SOME RECENT LITERATURE CONCERNING THE ORIGIN OF MAN.

By A. Rendle Short, M.D., B.S., B.Sc., F.R.C.S.,
Professor of Surgery in the University of Bristol.

THE subject before us is so enormous, and arouses such widespread interest, that it will be necessary at the commencement to define some limits to our inquiry. We shall therefore confine our attention to the question of man's origin from an ape-like ancestor. We shall not attempt to discuss the general theorem of an animal ancestor of nature unknown; if there were any large measure of agreement amongst those scientists who reject the ape-theory what animal is to be postulated instead, it might be profitable to do so; but there is not. Nor shall we have anything to say, except incidentally, concerning the length of time man has been on the earth, nor as to the question as to the original relation between the various races of mankind—white, negro, Mongoloid, American Indian, and the rest.

The orthodox scientific theory of man's origin, taught in nearly every college and university in the world, expounded in the text-books, expected in the examination room, and believed by the majority of the anatomists, zoologists, and anthropologists, was first powerfully argued by Charles Darwin, and popularised by Haeckel and Huxley. It is to the effect that man owes his ancestry to an extinct ape-like ancestor. Some evolutionists considered that he was derived from the existing anthropoid apes—the gorilla, chimpanzee and orang-outang—but this view is given up. Sir Arthur Keith, in his Presidential Address at the British Association in 1927, announced that the question is now definitely settled and the ape-like ancestor theory proved. The common stem giving rise to man and the apes probably diverged in Miocene times, and our immediate ancestors were intermediate in structure between modern man and the ape. No doubt this view is very widely accepted, especially by the older anatomists

and by the writers of orthodox text-books of science; no doubt it is commonly taught in nearly every university in the world. Very many facts and observations seem to confirm it. But science has a way of upsetting our "settled conclusions" just when we are beginning to feel happy and secure about them, and I propose to bring evidence before you this evening, not to establish an alternative theory—apparently the time has not yet come for that to be done—but to show that though Sir Arthur Keith declared that Darwin's theory of the ascent of man would never be shaken, it is being shaken. Mr. Pyecraft (1), one of the zoologists at the Natural History Museum, South Kensington, wrote recently concerning the Theory of Natural Selection generally: "We seem to be threatened with a recrudescence of the controversy over the Darwinian theory. But now the conflict is not to be between learned professors of biology on the one side and the Church and the people on the other, but an internecine warfare—that is to say, between ourselves. It has taken something like fifty years to secure what we might call orthodoxy among the elect; now all is to be thrown into the melting pot again."

The same appears to be true with regard to the ape theory of man's origin. The doubts about it are beginning to percolate down to the newspapers. The *Morning Post* wrote, just about the time when England went off the Gold Standard: "There are disturbing signs that the scientific world may have to go off the ape standard. Speeches at last week's meeting of the British Association suggested that scientists are uncertain whether the stability of physical evolution can be maintained, and now Professor Sergio Sergi, at the World's Anthropological Congress, seems to be depressing the value of the 'missing link.' Owing to the general uneasiness that prevails, it is impossible to give authentic quotations for the evolution theory, but personally I am getting into something else as soon as I can." And in a more serious vein, the *Daily Telegraph*, in a review of a book we shall presently be quoting from, said in December, 1933: "Since the first flush of enthusiasm which followed the enunciation of the Darwinian theory of evolution, the *tempo* of the science of anthropology has suffered a surprising slowing up. This branch of knowledge has advanced from certainty to perplexity." It may be said, "But this is only the opinion of newspaper men." We turn therefore to the scientists.

Let us begin by reviewing the evidence for the ape line of descent. The first and greatest argument, of course, is the very close anatomical similarity between the human body and that of the gorilla or chimpanzee. The likenesses are so numerous and so well known that it would be tedious and unnecessary to enumerate them ; they are so obvious that in the opinion of many nothing more need be said : man and the ape must be brothers. Amongst animals, bodily resemblances have generally been taken to prove blood-relationship. But there is another side to the matter. Although there are striking resemblances, there are also very constant differences. The human brain is far larger and more developed. The ape has a projecting muzzle, a hairy coat, and a foot quite unlike ours ; the great toe is opposable, like a thumb. Man has no vibrissæ (tactile hairs) ; every other mammal has them. The apes have no hymen. No doubt it will be replied that these are merely the differences between species or genera, but a much more considerable point is next to be mentioned. The trend of modern zoological research goes to show that likeness of bodily structure is *no proof of common descent or blood-relationship*. There is a phenomenon amongst animals, living and extinct, known by the name of " Convergence." Two totally unrelated animals, widely different in their geological history and zoological relationships, may have a strangely similar bodily structure or individual organs if their mode of life is similar. And this Convergence is not an occasional and exceptional phenomenon ; examples of it are numerous and widespread. A very full discussion is given by L. Berg (2), of Moscow. How like the common newt, that divides its time between stream and shore, is the crocodile, whose habits in that respect are similar. Yet the crocodile is a reptile and the newt an amphibian. Their zoological relationships are very far apart ; their resemblance is due to the suitability of that particular pattern of legs, tail and general conformation for a life spent betwixt land and water. The spermatozoon of vertebrates, *e.g.*, toad, is, down to minute details, like a free-swimming, lowly form of life called Trichomonas ; but no one imagines that vertebrates are descended from Trichomonas. The extinct (Mesozoic) plants called Bennettitales show a sort of flower, with male and female elements and pollen, but they are Gymnosperms, allied to modern Cycads, and cannot possibly be ancestors of modern flowering plants.

Common wheat exists in several varieties, bearded and

beardless; white, red or black-eared; winter and spring. But just the same varieties are found of other wheats, spelt, rye, and barley. This must be an inherent law of grain; it cannot be chance.

The Dipnoi (air-breathing fish living in mud or water) cannot be the ancestors of frogs, toads, etc., but they share with them the paired lungs, the partitioned auricle (of the heart), and many other characters.

The eyes of the octopus are just like those of a mammal, with cornea, iris, ciliary body, lens and retina; but the octopus is not the ancestor of the vertebrates. Lowly vertebrates have no eyes (amphioxus) or a very elementary eye (the hag fish). Two animals are known that have eyes like an old gentleman's bifocal spectacles, the upper half to see in air and the lower in water, but one is a fish and the other is a beetle.

Three types of fish—the electric eel, Torpedo and Malapterurus—can give powerful electric shocks, but they are quite unrelated. The claws of the lobster and of a scorpion are on the same pattern. The glow-worm and the fire-fly, and also certain deep-sea fish, are luminous in the dark.

One of the most remarkable examples of Convergence is furnished by the marsupials (pouched mammals of primitive type) of Australasia. There are forms that mimic most of the common types of the mammals of Europe, Asia, and Africa. There is a volplaning opossum like a flying squirrel or flying lemur, the flesh-eating Thylacine like a wolf, another marsupial like a rat, and another like a bear. Nor is it only in outward form that Convergence is seen. The crocodile, like the bird, has a four-chambered heart. The extinct flying lizard, the pterosaur, had air-filled bones, and the foramen admitting the air situated just where it is in birds.

Bower points out that both plants and animals are bi-sexual, but it is scarcely credible that they have a bi-sexual common ancestor. Osborn calls attention to the strange parallelism between extinct reptiles and modern mammals; the huge dinosaurs with horns (Triceratops) like a rhinoceros; ichthyosaurus, like a whale; pterosaurs, like a bat; flesh-eating cynodonts with teeth like a dog; iguanodon, walking on its hind legs and tail like a kangaroo; the turtle, armour-plated like an armadillo, or the extinct glyptdon. Surely all this must be law, not chance. Especially when we find that each of these types

requires not one but many coincident modifications—*e.g.*, the heavy-headed rhinoceros must have massive legs and a strong neck; the flesh-eating Thylacine, the wolf and the extinct cynodont must have agility to hunt their prey.

The most recent, and one of the most eminent of writers on the descent of man is Professor Le Gros Clark (3), who, on the whole, is in favour of the theory of descent from an ape ancestor; but he frankly acknowledges the difficulties and pitfalls of the hypothesis. He says: "In the evaluation of genetic affinities anatomical *differences* are more important as negative evidence than anatomical *resemblances* are as positive evidence. It becomes apparent that if this thesis is carried to a logical conclusion, it will necessarily demand a much greater scope for the phenomenon of parallelism or convergence in evolution than has usually been conceded by evolutionists. The fact is that the minute and detailed researches which have been carried out by comparative anatomists in recent years have made it certain that parallelism in evolutionary development has been proceeding on a large scale and is no longer to be regarded as an incidental curiosity which has occurred sporadically in the course of evolution. Indeed, it is hardly possible for those who are not comparative anatomists to realise the fundamental part which this phenomenon has played in the evolutionary process."

We are driven to the conclusion, therefore, that the similarity between man and the ape may be another example of Convergence: in other words, the resemblances do not definitely prove blood-relationship.

But further, as Wood Jones (4), the Professor of Anatomy in the University of Melbourne, has pointed out, there are some anatomical features that make it easier to believe the apes are descended from man—an impossible hypothesis (A. R. S.)—rather than man from an extinct ape. The course of evolution never retraces its steps (Dollo's Law). If a modification has once been made, it persists. Now in some respects man's structure is more primitive than that of the apes. Like early mammals, but unlike the apes, he retains the ethmo-lachrymal, ethmo-sphenoid, and sphenoparietal articulations. The male external genitalia are more like those of primitive primates than those of the ape. Some primitive muscles—*e.g.*, the pyramidalis and the pronator radii teres—are absent in the apes.

According to the law of Recapitulation, every animal has to

climb up its own genealogical tree—that is to say, its ontogeny repeats its phylogeny, or its development in embryo gives evidence of its ancestry. (The law of Recapitulation is the trump-card of the advocates of the evolution theory; as a matter of fact, we think its value is greatly overrated.) Also, throw-backs may occur—that is, pathological specimens will be born from time to time that resemble the ancestor. Judged by either of these tests, the ape-ancestor theory stands definitely discredited. It is true the infant may have a hairy skin (lanugo), but so have nearly all mammals besides the apes. The sloped back forehead, great eyebrow ridges, projecting muzzle, and opposable great toe, are never seen in human fœtus; in fact, the ape fœtus is more like a human being than *vice versa*. The Darwinian tubercle on the human ear, and multiple nipples, which are often quoted as proving man's animal ancestry, are nothing to the point, because no ape has long pointed ears, or multiple nipples. It is often stated that children are born with "tails"; but as a rule the alleged "tails" are nothing but fatty or fibrous tumours such as may be met with in many parts of the body, without any embryological significance. The bones of the coccyx are not useless relics: they have an important function in giving origin to important muscles. In any case, no ape has a tail. There are many congenital abnormalities with which the medical profession is well acquainted: club foot, hare lip, cleft palate, congenital dislocations, nævi, supernumerary fingers and toes, *spina bifida*. But none of these recall the ape. Who has ever seen a human with a projecting muzzle or opposable great toe? We come to the conclusion, then, that the argument from anatomy and development is too uncertain to be relied upon. In the opinion of Professor Wood Jones and others, man's ancestor was not an ape but must be sought much further back, and in a much more primitive mammal. He suggests a little creature called Tarsius, which has been described as a living fossil.

The next main argument for the ape-descent theory is derived from physiology. It is maintained, for instance, that ape's blood and human blood are identical, and differ from that of other mammals; this is taken to prove close relationship.

Far more work has been published on the comparative anatomy of the primates than on their comparative physiology. The best modern summary of the latter known to me is Zucker-

man's (5) *Functional Affinities of Man, Monkeys, and Apes*, published at the end of 1933. He shows that the blood of man and the apes cannot be regarded as identical. The blood of all animals has a good deal in common. The red corpuscles of man and most mammals are exactly alike under the microscope; the hæmoglobin of man and most mammals is indistinguishable by the chemist. As Nuttall showed in 1904, human serum and ape serum give the same precipitin reaction, though for ape's serum a much higher concentration is needed. But there are differences. Human blood contains hetero-agglutinins against the red corpuscles of the ape, and *vice versa*, so that it would be most dangerous to use ape's blood for transfusion in man. Basophile leucocytes, which are very scarce in human blood, are 3 per cent. of gorilla's white cells, 15 per cent. in the orang, and 20 per cent. in the chimpanzee. By the use of anti-erythrocyte sera, Landsteiner and Miller (6), of the Rockefeller Institute, were able to show in 1925 that human and ape red blood corpuscles are not identical, and can be distinguished from one another, but those of a white man and a negro cannot. (This is very fairly pointed out by Sir Arthur Keith himself in his article on the Origin of Man in the last edition of the *Encyclopædia Britannica*.) They go on to conclude: "The experiments described show that a definite and constant serological difference is demonstrable between the bloods of man and the two anthropoids studied, chimpanzee and orang-outang," and again, "This conclusion is in agreement with the accepted view that man has not evolved directly from any of the existing species of primates, as was formerly supposed, but that the Catarrhina, anthropoids, and man have all sprung from a common stock."

Zuckerman further reminds us that man is physiologically different from the apes in his use of fire and tools, in his function of speech, his carnivorous diet and custom of monogamy.

We turn next to the evidence of palæontology. Here we must definitely put out of our minds the wholly imaginary pictures of ape-men that appear from time to time in the illustrated London papers, and even in museums. As Professor Wood Jones says, "The missing link pictures must be deleted from our minds, and I find no occupation less worthy of the science of anthropology than the not unfashionable business of modelling, painting and drawing these nightmare products of imagination, and lending them in the process an utterly false value of apparent

reality." He compares it with the pseudo-science of the old phrenological charts.

Confining ourselves to real evidence, although the whole world has been ransacked in the search for "missing links," the actual discoveries have been few, and have taken unexpected forms.*

When the first skulls of Neanderthal man were found, with huge brow ridges and head sunk on the chest, it seemed as if the true ape-man was before us. But Neanderthal man had nothing else ape-like about him. His brain was as big as ours; his teeth were truly human; he used tools, lit fires, and buried his dead.

So-called Rhodesian man appears to be closely allied to the Neanderthal type, and so does the Galilee skull. On the other hand, the Tauungs skull, called Australopithecus, also first described as a "missing link," is really that of a young anthropoid (Keith). A better case can be made out for three other fossil types, yet all with serious reservations. I append a very brief summary. (The details are taken from the writings of Sir Arthur Keith (7) (8).) First in the field was Pithecanthropus erectus, found in 1894 at Trinil, in Java, by Dubois. These remains consist of the top of a skull, three teeth, and, found at a distance of some 15 yards, a femur. To these is to be added, possibly, a piece of a jaw. The beds in which these were found are considered to be late Pliocene, or more probably early Pleistocene. (Pleistocene means the Ice Age; Pliocene is the geological time-period next earlier.) The skull has been variously described as that of a large extinct ape (by Virchow, Bumuller, Kollman), or intermediate between man and ape (Dubois, Keith, and others).

Next in order is Eoanthropus dawsoni, found by Mr. Charles Dawson at Piltdown, in Sussex, in 1911–12. The geological level, again, may be late Pliocene or early Pleistocene, and again there is a discrepancy between the skull, which has the shape and brain capacity of modern man (Keith) and the jaw found near it, which is ape-like. A piece of worked elephant bone was also discovered close by.

More recently, in 1928–29, a nearly complete fossil skull with several fragmentary jaw bones and teeth has been found near

* The whole subject of the fossil remains of man and apes has been admirably dealt with by Mr. Douglas Dewar in a paper read before the Victoria Institute on March 25th, but for the sake of completeness some of the ground is gone over again.

Peking by Mr. Pei, and described by the late Dr. Davidson Black. These also are dated early Pleistocene. The skull has a brain capacity equal to that of a human, but is shaped rather like Pithecanthropus. The jaws and teeth, also, are intermediate between man and ape, so far as can be determined from the scanty nature of the evidence. The find is called Sinanthropus pekinensis. Worked flints with evidences of fire have been discovered in close association with the remains.

To sum up, there have undoubtedly been some strange types of mankind on the earth in prehistoric times, but that they link man with the ape is open to question. It is clear that Eoanthropus was truly human ; it is possible, but not certain, that the jaw belonged to the same individual. They were not found close together. It is by no means so certain that the femur (human) and the cranium (ape-like) of Pithecanthropus have anything to do with one another. Peking man was truly human. Several " episodes " show how cautiously this palæontological evidence ought to be interpreted. In 1922, Professor Gregory, in America, found a single tooth which he thought was from a man-like ape, and called it Hesperopithecus—" the evening of the apes." The London papers, of course, came out with the usual imaginary drawings—half-ape, half-man. In 1927, it turned out that the tooth belonged to neither ape nor man but to an extinct peccary. In 1926, at Gardar, in Greenland, parts of a human skull and jaw were found, more ape-like in some respects than even the Rhodesian skull. It would have been a beautiful missing link but for the fact that it came from a Norwegian twelfth-century Christian graveyard. According to Professor Hansen, who described it, it is a throwback to primitive man. Sir Arthur Keith, with far greater probability, concluded that it is the result of a disease, acromegaly. But that raises the question whether the other abnormal skulls may not be due to disease also. The real ape-like ancestor of man, therefore, remains to be discovered, if he ever existed. With this agree the candid words of Sir Arthur Keith, written in 1931 : " The fossil forms which represent this stage in the evolution of anthropoid and man have not yet been found ; their existence is inferred."

The most unexpected part of the palæontological evidence, however, remains to be mentioned ; the further back we look for early man, the more like ourselves he appears to be. When skulls with a cranial capacity equal to that of a modern

European, and in all respects undeniable members of the species *Homo sapiens*, were discovered at Galley Hill, at Calaveras, and at Castenedolo, in geological deposits at least as old as those in which *Pithecanthropus erectus* was found, it was felt that the evidence must be lying, and it was more or less discredited. But during the past year or two at Kanam and Kanjera, in East Africa, Dr. L. Leakey (9) has obtained portions of a jaw and skulls of the same great age, early Pleistocene, which are definitely modern in type, and associated with worked flints of human manufacture. These conclusions were verified last year by four committees of experts, anatomists and geologists, sitting simultaneously.* In 1925 a similar find was made in the City of London in digging the foundations for a building. We thus reach the surprising conclusion that *Homo sapiens* is as old as, or older than, any of his alleged ancestors, so far as at present discovered. In other words, the palæontological evidence concerning the forerunners of modern man reduces itself to something not far removed from nil. Reid Moir has found worked flints in East Anglia in earlier beds still, the Pliocene, which present evidences of the work of an intelligent people.

Very briefly, let us have a word with the psychologists. Some of them have been inclined to adopt the attitude that the ape at his best is as good as man at his worst. They emphasise the cleverness of the tricks which a chimpanzee may be taught, profess to be able to recognise ape language, and would have us believe that the Australian aborigine or Central African native has barely the intelligence of a beast. But, as Zuckerman points out, it is very doubtful if, according to exact experiment, the chimpanzee is any more intelligent than a baboon, or, one might add, making due allowance for anatomical differences, a dog or a horse, and, as for the African or Australian native, it is at length being recognised that you must not judge intelligence by that of the adult brought up in the wilds, but rather by that of the child given a proper education. Granted this, the best of the native children will be at least as good as the worst of the European.

Dr. Oliver (10) in September, 1932, tested two large schools in Kenya, the one consisting of native boys and the other of the children of European settlers. He found that the average

* *See* Addendum.

intelligence of the natives was only 85 per cent. that of the Europeans, but 14 per cent. of the natives surpassed the European average. It is noted that the Europeans were of good stock, probably higher than the average at home.

In assessing the relative brain power of Africans and Europeans, it must not be forgotten that the standard of bodily health in the white man is, as a rule, far better, and this is found to have an effect on learning capacity. Dr. J. H. Sequeira (11), in his admirable Chadwick Lecture of April 28th, 1932, drew attention to the astonishing multiplicity of diseases in the individual native, whose person in most instances presents the picture of a pathological museum. Thus in an investigation in one large district 94·8 per cent. of the children under 10 years of age showed symptoms of chronic malarial infection; 75 per cent. of the boys in a reformatory revealed infestation with hook-worm; yaws is almost universal, and is a very disabling disease. It is generally believed that the natives of Australia are as low in the scale of human intelligence as any, but an Australian aborigine was good enough a year or two ago to play in first-class cricket; another is an eminent mathematician. Central African natives can be taught to make microscopic slides and find malarial parasites. To talk about the ape being as intelligent as man is too puerile to be taken seriously.

A curious experiment has lately been carried out by Professor and Mrs. Kellog (12), of Indiana University. They brought up their own child, aged ten months, and a chimpanzee, aged seven and a half months, born in captivity, on exactly the same lines, down to the minutest details. The animal was fed upon a bottle, clothed, bathed, fondled and given exactly the same treatment as the baby. It was put in a perambulator and wheeled about, and in due course taught to walk and to feed itself with a spoon. Its mistakes were corrected, as one corrects the mistakes of a child. But the chimpanzee remained a chimpanzee and the child a child. It was definitely inferior in learning, though it was able to respond to 58 different words and the child to 68. It is put to the animal's credit that, if hungry, it would bite the Professor's trousers. The experiment was brought to an end after nine months—that is to say, just when a child begins to make rapid strides in its education.

It is generally taken for granted that human intelligence shows a progressive development; that modern man is far cleverer

than his neolithic ancestors, and these again than the cave man and the flint-chipper of Chellean (early Palæolithic) times. Of course, our civilization is immensely more complicated. Our machines and our medical skill would be a marvel to the Ancient Britons; but the argument that therefore we have better brains is entirely fallacious. Other men have laboured and we have entered into their labours; other men have invented and observed, and we have learned what they had to teach. Some of the most remarkable of human discoveries were made so long ago that their origin is lost in the mists of antiquity. Who were the prehistoric geniuses who counted the days of the year; discovered the properties of opium; learned how to make cheese and soap; combined copper and tin into bronze; and invented the smelting of iron ore? Who made the first boomerang, or the first bow and arrow, or tamed the first horse? Indeed, we may push the inquiry further back still, and pay tribute to the intelligence of the man who first chipped flints and learned the secret of making fire. As Mr. Reid Moir, the great authority on Palæolithic man in East Anglia, has recently stated, the very earliest worked flints known to us, the pre-Chellean, present such differences that they must have been made by an intelligent and well-cultured people, who had, moreover, a great fight to maintain mastery over the numerous wild beasts that shared the lordship of the world with them. No wonder the earliest known skulls held brains as big as ours.

In this connection we may quote the words of Professor McDougall (13), of Harvard University, a leading authority on psychology: "It is now widely recognized that the strict neo-Darwinian theory of organic evolution is inadequate. . . . It finds itself, at the conclusion of its attempts, with mind upon its hands as an enormous remainder or surd, that cannot intelligibly be brought into the scheme or ignored, save at the cost of the absurdity of the whole scheme."

There will be wide agreement with the scientific correspondent of *The Times* (14) who, commenting on Sir Charles Sherrington's address to the Royal Society in 1925, wrote: "In short, these newer results of science reinforce the dogmatic statements of Western theology, and, it may be added, the common belief of the majority of mankind, that there is a vital difference between men and animals. Our quality of exhibiting reasonable and responsible conduct becomes more distinctive."

Let us conclude with a few quotations from first-class authorities. Professor Le Gros Clark, an advocate of the ape-descent theory, writes, "While, however, we may accept the thesis of Man's descent from 'lower' forms of life, there is by no means a consensus of opinion among biologists as to the precise route by which the human family arrived at its present status, or what may have been the real nature of its immediate progenitor." In his opinion, the common ancestor of man and the apes must have been very far back, and quite a small animal, no larger than a gibbon. It is the different structure of the foot that leads him to this conclusion. He further recognises that no mere play of external forces upon a more primitive organism that reacts to its environment in obedience to what Darwin called Natural Selection is adequate to explain the origin of man. He writes, "It seems certain that the instances of parallelism in the evolution of the Primates which have been brought to light in the preceding chapters are to be interpreted satisfactorily only by the conception of definite pre-determined trends of development, that is, by the conception of Orthogenesis. This conception puts the onus of evolutionary progress more on the germ-plasm, and regards the influence of the environment as of somewhat secondary importance. Hence it seems to intensify the mysteries of the germ-plasm, which (it implies) is endowed from the beginning with countless potentialities for evolution in definite directions. It becomes, therefore, increasingly difficult to conceive of evolution as being fundamentally merely a matter of action and reaction between the physico-chemical factors of the environment and those of a passive or at least a neutral and completely plastic organism. For this reason, Orthogenesis is apt to be dismissed rather abruptly as a 'vitalistic' principle, complicating in an unwelcome manner the mental pictures which biologists have striven to elaborate under the influence of mechanistic ideas. *But if the mysteries of the living and evolving germ-plasm are even deeper and more enigmatical than we have been inclined to believe, it were better to recognise the fact*" (italics ours).

With this accord the words of D'Arcy Thompson (15), the eminent zoologist, in his introduction to Berg's book on *Nomogenesis*: "How species are actually produced remains an unsolved riddle; it is a great mystery. Here at least is a conclusion that few men of our time will venture to dispute."

Professor H. F. Osborn (16), the greatest authority in America

on fossil vertebrates, and head of the Natural History Museum, wrote: "Hence the idea of man's ape ancestry is a myth and a bogey, due to our previous ignorance of the real cause of human evolution." And, again, he writes of "the profound cleft between the ape and the man. It is our recent studies of the behaviourism of the anthropoid apes, as contrasted with the behaviourism of the progenitors of man, which compel us to separate the entire ape stock very widely from the human stock."

Wood Jones comes to the following conclusion: "Man is more primitive than the monkeys and apes. . . . It follows that, far from being a descendant of the apes, he may be looked upon as their ancestor. . . . Indeed, from the point of view of anatomy, I conceive it to be impossible to take any other view."

And Tilney (17), in his monumental work published two or three years ago on *The Brain from Ape to Man*, says "Apes are quite as unconcerned in the origin of man as they are innocent of participation in it."

The special interest of the Victoria Institute is the relation between modern science and Christian faith based on the Bible. The Christian has always felt that the gap between animals and man is bound to be wider than certain scientific authorities would have us suppose. According to the first chapter of Genesis, man was last on the earth of living things; here geology agrees. His creation is separated from that of the animals by the usual formula, "And God said," which always introduces something new. According to the second chapter of Genesis, his body was not created out of nothing, but from the dust of the earth. Man does not eat dust, but it is remarkable that the some thirteen elements of which the human body is made up—carbon, sulphur, phosphorus, hydrogen, oxygen, nitrogen, calcium, magnesium, sodium, potassium, iron, chlorine and iodine—are all found in rock or soil, along with silicon and aluminium, which the body rejects; no elements are present in the body that are not found in rock or soil; those most plentiful in soil are also plentiful in the body, and elements like iodine that are scantily found in the body are scantily found in nature also. It has been customary to interpret the passage in Genesis as meaning that man's body was formed directly from the earth, without any intermediate stages; but perhaps that does not necessarily follow from the Hebrew text. But no explanation of the problem of man's origin that derives him wholly—not only

his body, but also his thinking power, memory, and instinctive reaction to the qualities of right and beauty—from a self-working process of evolution, without any Mind to direct it or moral qualities to give it atmosphere, can possibly be accepted. God said, "Let us make man in our image, after our likeness."

REFERENCES.

(1) Pyecraft. *Science Progress*, 1930, p. 441.
(2) L. Berg. *Nomogenesis*, Leningrad, 1926. English translation published by Constable & Co.
(3) Le Gros Clark. *Early Forerunners of Man*, 1934.
(4) Wood Jones. *Man's Place Among the Mammals.*
(5) Zuckerman. *Functional Affinities of Man, Monkeys, and Apes*, 1933.
(6) Landsteiner and Miller. *Journ. Experimental Medicine*, 1925, vol. lxii, pp. 841, 853, 863.
(7) Keith. *The Antiquity of Man*, 1925.
(8) Keith. *New Discoveries Relating to the Antiquity of Man*, 1931.
(9) Leakey. *Adam's Ancestors*, 1934. *See* also *The Times*, March 9th, 1932; October 21st, 1933.
(10) Oliver. *East African Med. Journ.*, September, 1932.
(11) Sequeira. Chadwick Lecture, *East African Med. Journ.*, June, 1932.
(12) Kellog. *The Ape and the Child*, 1934.
(13) McDougall. *Evolution in the Light of Modern Knowledge*, 1925, p. 352.
(14) *The Times*, March 16th, 1925.
(15) D'Arcy Thompson, Introduction to Berg's *Nomogenesis.*
(16) Osborn. *The Times*, May 3rd, 1927.
(17) Tilney. *The Brain from Ape to Man.*

ADDENDUM.

Very recently, the site of Leakey's discoveries has been re-examined by another geologist, and the antiquity of his human material seems to be in doubt (Boswell, *Nature*, March 9, 1935; Dreyer, *ibid.*, April 20). The whole incident shows how hazardous some of the confident conclusions of anthropology really are.

DISCUSSION

Mr. DOUGLAS DEWAR, B.A., F.Z.S., said: Professor Rendle Short's most stimulating paper raises so many interesting points that I have to impose upon myself a self-denying ordinance and touch upon only one or two.

In my opinion he has dealt very tenderly with the theory that man evolved from an ape. To my way of thinking the superficial

resemblances between man and the big apes are heavily out-weighed by the deep-seated differences. Professor Rendle Short has touched but lightly on these, presumably because, as he points out, anotomical similarity is no proof of blood relationship. Among these differences between Man and Ape Professor Rendle Short does not mention that which I consider the greatest, viz., the vertical position of man's body, which is unique among mammals, and his bipedal gait, which is also unique, because other mammals, such as the kangaroo, jerboa and tarsier, that progress on their hind limbs, do not walk or run but move in a series of jumps. The upright posture of man renders his anatomy fundamentally different from that of the apes who cannot walk on their hind legs without the aid of their hands or a stick or the support of a human trainer. Not only are man's legs and feet different from those of any other creature, but the whole formation of his hip bone and the curvatures of his spine are unique. These involve muscular peculiarities.

Professor Parsons asserts that there is a greater difference between the musculature of man and that of the other Primates than there is between that of many different Orders.

I maintain that it is just as impossible for a quadruped to evolve into man gradually as it is for one to have become gradually transformed into a whale or bat. There is no kind of gait intermediate between the quadrupedal and bipedal. In my opinion, it is as futile to seek for a fossil skeleton intermediate between that of a human being and that of a quadruped as to hope to find one of a creature midway between a bat or a whale and an ordinary land animal. No anatomist has yet accepted my invitation to make a drawing of the skeleton of such a creature.

I do not think that Vialleton exaggerated when he asserted that man is quite as much isolated from his supposed cousins as bats and whales are from their supposed terrestrial ancestors, and therefore, for anatomical reasons only, man should be deemed to form a separate Order. If we take into consideration his psychic characters he should be placed in a separate kingdom.

Another fundamental peculiarity of man is that he is the only land mammal not provided with a protective covering of hair, fur or wool. For an animal to lose such a covering would not involve the mechanical difficulties attending the transformation of a quad-

ruped into a biped; nevertheless I find it very difficult to believe that any Primate gradually lost its hairy covering, because of the great disadvantages under which a naked skinned animal labours in comparison with one endowed with a hairy covering. Quite apart from the loss of the protection against cold, on the one hand, and from the rays of a tropical sun on the other, and the loss of a valuable protection from the teeth and claws of powerful assailants and the fangs of poisonous snakes, and from skin abrasions during a hasty progress through a dense jungle, quite apart from such disabilities the loss of the hair of a Primate would deprive the female of the ability to retain full use of her limbs for brachiation or other kind of locomotion when carrying her helpless offspring. The young ape or monkey clings to the hair of its mother with leech-like tenacity, to the hair of the back in the case of New World monkeys and that of the under parts in the Old World monkeys and apes. So tight is the grip of the young one on its mother's hair that great force is needed to dislodge the youngster. Le Vaillant records that he shot in British Guiana a monkey carrying a young one on its back. The youngster, which was uninjured, continued to cling to its mother's dead body all the while this was being taken to the camp. In order to tear it away Le Vaillant had to obtain the assistance of a negro. The moment it was disengaged, the youngster made a dart for a wooden block that stood near covered with a peruke, which it embraced with all its paws, nor could it be made to quit this for three weeks.

Considerations such as these show how fantastic is the theory that man evolved from some kind of ape.

As regards Dr. Rendle Short's remarks about Sinanthropus (Pekin "Man") being able to use tools, I am inclined to think that the artifacts found in association with that fossil were manufactured not by that creature but by the men who preyed upon and devoured it. Modern types of men were in existence at that period.

In conclusion, may I make a few remarks about "convergence" of which Dr. Rendle Short has cited many examples. While not denying these likenesses I do not admit that they are the result of convergence. These likenesses are just what we should expect to find if every type is a special creation admirably adapted to its surroundings.

To the evolutionists it is most surprising that such various creatures as peripatus, the centipedes, spiders, scorpions, insects and wood-lice should all breathe by tracheæ of precisely the same construction; hence the theory of convergence has been formulated, *i.e.*, that these complicated organs have evolved independently on several occasions. To such lengths have facts forced this theory that Woodward writes, "Apparently the same family or genus or species may have originated more than once from a separate series of ancestors." In order to account for certain facts the theory has been applied to mankind. Dr. Crookshank believes that man has evolved independently on at least three occasions, the white races and the chimpanzee from one common ancestor, the negro and the gorilla from a second and the mongol and the orang from a third common ancestor. In his book *The Mongol in our Midst*, he adduces a number of facts in support of his view of the origin of man. Klaatsch and Sergi likewise believe in the polyphyletic origin of man.

Finally I propose a hearty vote of thanks to Dr. Rendle Short for his valuable paper.

Mr. W. McAdam Eccles, M.S.Lond., F.R.C.S.Eng., said: I, too, would like to add my meed of praise to Mr. Rendle Short for the paper which he has read this afternoon. But I desire to express my regret that he has taken up so much time in confuting the theory that man has *descended* from "an ape-like ancestor," and for two reasons.

Firstly, man, in whatever way he came into being, has never "descended" but ascended, and secondly, to protest that to argue this point so persistently as being "Scientific" is to impress the mind of the man-in-the-street that he is somehow related to the monkey, a statement often attributed to Charles Darwin but never made by him.

In passing it must be allowed that Darwin did make a mistake when he styled his work "The Descent of Man."

Turning to the last sentences of the address, I can hardly agree that man "occupies a section of the story of Creation *all by himself*" (my italics). Apparently Mr. Rendle Short refers to the first

chapter of Genesis when he writes thus, but if anyone will read that chapter, he will see that man's creation really follows, and is on the same " Day " and linked with the " creation " of " animals, reptiles and wild beasts, God saw all that He had made and very good it was. Evening came and morning came, making the sixth day."

I would ask a very definite question. And it is : Is our physical (animal) body " in the likeness of God " ? If so, then the body of a chimpanzee is " in the likeness of God."

No ; Man possesses that which the animals do not possess and never will possess, a power to correspond with God, to have a Spirit in the likeness and resemblance of the Divine.

Author's Reply.

I should like to thank those who have spoken in such kind terms of my paper, and especially Mr. Douglas Dewar for taking the Chair, and for his very interesting remarks, with which I largely agree.

I have made a few small alterations to meet criticisms from Mr. McAdam Eccles, but I believe the popular idea is correct in attributing to Charles Darwin a theory that man is descended from a Simian ancestor. He says :—

> " As man from a genealogical point of view belongs to the Catarhine or Old World stock, we must conclude, however much the conclusion may revolt our pride, that our early progenitors would have been properly thus designated. But we must not fall into the error of supposing that the early progenitor of the whole Simian stock, including man, was identical with, or even closely resembled, any existing ape or monkey." (*Descent of Man*, New Edition, 1901, p. 239.)

NOTE.

Among the late Dr. Pinches' papers there is a note referring to fresh and convincing evidence as to the sovereignty of Belshazzar, which reads as follows :—

" In a poem of the Persian period, translated by Mr. Sidney Smith of the British Museum, in his *Babylonian Historical Texts* (Methuen & Co., 1924), is a remarkable and by no means friendly account of Nabonidus, King of Babylon, the father of Belshazzar. Mr. Smith shows from this poem that the Tema to which Nabonidus went for at least eight if not for thirteen years of his reign, leaving the executive power at Babylon in the hands of his son, Belshazzar, was not in the neighbourhood of Babylon as has hitherto been supposed, but far away in *Amurru*, " the land of the Amorites," a name given to the West Country, and that it is probably to be identified with the North Arabian Oasis of Teyma referred to in Job vi, 19, and Isa. xxi, 14. The passage which speaks of Tema tells us also of a far more important fact, viz., that Belshazzar was raised by his father to the sovereign power at the time of his departure to Arabia, thus explaining, not only the statement as to his kingship in Dan. v, 1, but also the references to the years of his reign in chaps. vii, 1 and viii, 1. This most interesting passage runs thus :—

' A camp he (Nabonidus) entrusted to his eldest-born (Belshazzar),
An army he caused to go forth with himself ;
He loosed his (Belshazaar's) hands, he entrusted to him the sovereignty,
While he himself set out on a distant expedition.
The forces of Akkad (Babylonia) advanced with him,
Toward the town of Tema in Amurru he set his face,
He set out on a distant march, a road not within reach of Old.'

T. G. P."