

The Ape-Man of Java

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IN THE tertiary middle epoch the climatic conditions of the northern hemisphere of the earth were queer. In most parts of Europe it was so warm that palms and other tropical growths thrived. And, as in the swampy forests of Borneo and Africa today, so various species of man-like apes dwelled in the forests of what is now Rhenish, French and Swiss territory.

One of these man-like apes, christened *Dryopithecus*, has been found in fossil form in the district of Haute Garonne in France. It is an animal a little larger than the living chimpanzee. For a time it was believed that in *Dryopithecus* we had the most man-like of all known apes. But *Dryopithecus* has proved to be less man-like than even the chimpanzee.

Then a second species was discovered. It has been named *Pliopithecus*. It was spread well over Europe in the miocene period, and if any living zoologist could have met the creature in the tropical forests he would have been amazed at its resemblance to an ape that is living today. It is that particular form of man-like ape which is least familiar and interesting to the public—the gibbon.

In their whole structure the gibbons are undoubtedly man-like apes. But in many anatomical characteristics they approach nearer to the lower monkeys than do orang-outangs, gorillas or chimpanzees.

The gibbon does not strike us at first sight like a man-like ape, but rather as a grotesquely exaggerated caricature of the true monkey. He has arms so ludicrously long that they are like fantastic trick-limbs.

And yet in this queer fellow is a quality that brings him close to man. Of all monkeys, the gibbon is the one that most decidedly walks upright.

The orang-outang "walks" with his legs bent, while his arms reach forward so far that his hands touch the ground and serve as supports. The sole of the foot does not strike the ground with its full breadth.

The gibbon, too, is pretty clumsy in his walk. But he does not use his immense arms as supports. He raises them higher than his head and bends them so at elbow and wrist that they form a kind of counterpoise like a balancing pole. At the same time he puts his entire sole to the ground. Thus he can walk—in a drunken manner, but practicable; so practicable that the gibbon walks upright on flat ground under all circumstances.

The gibbon has another man-like attribute.

Man sings. His throat is organized so that it covers a scale of sounds. No monkey, no mammal of any kind, equals man in this, except the gibbon. The gibbon controls a whole octave, and Brehm says that the song of the gibbon pleased him greatly, being the most musical that he ever heard any mammal except man utter. Does this mean that the gibbons, the forest ghosts of Southern Asia, are, after all, nearer to the ancestral forms of early man than are the gorillas and orang-outangs?

When we ask this question, the proof of the existence of gibbon apes so long ago as the tertiary epoch gives us a valuable factor. It makes the gibbon the oldest man-like ape of the world.

If that is correct, the fossil remains of the gibbons of the miocene period take us back beyond the eagerly sought ape-man. They are earlier and lower than he.

The historical chain would be: From the lower monkeys a line ascending to the gibbon. From the gibbon, a separation into three branches. One of these branches remains the gibbon, unaltered, lasting to the present day. Another develops itself into man-like apes like the gorilla, chimpanzee and orang. And the third branch, still veiled in mystery, leads to man.

The ape-man, then, must stand between man and the arch-gibbon. Our deductions would lead us to imagine this ape-man as having shorter arms than the gibbon of today. His legs and feet would have to be suited better to upright walking than those of today's gibbon. And his brain must be of a dimension about half way between that of the brain of the gibbon of today and the lowest human race of today.

Many years ago a fossil upper thigh was found near Mayence in Germany. First it was supposed to be the thigh of a human female about twelve years old. But at last it was proved absolutely to be a leg bone of a gibbon ape, thus placing the existence of the gibbon monkeys in Europe absolutely into the last period of the tertiary epoch.

Then a skull of a gibbon was found near Calcutta in India in strata belonging to a period only a little later in this same tertiary epoch.

In the latter third of tertiary time there were many changes in the habitat of mammals on the northern hemisphere, owing probably to changes in temperature. It is conceivable that the gibbons began to move toward the warmer parts of Asia. Now, had the division of the branches leading severally to gibbons, man-like apes and ape-men already occurred at this time?

In a matter like this, demanding exact demonstration, we cannot admit the exact

creation legends of the world that tell of man's beginning—Asia. But it must be admitted that in strictly zoological facts there is a certain suggestion that the cradle of humanity was there.

Even Virchow, despite his remarkable attitude toward theories based on Darwinism, unbent sufficiently to declare that, if it were possible to discover fossil remains of an ape-man anywhere, it should be possible in India and the regions around Sunda Straits.

Virchow's declaration became decisive for the plans of a young Holland doctor. He chose Java for his field.

He was Eugene Dubois. Within four years after the beginning of his excavations he announced that Virchow's problem had been answered. A being, walking upright, with a brain between the brain of man-like ape and man, in many ways strikingly like the gibbon, but in many other ways a human, had been found; the missing link between gibbon and man—*Pithecanthropus erectus*, the erect-walking ape-man.

During the four years of excavation Dubois had found so many fossil bones of animals of all kinds that they filled four hundred cases when they were packed for shipment to Leyden.

The excavations were made in certain strata in the middle part of the long island. They were formed of volcanic matter, great masses of boiling mud which poured from the volcanic chains, carrying rocks with them. Even in our days the volcanoes of Java and neighboring islands display their tremendous forces, destroying villages and tribes. We remember the bursting of the island Krakatan that involved the whole earth in atmospheric disturbance.

It is no wonder that in such a land volcanic deposits can form whole chains of hills, hiding the traces of vanished life of past epochs deep in their interior.

The age of deposits in which Dubois worked may be placed toward the end of tertiary times.

At that time *Ichthyosaurus*, who had ruled the seas even there, had vanished away. But in Europe there was the mammoth and in America were elephants, horses, toed horses and the giant sloth, *Megatherium*.

At that time Java either was no island. The shallowness of the sea between Java, Borneo, Sumatra and the mainland of India, taken in conjunction with many zoological facts, establishes almost certainly that

that whole island world once was a part of the Indian mainland. Wallace has shown strikingly that the true ancient boundary of the Asiatic mainland runs along a line from Borneo-Java and Celebes. Even today the ocean descends suddenly to enormous depths just beyond that line. And beyond it the animal world displays itself in strange forms—the grotesqueness of the Australian fauna.

In Java at that time, when it was still part of the mainland or shortly after it had become island, there was stegodon, the link between the mastodon and the true elephant. There was a hippopotamus, now to be found only in Africa, but then living in Asia and in Europe.

Thousands of valuable bones were gathered by Dubois. And at last, in an ancient river bed, he found four loose, imperfect bones that are worth more than all the thousands.

First a lone tooth appeared. Then, in the same level, but three feet away, the roof of a skull. Nine feet farther below there was another tooth. And at last, thirty-six feet beyond that find, there was a left upper thigh.

It is plain what had been the destroyer. The skeleton, or perhaps the corpse, had fallen into the river. Gradually the current had torn it apart and carried the fragments away. Only these few parts had remained fast in the mud and had been baked into stone with that mud in the course of time.

But fortunately the four parts that were thus preserved are most useful.

The skull points unmistakably to the gibbon. But its size is beyond that of the ape. After careful cleansing and measuring of its capacity, Dubois estimates that the brain contained in it occupied from nine hundred to nine hundred and fifty cubic centimetres. Under no circumstances could it have been more than a thousand.

The greatest measure of a male gorilla's brain in a special case was six hundred and five cubic centimetres. In general the gorilla brain is 498 in the male and a little less for the female. No other man-like ape equals the gorilla.

The middle-thing of Java, therefore, had a brain far beyond that of all man-like apes.

In man, the average capacity of the skull may be stated as 1,410 cubic centimetres for the European.

Therefore, in the point of brain, the creature of Java was neither a gibbon nor a man. It is a middle-thing—just what science looked for when speaking of the missing link.

Death Hedges Their Duty

IT WAS just about three months ago that a group of men stood on the shore by the rapids above Niagara's Horseshoe Falls, when Jacques Foisy, girded by a frail rope, went out into the stream and drove a spike into a crevice in the rock. To-day a party of New York mechanical experts are superintending the hazardous task of damming the rapids above these falls. The work is part of a plan for developing 125,000 horse-power electrical energy, and the cost when complete and ready for the power to do its work will be close to \$7,000,000. The syndicate is known as the Electrical Development company of Ontario, and some of the best engineering men of America have been called into requisition. They will beat back the rapids, dam their flow, dry up the bed of the river above the falls for twelve acres, erect a new channel for part of its course. Then they will sink a shaft of 150 feet and create the power through thus diverting the water into it. To carry away this water after it has been used a tunnel 2,200 feet long will be built at a depth of 177 feet below the bed of the rapids. The exit of the tunnel for the discharge of the tail race water will be under the very brow of the falls.

The work of constructing the coffer dam is a spectacular one. It bristles with startling suggestions. Ahead is the roar of the falls, the drop, the rocks, the whirlpool rapids and the Devil's Hole. Behind is the ceaseless torrent battling against the invasion, this chaining of its right to flow and run at will. Inch by inch the dam forces its way into the current, each foot from shore making the water deeper, the rush more terrific, and the battle between man and nature more singularly earnest. One foot, two feet, ten and now twenty-four feet are registered as the depth of those solid walls of water that roar against the dam, drenching the little corps of adventurous workers with its spray.

It is a little corps of workers of necessity, for it is not a work on which a great force of men could be available. It is the Gideon's band, the selected few who are employed here. It is not a work that can be hurried. Each step, each movement, has to be taken with care. The men to do the outpost work on this dam were secured with much difficulty. Lucrative wages were offered, but one wrong step means death to the worker, death in the falls and then the whirlpool rapids to play with the body for a while.

The dam will, when completed, be 2,200 feet in length. The cribs will be 24 by 16 feet, and each one will, it is estimated,

weighted with 25 tons of stone. When the work was commenced many, attracted by the offer of excellent pay, came to apply for the positions. Most of them listened to the falls, glanced at the rapids and left. Some worked while the dam was being built near the shore, but left as it poked its narrow nose out into the stream. To-day the most dangerous part of the work is being carried on by French-Canadian river men.

The work is at all times perilous, but the climax is reached when Jacques Foisy takes the soundings in advance of the dam's course. The last soundings revealed a depth in the rapids of twenty-four feet. Three beams were placed out in these rapids, secured by ropes, and Foisy, attired in his usual costume and without even removing his overalls, leaped out upon them. If the ropes should break, if he should slip, if the beams should overturn, and if one of those angry waves should rise just a little higher! But Foisy thinks nothing of all this, but commences to lower the iron bar that is marked off in feet and inches. Seizing this bar the current endeavors to wrest it from his hands. Under the most favorable conditions, and with feet well planted upon the firmest land, to take the soundings of Niagara's rapids would be a perilous task, but here stands Foisy on three dancing timbers, lowering the rod much more at ease than the spectators on the dam above. Vigorously he battles with the water and then the bottom struck he marks the spot and leaps lightly back to the crib. Then Mr. Thornley finds that the iron bar has been slightly bent by the force of the water, which rushes by at the rate of twenty-five miles an hour.—Brooklyn Eagle.

Pointed Paragraphs

Usually the right side of the market is the outside.

A wise man knows all he tells, but he never tells all he knows.

A woman loves a man in proportion to his ability to make her angry.

Any man who attempts to dodge a bill collector is apt to be found out.

When a man's nose is as red as a beet it's usually safe to bet that he is one.

If there is anything more pitiful than an effeminate man it is a masculine woman.

In England a candidate stands for office, but in this country he has to hump himself and run.

The thigh proves that the creature was at least a third larger than all fossil or living gibbon apes. The Java creature was fully as large as the average man.

The teeth, belonging to the upper jaw, show features belonging to both ape and man.

The crown is entirely that of man; the size and root are ape-like.

The last witness is the upper thigh. It gives the most startling testimony.

It is the upper thigh of a thing that walked erect.

The upright walk of man has stamped itself splendidly into his skeleton. Man's upper thigh is almost entirely straight. Compare with this the skeleton of a gorilla and you will find that the upper thigh is not only short and thick but curved and hollowed toward the inside.

The bone of Java is bent a little, but not more so than happens occasionally with a normal man; far different from the great curvature of the gorilla's thigh.

There is no doubt that this thing, whatever it was, walked like a man.

Plainly, gibbon and man were linked in the thigh. And it was found in South Asia, where the gibbons still live.

Pithecanthropus erectus gives us the beginning of a great series of difficult problems, as did the famous reptile-bird, *Archaeopteryx*, of Solenhofen, in whose case the really puzzling questions arose long after the question as to what it was had been settled.

For instance, we must still ascertain exactly what is the age of the deposits in which the ape-man was found. It may be that we shall find them to be of a period from which we already possess genuine human skulls found in other localities.

At present our estimates place it loosely from the end of the tertiary period to the earliest glacial period. And certain European finds of undoubted human bones take us back as far as that glacial period.

Should it be ascertained that *Pithecanthropus* and the human remains of Europe's glacial time are contemporaneous, a great field of conjecture and research will have been opened. It would appear then that the *Pithecanthropus* of Java were simply isolated survivors.

Should it be proved, on the contrary, that the Javanese deposits date back into the tertiary period, says the tertiary pliocene, thus placing the beginning of human man into Eastern Asia, we would have the problem before us of how the finished product, man, could have wandered and spread so soon thereafter from the Sunda Straits to France on one side and to South America on the other.

Meantime men are digging busily in Java for a complete or measurably complete skeleton of *Pithecanthropus*. Chance holds the key. We must wait in patience.

In Solenhofen, which furnished the world that magnificent reptile-bird—the missing link between lizard and bird—sixteen years elapsed between the first find and the second; and since then twenty-five years have passed without a third find.

But we have the one great fact. A bright light has been shed on the chain from gibbon to man. To work backward from the gibbon is not so difficult.

Recent anatomical proofs show that the line of descent from the lower mammals to the monkey passes through a half-monkey that still survives—the so-called "forest-ghost" or "ghost-makl," which inhabits Sunda Islands today.

Fossil relatives of this animal have been found in North America in the deposits from the first third of tertiary time. In those days the line of man was represented by these mammals, much lower in order than the present true monkeys. And from the half-monkey the descent probably is to be traced to the still lower insectivorous mammals, such as the good, honest porcupines, which certainly do not appear at first sight to be "ancestors."

And ancestors of the porcupines, away back in the cretaceous or chalk periods, lead again to the marsupial animals such as the kangaroo. At last we find the duck-bill laying eggs today like a lizard.

And this takes us back to the reptiles and amphibians. The amphibian ascended from the fish through the lizard-fish. From the fish the thread leads back to the realm of the things without backbone, the invertebrates. And that takes us back to the single cell or uni-cell, the first creature.

Men complain sometimes that the glow of romance pales with the advance of science.

I feel that science enriches the world with romance more and more in the best sense. Ever more glowing, ever more wonderful, does the picture become. Ever more mightily knowledge arouses us, takes us in a flight through vast time, bears us through fairy-like places.

And when the spirit of knowledge has made seers of us, we perceive behind the splintered, fossil bones of Java the sum of great power that thrills the devout reader of the story of Eden; behind *Pithecanthropus erectus* of Java there towers, half unveiled, the greatest of all mysteries, the mystery of the being of man, of the appearance of the first conscious brain; the mystery of ourselves.

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