-log . . . How astonished will they be at an era which eagerly applauds, instead of standing aghast, every time a fossil fills another gap in man's believed line of ancestry."

NOTE: As the search for the missing link has been active since 1948 when this chapter was written, the reader is referred to Appendix IV which deals with events from October 1948 to July 1951.

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[1] Some time after I had written this paragraph I came upon the following on page 257 of "The South African Ape-man—The Australopithecinae" (1946) by R. Broom and C. W. H. Schepers: "When someone produces relics of *Homo sapiens* in geological deposits more ancient than Mid-Pleistocene, we seek all manner of unlikely explanations for such an improbability, even going so far as to discredit usually reliable witnesses. Such finds ultimately become veritable skeletons in the cupboard to anthropologists, who, in the subconscious endeavors to support dogma, even fail to describe such finds fully enough to allow fools to enter where angels fear to tread!"

[2] The Castenedolo, but not the Calaveras skull is mentioned on p. 18 of H. J. T. Johnson's "The Bible and the Early History of Mankind" (1943). Mention is made of the Calaveras but not the Castenedolo skull on p. 103 Of W. Howell's "Mankind so Far" (1946), and on pp. 295, 298 of R. Ruggles Gates' "Human Ancestry" (1948). Gates gets over a difficulty by asserting that the Calaveras skull is Pleistocene and not Pliocene. But he does not give the grounds on which this dogmatic assertion is based.

[3] Aromorphosis and Aromorph are terms invented by Severtzoff in 1931 in order to save the face of evolutionism. Aromorphosis is a variation or mutation which results in the increase of the energy or "Life activity" of an animal, and the character thus produced is an aromorph. Thus an aromorph is what many would call a special creation.

## Chapter IX

### TRANSFORMISM VERSUS THE GEOLOGICAL RECORD

The facts set forth in the foregoing chapters, that is the evidence of the fossils, demonstrate that neither the Darwinian theory of evolution nor any materialistic theory of evolution can be successfully defended.

The Darwinian theory must either be abandoned completely or modified almost beyond recognition.

Most modern zoologists are adopting the latter course, although this means that if this modified form of evolution took place, it must have been God-directed. It cannot have been brought about by blind forces of nature. In truth this new kind of evolution is a theory of successive creations. It can no more have been the work of natural forces than can have been the creation of the living world as recorded in the first three chapters of Genesis.

The only way of bringing the evolution concept into harmony with the geological record is to suppose, as Dr. Morley Davies does, that evolution at various past times took place very much more rapidly than is now happening.

In 1931 Severtzoff asserted (“Morphologische Gesetzlichkeiten der Evolution”) that, in addition to ordinary changes undergone by animals, which do not result in an increase of the energy or ‘life activity’ of the animal, there are changes which accomplish this. These latter he called *aromorphosis*, and the new forms resulting therefrom he styles *aromorphs*.

O. H. Schindewolf goes much further and speaks of “explosive evolution” (“Paleontologie, Entwicklungslehre und Genetik”, 1936): in his view what he calls macroevolution takes place in an explosive manner within a short period of geological time and is followed by a slow series of orthogenic improvements . . . He asserts that it is useless to look for missing links in many cases, because the supposed links never existed. The first bird hatched from a reptilian egg. This of course is Special creation dressed up to look like evolution.

F. E. Zeuner is a disciple of Severtzoff. He writes (“Dating the Past” (1946) p. 380): “*Every higher category passes through an episode Of intense evolution which lasts for something like 50 million years.*” (Italics are his.) “This makes the process of evolution, viewed from the standpoint of time, appear somewhat ‘jerky,’ Some authors go further and call it ‘discontinuous’ (Schindewolf, 1936). The existence of an apparent minimum required for the



formation of a new species, however, sets a limit to the suddenness of the process.” According to Zeuner (p. 381) “warm-bloodedness and many other characters of mammals are probably the consequence of a single important aromorph. The evolution of man also may be regarded as characterised by an aromorph in erect posture.”

G. G. Simpson holds similar views, but he objects to the term “explosive evolution.” He calls it fast-rate evolution. For this he has coined the term *tachytely*. He also speaks of normal-rate evolution or *holotely* and slow-rate evolution or *brachytely*. Chapter IV of his “Tempo and Mode in Evolution” (1946) is headed “Low-Rate and Fast-Rate Lines.” In this however, we read hardly anything about Fast-Rate lines, merely: “In the preceding chapter numerous probable examples of exceptionally high rates have been suggested, although in the nature of things the evidence for such rates is largely indirect.” These “probable examples” are all set forth in his Table 16:

# ESTIMATED DURATION OF THE ORDERS OF MAMMALS

## (In Millions of Years)

Order	Estimated Length of Unknown Origin Sequence	Estimated Length of Recorded Sequence	Estimated Total Duration
Marsupialia	55	70	125
Insectivora	55	70	125
Taeniodonta	10	25	35
Edentata	10	50	60
Lagomorpha	35	35	70
Rodentia	20	50	70
Cetacea	20	40	60
Carnivora	10	60	70
Condylarthra	10	25	35
Litopterna	10	50	60
Notoungulata	10	50	60
Pantodonta	10	25	35
Proboscidea	15	35	50
Sirenia	15	40	55
Perissodactyla	10	45	55
Artiodactyla	10	45	55

The figures in the middle column are based on evidence, viz. the date of the earliest known fossil and the period during which fossils are known to have been laid down. But the *figures in the first column are purely conjectural*, just guesses made by Simpson, *guesses based on no data, save his imagination*, guesses made by him to suit his theory, viz. “the conclusion that most of the known exceptionally low-rate lines must at some previous time have been high-rate lines seems inescapable.”

Why “inescapable?” Simpson tells us (p. 119): “If a structural unit, such as a bat’s wing, be studied, it may be found that its recorded rate of evolution is effectively zero. The bat’s wing has not essentially progressed since the Middle Eocene, although a few of its nonfunctional elements have degenerated, and it has become more diversified. Extrapolation of this rate in

an endeavor to estimate the time of origin from a normal mammalian manus might set that date before the origin of the earth.”

Thus, unless we make an assumption for which there is not a particle of evidence, which indeed is against all available evidence, the theory of organic evolution, as enunciated by Darwin and his followers, must be replaced by the theory of special creation. As the lesser evil Darwin’s dupes assume that the impossible happened!

## CLANDESTINE EVOLUTION

Mention should be made of another attempt to account for the lack of intermediate fossils. This attempt is made by Dr. G. R. de Beer, who writes: (“Embryology and Evolution” (1930) p. 30):

“It is, perhaps, worth stressing the fact that if a novelty appeared and only affected the young (i. e. embryonic or larval) stages of ontogeny in a race, that race would not show any phylogenetic progression, since that is measured only by adult modification. It is therefore possible to imagine that a certain amount of ‘clandestine’ evolution of qualitative novelties may take place in the young stages of development while the adults are peacefully undergoing quantitative changes. Such an evolution of structures in the young is well known and called caenogenesis, or youthful adaptation. If now neoteny occurs, and the animals become sexually mature in the young condition, the phylogeny will undergo an unexpectedly abrupt modification, and start off in a new direction altogether . . . Is it not possible that these gaps (i. e. lack of intermediate fossils), that these discontinuities in the phylogenetic series of adults, may be also to a certain extent due to ‘clandestine’ evolution in the young stages, followed by neoteny and the sudden revelation of these hidden qualitative novelties?”

The above passage shows that its author has good imagination. I doubt whether he himself seriously believes in ‘clandestine evolution.’

If it ever happened it is poles apart from the evolution of Darwin. Even if it happened and was followed by neoteny, it would, in my View, not account for the complete absence of fossils linking such highly specialized forms as pterodactyls, ichthyosauruses, turtles, bats, cetacea, sirenia, etc., with ordinary quadrupedal land animals.

There seems no way of escaping from the conclusion that every advance in knowledge of the fossil record renders the transformist theory less credible.

The attempts of Morley Davies, Severtzoff, Zeuner, Simpson and de Beer to square evolutionism with the known fossils call to mind the clutching of straws by drowning men, because they have not noticed some life buoys floating near them!

## Chapter X

### THE EVIDENCE OF EXPERIMENTS

The evidence afforded by experiments can neither prove nor disprove the theory of organic evolution, but it can testify for or against the theory. It is submitted that its testimony could not be more unfavorable than it actually is.

If in the past spontaneous generation took place, or natural forces transformed lifeless, inorganic matter into living protoplasm the biochemist ought to be able to repeat the process in the laboratory. T. H. Huxley recognized this and wrote ('The Physical Basis of Life', *Fortnight. Rev.* (1869), p. 129): "The existence of the matter of life depends on the pre-existence of certain compounds, namely, carbonic acid, water and ammonia. Withdraw any one of these three and all vital phenomena come to an end. They are related to the protoplasm of the plant as the protoplasm of the plant is to that of the animal. Carbon, hydrogen, nitrogen, oxygen are all lifeless bodies. Of these carbon and oxygen unite in certain proportions and under certain conditions to give rise to carbonic acid; hydrogen and oxygen produce water; nitrogen and hydrogen give rise to ammonia. These new compounds, like the elementary bodies of which they are composed, are lifeless. But when they are brought together under certain conditions they give rise to the still more complex body, protoplasm; and this protoplasm exhibits the phenomena of life.

"When the hydrogen and oxygen are mixed in certain proportions and an electric spark is passed through them they disappear, and a quantity of water, equal in weight to the sum of their weights, appears in their place. There is not the slightest parity between the passive and active powers of the water and those of the oxygen and hydrogen which have given rise to it . . . What justification is there, then, for the assumption of the existence in the living matter of a something which has no representative or correlative in the not-living matter which gave rise to it?"

This seemed conclusive and it was thought that living matter would soon be produced by experiment in the laboratory. Haeckel went so far as to foretell the production of protoplasm for commercial purposes!

As, at that time the state of physics was as backward as that of biology today, this optimism seemed reasonable, because the laws of Chemistry are such that, whenever the right elements are brought together in given conditions, a definite chemical compound is produced; and we know the

elements of which protoplasm is composed and the conditions of temperature and pressure necessary for its existence. But all attempts to manufacture protoplasm have completely failed. Nevertheless, as I said in ("Is Evolution Proved?" (1947) p. 195): "evolutionists believe that natural forces in the past did with *inorganic* matter, what modern chemists, with all their apparatus, knowledge, chemicals, X-and other rays, have failed to do even with *organic* compounds. Thus, *so far as it is possible to prove a negative, experimental evidence proves that the evolution theory is not true.*" Nor is this all. It is almost universally held that living matter today is never formed from non-living matter. And the evolutionists hold that there is no evidence that this happened more than once in the past. As we have seen, a chemical compound is invariably formed when the elements that compose it are brought together under proper conditions. Therefore evolutionists have to believe that during the hundreds of millions of years that the earth has been habitable, during all the climatic changes that have taken place *only once* did the proper conditions for the formation of protoplasm come into existence, and that no chemist or other experimenter has been able to repeat such conditions. Nor is this the only difficulty the evolutionist has to overcome. If the first living protoplasm did arise as the result of favorable chemical conditions think of the difficulties this first living matter would have to overcome. It would have to feed and reproduce itself in a world entirely mineral and without trace of organic matter, devoid of an ounce of 'soil' in the gardener's sense; the land hard mineral rock, or barren sand, or bare mud, devoid of bacteria or other microorganisms, the water holding only atmospheric and perhaps other gases and mineral salts. Small wonder that Sir Gowland Hopkins, in his Presidential Address to the British Association in 1933, said: 'Most biologists, I think, having agreed that life's advent was at once the most improbable and significant event in the history of the universe, are content for the present to leave the matter there.'

The degree of improbability that natural forces ever converted inorganic matter into the simplest living organisms which must have been composed of several protein molecules may be gathered from the following estimate made by the late Prof. Eugene Guye, recorded by Du Nouy in his "Human Destiny:" of the probability of a single protein molecule being formed by the action of chance and normal thermic agitation is practically nil. If we suppose 500 trillion shakings per second (5 followed by fourteen noughts) which corresponds to the order of magnitude of light frequencies, we find that the time needed to form, on an average, one such molecule in a material volume equal to that of the earth is 27 times longer than the earth has been in a habitable condition.

R. E. D. Clark well says (“Darwin: Before and After,” (1848) p. 127): “The materialist . . . must explain how chemical molecules of gigantic complexity came into existence and have been able to arrange themselves in increasingly complicated ways. This is the fundamental problem of evolution, yet it is generally ignored in modern books on the subject, nor, (at least to the author’s knowledge) has the problem ever been fairly faced.”

## EXPERIMENTS OF COMMERCIAL BREEDERS, FANCIERS AND GENETICISTS

Breeders, by taking advantage of the phenomena of variation and heredity, have produced the various varieties of domesticated and cultivated plants, while geneticists, experimenting on quick-breeding animals, have produced a number of freaks in the laboratory.

Darwin made the results of breeding operations one of the mainstays of his theory. In his day there was no science of genetics, so he of necessity confined himself to the work of commercial breeders. He pointed out that some of our domestic breeds differ from the wild form to such an extent that, if met with in a state of nature, they would be considered new species, or, in a few cases, new genera. Of pigeons he wrote (“Origin of Species,” 6th Edn., p. 17): “I do not believe that any ornithologist would place the English carrier, the short-faced tumbler, the runt, the barb, the pouter and the fantail in the same genus.”

Darwin knew nothing of the endocrine glands which exercise so great an influence on bodily form, and did not realize that many of the domestic breeds, such as dachshunds, fantail pigeons, etc., are the result of gland unbalance, and that such freaks would have little chance of living in the wild in competition with normal individuals.

Had Darwin been content to confine his theory to the origin of new species and even genera, the operations of breeders would have afforded strong experimental evidence in favor of his theory. But they are most unfavorable to the theory that all existing animals and plants are modified descendants of one-celled ancestors.

All the domestic breeds from a common stock, no matter how much they differ from one another in appearance are fertile *inter se* and clearly bear the stamp of their ancestral form. Despite centuries of breeding fowls remain fowls, horses remain horses, pigeons, pigeons and so on. The animals themselves appreciate this: a puppy of any breed of dog at once recognizes an individual of any other breed of dog as one of its own kind. More than two thousand generations of fowls must have been bred since the days of the early

Roman poultry fanciers, but the fowl of today is in all essentials the fowl of the classical Romans, and so with all other breeds of animals which have for centuries been the subject of breeding experiments.

The experiments of scientific breeders or geneticists tell the same story. Since 1910, when Morgan and his collaborators began breeding *Drosophila melanogaster*, the fruit fly, of which some 25 million have been bred, representing about 1000 generations, some 1000 mutations have been recorded. The vast majority of these new forms produced in the laboratory are freaks. Here are some of the names given to those having peculiar wings: abrupt, abnormal, aeroplane, apterous, apart, balloon wing, bobbed, bubble, beaded, bloated, bowed, broadened, blistered, bent, beaded, clipped wings, cut, crossveinless, curly, depressed, dumpy, dachsous, flap-wing, folded, fringed, and so on through the alphabet. And this applies to all the other parts of the body in which mutations have been recorded.

Dr. Muller, who was awarded the Nobel Prize for his work on this fly, stated ("Time" Nov. 11th, 1946, p. 38): "Most mutations are bad. In fact good ones are so rare that we can consider them all as bad."

Scores of geneticists are working on this fly in the hope of producing some novelty. In 1927 Muller discovered that exposure of an animal or plant to X-rays greatly increases the rate at which mutations appear; in the case of *Drosophila melanogaster* the increase is 15,000 per cent, in that of the plant *Crepis* the increase is 60,000 per cent. Needless to state that since 1927 the organisms experimented on have been freely X-rayed. Despite this *Drosophila* and every other organism experimented on refuse to turn into something else. Many of these mutants differ in appearance from the wild form more than many other species of *Drosophila* do, but all these mutants, when not so defective as to be incapable of breeding, are fertile when crossed with the wild form, whereas the various species of *Drosophila* when crossed either yield no offspring or infertile hybrids.

Thus, contrary to the expectations of transformists, breeding experiments have demonstrated the stability of species. Le Dantec likens the results of these experiments to the man at the circus who comes into the ring wearing 36 waistcoats, which he takes off one by one; at the end of the process he is still a man. After all this experimenting *Drosophila melanogaster* still remains *Drosophila melanogaster*. So it is with all the other animals on which geneticists and breeders have operated: the shrimp *Gammarus*, mice, guinea-pigs, rats, rabbits, pigeons, horses, etc.

Plants tell very much the same story as animals, except that in them, unlike animals, the phenomenon of polyploidy is fairly common, and



polyploids are usually infertile when crossed with the parent form. But this fact is of little use to the evolutionists.<sup>[1]</sup> In consequence the plant geneticist Heribert Nilsson asserts (“Hereditas” (1935) p. 236): “*The theory of evolution has not been verified by experimental investigation of the origin of species.*”

Indeed it is difficult to imagine how the experimental evidence could be more unfavorable than it is to the theory of evolution.

The question naturally arises; as all the efforts of breeders and geneticists have produced only minor changes in animals, is it likely that natural selection or any other natural force can effect greater changes?

To this question three answers have been given by transformists.

1. Yes. The breeder has been at work for only a few centuries, while the forces that bring about evolution have been operating for many million of years; it stands to reason that the breeder in so short a time cannot accomplish that which has been effected by natural causes since living matter originated. Geneticists have bred only about 1000 successive generations of *Drosophila*; only some 2000 generations of fowls have been bred, we estimate that it would require 100,000 generations to produce a new species of horse. This last estimate is that of Dr. W. E. Swinton made in a lecture on Oct. 22nd, 1947.

This would be a very effective reply but for two facts. The first is that it means that at least 300,000 years would be needed for a new species of horse to evolve. As the evolution of a new genus would require at least ten times the above, it follows that at least 3 million years are required for the evolution of a new genus, and ten times as long, or 30 million years, for the evolution of a new family, 300 million years for that of a new order, and 3000 million years for the evolution of a new class, i.e. longer than the earth has been in a habitable condition!<sup>[2]</sup>

The second fact is that the breeder, no matter on what animal or plant he operates, after he has effected a number of minor changes in any given direction, is suddenly brought to a standstill: in a comparatively short time he reaches a stage at which he cannot accomplish more, no matter how much he try.

As an example take the dogs. We know that men of the new stone age had domesticated dogs. The pictures on ancient Egyptian monuments show that men kept both house and hunting dogs and their breeds of dogs included the greyhound and the dachshund type and a breed that had hanging ears.

Thanks to Dr. Caius we know that in England during the reign of Queen Elizabeth a number of breeds were popular. He classifies these dogs thus: 1.

The Generous Kind. This consisted of the terrier, the harrier, the blood-hound, the gazehound, the greyhound, the leymmer and the tumbler, all used for hunting; the spaniel, the setter and the water-spaniel or finder, which were used for fowling, and the spaniel-gentle or lapdog for amusement. 2. The Farm Kind, consisting of the shepherd's dog and the mastiff. 3. The Mongrel Kind, consisting of the wappe, the turn-spit and the dancer.

Of the above several have become extinct, but a great number of new kinds have been imported, such as the Borzois, retriever, Alsatian, Schipperke, Pekingese, pugdog. Further new breeds have been produced by crossing existing breeds, such as Sealyham and the Yorkshire Terrier. But I cannot find any evidence of a new type of dog having been bred by artificial selection for more than a century.

It may safely be asserted that none of the existing breeds of animals will ever undergo extensive developments in the directions in which they have already been changed: any changes made in them will be in other directions.<sup>[3]</sup>

The fact that breeders are invariably brought to a standstill, no matter on what animal or plant they operate, or in what direction, is fatal to the evolution theory as enunciated by Darwin and developed by his successors, unless it can be explained away.

The second and third of the answers are ingenious attempts to do this.

The second answer, which was formulated by de Vries, who was a botanist, is that he believes that the history of every species is made up of alternating periods of inactivity when only fluctuating variations occur, and of activity when "swarms of new species" are produced by sudden mutation.

De Vries' theory is vitiated by the fact that (unknown to himself) he was working not, as he thought, on a pure species but a composite one. There is not an iota of proof that the life history of species is made up of alternating periods of activity and stagnation, or that all the species on which experiments have been made were in the period of stagnation.

The third answer to the question is more subtle than either of the others, although it is at least as old as Epicurus. It is that the breeder has failed because he has been operating on unsuitable material, namely on species the evolutionary tendencies or powers of which are nearly exhausted.

Here is a translation of a passage from "L'Adaptation" (1925) p. 374 by L. Cuénot, the formulator of this theory:

"We are then led to believe that the evolutionary outburst (*elan evolutif*) has been the appanage of a series of rare forms, of small range which have

disappeared without leaving relics, after having exhausted their potentiality of variation in giving rise to the ancestors of the great natural groups: the ramification of the mammalian tree, to continue the simile, seems to have been complete by the middle of the Tertiary, the axis and petioles have dried up irrevocably: only a certain number of leaves are still green and fully alive; many others have dried up for ever. The green leaves are still capable of evolution and producing secondary leaflets, but no new group can appear, the evolutionary sap no longer circulates. The best proof of this is that new families have not been formed for millions of years (the estimate of the duration of the Tertiary as there millions is far too low): all existing animals belong to specialized groups from which it is inconceivable that they should emerge. The same applies to many other orders of the animal kingdom: incontestably the evolution of reptiles, birds, amphibians, fishes, echinoderms, molluscs, crustaceans, sponges has completely finished: they may still produce species and new genera, but they have not within them undifferentiated material capable of evolving into unexpected forms and new mechanisms: they exhausted their evolutionary creative potentialities during the Secondary and Tertiary periods.

“I do not mean by this that evolution has definitely ended on the earth, and that we know all the possible forms of life . . . I readily believe that there is still a reserve capable of giving rise to new beings quite unlike any that existed formerly, or exist today. I look for these among microscopic organisms such as the Echiuroidea, Tardigrades, Dinoflagellates, Archinannelids, Rhodope, terrestrial forms such as the Myrientomata.”

The above passage is a masterpiece. It is designed to meet most of the serious objections to transformism: the meagre results obtained by breeders, the absence of nascent organs and structures in animals, the lack of fossils testifying to the gradual origin of peculiar types, and the fact that the animals on oceanic islands all belong to families that occur on the mainland and the plants to mainland natural orders.

There is, however, not an iota of positive evidence in support of this hypothesis, and Cuénot makes no attempt to point to any natural forces capable of bringing about this strange kind of evolution.

A theory of this nature cannot be disproved, but there is evidence which casts strong suspicion on it. According to the hypothesis, the older a group. i.e. the longer it has existed, the more complete should be the drying up of the evolutionary sap. Now fishes first appear in the Ordovician or possibly the Cambrian, but mammals first occur in the Trias; in other words fishes have existed on the earth more than twice as long as mammals. As the evolutionary sap has dried up so much in mammals that breeders cannot produce a new

species, they ought to find fishes quite intractible. But in the only species on which breeders have operated extensively—the Crucian carp of Asia—they have effected greater changes than breeders have in mammals. The various breeds of goldfish, such as the telescope, nymph, fantail, celestial, fringe-tail, eion-head, veil-tail, oranda and comet, differ from the ancestral form quite as much as do the greyhound, St. Bernard, toy-terrier, dachshund and foxhound, and quite as much as the various breeds of pigeons.

In order to render the experimental evidence against the evolution theory less unfavorable, Dr. Morley Davies asserts that there is this great difference between artificial and natural selection: Natural selection (or whatever effective agent we substitute for it) deals with the *whole organism*, while the breeder deals with selected ‘points’ only—either superficial characters like color and shape, or such qualities as speed or milk-productivity which certainly involve a number of factors but only a limited number. He does not, he cannot concern himself with variations in internal organs needful for the efficient correlation of functions throughout the organism. His artificial breeds are unbalanced, top-heavy structures: he is like a builder who is trying to widen the top of a tower by elaborate corbelling, without attempting to widen the foundations. The distance to which he can extend is limited, and is no criterion of the area which he could roof over in a building the foundations of which were properly adapted to its superstructure. (*op. cit.* p. 16).

The reply to this statement is: first there is some force in it, but it cannot be said to apply to the work of geneticists and it cuts both ways, because it enables the breeder to produce varieties that could not survive in nature.

That the analogy between artificial and natural selection must not be pushed too far is evident from three facts:

1. The human breeder can and does effect changes in animals far more speedily than they can be effected under natural conditions, probably more than a hundred times as quickly, because, *ex hypothesi*, all but favorable variations that occur in nature are soon wiped out, whereas the human breeder can select any variation he fancies, irrespective of its being advantageous or otherwise.

2. The unnatural conditions under which domestic or laboratory animals live are likely to induce variations that would not occur in nature. In fact the breeder subjects the subjects of his experiments to conditions impossible in nature, such as to X-rays, which, as we have seen, greatly accelerate the frequency of mutations.

3. In nature the odds are greatly in favor of a new variation being swamped by its possessor mating with individuals which do not exhibit this

variation. The breeder, on the other hand, when he wants to perpetuate a variation, segregates the individual in which it occurs and either crosses it with another individual that has varied in the same way, or back-crosses it with the parent and so perpetuates the desired variation. Thus it seems an underestimate to say that a human breeder works more than a hundred times as rapidly as nature. So that, as we know that dogs have been domesticated for 6000 years, the 6000 successive generations of dogs should have produced a greater change in the species than would occur in 600,000 generations subjected to natural selection.

There is no getting away from the fact that breeding experiments afford strong evidence against the evolution theory.

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[1] In my debate with Mr. Joseph McCabe, published under the title “A Challenge to Evolutionists,” I have dealt with polyploidy in plants.

[2] G. G. Simpson on geological evidence gives 5 to 6 million years as the average time taken for the evolution of a new genus of horse (“Tempo and Mode in Evolution” (1944) p. 17). Thus both the fossil and experimental evidence show that the earth has not been in existence nearly long enough to allow of the conversion of a fish into a mammal.

[3]

Note that all the varieties produced by the breeder are fertile when crossed with any other variety while the reverse is the case with species. These usually do not interbreed and if they do and progeny results, this is sterile. Much has been made of this difference between species and varieties by creationists and rightly so, because for all practicable purposes species are immutable. But since the sexual organs, like all other organs and structures in animals and plants exhibit the phenomenon of variation; as if as Paley suggests, variety itself, distinct from every other reason was a motive in the mind of the Creator, and a characteristic of animals is that no two individuals are exactly alike (cf. human finger prints), it would be surprising if since the creation, individuals of many species have not been born which differ so much in their sexual organs from distant members of their species as to be infertile with these.

It is said by F. E. Zeuner (“Dating the Past”) that it takes 500,000 years to produce a “good species” in nature. Thus it is right to speak of the great stability of species.

## Chapter XI

### THE EVIDENCE OF THE GEOGRAPHICAL DISTRIBUTION OF ANIMALS

The facts of geographical distribution, apart from giving some support to the view that in the past new species and even new genera have come into existence by the accumulation of variations, are most unfavorable to the theory of evolution.

These facts are so numerous that it is not practicable to deal with more than the merest fraction of them. Here is one. The transformist has to believe that every species of each order and every order within a class is derived from a common ancestor. If this be the case, the geographical distribution of animals should show clearly the locality in which each order of a class originated, and how the species of each reached their present habitats. But in many, if not all, cases this is impossible.

In IS EVOLUTION PROVED? I put the following to Mr. Shelton: (p. 165).

“The Amphibia are a small class formed of only three Orders and 20 Families. Here are a few of the difficulties you encounter if you expect the evolution theory to account for the present geographical distribution of the Class. The Caecilians (legless, worm-like, burrowing amphibia) occur in America from Mexico to Peru, Tropical Africa and the East Indies. How did they come to be thus distributed? One genus, *Dermophis*, is composed of 6 species, of which 5 inhabit America and 1 West Africa. Another genus, *Uraeotyphlus*, is made up of 3 species, 2 of which live in the Malabar Hills of South India and 1 in West Africa. Of the tailed amphibia, the genus *Amblystoma* has several species in N. America and 1 in Siam. Among the frogs, the family *Liopelmidae* is composed of 2 genera, one of which is found only in New Zealand and the other in the N. W. corner of the U. S. A. The *Dentrobatidae* is composed of 2 genera, one of which is confined to Madagascar and the other to S. America. Nearly all the species of the *Cystignathidae* live in Australia and Tasmania, but a few occur in America south of Mexico. In my view, these facts fit the theory of creation much better than they fit the evolution theory. If you disagree, please say where each of the above groups originated and how they reached their present habitats.”

Mr. Shelton was unable to make any reply.

2. The facts of geographical distribution are unfavorable to transformism because they show that some species and genera are very stable and that, if ever a family or order evolved from a preceding one, the process must have been so slow that the earth has not been habitable nearly long enough to allow a one-celled animal to evolve into a mammal.

There are hundreds of species of animals of which the geographical range is immense and in such the individuals living in Ceylon can never mate with those in the British Isles, nor can those of China or Malaya. Yet, although living in such different climates and so widely separated geographically the individuals are of the same species. The species has not split up into a number of local ones. Many species of birds have a range which is almost cosmopolitan, such as the common kingfisher, house sparrow, osprey, sparrowhawk, merlin, kestrel and barn owl. In all these the range is continuous, but the same phenomenon is seen in animals of which the range is discontinuous, for example the snake *Polydoniopsis melanocephalus*, found in the Malay peninsula, and Archipelago, Comoro islands, Madagascar and Central America.

The facts of geographical distribution show that, if new species do arise by evolution, the process is very slow. Dr. F. E. Zeuner has made a careful study of the distribution of a group of swallow-tailed butterflies living in the Malay Peninsula and Archipelago. He describes about 70 species of these, some of which are confined to one island. He believes that these are all derived from a common ancestor, and have arisen in consequence of their isolation on these islands, and, taking into consideration the times at which various parts of the area have been under the sea and re-emerged, he writes ('Systematics of the Troides and its Allies,' *Trans. Zool. Soc.* (1943), p. 174): "One will be fairly close to the mark . . . if one accepts a period of 500,000 to one million years as the time for the evolution of a 'good' species."

Butterflies are land species. Those who have studied the geological and geographical distribution of animals have come to the conclusion that the evolution of a new marine species takes much longer than that of a land species. Thus E. Mayr writes (*Systematics and the Origin of Species* (1942), p. 223): 'Speciation in marine animals moves at a snail's pace as compared to that of terrestrial animals. The connection between the Atlantic and the Pacific oceans (at Panama or Nicaragua) was interrupted some two or three million years ago, but some of the species of fish and crustaceans are still the same on both sides of the Isthmus of Panama . . . The palaeontology of marine animals indicates the same slow evolution as does the existence of so many bipolar species.<sup>[1]</sup> The speed of evolution should not be overrated even in terrestrial groups . . . Many of the insects of the mid-Tertiary amber cannot



be separated specifically from living species, and even an amber fauna believed to be Cretaceous was found to be remarkably similar to living forms.'

I do not know what time-scale Mayr uses in saying the connection between the Pacific and Atlantic oceans was interrupted 2 or 3 million years ago. Scott, on the strength of the mammal fossils, writes: 'In early Pliocene times the junction between the two continents (N. and S. America) was re-established and has continued to the present day.'

According to the time-scale we are using, the Pliocene period began 15 million years ago, and this would mean that the communication at Central America between the Atlantic and Pacific was cut off some 12 million years ago. The mid-Tertiary amber to which Mayr refers, on our scale, was formed about 30 million years ago.

The number of genera of extensive geographical range is large. A familiar example is the crocodile (genus *Crocodylus*) which is found in Africa, South Asia, North Australia, Fiji and Solomon Islands and Tropical America. Fossils of this genus have been found in Eocene rocks in England, showing that the genus has persisted unchanged for over 50 million years, and a doubtful Cretaceous fossil suggests antiquity of more than 80 million years. The white-ant genus *Eutermes* ranges from Africa to Australia. The lizard *Gymnodactylus* occurs in South Europe, South Asia, Australia, the islands of the Pacific and Tropical America.

The genus *Tapirus* (Tapir) today occurs only in Central America and Malaya. The Malayan species differs but little from the American ones. Fossils of this genus have been found in Lower Miocene deposits, so it has existed unchanged for at least 30 million years.

Darwin and his followers cite the peculiarities of the fauna of oceanic islands as evidence in support of transformism. Oceanic islands are those which are believed never to have formed part of a continent. One of the characteristics of these is the absence of land mammals and the paucity of amphibia on them. Darwin wrote ("Origin of Species" 6th Edn. p. 350):

"This general absence of frogs, toads and newts on so many true oceanic islands cannot be accounted for by their physical conditions, for frogs have been introduced into Madeira, the Azores and Mauritius, and have multiplied so as to become a nuisance. But, as these animals and their spawn are immediately killed (with the exception, as far as known, of one Indian species) by sea water . . . we can see why they do not exist on strictly oceanic islands. But why, on the theory of creation, they should not have been created there, it would be very difficult to explain. Mammals offer another and similar

case . . . It cannot be said that small islands will not support at least small mammals, for they occur in many parts of the world on very small islands when lying close to a continent. It cannot be said, on the ordinary view of creation that there has not been time enough for the creation of mammals: many volcanic islands are sufficiently ancient . . . Although terrestrial mammals do not occur on oceanic islands, aerial animals do occur on almost every island. New Zealand . . . Norfolk Island, the Viti Archipelago, the Bonin Islands, the Caroline and Marianne Archipelagos and Mauritius all possess their peculiar bats. Why it may be asked, has the creative force produced bats and no other mammals on remote islands? On my view this question can easily be answered: for no terrestrial mammal can be transported across a wide space of sea, but bats can fly across.”

In my “Difficulties of the Evolution Theory” I made the following comments (p. 19): “Apparently Darwin did not put to himself the question: As living matter seems to have originated in the sea and all land faunas to have evolved from aquatic forms, why have marine organisms given rise to terrestrial forms only on the shores of the mainland, why has this not taken place on the shores of any true oceanic island? In view of the fierce struggle for existence in the sea, is it not surprising that some marine organisms did not escape from it by seeking refuge on oceanic islands as others have done on the mainland? It cannot be said on the ordinary view of evolution that there has not been time for the evolution of amphibians from aquatic organisms; many oceanic islands are sufficiently ancient.”

Dr. A. Morley Davies has made the following reply (*op. cit.* p. 163): “I can only suggest possible reasons. The change from a water-life to a land-life involves so many and complex adaptations that there must necessarily be many failures to one success, and this ratio of failure to success must be repeated time after time as each step forward is attempted. There is needed, therefore, a great variety of conditions tempting, as it were, the making of a great number of experiments, if one successful move is to be made; and there must be a number of successful first moves to make a second move possible. I suggest that the limited area of an oceanic island shore, and the scattered nature of the islands may not give sufficient opportunity for an adequate number of experiments. Again the absence of large rivers from oceanic islands shuts off the best path by which a change from marine to terrestrial life may take place—the path by which the amphibia certainly came from lung-fishes.”

I heartily agree with the statement that the change from a water-life to a land-life involves many and complex adaptations, and it is for this reason that I am convinced that the change never took place, at any rate gradually. Dr.

Davies, however, believes it has taken place with varying success on a number of occasions; he writes (*Loc. cit.*): “Yet the Palaeozoic ancestors of the Amphibia are not the only fishes that have tried to adapt themselves to a land life. There is a marine fish, *Periophthalmus*, which during ebb-tide hops about on muddy foreshores in the Indo-Pacific region, seeking small crustacea and other organisms. It appears to be well-adapted to its peculiar life, but whether its habit originated on the shores of the mainland or of any of the islands of the Malay Archipelago is not known. *Periophthalmus* belongs to the Goby family, but among the Blennies there is a very similarly modified form, *Alticus*. Among the mugiliform fishes, there are three genera adapted to breathing air: *Ophiocephalus* (Asiatic) and *Channa* (African) have large suprabranchial cavities into which project vascular folds from the walls. *Anabas*, the tree-climbing fish (Africa and E. Indies) has still more vascular lamellae, and though it lives partly in the rivers it will drown if prevented from rising to the surface. Among the Siluridae, *Saccobranchus* (Asiatic) has a large hollow sac expanding back from the branchial cavity below the trunk muscles, which acts as a lung. These are only a few of the Teleostei which have adapted themselves to air breathing. In the Dipnoi (lung-fishes of Africa, S. America and Australia) the swim-bladder serves as a lung; and this must have been the case also with the ancestral fish-amphibia (*Osteolepidae*).

“Are any of these modern air-breathing fishes potential ancestors of a new class of Terrestrial vertebrates? Who can tell? It is doubtful if any of them shows the range of variation in structure that is necessary to provide a chance for further development.”

I have no hesitation in predicting that none of the above named fishes will become ancestors of a new class of land vertebrates. Dr. Davies does not seem to realize that none of the fishes he has named, nor the even more terrestrial Siluroid fish *Clarias lazera* of Senegal can have taken to spending time out of water unless each had been previously adapted to such existence. Moreover none of them show the least sign of developing lungs. The lung-fishes, it is true, have lungs, but they have had these since their earliest known fossils occur in the Devonian period, and they show no sign of attempting to make use of them by hunting for quarry or food on land, *Ceratodus* certainly never voluntarily leaves the water, although so well equipped for breathing air. Moreover the lung-fishes are dying out, thus, as Maurice Thomas points out, (“*Le Transformisme e contre la Science*” (1928) p. 85) we have the paradox that fishes adapted to breathing both in the atmosphere and under water are dying out while those which can breathe only under water are flourishing. Thomas also points out that the late appearance of lungs in the developing tadpole renders it extremely improbable that amphibia are derived from lung-

fishes. As the lung-fishes have fully-developed lungs tadpoles should have these at the time of birth, but they appear much later. "Can," asks Thomas, "an organ possessed at birth by the supposed ancestor have disappeared in the embryo and later reappeared?"

To return to the fauna of oceanic islands. Many of these islands have been in existence a very long time, yet no new family of animals has evolved on any of them, all the animals which inhabit them belong to mainland families. The nearest approach to peculiar families on a true oceanic island are the sub-family of flowerpeckers, Drepaninae and the sub-family of land snails the Achatinellae of the Sandwich Islands. As these sub-families are not known, living or fossil, on any continent, it is possible or even probable that they have originated on the Sandwich Islands, but it may be that they formerly lived and have become extinct on the mainland but have persisted in the Sandwich Islands. *Ex hypothesi* oceanic islands have been peopled by immigrants from the continents, and, as they were originally uninhabited, they are the places at which evolution should be most rapid: the environment would be different from that of the mainland, and for a time there would be no enemies to fear and little competition for food, so that variation could have free play and not be subjected to the pruning hook of natural selection. Thus the fact that no new family has evolved on an oceanic island suggests that it is not possible for one family to become converted into a different one.

The distribution of Marsupials has often been cited as evidence in favor of evolution. In fact it is the reverse. Thus Professor H. Munro Fox writes on page 316 of this "Biology," a book published by the Cambridge University Press: "There is another strange fact about the distribution of animals which only evolution and geology can explain. The kangaroo and its relations flourish in Australia. Opossums, which are their relations, are found in America. Nowhere else in the world does this group of mammals live. Yet Australia and America are widely separated by seas. Again a strange animal called the Tapir, which you can see in the zoo, lives only in Borneo and Central America. Yet the barriers to spreading between these two places are enormous. Why are these nearly related animals found only in such remotely separated places? The answer is that in early Tertiary times kangaroo-like and tapir-like animals lived all over Europe, Asia and North America. Their fossil remains have been found. In the struggle for existence they have died out everywhere except in the isolated spots where they survive today."

The above account, while true as regards the tapirs, is false in respect of the "kangaroo-like animals." Not a single fossil of such creatures, or of any kind of Marsupial, has been found in any part of Asia or eastern Europe. But fossils of placental mammals have been found in Upper Cretaceous rocks of

North Asia, and in Miocene rocks in Japan, China and India. If then Australia received its mammals by way of Asia, these should be placentals and not marsupials. Unless the Australian marsupials were created in Australia, they must have migrated thither from South America across a southern continent which has disappeared and which did not touch Africa. This is highly improbable because the ocean south of Australia is very deep, and, if Australia were ever joined to such a continent, the severance must have taken place more than 200 million years ago.

The marsupials, if immigrants, must have existed in Australia during an immense stretch of time. But all the Australian Marsupials constitute a single order. Despite their isolation and their varied environments, they have not evolved into a new order. Nor is this all. The Marsupials are divided into two sub-orders—the polyprotodontia, having more than two incisor teeth, and the diprotodontia, having two incisor teeth. As each of these sub-orders has representatives in both America and Australia, both sub-orders must have been in existence before communication between Australia and America was severed. Thus 200 million years apparently is too short a time for the conversion of a sub-order into an order. Nor have any ruminant, volant or marine mammals evolved in Australia.

If 200 million years be not long enough for the evolution a new order, that of a new class would require more than 2,000 million and that of a new phylum more than 20,000 million years. But, according to latest computations, the earth has not been in existence longer than 3,000 million years.

The facts of the geographical distribution of animals tell heavily against the theory of organic evolution.

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[1] Species found in both the Polar Seas and nowhere else.

## Chapter XII

### NASCENT AND VESTIGIAL STRUCTURES

Evolutionists adduce the existence of what they assert to be vestigial structures as evidence of evolution. If such exist, however, they would only show that in course of time animals lose structures. As the theory of evolution requires the origin of new organs, what is needed, as evidence to support it, is the presence of nascent organs in animals, that is organs which in their present condition are of no use but will be useful when fully developed. But nascent organs and structures seem to be non-existent. Such a state of affairs strikes at the root of the evolution doctrine.

That during the past fifty years textbooks have brought to light only facts apparently favorable to evolution is shown by the fact that they invariably refer to vestigial structures, but never mention nascent structures.

Darwin was not guilty of this omission. In order to forestall criticism he tried hard to find some examples of nascent organs. He suggested that the wing of the penguin might be a nascent organ of flight, today no zoologist accepts this suggestion. Darwin was of opinion that the mammary glands of the duck-billed platypus (*Ornithorhynchus*) may be considered "in comparison with the udders of a cow as in a nascent condition." Later research has shown that this view is incorrect (see p. 225).

Darwin's third attempt to cite a nascent organ reads as follows ("Origin" p. 399): "The ovigerous frena of certain cirripedes which have ceased to give attachment to the ova and are feebly developed are nascent branchiae." Even if Darwin's surmise be correct, this would be case of a change in the function of an existing organ rather than of an entirely new structure.

Owen considered the simple filamentary limbs of the mudfish, *Lepidosiren*, to be nascent terrestrial limbs. This view is not accepted. This fish shows no desire to leave the water, and, as fossils have been found of another member of the family in Oligocene deposits, if these fins were incipient legs they should be far more leg-like by this time.

Beddard suggested that the small independent slip of the rectus femoris muscle seen in some birds may be a nascent rather than a vestigial ambiens muscle. This suggestion, however, does not seem to be correct.

I know of no other structure that has been cited as a nascent organ. The mammae of male mammals cannot be nascent mammary glands as they occur

in so many orders, and there is no evidence that they are better developed today in any species than they were three or four thousand years ago.

Thus, although the anatomy of thousands of species of animals has been carefully studied, it is impossible to name a structure in any of them which is even probably in a nascent condition. Darwin appreciated this objection and made the best of a bad business by writing (*Loc. cit.* p. 398): “It is often difficult to distinguish between rudimentary<sup>[1]</sup> and nascent organs: for we can judge only by analogy whether a part is capable of further development, in which case it alone deserves to be called nascent. Organs in this condition will always be somewhat rare; for the beings thus provided will commonly have been supplanted by their successors with the same organ in a more perfect state, and consequently will have become long ago extinct.”

The flaw in this argument is obvious: if evolution be now taking place, the animals about to supplant their rivals owing to the acquisition of new and useful organs should today exhibit these in a nascent condition.

Consider the significance of this absence of nascent organs.

According to the evolution theory all multicellular animals are derived from one-celled ancestors, which exhibit nothing that can be called an organ in the strict sense. Consider now the vast number of organs and structures which are supposed to have evolved in the descendants of these organ-less ancestors; every differentiated cell, bone, cartilage, muscle, tendon, nerve, blood vessel, ganglion, hair, feather, scale, spine, shell, spur, antler, horn, hoof, claw, nail, tooth, tusk, antenna, appendage, every internal organ from the blood corpuscles to the stomach and liver. Every type of each of the above organs, according to the evolution theory, must have at one time existed in a nascent condition. Now consider the million or so existing species of animals all of which are supposed to be in a state of flux, evolving. If these species be really evolving, the majority of them ought to exhibit nascent structures in all states of completion, from unrecognizable excrescences to structures almost ready for use. Not a single one seems to exist!

I know of only four explanations of this lack of nascent organs.

1. Every type has been separately created with all its organs.
2. New structures arise in animals, not gradually, but per saltum.
3. Evolution no longer operates: It is a thing of the past. This appears to be the view of Professor Broom, who writes (“The Coming of Man” (1933) p. 225): “As nearly all the great changes in evolution, except the evolution of man, took place before the Miocene Age, and very little evolution of any sort has taken place since the Pleistocene, i.e. in the last million years or so, it

looks as if the agencies that directed evolution are no longer active on earth, or at least that their activities are different. Possibly they are no longer interested in bodily evolution, but engaged in the more important work of evolving higher types of humanity.”

4. That the capacity of evolving has ceased in the vast majority of animals, but is the possession of a few of them. This is held by Professor Cuénot, whose views on this matter we quoted on p. 153.

The first of the above explanations is pure creationism, the second is creationist, rather than evolutionist, while the last two are evolutionist. They account for the failure of practical breeders and geneticists to produce a new type of animal. Broom’s views cannot be tested experimentally, those of Cuénot can. I do not anticipate that breeding experiments on any of the animals cited by Cuénot will produce any new types, because his theory is in direct conflict with the geological record, which indicates that no new phylum has come into being since, at any rate the Ordovician Period. Professor Broom’s idea that the agencies which direct evolution are now concentrating on higher types of humanity is not borne out by Archaeology or pre-history. There is no evidence that human nature is changing.

I regard the theories of Professors Broom and Cuénot as valiant attempts to save the face of evolutionists, but they do not overcome the difficulty presented by the absence of nascent organs, because, so far as I am aware, no fossil exhibits a nascent organ: the earliest known fins are fully developed, so are the earliest legs, and wings, whether of insect, bird, bat or pterodactyl.

Although Dr. Davies has nothing to say regarding nascent organs, he makes gallant efforts to enlist vestigial organs as witnesses for evolution. I do not agree with his statement (E. p. 166): “The existence in any animal of structures to which no use can be assigned, but which are obviously identical with structures that are useful in other animals, has always been a fact easier to reconcile with evolution than with creation.” The existence of such structures is certainly easier to reconcile with a theory that structures may in time degenerate than with a theory that this cannot happen; but the latter is not necessarily part of a theory of special creation. Thus, if it could be shown (which it cannot) that the wisdom teeth of man are disappearing and are now useless relics, this would not effect the theory that man was specially created.

Moreover, as Col. L. M. Davies has pointed out, the curse described in the third chapter of Genesis implies that considerable changes took place in animals, and some of the supposed “vestiges” may be the result of this.

Before considering the structures cited as vestigial let me insist that no structure should be deemed to be vestigial unless it can be proved to be of no



use to its possessor in adult, embryonic or larval life and that it is not a structure inevitably resulting from the manner in which embryos develop. If any animal exhibits a structure of which we have not discovered the use, it is premature in the present state of knowledge to assert that it is a useless vestige. Scores of structures once declared to be useless are now known to be of very great use. All that can be done safely with structures of which the use is not known is to place them in a suspense account. Probably in time the use of most of these will be discovered, so it may be true to say that the number of vestigial structures in animals is the measure of the ignorance of zoologists.

Let me here mention certain structures which until quite recently were cited by transformists as useless vestiges, but which are now universally acknowledged as having most important functions. Chief among these are the endocrine glands: thyroid, parathyroid, thymus, pituitary, and pineal or epiphysis. Rolleston is largely responsible for our knowledge of the functions of these ductless glands. His book "The Endocrine Organs in Health and Disease" (1936) is a classic. Despite recent advances in physiology, it may safely be said that what we know of these and other ductless glands is a very minute fraction of what we have to learn, and that there are other glands in the body the use of which we are largely ignorant. But today few will dare to say that these glands have no function.

It is hardly necessary to mention that no one now suggests that the flattened outer ear of man is a useless vestige of a movable ear.

Thanks to the ease with which man can move his head from side to side, he does not need a mobile ear, and the flattened form of the outer ear is a safeguard against its getting torn or damaged.

It is however necessary to speak of "Darwin's point" i.e. the little conical projection on the margin of the ear, because, in that strange book "The Science of Life" (p. 411) we are told that it is "the remains of the tip of the pointed ear of lower forms, now folded downwards and inwards." Unfortunately for Dr. Julian Huxley and Messrs. H. G. and G. P. Wells it does not correspond to the tip of the ear of a lower animal. In any case, since many breeds of domestic dog exhibit no trace of this point, is it not absurd to imagine that it persists in man today just because man must recapitulate ancestral stages in embryonic development?

Mention must here be made of the claws or spurs which occur in several kinds of snakes on either side of the vent. e.g. in Boa, Python, Eryx and Tortrix. These claws are often said to be useless relics of the hind legs of snake ancestors. In fact it is almost certain that these appendages assist in locomotion, particularly in the case of large constrictors when climbing trees

or hanging from branches. Further A. K. Martin in “The Ways of Man and Beast in India,” says that these horny protuberances assist the python in driving itself forwards when on the ground.

In this connection it is necessary to mention that these claws are attached to a small pelvis consisting of ilium, ischium and pubes by means of a leg bone which seems to be homologous with the femur.

Moreover in no known snake is there any trace of a pectoral girdle on a fore-leg.

It may be asked: even if, as seems probable, these hind claws and the pelvis are useful, does not their existence in their present form denote that the snakes of today are modified descendants of ancestor which walked on four legs? For reasons to be given later (see page 176) I submit that the reply to this question is in the negative.

In my “Difficulties of the Evolution Theory,” I cited as useless vestiges the following which I have since discovered, serve useful purposes: the splint bones of the horse, the lateral toes which do not reach to the ground of deer and other artiodactyls, the teeth that appear in the foetus of whalebone whales, the eyes of some animals that live in dark caves, probably the stumps of wings exhibited by some flightless insects, and possibly the wings of struthious birds and the vermiform appendix in man.

We have now to notice the uses to which, these various structures are put.

1. *The splint bones of the horse.* These, as Hayes points out, (1) strengthen the leg, (2) serve as an attachment for certain muscles, (3) in conjunction with the canon bone form a groove in which lies the upper part of the suspensory ligament,—an elastic brace supporting the fetlock and counteracting the effects of weight.

Several other considerations indicate that the splint bones of the horse are not useless vestiges. There is no evidence that they are diminishing in size. Many mammals have a collar bone, while in others there is no trace of this bone. If these latter have lost this bone because it is of no use to them, why have horses not managed to rid themselves of the whole of digits nos. 2 and 4?

2. *The lateral toes of deer and other artiodactyls.* In the horse the splint bones represent the proximal or upper part of the metapodials; evolutionists suppose the distal or far end to have been lost. In deer, however, the lateral toes represent the far ends of the metapodials with the attached toes; in them the proximal ends are supposed to have disappeared. Those who believe the lateral toes in both deer and horse to be useless vestiges have to explain why

the former have lost the proximal portion and the horse the distal. Clearly these supposed vestiges serve a purpose which differs in the two types. We have noticed the uses of the splint bones of the horse. The position and degree of development of the lateral toes in deer varies with the species, or genus. Each kind of deer has the type of foot needed to prevent its feet sinking deep into soft ground. At one extreme is the lightly built, small antlered Cervulus, of which the lateral digits lack toe-bones, at the other extreme are the musk deer and reindeer, of which the lateral toes are nearly as large as the middle pair, in consequence the foot presents a broad surface to the ground and the lateral toes prevent their possessor from slipping on a frozen or rocky surface.

In the pig the fifth toe seems to be represented by the trapezoid to which a ligament and a muscle are attached. The side toes are useful in marshes and on steep slopes; the hoofs on these get worn, as do those of the middle pair.

In the ox tribe the lateral toes are wanting in some; in most they are represented by a hoof only or by a hoof and nodules of bone. In the ox the lateral toes take the form of horny knobs known as ergots, provided with ligaments to prevent them being pushed up and down when the leg is extended. They support the toes when these receive shocks from below or from one side on rugged ground; they are also serviceable in marshes and on steep slopes. As the ox, unlike the boar, is not addicted to mountains, there is no need for its ergots to be regular hoofs. Each species has the type of foot best suited to its requirements.

3. *The teeth in the foetus of toothless whales.* When I cited these as useless vestiges I had not read Vialleton's "L'Origine des Etres vivants," where he writes (p. 164): "Certain of these (supposed vestigial organs) deserve a special examination because they play a part that escaped the notice of Darwin. When he cited as truly vestigial organs the germs of teeth in the foetus of whales devoid of teeth in the adult state, and those of the upper incisors of certain ruminants, the gums of which they never pierce, he forgot that these germs in mammals, where they are very large relatively to the parts enclosing them, play a very important part in the formation of the bones of the jaws, to which they furnish a *point d'appui* on which these mould themselves. Thus these germs have a function."

That Darwin was wrong and Vialleton right is indicated by the following facts:

(a) To quote Vialleton, "the disposition (of these foetal teeth), their form and their number, different from those of other Cetacea, show that in the whalebone whale, far from being merely the relics of an extinct ancestor, they

have an individuality and a causality peculiar to them, since they are multiplied and adapted to the length of the jaw.”

(b) It is highly improbable that the ancestors of the toothless whales first acquired a number of additional teeth, then scrapped them all and developed in their place the extraordinary baleen plates that occur in the mouth.

(c) No living or any known Tertiary bird has teeth, but Archaeopteryx and all known Cretaceous birds had well-developed teeth. If, as the evolutionist supposes, modern birds are derived from toothed ancestors, many, if not all, birds should exhibit foetal teeth, as whalebone whales do, but no known bird embryo shows any trace of teeth. The supposed rudimentary teeth that have been described in parrots, are not teeth but papillae, similar to those under the hoof of the horse, which provide horny tissue to make good that worn away. Birds lack embryonic teeth because these are not necessary for the moulding of the very slender jaw.

(d) American Ant-eaters lack teeth, and having attenuated bird-like jaws, no teeth appear in the foetus, although embryonic teeth occur in the toothless Edentata of which the jaw is comparatively massive.

(e) The adults of both the known Monotremes, Platypus and Echidna, lack teeth, but while the embryo of the slender-jawed Echidna shows no teeth that of Platypus does, and these persist for some time.

(f) Confirmation of the correctness of Vialleton’s assertion that one of the functions of developing teeth is to enable the jaw to be properly moulded, is afforded by a paper by Dr. John Cameron (Trans. Roy. Soc. Canada, Vol. XII, 1918) illustrated by a photograph of a microcephalic idiot of whom the jaws recede like those of an ape, because of the poor development of the teeth. “In many of these individuals” he writes (p. 179) “the teeth never develop at all. The effect of this defective dentition is reflected in the corresponding feeble degree of development of the jaws . . . The superior and inferior maxillae (jaws) in the early stages of their ossification, it may be recollected, are fragile bony shells enclosing the dental germs. For example the lower jaw at birth is simply a thin trough of bone enclosing the developing teeth. The cause (of the poorly developed jaws) is a deficiency or actual total failure of development of the dental germs, the effect being that the investing jaws likewise fail to execute their normal growth and evolution.”

4. *The Vermiform Appendix in Man.* Birmingham seems to have been the first to suggest that this is not a useless vestige, and at present this seems to be the prevailing view. Thus Le Gros Clark writes (“Early Forerunners of Man” (1934) p. 205): “The significance of the vermiform appendix is still quite

obscure, but in view of its rich blood supply it is almost certainly correct to regard it as a specialized and not a degenerate structure.”

In addition to its rich blood supply the appendix has a complex wall composed of an external muscular coat, followed by a mucous layer, under which is a mass of lymphoid tissue which *does not appear until after birth*, and finally an inner coat of mucous membrane. The use of this organ would probably have been discovered ere this, but for the fact that useless organs, being required as evidence for evolution, are eagerly sought after by transformists!

5. *Blind Cave dwellers*. Numerous animals, including tailed amphibia, fish, insects and spiders, that inhabit dark caverns are blind. Some of these have traces of eyes; in others the eyes are degenerate. It is doubtful whether imperfect eyes in such cases are the result of evolution, because:

(a) In some species of beetle the males have fairly large eyes, while these organs are much reduced or lacking in the females.

(b) The amount of degeneration of the eye varies greatly in individuals of the same species. Thus, the spider, *Troglohyphantes*, may be quite blind in one cave and have small eyes in another. McIndoo found in one cavern a species of spider of which the individuals exhibited all degrees of eye degeneration, the number of eyes varying from 8 to 0. Racovitza examined 59 individuals of the Isopod, *Trichoniscus gachassini*, living in a cave near Algiers and found that 2 near the entrance had small but well-developed eyes, 36 had very degenerate eyes and 21 had no traces of them.

(c) Some animals inhabiting dark caves have perfectly-developed eyes.

(d) The eyes of the blind amphibian, *Proteus*, normally do not reach the darkened skin, but its larvae, if exposed to red light, develop normal eyes.

(e) Sexton and Winge, when experimenting on the shrimp, *Gammarus chevreuxi*, which has black eyes, produced suddenly in broad daylight, forms having red eyes, those with white and those having degenerate eyes. Similar results were obtained in the case of the fruit fly, *Drosophila melanogaster*.

(f) From abnormal eyeless forms thus produced, individuals having normal eyes may be bred.

(g) Payne raised 69 generations of *Drosophila melanogaster* in complete darkness without effecting any change in the eyes or in the desire to seek light.

It would thus seem, that, in some circumstances, the gene complex believed to control the development of the eyes does not work normally.

Should blind mutants appear in nature these would soon be wiped out, but, if this happened in a dark cave, there is no apparent reason why blind individuals should not survive to produce offspring.

6. *Flightless insects on Islands*. A. R. Wallace wrote ("Darwinism" p. 105) of the insects of Madeira: "Many have either lost their wings or have had them so reduced as to be useless for flight, while the very same species on the continent of Europe have fully developed wings . . . The explanation of this change is that Madeira . . . is much exposed to sudden gales of wind, and, as most of the fertile land is on the coast, insects which flew much would be very liable to be blown out to sea and lost. Year after year, therefore, those individuals which had shorter wings, or those which used them least, were preserved; and thus, in time, terrestrial, wingless, or imperfectly winged races or species have been produced." This hypothetical explanation assumes that the smallest change in the size of a wing may be a matter of life or death. Far more probably the case of these wingless or stunted-winged insects is on a par with that of blind or partially blind cave dwellers. Professor T. H. Morgan and his collaborators, when breeding the fly, *Drosophila melanogaster*, found that individuals occasionally crop up of which the wings are defective, stumpy, vestigial or entirely lacking. This may well have happened in Madeira. In ordinary circumstances a mutant that could not fly would soon perish, but on Madeira, where gales are frequent, winglessness might be beneficial in some cases. Are the wings of these Madeira insects lost or merely in abeyance? If the former be the case this would be proof that animals may lose structures, and if the evolutionist be content to limit the theory of evolution to loss or decay of structures, he will have made out his case.

Having disposed of the structures, which at one time I believed to be useless vestiges, let me now deal with three structures that I classed as embryonic remains (D. p. 28 and 55-57) i.e. useless to the adult, but the necessary results of the manner in which embryos develop, because I did not then realize their usefulness to the adult organism, viz. the semilunar fold of man's eye, the muscles of his external ear and his hidden tail.

*The semilunar fold*. Every higher embryo exhibits the primordia that give rise to the upper and lower eyelids and another which may give rise to a third eyelid, as in many birds, or to the semilunar fold.

The main use of this in man is to collect foreign matter that gets on to the eyeball and to prevent it from injuring the eye. Unlike the nictating membrane of birds which is a membranous structure containing much elastic tissue, the semilunar fold is a cartilaginous structure, which as E. P. Stibbe shows, (*Jour. Anat.* Vol. LXII (1927-28) pp. 159-175) picks up particles that enter the eye, and collects them into a sticky mass in the corner of the eye where it causes

no irritation and does no damage and can easily be removed by the finger. Some account of this operation is given on p. 228 of "Is Evolution Proved?" (1947), and on pp. 280-4 occurs an account of the efforts of Mr. H. S. Shelton and Dr. W. T. Letchworth to make out that this fold is a useless vestige. The desire of transformists to discover vestigial organs is pathetic!

*The muscles of the External Ear.* Dr. Davies evidently accepts Darwin's view that these are relics of the panniculus camosus which extended over great part of the body of remote ancestors of man. This muscle system enables its possessor to twitch the skin and thus obtain some relief from insects that settle on it. The human skin, owing to the shortness and fineness of its hairs in most parts, is peculiarly exposed to insect bites, as all who have lived in the tropics are aware. This being so, in default of very strong evidence that man's ancestors possessed this useful system of muscles, I cannot believe that the greater part of it has been lost. As muscles are very variable and as some birds have an ambiens muscle while others show no trace of this, it is highly improbable that man should retain any part of a useless muscle. Thus, there are *a priori* grounds for the belief that these ear muscles of man serve a useful purpose. Vialleton writes (O. p. 163): "It should not be forgotten that an organ always presents in the various animals a large number of different degrees of complication which it is possible to arrange in a series, of which the extreme terms are widely separated from one another, without, however, conveying the right to consider the most simple of them as vestigial in the transformist sense. To regard them as such is to go a little too fast; for example our auricular muscles, on the pretext that the external ear can be moved only by certain individuals; for these muscles, without moving the ear, may serve to stretch or fix the epicranial aponeurosis. There is great difference between the action of a muscle and that of a simple contractile cord having the same attachments as the former. Every muscle, in effect, produces at the same time as its principle action, an infinity of little secondary movements on its enveloping aponeurosis, on the connective tissue and on the vessels that surround it. It is all this, together with the action of antagonistic muscles, which harmonises the movements and makes them different from those of a dancing Jack, and this is why the principal action may be lacking and the others remain necessary."

*The hidden bony Tail of Man.* In one sense this is an embryonic reminder, because an external tail is necessary for the development of the human embryo, but, as this tail, after being withdrawn within the body, has its use (see p. 37), it is not strictly correct to describe it as a purely embryonic remainder.

We have now to consider the examples of vestigial structures cited by Dr. Davies (E. p. 168), viz. the tiny shells of some molluscs.

He deems the shell of the slug *Testacella* a useless vestige of a well-developed ancestral shell, and apparently regards the shell as one of the ills that afflict molluscs, of which many of them are endeavoring to rid themselves, with various degrees of success, the Nudibranchiata having achieved complete success.

In several groups of Gastropods the shells of different species exhibit great differences in size. Does this fact convey the right to assume that the small shells are the result of atrophy? I doubt it. It is difficult to furnish proof, because shell-less animals are rarely fossilized: but, as the genus *Bulla*, mentioned by Dr. Davies, has been found fossil in early Tertiary deposits, if the shell be undergoing atrophy, the process is in this case exceedingly slow.

The shell is a valuable protection to a soft-bodied animal. The best protection is afforded by a shell large enough to accommodate the entire body of its possessor; but such a shell necessitates sluggish habits and is not suitable for an active animal. The smaller the shell the less the protection it affords, but the greater the mobility it allows. A mollusc cannot have it both ways. If it lead an active life it must be content with a small shell, or none at all. Molluscs devoid of a shell or having a very small one, need other means of defence. The sea-hare (*Aplysia*), cited by Dr. Davies, is able to eject a concealing cloud of purple fluid, and is unpalatable. Other naked species protect themselves by secreting acids, or appropriating the nematocysts or stinging cells of sea-anemonies. How they contrive to accomplish this feat is a mystery (see "Enigmas of Natural History," p. 8. by E. L. Grant Watson).

Some naked molluscs take refuge in sponges or behind sea-anemonies, others live in the discarded shells of other molluscs.

I do not assert that in no case has the shell of any mollusc undergone atrophy as the conditions of life changed, but there is no proof that this has happened. In my view it is probable that the shell, no matter how small, has some use. Professor Goodrich remarks (B. vol. 8): "It is doubtful whether any really useless parts are ever preserved for long unless they are insignificant."

From the foregoing remarks it is apparent that the number of truly vestigial structures is small, and that of embryonic remains tends to diminish with increasing knowledge. Among these latter mention may be made of the organ of Rosenmüller in female mammals, the mammae of male mammals, the right ovary and oviduct in birds, and the left lung in snakes. The significance of these will be considered in Chapter XIV.



Before leaving the subject of vestigial organs, it is desirable to say something of structures, homologous with the pelvis and hind limbs of quadrupeds, which occur in the cetacea and the Sirenia, because at one time these were deemed to be useless relics of fully-developed pelvis and hind legs.

As is well known in both these orders of aquatic mammals in place of the pelvis and hind legs that characterize all terrestrial animals are certain small bones which arise from the primordia which gave rise to pelvis and hind legs in nearly all the mammals.

In the cetacea there are two small slightly-curved bones, which appear to represent the pelvis. They are not connected with the backbone, but are placed horizontally round the uro-genital orifice so that they almost completely surround it. Their ends being joined by ligaments. These bones are smaller in some species than in others, they differ in shape with the species, and vary within the species. In some whales there are two small bones, believed to represent the thigh bones, and in one species another pair believed to represent the tibia. All these bones are joined to one another by various ligaments, and, as Vialleton points out, their purpose is clearly to prevent the reproductive opening from being unduly squeezed by the downward movement of the great tail when the animal is swimming.

In the Sirenia, these bones representing the pelvis are relatively larger and are placed vertically and not horizontally as in the whales, and the upper part is pressed up against a lumbar vertebra. Their function is to prevent the viscera being crushed by the downward movement of the tail.

The great French comparative anatomist L. Vialleton has shown (*"Membres et Ceintures des Vertebres tetrapodes,"* (1925) p. 391) that the differences in the disposition of these pelvic bones is due to the fact that in the Cetacea the lumbar region is long, containing as it does, from 6 to 20 vertebrae, while in the Sirenia there are only 2 lumbar vertebrae in the manatee and 4 in the dugong. In the Cetacea all that is needed is for the bones in the pelvic region to protect the uro-genital orifice from being crushed by the downward movement of the tail in swimming, so that the pelvic bones guard this orifice. In the Sirenia all the viscera need protection from being badly squeezed, and so the pelvic bones are relatively much larger and more solid, especially in the manatee, and press against the backbone.

The theory that these pelvic bones are degenerated pelvic bones of a land ancestor and the fossil evidence adduced in favor of theory have been dealt with in Chapter VI above.

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[1] By “rudimentary” he means vestigial.

## Chapter XIII

### BLOOD-PRECIPITATION TESTS

Some biologists believe that the serological reactions of the blood of animals afford evidence in favor of the doctrine of evolution.

Although this belief is very far from being universal, it is necessary to deal with the subject because:

1. In the words of Prof. F. Wood Jones, "There is a wealth of semi-popular and frankly popular work, purporting to translate orthodox science to the man in the street, that makes much of these serological tests, probably because of the easy transition from the finding of a serological similarity to the claiming of a blood relationship."

2. This practice is not confined to popular and semi-popular books. These blood tests are cited as evidence for transformism in some textbooks, for example Thomson's ("Outlines of Zoology," 9th Ed., 1944, p. 964). Moreover Dr. Morley Davies, in his "Evolution and its Modern Critics (1937). pp. 230-32, maintains that these blood tests support the theory of evolution."

3. These blood tests were made much of by Prof. H. H. Newman. Zoologist, University of Chicago, in his evidence for the defendant John T. Scopes a teacher of science in the Rhea High school at Dayton, who was convicted and fined on a charge of teaching evolution in violation of a Tennessee law prohibiting the teaching of evolution in the State public schools. In the course of his evidence given in 1925, Prof. Newman is reported to have said ("Evolution and the Blood-Precipitation Test" by Arthur I. Brown); "At the present time the technique of blood-testing for animal affinities is rather difficult, and very few workers have attempted to make use of it. The results so far attained, however, are so definite and clean-cut that there is every reason to expect a great future for this type of evolutionary evidence."

The inoculation of any animal, say a rabbit, with small doses, given at intervals, of the serum of some animal, say a horse, results in the appearance in the blood of the animal so inoculated of what is known as an anti-serum, which has the property of causing a precipitate when added to the serum of the blood of a member of the family (the horse in our example) of which the

serum was injected into the other animal, but not when added to the serum of the members of other families.

Evolutionists hoped, by making use of this knowledge, to be able to discover the kinship of all animals. To this end a vast number of serological experiments have been made. The results of no fewer than 16,000 experiments made by Dr. H. F. Nuttall and his colleagues have been tabulated and set forth at great length in a volume, published in 1904, entitled "Blood Immunity and Blood Relationship."

Nuttall believes that his experiments prove that "a common property has persisted in the bloods of certain animals throughout the ages which have elapsed during their evolution from a common ancestor and this in spite of differences of food and habits of life."

This belief has arisen because Nuttall takes into account only the experiments that appear to support the doctrine of evolution and rejects those which do not, because he believes that in these "some error" has crept in.

He devoted fifteen pages to "Sources of Error." He has, however, candidly included in his tables the results of the experiments into which he believes error has crept, in consequence they contain all the data afforded by his work.

Nuttall's table embodying the results of his tests with anti-human serum is here reproduced in preference to any other, as it throws light on the supposed kinship of man with the lower animals.

The table shows that in the case of serum of 34 human beings to which anti-human serum was added there was a precipitate (full reaction) in 24 individuals, marked clouding in 7 and medium clouding in 3.

When commenting upon the results embodied in the table overleaf, Nuttall lays great stress on the fact that the maximum reaction occurs only amongst the humans, Anthropoids and Old World Monkeys. This, he thinks, proves near blood relationship of these three groups. If so, it proves that some of the human beings experimented on were less closely related than the anthropoid apes to their fellow men, since all anthropoids but only 71 per cent of humans show full reaction to anti-human serum. Moreover, three of the humans exhibit closer relationship to some Old World and New World Monkeys than they do to some of their fellow men: indeed some of them are as nearly related to carnivores, rodents and ungulates as to their own kind. This, as Euclid would say, is absurd.

Dr. A. M. Davies takes exception to the last sentence. He writes (p. 231): "What is actually shown is that the range of variation in blood-chemistry in 35 men of 4 races is greater than that in 8 anthropoid apes of 3 species (those

being the actual numbers tested.) The figures suggest that ‘Man’ may not be a true species, but a hybrid from several species, and at any rate they harmonize with the more recent discovery that there are two distinct chemical types of human blood, transmitted hereditarily in Mendelian fashion. (See for instance, Millott, J. ‘Blood-Groups and Race.’ *‘Antiquity’*, (1935) IX pp. 399-409). Certainly the fact that anthropoid apes are apparently ‘more’ human than man, can hardly count as evidence against the blood relationship of the two.”

I see no necessity to comment on Dr. Davies’ interpretation of the facts.

These anti-serum reactions regarded as tests of kinship teem with similar absurdities. They show that some whales are more nearly related to man than some monkeys are. The anti-serum of the ungulates (hoofed animals) shows that their nearest relatives are the Cetacea, but the anti-serum of the Cetacea shows that bats are their nearest relatives!

Here is Dr. Davies’ comment on the above passage: “The only absurdity lies in the attempt to reason on too narrow a basis. The resemblances referred to are very natural cases of convergence. The possibilities of divergence in blood-chemistry are not infinite, and it is not surprising that the blood of two diverging lineages should occasionally converge into accidental (and not very close) similarity. The same remark applies to the one solitary bird out of 328 (of 219 species) which passed third class when all the others failed, by slight convergence on Man in respect of its blood.”

The above comment by Dr. Davies is worth studying, as it is so characteristic of transformists. When two animals which, according to the evolution theory, are closely related have characters in common this is proof of their relationship, if, however, this happens in the case of two animals which on the evolution theory are not related, then the common characters are due to convergence. The naivety of transformists reminds one of Tom Sawyer’s ideas about incantations. If you got what you wanted by repeating an incantation, you knew that it was due to the incantation, if you did not then you could see that the witches had interfered.

Other examples of relationships ‘proved’ by these anti-serum tests are that the crane is nearly related to the greenfinch but far removed from the hedge-sparrow; indeed the crane is more closely related to the emu, the silver pheasant and the turtle than to the hedge-sparrow.

Eel serum breaks up the red corpuscles of adult rabbits but not of new-born rabbits. From this it would appear that the chemical nature of the blood may change during the life of an individual.

# ANTI-HUMAN SERUM REACTIONS

1	2	3	4	5	6
	No Reaction	Faint Reaction	Medium Clouding	Marked Clouding	Full Reaction
97 Primates					
34 Human (4 races)	-	-	3 (8%)	7 (21%)	24 (71%)
8 Anthropoid					
Apes (3 species)	-	-	-	-	8 (100%)
36 Old World Monkeys (26 species)	3	-	26 (72%)	3 (8%)	4 (10%)
13 New World Monkeys (9 species)	3	2 (15%)	5 (38%)	3 (23%)	-
4					
Marmosets (3 species)	2	1	1	-	-
2 Lemurs		-	-	-	-
29 Bats	26	3 (10%)	-	-	-
15					
Insectivora	13	2 (13%)	-	-	-
97					
Carnivores	70	13 (3%)	14 (14%)	-	-
65					
Rodents	53	7 (11%)	5 (7%)	-	-
70					
Ungulates	40	19 (27%)	11 (16%)	-	-
3					

Cetacea	-	3 (100%)	-	-	-
13					
Edentates	12	1 (7%)	-	-	-
26					
Marsupials	25	1 (4%)	-	-	-
1	1	-	-	-	-
Monotreme					
320 Birds	319	1 (3%)	-	-	-
49 Reptiles	49	-	-	-	-
14	14	-	-	-	-
Amphibians					
19 Fish	19	-	-	-	-
Crustaceans	7	-			

Since Nuttall made his experiments it has been discovered that human beings of all races are divided into four groups in respect of their blood, known as O., A., B., and AB. Individuals belonging to the O. group can have injected into them without harm blood from members of all groups, including their own. The blood of group AB, can be transfused into the blood of any group without harm, but fatal effects are produced when the blood of an A group individual is transfused into a person belonging to group B. or AB., or when blood of a B. group individual is transfused into an individual of the A. or AB. group.

The fact that the blood of some men, is fatal if transfused into another man of the same race, should convince any unprejudiced person that blood-precipitation tests are of no value in determining relationship.

Needless to say that Professor Newman's predictions have not come true. Mr. H. S. Shelton in his recent debate with me did not cite these blood tests as evidence for evolution.

As Dr. A. I. Brown well said (*op. cit.* p. 31): "the propounders of this blood argument have extracted from the facts, not the evidence which the facts proclaim, but the interpretation of their own highly cultured imagination, dominated by a materialistic and evolutionary bias."

## Chapter XIV

### THE DEVELOPMENT OF THE ANIMAL EMBRYO

#### Part I

(This part is largely a repetition of Chapter VI of “Difficulties of the Evolution theory:” and Part II of Chapter VI of “More Difficulties,” which is a reply to part of Dr. Morley Davies’ book “Evolution and Its Modern Critics,” in which he defends the recapitulation theory).

Every living organism begins its existence in the form of a single cell: some animals retain this form throughout their life.

The early stages of the growth of the embryo of every many-celled animal (Metazoan) consist in the formation of new cells by the division of the first cell into two cells, each of which then divides so that the embryo consists of four cells; these by division become eight, the eight sixteen, and so on. This process, which is called segmentation, results, in the case of eggs which contain little or no yolk, in the formation of a hollow ball of which the wall consists of a single layer of cells. By this arrangement every cell is able to derive nourishment directly from the outside and to pass to the outside the waste products of the chemical changes which continually take place within it. This spherical embryo is known as the blastula. A few animals, such as *Volvox* retain this arrangement throughout life.

The next step in the development of the embryo of all the higher animals is the formation of what are known as the germinal layers, from which all the tissues of the adult arise. There are three of these layers, an outer one (the ectoderm) a middle one (the mesoderm) and an inner one (the endoderm). In eggs that contain no yolk from which they can draw nourishment, the inner layer is formed by the inpushing of one pole of the blastula, so that a double-layered cup is formed, just as a hollow ball can be made into a cup by pushing in one end after a hole has been pierced in it. In this stage the embryo is called a gastrula.

Some adult animals, such as sponges, retain this configuration throughout their life. But most vertebrates develop a third layer separating the ectoderm from the endoderm. This is brought about in various ways. It is not practicable to describes these processes here.

After the third germinal layer has been formed all vertebrate embryos pass through a stage in which the embryo assumes a bilateral, elongated form,



having a head and a tail region.

In all vertebrate embryos there is a stage of development in which the neck region exhibits five or six bulges on each side, one behind the other. These bulges are caused by the fact that each holds a minute blood vessel conveying blood from the lower (abdominal) part of the body to the upper (dorsal) part. These bulges are called arches.

Between each of these arches is a furrow facing outwards and one facing inwards into the cavity of the alimentary canal, the thin wall of this canal forms the bottom of each furrow, as it separates the outer from the inner furrow.

Up to this stage the development of all backboned animals is the same. But from now onwards, the development differs completely according as to whether the animal is a fish which breathes by gills or a land animal which breathes by lungs.

In the case of fishes the bottom of the each furrow becomes absorbed so that the sides of the alimentary canal become perforated by slits which become the gill slits. This never happens in the case of amphibia, reptiles, birds and mammals.

In the developing fish the blood vessel in each arch becomes divided longitudinally so that each arch comes to hold two parallel blood vessels which become connected by a network of very minute blood vessels so that the blood can pass from one vessel to the other in the arch. Then by further development these arches and their blood vessels become gills.

In the higher animals none of the changes just described happen. Their development will be described later.

All this detail is necessary in order that the reader may appreciate the criticism of the recapitulation theory which follows.

It is the existence of these arches and furrows in the early stage of the embryo of every backboned animal which led Haeckel to enunciate what he called the biogenetic law, and is now called the recapitulation theory: The developmental history or ontogeny of every multicellular animal recapitulates the various stages of its ancestry and thereby every organism resembles roughly at each stage of its development the form of one of its ancestors.

According to Haeckel, the fertilised ovum represents a protozoan ancestor, the blastula stage represents a volvox ancestor, the gastrula stage a sponge ancestor, and the stage where the embryo of a backboned animal exhibits the arches and furrows just described, represents a fish ancestor. In

support of his argument, Haeckel called the furrows gill-slits and the arches gill arches, although these have no respiratory function whatever! And even today many books, especially school books, describe the gill slits and gill arches of the chick embryo, which is mostly studied by biology students.

That zoologists should have been fooled in this way by Haeckel, is in part explained by the fact that at this particular stage of development the front part of the embryo becomes much curved owing to rapid growth of the head region, and this curvature presses the arches close to one another, and this part of the embryo seen through a low-powered microscope looks very like that of a dog-fish. I remember well being impressed by this as a student.

This theory was as warmly welcomed as was Darwin's theory of natural selection, because it seemed to afford proof of the truth of the theory of evolution. This erroneous theory did one good thing, in that it was a great stimulus to the study of embryology, which was taken up by many in the expectation of discovering the evolutionary history of the animals of which the embryonic development was studied. Unfortunately in the end it did much harm because it has led zoologists to take a wrong view of embryonic development. This pernicious influence is still felt.

It is but fair to state that a few biologists have never accepted the theory, notably the Swiss Hiss, and the Englishman Adam Sedgwick, under whom I studied at Cambridge.

For many years the theory was in high favor and some new facts were brought to light which seem to favor it, but there were more which do not favor it. In consequence it became necessary repeatedly to modify the theory. So that in 1894 we find one of the most ardent supporters of the theory, Milnes Marshall, writing: "The development of the embryo is indeed a history of which entire chapters are lost, while in those that remain, many pages are misplaced and others so blurred as to be illegible" ("Biological Lectures and Addresses" p. 306).

Admissions such as this strike at the root of the theory, and it will surprise future generations that the theory is today retained in any form. Many zoologists recognize this. Garstang for example, pointed out (Jour. Linn. Soc. 1922) that before an animal can leave a trail for a new species derived from it to recapitulate, it has first to follow the trail of its own development and then add something more which is absurd. Nordenskiöld declared: "Time has dealt hardly with Haeckel's ontological theories." Nevertheless almost every transformist gives the theory at least qualified acceptance. A few such as E. A. MacBride and E. G. Conklin, never gave it up. When its teachings support

any thesis it is usually invoked, and it is paraded as proof of evolution in every textbook.

Dr. A. Morley Davies accepts the theory in a modified form and in the book already mentioned he has commented on my present remarks. My reply to him will form the second part of the present chapter. Meanwhile listen to what Drs. W. J. Hamilton, J. D. Boyd and H. W. Mossman have to say on the theory in their "Human Embryology," a 366-page book with many illustrations published in 1946 at 31/6d by W. Heffer and Sons Ltd., Cambridge: (p. 326): "Although the original theory, especially as expressed by Haeckel (1874), has been replaced by a more tenable modern version, the general idea of recapitulation has been of the utmost importance in the stimulation and interpretation of investigations in the field of comparative embryology. For one fact which does not seem to fit in with the modern theory of recapitulation a thousand can be cited which are meaningless without it. No matter how inadequate the investigator may regard even the modern theory as an explanation of or reason for the developmental course taken by a species, he will still profit during his study of embryology by keeping constantly in mind the general principle that, with few exceptions the younger the stage of development of an embryo of a particular species, the lower is the animal group which it resembles both morphologically and physiologically. The value of this principle for the correlation of facts is far greater for the student than the question of its worth as a philosophical explanation of ontogenies."

The fact that a recent book written by three authors has made the above statement makes it imperative that I set forth, first a few facts that are fatal to the recapitulation theory in any form and secondly give the scientific, as opposed to the transformist, interpretation of the embryological phenomena.

### *1. Facts Fatal to the Theory.*

1. Admittedly it does not apply to the embryonic development of plants. This is inexplicable if recapitulation be a law of nature, and if, as transformists believe, plants and animals are descended from a common ancestor.

2. Between the one-celled stage and the blastula stage every embryo passes through a two-celled, four-celled, eight-celled, sixteen-celled, thirty-two-celled stage. These, while mechanically essential, cannot represent ancestral stages, because no animal or plant, living or extinct, is known composed of two, or four, or eight, or sixteen cells, etc. In the animal and plant kingdoms there is a great gulf between the one-celled Protozoa and the many-celled Metazoa. Moreover, according to D'Arcy Thompson the facts of

surface tension prohibit the existence of a two-celled creature. Thus the recapitulation theory comes to grief almost from its outset!

3. It sometime happens that the embryos of closely-allied species pursue different developmental courses. Thus the Crustacean *Peneus* and the common crayfish resemble one another so closely that, if there be anything in the evolution theory, they are near akin. Nevertheless *Peneus* hatches out in the form of a larva known as the Nauplius and passes through the stages known as Metanauplius, Protozoa and Zoa before it assumes the adult form, whereas the crayfish emerges from the egg in a form like that of the adult, after having undergone development as direct as possible.

Most crabs leave the egg as a Zoa larva, then pass through two more stages before they assume the adult form. Some, however, leave the egg in adult form. Many of the latter are freshwater species which would be carried out to sea by the current of the river in which they are hatched, if they emerged from the egg as free-swimming larvae as most sea crabs do. Obviously both the crabs that undergo metamorphosis and those which do not cannot recapitulate the supposed history of their race.

4. Transformists believe that birds are derived from ancestors which possessed teeth, but no traces of teeth are found in any of their embryos.

5. The head of the human foetus progressively lessens in relative size as it develops, instead of becoming progressively bigger as the evolution theory requires.

6. While the growing embryo shows all the supposed ancestral stages of the urinary system (see p.???) it shows none of the presumed stages in the transition of the respiratory system from gills to lungs.

7. Some organs develop in such a way in the embryo that they cannot possibly represent ancestral stages, e. g. the eye and the heart.

8. Another fact fatal to the recapitulation theory is the early stage at which every embryo assumes all the features of the genus to which it belongs. In their zeal to prove the truth of the evolution theory many zoologists have overlooked this; indeed some have actually misled the public on this subject. T. H. Huxley gave, in "Man's Place in Nature" figures of the embryos of a dog and a human being to show how closely they resemble one another, but he does not say that the latter is an embryo only 23 days old. He describes in some detail the development of each embryo up to this stage, emphasizing the similarity of the process in the two cases. He does not continue beyond this stage, alleging that to do so would be tedious and unnecessary for his purpose. He did not add that it would have destroyed his argument! He is guilty of

more than mere omission—for he writes: “Indeed it is a very long time before the body of a young human being can be readily discriminated from that of a young puppy.” The truth is that by the time the human embryo is forty days old it is impossible to mistake it for that of a dog, and by the forty-fifth day it is unmistakably that of a human being. Sir Arthur Keith writes of the human embryo: “Human characteristics begin to peer through its higher primate qualities before development is a month old.” Thus an expert can identify an embryo as human by the thirtieth day.

It is to be regretted that a few transformists in their anxiety to demonstrate that man has descended from a lower animal have published pictures greatly exaggerating the similarity between human and animal embryos. Haeckel was a bad offender. He was charged by Brass, Hiss, Rutimeyer, Koelliker and Keibel with “faking” his illustrations. The worst of Haeckel’s misdemeanors was to cause the same plate to be printed thrice over and to label one a human embryo, the second a dog embryo and the third a rabbit embryo, in order to show how similar the embryos of these are.

The human embryonic period is about nine months. Haeckel gives in “The Last Link” (1898) thirty-two stages through which man is supposed to have passed during his evolution from a single-celled ancestor. If this supposed history were recapitulated at an even rate, the passage through each of these stages would occupy about eight days, and it would be impossible by inspection to discover whether or not any embryo were human until about the 270th day of its existence, whereas it is possible to do so about the 30th day. Man is not peculiar in this respect . . . The foetus of a cat is distinguishable from that of a dog before the teeth or claws have shown themselves: in other words an embryo bears the stamp of the family to which it belongs before the appearance of the features by means of which systematists distinguish its family from other families. Clearly then, the development of the embryo does not follow a supposed ancestral history: the final form of every organism is determined at a very early stage of its development. If in the past any type has been transformed into another type, the transformation must have been determined very early in embryonic life.

9. Every transformist believes that the horse of today is descended from an ancestor having five toes on each foot. They all cite as an ancestor of the horse *Eohippus* of the Eocene period which has four toes on each fore-foot and three on each hind. But at no period of the embryonic development of the horse is there any trace of five toes. The embryonic foot exhibits three rays, the middle one of which is the largest and develops into its toe, while the smaller lateral ones become the splint bones. There is no recapitulation of a five-toed ancestor. This does not prevent transformists from asserting that the

presence of a tail in the human embryo from the 5th to the 8th week of its existence is the recapitulation of the stage of a long-tailed ancestor. This is supposed to be recapitulated, but not the 5-toed stage of the horse ancestry.

Most evolutionists put an evolutionary interpretation on all the phenomena of embryonic development. All these however are capable of another interpretation which fits the facts comfortably, and satisfactorily accounts for the contrivances by means of which a highly complicated organism, that not only inherits the characteristics of each parent, but is distinguished by small differences from every other individual of the species, is developed in a few weeks from a fertilized ovum of microscopic size. From start to finish intelligence is at the back of this process, the difficulties of which are overcome by a series of beautiful devices.

Embryonic development exhibits two features which give the clue to most of these phenomena:

1. The structural changes through which an animal passes in its embryonic development follow the shortest, quickest and most direct route possible to adult state compatible with the immediate necessities of life. Among these necessities are an unceasing supply of nutriment and oxygen and the means of ridding the embryo of carbonic acid and other waste products of the chemical changes that take place within it.

In effect this is the application of the comprehensive law of Conservation of Energy to the developing embryo. Dr. C. B. Courville calls this the Law of Least Action: "Whenever there is more than one conceivable method of operation, nature follows the one in which the product of Time multiplied by the Energy is the least possible amount." . . . A stabilized plan is evident for "the ingestion and absorption of food, for the circulation of the blood, for the excretion of waste products and for the transmission of nervous impulses, etc. While modified to suit individual differences, the plan for the intake, digestion and absorption of food and the elimination of digestive waste is the same in the earthworm as for man. There has been no evolution of this plan beyond that point. Wherever there is a demand for a balancing mechanism, an arrangement with one essential principle was provided, and there has been no evolution even in the essentials of this plan from the cyclostomes to man." . . . "The similarities in . . . the passage of embryos from the simple to the complex can best be explained on the logic of necessity." (Bulletins of The Natural Science Foundation, Aug. 1941, July 1942 and Dec. 1943).

2. The fertilized ovum is endowed with the power of developing at a very early period the tissue-producing cells or primordia of each of the major organs and structures that occur in any member of the phylum or class to

which the animal belongs, even the primordia of structures which that particular individual will not need in the adult state; in the case of these latter the development of the primordia capable of producing them is early checked; thus the embryo of every higher animal exhibits the primordia of both the male and female generative organs, but in normal circumstances only those of one sex attain maturity.

Keeping in mind the above features of embryonic development let us interpret the main facts cited by transformists in support of their views:

1. Every metazoan (multicellular animal or plant) begins its life in the form of a single cell. Evolutionists assert that this fact means that every animal is descended from a one-celled ancestor, and this is the first stage in embryonic development.

A little reflection should convince anyone that whether or not there is anything in the evolution theory, a single cell is quite the best way to begin the existence of a complicated animal which is the offspring of a male and female parent. It has to exhibit the characters of its species and some of the idiosyncracies of each parent without making undue demands on the tissue or strength of either parent. Obviously each parent must part with a portion of its body containing what may perhaps be described as the germ of every organ and structure, must, so to speak, give out the quintessence of itself. These two quintessences must join in the formation of the body of the offspring, and must be different on each occasion on which offspring are produced in order to bring about the phenomenon of variation.

In order to insure that no two quintessences shall ever be identical a very beautiful device is adopted. To appreciate this a book on genetics should be consulted. Here it must suffice to say that in the nucleus of every cell is a quantity of chromatin, which is believed to hold the genes which are the carriers of heredity. When a cell is about to divide into two the chromatin forms itself into a number of rod-like bodies of various shapes and sizes, the number of these varying with the species. These bodies arrange themselves in pairs, one member of each pair being derived from the male and the other from the female parent. Then each chromosome of each pair divides lengthwise into two exactly equal halves, and one half travels to one end of the cell and the other to the opposite end; thus there are two nuclei in the cell, which divides into two cells each with its nucleus.

But when a generative cell is to be formed, whether male or female, the procedure is not the same. The members of each pair conjugate and exchange material before they part. They do not split but one member of each pair goes to one end of the cell and the other to the other end, so that half the

chromosomes collect at one end and half at the other. Then the cell divides into two germ cells each having half the normal number of chromosomes. When a male germ cell meets a female one the two fuse into one cell which has the normal number of chromosomes, half derived from each parent.

Thus does every individual begin its existence. The exchange of materials at conjugation and the random assortment of the chromosomes at the time of cell division are the devices which give rise to the phenomenon of variation. As there are probably fully one thousand genes in each cell nucleus, each of which influences the development of some structure and also the actions of its neighboring genes, and the number of possible combinations is unlimited, it is not surprising that no two individuals are exactly alike, despite the fact that all of them exhibit many characters of their parents. What is surprising is that most transformists believe that the complicated apparatus for securing variety evolved fortuitously.

The cells of which the body of every metazoan is composed correspond to the bricks of a building. Even as every building is begun by laying a brick or stone, so does the existence of every metazoan begin by the manufacture of a single cell which contains within it the potentiality of developing into an organism.

2. Evolutionists allege the great similarity of all embryos in the earliest stage and cite this as evidence of evolution. They have nothing to say about the 2-4-8-16-cell-stages of development because such stages cannot represent possible ancestors. They pass on to the Blastula stage and try to make capital over the way in which this develops. Thus Professor Conklin writes ("Creation by Evolution" (1928) p. 72): "It is certainly no mere accident that all eggs undergo a series of divisions or cleavages which lead to the formation of a hollow sphere, the blastula . . . the cleavage of eggs in types so different as flatworms, annelids and molluscs is almost cell for cell the same . . . These fundamental resemblances call for some explanation and the only explanation that has ever been proposed is evolution."

The best comment on this is to give the explanation of Sir D'Arcy Thompson in his "On Growth and Form," published in 1917, and of which a new edition appeared in 1942. Of embryological development up to the eight-cell stage he writes: "All possible groupings or arrangements whatsoever of eight cells (where all take part in the surface of the group, none being submerged or enveloped by the rest) are referable to some one or other of *twelve* types or forms, and . . . all the thousands and thousands of drawings which diligent observers have made of such eight-celled structures, animal or vegetable, anatomical, histological or embryological, are, one and all, representations of one Or other of these twelve types," and "Now that we



have seen that a certain limited number of types of eight-celled segmentation appear and reappear, here and there, throughout the whole world of organisms, there still remains the very important question, whether, *in each particular organism*, the conditions are such as to lead to one particular arrangement being predominant, characteristic, or even invariable. In short, is a particular arrangement of cell partitions to be looked upon (as the published figures of the embryologists are apt to show) as a *specific character*, or at least a constant or normal character of the particular organism? The answer to this question is a direct negative . . . Rauber has put on record a considerable number of variations in the arrangement of the first eight cells which form a discoid surface about the dorsal (or animal) pole of the frogs egg."

From these Thompson selects no fewer than six essentially different types. This one fact suffices to smash the recapitulation theory. Far from following a single track in the formation of an eight-cell embryo the frog may take one of six courses.

Clearly such similarity as exists between embryos in early stages of development has no connection with any supposed blood relationships but is the result of the physical, physiological and mechanical conditions under which embryos develop.

3. Transformists unfailingly cite the so-called fish-stage through which the embryo of every vertebrate passes as one of the best "proofs" of evolution. Prof. H. Munro Fox writes ("Biology" (1936) p. 303):

"The embryos of both birds and mammals, including man himself, have gill-slits and a two-chambered heart. In these embryos, unlike the tadpole, the gill-slits are never of any use. Later on in development they disappear. This means that the land vertebrates once had fish-like ancestors and still, while they are embryos, birds and mammals continue to pass through a stage which their aquatic ancestors passed through when they were embryos."

The truth is that the so-called fish stage of every embryo must be passed through for the same reason that during construction a four-storied building must pass through a two-storied stage.

The so-called fish heart and gill arches have to be formed because the head region of the embryo from a very early stage onwards, requires a copious blood supply. This necessitates the early formation of a heart or pumping organ and a simple system of blood vessels. These have to be formed before there is time to develop the four-chambered heart necessary to the higher animal. To accomplish this, one or other of two devices must be adopted. Either a simple heart must be developed to function while another complicated heart is developing, or the simple heart must be so constructed

that it can become transformed into a four-chambered heart while it is operating as a heart. In this case the latter course is adopted, and by a most ingenious arrangement this simple heart while it is continuously working is converted into a four-chambered heart. In some other organs, such as the kidney, the former course is adopted (see [p.198]).

The heart develops as follows: Two tiny tubes are formed which run parallel. Those coalesce to form a single tube; the wall of the front part of this thickens, and the thickened part becomes separated from the thinner hind part by valves. The heart is now an effective pumping machine composed of two communicating chambers; a posterior one, the auricle, and an anterior one, the ventricle, which, by contraction of its thick muscular wall, expels blood into the arteries, the backward flow being prevented by the valves between the two chambers. In fishes this type of heart persists throughout life, being suitable for a gill-breathing animal of comparatively simple structure. Animals higher in the scale need a more complicated heart and in them the embryonic heart becomes three- or four-chambered, as the case may be, by the growth of a septum in one or both of the chambers.

Clearly then the reason why the mammalian embryonic heart is at first a simple tube is, not that mammals evolved from fishes, but that, as the mammalian embryo must have a functioning heart at a very early stage, the simplest possible type of heart is formed. As development proceeds the form of the heart changes to meet the increasing demands made upon it.

The visceral arches are as necessary to the embryo of the higher vertebrates as to that of a fish; in both they form part of the lateral wall of the cephalic extremity of the embryo, serve as paths for the aortic arches and later contribute to the formation of various organs. As regards the blood vessels which pass along them. At the moment when the heart is ready to function the head region is in urgent need of a supply of blood, in consequence, each branch of the ventral aorta pushes forward and passes along the foremost visceral arch and so reaches the back without piercing the alimentary canal. Having reached the top of the visceral arch each vessel bends back and conveys blood to the middle and hind regions of the embryo. Then to meet the increasing demand for blood, three more aortic vessels arise in the next three arches. Then there are four vessels on each side conveying blood from the ventral to the dorsal aorta. Then, to meet the increasing demands of the head region, the first three aortic arches become converted into the internal carotid and other arteries which supply the head. Meanwhile another aortic vessel is formed in the last visceral arch. This eventually forms part of the pulmonary artery. The aortic vessel ends up as part of the aorta of the adult. Sometimes a

fifth vessel develops in the fifth visceral arch, this later disappears without giving rise to any blood vessel in the adult.

Having served their purpose in embryonic life the visceral arches give rise to several organs required for use by the adult. Up to the time of the appearance of these visceral arches the development of all vertebrates follows the same lines, because all are constructed on the same plan. From this stage onwards development differs according as the animal breathes in water or in air.

In a fish or other gill-breather the membranes forming the bottoms of the furrows between the arches become absorbed, thus are formed the gill-clefts. These are narrow at first but gradually broaden. Meanwhile gills grow on the arches and the blood vessel in each arch divides longitudinally into two vessels, one of which is connected with the dorsal and the other with the ventral aorta. The two parallel vessels thus formed in each arch communicate by means of a network of tiny blood vessels, which extend into the gills. By this arrangement the blood in the adult that comes from the heart in a venous or impure condition flows into the gill where it is aerated, then it passes into the dorsal aorta, thence to all parts of the body.

Very different from the above is the course of development of these visceral arches in reptiles, birds and mammals. In these no clefts form between the arches, nor do the blood vessels in them split into two. Thus in these animals neither the arches nor the blood vessels they contain ever assume any of the characters or perform any of the functions of gills. It is therefore clearly incorrect to call them gill arches. Let us now notice briefly the fate of the visceral arches in fishes, on the one hand, and air-breathers on the other.

1. The first or mandibular arch develops into the upper and lower jaws in Elasmobranch fishes: in other fishes and amphibia, reptiles and birds it forms the lower jaw and Meckel's cartilage; in mammals it forms the incus and stapes (bones in the ear) and Meckel's cartilage.

2. The second or hyoid arch forms the hyoid arch in fish, the columella (the ear bone) and part of the hyoid apparatus in amphibia, the columella in reptiles and birds, the stapes, styloid process, external ear cartilage and hyoid apparatus in mammals.

3. The third arch—the first visceral arch—gives rise to the first gill arch in fishes, part of the hyoid apparatus in amphibia, reptiles and birds, while it disappears in mammals.

4. The fourth arch—the second visceral arch—forms the second gill arch in fishes, apparently part of the hyoid apparatus in amphibia, reptiles and birds, and part of the thyroid cartilage (Adam's apple) in mammals.

5. The fifth arch—the third visceral arch—gives rise to the third gill arch in fishes, disappears in amphibia, reptiles and birds, and forms part of the thyroid cartilage in mammals.

6. The sixth arch—fourth visceral arch—gives rise to the fourth gill arch in fishes, disappears in amphibians, reptiles and birds, and gives rise to the epiglottis in mammals.

Here is the transformist explanation of the above differences in development. Professor H. E. Walker writes ("Biology of the Vertebrates" (1928) p. 516): "The gill arches are not entirely lost however, for certain parts of the mature skeleton (of animals above fish) are directly derived from the primitive splanchno-cranium inherited from ancestral water-dwellers. Nowhere is the thrift and resourcefulness of Nature better exemplified than in the disposal of the parts of the splanchno-cranium after they have outlasted their original use, owing to the emergence of vertebrates from life in water to land . . . The embryological skeletal material which originally had to do with respiration and the support and protection of the anterior end of the digestive tube, has now, by a series of makeshifts, assumed very diverse functions, such as the support of the vocal apparatus and the muscular tongue, or the transmission of sound waves to the inner ear."

Thus, according to Walker and most transformists, mammals "hear through the jawbones of their phylogenetic ancestors"!

We will notice later (see [p.[226](#)]) the utter absurdity of this theory. Meanwhile we must bear in mind that in no known fish do all the so-called gill arches give rise to gills. As we have noticed, in Elasmobranchs the mandibular arch forms the jaws of the adult. If the evolution theory be true, this can only mean that, for some reason or other, some vertebrate lost its original mouth and used its first gill arch as one!

The fate of the third and fourth visceral arches is of itself almost sufficient to disprove the recapitulation theory. According to this theory these two arches exist only because the amphibia evolved from fishes; they are not used by amphibia. This being so, they should have undergone atrophy, as the hind limbs of the whales are supposed to have done, and by the Trias all traces of them should have been lost. The recapitulationist has to suppose that they not only did not undergo atrophy, but, after many millions of years, suddenly acquired the power of developing into the epiglottis and contributing to the formation of the thyroid cartilage in mammals. Had not the history of these

two arches been unlike that of every other useless organ mammals could not have evolved!

The way in which the kidney develops is adduced as evidence of the descent of air-breathing vertebrates from fishes.

As the embryo must have a kidney to rid himself of waste products at an early stage, one has to be developed while the complicated adult kidney is being formed. Accordingly what is known as the pronephros or head kidney is first formed. This consists of a row of two or three nephridia on each side of the body. These nephridia are tubes, one end of which opens into the body-cavity and the other end into a common duct leading to the exterior. Each nephridium comes into contact with a bunch of tiny blood vessels known as a glomerulus. From the blood in these the waste products of the embryo are taken up by the nephridia and so passed out of the embryo. As the embryo increases in size new nephridia are formed behind the first ones. These are of more complicated structure and are described as a second kidney, the mesonephros or middle-kidney. As the mesonephridia increase in number the pronephros gradually undergoes atrophy. A kidney of the mesonephros type suffices to carry off the waste products of comparatively simple organisms; in consequence in fishes it persists throughout life as the functional kidney. In some cases the pronephros also persists. The mesonephros is inadequate for the needs of organisms higher than fishes, in consequence a far more complicated kidney—the metanephros or hind-kidney—develops behind the mesonephros. When this final kidney is ready to function, the nephridia of the mesonephros become absorbed, but their duct persists, being used to carry the male genital products.

The development of the human kidney, illustrated by diagrams, is fully described in books on embryology, and in Vol. 22 of the latest edition of the Encyclopedia Britannica.

The reason why the early embryonic kidney, instead of being converted into, is replaced by the adult kidney, thus appears to be, not that the embryo is compelled to recapitulate prepiscine and piscine stages, but that embryonic conditions require the kidney to be situated far forward—a position that would be inconvenient in the adult.

Recapitulationists assert that the backbone is formed in a roundabout way because the embryo is compelled to recapitulate ancestral stages.

The backbone makes its appearance in the form of a long column of cells immediately below the nerve tube: at this stage it is known as the *chorda dorsalis* or notochord. Then a membranous sheath arises enclosing both the chorda and the neural tube. In this sheath are a number of condensed areas,

which gradually become converted into cartilage, the chondrification of each area beginning at two places, one to the right and the other to the left of the chorda. Thus arise the vertebrae, which eventually become ossified. The ossification of each vertebra begins at first from three centres, later also from five accessory ones.

In a few animals the backbone retains throughout life the form of the notochord, and in some fishes the vertebrae remain cartilaginous.

The method of development just described is a necessary consequence of the properties of living tissues. The backbone, while it is developing, needs nourishment throughout its length. The nature of bone is such that the presence of numerous minute blood vessels is essential for its formation. These are not necessary for the growth of membrane and cartilage, which, in consequence, can be formed at a time when the production of bone is impossible. Moreover, cartilage can grow interstitially, bone cannot. As soon as the embryo is sufficiently advanced to enable blood vessels to form in the backbone ossification begins. As ossification is a slow process, in order to expedite it, the ossification of every vertebra and every bone in the body is effected from several centres.

Clearly then, evolution or no evolution, the formation first of membrane, then of cartilage are necessary stages in the development of bone.

4. The presence of a well-developed tail in the embryos of man and other tailless vertebrates is advanced as evidence of evolution.

The human embryo displays, from the fifth to the eighth week of its existence, a well-developed tail, together with the muscles connected therewith: these eventually become absorbed into the surrounding tissue and the tail vertebrae are condensed into the coccyx.

Dr. Davies deems the existence of a tail in the human embryo to be incompatible with the theory of special creation. "Man" he writes (E. p. 223) "has only a slight vestige of a tail, but in the foetal stage this tail is not only proportionately much longer but provided with the muscles found in animals with movable tails. The creationist must either show that this tail serves some useful temporary purpose; or he must fall back on some fanciful explanation as Vialleton used for the bird's wing."

I take exception to the words "man has only a slight vestige of a tail," because they set forth an unproved theory as if it were a demonstrated fact. I submit that the correct statement should be, "Man has what many biologists believe to be a vestige of an ancestral tail," or, better still, "Man has no tail, but many believe his os coccyx to be the relic of a well-developed ancestral

tail.” It may be noted that the os coccyx is situated lower and is longer in man than in the anthropoid apes, being composed of four vertebrae in the former and three in the latter. Thus, if man descended from an anthropoid ape, his os coccyx has increased in size. These differences correspond to profound differences between the organization of man and that of the anthropoid apes. In man the absence of a tail is essential to his erect posture; in the apes were the coccyx not very short and situated higher than in man, the process of giving birth to the young would, as Vialleton points out (“L’Origine des Etres vivants” (1930) p. 284), be greatly impeded. “To regard” he writes, “the absence of a tail as a character common to man and the anthropoids is to disregard the differences of structure that are hidden behind this apparent resemblance, and to fail to appreciate the different condition to which the anatomy of each type responds.” The creationist view is that man has no tail and that the primordium that gives rise to the tail in tailed vertebrates gives rise to the os coccyx in man.

But I agree that the creationist has to explain why the human embryo has at one stage a fairly long tail, if a tail be defined as part of the animal behind the hip-girdle. This I will do now.

The animal kingdom is divided into more than a dozen great groups which have been given the question-begging name of phylum. Each of these phyla is constructed on a fundamentally different plan.

Every vertebrate embryo is, so to speak, built up around the notochord—the precursor of the backbone. The neural axis is the first product of the ectoderm and the primitive proto-vertebrae that of the axial mesoderm. These proto-vertebrae are formed in almost the whole length of the body; the embryo at this stage exhibits a chain of segments or metameric primordia (*anlage*), the function of most of which is to produce vertebrae, muscles and nerve fibres. These are indispensable to the embryo, but are purely embryonic structures. Although in outward appearance all are alike, each develops on peculiar lines. The members of this series of primordia situated behind the spot at which the hind limbs bud out from the embryo give rise to the tail of the adult, be it long or short. According to Sir Arthur Keith the human embryo displays from eight to eleven of these incipient tail vertebrae. Kunitoma, who has made a special study of the development of the human tail, records that the longest tail he has seen measured 1.2 mm. in an embryo 7.4 mm. in length. This tail, at an early stage, is composed of a longer basal part containing primitive vertebrae, the chorda dorsalis and the middle sacral tissue and vein, and a shorter distal part in which the tissue is not differentiated. The tail begins to diminish in size when the embryo is from 8 to 9 mm. in length, and by the time it has attained a length of 25 mm. the

whole of the vertebrated part of the tail has become withdrawn into the body, leaving exposed only the distal part as a pimple placed a little dorsal to the spinal column. This portion is eventually absorbed. Of the vertebrae in the other part of the tail four usually continue to develop and fuse to form the os coccyx, which soon becomes bent forward and serves for the attachment of certain muscles. The fact that the tail is thus curved enables man to sit without suffering inconvenience and probably affords some of the additional support required by the viscera on account of man's upright posture. It is important to notice that in its earliest state the tail of man is as long as that of the embryo of a long-tailed animal. If man be descended from a long-tailed ancestor, which had gradually lost the greater part of its tail, it is reasonable to suppose that this organ would have gradually become shorter at its inception, but, as we have seen, this does not happen.

If anyone assert that the human embryo recapitulates the various stages of its tailed ancestors, I should say to him "You assert that the whale is descended from ancestors having well-developed hind legs, why does the whale embryo not exhibit, at an early stage, well-developed legs and which later shrivel up?"

In connection with the human embryonic tail, it is important to bear in mind that at an early stage, i.e., before the second month in man, the human (and indeed every vertebrate embryo) exhibits a length of intestine behind the vent or anus. He who asserts that the human embryonic tail is a relic of a tailed ancestor, must, if he be logical, assert that the postanal gut is a relic of an ancestor that went through life having such a strange organ. Writers who dilate upon the human embryonic tail are usually silent regarding the postanal gut. Is it fair to students to withhold this fact from them? Clearly both embryonic tail and postanal gut appear because of the way in which embryos develop.

To the question, why does the tail develop in this way, why does it not develop as legs do by being budded from the body, the reply is that, as the legs require nourishment during development, they have to be budded not at the extreme hind end of the body but a little way from this and it is more simple to make use of the vertebrae existing behind the limbs than to scrap these and form new bones behind them. In this connection let me point out that there is no such thing as waste in nature: it is not wasteful to develop structures, that are subsequently absorbed, or for an animal to lay millions of eggs of which only a few reach maturity. In each case the material employed is subsequently used, again and again.

## EMBRYONIC REMAINS



We are now in a position to deal with a class of structures, incorrectly called vestigial by many transformists, which are in fact embryonic remains, i.e., the results of the manner in which all embryos develop.

*The organ of Rosenmuller in females and the mammae of males.*

These are ill-developed organs that are well developed in the opposite sex. It has been said that these are relics of a hermaphrodite ancestor, in which the organs of both sexes were functional. It is doubtful whether many believe this, because hermaphroditism is virtually unknown in vertebrates. It does not occur in any known living reptile, bird or mammal: abnormally occasional cases have been reported in newts, frogs and toads. A few fish appear to be hermaphrodite.

In truth these structures are the results of the fact that every higher animal exhibits the primordia of both male and female organs: the superficial cells from which are formed the ovaries and the deep-seated cells from which arise the seminiferous tubes and the Wolffian and Mullerian ducts that carry away the male and female products. For a time the embryo develops as if it were going to produce a hermaphrodite; then one set of organs ceases to develop and undergoes more or less complete atrophy. The reason of this seems to be that if the animal is to be male a hormone at a certain stage of development is secreted which prevents the female primordia developing beyond a certain stage and *vice versa*.

Vialleton is of opinion that the presence of both sexual *ebauches* is probably in harmony with the mechanisms of development. "It is possible that the *ebauches* of the two genital ducts assist one another. Particularly in mammals the reunion of the Wolffian and Mullerian ducts in the genital cord, involving the formation of a dense mesenchymatous sheath around them facilitates the growth of the complex coats of the genital ducts developed in connection with gestation and parturition." ("Membres et Ceintures" (1925) p. 554).

## Part II

### A CRITICISM OF DR. A. MORLEY DAVIES DEFENCE OF THE RECAPITULATION THEORY

Dr. Davies remarks on the recapitulation theory in his "Evolution and Its Modern Critics" are most interesting and I hope that they will be widely read. He candidly admits that (p. 138): "in any strict sense the recapitulation of ancestral history is a sheer impossibility." He also admits that recapitulation may not only be abbreviated, but unequally abbreviated, stages may be

skipped or short-circuited and even “something like a reversal of ancestral stages may sometimes occur.” Nevertheless he does not discard the theory; his view is “The structural changes through which an animal passes in its ontogeny, if they are not accounted for exclusively by the immediate necessities of life, are a valuable indication of the ancestral history.”

Even in this diluted form the theory does not hold water. The alimentary canal in the embryo for some time is devoid of mouth and anus. This cannot represent an ancestral state. What is the immediate necessity of life that requires the primitive gut to be a blind tube?

There are several conceivable methods whereby the fertilized cell could acquire all the organs of the complex adult. The particular method adopted is to endow the original cell with the power of developing, at a very early period, the tissue-producing cells or primordia (or, as the Germans say, *anlagen*, or the French *ebauches*) for each of the major organs or structures that occur in any member of the class of animal to which the embryo belongs, even the primordia of structures which that particular individual will not need in the adult state. In the case of the latter the development of the primordia capable of producing them is early checked; thus the embryo of every higher animal exhibits the primordia of both the male and the female generative organs, but in normal circumstances only those of one sex attain maturity. The absurdity of the notion that the embryo of a higher animal recapitulates a hermaphrodite ancestral stage was exposed by Prof. Crew’s famous hen, who, after the termination of her egg-laying period, assumed male characters and became the father of a brood.

We have noticed that the embryo must have a continuous supply of nourishment during the whole of its period of development. In the case of mammals, where the mother affords this nourishment, and of birds, where the egg contains an adequate supply of food yolk, the embryo proceeds direct to the adult form.

When, as in the case of many invertebrates, the egg does not contain food sufficient for the needs of the embryo during the whole of its development period, the embryo hatches out in an incompletely-developed state as a free-swimming larva able to find the food necessary to complete its development. Let us consider, in the light of these observations the points raised by Dr. Davies.

He asserts (p. 145) that the blood circulation system of the vertebrate embryo exhibits “a fish plan, elaborately adjusted to meet the needs of an air-breathing animal.” To this I demur. No known fish has a circulatory system like that of the vertebrate embryo at the time when the blood runs through the

series of aortic arches, each of which is a single tube conveying blood from the ventral to the dorsal part of the body. In fishes the blood system in the pharyngeal region is a complicated arrangement, consisting of a series of arches, each of which contains an afferent and an efferent vessel connected by a network of capillaries that enter the gills where the blood they contain is aerated. If the early aortic-arch system of the vertebrate embryo can be said to be on the plan of any other animal, it is the annelid plan. The earthworm has in each of the 7th, 8th, 9th, 10th and 11th segments an "arch" or blood vessel, known as a heart, conveying blood from the dorsal "aorta" to the ventral (sub-intestinal) blood vessel. It is true that in the earthworm these vessels themselves are pumping organs, in consequence no special heart exists, also that the blood flows in the opposite direction from that in the vertebrate embryo, but in the earthworm the central nervous system is situated ventrally instead of dorsally, so that in each case the aortic "arches" convey blood to the main nervous system. If the dorsal and ventral parts of the earthworm were reversed, the early blood system in the anterior part of the vertebrate embryo would be a replica of that of the annelid. Indeed largely on this account, some have deemed vertebrates to be derived from an annelid ancestor. Thus, had Dr. Davies stated that the circulation of the vertebrate embryo is on the annelid plan, elaborately adjusted to meet the needs of, on the one hand, a gill-breathing, and on the other a lung-breathing animal, I should not have been able to retort that the blood system of the vertebrate embryo is not at all like that of an annelid, but I could have cited grave objections to the theory that vertebrates are descended from annelids.

I submit that the circulatory system in the vertebrate embryo is peculiar to vertebrates and a most effective method of providing the embryo with a blood supply at a very early period by means of an apparatus capable, while it is serving its purpose in the embryo, of developing into the type of circulation required by the adult, be it fish, amphibian, reptile, bird or mammal.

I asserted (D. p. 48) that, as the 3rd and 4th embryonic visceral arches give rise to no structures in any existing amphibian, reptile or bird, the evolutionist has to suppose that they exist only because the embryo is obliged to recapitulate the early fish stage. This being so they ought to have undergone atrophy long ago. I added "the recapitulationist has to suppose that they did not undergo atrophy, but after millions of years suddenly acquired the power of developing into the epiglottis and contributing to the formation of the thyroid cartilage (Adam's apple) in mammals." To this Dr. Davies retorts (p. 151): "The fallacy here is, as in other arguments of Mr. Dewar's, that he assumes that because in *existing* adult amphibians and reptiles these two visceral arches have disappeared from want of function, that they had

already disappeared or were functionless in those primitive amphibia and reptiles through which mammals are derived.”

Dr. Davies suggests that these arches gave rise to some structures in the primitive amphibia and reptiles from which he thinks mammals are derived. He does not even hint as to the nature or uses of these structures imagined by him. His suggestion, which to me seems far-fetched, cannot be proved or disproved. It must mean, either that the amphibia and reptiles in the direct line of mammalian ancestry possessed unknown structures peculiar to them, which later became converted into the epiglottis and thyroid cartilage in mammals, or that all the primitive amphibia and reptiles possessed these structures which they subsequently lost without coming to any harm, and either that this loss occurred before birds evolved, or that birds originally possessed them and have lost them.

It is worthy of remark that no amphibian, reptile or bird embryo recapitulates the late stages in the development of these hypothetical structures: thus it would seem that Dr. Davies believes that useless visceral arches and blood vessels appear in the embryo because it obeys the law of recapitulation as regards the earlier but not the later stages of development. My view is that these two arches, with their blood vessels, develop because they are essential to the provision of an adequate supply of blood to the head region of the embryo at an early stage.

I ask those who believe that all but one of these arches are useless to the embryo and only develop because the embryo has to recapitulate a fish stage to consider its absurdity. This is that every land animal is descended from an ancestor which possessed gills which had developed in the embryo in the manner described above. This ancestor and its progeny elected to leave the water and live on land. This would have been impossible unless it had already developed a lung with appropriate blood supply by the sacrifice of its last gill as a breathing organ in the water; and in order to develop this lung the gill blood vessels had to be transformed into the pulmonary artery. After this ancestor had come ashore its remaining gills ceased to be useful and all completely disappeared except parts of their blood vessels which developed into the carotid arteries. How the creature managed to live on land before the carotid arteries were developed is left to the imagination. Moreover, although today every step in the course of evolution up to the time of the formation of the aortic arches is faithfully recapitulated in the developing embryo, not a single one of the stages is recapitulated of all the transformations which led to the evolution of gills, and of those which led to their devolution to the precise stage from which their evolution commenced, so that all traces of the period

of existence as a fish have been obliterated, as though the animal were ashamed of its fish ancestor!

Dr. Davies writes (p. 146): "If therefore we accept Mr. Dewar's interpretation that creative activity is under compulsion to conform to a certain 'Vertebrate plan' we must infer that the plan was originally chosen with a view to the creation of water-breathing fishes, and that the air-breathing vertebrates were an afterthought, the original fish plan in them being patched up in various ingenious ways to suit cold-blooded and warm-blooded air-breathers. If the evidence were in the contrary direction—if the fish circulation showed features which could only be explained as modifications of a plan primarily designed for air breathers, it would provide an argument for creation. As it is, the opposite is the case."

As regards vertebrate plan, I suggest that this was deliberately chosen, not that the creative activity was under compulsion to conform to any plan. I have already shown that the plan is of such a nature as to embrace the formation of both gilled and lunged vertebrates.

If the fish circulation showed features which could only be explained as modifications of a plan primarily designed for air-breathers, in my view, far from affording an argument for creation, this would have shown the creation of fishes to be an afterthought! But this is beside the point; I assert that there is nothing fishy or fish-like in the early phases of the development of the embryo of an air-breathing vertebrate. There is a phase common to gill-, and to lung-breathers, after which the development of each type follows a different course.

Let us now examine the reasons given by Dr. Davies for believing that an original fish plan has been patched up in order to suit air-breathers.

The first of these reasons is that the heart of a bird or a mammal is a double organ, so much so that physiologists find it convenient to speak of a right and left heart as though they were separate organs. Dr. Davies asserts that there is no physiological reason why they should not have been created separate hearts, like the systemic and branchial hearts of the cuttle fish.

I submit that the formation of two hearts at the inception of the embryonic circulatory system would have been a clumsy arrangement, necessitating each heart being perforated laterally and connected by a passage in order that the embryo should have an effective systemic blood circulation during the period in which the pulmonary circulation is small. Later the perforations of the hearts would have had to be closed and the connecting passage would become a superfluity. Recapitulationists seem to lose sight of the fact that the needs of the developing embryo are quite as important as those of the adult.

The reason why Dr. Davies deems the original embryonic plan to have been patched up is the fact that in air-breathing adult vertebrates there is no need for more than one aortic arch (half a pair), nevertheless there are several pairs in the embryo. Here again Dr. Davies seems to have overlooked the needs of the developing embryo. It is imperative that this be given a blood circulation at a very early stage; it cannot wait for this while one big aorta is being developed. This is why it is provided with several pairs of arches.

The nerves of the vertebrate retina are situated between the source of the light falling on the retina and the photosensitive parts of the latter—the rods and cones. According to Dr. Davies this arrangement affords evidence of the evolutionary origin of the eye, it exists only because the eye in its embryonic development recapitulates what he believes to be the various forms of a series of ancestors. I do not believe that any animal existed having an eye in the condition depicted in fig. no. 29, C. and D. of Dr. Davies' book. I assert that the vertebrate eye develops in such a way that it could not function as an eye until its development is complete, or very nearly so. It is one of the organs which cannot be deemed to recapitulate the ancestral stages postulated by evolutionists.

As to the relative positions of the nerves and the rods and cones, I know no mechanical or physiological reason why both nerves and rods and cones should not all have developed in the lower layer of the optic cup, the upper layer becoming absorbed, or (as happens in the case of *Sphenodon* mentioned by Dr. Davies, p. 299) developing into the lens. The fact that this does not happen, that the method of development followed in the pineal eye of *Sphenodon* is not adopted in this case, indicates that there is some advantage in the present positions of the sensitive parts of the retina. As to the alleged inconvenience of the "blind spot" in the vertebrate eye, I shall be beholden if anyone can furnish me with a single instance of an animal being captured, or missing food owing to its blind spot.

Dr. Davies is of opinion that one nerve could supply the whole eye, and, as this organ is served by three nerves and six muscles to which three embryonic metameres or segments contribute, he deems this evidence for evolution; I do not know what his reasons are for asserting that two of the three nerves are superfluous. As to the eye nerves and muscles being derived from three of the segments, since the optic vesicle extends into three of these segments the function of which is to produce nerves and muscles, it is but natural that each of them should furnish the nerves and muscles to the portion of the eye within its ambit. Had each segment supplied one nerve and two muscles Dr. Davies might have asserted that each was mechanically providing its quota, but that is not so: the foremost of the three contributes four muscles

and the others one apiece. Here we have an example of the beautiful way in which the various parts of the body work in cooperation, as if directed by some outside agency.

I will conclude this chapter by mentioning that of recent years two zoologists have openly stated that they reject the recapitulation theory.

Dr. W. E. Swinton of the British Museum in a lecture delivered in Nov. 1947 said that in his opinion the recapitulation theory is “just not true.” One of the reasons he gave for his belief is that we know from mammalian history that teeth were developed before tongues, but in the embryo the reverse is the case.

William J. Straus Jr. wrote (“Quarterly Review of Biology,” June 1947): “It is Haeckelism of the worst sort to state that in all vertebrates ‘the throat is pierced or nearly pierced at some stage of the animal’s existence by paired gill-slits.’ . . . It is misleading to say that ‘gill arches’ (how one squirms at the term!) are fishy reminiscences.” “It is a distinct strain on the imagination to interpret the lanugo (the hairy covering of the human foetus) in terms of ontogenetic recapitulation.”

## Chapter XV

### METAMORPHOSIS

In order to complete the refutation of the recapitulation theory, it is necessary to deal with the metamorphosis which is undergone by a large number of invertebrates during their development from the egg to the adult form.

Dr. Davies cites *Sacculina* as an example of a creature which, in the course of embryonic development, passes through stages which, according to him, are valuable indications of its ancestral history.

The fact is that, as we will demonstrate, *Sacculina* is an embarrassment to the transformist rather than to the creationist.

*Sacculina* in the adult state is little more than an egg-producing bag provided with filamentous excrescences by means of which it obtains nourishment from the crab on which it is parasitic. It leaves the egg as a free-swimming larva. Dr. Davies writes (*op. cit.* p. 144): “Granted that *Sacculina* must have a free-swimming larva, why should it not have a ciliated larva like a Trematode, or like so many Echinoderms, Worms and Molluscs? Why does it have two successive larval stages, thereby increasing the risk of death, before reaching the host? Why should these larvae be of Arthropod type, moving by muscular appendages and entirely devoid of cilia? Why should the first larval form be one common to most of the lower Crustacea, and the second be characteristic of the ordinary non-parasitic Cirripedes? Evolution gives a meaning to all these peculiarities: Creation can only suggest a storage place with an inadequate number of pigeon-holes, so that a parasite has to get shoved in along with some group—no matter which—to which it has no resemblance.”

The reason why the swimming organs of the *Sacculina* are appendages moved by muscles seems obvious. As the young *Sacculina* needs considerable powers of locomotion if it is to have a good chance of finding a crab to which it can attach itself, it requires swimming organs more powerful than those provided by cilia. Why does it hatch out in so minute form? Because it has to obey the maxim “you must cut your coat according to your cloth.” The egg has but little food stored within it. The problem to be solved is, given a very limited supply of food, to produce a larva having considerable powers of locomotion. The solution is the type of larva that leaves the egg—a microscopic creature having an oval unsegmented body, provided with a



single eye, a mouth, digestive system and three pairs of appendages, the front pair to assist the creature in feeding and the other two to serve as locomotive organs. It is difficult to conceive of an organism more simple than this having these characters. The larva must have some form and what more reasonable than that this form should be similar to that which proves to be so effective for larval crustacea? Crustacean larvae need considerable locomotive powers and this explains why they, like Sacculina, are not given cilia as swimming organs. On account of the outward resemblance of the larva of Sacculina to that of a crustacean, the name, nauplius given to the larva of the latter is also applied to that of Sacculina, on a similar principle to that under which the visceral arches of the amniote embryo are called gill arches!

Before the larva can adopt a sessile life, it has to develop an organ enabling it to pierce the integument of its future host, and means of attaching itself to and of obtaining nourishment from its host. While these organs are developing the larva has to seek its food in the water and protect itself against enemies. This being so, it is not matter for surprise that it develops a bivalve shell open below to give its swimmerets free play. This is called the Cypris stage because the larva in this condition bears a superficial resemblance to the Ostracode Cypris.

The Sacculina larva passes through these stages because either it is forced to recapitulate adult stages of its ancestors, or, evolution or no evolution, these successive conditions are necessary to its existence. Dr. Davies admits that “this is not actually a case of recapitulation.” He asserts “Sacculina must have had ordinary non-parasitic Cirripedes in its ancestry; it only goes through the larval stages, not the adult stage of ordinary Cirripedes.”

Why MUST Sacculina have had non-parasitic Cirripedes in its ancestry? If it had them, why must it pass through their larval but not their adult stages? Why is the supposed biogenetic law observed in the one case and disobeyed in the other? I contend that Sacculina had neither nauplius-like nor Cirripede ancestors, that it passes through its larval stages because these are essential to its development.

For my part, in default of experimental proof that it is possible, I do not believe that any animal enjoying a free-living existence, ever became so completely sessile as to lose by degrees its eye and swimming organs. Be it noted that before the supposed free-swimming ancestor can have switched over to a sessile existence it must have developed the means of piercing the integument of the crab, of attaching itself permanently to it and of obtaining nourishment from its tissues, that is the capacity to develop long root-like processes able to absorb and convey to Sacculina nourishing matter from the tissues of the crab.

Nor is this the only difficulty which the evolutionist is up against. The nauplius larva succeeds in finding food, and numbers avoid being eaten by enemies; why then did an animal of which the adult was a nauplius-like creature ever change into anything else? Why did it not retain its nauplius form during its whole life and develop sexual organs?

The creationist says that Sacculina was designed by God and by design it laid eggs having little food yolk; in consequence, in order that the adult Sacculina could be formed, the egg had to hatch out as a nauplius which changed into a cypris larva before it became a Sacculina. But the transformist cannot give such an explanation unless he believes that the blind forces of nature, not only planned to produce, but succeeded in producing a Sacculina, endowed with the capacity of laying eggs able to produce a nauplius having the power to develop into a cypris, which was able to turn into a Sacculina. In this connection we must bear in mind that the evolutionist has to believe that this curious change of mode of living has occurred not only in the ancestors of Sacculina but in those of dozens of other kinds of parasites.

The curious animals, popularly known as sea-squirts, which look rather like double-necked leather bottles, furnish another example of metamorphosis. The scientific name of the group of which they are members is Ascidia or Tunicata. The larva is often called a tadpole because of its superficial resemblance to the tadpole of a frog. In the words of Professor W. Garstang "the whole of the embryonic processes lead directly by the nearest route to the building up of the larva," which attains a length of about  $\frac{1}{4}$  inch. Four-fifths of this is composed of the tadpole-like tail, which is the organ of locomotion. In front of the body are three peculiar warts which secrete a sticky substance. These are the means by which the larva, after swimming about for some time, attaches itself to some inanimate object. It then undergoes complete metamorphosis. The tail, "notochord," nerve tubes and sensory vesicle are devoured by phagocytes formed within the animal, a new set of organs is developed and the sac-like adult is formed, which looks more like a plant than an animal. I submit that a transformation such as this cannot have developed gradually during a period of thousands of years, because during the long period of transformation lasting from the moment it had fixed itself until the new set of organs had developed the animal could have obtained no food except from its own tail. Why does the Ascidian larva develop as an organ of locomotion, not cilia or swimming legs but a great tail? Because the tail, after having served its purpose as an organ of locomotion, provides the animal with the food it must have after it has fixed itself and before the new feeding organs are developed.

Since the Ascidian tadpole flourishes in its free-swimming state, it is for the transformist to explain why it eventually became transformed into a sessile sea-squirt. Is it possible to believe that natural selection acting on random variations inaugurated and perfected this amazing metamorphosis?

In the same way the tail of the frog tadpole provides the latter with a store of food on which it can draw during the period in which its jaws are being transformed into the very different jaws of the frog.

To class Sacculina among the Crustacea and the Sea-squirts along with the vertebrates, as modern systematists insist on doing, tends to bring Zoology into disrepute. Why do they not class the frog as a fish?

The flat-fishes, i.e. soles, plaice, flounders and turbot, etc., undergo a limited metamorphosis, quite unlike that of Sacculina or of the Sea-squirt. The fish when adult have both eyes on the same side of the head, and swim about and rest with one side of the body facing upwards and the other downwards. More than 600 species of these flat fishes have been described. Some consider them to be an order composed of five families.

When it emerges from the egg, the flatfish has a symmetrical body shaped like that of an ordinary fish, with an eye on each side of the head. As it grows the body becomes laterally compressed and the cartilage of the supraorbital bar above one eye (the left in some species, the right in others) becomes absorbed, leaving a gap through which the eye below will pass during its migration round the top of the head to the opposite side. The fish now begins to tilt over to the side from which the eye is moving. The migration of the eye is a matter of a few days. When the migrating eye reaches the supraorbital cartilage on the opposite side of the head, the other eye begins to move, and the two eyes travel together until they reach the position they occupy in the adult. Their combined movement causes the intervening supraorbital bar to become distorted. Then ossification sets in.

In this connection it may be noticed that the turning over of the flatfish to one side does not seem to be a necessary consequence of the flattening of the body because some fish equally flat, such as the John Dory and the freshwater fish, *Pterophyllum scalare*, remain vertical. Moreover, the Bream, which does not live on its side, is more flat than the Halibut, which is the least flattened of the flatfish.

The evolutionist apparently believes that some ancestor, or ancestors, of the fiat-fish became rather flat and then, for some unknown reason, the supraorbital bar on one side conveniently became absorbed, and the eye below began to shift its position, and this shifting became greater in successive generations, until eventually both eyes were situated on the same

side; that is for thousands of years these fish swam about in a position intermediate between the vertical and the horizontal.

The fossils afford no support to this theory, the earliest known turbot, which occurs in the Eocene, and the earliest sole, found in the Upper Miocene, are as flat as are any living flat-fish. All living fish assume in the water a perfectly vertical or a perfectly horizontal position; none of them swim with a list, as evolutionists suppose many kinds of fish to have done in the past.

The metamorphosis of a caterpillar into a butterfly is a process which cannot have developed gradually step by step, generation after generation. Before undergoing metamorphosis the caterpillar has to manufacture a protective covering. This wonderful feat and those that follow are graphically described by Mr. E. L. Grant Watson in his "Enigmas of Natural History." As I have not watched the process I take the liberty of quoting his account of the transformations effected after the caterpillar has entered the pupal stage (p. 72): "The shape and position of the organs of the butterfly which is to be, are already stamped on the pupa. It should be particularly noticed that these marks are on the OUTSIDE and that there is nothing yet formed inside to correspond with them. This is a significant fact and one which, when its significance is grasped, will modify the accepted idea that development takes place always, and only from a centre outwards. The governing idea has at this stage at last declared itself, and although there is within the creature, at this stage, nothing but a green watery pulp, all the places in its organism which are later to be occupied by legs, wings, antennae, etc., are now definitely marked. They are waiting to be filled by the organs, not yet made, but already determined. Later a new generation of tissue is formed, partly from this central intestinal magma, and partly from the proliferation of special corpuscles called image-bearing discs. Thus it is that the newly-formed portions seem to have no direct filiation with the destroyed parts of the larval organism. The creature has in fact died, in so far as it has lost its form, its organs, and its habits, and now, in a manner which cannot be described as anything but mysterious, is experiencing a new orientation towards a quite different form, which is to find its expression in quite a different mode of life."

Does any one really believe that the ancestors of butterflies were as adults just masses of pulp enveloped in cases, having no means of procuring external nourishment? If not, it is for the evolutionist to explain how the process of metamorphosis became intercalated in the life history of the caterpillar. The caterpillar has biting jaws by means of which it rapidly demolishes the leaves on which it subsists; on the other hand, the mouthparts of the butterfly are

entirely different: the butterfly is incapable of biting anything, its first maxillae are grooved and greatly elongated, often coiled; pressed together they form a tube through which nectar from a flower is drawn into the stomach, which is a suction pump. The transformation of mouth parts of the caterpillar type to those of the butterfly type involves a period during which the possessor of the mouth has either to go without food or subsist on its own tissues. Thus it is impossible that such transformation was effected in the past by a gradual process extending over a period of thousands of years. Unless the transformation was effected suddenly and miraculously butterflies must from their origin always have had suctorial mouthparts.

## Chapter XVI

### PARASITISM

The existence of hundreds of different kinds of endoparasites presents a formidable, if not insuperable objection to the evolution theory. An endoparasite is one which must live during all or part of its life inside another organism, and which perishes if prevented from so doing. A. C. Chandler certainly does not overstate the difficulty when he writes ("Introduction to Parasitology" (1944) p. 14): "It would be difficult, if not impossible, to explain, step by step, the details of the process of evolution by which some of the highly specialized parasites reached their present condition."

Consider the liver-fluke, *Distomum hepaticum*. This spends its adult life in the intestine of a sheep. The eggs after being laid pass out of the sheep into the open where they hatch out as little ciliated embryos that swim about in water. In order to survive, these larvae must find a pond snail (*Limnaea truncatula*.) Having reached the snail the larva finds its way into the pulmonary chamber. Here it loses its cilia, increases in size and buds off germinal cells into its own body-cavity. While in this condition it is known as a sporocyst. The buds it casts off develop into secondary larvae known as rediae; these are elongated oval in shape, have a mouth and stomach, and are provided, on the under side, with a pair of knob-like processes by the aid of which they move. They force their way out of the sporocyst and enter the tissues of the snail where they give birth to other rediae that develop into larvae known as cercariae, which in outward appearance resemble broad-bodied tadpoles, and even exhibit a "notochord." Using the long tail as an organ of locomotion, the cercariae work their way out of the snail, then attach themselves to blades of grass where each sheds its tail and encases itself in a tough sheath. They remain in this condition until they happen to be eaten by a sheep when grazing. Inside the sheep they find their way into its liver where they develop into the adult state and acquire sexual organs. They then migrate into the intestine of the sheep and thus complete the cycle of their life history.

Consider the improbability of a free-swimming worm evolving into a liver-fluke. Such a creature would be killed by being swallowed by a sheep unless it were endowed with the ability to resist the dissolving activities of the saliva and other digestive juices. Moreover its eggs would have to be similarly equipped and to have the power of hatching out into larvae having the instinct of finding their way into the pulmonary chamber of a certain species of pond snail.

Notice that in the earliest part of its life the liver-fluke has to be adapted to life in the open, next to existence in the pulmonary chamber of a snail, then to living inside its tissues, after that once more to life in the open, then in the stomach of the sheep and next in its liver, and finally in its intestine. Failure of the animal to accommodate itself to any of this succession of conditions would lead to the rapid extermination of the species. Moreover the liver-fluke is not the only species to enjoy such a variety of environments. Hundreds of other species lead a similar existence; in some the variety of environments is even greater. Thus the tapeworm, *Diphyllobothrium latum*, spends part of its life in a copepod, part in a fish and part inside a human being.

Another important point is the immense variety of these parasites. The Trematoda—the Class to which the liver-fluke belongs—are all parasites; about sixty different families of these are endoparasites, i.e. parasites which live inside their hosts, and 13 families are ectoparasites, those that live outside their host. That is to say this Class of parasites is more diversified than is the Class that includes all the mammals. Another Class—the Cestodes,—of which all the members are endoparasites, is composed of five Orders embracing 30 families. The evolutionist has to explain not only how parasitism arose but why these parasites, both internal and external, have become so diversified. It is not difficult to believe that what appear to be different species of the same genus might result from some members of the genus living in one kind of tissue and others in another; thus the parasite *Schistosoma* which causes the disease known as bilharziasis in man, assumes the form known as *S. haematobium* when it lives in the bladder and *S. mansoni* when it lives in the large intestine. But how can evolution have caused such diversification as to lead to the origin of new genera, families and orders? In this connection it may happen that parasites belonging to different Orders may occur in the same type of host.

In order to secure the perpetuation of its species every endoparasite has to lay prodigious numbers of eggs. Here are some figures given by Dr. Chandler (*Op. cit.* p. 238): “The hookworm *Ancylostoma duodenale*, lays in the neighborhood of 20,000 eggs a day, and it must do this for at least five years: the total offspring of such a worm would number 36 million . . . The hookworm, however, has a comparatively simple time of it. Flukes and tapeworms have an even more difficult problem to face. According to the estimates of Penfield *et al.*, the number of eggs produced by a beef tapeworm are suggestive of a pre-war national debt—over 2500 millions in 10 years.”

Yet Dr. Chandler, in common with all good transformists, believes that the blind forces of nature have accomplished all the devices necessary for the perpetuation of the species. The credulity of transformists knows no limit!

The above are difficulties presented by one aspect of parasitism. Those presented by other aspects are equally formidable. A whole volume could be filled with examples furnished by insect parasites. Let us notice one instance as showing the nature of these difficulties.

The hymenopter, *Ibalia*, victimizes the wood-wasp, *Sirex*. The latter bores with its powerful ovipositors a hole in the trunk of a conifer for the reception of its egg. This last yields a grub which feeds on wood. The grub when feeding bores a tunnel in the wood, in which it lives for some years until it turns into a grub that develops into the adult wasp which, by the aid of its powerful jaws, bites its way out of the tree. How this particular habit gradually developed is a difficulty of the evolution theory which we cite in passing. We are here concerned with the habits of *Ibalia*. This, using the hole in the trunk already bored by *Sirex*, lays its egg inside the *Sirex* grub. On being hatched the *Ibalia* larva feeds on the tissues of the *Sirex*, not devouring the vital organs until it has eaten the others, thus obtaining all along fresh meat. Ordinarily the *Sirex* grub bores deep, but when the *Ibalia* is inside it, it changes its habit and burrows towards the surface, with the result that *Ibalia*, of which the jaws are not powerful, has not to bore far in order to get out of the tree trunk. If the *Ibalia* grub were to devour the vital organs of its victim too soon it would starve to death, and it would perish inside the tree did not the *Sirex* grub change the direction of its boring. It is conceivable that natural selection might have fixed the habit of the *Ibalia* larva to attack the vital organs last, by weeding out all who did not do this, but how could natural selection have originated in *Sirex* the change in its boring habit, from which it derives no benefit?



## Chapter XVII

### SOME TRANSFORMATIONS POSTULATED BY THE DOCTRINE OF EVOLUTION

One of the maxims of science is that an explanation of a phenomenon invoking natural forces known to exist should be preferred to an explanation which involves a miracle. One reason why the evolution theory was so readily accepted was the belief that, while the theory of special creation involves the miraculous, that of evolution does not.

One of the aims of the present book is to demonstrate that the theory of evolution, far from dispensing with miracles, involves more than does the theory of creation. For example, the theory that the first whale was miraculously created involves one miracle, while the theory that it gradually evolved from a land animal involves at least two major miracles, viz. a gradual transformation which is apparently impossible, and the preservation during the period of transformation of many successive generations of creatures unable to walk or swim properly.

The theory of the gradual origin of any new type of animal involves changes which are apparently physiologically or mechanically impossible.

Let us notice a few of these.

#### *1. The Gradual Transformation of An Amphibian Into a Reptile*

In this connection I take the liberty of quoting Dr. J. Needham ("Science Progress" (1929) Vol. 23, p. 63): "When the first reptiles left the sea, they were faced with two very difficult embryological problems. To begin with, they had to find out how to abandon metamorphosis: but, that accomplished, they had to discover a way of arranging a water supply for their embryos. As Gray has shown, aquatic embryos always depend on their environment for a supply of water: in other words, the fertilized egg contains enough solid but not enough water to make the finished larva. The first terrestrial eggs, therefore, had to contain enough water as well as enough solid, and, as arrangements to prevent undue evaporation were essential, the closed-box system (i.e. the encasing of the egg in a hard shell) inevitably developed. The mechanism by which a constant pressure head of water was provided in the terrestrial eggs, namely the egg-white, can be seen functioning at the present time in the as yet unidentified acid which, introduced by the embryo's metabolism into the egg-white, as Vladirow has shown, gradually brings

the latter to its isoelectric points and liberates water by degrees from the colloidal albumen. All the economy of the successful terrestrial egg had to be directed towards conserving the water, and, while a great bath would have been required to keep the urea concentration down within bearable limits if all the nitrogen was secreted in that form, only 20 per cent of the water need be set aside for handling uric acid.”

Every transformist believes that on one occasion an amphibian did evolve into a reptile, yet he believes that the theory of evolution dispenses with miracles!

Before, then, the habit of depositing eggs in water could be changed to that of laying them on land, the following alterations in the egg had to be made: (1) the formation of a tough shell to prevent the evaporation of the liquid contents of the egg and to protect them from predacious animals, (2) the secretion of an acid to cause the egg-white to yield its water as required, (3) a change in the metabolism (chemical changes in the embryo) whereby the waste products take the form of insoluble uric acid instead of soluble urea, (4) the introduction of a quantity of yolk to feed the embryo until it was able to fend for itself, (5) the formation of an entirely new organ—the amnion—which had to be water-tight and in which the embryo floated: Until this organ is complete it can be of no use whatever, (6) another new organ—the allantois—to enable the embryo to breathe and to act as a receptacle for the waste products resulting from its metabolism, (7) the development of a tooth in the embryo with which to break the hard shell of the egg when the time for its liberation came, (8) the ability to use this tooth. Moreover, fertilization of the egg, as soon as the hard shell evolved, had to take place within the female before the shell began to harden, necessitating a number of changes in the uro-genital organs and habits of the adult.

Until all the above transformations had come into existence the laying of a hard-shelled egg would have meant death to the embryo. Most of the above changes would have been useless or even harmful until they were more or less complete. What then can have not only inaugurated these changes but caused them to continue until after object was attained?

It is necessary never to lose sight of the fact that, while all the transformations postulated by the doctrine of evolution were being effected, the creatures being transformed, their eggs and their young had to live and compete with other organisms.

## *2. The Gradual Transformation of a Reptile Into a Bird*

Birds, like mammals, are warm-blooded, while reptiles, amphibia and fishes are not. In the latter the temperature of the blood is always the same or

nearly the same, as that of the surrounding medium, be this air or water. In warm-blooded creatures the temperature of the blood is constant, and, in all but the hottest climates, considerably higher than that of the surrounding air or water.

In temperate and cold climates the blood can be maintained at its normal temperature in birds and mammals only by the expenditure of much energy in the form of heat. In consequence a warm-blooded animal requires a far greater quantity of food than a cold-blooded one of the same size. Thus the former is a much-less economical machine than the latter and, owing to the much greater quantity of food required, it is greatly handicapped in the struggle for existence in comparison with a cold-blooded one.

The difficulty in believing that a cold-blooded creature ever became warm-blooded may be met by suggesting that the transformation took place in the tropics where the temperature is fairly constant and about that of blood-heat. But even so there remains the difficulty of the origin Of a most complicated mechanism for preventing the individuals in question from becoming overheated when pursuing their quarry. In the case of birds the heat-regulating mechanism is not fully understood. The feathering prevents undue dissipation of the heat generated by the chemical processes of the body. The spacious air sacs, which are organs peculiar to birds, probably assist in the dissipation Of heat generated during periods of great activity. But these alone would not suffice to maintain a constant temperature. There seems to be a special nervous mechanism which controls the oxidation Of the tissues and regulates the blood supply to every organ.

It is difficult to believe that natural forces produced this mechanism just when it was needed. Moreover, the transformist has to suppose that a temperature-regulating mechanism has been evolved on at least two occasions, in birds and in mammals, and probably more than once in mammals.

Further, eggs of warm-blooded birds have to be kept at a constant temperature. In consequence in cold and temperate climates birds have to incubate their eggs, and, in very hot localities, to take precautions to prevent them being baked by the sun. Reptiles have not to incubate their eggs, and so have but to scrape earth over them to protect them from the sun. Paradoxical though it sounds warm-blooded animals are better adapted to cold climates than are cold-blooded ones. But this does not explain how warm-bloodedness evolved, although it accounts for its creation.

Feathers are structures peculiar to birds, and in view of their extraordinary complexity, their origin is a problem that has baffled every transformist who

faces facts squarely. There are models of feathers in the Natural History Museum at South Kensington. Along each Side of the shaft runs a series of thin plates or lamellae of which the broad surface is at right angles to the shaft. These lamellae are known as barbs. Along each barb runs a double row of plates—the barbules, those on the near side of the shaft taper to a point, while those on the other side terminate in hooks. By means of these hooks the adjacent barbs are locked together and so give the feather its marvelous firmness and elasticity; Gadow estimated that some large feathers contain over a million barbules. Writing of a feather of the pigeon W. Beebe says (“The Bird” (1907) p. 34): “Making a very low estimate of the whole vane we have 990,000 separate barbules on this one feather, and when we think of the innumerable finer hooklets and then the number of feathers on the pigeon’s body, we can echo the exclamation of Solomon: ‘The way of an eagle in the air’ is ‘too wonderful for me’.”

This brings us to flight. It is still more difficult to believe, as transformists do, that the fore-leg of a land reptile or the fore-paddle of an aquatic reptile, as the result of the action of natural forces, became converted into a bird’s wing, gradually or otherwise. This is an implement that, in a fraction of a second, can be converted from a plane impervious to air into one through which the air passes without resistance.

Dr. Morley Davies in his reply to my “Difficulties of the Evolution Theory” did not attempt to account for the origin of feathers or flight, and H. S. Shelton in his written debate with me was quite unable to do so.

By way of contrast to the attitude of zoologists engaged in debate is that of Mr. G. Heilmann who had to meet no opponents. He writes (“The Origin of Birds” (1916) p. 200): “From being a terrestrial runner the animal now turns an arboreal climber, leaping further and further from branch to branch, from tree to tree and from the trees to the ground. Meanwhile the first toe changes to a hind toe so adapted as to grasp the branches. As the hind limbs while running on the ground have abandoned the reptilian position, they are kept closer to the body when leaping takes place, the pressure of the air acting like a stimulus, produces, chiefly on the forelimbs and the tail, a parachutal plane consisting of longish scales developing along the posterior edge of the forearms and the side edges of the flattened tail.

“By the friction of the air, the outer edges of the scales become frayed, the frayings gradually changing into still longer horny processes, which in course of time become more and more featherlike, until the perfect feather is produced. From wings, tail and flanks, the feathering spreads to the whole

body. The lengthening of the penultimate phalanges of the fingers is attained by using the claws for climbing, and this elongation has been very propitious to the subsequent development of the wing.

“The more intensive use of the arms, however, has also lengthened these, and laid claim to more powerful muscles for the movements of the same: this again has reacted on the breast bone, the two lateral halves of which have coalesced and ossified completely, forming a projecting ridge for the origin of the muscles.

“Then accelerated metabolic process, finally, produced an increased calorificity protected by the feathering until the warm-blooded state was attained.”

The above does credit to Mr. Heilmann’s imagination. I place it on a par with the story of Cinderella. I am unable to believe that, were a reptile, generation after generation, to spend twelve hours daily from the Cambrian onwards in leaping from tree to tree, the result would be the evolution of wings and feathers. Yet Mr. Heilmann is taken seriously by many authorities, for example Mr. A. Wetmore cites his book in the small bibliography at the end of his article on ornithology in the Encyclopedia Britannica.

Neither Mr. Heilmann nor anyone else, so far as I am aware, has attempted to explain why the wing of the pterodactyl (see [p.229]) differs fundamentally from that of a bird: it lacks feathers and is membranous, the membrane being supported by an enormously elongated little finger. Mr. Heilmann has to believe that leaping from tree to tree affected the reptile ancestor of birds very differently from that of the pterodactyls.

*Prima facie*, then it is highly improbable that a feather evolved from a reptilian scale, and that the wings of a bird, a pterodactyl or a bat gradually evolved from an ambulatory or natatory limb.

As we have seen ([p.56]) the fossils lend no support whatsoever to the notion that such evolution has occurred. The feathers of Archaeopteryx, the earliest known bird, are as perfect as those of birds today; in the earliest known fossils of pterodactyls and bats the wings are fully developed.

### *3. The Gradual Transformation of a Reptile Into a Mammal*

According to Dr. G. G. Simpson (“A Catalogue of the Mesozoic Mammalia in the Geological Department of the British Museum”, 1928) the transformation of a reptile into a mammal has been effected on no fewer than four occasions. Some transformists do not accept this view but all of them are convinced that mammals are derived from reptiles.

That this transformation cannot possibly have been effected gradually I hope to demonstrate by setting forth some of the differences between reptiles and mammals:

1. In reptiles each half of the lower jaw is composed of six bones—the dentary, splenial, coronoid, angular, supra-angular and articular<sup>[1]</sup>. The first of these is the largest and is called the dentary because it bears the teeth. The last is called the articular because it is the part of the jaw which articulates on the quadrate bone. In every mammal each half of the lower jaw is composed of only one bone—the dentary.

2. In all reptiles the articulation of the lower jaw with the skull is not direct, but through the intervention of a bone called the quadrate: in every mammal the articulation is direct; there is no quadrate bone.

3. In reptiles the drum of the ear is connected with the tympanum by a single rod-like bone, known as the columella: in mammals the connection is by a series of three bones called the stapes, malleus and incus, because in shape they resemble respectively a stirrup, a hammer and an anvil.

4. In the mammalian ear there is a very complicated organ—the organ of Corti, that does not occur in the ear of any reptile. The most striking feature of this is its 10,000 rods or pillars (into which run some 20,000 nerve fibres) set in two rows on a base; each rod in a row leans towards its opposite number in the other row, so that their swollen ends or heads meet, the convex head of one fitting into a concavity in the head of its opposite rod. Thus a tunnel composed of some 4,000 arches is formed. Sound waves cause these rods to vibrate.

5. In mammals the ilium (part of the hip bone) projects forwards; in reptiles it projects backwards.

6. The structure of the thoracic girdle differs fundamentally. In reptiles it articulates with the breast bone by means of the coracoid bones, and forms part of the thorax; in mammals it does not. In consequence the latter neither walk nor breathe in the same manner as the former. In reptiles the front part of the body is propped up on the forelimbs; in pronograde mammals (those that walk on all fours) it is, in the words of Professor F. G. Parsons, “suspended like a suspension bridge between the two scapulae (shoulder blades), the serratus magnus muscles form the chains of the bridge.”

7. In reptiles the ankle joint is between the two rows of ankle bones; in mammals it is between the leg bones (tibia and fibula) and the ankle bones.

8. The cheek teeth of mammals, unlike those of reptiles, have more than one root and complicated crowns.

9. In reptiles the visceral cavity extends behind the hip, forming a pocket on either side of the intestine in which part of the kidney lies, in mammals the visceral cavity does not extend behind the hip.

10. In reptiles the fore part of the thorax is rigid and incapable of expansion: in mammals, being formed by the first pair of ribs, it is expansible.

11. Complementary to the structure of the forepart of the mammalian thorax is the diaphragm a fibro-muscular partition between the thoracic and abdominal cavities. Reptiles have no diaphragm, in consequence they do not breathe as mammals do, their thorax is not a closed box, it is not alternately expanded and contracted during breathing. Sir Arthur Keith confesses his inability to see how the mammalian diaphragm can have been derived from any reptile: hence, as a transformist, he is driven to conclude that mammals evolved direct from an amphibian (*"Jour. of Anat. and Phys."* (1905) Vol. 39. p. 261).

12. The muscular coat of the alimentary canal is furnished with a layer of longitudinal muscles and one of circular muscles; in mammals the longitudinal muscles are outside the circular muscles, in reptiles and birds they are inside them.

13. Reptiles have two aortae; mammals have but one—the right.

14. Reptiles are cold-blooded; mammals are warm-blooded.

15. In reptiles the red blood corpuscles are nucleated; in mammals they are not.

16. In reptiles the ciliary muscle of the eye is striped; in mammals it is not.

17. The system of blood supply to the iris of the eye differs fundamentally in mammals and reptiles.

18. No reptile exhibits hair or fur; nearly all mammals do.

19. In reptiles the skin (epidermis) has three layers: 1. the germinative layer, 2. the Malpighian layer and, 3. the horny layer. In mammals the epidermis has 5 layers—the germinative, the malpighian, the granulated, the transparent and the horny layers.

20. Mammals are provided with mammary glands—organs entirely unknown in reptiles.

21. In reptiles the chief nitrogenous excretory product is uric acid; in mammals it is urea.

The above list, which is by no means complete, makes it clear What great changes would have to be effected to convert a reptile into a mammal. As the matter is of great importance let us look a little more closely into the matter.

Items 1 to 4 above relate to the lower jaw and skull. Let me here repeat the questions I put to Mr. Shelton in our debate:

“I maintain that the above changes cannot possibly have been effected gradually and, in consequence, the theory that a reptile ever became gradually converted into a mammal is untenable. If you disagree, please describe, stage by stage, how these various changes can have taken place, the order in which they occurred, and how the organ of Corti can have started, and describe its gradual development into its present condition.

“As all reptiles, past and present, seem to have fared or to fare quite well with their present type of lower jaw and hinge to the skull and with their present auditory apparatus, please state what caused one kind of reptile . . . to change the type of its hinge with the skull and to exchange its reptilian auditory apparatus for the mammalian type. Please explain how this reptile, while its jaw- and ear-bones were being thus reorganized, contrived to eat and to hear. Moreover, how do you account for the fact that, whereas thousands of fossils of reptiles have been found, all of these have at least 4 bones on each side of the lower jaw and one ear bone; not a single fossil has been found of a reptile having 3, 2, or 1 bone on each side of the lower jaw, and all have one ear bone and none 2 or 3 ear bones; also why no living reptile displays any of these peculiarities.”

Mr. Shelton, although pressed by me to reply, failed to do so, wisely in my opinion. Dr. Morley Davies thus delivers himself: (“Evolution and its Modern Critics” p. 202): “The morphological explanation of these differences is that all but three of the lower jaw bones of the reptile are missing in the mammal, one (dentary) composes the actual jaw, one (angular) supports the ear drum, one (articular) has become the malleus, and the quadrate has become the incus. This is not a matter of evolutionary theory, but of comparative anatomy, accepted by creationists as due to different modifications of a common vertebrate plan: and indeed, on the face of it, such complete changes of function in particular bones are more plausibly explained by the intervention of creative power than by gradual evolution. A sarcastic creationist might get quite good fun out of an imaginary picture of the transitional reptile-mammal obliged to stop eating in order to hear, since the bone articulating his jaw also transmitted sound waves. Actually, the transitional condition is closely approached in the mammal-like reptiles of the Karoo Beds of South Africa.”



The only exception I have to the above statement (which is a valuable admission) is the last sentence. The fact is that all the mammal-like reptiles have quadrate and none of them a malleus or incus bone.

Dr. R. Broom, an authority on the fossils of the South African mammal-like reptiles in his "The Mammal-like Reptiles of South Africa" (1932) says of the Ictidosaurians which he believes gave birth to the mammals: "The small bones of the jaw only lie in a groove in the dentary and if they became just a little smaller would doubtless be quite free. The changes by which the articular became the malleus, and the angular the tympanic in my opinion originated after the small bones left the jaw, and can be fairly easily imagined." He admits that in these creatures the lower jaw still articulated with the quadrate bone. The changes, he writes (p. 320): "that converted them, or one of them (i.e., an Ictidosaurian reptile) into a mammal may have been a change in diet. The snapping jaw had to be converted into a masticatory jaw, and as the quadrate became more or less fixed to the squamosal (i.e. the bone of the skull on which the quadrate articulates) it kept with it the articular and other little bones of the jaw, and the dentary became comparatively free and formed a new hinge with the squamosal. The small bones, no longer moving with the jaw, became modified as parts of the auditory apparatus."

In less technical language Broom's story is: Some reptile scrapped the original hinge of its lower jaw and replaced it by a new one attached to another part of the skull. Then five of the bones on each side of the lower jaw broke away from the biggest bone. The jaw bone to which the hinge was originally attached, after being set free, forced its way into the middle part of the ear, dragging with it three of the lower jaw bones, which, with the quadrate and the reptilian middle ear bone, formed themselves into a completely new outfit. While all this was going on, the Organ of Corti, peculiar to mammals and their essential organ of hearing, developed in the middle ear. Dr. Broom does not suggest how this organ arose, nor describe its gradual development. Nor does he say how the incipient mammals contrived to eat while the jaw was being rehinged, or to hear while the middle and inner ears were being reconstructed!

Item 4. The Organ of Corti. Neither Shelton nor Broom have anything to say about how this most complicated organ could have been formed gradually or except by a miracle. This is the best that Dr. Davies can do. (*Op. cit.* p. 209): "Increasing elaboration of sense organs is a natural feature of evolution towards a higher type of life: and an organ of Corti would have been useless in the absence of the refinement of transmission due to the substitution of a chain of small ossicles for the rod-like *columella auris*."

As regards items 6, 10 and 11. Davies writes (p. 206): "It is doubtful if we shall ever learn how the diaphragm arose, with the gradual substitution of a thoracic for a buccal breathing-mechanism; but that does not mean that it could not have arisen by natural evolution."

Items 5, 6 and 9. Davies writes (p. 203): "These points relate to the hip-girdle, which is certainly very different in modern reptiles and mammals, but if we take all reptiles into account we find the differences converging backwards in time into a very simple type from which the various later types can be derived." To say the best of this it is very vague.

Item 18. Hair. Davies writes (p. 206): "Hairs are developmentally quite different from scales and feathers; they originate in the embryo as down growths of the epidermis into the dermis, not as surface upgrowths. It seems probable that they served first as tactile organs, but their use in checking evaporation from the skin may have saved the mammals from losing their skin glands in a dry climate."

Item 20. Mammary Glands. Davies writes: "It is from the skin-glands that the milk glands have been evolved. The tendency for the young to get nourishment from some kind of parental secretion has shown itself again and again when conditions were favorable; in some viviparous skates the oviduct secretes a fluid very like milk, and 'pigeon's milk' is a secretion of the bird's crop. In monotremes it is the sweat glands which have become modified to secrete milk; ordinary sweat glands are unknown in *Echidna* and found only in the bill of *Ornithorhynchus* (this may account for their imperfectly warm-blooded character). In the higher mammals the sebaceous glands (associated with the hairs) have become similarly modified. In all these cases we may suppose that a secretion originally serving as a moistening or lubricating fluid was habitually absorbed by the young, and a gradual increase in the nutritive quality proved of survival value. The evolutionist will infer from the differences between monotremes and other mammals that, when their ancestors diverged from the common 'reptilian' stock, either the milk-forming habit had not been started, or it had been started for both kinds of skin-glands, to be restricted later to one or other in the respective branches."

We may admire Davies' theories without accepting them!

Item 21. Davies says that, as ammonia, uric acid and urea are excreted by all animals, "evidently there is no need to assume an abrupt change in evolution from one process to another; a gradual increase in one constituent and decrease in the other is sufficient . . . It may tentatively be suggested that uric acid metabolism is bound up with the absence of skin-glands in typical reptiles and birds: and that urea-metabolism and glandular skin may have

existed continuously in the ancestry of mammals from Amphibia through Therapsida to the present time.”

Item 8. Davies writes (p. 209): “This is hardly true of the living toothed Cetacea or Xenarthra, but apart from that—if the highly complex teeth of the modern horse have been evolved from the simple quadritubercular teeth of Eohippus, why should not the latter have been evolved from still simpler reptilian teeth? The mammalian canine is still essentially a reptilian tooth, and in some primitive mammals there is a gradual transition from canines to incisors in one direction and cheek teeth in the other.”

Item 7. Davies writes (p. 209): “the statement ‘in reptiles the angle joint is between the two rows of the ankle bones’ does not apply to the mammal-reptiles (Therapsida). Moreover, both types are derived from a flexible form in which the articular movement is not yet concentrated at either level.” Thus, in order to overcome this difficulty Davies conjures up a plastic ancestor which throws off a line of descendants having a reptilian ankle and a line having a mammalian ankle.

Item 12. “There is” writes Davies “no need to assume that the longitudinal muscles were gradually transformed into circular and vice versa, which Mr. Dewar seems to think is the only evolutionary method.”

Items 15, 16 and 17. Davies says he is not competent to deal with these.

The above difficulties appertain mainly to the morphological differences between reptiles and mammals, but these are insignificant in comparison with the physiological differences. Prof. J. B. S. Haldane’s answers to the above objections in his debate with me are printed in “Is Evolution a Myth?” (1949).

Clearly the above difficulties greatly outweigh osteological similarities between certain reptiles and mammals. When endeavoring to decide whether these skeletal resemblances are due to similarity of habit or to blood relationship it is desirable to bear in mind the following facts:

1. So great is the variety displayed by vertebrates that inevitably some members of each class display resemblances to members of other classes; for example the mammal known as the duck-billed platypus exhibits some avian and some reptilian characters.

2. The extinct flying reptiles, known as Pterosaurs or Pterodactyls, display many bird-like features. H. G. Seeley writes (“Dragons of the Air” p. 222) “The avian characters of Pterodactyls are predominant parts of their organization, for the conditions of the brain and lungs shown by the moulds of the brain case and the thin hollow bones with conspicuous pneumatic foramina, give evidence of a community of vital structures with Birds, which

is supported by characters of the skeleton . . . A community of structures is found to extend among the bone of such distinctive parts of the skeleton as the sternum, shoulder-girdle, bones of the forearm and foreleg; for in all these regions the Pterodactyl bones are practically indistinguishable from those of Birds. This is the more remarkable because other parts of the skeleton, such as the humerus and pelvis, show a partial resemblance, while the parts which are least avian, like the neck bones, have no tendency to vary the number of vertebrae in the way which is common among Birds.”

In addition to the above, the skull of the Pterodactyl exhibits a number of avian features.

Thus, in the case of the Pterodactyls and the Birds the same question arises as in that of the Therapsid Reptiles and the Mammals: are these resemblances due to near blood relationship or to like habits?

At one time it was thought by many that birds are derived from Pterodactyls; today few, if any, hold this view, for several reasons, the chief of which is that the bird's wing is constructed on a plan fundamentally different from that of a Pterodactyl. Evolutionists generally believe that the bird-like features of the Pterodactyl are either those “common to most archaeosaurs or parallel developments due to similarity of life.” (Davies *op. cit.* p. 193).

How little justification there is for regarding the similarities as the result of blood relationship in the one case and not in the other is apparent from lists of the main similarities between birds and pterodactyls on the one hand and mammals and therapsids on the other:

# SIMILARITIES BETWEEN PTEROSAURS AND BIRDS      MAMMALS AND THERAPSID REPTILES

## *Head*

1. Head placed at right angle to neck.
2. Shape of head similar.
3. Shape of brain similar.
4. Beak with nostrils in same position.
5. Palate similar.
6. Presence of intermaxillary bones between the nostrils.
7. Quadrate bone forwardly inclined.
8. One occipital condyle.

## *Shoulder and Limb Girdle*

9. Scapula and coracoid and position of articulation of humerus similar.
10. Relations of lower arm bones similar.

## *Sternum and Ribs*

11. Sternum similar and keeled.
12. Small number of sternal ribs.

## *Pelvis and Hind Limb*

13. Tibia and fibula similar.
14. Ilium produced in front of and behind thigh joint.

## *Head*

1. Head bones situated alike but different in proportions.
2. Absence of corpus callosum.<sup>[2]</sup>
3. Prefrontals and Postfrontals lacking.
4. Teeth differentiated into incisors, canines and molars.<sup>[3]</sup>
5. Two occipital condyles.

## *Shoulder and Limb Girdle*

6. Presence of coracoid and interclavicle.<sup>[4]</sup>

## *Sternum and Ribs*

7. Coracoid articulates with sternum.

## *Pelvis and Hind Limb*

8. Ilium forms small angle with sacrum.

## *General*

## 9. Presence of cloaca.<sup>[5]</sup>

3. The Therapsids are not the only reptiles exhibiting mammal-like features. L. M. Berg writes (“Nomogenesis” p. 197): “In the Permian and Triassic Dicynodon, of the order Anomodontia, the structure of the zygomatic arch, scapula and pelvis is like that of mammals. If we admit that Mammalia were derived from Theriodontia, by what . . . may be explained the similarity of Dicynodon to mammals? In Dinocephalia . . . in the region of the ear are displayed remarkable resemblances to what is observed in mammals. Lastly in the Pareiasauria . . . we find a development in the direction of mammals, to which the presence of an acromion and the fusion of the pelvic bones testify. Thus, even if we admit that mammals have been derived from one group of Theromorpha, it follows that the resemblances of the former to other groups of the latter are due to parallel development.”

In Berg’s opinion the mammals cannot be derived from the Theriodontia. He, with Furbringer, believes that their mutual similarities are due to parallel development, i.e. to similarity of habits or to coincidence.

It is submitted that the resemblance of the mammal-like reptiles to mammals is explained by two facts:

I. Reptiles from the Permian to the end of the Cretaceous period occupied, to the exclusion of the mammals, all the low-lying parts of the earth and in consequence the reptiles which occupied the niches now filled by mammals had many of the habits of these, and these habits are reflected in their morphology.

II. In the past reptiles were enormously diversified, far more than mammals are. Great as are the differences between such mammals as a mouse, bat, kangaroo, platypus, horse, armadillo, elephant, whale, seal, these differences are not so great as those between lizards, crocodiles, pterodactyls, turtles, ichthyosaurs, snakes, thalattosaurs, turtles, theromorphs and bipedal and quadrupedal dinosaurs.

In respect of size there were reptiles no bigger than a mouse and gigantic forms, such as Diplodocus 87 feet in length and Tyrannosaurus which towered 20 feet above the ground.

Some of the bigger orders of reptiles, such as the Theromorphs and the Dinosaurs, were as diversified as the whole class of mammals.

The teeth of the Theromorph reptiles exhibited greater variety than do those of mammals. Some had two canines, others three, on either side of the jaw. In some the teeth were undifferentiated. In some the teeth decreased in

size from front to back. Some had only incisors and canines. In some the molars were arranged in two rows; in others the arrangement was irregular.

Such, then, was the diversity exhibited by the reptiles in the past, that it would be strange, evolution or no evolution, if none of them exhibited skeletal features like those of mammals.

#### 4. *The Gradual Transformation of a Land Mammal Into a Whale or a Sea-Cow*

We have already pointed out (p. 70) that such a transformation would entail a long line of ancestors able neither to walk properly on land or swim properly in the sea.

“There is,” writes Vialleton (“*Membres et Ceintures*” (1924) p. 394) “no room for states intermediate between those of ordinary mammals and fish-like mammals, for one cannot imagine individuals of which the posterior members are still fairly well (*assez*) developed and the tail already longer than usual, functioning simultaneously . . . It is thus an illusion to seek for intermediaries which will at the same time exhibit the pelvis of an ordinary mammal and a tail tending towards the pisciform type. The two conditions exclude each other.”

Dr. Davies meets my criticism thus (p. 92): “Admittedly we have here a difficulty of the evolution theory.” While links are missing it is difficult to picture their exact mode of life. Precisely the same difficulty occurs when we try to picture how the wheel was evolved from the roller: the exact nature of the intermediate stages have so far baffled all attempts at reconstruction. The easiest way out of the difficulty would be to give up the attempt and say that the wheel was not a human invention but a supernatural revelation; yet I know of no one who has adopted that view. Everyone believes that the wheel was developed out of the roller, though no one can confidently say how.

If it be true that we cannot imagine how man invented the wheel, it would mean either that the wheel was “a supernatural revelation,” or that ancient man was more intelligent than his present day descendants. The latter alternative does not fit in very well with the theory of evolution!

Moreover, the conversion of a roller into a wheel is a mere bagatelle in comparison with that of a land animal into a whale. The former during the period of transformation had not to find its food or to hold its own in competition with other rollers or wheels. I cannot conceive how a land animal became gradually converted into a whale or sea-cow, but I have no difficulty in imagining the various stages of the conversion of a log into a spoked wheel, or in making rough sketches of these. I do not say that my sketches

would represent the stages actually passed through. But I do not ask transformists to make sketches of actual ancestors of whale. I ask for drawings of *possible* intermediaries.

I contend that a true intermediary would not be viable and so cannot have existed. If my contention be right the theory of organic evolution collapses, because, if ever a land mammal became converted into a whale, the conversion must have necessitated either one terrific miracle or many small ones.

It is not merely a change in mode of locomotion. It is a transformation of almost every part of the body. Whale calves are born and suckled under water. This would be impossible if both mother and young were not specially adapted for this. In order that the baby whale can breathe while taking in milk and the adult breathe while taking water into the mouth the epiglottis and the laryngeal cartilage have to be prolonged upwards to form a cone-shaped tube, and the soft palate has to be prolonged downwards so as tightly to embrace this tube. Then there must be a cap round the nipple of the mother into which the snout of the young one fits tightly. The mother also has to have a milk reservoir and apparatus for forcing milk into the mouth of her calf. If the whale evolved from a land ancestor all these adaptations must have been made before the sudden change from suckling the young in the air to suckling under water. These adaptations are hardly noticed in textbooks, which also slur over the locomotor difficulties. Here is a typical example to be found on page 682 of Thomson's "Biology for Every Man" (1934): "We may begin with an animal like the stoat that occasionally jumps into the water and swims well. The next step may be illustrated by the otter, that is thoroughly at home in the river and may swim for miles out to sea, yet remains equally at home on land. On the next level may be placed the almost exterminated sea-otter (*Enhydra*) of the North Pacific, whose hind feet are suited only for swimming. Then we reach the progressive series represented by the sea-lion, walrus and seals—the last named being almost as thoroughly aquatic as the whales, except that they bring forth their young on the shore and nurse them there."

Needless to say, the above passage in no way meets the difficulty of the gradual transformation of a land—into an aquatic animal. Yet W. K. Gregory made an almost identical statement on page 751 of Vol. 14 of the latest edition of the Encyclopedia Britannica. So does Prof. J. B. S. Haldane in reply to Mr. Arnold Lunn's request for sketches of intermediate forms. Haldane pleads that he is not a good sketcher, but that his drawings would be rather like caricatures of dugongs and seals. ("Science and the Supernatural" p. 320).



It is interesting to notice that neither Thomson, Gregory, Haldane nor, so far as I am aware, any other evolutionist mentions the polar bear when dealing with the supposed evolution of whales and sea-cows, and no hint is given of the thoroughly aquatic habits of the sea-otter.

The fact that these two animals exist and flourish is fatal to the notion that whales, sea-cows, seals, walruses or sea-lions gradually evolved from an ordinary land quadruped.

The sea-otter is a beautiful swimmer. It is said to be even more pelagic than seals, walruses and sea-lions, for it carries and suckles its young in the open sea which these do not. Nevertheless its appearance differs little from that of many mammals that never willingly enter water. The only features which it exhibits that would lead one to suspect its aquatic habits are the webs between its toes.

The polar bear swims nearly, if not quite as well, as seals, walruses and sea-lions. It has been seen swimming steadily across a gulf forty miles across, also in the sea 80 miles from the nearest land, with no ice in sight. Its maneuvers in the water are astounding. It subsists largely on fish. It also catches and devours seals which it sometimes takes in the water, and of course it can easily overtake them on land. Yet there is nothing in the anatomy of the polar bear which would lead anyone to suspect its aquatic habits. It is circumpolar in its distribution.

As sea-otters and polar bears are able to secure their food in the sea as successfully as sea-lions, walruses and seals can, while they are far better equipped for hunting on land or ice, is not the idea that any land quadruped ever got its hind limbs pinned up as they are in the sea-lions and other pinnipedia ludicrous?

Even if this strange event did happen and a normal land quadruped became changed into a sea-lion, this would not be a stage in the development of a whale or a sea-cow, because in sea-lions, walruses and seals the pelvis and hind legs are well-developed and the tail is short—conditions diametrically opposed to those of sirenia and whales. Hence if these two latter on the one hand and the sea-lions and other pinnipedia on the other be derived from a land quadruped, the evolution from its start followed widely diverging lines.

Nor is this all. Seals cannot have evolved gradually from either sea-lions or walruses, because the latter use only the fore-legs as swimming organs, while the seals employ as such only their hind legs and tail. Thus the sirenia, cetacea, seals, walruses and sea-lions all give independent evidence against

the evolution theory. Each one of them is a stumbling block to the transformist.

### 5. *The Gradual Transformation of An Ordinary Mammal Into a Bat*

The transformation of a quadruped into a bat cannot have been effected gradually, step by step, because the greatly-elongated digits of the fore-limb would have rendered walking very difficult, even before they were nearly long enough to serve as supports of the wing membrane. Nor can the supposed ancestor have been a biped, such as an ape or a man, because the arms of this creature would have become useless as such before they had become wings.

“Is it possible” asks Vialleton (“*Membres et Ceintures*” p. 421): “to assign an order to the series of changes which are necessary to convert an ordinary mammal into a bat? Is it possible to select among all the affected apparatus the one that would first have to become modified, and of which the modification would involve that of all the others? Nothing makes it permissible to think that it is. Neither palaeontology nor morphology furnishes us with an intermediate form. The flying lemurs, squirrels and phalangiers cannot possibly be regarded as such. It is very probable that all the changes were effected simultaneously . . . so as to produce at one stroke a new type equipped with the organs and apparatus capable of enabling it to live and propagate itself, and, at the same time, with the instincts necessary for the new mode of life.”

As some textbooks declare that flying squirrels and other animals having a patagium are intermediate between ordinary and flying mammals, it is necessary to amplify Vialleton’s remarks. The truth is that the patagium, far from being an incipient organ of flight, presents an obstacle to the development of a wing, because its existence necessitates an orientation of the fore-legs incompatible with flight. It remains rigid and fully expanded when the animal is moving in the air. It is folded only when the animal alights. It cannot be used as a wing. It is just a parachute. The difference between it and a wing is fundamental.

### 6. *The Gradual Transformation of a Lower Animal Into a Human Being*

Man is unique among animals. If we regard only his anatomy, he is merely a family, represented by one species of the primate sub-order Simioidea, which includes the monkeys and apes. If we take into consideration his psychic characters it seems necessary to place him in a separate kingdom. That such a creature—one that lords it over all the others—should have arisen in the ordinary course of evolution is *prima facie* improbable.

His chief asset is his brain, which is far larger than is needful to enable him to hold his own against all other animals. What natural force can have caused his great brain to have developed?

On the other hand, while his brain was yet on the same level as those of the creatures from which he is supposed to have evolved, it is difficult to understand how he could have competed against powerful predacious animals. Physically he is no match for them. He is a comparatively poor climber. He is not so fleet of foot as most quadrupeds. His teeth and nails are contemptible weapons. He lacks protective armour. Owing to his nakedness he is more sensitive to changes of temperature than are most animals. His great assets—his brain and hands—would not suffice to set off his disabilities until they had attained considerable development. If he once possessed other weapons of offence, why did he lose them? He needed them to fight against his fellow men, and natural selection should have maintained their efficiency. If he evolved in some part of the globe free from large apes and carnivores, what led to the enormous development of his brain?

Nor are the above the only difficulties of the theory that man is derived from a lower animal. No matter what view be held of man's origin, the exercise of a little common sense should convince anyone that none of man's ancestors can have had any of the following characters (the account of which that follows repeats what I wrote in "The Man From Monkey Myth" in the issue of "The Nineteenth Century and After" of April 1944):

(1) A hairy coat to which the young could cling, thus allowing the mother full use of all four limbs for locomotion.

(2) Quadrupedal gait.

(3) An opposable great toe.

Let us consider these. As to the hairy coat, Darwin must have realized that, if this were lost, this must have happened in spite of Natural Selection. Instead of admitting this, he suggests to his readers that the loss took place in the tropics. He writes ("Descent of Man" (1901) p. 86):

"Mr. Belt believes that within the tropics it is an advantage to man to be destitute of hair, as he is thus enabled to free himself of the multitude of ticks (acari) and other parasites, with which he is often infested, and which sometimes cause ulceration. But whether this evil is of sufficient magnitude to have led to the denudation of his body by Natural Selection may be doubted, since none of the many quadrupeds inhabiting the tropics have, so far as I know, acquired any specialized means of relief. The view which seems to me the most probable is that man, or rather primarily woman,

became divested of hair for ornamental purposes, as we shall see under Sexual Selection; and, according to this belief, it is not surprising that man should differ so greatly in hairiness from all other Primates, for characters, gained through Sexual Selection, often differ to an extraordinary degree in closely related forms.”

Darwin here ignores the fact that the main function of the body hair of apes and monkeys is to provide a kind of mat to which the young clings when carried by the mother, allowing her full use of all four limbs for brachiation or other form of locomotion. The young New World monkey hangs on to the back hair of the mother; young Old World monkeys and apes cling to the hair of the mother’s underparts. Le Vaillant records that he shot, in British Guiana, a monkey carrying a young one on its back. The youngster, which was not injured by the shot, continued to cling to its mother’s dead body while this was being taken to the camp. In order to tear it away Le Vaillant had to get the help of a Negro. When disentangled the young one made a dart for a peruke on a wooden block. It embraced the peruke with all four hands and could not be induced to quit it for four weeks.<sup>[6]</sup>

Now consider the case of a species of ape of which the body hair grew gradually shorter and finer. The shorter the hair became the more difficult it would be for the young to hang on and the greater would be the mortality resulting from them falling to the ground when the mother was moving fast; and *ex hypothesi* Natural Selection would prevent the shortest-haired females rearing young, for, said Darwin (*Origin of Species*, p. 63): “We may be sure that any variation in the least degree injurious would be rigidly destroyed.” The only way in which the unfortunate species of which the body hair was becoming progressively shorter could avoid extinction would be for mothers to take to using one of their limbs to hold the young one. As this would allow only three limbs for locomotion, the mothers when fleeing from enemies would be sorely handicapped and so be eliminated by Natural Selection.

The foregoing considerations show why Darwin made Sexual Selection responsible for the nudity of man. He promised that when speaking of Sexual Selection he would explain how this feat was accomplished. But those who turn to the part of the book on Sexual Selection for enlightenment will find no mention of the matter. This is particularly disappointing because of Darwin’s assertion that ‘primarily woman became devoid of hair for ornamental purposes’ does not tally with his oft-repeated declaration that Sexual Selection modifies the male rather than the female, owing to the greater and more promiscuous ‘eagerness’ of the male who ‘usually accepts any female’

(*Descent of Man*, pp. 348, 640, 683, 796, 825). In this case there was no reason why Sexual Selection should cause the female to lose her hair, such loss not being necessary for her to attract males, but there was every reason why Natural Selection should operate to prevent the loss of the hair so greatly needed for the carrying of her young. Darwin evidently found himself in difficulty. He could hardly expect to be believed if he asserted that the prehuman male suddenly acquired an aesthetic preference for short-haired females, and had an eye keen enough to distinguish between one of which the average length of the body hair was, say, 13 mm., and one whose hair measured 12 mm., and mated only with the latter, so that the body hair of the female became progressively shorter until eventually the present nude condition was reached.

Nor could Darwin, even though fortified by his belief that acquired characters are inherited, assert that, just as girls today pluck their eyebrows to attract men, so did the female prehumans heroically pluck the whole body, because human beings have many body hairs, probably as many as anthropoid apes have, but the human hairs are very much shorter and finer. Neither of these theories accounts for the nakedness of the males. Darwin, profiting by our ignorance of the laws of inheritance, asserted that the characters acquired by one sex as the result of Sexual Selection are transmitted to the other sex, but, even so, he had to explain how the naked females contrived to transmit to the males long beards, moustaches and whiskers which they themselves lacked. These troublesome male ornaments also made it difficult for Darwin to change his theory by asserting that the males were the first to be denuded because the females suddenly acquired a predilection for naked males, for, in that case, he would have had to tell us why Natural Selection permitted the males to transmit their nudity to the females and so deprive them of their means of carrying the young. He would also have been up against Natural Selection had he asserted that the males and females acquired their nakedness contemporaneously, either by mutual selection, or by plucking or scratching off their own hair, or that of the opposite sex. No wonder, then, that Darwin did not fulfill his promise to show us how mankind lost the hairy coat. So does Darwin's theory that Sexual Selection brought about the nudity of mankind collapse, and with it the theory that man's ancestors had a coat of long hair.

The supposition that man is descended from a quadrupedal ancestor is, I submit, unsustainable. Man's upright posture and gait mark him off very sharply from all other types. That great comparative anatomist, L. Vialleton, goes so far as to assert (*op. cit.* p. 281) that man is as far separated from his

supposed simian relatives as bats and whales are from all other animals. Professor F. G. Parsons, who is a transformist, writes (*Ency. Brit.*, vol. 15, p. 990): there is 'a greater gap between the musculature of man and that of the other Primates than there is between many different orders.' Darwin did not appreciate this. The change from quadrupedal to bipedal gait presented no difficulty to him. He wrote (*Descent of Man*, p. 78): 'We see . . . in existing monkeys a manner of progression between that of a quadruped and a biped.' This is not so. Monkeys are quadrupedal, but, as they spend most of their time in trees, they are more agile, more supple than creatures which rarely leave the ground. Hence those who derive man from a quadruped naturally assert that this ancestor was a tree-dweller, be it ape, tarsier or lemur. They have to get man's ancestor up a tree. How it got there, how it became transformed from a ground to a tree-dweller, they make no attempt to explain. Darwin starts off with an ape living in the trees and then makes it descend to the ground. Having got it back to *terra firma*, Darwin has to get it on its hind legs. Accordingly he writes (*op. cit.*, p. 76):

'as it became less arboreal . . . its habitual manner of progression would have been modified; and thus it would have been rendered more strictly quadrupedal or bipedal . . . Man alone became a biped; and we can, I think, partly see how he has come to assume his erect attitude . . . Man could not have attained his present dominant position . . . without the use of his hands . . . But the hands and arms could not have become perfect enough to have manufactured weapons or to have hurled stones, as long as they were habitually used for locomotion . . . From these causes alone it would have been an advantage to man to become a biped. . . . To gain this advantage the feet have been rendered flat; and the great toe has been peculiarly modified, though this has entailed the almost complete loss of its power of prehension.'

What will scientific men of the future think of this poppycock? What a picture Darwin draws of this prehuman, which, with commendable foresight and noble self-denial, abstains from using its forelimbs for locomotion, and suffers agonies in its gallant efforts to balance itself and walk on its hind legs! How its spine, hip-, leg- and foot-bones, to say nothing of the great toes, must have ached while they were being reconditioned to adapt themselves to erect posture! Nor did these aches and pains entirely cease when, at last, the erect position was acquired. Dr. John Murphy solemnly assures us (*Primitive Man*, p. 76):

‘When the upright posture was new to the precursor of man, the necessity for frequent rests from it would be greatly felt.’

Even Natural Selection must have been moved to pity by the plight of this prehuman and so refrained from destroying it; otherwise, according to our evolutionists, man would never have come into being.

In addition to the handicap imposed by the change of gait, the incipient hominid would have suffered from the shortening and weakening of the arms. Baumann’s dynamometer tests showed that a male chimpanzee is 4.4 times and a female chimpanzee 3.6 times as strong as a physically developed fit young man.

We have now to consider the supposed loss of the power of opposing the great toe. The corresponding toe of an ape may be compared to one of the blades for a pair of scissors, the other being represented by the remaining toes, these last being bound together by a band of fibres known as the transverse ligament. In man this ligament embraces the great toe as well as the other four, thus the human foot, as compared with that of the ape, is like a pair of scissors so tied that it cannot be opened. The hind limb of the ape is an efficient grasping organ, which the human foot is not.<sup>[7]</sup> Now, the transverse ligament must either embrace the great toe, or not embrace it; no intermediate condition is possible. If, then, man be derived from an animal having the great toe opposable, this non-opposability of his great toe must have arisen suddenly, *per saltum*, as a sport. As this would have imposed a great handicap in the struggle for existence, the Darwinist seems compelled to believe that after a definite date almost every individual had this disability, because, had only a few suffered from it, they would have been, in Darwin’s words ‘rigidly destroyed’; in other words, the loss of opposability must have been a miracle affecting thousands of prehumanidae. The theory of evolution is supposed to obviate the necessity for miracles. It does nothing of the sort. It merely substitutes miracles of transformation for those of special creation. The transformist, W. Beebe, writes (*The Bird*, p. 97): ‘The idea of miraculous change, which is supposed to be an exclusive prerogative of fairy-tales, is a common phenomenon of evolution.’<sup>[8]</sup> The fact that the peasants of Landes and some orientals can oppose, to some extent, the big toe to the others is, as Broderip stated, a trap for the unwary. Haeckel caused Darwin to fall into it. The latter writes (*op. cit.*, p. 77): ‘With some savages, however, the foot has not altogether lost<sup>[9]</sup> its prehensile power, as shown by their manner of climbing trees, and of using them (sic) in other ways.’

As Wood Jones points out, in *Man’s Place among the Mammals*, ‘the human mobility of the big toe is effected by movement at the metatarsal-phalangeal joint, whereas in the monkey and ape the movement is largely at

the saddle-shaped tarso-metatarsal joint.’ In less technical language, as the transverse ligament in man binds together the bones of the sole of the foot, the toes jointed on these are capable of a little independent movement varying in extent with the individual, just as the fingers of the hand are. In apes the big toe and the sole bone on which it is hinged can move at the joint with the ankle.

In conclusion, as Vialleton puts it (*op. cit.*, p. 284), ‘there is absolute opposition between the attitude and the locomotion of man and those of the apes.’ No amount of wishful thinking or special pleading can dispose of this fact. He criticises a picture drawn by T. H. Huxley, showing a series of skeletons of anthropoid apes and man, all upright or almost so, differing only in size, the dimensions of the cranium and the arms, and a slight inclination of the spinal column.

‘This drawing,’ he writes (*Membres et Ceintures des Vertebres tetrapodes*, p. 640), ‘which dissembles the contrast between anthropoids and man, has done much to impress on the minds of the incompetent the notion of perfect continuity between these two groups; it is one of the most striking examples of the schematism so often employed in support of transformist ideas.’

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- [1] Some members of the Ictidosauria—an extinct group of reptiles—had five or even only four bones on each side of the lower jaw.
  - [2] Some other mammals lack this or have it poorly developed.
  - [3] It is doubtful if these structures are homologous in reptiles and mammals.
  - [4] It is doubtful if these structures are homologous in reptiles and mammals.
  - [5] It is doubtful if these structures are homologous in reptiles and mammals.



[6] To provide a baby orangutan, captured in Borneo, with something to cling to, A. R. Wallace made out of a piece of buffalo hide an artificial mother, but he had to remove this because the young orang, in its efforts to extract milk therefrom, was nearly choked by the hair it swallowed.

[7] In all anthropoid apes and a few monkeys the foot is a more efficient grasping organ than the hand. Hartmann, who objected to their feet being called hind hands, had to describe them as prehensile feet.

[8] Professor J. Lefevre writes (*Manuel Critique de Biologie* (1938), p. 35): 'Grace a Haeckel le transformism est a son apogee. Il a repandu partout sa foi; la parole ardente des maitres entraine irresistiblement les eleves. Dans leur lecons chargees de la mystique nouvelle, il n'est question que d'animaux se battant, s'allongeant, se ramassant, se tordant, se retournant, se pliant, redressant leurs bras, s'ornant d'appendices, se creant des organes, se fabriquant des tentacules et des yeux, se transformant les uns dans les autres, se differenciant et se perfectionnant a volonte: prodiges plus merveilleux et beaucoup plus miraculeux que l'idee creatrice elle-meme.'

[9] Notice the question-begging word 'lost.'

## Chapter XVIII

### SOME CHARACTERS OF ANIMALS APPARENTLY INCOMPATIBLE WITH EVOLUTION

Morphological, histological and physiological research has revealed that most, if not all, organisms present features difficult to reconcile with the evolution theory.

1. *The ratio between types and species in the various large groups of animals and plants does not seem to be in accord with it.*

If every type be the consequence of the accumulation of variations or mutations, the more peculiar the type the greater must be the number of species between the type and the ancestral form, and the more types in any group the greater must be the number of intermediate species. Thus the doctrine requires that a group rich in types should invariably contain more species than one poor in types. In fact the reverse is the case.

Fuchs has enunciated the following rule: the number of species in each group is in inverse proportion to the number of types contained within it. Thus the Crustacea and Mammalia are rich in types and poor in species; insects and birds are poor in types and rich in species. This is equally true of plants: the Smilacaceae, the Rosaceae and Liliaceae are rich in types and poor in species: the Compositae, Gramineae and Leguminosae are rich in species and poor in types.

Thus, according to the latest figures I have seen, 12,000 species of mammals and 28,000 of birds are known, but the birds, despite their wealth in species, all fall into some five types: flying, terrestrial, aquatic, wading and nocturnal: whereas mammals display the following types scampering, cursorial, graviportal, saltatorial, fossorial, scansorial, brachiating, bipedal, volplaning, flying and nocturnal.

The Coleoptera (beetles) are a more homogeneous group than the Crustacea: nevertheless 120,000 species of Coleoptera were known in 1898 as compared with 8,000 species of Crustacea.

2. *The great disparity in the span of life in various animals.*

If every organism be descended from a common ancestor, would such enormous differences exist? Why should a parrot live to over 100 years (there is a record of 116 years) while the pheasant apparently does not live longer than 15 years? Why should an elephant live as long as 120 years while no

rhinoceros is known to have lived more than 37, and no hippopotamus more than 33 years? Why should the cat live three times as long as the guinea-pig?

As the vast majority of animals in a state of nature are killed long before they have reached their full span of life, and as species the members of which are long-lived do not seem to be more flourishing than those of which the members are short-lived, can the disparity in longevity be the result of natural selection?

Moreover, if the doctrine of evolution be true, there should be an intimate connection between kinship and longevity: the more nearly related two species, the less should be the difference in the duration of their lives? No such connection exists. "The differences" writes Pearl ("Biology of Death", 1922): "between distinct groups of animals (species, genera, families, etc.) in respect of life span stand in no generally valid orderly relationship to any other broad fact now known in their structure or life history."

If, however, the various types are independent creations we should expect this disparity in the span of life, because the *raison d'être* of these types is the stocking of the earth with an endless variety of forms, and length of life is a characteristic offering ample scope for variety.

3. *The great disparity in the length of time the various groups of animals have persisted on the earth.*

Examples of short duration of existence are afforded by the Entelonychia, Astrapotherioidea, Pyrotheria among mammals, the Ichthyosauria, Plesiosauria, Pterosauria and Dinosauria among reptiles the Graptolites, Cystoidea, Blastoidea and Eurypterida among the invertebrates.

Examples of long-lived groups are the Selachii (sharks and skates), Chelonia (turtles), Crocodilia, all three orders of Brachiopods (lampshells), Diplopoda (millipedes), Blattoidea (cockroaches).

The smaller groups show the same thing. Thus the following genera have persisted since the Cambrian period—the Foraminifera: Lagena, Nodosaria, Cristellana, the Brachiopods: Lingula and Crania.

The long persistence of many genera and other groups cannot be accounted for by asserting that the conditions under which they exist have undergone little or no change, because (1) Some genera which in various localities live in very different conditions have persisted unchanged for immense periods of time. Arca and Leda are two genera of molluscs now living in the sea round Great Britain. The fossils show that Arca has persisted unchanged ever since the Ordovician period, while Leda has existed unchanged since the Silurian. Today these genera occur in most parts of the

world at varying depths from low water on the shore to 250 fathoms. Arca today occurs in such different environments as Prince Regent inlet and the muddy waters of the Jumna about 1000 miles from the sea. Moreover the fossils of these genera indicate that throughout the millions of years of their existence they have been widely distributed and so have, all along, been exposed to very different conditions in various parts of their range.

(2) Thousands of genera which lived side by side with these long-lived ones have become extinct.

“For the extinction of many plants (Sigillaria, Lepidodendron, Cordaites) and animals (Blastoids, Tetracoralla, Trilobites, Rudistae, Ichthyosaurs, etc.) of former periods no adequate explanation has yet been found,” writes von Zittel (“Textbook of Palaeontology”, 1913, vol. I, p. 15). “Changes in external conditions, especially as regards the distribution of land and water, climatal conditions, saltness of water, volcanic eruptions, paucity of food supply, the encroachments of natural enemies, and diseases may have led to the extinction of certain forms; but such conjectures signally fail to account for the disappearance of entire species or particular groups of organisms. Oftentimes extinction seems to have been caused merely by superannuation.”

The enormous differences in the longevity of groups ill fit the doctrine of evolution, but if each type be a special creation, we should expect an attribute of some types to be the power of long persistence.

*4. There is no relation between the stability of Genera and the number of successive generations produced in a given length of time.*

The fossils show that genera which produce a large number of broods in a century undergo little, if any, change during immense stretches of time.

The elephant (Elephas) produces between 3 and 4 successive generations in a hundred years, the horse about 30 and the mouse (Mus) about 400 in the same period of time. Thus Mus has 100 times as many chances of producing variations and the horse ten times as many as the elephant. If the evolution theory were true these three genera should have evolved at the above rates. But the fossils show that the reverse has been the case. The earliest known fossil of Mus occurs in a Lower Pliocene deposit at Roussillon, those of Equus and Elephas first occur in the Upper Pliocene.

These are supposed by evolutionists to have evolved from genera now extinct which lived in the early and middle Pliocene. Thus these comparatively slow-breeding genera have each evolved into at least one new genus, while the genus Mus has persisted since the Lower Pliocene. Most insects, I believe, rear at least one brood every year and are able to breed

when less than a year old, so that each genus must give rise to at least 100 successive generations in a century; nevertheless the fossils show that a number of genera of these have persisted for many millions of years, unchanged. e.g. the genera *Forficula* (earwigs) and *Thrips* are known to have existed in the Eocene period. i.e. considerably over 40 million years ago as geologists now date rocks, while fossils of two genera of silver fishes (*Lepisma* and *Machilis*) of the cricket (*Gryllus*) and of book-lice have been found in Oligocene deposits. Those of may-flies (*Ephemera*) and Tsetse-flies (*Glossina*) have been found in Miocene deposits at Florissant in Colorado.

Facts such as these are exceedingly unfavorable to the transformist theory.

*5. The Distribution of Anatomical Characters among members of Orders and higher groups.*

If all the members of an order or other group be derived from a common ancestor it should be quite easy to draw up a genealogical table showing the descent of each species from the common ancestor, in other words to draw up a phylogenetic classification. To take a hypothetical case: A. the common ancestor of a group gives off descendants which evolve in different directions: one line results in the form B. having a hairy integument, and the other in the form C. having a woolly body-covering. B. and C. each give off lines of descent which evolve differently: in the B. or hair-covered line certain characters appear which we may designate a. b. c. d. e. etc., and in the C. or woolly line other characters arise which may be designated v, w, x, y, z. Among the living descendants of A. only the hairy forms should exhibit any of the a. b. c. characters and the woolly ones x. y. z. In no individual should both an a. b. c. and an x. y. z. character appear.

In fact in no known group are anatomical characters distributed in this way.

Take man as an example. He is said to have evolved from some primate. At a comparatively early period the prehensile-tailed New World Monkeys were separated from the Old World Monkeys. Man is supposed to be derived from the latter group. This being so, he should exhibit no features which characterize New World Monkeys but possess many of those of the Old World Monkeys. But Sir Arthur Keith has shown (Art. "Man", *Encyc. Brit.*, 1929) that man exhibits 5 per cent of the characters of New World monkeys and 5 per cent of those of Old World monkeys. Nor is this all: taking a large number of selected points, 9 per cent of these occur in man, gorilla and chimpanzee, but in no other animal; 5 per cent man shares with the orang alone and 8 per cent with the gibbon alone. All this is not in accord with the theory. Keith writes: "From the details revealed by anatomical analysis it is

plain that evolution has not proceeded in an orderly manner in shaping the bodies of the higher primates: characters are curiously scattered.”

The primates are not peculiar in this respect. Every other group of animals of which the comparative anatomy has been studied exhibits similar features.

This is why all the genealogical trees drawn up by transformists differ. Each is based on the set of characters which the investigator deemed most important. Bashford Dean exposed these differences in the various supposedly phylogenetic classifications of fishes. Vialleton has done so in the case of mammals (“L’Origine des Etres Vivants”, 1929, p. 180). In the case of Birds, I have done so in Appendix III.

A survey of the anatomical characters of any group seems to indicate that there are, so to speak, available certain types of each organ and that these types are distributed among the various families in such a way as to produce the maximum variety with the material available.

#### 6. *The Distribution of Tracheae.*

Tracheae are tubular infoldings of the integument kept open by a spiral thickening of the wall. They constitute the breathing organs of *Peripatus*, the millipedes, centipedes, insects, spiders, scorpions and the land crustaceans known as wood-lice.

The presence of tracheae in such various groups can be explained on the evolution theory by assuming either all the groups are descended from a common ancestor that lived on land in pre-Cambrian times, or that tracheae have evolved on several occasions. Both assumptions seem to be untenable. As regards the first Dr. W. T. Calnan writes (*Enc. Brit.* (1929) vol. 2, p. 495): “The suggestion that all existing arthropods can have been derived from tracheate air-breathing ancestors . . . cannot be considered seriously in the present state of our knowledge.”

Moreover the suggestion leaves the origin of the “Lung-books” of scorpions not accounted for. Accordingly, the other alternative is generally accepted by transformists. “For more than a quarter of a century” writes A. Willey (“Convergence in Evolution” (1911) p. 148) “it has been recognized that Tracheate Arthropods could not be reduced to a common standard and it has also come to be realized that the tracheae of Insects and Arachnids have had separate origins and are therefore different morphologically, though similar histologically and physiologically.”

Thus the doctrine of evolution appears to entail the belief that apparently identical complicated organs have evolved on more than one occasion.

## 7. *The Distribution of Nephridia.*

The nephridia (excretory organs) of such very different animals as the Lancelet (*Amphioxus*) and the Polychaete worms are in every way similar in structure, being ciliated tubes that end blindly in branches furnished with vibratile flame-cells or solenocysts. As there are insuperable objections to the view that the animals named above have descended from a common ancestor possessing nephridia of the above description, evolutionists are apparently compelled to believe that these complex organs have evolved independently on two occasions.

Tracheae and nephridia are not the only examples of identical structures found in widely separated animals. To account for these the doctrines of parallel or collateral and convergent evolution have been formulated.

Evolution has indeed become a name to conjure with.

“In Darwin’s day” writes Prof. F. Wood Jones (“Man’s Place Among the Mammals” (1929) p. 213) “it appeared beyond belief that the processes that he claimed to be responsible for producing evolution could ever have resulted in the formation of an organ so complex in its perfection, so useless in any stage short of perfection, as the eye . . . With more plastic views of evolution . . . but little astonishment is caused today by the knowledge that eyes have been developed several times over in complete independence . . . it should not therefore unduly strain our scientific credulity to imagine that an animal conforming to the popular conception of a monkey has developed twice. Indeed, when we consider the extinct Lemur, *Mesopropithecus*, we may even have to admit that it came near to being developed three times.

“. . . To some it may seem impossible that a creature so complex, so definitely showing incipient human characters, could have developed more than once, and that animals so superficially alike as the Spider Monkeys and the Woolly Monkeys on the one hand and the Langurs and the Gibbons on the other, had evolved in utter independence from a probable pre-Tertiary ancestor which still retained many insectivore-didelphian characters and was little better to look at than a Tree-shrew. Yet, if comparative anatomy is capable of affording any evidence concerning the kinship of animals, there can be no reasonable doubt that every striking simian character found within the two phyla of the Platyrrhines and the Catarrhines (Old and New World Monkeys) has been independently developed as part of the phenomenon of convergence.”

Sir Smith Woodward held similar views. He wrote: “Apparently the same family or genus or species may have originated more than once from a separate series of ancestors.”

Thus, according to some transformists, structural resemblance is no guide to relationship: two animals, so similar that both appear to belong to the same genus, may be in no way nearly related.

### 8. *Coadaptations.*

Coadaptations are the reciprocal adjustments of two independent parts of an organism so that they fit into one another as the blades of a pocket-knife fit into the handle. Cuénot cites a number of these in “L’Adaptation,” (1925). One of them is the apparatus resembling the press-button and socket of a glove, that fastens the mantle of a cuttle-fish in such a manner that the water expelled by the contraction of the mantle is forced out through the funnel thus formed and so propels the animal through the water.

Another example is the jumping apparatus of the click-beetle or spring-jack *Agriotes*.

When an *Agriotes* is frightened it drops to the ground. If it falls on its feet it runs for cover, but if it falls on its back it instantly draws in legs and antennae and remains motionless as if dead. Then suddenly it jumps about 3 inches into the air, if it falls on its back it repeats the above performance until it lands on its feet. The jumping apparatus is a beautiful peg and socket arrangement. The peg projects from the hind edge of the lower part of the first body segment (prosternum). The socket is in the corresponding part of the second segment (mesosternum). The peg has a slide on each side—a smooth, highly polished surface; it also has a groove round it a little behind its point. The socket has on the inner wall a pair of slides corresponding to those on the peg, and a ridge corresponding to the groove of the peg. The socket is rather larger than the peg so that the fit is not tight. When the insect is about to jump the peg is pulled out of the socket by two muscles and this stretches a spring that connects peg and socket; but even when the muscles relax the peg cannot get back into the socket because the ridge of the latter is inserted in the groove of the peg, acting as a stop or a catch. The beetle, however, releases the peg by a violent twitch of the body, then the spring pulls the peg into the socket with such force that the shock of the impact not only jerks the insect into the air but makes a loud click from which the beetle derives its name.

Not only would this jumping apparatus be entirely ineffective until completely developed, but, although useful, it is not indispensable, as the insect, when on its back, is able to turn over, but with difficulty, by means of its claws and by moving its legs. Occasionally it does turn over in this way. Cuénot put one on its back 115 times and it righted itself 100 times by jumping and 15 by means of legs and claws.



The hooks and barbules of the feathers of birds (see [p.222]) afford another example of coadaptation, as do the various mechanisms by which the fore-and hind wings are linked in the Hymenoptera; for example in most moths one or more bristles placed near the body on the front border of the hind wing interlock with hooked catches on the under surface of the forewing. In the hive-bee a row of tiny hooks along the front border of the hind wing engage the folded-over edge of the forewing. Even if the effects of use and disuse can be transmitted to posterity (of which there is no proof) it is difficult to believe that these coadaptations can have evolved gradually.

Cuénot writes: “The extreme mechanical perfection of these little appliances excludes accident: they are as refined in their structure as they are precise in their function. From all the evidence it cannot have been a fortuitous germinal mutation that caused the sudden appearance of a press-button and its socket. . . Without any doubt coadaptation is the end of directed evolution . . . But the only directive factor we know is Darwinian selection: it would be necessary for this to play the part of the workman correcting and gradually perfecting by successive fumbings: . . . but even if its omnipotence be admitted, selection could not create the co-ordinated details of coadaptations, and it is precisely the origin of these details that it is difficult to comprehend . . . But after these negations nothing remains. It would be pure metaphysical amusement to imagine inside the organism a tiny whimsical demon, regulating and directing mutations, even if he were decorated, as some would decorate him, with pompous names, innate tendency to become perfect, *elan vitale*, *entelechy*, etc. We must once again resign ourselves to saying: *ignoramus*.”

We have to bear in mind that many of these coadaptations would be useless until fully, or nearly fully developed. Coadaptations, so difficult to reconcile with the theory of evolution, are precisely what the doctrine of creation demands.

Darwin was addicted to pointing to facts “Inexplicable on the ordinary view of the independent creation of each species.” Today the boot is on the other leg: it is possible to point to thousands of facts which appear to be inexplicable on the Darwinian view of Evolution.

### 9. *Mutual Adaptations.*

Some mutual adaptations, that is, complementary adaptations in two individuals, are of such a nature that they cannot have originated gradually. Cuénot, as a transformist, calls these pre-adaptations. According to him they must have evolved in anticipation of future conditions.

If mammals evolved from reptiles or amphibians, both mother and young of the nascent mammal had to be preadapted to the mammalian mode of nourishing the young. In marsupials and placentals the mammary glands are provided with nipples: these would be useless unless the young had soft muscular lips—organs unknown in reptiles.

At birth a kangaroo is little more than an inch long: it is blind and incapable of sucking: its forelimbs are considerably longer than the hind and are provided with well-developed claws. Its lips are enormously developed. It is usually said that when the youngster emerges from the mother's uro-genital sinus, it climbs with the aid of its fore-paws into her pouch and on reaching the teats, seizes one with its lips. E. L. Grant Watson, however, says ("Enigmas of Natural History" p. 115) that the mother picks up the baby kangaroo with her lips and places it in her pouch. Once it has seized a nipple it is only with great difficulty that the young one can be pulled off. According to Grant Watson, the skin breaks down between mother and offspring and there is established a second intimate relationship in which the blood of the parent brings nourishment to the young. This is why bushmen believe that the young kangaroo is budded in its mother's pouch. Although the baby is so firmly attached to the nipple it has not sufficient strength to suck; accordingly the mammary gland of the mother is furnished with muscles that force the milk into the gullet of the young one. In order to prevent the milk so injected entering the windpipe, and to enable the young one to breathe while it is being fed, its windpipe is prolonged upwards and forwards to fit into the back of the nasal tunnel. To prevent milk escaping by the sides of the mouth, these are closed, and, for a time, the mouth does not enlarge with the growth of the rest of the body.

None of the above pre-adaptations would be of much use apart from the others and until all are well developed. Can they, then, have originated gradually?

The pre-adaptation of the mother whale and her calf are not less complicated. No gradual transition is possible from suckling the young in the air to suckling it under water. On the first occasion when the young one was suckled under water both mother and calf had to be adapted to the operation. The windpipe of the calf is modified like that of the baby kangaroo, while the nipple of the mother is surrounded by a pocket that fits tightly over the snout of the calf and so prevents salt water being imbibed with the milk.

It is submitted that the above facts show that many morphological characters of animals are such that they must have come into being suddenly and in a fully-developed condition, in other words that they were specially created.

## 10. *Morphological Adaptations of Aquatic Insects.*

It is submitted that many of these adaptations are quite incompatible with the doctrine of evolution.

Transformists seem to be agreed that the earliest insects to be evolved were terrestrial, and that all the aquatic species are derived from land ancestors. The number of species of aquatic insects is very large and they are members of almost every order. Over 56 years ago L. C. Miall wrote ("The Natural History of Aquatic Insects" (1895) p. 5): "I think we can say with a considerable degree of probability that this change of habitat from terrestrial to aquatic has taken place in the class of insects at least a hundred times quite independently and the number may well be much higher than a hundred."

Consider what drastic changes in the anatomy and physiology of a species are needed to enable a land form to lead an aquatic existence. In my view the improbability of such change having been effected on about one hundred different occasions is immense.

The supposed transformation affects, the mode of locomotion, of feeding and of respiration. Let us consider some of the means whereby insects are adapted to locomotion in or on water. An excellent account of the chief of these is to be found on pp. 382 and 383 of the above named book. The Pond-skaters "stand or run upon the surface of the water, which they dimple but do not break." The Water Spring-tails can leap from the surface film and alight upon it unwetted. The Whirligig Beetle (*Gyrinus*) darts to and fro on the surface, changing its course by slight adjustments of its peculiar paddles. The larvae of gnats and mosquitoes hang from the surface film by an unwettable basin at the end of the tail which admits air into the spiracles, while the head sweeps through the water in search of food. In some species the adults, in others the larvae, are able to creep on the underside of the surface film. The water-boatman rests with its back downwards, and is able to swim in this position. The winged *Dytiscus* is perfectly adapted for underwater navigation: the tibiae and tarsi of its hind legs are flattened and margined by long bristles. While swimming the tarsus rotates so as to present its broad surface to the water during the forward stroke and its edge during the backward stroke. *Polynema* swims by the help of its wings as a penguin does. "Many long-bodied Dipterous larvae move by a lashing action, striking the water sideways and instantly reversing the stroke. In *Corethra* and the Gnat the lashing action of the larva is aided by a fin composed of close-set bristles. Some dragon-fly larvae swim by striking the water with the abdomen: others swim by jet propulsion, expelling water violently from the intestine." Perhaps all the above devices are eclipsed by the larva of the Buffalo Gnat (*Simulium*), of which Miall gives an admirable account (*op. cit.* pp. 179-182). This lives in

running streams but cannot swim. The ends of its legs are modified into suckers and around these is a circle of hooks; by means of these suckers and hooks it is able to obtain a good foothold on a submerged leaf and is not easily dislodged . . . When it does become dislodged it is able to regain its position, thanks to a perfect labyrinth of silken threads which it has spun and which extend in all directions from leaf to leaf. "To recover its position" writes Miall "is not difficult if the network of threads is intact or if the larva has even a single thread to grasp. Sometimes it hauls itself up, hand over hand, like a Leech or a Looping caterpillar, applying its two suckers alternately to the thread. It can also creep along its thread by means of the prothoracic hooks only . . . Although the larva commonly slides along a thread previously made . . . it can upon a sudden emergency spin a new thread like a Spider or a Geometer larva."

The mental gymnastics which enable an entomologist to be an evolutionist have long been a source of wonder to me.

#### 11. *The Astounding Diversity of the Minute Details of Organs.*

The teeth afford excellent examples of this character. Consider the minute structure of their dentine and enamel. C. S. Tomes wrote (*Proc. Zool. Soc. Land.* (1906) p. 45): "It might have been expected that there would be but little variety of structure in the teeth of animals belonging to the same great groups, for it is not easy to see how this should be affected by the ordinary processes of selection. It might have been thought that so long as a tooth was strong enough, sharp enough, and well adapted in external form to its work, its structure would matter little and would remain constant. But it was shown by my father, the late Sir John Tomes, that by a mere examination of sections of the enamel it was possible in the case of rodents, not merely to pronounce that the enamel was that of a rodent, but, in a large number of instances, to refer it correctly to a particular family of rodents or to a group of rodents . . . Similarly my father showed that the enamel of Marsupials presented characters very unusual in Placental mammals, and therefore almost characteristic of Marsupials, whilst the Carnivora also presented well-marked enamel characters."

Teeth in their outward form display the same phenomenon. This is much more diversified than appears to be necessary for purely utilitarian purposes. Dr. F. Gordon Cawston writes ("The Evolution Theory in Its Relation to Tooth Replacement" p. 4): "Some fishes have but four teeth (in all) whilst others have hundreds. This diversity in number is very pronounced in sharks and rays. In some the crowns of the teeth are joined to form flat paving-stones which are either square, oblong or rhomboidal; in others the teeth surfaces do

not join. Other teeth have sharp pointed cusps, and a single cusp may be erect, curved or barbed. Some teeth have lateral denticles, others have none."

The roots of the teeth of sharks and rays are more diversified than the crowns are. E. Casier shows (*Bul. Mus. Roy. d'Hist. Nat. de Belgique*, Tome XXIII. No. 14, 1947) that the sharks exhibit at least six distinct types of root structure. The root may be single or bifid. The single root may have one opening for the reception of the nerve supply, or two, or even more. In the Eagle-ray type of tooth there are unlimited numbers of apertures leading to about sixty longitudinal blades. Of course different feeding habits account for some of this diversity, but not for all. Casier considers that it is unreasonable to attribute to evolution the structure of the teeth in many fishes.

The variety of the types of the hair that covers the body of most mammals is quite as remarkable as that of teeth. As the body hair serves the same purpose in most mammals, there seems no reason, except desire for variety, why the minute structure of the hairs is not almost identical in all kinds of animals. In fact both the central part, or medulla, and the cuticle display amazing variety. Of the medulla Martin Duncan writes (*Encyc. Brit.* Vol. 1, p. 80) "The variations in the medulla may be summarized as (a) the continuous type, which may be homogeneous, as in the chimpanzee, or nodose, as in the gelada baboon; (b) discontinuous medullas, which in simple forms may be ovate, elongated, or flattened (in *Hylobates* it is discontinuous and elongated); (c) a fragmental type, as in *Semnopithecus*."

Thus we have all the main types of medulla occurring in the hair of the Primates.

The scales of which the cuticle is composed vary greatly in size and shape, and, to quote Duncan, "Constitute the most important microscopic structure of the mammalian hair, for they possess definite and constant specific characters." Thus the cuticle of the hairs of no two species is the same.

So far as we have been able to study the minute details in respect of any species, we find that this diversity extends to individuals within each species. Consider one small feature of man: the ridges on the skin of his finger tips. It is well known that no two of these are alike in any of the thousands of individuals of which the finger tips have been examined, so that finger prints are used all over the world as a sure means of identification. In an article in "The Sunday Dispatch" in 1947 the Marquis of Donegal stated that he learned from an expert that "the chances of identical prints in two individuals are reckoned at one septillion to one . . . if every man, woman, and child in the

world would write three strokes a second with a pencil, it would take them 8 million years to complete a septillion of strokes.”

The ridges on the skin of some individuals are in the form of arches, others take the form of loops, yet others of whorls. Is it conceivable that any particular form or arrangement of these skin ridges gives its possessor any advantage over individuals in whose fingers the arrangement is different? If it does so, why does not every individual have the most advantageous arrangement?

The only satisfactory, or even reasonable, explanation of this diversity is that given by Paley (who understood nature far better than Darwin did): “Apparently VARIETY itself, distinct from every other reason, was a motive in the mind of the Creator, or with the agents of His Will.”

In the written debates I had with H. S. Shelton and I. B. S. Haldane I cited some of the above objections to the evolution theory and asked them to meet these. Shelton’s attempts were very feeble. They are set forth in “Is Evolution Proved?” (1947). Haldane made a rather better showing. His efforts are recorded in “Is Evolution a Myth?” (1949). The truth is that every materialistic theory of evolution collapses when confronted by the above difficulties.

## Chapter XIX

### DIFFICULTIES PRESENTED BY SOME INSTINCTS

Many habits of animals are such that it seems impossible for them to have been acquired gradually. One of these is the habit of the male of the fish Arius of incubating the eggs in his mouth—a habit necessitating his going without food for several days. The aft-topsail fish (*Felichthys felis*) and the toad (*Rhinoderma darwini*) have similar habits, as have the females of African cichlid fishes.

The nesting habits of many birds cannot have developed gradually. Let us notice those of the Indian tailor-bird, the oriole and the weaver bird. The hen Indian tailor-bird (*Orthotomus sutorius*) makes a receptacle for her eggs out of one or more leaves while still growing on a bush. The procedure differs as she utilizes one large leaf or two or more small ones to form the casing of her nest. When a single leaf is used the hen begins operations by piercing with her bill a series of holes along each margin of the leaf. She then procures strand after strand of cobweb. One end of each strand is wound by her round the part of the leaf between the margin and one of the holes she has punctured. Having thus made this end fast she attaches the other end of the strand in the same way to the opposite edge of the leaf, thereby drawing its edges together. She then connects in the same manner each of the other punctures with the corresponding one near the other edge of the leaf. Thus a cone-shaped receptacle is formed. This may be more or less horizontal at first, but gradually assumes a vertical or hanging position as it becomes weighed down by the weight of the soft cotton-like material of which she makes the actual nest. The bird keeps this material in position by puncturing with her bill a number of holes in the leaf, through which she pushes some cotton which is retained in this position by the silicious material in the leaf. Although cobweb bears considerable strain, it could not keep together the edges of the leaf when this held the mother bird and three or four nestlings. The hen therefore connects some of the punctures on opposite sides of the leaf by short strands of cotton, each end of each strand being pushed through a puncture. The fluffy knob of cotton protruding through the puncture, which is kept *in situ* by the silicon in the leaf has been mistaken by some observers for a knot, but the bird does not make a knot. I have seen dozens of these wonderful nests, but never one that did not bear the weight of the mother bird and her brood. It seems impossible that the habit of making a nest in this way can have evolved gradually.

The Oriole (*Oriolus kundoo*) constructs a hammock slung from the prongs of a forked branch. The hen either shaves off strips of pliable bark up to two feet in length, or makes use of other suitable material, such as hemp fibre, or even strips of cloth. Having secured a suitable strip, the hen winds one end round one limb of the selected forked branch, carries the free end to the other limb, winds the strip around it and, returning to the first limb winds the end of the strip round this. Several fibres dealt with in the above manner serve to support the nest which is a slender cup made of fine fibres.

The nest of the weaver bird (*Ploceus baya*) is a superbly plaited flask suspended from a branch of a tree. The material used varies with the locality. In Bombay it usually consists of thin strips of cocoa-nut leaves; elsewhere it is commonly composed of strips of giant grasses. Having selected, let us say, a blade of elephant grass, the bird makes a notch with its bill in the blade near its base.

The weaver then grips with its bill the edge of the grass at a point just above the notch, and, with a jerk of the head tears a thin strip from the leaf.

While retaining this in the bill, it tears off a second, and a third, and occasionally a fourth strand; it then flies off with its load of building material. Should any of the strands still remain attached to the tip of the grass stem the momentum of the flying bird usually suffices to complete the severance. If it does not the flier is pulled back and swings in the air suspended by the still fastened strips. In that case the bird again flies off and perseveres until it succeeds. The fibres first collected are wound round and round the branch from which the nest will hang. These remain firmly fixed owing to the silicious matter in the leaf. The fibres next collected are plaited into those attached to the branch and in a short time the birds plait a rope some four inches long. This is then expanded by the addition of further material into a bell-shaped structure, which will form the roof of the nest. The next step is to plait a loop across the base of the bell, which then has the appearance of an inverted basket having a handle. Up to this point both cock and hen do the same kind of work. After the loop is completed the hen brings in no more material but remains perched on the loop while the cock does the fetching, and both plait the material he has brought, the hen working from the inside and the cock from the outside of the nest. The next step is to close up one side of the loop to form a receptacle for the eggs; the other side is left open, but is prolonged downwards to form a tubular passage about six inches long.

Thus, the entrance to the nest is from below and the nest has the shape of a retort. The habit of constructing a nest of this description cannot have been developed gradually. This applies to many other kinds of nests, that of the



English house-martin, for example. This is a cup composed of mud pellets attached to a wall under the eaves of a house.

A great many examples of habits that cannot have been acquired gradually or piecemeal are afforded by spiders and insects. The books of Hemi Fabre are full of them. Even though Fabre on occasions may have exaggerated the accuracy with which the solitary wasps find the nerve ganglia of their victims in order to paralyze these, it is impossible to believe that such habits developed gradually in many species, even in a form not so perfect as they now present.

Facts such as these led Fabre to regard the theory of organic evolution as a solemn hoax.

Fabre is not the only entomologist who rejects the evolution theory because it is incompatible with many of the habits of insects. Geoffrey Taylor, in a broadcast given in Ireland early in 1948 said: "I will, to end this talk, outline the life history of the Large Blue Butterfly (*Maculinea arion*), since it was this that first shook my faith in the whole evolutionary set-up."

The female lays her eggs singly on the buds of wild thyme. On emerging from the egg the caterpillar feeds on the flowers of the thyme for about three weeks, during which it moults three times. Then it leaves the thyme plant and never eats vegetable food again. On the ground the caterpillar soon meets with a red ant of a colony near the thyme plant on which it had been feeding. The ant strokes the caterpillar with antennae and legs and thus causes sweet fluid to exude from a special gland in the tenth segment of the caterpillar's body. The ant drinks the fluid. After this has gone on for about an hour the caterpillar suddenly hunches up the front part of its back, whereupon the ant stands astride the caterpillar, seizes it in its jaws (as a cat might pick up a kitten) and carries the caterpillar to the ants' nest. Inside the nest the ants feed the caterpillar on their own larvae and in return they milk from it its sweet fluid. For six weeks the caterpillar is fed in this way, during which it grows to three times its size without moulting; its skin stretching to accommodate the growing body. Then the caterpillar hibernates till the following spring in a special cavity in the nest. In the spring it awakes and resumes feeding on the ant larvae until early June by which time its length has increased from 3 mm. to 14 mm. without moulting. It now ceases to feed and spins a pad of silk on the roof of the chamber in which it has spent the winter, and attaches itself to this pad by its claspers. Here in about a week it changes into a chrysalis. Then after hanging for a few days it falls to the floor where it lies among the ants for about three weeks until it emerges as a butterfly. Then while its wings are still unfolded, it crawls through the passages of the nest into the open air. Then it climbs on to a grass stem where its wings unfold and dry; this process

having been delayed to enable it to move through the nest passages without injuring its wings.

This then is the story. To quote Taylor (“Irish Monthly” April, 1948, p. 163): “One can hardly imagine a more unlikely story; but it is well authenticated. What is more to the point, I defy anyone to imagine that fantastic life history, involving cooperation between two totally different orders of insects—ants and butterflies—taking place as the result of chance random variations. Whatever else it may show, the story of the Large Blue Butterfly and the Small Red ant knocks evolution, as an automatic materialist process, bang on the head. Beyond that, so far as I can see, this complex, eccentric, fairytale adaptation of two different insects to one another can only be a result of final causes, and is clear evidence of intelligent design—involving, of course, an intelligent designer.”

## Chapter XX

### THE TRANSFORMIST ILLUSION

It is submitted that the facts set forth in this book show that it is an illusion to believe that blind natural forces have caused life to emerge from inert matter and then gradually to assume the varied forms of living organisms. We are therefore justified in speaking of the transformist illusion.

As we have noticed, an evolution of the simple into the complex would violate the law of entropy or the law of morpholysis, which law, as R. E. D. Clark has shown (“Darwin: Before and After” (1948) p. 154 *et. seq.*), is the basis on which all physical science is built and which biologists (including Darwin) take for granted whenever it suits them, but they act as if it did not exist when it upsets their doctrine!

Thus, if any evolution has taken place it must be consistent with this universal law. And this means, as Clark well says (*op. cit.* p. 157): “The possibilities latent in evolution are very strictly limited: that evolution can never in the strict sense be constructive or creative.” To those who believe in evolution Clark gives the admonition (p. 163): “Let it be admitted candidly that evolution has occurred in the face of all the laws of nature: let it be admitted that theologians are right in insisting that, if the process took place at all, it was God-guided and was, in fact, a whole series of creative acts.”

But the ascertained facts of biology and palaeontology, far from encouraging a belief in evolution, almost compel us to reject it.

This was the conclusion arrived at by the French geologist, Paul Lemoine, who, as editor of the volume of the French Encyclopedia dealing with Living Organisms, reviewed the articles of the various contributors.

He showed how the facts adduced are against evolutionism. He pointed out how the geological data emphasize the sudden appearance of all new groups, and the extreme slowness with which changes in animals have taken place. He quotes Jeannel’s statement: “The duration of the evolution of insects of the Primary period must have been ten times as long as that of all the earlier periods added together.” This, says Lemoine, means that the common ancestor of the insects lived 5,000 million years ago. “If you believe” he adds “in the monophyletic origin of life you have to invoke astronomical periods and go back to the times when the earth or even the solar system had not come into existence.”

Lemoine concludes: “It follows from this account that the theory of evolution is impossible. In reality, despite appearances, no one any longer believes in it, and one speaks without attaching any importance to it, of evolution to denote linkage—or more evolved, less evolved in the sense of more perfected, less perfected, because it is the conventional language, admitted and almost obligatory in the scientific world. Evolution is a kind of dogma, in which the priests no longer believe, but which they maintain for their people.”

Lemoine, of course spoke of French biologists, whom Darwin never dominated to the extent that he has dominated British, American and German biologists. Most of these seem really to believe in evolution.

This belief is not entirely due to Darwin worship. Two of the reasons of the popularity of evolution today are:

1. The theory purports to do away with miracles and to dispense with a Creator.

2. It offers a very simple explanation of a number of phenomena, such as (a) Only one of the oldest known animals, those of the Cambrian period, belongs to a species now living, only two or three to living genera and about 100 to living families, (b) Nearly all the species and genera and most of the families and a number of the orders now living make their first appearance in the rocks at varying periods subsequent to the Cambrian, (c) As we pass downward through the geological strata we find that the lower we go the greater the percentage of fossils of extinct forms. For example the strata of the Tertiary period are subdivided chronologically on the basis of the percentages of their fossils of living species:

<i>Period</i>	<i>Percentage of Fossils of Living Species</i>
Eocene	5 or less
Oligocene	5 to 20
Miocene	20 to 50
Pliocene	50 or upwards

The fossils of genera and families, however, tell a different story. Thus of the Mollusca of the British Isles 73 per cent of living genera and about 75 per cent of living families are shown by the fossils to have been in existence in the Eocene period. (d) It is possible from the known fossils to arrange a few chronological series indicating that in course of time species have gradually changed into new species. As regards 1, above, we have shown that this is incorrect. No. 2, on the other hand does seem to show that Linnaeus was

incorrect when he declared that every species was specially created. There is also fossil evidence which suggests that, if given long enough, a new genus may evolve, but there is no evidence that a new family has ever arisen in this way.

Nor is this all. As we have seen, the fossils which suggest that new species have evolved show that this evolution is a very slow process, so slow that at least 100 million years are needed for the evolution of a new order. In short this fossil evidence, so often cited as favoring the evolution theory, is fatal to it.

The known fossils, then, do not prove that a new species has ever evolved, but they indicate, in my view, that this probably happened. If this has not happened, then the known fossils tell us that in the Cambrian period there must have been in existence at least 25 million different species as opposed to the million or so now living. If this were so, it would be quite in accord with the law of entropy, with the fact that the universe seems to be running down as a wound-up clock does.

In the present state of knowledge it is impossible to say what the units of creation were, but it is almost certain that they were very numerous, that, as Berg puts it, in this respect Linnaeus's dictum that every species was specially created is much nearer the truth than Darwin's idea that all existing species are derived from one or two simple ancestors.

We are clearly justified in speaking of the transformist illusion.

# Appendix I

## A NOTE ON CLASSIFICATION

Despite the multitude and great diversity of living organisms it is possible, with a very few exceptions, to classify them, so that all fall into a few major divisions founded on fundamental points of structure.

Organisms are divided into two main groups—the Animal and the Vegetable Kingdoms. Each of these kingdoms is formed of less than a score of groups each of which is constructed on a different plan. In the case of the Animal Kingdom zoologists place in the same group all the animals constructed on any one of these plans. These groups used to be called sub-kingdoms, but now-a-days they are given the question-begging designation Phylum.

# LIST OF THE PHYLA OF THE ANIMAL KINGDOM

## *One-Celled Animals*

1. Protozoa

## *Multicelled Animals*

2. Coelenterata (jelly-fishes, corals, etc.)
3. Porifera (sponges)
4. Platyhelminthes (flatworms, tapeworms, etc.)
5. Nemertinea (marine worms)
6. Rotifera (wheel-animalcules)
7. Nematoda (thread-worms)
8. Annelida (round-worms, such as the common earthworm)
9. Chaetopoda (arrow-worms)
10. Polyzoa or Bryozoa (sea-mats)
  11. Echinodermata (starfishes, sea-urchins, sea-cucumbers, sea-lilies)
12. Brachiopods (lamp shells)
13. Mollusca (cuttle-fishes, limpets, snails, mussels, etc.)
14. Arthropoda (crabs, lobsters, insects, spiders, etc.)
15. Tunicata (sea-squirts)
16. Enteropneusta (Balanoglossus)
17. Vertebrata (backboned animals; fishes, amphibia, reptiles, birds, mammals, also Amphioxus).

N. B. Most evolutionists lump Nos. 15, 16 and 17 together to form the phylum Chordata, because the worm-like Balanoglossus and the sessile sac-like sea-squirt in their larval stages exhibit what are taken to be bits of a notochord. Transformists believe them to be degenerate backboned animals, and so rank them with the vertebrata. It would be as sensible to group every animal and plant with the protozoa, because everyone of them begins embryonic development as a single cell!

Every Phylum is divided up into smaller groups, known as Classes, each Class has a few characters not found in other Classes. Thus the Phylum

Echinodermata is divided into 7 classes, 2 of which have become extinct. The 5 which still exist are the classes:

1. Crinoidea (sea-lilies) 2. Holothuroidea (sea-cucumbers) 3. Asteroidea (starfishes) 4. Ophiuroidea (brittle starfishes) 5. Echinoidea (sea-urchins).

The Classes themselves are very large and diversified groups. Thus the bat, whale, elephant and mouse all belong to the Class Mammalia. In consequence every class is divided into smaller groups known as Orders. Thus the bat belongs to the Order Chiroptera or winged-mammals, and the mouse to the Rodentia or gnawing mammals.

Most of the Orders are large groups, thus the Order Carnivora includes such different animals as cats, dogs and bears, but these all have certain features in common which causes them to be placed in the order Carnivora. Each Order is further divided into families; thus the Carnivora is composed of such families as the Felidae (cats, lions, tigers). Canidae (dogs, wolves, foxes, jackals) and the Ursidae (bears). The Families are well-named because all the members have a general resemblance; and many who reject the evolution theory are ready to admit that all the members of a family may have been derived from a common ancestor, for example dogs, foxes and wolves may have had a common ancestor. Although not very diversified, families are divided into smaller groups known as Genera. The genera again are mostly split up into smaller groups known as Species, all the members of which are very similar. The species is the smallest unit into which organisms are usually divided. Some systematists go farther and divide the species up into races or sub-species. Thus every animal can be placed in the cadre of zoological classification, and every animal is given by scientists two names, the first of which denotes the genus to which it belongs and the second its species. Some add a third name to denote the sub-species or local race to which a given individual belongs. Thus the wolf and the jackal, which are members of the canidae, or dog family, are both members of the genus, canis the wolf is the species *Canis lupus*, the jackal *Canis aureus* and the dog *Canis familiaris*. But the Cape Hunting dog differs sufficiently from the above three species to be assigned to a different genus called Otocyon. Thus the jackal is the species aureus of the genus Canis, of the family Canidae, of the Order Carnivora, of the Class Mammalia, of the phylum Vertebrata.

Now zoologists are agreed that all the individuals which compose a true species are derived from the same pair of ancestors, and until the appearance of Darwin's "The Origin of Species nearly all believed that the species were the units of creation and subscribed to the aphorism of Linnaeus 'Species tot sunt diversae, quot diversas formas ab initio creavit infinitum Ens.'"



Darwin, however, asserted that all existing animals are derived from one or a few original pairs.

Strange to say Darwin's bold generalisation soon became almost generally adopted. It does not seem to have occurred to anyone to consider seriously the possibility that, say, a mollusc and a crab could both have the same ancestor. The exercise of a little common sense, should show any zoologist, that, as no two individuals of a species are quite alike, it does not seem improbable that the various species which constitute a genus have been derived from a common ancestor, that, for example the horse, zebra and quagga may all be the descendants of a single pair of ancestors, but it does not seem at first sight probable that a stag and a horse should be derived from a common ancestor, because these differ so much that they are placed in different families and in what many deem different sub-orders. That a rat and a horse should be derived from a common ancestor seems on the face of it absurd. Indeed it is absurd. Vialleton has demonstrated that the various groups into which the animal kingdom is divided are not all based on the same criteria. Phyla, classes and orders are founded on the modalities of the organization of their members, so he terms these Types of Organization (Types d'Organization), while the families, genera and species are based particularly on form, hence he calls these Formal Types (Types formals).

"Between these two groups" writes Vialleton ("Membres et Ceintures des Vertebres tetrapodes", 1924, p. 675) "there is a fundamental difference. The former includes types that differ from one another in their very nature because each of them results from a peculiar development of the embryonic primordia (*ebauches*) of the phylum. If a new type of organization has ever developed in nature this can only have happened by a sudden change in the course of development in the earliest stages of embryonic life, which absolutely excludes the process of phylogenetic development required by the doctrine of evolution. On the other hand each formal type includes categories all of the same nature of which the different terms are distinguished only by more or less accessory details or by their form." It is not difficult to believe that a small change in the stimuli which cause the embryos to develop might result in a leopard becoming in course of time changed into a tiger.

That the distinction drawn by Vialleton between the two types of organization is not fanciful is rendered clear, by the fact that when looked into carefully, none of the evidence that has been adduced to support evolution even hints that a member of any family has ever given off a line of descendants the terminal member of which differs from its ancestor so much that it should be designated a member of a different family.

As I suggested in 1932 (Trans V. I. LXIV p. 141): “In the present state of knowledge it would be advantageous to distinguish between differentiation and evolution: if changes within the ambit of the natural family were described as differentiation and only greater changes were called evolution, it would be seen that there exists no proof that ANY evolution has taken place.”

I may here mention that Vialleton has said much the same thing, but what I would call differentiation he calls “evolution” and what I would call evolution he calls “transformism.”

## Appendix II

### THE DATING OF GEOLOGICAL DEPOSITS

The theory that the rates at which Uranium and Thorium disintegrate enables us accurately to date any rock or deposit containing any Uranium or Thorium ore was as eagerly and uncritically accepted by biologists and palaeontologists as was Darwin's theory of natural selection.

Those who accepted these two theories so readily seem to have acted on the adage "Don't look a gift horse in the mouth." Darwin's theory was seized upon with avidity because it was thought that it abolished the miraculous in nature. In fact, it involves more miracles than creation does! "The idea of miraculous change" writes Mr. C. W. Beebe ("The Bird" (1907) p. 970) "which is supposed to be an exclusive prerogative of fairy tales, is a common phenomenon of evolution."

The radio-activity method of dating rocks was so rapturously adopted because it appeared to give transformists all the time that is needed for the stupendous transformations of plants and animals postulated by the evolution theory—time which the physicists had hitherto declined to allow. But those who so uncritically adopted this new method of dating rocks forgot the adage: "What is sauce for the goose is sauce for the gander." This method shows not only that the deposition of the sedimentary rocks took many millions of years, but also that the time required for the development of new races is not several hundred years as previously thought but thousands of years. And it shows that from 500,000 to 1 million years are required for the evolution of a good land species, and much longer for the evolution of a marine species (*vide* p. 375 of F. E. Zeuner's "Dating the Past" (1946)).

But this is a side issue. The important question is: Is the Radio-activity method of dating rocks really reliable? It is submitted that it is doubtful whether it is even approximately reliable. It is based on a number of assumptions, some, at any rate, of which may not be justified:

1. That the rate of disintegration of Uranium and Thorium has always been the same. There are various reasons for thinking that formerly this was much more rapid than it now is. Mme. Joliot gives some of these and Dr. Joly others ("The Surface History of the Earth" (1925) p. 148 *et. seq.*). If this be the case, the current estimates of the ages of the rocks are too high.

2. That there formerly existed no isotopes of Uranium and Thorium which disintegrated more rapidly than the forms of these elements known to us. Dr. Joly is of opinion that in the case of Uranium there is definite evidence of the former existence of such an isotope.

3. That Uranium and Thorium themselves, unlike Radium, are not stages in the disintegration of elements of higher atomic number, which broke up so rapidly that they have ceased to exist on earth. There is no evidence that this is the case, but we cannot be sure it is not. Indeed Professor Fermi and others have been able to produce in the laboratory elements of higher atomic number than Uranium, which broke up very rapidly.

4. That of the 16 known isotopes of Lead only two, viz. Uranium-lead and Thorium-lead are the products of radio-disintegration. For all we know some or all the other 14 isotopes may be the end-products of elements which broke up so rapidly that they no longer exist on the earth. This is not a wild guess. The late Lord Rutherford, when dealing with the unstable elements formed under the observations of M. and Mme. Curie-Joliot, wrote in the paper read before the Indian Science Congress on January 3rd, 1938: "No doubt such transient radio-active elements are still produced by transmutation in the furnace of our sun, where the thermal motions of the atoms must be very great. These radio-active elements would rapidly disappear as soon as the earth cooled down after separation from the sun. On this view Uranium and Thorium are to be regarded as practically the sole survivors on our earth of a large group of radio-active elements owing to the fact that their time of transformation is long compared with the age of our planet." ("Nature" (1938) p. 60).

Professor Joly writes (*op. cit.* p. 145): "The study of haloes . . . affords evidence . . . of the former existence of yet other radio-active elements."

That some, at least, of the above objections to the radio-active method of calculating the age of rocks are valid is shown by the following facts:

(a) The very discordant results obtained from ores in the same rocks.

Here are some examples. Dr. Joly records (*op. cit.* p. 152): "A selected specimen of thorite from Ceylon afforded an age of 150 million years, whereas a uranium-lead ratio gave these rocks 512 million years."

Mr. D. J. Whitney (Trans. Victoria Inst. 1933, p. 34) stated that examinations of certain Texas ores would make these ores, all from the same deposit, vary from 1,671 to 11,470 million years old.

Professor A. Holmes states (Jour. Amer. Sci. (1934) p. 143) the lead ratios from several specimens of uraninite from the same geological formation in Gondonia, S. Africa, gave lead ratios varying from 0.118 to 0.172, a variation

of nearly fifty per cent. He deems 0.131 to be the correct ratio, but he admits that the ore which gave the highest ratio was specially selected on account of its fresh appearance and that neither the chemical nor the physical properties of this specimen were such as to suggest that its lead ratio was too high by over fifty per cent.

Obviously there is something radically wrong with a method of computing age which gives very discrepant results.

(b) The results of the radio-active method of dating the age of rocks are quite incompatible with those based on the sodium content of the oceans.

The rivers are unceasingly pouring quantities of sodium and other salts into the sea, in dilute solution. The amount of water in the oceans is kept constant by evaporation, but the water thus evaporated is free from salts.

As there is no known means by which the sea is able to rid itself of more than a small fraction of the sodium carried to it, it is evident that the ocean must be growing saltier. We can calculate with fair accuracy the amount of sodium carried to the sea by rivers every year and the total sodium content of the oceans. These figures are respectively 156 million and 1,260 million million tons. If we divide the latter figure by the former we get 81 million. This would represent the number of years it would take for the sea to have acquired all the sodium it contains, if the whole of this be derived from the rivers, assuming that the rivers have all along brought in sodium at the present rate.

Making allowances for the possibility of the rate having been slower formerly and for the sea getting rid of some of its sodium as spray and in other ways, Professor Sollas, assuming that the sea originally contained no sodium, arrived at the extreme limits of the existence of the oceans as from 80 to 175 million years (Presid. Address, Geolog. Soc. 1909). Nevertheless geologists today assert that the sea has been in existence considerably more than 600 million years! It is true that Dr. A. Holmes has attempted to show ("The Age of the Earth," p. 39) that if we exclude the sodium carried to the sea otherwise than in solution we arrive at the figure 330 million years as the age of the ocean. But even this figure is far lower than that given by the radio-active method, and is based on the assumption that the sea was originally entirely devoid of sodium. E. J. Conway has made a number of suggestions (Proc. Roy. Irish Acad. Vol. XLVII 1942-3) which he thinks tend to bridge the gap between the figure based on the salinity of the ocean and the radio-activity results:

1. Prof. A. C. Lane's contention that under flood conditions the inorganic composition of streams is much less than when the river is normal or low and

the estimates of the composition of river water have been taken mostly outside flood time, in consequence the chemical denudation may be actually no more than two-fifths of that usually taken. This, if it applied to the estimate of the total Sodium discharge could raise the age of the ocean to the level of 700-800 million years which begins to approach the order of the figure determined by radio-activity.

2. There are reasons why denudation should be at present greater than the mean rate prevailing throughout the oceanic age, the more important of these would appear to be:

(a) We are at present in a late continental period, when the mean elevation of the land surface is exceptionally high and the weathering may be expected to be greater than the mean rate. (b) Geologically speaking the earth has just emerged from a glacial age and much glacial matter is probably being still delivered to the ocean. This has been pointed out by Jeffreys ("The Earth" 1924), but it may be said that the Nile, one of the largest of the rivers, should be exempt from this effect, whereas its composition is similar to the total estimate of Clarke in "Data of Geochemistry" (1924). (c) Conway believes the Carbonic acid gas tension in the atmosphere is probably increasing and, with this the weathering rate. (d) The advent of man has initiated a period of extensive forest destruction, particularly in those regions the rivers of which have been most studied. The large-scale levelling of forests may be expected to increase appreciably the total weathering rate. In this connection the composition of the Amazon is instructive. The Amazon basin comprises about 6 to 7 per cent of the total drainage area of the earth and if the composition of its waters were substituted for the mean as computed for all rivers then the age of the ocean would work out at about 2,350 million years. But Conway points out that in the drainage basin the Amazon the weathered rock is held by the vegetation and very largely leached of its salts, fresh rock being attacked much less slowly than in the average drainage basins studied.

Conway is trying to close the gap between the results of the two methods, and has not mentioned any factors operating in the opposite direction such as the desiccation that has taken place in the Sahara. S. W. Asia, The Gobi Desert, Australia and elsewhere.

Moreover the age of the ocean deducted from the amount of salts in the ocean is based on the assumption that the ocean began as fresh water.

That this last assumption is incorrect and that the sea from its inception contained a large quantity of sodium is certain because the proportions of the various kinds of salts in river and in sea water are very different. If the sea be nothing but concentrated river water, the proportions of the various salts it

contains should be the same, but they are not, as the following figures given by Julius Roth show:

Proportions of the total Salts in any given volume of Water:

	Carbonates	Sulphates	Chlorides
River water	80%	13%	7%
Sea water	0.2%	10%	89%

As the sea originally contained a large quantity of sodium and other salts, its age must be very much less than that arrived at by dividing its total sodium content by the amount of sodium carried to it annually by the rivers.

Let it be clearly understood that the above method does not give the age of the oceans, but it does fix a maximum, which is very much less than the figure given by the radio-active method of calculation.

The foregoing considerations indicate that at present it is premature to make a definite pronouncement as to the age of any rock. If, for convenience, the figures based on the rate of the disintegration of Uranium be adopted, it should be made plain that the figures are speculative and may well be wide of the mark. Even so they show that the earth is millions of years old and probably indicate approximately the relative duration of the various geological periods.

Dr. A. Knopf, Sterling Professor of Geology, Yale University, writes: "No secure evidence is yet at hand on the length of any of the periods. We have made only a beginning in establishing an absolute geologic time scale" ("Genetics, Paleontology and Evolution" (1949) p. 6).

## Appendix III

### SOME ANATOMICAL CHARACTERS OF BIRDS DIFFICULT TO RECONCILE WITH THE DOCTRINE OF EVOLUTION

If birds evolved from a reptilian ancestor, every organ or structure they possess must either be inherited in a more or less modified condition from that ancestor or be an entirely new structure acquired in the course of evolution.

Of organs seen in birds but not in any living reptile mention may be made of feathers, the caeca, the oil gland, the ambiens muscle and the syrinx.

Nothing in the least like a feather is to be found in any known reptile. A feather is one of the most beautiful objects in nature. It is a complicated structure. A wing-feather of a pigeon possesses fully a million barbules.

The caeca are blind diverticula of the gut at the junction of the large and small intestines. The entrance of each is guarded by a valve. The function of these organs is not yet known. In some birds they are large, in others small. In some they are lacking.

The oil gland is situated on the lower back above the root of the tail. Birds which have the gland seem to use it to dress their feathers, but those lacking it are as spruce as those possessing it, and, according to Paris, the gland may be removed without apparent harm. But, if the nipple become blocked, a bird sickens and dies, unless the obstruction be removed.

The ambiens is quite unlike any reptilian muscle. It arises from the pelvis immediately below the thigh joint, runs to the knee, where it becomes a tendon curving round the knee in a tunnel, after which the tendon doubles back on the outside of the leg to join one of the muscles serving the toes. In some birds the ambiens muscle ends at the knee; in others it does not exist, or is vestigial.

Birds have no vocal chords, the function of these being performed by membranes in the syrinx. The syrinx is an organ peculiar to birds. There are several types of this. The commonest type may be thus described: near the point at which the windpipe divides into the two bronchi occurs a bony case formed partly by some of the rings of the windpipe and partly by some of the bronchial rings which are membranous on the inner side. At the junction of the bronchi a bone—the pessulus—passes across the syrinx from back to front. To each side of this bone along its whole length, is attached a



membrane—the *membrana semilunaris*—so called because its outer border is concave.

Opposite each *membrana semilunaris* and attached to the inner side of the wall of the syrinx another membrane is stretched. Thus there is on each side of the pessulus a pair of membranes parallel to one another. By the action of muscles these membranes can be stretched and so brought closer to one another. The vibration of these produces notes. All birds, except the ostrich possess a syrinx; in some this is much more complex than in others.

The contour feathers of many birds exhibit an aftershaft, which may be nearly as large as the mainshaft from which it branches off.

A few birds exhibit tracts or patches of peculiar feathers known as powder-down feathers, because they break up into a fine powder which seems to impart a bloom to the rest of the plumage.

Thus some of the features peculiar to birds do not occur in all birds and therefore are not indispensable structures.

If the evolution theory be true it would seem that the fully-evolved bird should possess every one of these structures, and the presence or absence of them in each group of birds should enable us to classify all existing birds according to the extent to which they have attained the status of the complete bird. In other words it should be possible to place all birds in a cadre of which the various grades represent stages in the acquisition of avian, or of shaking off reptilian characters. But it is not possible to do this. No one dare point to any group of birds as being the most nearly related to reptiles, or to any group which is the most evolved.

The indispensable characteristics of birds, i.e. those which occur in all groups of birds offer an equally insoluble problem to the evolutionist. Let us notice some of these characters. There are several modes of arrangement of the wing feathers. Although usually all the members of an order exhibit the same arrangement, there are numerous exceptions. For example the osprey, the honey-buzzard and a few others differ from the majority of birds of prey in this respect.

As a rule the feathers on the body are not distributed uniformly over the surface; they grow in definite areas, between which are spaces, known as aptera. Usually the feather arrangement (pterylosis) is uniform in any given Order, but there are numerous exceptions. For example the nightjars exhibit two types: in *Steatornis* there is a marked break in the dorsal feather tract, and the ventral tract is undivided on the neck; in *Caprimulgus*, *Antrostomus* and *Nyctidromus* there is no break in the dorsal tract and the ventral tract

bifurcates on the neck. Cuckoos, rails and tinamous each exhibit more than one type of pterylosis.

The foot of a bird differs considerably from that of a reptile. No bird has more than four toes; the ostrich has but two.

The tendons that serve the toes are variously arranged. Beddard ("The Structure and Classification of Birds" (1898) p. 100) distinguished seven arrangements of these tendons. In passerine birds the two tendons remain entirely separate: in all other birds they are united, in some they are connected by a slip known as the vinculum, in others they fuse. In passerine birds one tendon—the flexor longus hallucis—serves the hind or first toe, and the other—the flexor profundus digitorum—serves the remaining three toes. This arrangement also occurs in fowls and other game birds, pigeons, parrots and storks, except that the tendons are united by a single vinculum. In some birds the flexor longus hallucis splits into a branch that runs to the hind toe and a branch which fuses with the flexor longus digitorum. In some, but not all, birds of prey the flexor longus digitorum splits up very low down into a branch serving the hind toe and one that fuses With the branch of the flexor profundus digitorum which runs to the second toe. In hornbills, goatsuckers and some other birds the two tendons fuse and the united tendon then splits up into four branches which run to the four toes. In some birds the two tendons are joined by a vinculum and below this the flexor longus hallucis divides into three branches running to digits 1, 2 and 3, while the other tendon supplies only the fourth toe. In the Trogons the flexor longus hallucis supplies the first and second digits and the other tendon the remaining toes.

Generally only one type of deep plantar tendons occurs in any given order or sub-order; but there are exceptions; among the Coraciae the arrangement differs in the rollers and bee-eaters; the kingfishers also exhibit two types of tendons.

The different types of these tendons cannot be accounted for as adaptations to different modes of locomotion. We have noticed that all passerine birds have the same type of tendon, but some of these run while others hop on the ground, some spend most of their time on the ground, others rarely leave the trees, others, such as nuthatches and tree-creepers run about on the trunks of trees. On the other hand, birds having other types are equally home on the ground, in trees or on the trunk of trees.

The skulls of birds fall into five types:

Dromaeognathous. The maxillo-palatine bones meet in the middle line and the vomer is well developed.

Desmognathous. The maxillo-palatines meet in the middle line, but the vomer is small or lacking.

Schizognathous. The maxillo-palatines do not meet and the vomer ends in a point in front.

Aegithognathous. The maxillo-palatines do not meet, and the vomer ends abruptly in front.

Saurognathous. The maxillo-palatines do not meet and the vomers are paired rods.

Speaking generally all the birds of an order have the same type of skull, but there are exceptions. Thus in some of the Barbets and Goatsuckers the maxillo-palatines meet in the middle, in others they do not.

As in the case of the tendons, the different types of skull seem to have no connection with the mode of life of a bird. Nor can it be contended that it is a matter of life or death to a bird whether the front of its vomer be blunt or pointed, or its ventral feather-tract be forked or undivided on the neck. Therefore, if all living birds be derived from a common ancestor, two consequences should follow: 1. the fact that a bird A. has a certain type of some given structure should necessitate its lacking one or more of the non-essential organs, because at the time the group to which A. belongs branched off from the main stock, we might reasonably expect the main stock to have lost or not yet acquired at least one of these non-essential structures. 2. Two birds of which the last common ancestor was of recent date should resemble one another in respect of nearly all characters more closely than they resemble any other bird, and the more distant the common ancestor of any two birds the more should they differ in form, in other words there should be no difficulty in classifying birds “naturally” or “phylogenetically.”

Neither of these conditions is fulfilled. Take, for example, the above five types of skull. According to the evolution theory all these are derived from one primitive form. This may have given rise to five lines of descendants, each having a different type of skull, or four lines may have branched off at various stages from the main stem, which still survives more or less unmodified. If either of these events happened, some non-essential characters ought to have been lost or not yet acquired before the five types of skull had become defined; the aftershaft, or the oil gland, or the ambiens muscle, etc., with the result that every bird having a given type of skull would lack one or more of these particular structures. But this is not the case. For example powder-down feathers, although comparatively uncommon (occurring only in herons, some parrots, frogmouths, and tinamous, three kinds of birds of prey, three kinds of crane and the passerine *Ochyperix*) are found in

Desmognathous, Schizognathous, Aegithognathous and Dromaeognathous birds. The evolutionist has therefore to believe, either that these feathers evolved from ordinary feathers on eight separate occasions, or that the first bird possessed them, and the vast majority of its descendants have lost them. This applies equally to the many other characters which are not exhibited by all birds.

In short no one has been able to formulate a “phylogenetic” classification that commands universal acceptance. Several attempts have been made; all of which have been demolished. Let us consider that of W. P. Pycraft given on page 57 of his HISTORY OF BIRDS (1910). According to Pycraft the Colii, Passeres and Cypseli are all more nearly related to one another than to any other group, all three having recently branched from a common ancestor.

The following table exhibits some of the characters of these groups:

Character	Passeres	Colii	Cypseli
1. Manubrium sterni	Forked	Forked	Forked
2. Ambiens muscle	Absent	Absent	Absent
3. Basipterygoid processes	Absent	Absent	Absent
4. Carotid arteries	One	One or two	One
5. Fifth secondary	Present	Present	Present or absent
6. Oil gland	Nude	Nude	Tufted
7. Skull	Aegithognathous	Desmognathous	Aegithognathous
8. Aftershaft	Present or absent	Present	Present
9. Caeca	Present	Absent	Absent
10. Biceps slip	Absent	Present	Absent
11. Vomer	Present	Absent	Present
12. Flexor tendons:	Of one type in Passeres, of another in Colii and Cypseli.		
13. Leg muscles:	Of one type in Passeres and Colii, of another in Cypseli.		
14. Pterylosis:	Of a different type in each group.		

Thus of the 14 characters noticed the above orders have only three in common. (Nos. 1, 2 and 3). Three (Nos. 4, 5 and 9) are alike in all three orders except in some aberrant individuals.

If some aberrant individuals be excepted, the Passeres and the Colii have nine of the above characters in common, and this is true of the Passeres and

the Cypseli; but the Passeres have ten of the above characters in common with the Coraciadae (rollers) and eleven with the Meropidae (bee-eaters). If then these characters have any evolutionary significance, the roller and bee-eaters would be more nearly related to the Passeres than are either the swifts or the colies.

Nor is this the main objection to Pycraft's phylogenetic tree. As the skull of the colies is desmognathous, while that of the passerine birds and the swifts is aegithognathous, Pycraft had to assume that one or the other of these types of skull evolved more than once, because there are several other desmognathous groups of birds which appear as side branches of his genealogical tree, and the Turnices (bustard-quails)—a group placed by him far from the Passeres—have an aegithognathous skull.

Pycraft's classification has been selected for criticism, because it is the latest attempt to undertake an impossible task, and he has endeavored to blend the labors of all the earlier authorities; he frankly admitted (*op. cit.* p. 47): "The classification of the Aves on phylogenetic lines is one of the most difficult tasks which the ornithologist can be called upon to undertake."

T. H. Huxley had tried to classify birds according to types of skull. Garrod and Beddard tried independently to classify birds according to the presence or absence of the ambiens muscle. Chalmers Mitchell tried on the basis of the convolutions of the intestine, others by the shape of the nostril, yet others by pterylosis. Each of the above attempts produced a very different classification and each separated species which are obviously closely allied, such as the white-necked stork from the common stork.

There is no getting away from the fact that every attempt to classify birds phylogenetically or to draw up a genealogical tree of the class, has been a complete failure. The reason for this is that birds have not evolved gradually from a common ancestor. If all the birds be derived from some primitive stock, each family almost certainly sprang into existence suddenly, endowed with its main characters and has since undergone comparatively little modification.

A survey of the anatomical features of birds indicates that there are indispensable characters, each of which may take several forms, also a few dispensible characters each of which may take several forms, and that every species is endowed with one form of every indispensable character and of one or more dispensible characters, and these have been distributed impartially among the various families. If anyone makes up fifty different hands of playing cards, each hand containing one card of each denomination from ace to king, save that, if desired, in any hand one or two blank cards are

substituted for the same number of cards of low denomination, the fifty hands so composed would represent very closely the anatomical features of fifty species of birds belonging to as many different families, assuming that the cards of higher denominations represented indispensable structures and those of low denominations dispensable structures, for example the four kings represented four types of skull, the four queens four types of pterylosis, the red twos naked oil glands and the black twos tufted oil glands, etc.

Were several persons asked to classify the fifty hands so constituted, some might divide them into two main classes according as the red or the black cards were the more numerous; others might separate the hands containing blanks from those containing none. A bridge player might divide the hands into five classes according as they justified a no-trump or a suit declaration. If some of the classifiers believed these hands to have evolved from a primitive hand they would try to classify them phylogenetically; and there would be disputes as to whether the blanks were primitive or otherwise, whether red had evolved from black or vice versa. The result would be various phylogenetic classifications, which, no matter how ingeniously worked out, would be valueless, because these hands did not evolve from a common ancestor. This seems to be the reason of the failure of all attempts to classify birds, or any other class of animals, phylogenetically.

In view of the above, it is not surprising that neither Mr. S. H. Shelton nor Prof. J. B. S. Haldane was able even to attempt to meet my request to draw up a phylogenetic table of any class or order of animals based on the distribution of morphological characters.

## APPENDIX IV

In the summer of 1948 Mdle. Germaine Henri-Martin found a fossil consisting of the greater part of the skull of a woman of modern type in the cave of Fontéchevade, in Charente, France. As this woman seems to have lived before the earliest known fossil of Neanderthal man, she is deemed a nonconformist by our orthodox English anthropologists and I cannot remember seeing an account of this find in any English periodical. I take the liberty of reproducing the following passage from Miss Marie Fetzner's contribution to the American symposium, "Modern Science and Christian Faith" (1950), which is based on H. L. Movius's "Notes on Tayacian Man" ("American Anthropologist" (1948), pp. 365-367): "The bones found are in no way outside the range of *Homo sapiens*. The discovery was not made by an amateur, but rather by a trained professional. There is no doubt that the remains were *in situ* at time of their discovery. They came from an undisturbed horizon sealed below a thick layer of stalagmite that underlies the Mousterian culture level at this locality. Mousterian culture appears always associated with the Fourth Glacial, and this deposit definitely underlies the Mousterian level. The associated faunal aggregate indicates that the level was formed during a warm temperate period. For these reasons the deposit has been designated as Third Interglacial. The discovery of the Fontéchevade *Homo sapiens* in a third interglacial site adds credence to the evidence already supplied by the Swanscombe fossil and others for the early existence of *Homo sapiens*."

The French anthropologist, Vallois, professor at the Sorbonne, asserts that the Fontéchevade skull closely resembles the Piltdown skull. Prof. L. Eiseley of the University of Pennsylvania says that the skull, which dates from Third Interglacial times, is that of a modern woman, *Homo sapiens*, ("Scientific American," July, 1948, p. 19). J. Kaelin, Prof. of Zoology and Comparative Anatomy at Fribourg University, Switzerland, being a good transformist thinks that this skull, like some other fossils, suggests that the common source of Neanderthal and of modern man possessed "modern" features which were later lost by the Neanderthals!

On October 29, 1948, L. S. B. Leakey, the leader of an expedition engaged in searching for Primate fossils in Kenya, reported having found in a Lower Miocene deposit on Rusinga Island, Lake Victoria, a jaw and a number of pieces of the skull which he attributed to the ape Proconsul of which the earlier fossils are described on p. 114. On fitting the pieces together Leakey

stated that the skull exhibited marked near-human features, which it had been thought did not develop until millions of years later. So intense was the interest in this discovery, that Mrs. Leakey, who had found some of the pieces of the skull, flew from Nairobi to London with the precious skull.

On Feb. 10th, 1949, Prof. Le Gros Clark said in a B.B.C. talk that Leakey had, during the past two years, found nearly 200 fossils of apes in Africa, including the remains of three different species of *Proconsul*. He also said that this skull was fairly complete except for the back and the base of the head. The skull was lightly built and the supraorbital ridges were not very pronounced. The nose is narrow and more like that of a modern monkey than of a modern anthropoid ape. Le Gros Clark said that he thought that the brain had some resemblance to that of man, and the leg bones attributed to *Proconsul* suggested a fast-moving animal. He further said that in his view *Proconsul* may have been the ancestor of both man and apes. It is important to bear in mind that the Skull of *Proconsul*, which Leakey thinks is more than twenty million years old, is the earliest known fossil (skull) of a higher Primate.

Since October 1948, Broom and his assistant, Robinson, discovered a number of fossils in a cave at Swartkrans, about a mile from the main Sterkfontein cave. They have attributed the fossils they have found to an Ape-man which they call *Paranthropus crassidens*, with the exception of a jaw which they deem human and have named *Telanthropus capensis*. In addition to several articles describing these fossils, Broom wrote a book called "Finding the Missing Link," which was published in 1950 by Watts and Co., London. The large creature he calls the Swart Krans Ape-man is much larger than any of the ape-men he had already found. One nearly perfect lower jaw found by Robbins in 1949, while Broom was in America, writes Broom, "is really huge, possibly larger than the Giant jaw from Java that has been called *Meganthropus* by the Dutch anthropologist, G. H. R. Koenigswald. It almost seems to confirm the view of the noted anthropologist, Franz Weidenreich that 'There was giants in the earth in those days' as stated in Genesis" ("Scientific American," November 1949, p. 22). Later Broom wrote of this creature, "We have now many skulls—two almost complete . . . three perfect lower jaws, a complete but somewhat crushed skull of a child and two child jaws. We have imperfect skulls and jaws of half-a-dozen other individuals and about 300 teeth. We have also a number of good bones, including a fine pelvis. This Swartkran man . . . differs markedly from the Sterkfontein ape-man. The front teeth are typically human, and even the eye-teeth are not larger than in man, but the premolar and molar teeth, though human in type, are much larger than in modern man. The face is large and very flat and there



are permanent ridges over the eyes and above the nose, but in the females these are rather thin. We have four brain cases, but all a little crushed, still these are quite sufficient to show that the brain was large . . . the brain in even the female Swartkran ape-man is estimated to have been over 900 cc., and thus human at least in size. The external ear region is typically human, and so is the articulation for the lower jaw. The front of the lower jaw has in character that which is definitely prehuman. The jaws have been very massive, and the temporal muscles that closed the jaws were very powerful, and while in man they only pass up about half-way on the side of the head, in our Swartkran being they passed right up to the top of the skull, and between them at the top was a well-developed median bony crest such as is usually seen in Gorillas. . . Its pelvis showed that it walked more or less erect.” (“Illustrated London News,” Aug. 19, 1950, p. 291.)

Broom does not tell us much about *Telanthropus capensis* found by Robinson in the Swartkranz cave in May 1949. He says, “we regard it as a true human jaw, though the molar teeth are a little larger than in *Homo sapiens*. They agree pretty closely with those of *Pithecanthropus* in size and structure. The jaw differs from those of our ape-men in having a very low ascending ramus, from which we assume that the brain was relatively larger. . . We have called this jaw *Telanthropus capensis* B. and R. and we regard it as possibly the oldest man.” (“Finding the Missing Link,” 1950, p. 77.)

While Broom and Robinson were working in the Swartkranz cave, Dart and his party under the auspices of the Bernard Price Institute, were looking for missing links in the Makapan cave about 180 miles to the north. Dart, it will be remembered, brought the Taungs skull (*Australopithecus*) to the notice of the world (see p. 124). In this cave they found the fossilized back part of the skull of a female, part of the face and lower jaw of a young male and part of the pelvis of a young male. According to Broom this pelvis is more human than that attributed to *Plesianthropus*. Dart regards these Makapan fossils as a species of *Australopithecus*, which he calls *Australopithecus prometheus*, because he found particles of charcoal in the breccia of the cave and concluded that the owner of these bones was able to make fire.

Before he had made these finds Dart had come to the conclusion that *Australopithecus* knew how to make tools because the skulls of the baboons found in the local caves had been fractured by hard blows. Dart published in the Feb. 1949, issue of “South Africa Science” an article entitled the “Bone-bludgeon Hunting Technique of *Australopithecus*.” Broom’s verdict on *Australopithecus prometheus* is: “These are ape men of a different type . . . but I do not think there is good evidence that they made fire. And I am not

satisfied that the supposed bone implements are really implements as Dart holds. . . Quite certain it is that our ape-man ran on their hind feet and that the hands were too delicate to have been used for walking. It seems probable that they dug out moles and hares with some kind of implement, and killed small baboons and dassies (the conies of the Bible) for food. If they made weapons and tools we may have to call them 'men.' In any case they were nearly men." ("The Scientific American," Nov., 1949, p. 24.) One of the defects in Broom's case is that he paid very little heed to the period on which his supposed apemen lived. The best he can do is: "We cannot yet say for certain when these beings that were very nearly man lived—possibly about a million years ago, but perhaps even earlier." ("Illustrated London News," Aug. 19, 1950, p. 291.) It was Broom's apparent indifference to the dates of his finds that caused the American anthropologists such alarm that they sent out a petition to endeavor to ascertain when these various creatures lived. So far as I can ascertain, no report on the discoveries of this expedition has yet appeared, so that we still are without authoritative information on this all-important matter.

Other important fossil finds have recently been made in Northern Iran on the shores of the Caspian Sea. All that I am able to say about this is based on an article in the Scientific American of June, 1951, on a report of C. H. Coon, Anthropologist of Pennsylvania University, and L. Dupree, Geologist of Harvard University, who came upon the skeleton of three people who had apparently been sitting 'round a hearth when the roof of the cave fell in and killed these men. Their bodies were found in a bed of gravel 39 feet deep, deposited before the beginning of the last Ice Age, 75,000 years ago. These skeletons are reported to be essentially identical with that of modern man, except for a small brain case. At the same site the diggers found the skull of a 12-year-old girl of the Neanderthal type, which they estimate lived from 10,000 to 12,000 years ago. As the writer of the article remarks, "that this finding confirms earlier claims of modern-looking skeletons in strata much older than Neanderthals and other supposed ancestors of modern man. . ."

This reluctance of transformists to believe that men of modern types were in existence long before Pithecanthropus has caused some of them to make ridiculous statements. Among the bugbears of these were the Piltdown, Galley Hill, and Swanscombe fossils, and much ingenuity has been exercised in the attempt to decry these and other examples of what Hooten calls non-conforming men.

It has been known for fully a century that bone contains traces of fluorine, and that both living and dead bone absorb this element. At the 1947 annual meeting of the British Association, it was suggested that the amount of

fluorine contained in any fossil bone might be a means of ascertaining the age of that bone.

This suggestion was promptly acted upon and it was determined to ascertain the percentage of fluorine in the bones of the above non-conforming men.

In the issue of "Nature" for March 11, 1950, is to be found an article by Dr. Kenneth P. Oakley of the Department of Geology of the British Museum and Dr. C. Randall Hoskins, Dept. of the Government Chemist, entitled "New Evidence of the Antiquity of Piltdown Man." This article is a long one and describes how they estimated the percentage of fluorine in pieces of the Eoanthropus fossils and in some teeth, found in the Ville franchian deposits (which some deem Pliocene and others Pleistocene, see p.??). Here are some extracts from this article: "The fluorine-dating method was first applied to the Galley Hill skeleton. Briefly, it was shown that indigenous fossil bones in the Middle Pleistocene terrance gravels at Swanscombe contain around 2 per cent fluorine, those from the Upper Pleistocene deposits in the same region, around 1 per cent, and post-pleistocene bones not more than 0.3 per cent; while the Galley Hill skeleton, although found in the Middle Pleistocene gravels, proved to contain only about 0.3 per cent fluorine, and therefore is clearly an intrusive burial, at earliest end-Pleistocene. The Swanscombe skull bones, on the other hand, discovered in these gravels by Mr. Marston in 1935-6 showed the expected 2 per cent fluorine."

As regards the Piltdown man bones, they write, "every available bone and tooth from the Piltdown gravel and from the neighboring deposits was analyzed, including 17 samples of anthropus material." These results they set forth in a table. Below are the fluorine figures for these fossils:

EOANTHROPUS I (Gravel pit)		EOANTHROPUS II (Neighboring field)	
Left parieto-frontal	0.1%	Right frontal	0.1%
Left temporal	0.4	Occipital	0.1
Right parietal	0.3	Molar	0.4
Occipital	0.2		
Right ramus of jaw	0.2		
Canine tooth	0.1		
Molar	0.1		

### OTHER MAMMALIAN REMAINS LOWER PLEISTOCENE

Molar Mastodon	1.9%	Molar elephas	2.5%
Molar mastodon	2.3	Molar elephas	3.1
Molar elephas	2.7	Premolar rhinoceros	2.0

### POSSIBLY MIDDLE OR UPPER PLEISTOCENE

Molar hippopotamus	0.1%	Metatarsal Cervus	0.1%
Premolar hippopotamus	1.1	Femur elephas	1.3
Molar equus	0.4	Mandible Castro Fibero	0.3
Molar Castor fiber	0.4	Indent-bone from basal Fragment of enamel	1.4
Incisor Castor fiber	0.1	Elephas	0.8
Antler Cervus	1.5		

elephas

## HOLOCENE OR PLEISTOCENE

Tibia, Cervus	0.1%	Ind. bone sub fossil	0.1%
Bovine long bone	0.1	Ind. bone sub fossil	0.3
Caprine molar	0.3		

## HOLOCENE (RECENT)

Fragment of fresh bone from soil	0.1%	Ungual Phalange, bos	0.3
Pelvis, bos taurus	0.1	Metatarsal, Bos	0.1%

The above table relating to OTHER ANIMALS shows that, generally speaking, the older fossils show the highest percentage of fluorine, but apart from this, there is considerable difference in the fluorine content in bones of the same period. Thus, the fluorine percentage in Lower Pleistocene varies from 1.9 to 3.1 and that of the later Pleistocene varies from 0.1 to 1.5.

It is open to those who think these figures reliable to explain the differences by difference in age, or in the fluorine content of the under surface water. But this is impossible in the case of the differences in ten various parts of the skull of Piltdown man. As these all belong to the same skull in the case of Eoanthropus I, What possible explanation is there for the fact that the percentage of fluorine in the left temporal bone is four times as great as that in the adjacent bone? It is true that these bones were picked up piecemeal, but all were in the same quarry. If the analyses are correct then the percentage of fluorine is not a reliable test of the age of any fossil bone. The fact that the notion that this fluorine test is a good one is so widespread among anthropologists constrained me to say that it would be of great advantage to the zoologist to spend some months in studying the rules of evidence which regulate the procedure of the Courts of Justice.

The exercise of a little common sense should satisfy anyone that this test is, in the present state of knowledge, not reliable since the fluorine content of any fossil bone depends on factors such as the capacity of that particular bone

for absorbing and retaining fluorine, the length of life of the owner of the bone, the amount of fluorine in the water drunk by that individual during his lifetime, the length of time the bone lay buried in the earth after the death of its owner, the amount of percolation of water in the bed in which the fossil lay and the percentage of fluorine in this water during the various periods of its burial. Other things being equal, generally speaking, the amount of fluorine in any fossil bone depends on the length of time it lay buried, but probably other things are never all equal.

It is usually said that the percentage of fluorine in living people varies from 0.03 to 0.01. But Harrison of the Dunedin Medical School says average percentage of fluorine in the teeth of New Zealanders is only 0.0042 while there are teeth of which the figure is as low as 0.0010.

I have no figures representing the highest known percentage of fluorine in human living bones. Badansky states ("Introduction to Physiological Chemistry," p. 544), that mottled teeth, a condition in which the enamel deteriorates, is very prevalent in certain districts of the U.S.A. and other parts of the world. This abnormality is associated with the presence of excessive amounts of fluorine in drinking water. In one community in which mottled enamel is endemic, the drinking waters were found to contain 3.8 to 7.15 mg. of fluorine as compared with 0.0 to 0.5 mg. in other localities where this condition is not endemic.

By way of proof that the fluorine content of any bone is untrustworthy as evidence of the age of that bone, I take the liberty of reproducing some extracts from an article by Dr. Russell Olsen of the Harvard University Museum of Comparative Zoology, entitled "The Fluorine Content of Some Miocene Horse Bones." Dr. Olsen obtained his material from fossil bone quarry containing Lower Miocene bones in Florida. His paper occurs in the issue of "Science" of Nov. 24, 1950. His specimens, he tells us, belong chiefly to what has been described by T. E. White as a monophyletic series, *parahippus bleckberi*-P, *barbouri*-P, *leonensis*-Merychippus *gunteri*.

The duration of the above series is represented by most of the Tampa and the lower part of the Hawthorne formation, i.e., considerably longer than one million years more than 30 million years ago.

If the fluorine test of age is trustworthy then the fluorine content of all these fossils should be far greater than that of the lower Pleistocene fossils given above, and the content of the later member of the series be considerably greater than that of the earlier ones. Here are Olsen's figures:

Table I

## FLUORINE ANALYSIS OF LOWER MIOCENE HORSE BONES

Sample No.	Description	No. of titrations	Fluorine%
1	large, light, unworn	3	2.4
2	large, dark, unworn	3	1.7
3	small, light, unworn	3	2.6
4	small, dark, unworn	3	1.9
5	large, light, worn	3	1.3
5a	large, light, worn	1	1.5
6	large, dark, worn	4	1.7
7	small, light, worn	5	2.7
8	small, dark, worn	3	1.7
9	large, light, worn	1	1.9
10	large, light, worn	1	1.9
	present day horse	3	0.01

The bone used was the first phalan of the middle toe.

Note that there is no gradual graduation of amount of fluorine; these amounts fall into two groups, one averaging 2.6% and the other 1.7%. The water-worn bones show as high a fluorine percentage as those unworn. It is true that all the bones that had high fluorine content are light colored, but the bones with the least fluorine content are all light colored. Here is Olsen's comment: "So marked a difference between these two groups of values might properly be taken to indicate two origins in time. However, the above-stated and well-attested time interval (Tampa-Hawthorne) is insufficient to account for the observed difference in fluorine accumulation. Alternatively we may conclude that these bones have lain for long periods in distinct areas, perhaps not widely separate, but certainly percolated by ground waters of quite different fluorine content. Finally the distribution of values in both worn and unworn bone suggests that such signs of wear as smoothed surfaces, rounded contours, etc., are neither exclusive nor quite reliable indications of transport."

Now compare the above figures with those given by Oakley and Hoskins for their Lower Pleistocene fossils, which are less than 1 million years old, against more than 30 million years of Olsen's bones. These younger fossils have a bigger percentage of fluorine than have the far more ancient ones.

The reader may think that as Olsen's figures relate to bone and Oakley Hoskins' Pleistocene figures to teeth, the two sets are not comparable.

In fact they seem to be comparable. The later authors write (*op. cit.*): "In attempting to interpret the analytical results, it is important to note that there is no significant difference in the rate of absorption of fluorine by bone and by dentine . . . there are indications that enamel is more resistant to absorption of fluorine than dentine. The analysis of teeth, with two exceptions, were based on samples which were either wholly dentine, or which included a substantial portion of dentine. The two exceptions were the enamel of elephant and the molar of mastodon."

Thus in the present state of knowledge, when a fossil bone contains a low percentage of fluorine all we can say with safety is that the fossil is either of comparatively late date or has been buried in a locality where the fluorine content of the percolating water is low or nil.

On June 6th, 1949, A. T. Marston, the discoverer of the Swanscombe skull (read before the Royal Anthropological Institute) on the Piltdown man, said: "The lower jaw and the canine tooth are those of an ape of about ten years old, while the cranium is that of a man of modern type, aged about forty. The argument that they belonged to the same species must rank as one of the most stupid errors that science has known. . . Every character of the jaw and canine tooth is that of the ape. They have no human qualities. Every character of the skull is that of man as he exists today." Compare this with the following assertion of the anthropologist Vallios to be found on p. 67 of "Paleontologie et Transformism" (1950): "No serious argument has been advanced against the jaw of Piltdown man, merely the *a priori* notion that in human evolution the various parts of the skeleton progressed in a parallel manner. Piltdown man is not a composite being, he is simply a man who exhibits an extreme evolutionary independence, his skull having progressed far more rapidly than the mandible."

Vallois is the author of the fifth new theory that, to my knowledge, has been advanced since 1945 to account for the origin of man. He believes that human evolution is a piecemeal affair. He expounded his theory in a paper read in 1947 to an international gathering of zoologists convened by the Rockefeller Foundation at Paris. His paper and others read were edited by Jean Piveteau in the volume named above. "From the beginning," writes Vallois, "the hominidae were diversified" and this diversity is seen at each stage of human evolution from prehominids, Sinanthropus, Pithecanthropus, Meganthropus. This stage, according to him, was followed by the Paleanthropus stage represented by Meantherthal and Heidelberg men and Africanthropus. He thinks that *H. sapiens* did not appear until after the last



glacial period. He contends that at each stage none of man's recent ancestors was more primitive *en bloc* than any other, for example Pithecanthropus was more primitive than Sinanthropus as regards brain and head length, and Sinanthropus was more primitive in the form of its forehead, premolar and thigh bone. In this way Vallois gets over the difficulty of the fact that early men included giants and pigmies.

In order to support this theory, Vallois makes two common blunders, viz. that the molar tooth found in the field nearby is identical with that in the jaw found in the quarry, and that Neanderthal man could not walk upright.

Vallois stated his fantastic theory before the following zoologists: Arambourg, Caullery, Cuénot, Ephrussi, Grasse, Prenant, Piveteau, Teissier, Viret, Teilhard de Chardin, Haldane, Waddington, Watson, Westoll and Stensia. According to the report the only one of these who made any comment was Arambourg, who said he did not agree with Vallois.

Sir Arthur Keith was not at the conference, but he agrees with Vallois about Piltdown man, or rather did so when he wrote his latest book, "A New Theory of Human Evolution" (1949), for in it (p. 229) he chides Weidenreich for asserting that Eoanthropus is an artificial combination of fragments of a modern human brain case with orangutan mandible and teeth; Keith asks that as England in Pleistocene times was joined to the continent, what is more probable than that we should find early human forms in which anthropoid and human features were combined? As the title of Keith's last book shows, he changes his mind as regards the evolution of man. In 1911, he asserted that modern man enjoyed a high antiquity. In the first edition of "The Antiquity of Man," Keith adopted Sollas's estimate of 400,000 years as the length of the Pleistocene period. In the second edition he changed his estimate to 200,000 years because he thought it impossible for any culture of man to last 40,000, 80,000, or 160,000 years. When later he adopted Holmes' estimate of one million years for the Pleistocene period, he had to abandon the claim of the modern type of man to a high antiquity. Rather than believe that Galley Hill man lived 100,000 years ago, Keith now believes that there is a geological flaw in the geological evidence.

I have only skimmed through the 450 pages of Keith's last book. It is based on assumptions, one of which is that Africa is the birthplace of humanity. Keith, in this, is influenced by Broom's South African "ape-man" which Keith calls Dartians. He writes (p. 209): "My scheme assumes that up to the end of the Oligocene period the great anthropoids (the gorilla, chimpanzee and orang) and man were all represented in a common ancestry, all being strictly arboreal in habit . . . the limbs and bodies of the common ancestry were then undergoing postural modifications, the lower limbs of the

prehuman group or groups becoming more and more the chief means of support in climbing and at the same time, becoming better fitted to serve as organs of progression on the ground.” In consequence of this prodigious feat, “before the end of the Miocene period the lower limbs of the prehuman groups had become completely adapted for a life on the ground, they were thus no longer confined to a life in the jungle, but were free to roam into the open country and thus to have the whole earth open to them. The South Africa anthropoids seem to me to represent the stage reached by our human ancestry in the Miocene period. That representatives of this Miocene phase of man’s evolution should have survived into the Pleistocene period in South Africa does not seem to me an improbable assumption.” Having got man firmly on his hind legs, Keith indulges in further speculation and invents what he calls the “Group Theory” of human evolution. He believes (p. 421) “there was first a long *primal* period when mankind was separated into small local groups or communities; this period is estimated to have lasted at least a million years. It was during the primal period that man made his major evolutionary advances. The *post-primal* period has endured for less than 10,000 years, it has led to a revolution in the mode of evolution.”

Sir Arthur Keith closes this effort of his imagination with the words, “In the clash and turmoil which disturbs the peace of the modern world we are hearing the creaking wheels of the machinery of evolution.” How illuminating!

The trustees of the British Museum in 1950 must be numbered among those who believe the man-from-monkey myth. In that year they ordered the printing as a museum guide to the public of a small book entitled “The History of the Primates, an Introduction to the Study of Fossil Man.” This book was written by Dr. Le Gros Clark, professor of Anatomy at the University of Oxford. As the trustees of the British Museum include such important people as the Archbishop of Canterbury, the Lord Chancellor, the speaker of the House of Commons, and the president of the Royal Society of London, the British public is entitled to expect that an official document approved of by the Trustees of the British Museum should contain an impartial account of the known fossils of man and of the higher primates. In fact, this guide for the public is an essay in support of the particular theory of the origin of man held by Prof. Le Gros Clark, namely that man has evolved from “small arboreal creatures not unlike the tree-shrew of today and that one of man’s ancestors was a species of *Pithecanthropus*.” This production caused the Evolution Protest Movement to write a protest against this book being used to educate the public. Among the charges made are that the author in order to bolster up his theory: (a) makes highly controversial statements; (b)

ignores, because they are unfavorable to his views the following fossils: a skull found at Calaveras, U.S.A., a skull and parts of skeletons found at Castenedolo in Italy, a jaw found at Fox Hall near Ipswich, a skull found at Olmo in Italy; (c) arranges his narrative so as to convey to his readers a wrong impression of the relative antiquity of some of the fossils with which he deals.

A covering letter, with a copy of the protest, was sent personally to every trustee. The chaplain to the Archbishop replied: "It is the function of the British Museum, as indeed of all scientists, to foster the search for the truth and it would be altogether unwise to try to cramp the scope of that search. If the search in any one direction is along the wrong lines, that will become clear in due course, and those errors will be discovered and the truth will become clearer." Three of the other trustees acknowledged receipt of the protest.

G. R. de Beer, Director of the Natural History Branch, on behalf of all the trustees, sent a reply in which he tried to justify the omissions. The Evolution Protest Movement immediately sent in a letter refuting de Beer. The whole correspondence is published in a pamphlet by the E. P. M. entitled "How They Choose Our Ancestors. A Protest to the Trustees of the British Museum."

De Beer's reply was feeble, his real justification for the omission of the Calveras skull is that it was the result of a hoax. This is disposed of by the fact that the skull was so encrusted with earth and stony material that it was not recognized as a skull until some of this material was cleaned off. Moreover most of the parietal and occipital bones are missing. In the covering material were two metatarsal bones, the lower end of a fibula, and fragments of an upper arm bone and of a breast bone, to say nothing of part of a tibia which was too small to have belonged to the owner of the other bones.

This entirely rules out the hoax theory. Even more feeble is de Beer's qualification for failure to mention the Foxhall jaw, viz. that after the jaw had been described and figured in a scientific publication it disappeared. This has made it "totally valueless" as a witness!

Subterfuges such as the above tend to bring anthropology into disrepute, although "The Meaning of Evolution" (A Terry Lecture, 1950) does not deal primarily with the evolution of man, I notice it here, because its author, Dr. George Gaylord Simpson seems to be one of the leaders of the materialistic evolutionists of the United States and in my view this book is a typical example of the views of present day transformists. Here are a few of Simpson's remarks: "Thomson (who delivered the first Terry Lecture in 1925), felt constrained to devote a considerable part of his work to

presentation of the proofs of the truth of evolution. This would be a waste of time now. Ample proof has been repeatedly presented and is available to anyone who really wants to know the truth. It is a known peculiarity, occasionally endearing, but more often maddening, that no amount of proof suffices to convince those who simply do not want to know or accept the truth. Reiteration for the sake of these wishful thinkers would be futile and reiteration for those who do want to know the truth is quite unnecessary, because they already know it or can easily find it in earlier works. In the present study the factual truth of organic evolution is taken as established and the enquiry goes on from there.” Dr. Simpson is evidently living in a Fool’s Paradise and where ignorance is bliss, it is folly to be wise. Apparently he is unaware that in three recent debates between zoologists who accept the theory of evolution and those who reject it, the latter have been victors. In the case of the verbal debate in 1927 between Joseph McCabe, who translated into English Haeckel’s “The Evolution of Man” and Douglas Dewar, McCabe fared so badly that he declined to allow his speeches (which had been taken down by a reporter employed by his association) to be printed, so that Dewar published his own speeches in a book called “A Challenge to Evolutionists,” which has been through three editions and which still remains unanswered. Then there is the debate between H. S. Shelton and Dewar published in 1948 under the title “Is Evolution Proved?” and still later, the debate between T. B. S. Haldane representing the Rationalist Press Assn. and Dr. L. Merson Davies and Douglas Dewar representing the Evolution Protest Movement, published in 1949. This debate was the result of a challenge by the Evolution Protest Movement; the rationalists had some difficulty in finding a zoologist to represent them, and Haldane agreed only if on condition that Dewar agreed to leave the origin of life out of the discussion and to accept Haldane’s vague definition of evolution.

I am prepared at any time to meet Dr. Simpson in written debate on evolution on the thesis: The weight of evidence is heavily against the theory of organic evolution. Possibly Dr. Simpson is not aware of the fact that Davies and myself offered to debate evolution with any two fellows of the Royal Society (a zoologist and a geologist), and publish the debate at our expense. This challenge was not accepted. The correspondence is published in a pamphlet, “Evolutionists Under Fire.”

If there is one thing that evolutionists are agreed upon it is the inadvisability of meeting in debate scientific opponents of evolution.

Simpson avoids all details regarding the evolution of man. He assures us that primate classification is “in a mess.” I agree. He asserts that the primates include the brainiest animals, but are not as a whole the brainiest. According

to him there are four levels of Primate brain development: 1. Prosimians; 2. South American monkeys; 3. Old-World monkeys; 4. Apes hominids and men. But he says (p. 90), “The four main primate groups do not (although many early and a few recent students have thought they do) represent four successive steps. . . The prosimians apparently gave rise separately to each of the other three groups. . . The prosimian aye-aye . . . is far more distant from the ancestral condition, and hence may be said to be ‘higher’ than is man in many respects. . . It now appears that the four (main) types of apes and men are independent surviving lines, all deriving separately from the Miocene radiation.”

Part III of “The Meaning of Evolution” is headed “Evolution, Humanity and Ethics.” It is dull reading but is enlivened by such gems as, “there is no real evidence whatever that evolution has had a goal, and there is overwhelming evidence that it has not” (p. 304); “Man has risen, not fallen” (p. 310); “Man has the power to modify and within certain rather rigid limits, to determine the direction of his own evolution. This power is increasing rapidly as knowledge of evolution increases” (p. 329); “We cannot predict for sure whether the future course of human evolution will be upward or downward” (p. 336). Simpson’s great discovery is thus imparted to his listeners: “Man is the result of a purposeless and materialistic process that did not have him in mind.” This is as profound as anything that Dr. Julian Huxley, whom Simpson admires, has said.

As a final example of the fallacies uttered by transformists, let me quote the following from “Editorial Comment” on p. 2 of the July, 1951, issue of “Biology and Human Affairs,” the official organ of the “British Council for Combatting Venereal Diseases”: “The evolutionary origin of man and his place in the universe have now been firmly established.”

It is a great relief to be able to close this appendix with a notice of a paper of outstanding merit by an evolutionist. I refer to the article by W. A. Straus, Jr., of the Department of Anatomy in Johns Hopkins University entitled, “The Riddle of Man’s Ancestry” (Quart. Rev. Biol., Sept. 1949, pp. 200-223). Straus rightly points out that recent fossil discoveries have made the apparent course of man’s evolution more obscure than it was a few decades ago.

Straus accepts the notion that man is a product of evolution, but realizes that the problem is a very difficult one and that there are objections to the various pedigrees that have been drawn up. The one he himself favors is that the first of the higher primates to branch off the main primate stem was the new-world monkeys, and after them the human stock branched off, then the gibbons, then the orang, and the main stock left them divided into two branches—the gorilla and the chimpanzee. But he writes (p. 220), “I wish to

emphasize that I am under no illusion that the theory of human ancestry which I favor at the present time, can in any way be regarded as proven. It is at the best merely a working hypothesis whose final evaluation must be left to the future. What I wish especially to stress is that the problem of man's ancestry is still a decidedly one one, in truth a riddle. Hence, it ill-behooves us to accept any premature verdict as final so to prejudice analysis and interpretation of whatever palaeontological finds may come to light, as the orthodox theory has so often done and is still doing. One cannot assume that man is a made-over anthropoid of any sort, for much of the available evidence is strongly against that assumption."

In 1921 Reinke wrote: "The only statement, consistent with her dignity, that science can make, is to say that she knows nothing about the origin of man." Today, in 1952, this statement is as true as it was when Reinke made it, and I venture to predict that it will be as true in 2002.

## GLOSSARY

ACETABULUM—Socket in hip bone in which head of thigh-bone articulates.

ACROMION—The top of the shoulder-blade.

AMBIENS MUSCLE—A thin muscle found in some birds that runs from the pelvis down the inner side of the leg to the knee where it crosses in a tunnel to the other side of the leg where it joins a muscle that bends the toe.

APONEUROSIS—The membrane forming the sheath of a muscle or connecting a muscle with a tendon.

AROMORPH—This, like aromorphosis, Bradytely, Horotely, and Tachytely, is a word coined by transformists to denote various changes they believe occur in animals. An aromorph is a character which results from aromorphosis.

AROMORPHOSIS—A change whereby the energy or vital activity of an animal is increased. The term was coined by Severtzoff.

ARCHAEOSAURIAN—A primitive type of reptile.

ARTICULAR—The bone of the lower jaw of reptiles that articulates with the skull.

ARTIODACTYL—A hoofed animal having an even number of toes on each foot.

ATROPHY—A wasting away.

BRADYTELY—This word was coined by G. G. Simpson to denote evolution at an unusually slow rate (low-rate evolution), the corresponding adjective being BRADYTELIC.

BUCCAL—Appertaining to the mouth.

CHROMOSOMES—Paired structures into which the cell nucleus breaks up when dividing. The number varies with the species.

COLUMELLA AURIS—A rod-like bone in the ear of amphibia, reptiles and birds.

DENTARY—The bone of the lower jaw that carries the teeth.

DIAPHRAGM—Midriff or membrane dividing the thoracic from the abdominal cavity.

ENDOCHRONDRIAL—Within cartilage.

ENTELECHY—A supposed principle or force that guides evolution.

EPICRANIAL—Appertaining to the scalp.

EPIGLOTTIS—The erect cartilage at the base of the tongue which, during the act of swallowing, closes down over the opening of the windpipe.

EPIPHYSES—Extremities of long bones that ossify separately.

FEMUR—Thigh-bone.

FORAMEN (Pl. Foramina)—An aperture.

GENE—The unit of heredity. The genes are hypothetical parts of the chromosome which are believed to affect development.

GENETICIST—A scientific breeder.

GERM PLASM—The part of the organism which gives rise to new individuals.

HOLOCENE—A term applied to the Quaternary or Pleistocene period.

HOROTELY—Simpson's name for evolution at a normal rate (adjective, HOROTELIC).

HUMERUS—The bone of the upper arm or the upper fore-leg.

ILIUM—The upper bone of the pelvis (q.v.).

ISCHIUM—The lower bone of the pelvis (q.v.).

LANUGO—The foetal hair of mammals.

MARSUPIAL—A mammal that typically has a pouch in the abdomen in which the young are carried. e.g. kangaroo.

MESOZOIC—The second of the great geological periods in which living organisms have existed.

METABOLISM—The chemical processes that take place in the organism.

METAZOA—All the animals composed of more than one cell.

MONOTREME—A mammal that lays eggs.

NEOTENY—Retention by the adult of larval characters.



**NOTOCHORD**—The axial rod in the dorsal region of the embryo derived from the middle germinal layer, forming the primitive basis of the spine.

**OBTURATOR FORAMEN**—A hole closed by a membrane.

**OCCIPITAL CONDYLE**—The bony process by which the skull articulates on the backbone. Birds and living reptiles have one condyle, mammals have two.

**ONTOGENY**—The history of the development of an individual.

**ORGAN OF CORTI**—A complicated vibrating organ in the mammalian ear.

**PALAEOZOIC**—Sometimes called the Primary, the first of the great geological periods during which animals and plants are known by their fossils to have lived on the earth.

**PELVIS**—Hipbone. This is made up of an os innominatum on each side. Each os innominatum is composed of three bones—an upper, the ilium, a lower, the ischium, and the middle, the pubis, which joins with its fellow of the other os innominatum.

**PERISSODACTYL**—A hoofed mammal having an odd number of toes on each foot.

**PLACENTA**—The organ, peculiar to placental mammals, whereby the foetus derives nourishment from the mother.

**PLACENTAL**—A mammal having a placenta, as opposed to marsupials and monotremes.

**PHYLOGENY**—The term applied by evolutionists to the supposed ancestral history of an animal.

**POLYPLOIDY**—The condition in which the normal number of chromosomes (q.v.) is exceeded.

**PREMOLARS**—The cheek teeth of the adults that replace the milk teeth of the young mammal. The front or cutting teeth are called incisors, the pointed teeth next to them are the canines, then come the premolars, and finally the molars.

**PRIMARY PERIOD**—See Palaeozoic.

**PRIMORDIUM**—The first distinguishable stage in the development of an organ.

**PROTOZOA**—The animals whose bodies are composed of a single cell, as opposed to all the others—the Metazoa.

PUBIS—See Pelvis.

RADULA—The rasping tongue of molluscs.

SACRAL—Appertaining to the Sacrum, which in man is a bone composed of five vertebrae. In man the six neck vertebrae form the cervical vertebrae, then come the dorsal vertebrae, followed by the lumbar vertebrae, after them comes the sacrum, followed by the coccyx composed of four fused vertebrae that end the spine.

SCAPULA—Shoulder-blade.

SECONDARY PERIOD—See Mesozoic.

STERNUM—Breast bone.

STIRPS—A name sometimes given to a group of animals larger than a family and smaller than an order. The groups into which animals are divided by systematists are, in descending order of magnitude: phyla, classes, orders, families, genera, and species.

SYMPHYSIS—The area in which two bones are joined to one another.

SYSTEMIC CIRCULATION—The general blood system of the body as opposed to the respiratory system.

TACHYTELY—Simpson's term to denote very fast rate of evolution; corresponding adjective is tachytelic.

TAXONOMIC—Classificatory.

TERTIARY—The third of the great geological periods in which organisms are shown by fossils to have inhabited the earth.

TIBIA—The shin bone.

TRANSFORMISM—The doctrine that all organisms are derived from a common ancestor, or two or three ancestors.

UMBO—The point on a bivalve shell above the hinge.

UNGULATA—The Order of hoofed mammals, including both Artiodactyla and Perissodactyla (q.v.).

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## TRANSCRIBER NOTES

Mis-spelled words and printer errors have been corrected. Where multiple spellings occur, majority use has been employed.

Punctuation has been maintained except where obvious printer errors occur.

Some photographs have been enhanced to be more legible.

Page numbers have been removed due to a non-page layout.

[The end of *The Transformist Illusion* by Douglas Dewar]