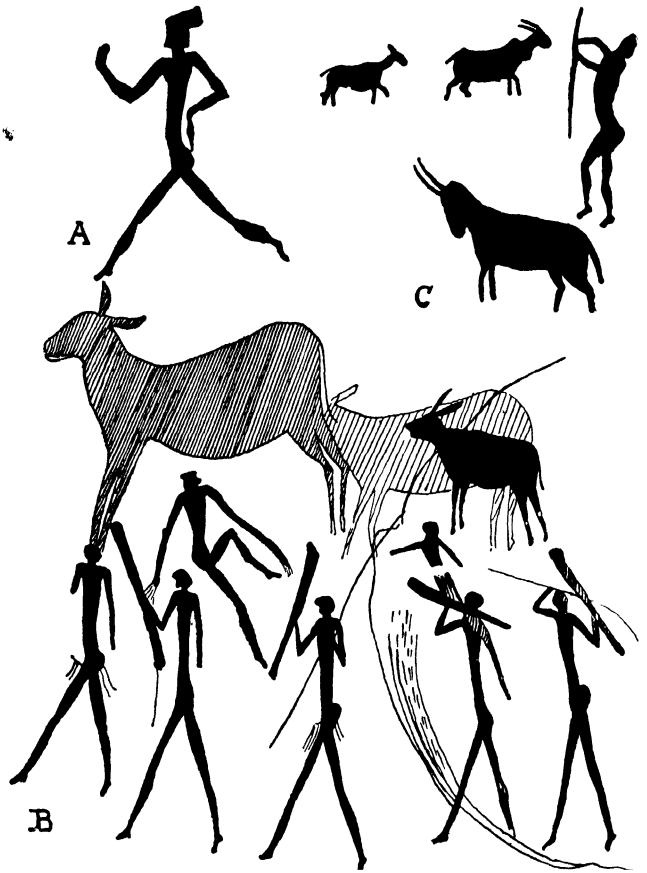
MEN OF THE DAWN



The Journal of the Royal Anthropological Society, 1931.

AFRICAN PAINTING

A and B from the Bambata cave, S. Rhodesia. The oldest painting (yellow) is lightly shaded, the next (red) moderately shaded, the later ones (brown) deeply shaded. A is a late Wiltor figure.

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MEN OF THE DAWN

THE STORY OF
MAN'S EVOLUTION TO THE END OF
THE OLD STONE AGE

BY

DOROTHY DAVISON,

Author of
"Days and Ways of Early Man"

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PREFACE

THESE are most difficult days in which to write a short book on prehistoric man. Discoveries and theories are pouring in so rapidly that long explanations are needed to give a balanced view of the various aspects of the subject.

Although it is not easy to keep abreast of all the new knowledge, yet it is fascinating to live in such progressive times. The subject is as full of thrills, problems, and surprises as a detective story, but unlike the best detective story it never ends. It calls for all the imagination and scientific thought that the best minds can give, and in return it opens up new vistas of understanding and gives breadth and colour to one's outlook.

The present generation could, if it would, see the results of many of the mistakes it is now making in the story of man's evolution.

With all its romance, beauty, and psychological problems archæology is far from being the dry-as-dust subject of popular imagination.

With this book should be read *The Search for Man's Ancestors*, by Professor Elliot Smith, for one supplements the other.

I wish most sincerely to thank Professor Elliot Smith, F.R.S., D.Sc., Professor Fleure, D.Sc., and the Rev. J. F. Shepherd, M.A., for the help they have so readily given me.

DOROTHY DAVISON.

Manchester, 1934.

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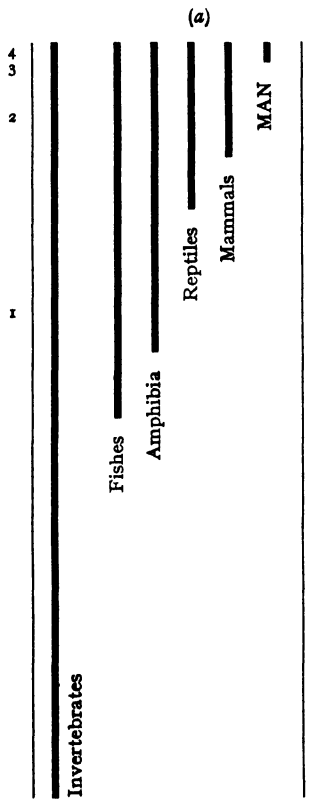


(*b*)

4. QUATERNARY	Recent	. .	200 ft.
	Pleistocene	.	200 ft.
3. TERTIARY	Pliocene	. .	260 ft.
	Miocene	. .	1,000 ft.
	Oligocene	. .	500 ft.
	Eocene	. .	800 ft.
2. SECONDARY	Cretaceous	.	3,000 ft.
	Jurassic	. .	5,000 ft.
	Triassic	. .	3,000 ft.
1. PRIMARY	Permian	. .	1,500 ft.
	Carboniferous	.	12,000 ft.
	Devonian	. .	5,000 ft.
	Silurian	. .	7,000 ft.
	Ordovician	.	15,000 ft.
	Cambrian	.	12,000 ft.

Archæan—Length unknown

CHAPTER I

HOW THE WORLD WAS PREPARED FOR MAN

MOST people now believe in evolution, but there are still many mistaken ideas about the way it has operated during past ages. Perhaps the most common fallacy is the belief that evolution proceeded in a straight line, so that each succeeding group of animals or plants was invariably an advance on the one before. There has always been progress from age to age, but there have been many failures and some degeneration.

Evolution may be likened to a tree rather than to a telegraph pole with man at the top. The tree's branches spread in all directions, and, though the majority grow upwards, a few bend downwards after some years of growth. One branch, of course, far outstrips all others—the branch to which man belongs. If evolution had been merely a series of steps upwards there would have been but few extinct species of animals and little of the great diversity of life that exists to-day.

To understand the evolution of man it is necessary to have some idea of the evolution of life as a whole; because man developed as part of that evolution and not as a being outside it.

It is impossible even to guess how long it is since life first appeared on the earth, though some idea of the almost inconceivable length of this period may be gained by a study of the first chart.

Man was evolved very late in the world's history, and he probably appeared a million or two years ago. Civilization is such a recent event that it could be represented on the chart only by an almost invisible dot!

In order to grapple with the immense period of the world's history it has been divided into four great

eras: the Primary, the Secondary, the Tertiary, and the Quaternary. Each of these is subdivided into several epochs, based upon the distinctive types of fossilized animals and plants found in the rocks. Some of these epochs drift almost imperceptibly into the next, while between others there is a marked difference.

The origin of life on the earth is a complete mystery, and even its earliest stages are unknown. It must have developed considerably during the immensely long Archæan epoch, but the Archæan rocks have been subjected to so much heat, pressure and movement that the remains of the first frail creatures were crushed and burnt out of existence. The only signs of life are the tracks of wormlike creatures in some of the least disturbed rocks. During this epoch the world was settling down into a solid state, and all kinds of volcanic activity were common.

In the next epoch, the Cambrian, animal life is found in so many and varied forms that it must have taken a long time to evolve and therefore have existed in Archæan times. Although Cambrian animals are complex compared with the simplest forms of life, they are primitive and monotonous compared with the animals of to-day. Then the only living creatures were sponges, corals, star-fish, jelly-fish, the ancestors of prawns and shrimps, and long-stemmed, flower-like animals called sea-lilies and trilobites. No life is known on land for millions of years after this.

During the next epoch, the Ordovician, there was violent volcanic activity, but the seas were teeming with creatures similar to those of the Cambrian epoch. It was not until the following Silurian epoch that there was any decided evolution of new forms. Silurian seas were haunted by formidable scorpions, six feet long, armed with powerful pincers. Less imposing but infinitely more important were the first vertebrates. They were the ancestors of all fishes, but were very unlike any living now. They had heavy bony plates over their heads and shoulders—doubtless to protect them from the onslaughts of the sea-scorpions. The

hind part of their bodies was free, but even so they were not very agile. During this quiet epoch there were ten thousand species of lowly creatures in the sea, but none on the land.

Next comes the Devonian epoch, whose red rocks are made of desert sand. This was a time of sandstorms and torrential rains, when most of the land was desert and lakes were being rapidly filled up with sand. Fishes increased and became more nimble as they discarded their heavy armour and trusted rather to speed to enable them to escape from their enemies. At last life appeared on the land. Ferns and reeds were the first plants, and the first land animals were insects, huge may-flies, spiders and scorpions.

Fish stranded in the shrinking, stagnant pools and lakes found life most difficult. Their supply of oxygen was exhausted, and poisonous gases took its place. Many died, but some adapted their breathing apparatus so that they could breathe air. They resembled the mudfish of Australia.

One of the greatest transformations in the world's history occurred between this epoch and the next, the Carboniferous. Deserts changed to dense jungles and putrid marshes, and everything was enveloped in warm moisture. The great forests of those days burn to-day in our grates as coal. Such dense and luxuriant vegetation has never been seen since on a large scale. Trees grew to 150 feet, and ferns were as tall as our trees. The degenerate descendants of those forests are our club mosses, horsetails, and ferns.

At that time a most important event occurred. Out of those dark, slimy forest pools crawled queer fish-like creatures with small weak legs. They were the first amphibians, stupid clumsy-looking animals. Ever since then their descendants have taken the centre of the stage. One of them became the ancestor of the first reptiles, which appeared during the Permian epoch. By this time another series of great movements had taken place, the climate had changed, and vast deserts once more covered the land. The wonderful vegetation of the

Carboniferous days vanished, and many ancient forms of life became extinct. Only the most adaptable forms survived, and their difficult environment compelled them to change their mode of life in order to get food. So the most advanced amphibians learned to live always on the land, and developed their limbs sufficiently to lift their bodies off the ground and even to move quickly. This epoch brings the long Primary era to a close.

The Secondary era is aptly termed "The Age of Reptiles," for during the pleasant, fertile Triassic, Jurassic, and Cretaceous epochs these creatures dominated air, sea, and sky. Reptiles as big as whales swam in the seas, great reptiles with bat-like wings and long beaks full of sharp teeth flew in the air, while the land was peopled with the most extraordinary host of nightmare creatures that the world has ever seen. In those days dragons were a reality. An animal with the head of a crocodile, the flappers of a sea lion, the neck of a snake, and the body of a hippopotamus was not a creature of the imagination, but a peaceful inhabitant of shallow water. The most formidable reptiles were the dinosaurs, whose eggs have been found in Mongolia. Some had small heads, long necks, and large bodies, and stood on their hind legs like kangaroos. One of them, Brontosaurus, was sixty feet long, and weighed twenty tons. His relative, *Diplodocus Carnegii*, was eighty feet from head to tail.

During the Jurassic epoch, when reptiles reached their greatest development, the struggle for life must have been very severe, and it is interesting to see how they reacted to it. Some grew to a huge size, others became slender and swift, somewhat like ostriches, and many developed the most formidable and fantastic armour ever worn by any creature. Triceratops covered its head and neck with a kind of bony bonnet with two horns over the eyes; Stegosaurus, of the tiny head, developed an enormous toothed crest from head to tail, while others bristled with spikes. In fact, these reptiles seem to have exhausted all the aids to a successful life

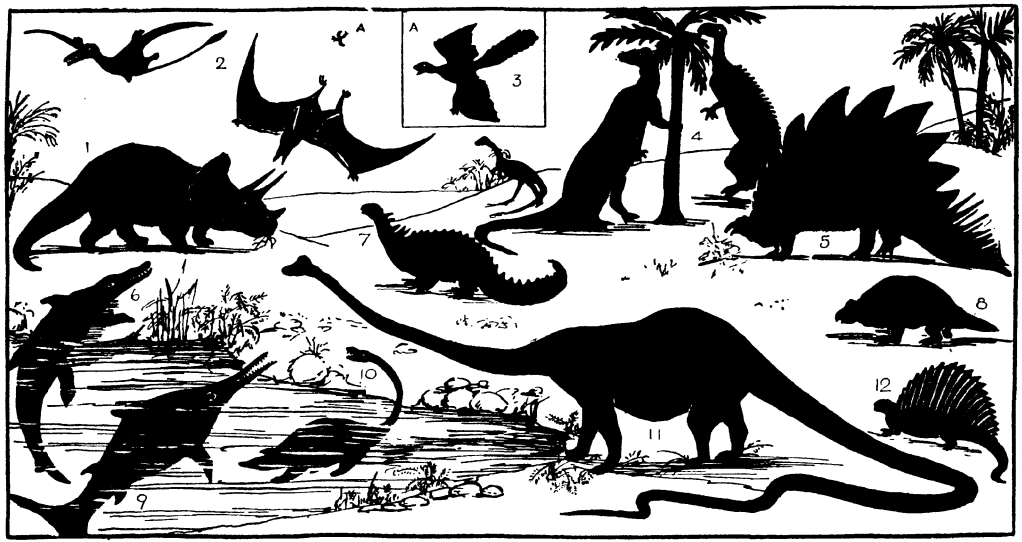


FIG. 1.—The Monstrous Reptiles of the Secondary Era.

1. Triceratops (Cretaceous, 20 ft.). 2. Pteranodon (Cretaceous). 3. Archæopteryx (Jurassic). 4. Iguanodon (Cretaceous). 5. Stegosaurus (Jurassic). 6. Metriorhynchus (Jurassic). 7. Polacanthus Foxi. 8. Kannemeyeria (Triassic). 9. Ichthyosaurus (30 ft.). 10. Plesiosaurus (Lias). 11. Diplodocus Carnegii (84 ft.). 12. Ship-lizard (Perma-Carb.).

except one: they never trusted to their brains. Some of the largest had a brain the size of an egg.

They are excellent examples of that insidious disease, over-specialization. These reptiles all specialized in some particular way which protected them so long as their environment remained unaltered, but when any change occurred they were quite unable to adapt themselves to new ways of life. Long necks were excellent labour-saving devices when food was plentiful in shallow pools—Diplodocus lay comfortably in the mud, and swung its neck round till its mouth encountered something to eat. When, however, the pools dried up its minute brain could not suggest any other activity, and the weak legs could not carry that ponderous body far; so Diplodocus starved and sank into the mud.

The heavily armoured reptiles dropped under the weight of their own armour; the carnivorous reptiles found no prey because the vegetable-eaters had perished; and so by the end of the Tertiary era all but a few of the least specialized reptiles had died out. Their epitaph might well have been: "I and my race died of over-specialization; our bodies became a trap from which we could not escape."

Their disappearance gave the humbler and smaller animals which had retained their plasticity a chance to develop in the Tertiary era. Foremost among these were the mammals. They were first evolved in Triassic days from a rather insignificant, unspecialized branch of the reptile family living in Africa (Theriodia). During Secondary times their only chance of survival lay in their small size, their agility and superior brains. When they were freed from the oppression of the monster reptiles they suddenly developed, and in a comparatively short time took their place in the air, sea and land. Many of them were little wiser than their predecessors and specialized in ponderous bodies, armour, and weapons, and so died from the same deadly complaint, over-specialization.

The small mammals, however, made steady though less spectacular progress, and gradually became the

generalized ancestors from which our modern animals have sprung. In Eocene times they were strangely alike, but by Oligocene days they were divided into recognizable groups, and by Miocene and Pliocene times there can be no doubt about their relationship to animals we know. The evolution of mammals was helped by the complete change in vegetation which took place in the Tertiary epoch. Grass, modern trees, and flowering plants appeared, and with them came birds, butterflies and all kinds of insects.

So it was that life developed from the first primitive marine invertebrates to fishes, amphibians, reptiles, mammals, and last of all to man himself.

CHAPTER II

THE TIMES OF EARLIEST MAN

IN early times man had a hard struggle for life, and of all the creatures that lived on the earth he seemed least able to defend himself from the dangers by which he was surrounded.

The forests echoed with the howls and cries of the fiercest wild beasts, the rivers swarmed with the huge rhinoceros and hippopotamus, while over the plains roamed great herds of bison and mammoths. In the dim recesses of the caves lurked cave bears, cave lions, and hyenas; the terrible sabre-toothed tiger was ever on the prowl seeking its prey. All these animals, with packs of wolves, wild cats, primitive horses, wild boars, and giant deer, made the world of that day exceedingly dangerous for man to live in. He seemed so defenceless.

The rhinoceros had two enormous tusks that made even lions and tigers afraid to attack it; snakes had poison; lions, tigers, and wolves had strong teeth and sharp claws; bison had horns and hard hoofs; and bears had strong forelimbs with which they crushed their victims to death. Moreover, such animals as were without powerful weapons of defence were swift-footed and could outrun their enemies. Rabbits were safe in their burrows; wild cats and monkeys found refuge in the trees, beavers in the banks of the rivers, and birds in the air. Every creature seemed to have a reasonable chance of life except the most important of them all—Primitive Man. There he moved among them with no apparent weapons of defence and no safe home, rather insignificant and very unprotected; and yet he was destined in the end to become master of them all. To-day he is so immensely superior in intellect to the

fiercest and most cunning of animals that it is hard to realize that he has been evolved from such a helpless forefather.

How primitive man survived, and how in the course of ages he became man as we know him, is the most wonderful story ever written in the history of the world. The latter portions of it, written and printed, we call History, but that is only the last chapter of the story. The earlier chapters are much more difficult to decipher, for they are written in human bones and the remains of animals which have survived from far distant ages in the rocks and in the things that man made.

Such being the source of our knowledge, it is little wonder that the story is not always clear, that there are gaps in it, that different interpretations are given to parts of it, and that there are still parts which cannot be understood at all.

The marvel is that we know anything of times so remote. Every year, however, our knowledge is becoming clearer and fuller. Very little of the earth has yet been explored for the purpose of unravelling man's story, so we may certainly hope that, as exploration proceeds, we shall have a much more complete record than we have to-day.

Chapter III

WHY MAN SURVIVED

If primitive man had been actually as defenceless as he seemed, it is certain that there would not have been a story to tell; for wild beasts would have made an end of the human race in its earliest childhood. The means by which man held his own amid great dangers and difficulties were new and very wonderful, such as Nature had not bestowed on any creature before. They were also the means which made possible his marvellous evolution.

There were many of them, but the chief were:—his wonderful brain, his power of speech, his clever hands, his upright attitude, stereoscopic vision, and his babies.

Of these the brain is by far the most important. It led the way, and without it there could have been no progressive development of the body. In Miocene times gibbons learned to walk upright, but their brains were not sufficiently developed to enable them to take advantage of the opportunities which such an attitude offered. This being so, it is necessary to understand how man's brain reached its present state; but in order to do this we must have some knowledge of a normal brain and its action.

The brain is divided into three parts—fore, mid, and hind brains. The fore brain is in two sections firmly bound together by a strong band of fibres, and it is called the cerebral hemispheres. This is the part usually referred to when the brain is spoken of. Through it we have consciousness, with it we think and learn to perform skilled actions.

In man the mid and hind brains are much smaller than the cerebral hemispheres, and they control only his automatic and unconscious nervous mechanism.

The cerebral hemispheres are the receiving house for messages or impressions brought to them, as it were, by telegraph wires or nerves, so that if a nerve is destroyed, messages from the part of the body served by that nerve can no longer reach the brain.

The cerebral hemispheres send out messages as well as receive them, and the motor-nerves carry such messages to all parts of our bodies and produce movements in the various muscles.

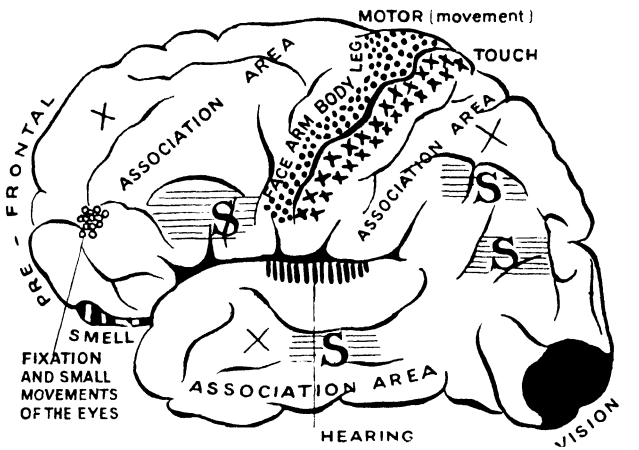


FIG. 2.—Map of Human Brain.

Showing the position of areas connected with various senses and also the larger areas associated with the higher faculties (white).

Messages are not, however, either received or dispatched from any part of the cerebral hemispheres indiscriminately. Each part of the body is connected with some special portion or "area," and one of the most wonderful achievements of modern science has been the mapping out of the brain.

A glance at the diagram will show the position of the areas dealing with sight, speech, smell, hearing, and the movements of various parts of the body. Within the

borders of each area are storehouses for memories connected with that particular area. Large tracts of man's cerebral hemispheres are not linked up with any particular part of the body, and it is in the size and complexity of these tracts that he differs most from the animals. In these portions messages delivered by the nerves are brought into touch with memories and messages from other sources; so they are called "association areas." Without these areas we should never have any complete mental pictures. Every memory could only be recalled separately and never correlated with any other idea or memory. For instance, the sound of a gun would simply be a sound to us, and would not suggest to our legs that they should carry us away as quickly as possible, or to our eyes that they should see where the gun was.

But though the association areas provide such splendid stores of experiences and memories all interwoven one with the other, there is still something needed to direct and unify our minds.

This is provided by the "prefrontal area," which is the whole front part of the brain forming the forehead. By it all other parts are controlled and kept efficient and alert. It also decides on lines of conduct after receiving reports from various "areas." Through it we think out ideas, decide on complicated courses of action, and concentrate on one subject to the exclusion of all others. Its function is not yet completely understood, but there is no doubt that it is responsible for what is commonly known as the higher mental faculties.

As we study men of old times it will be seen that this is the last part of the brain to develop, and that since the days of the first ape-men it has increased very much in size and complexity. This marvellous brain, with its well-organized association areas and dominating prefrontal area, has been the chief factor in man's evolution.

Chapter IV

THE EVOLUTION OF THE BRAIN

In order to understand how man's brain reached its present marvellous complexity it is necessary to trace the evolution of the brain from earliest times.

The lower animals have only an automatic nervous system, and therefore can perform only reflex actions. The story of the evolution of life is the story of the evolution of the cerebral hemispheres, and the gradual transference of much of the control of the body from the automatic to the conscious parts of the brain. We still retain the automatic system, but are unconscious of it until, through wounds or disease, the higher cerebral centres break down. Then the more primitive system asserts itself and the finer sensibilities and movements are lost.

The lowest animals do not possess a brain at all. They have only a nerve running from head to tail, with branches radiating from it. The head portion of this nerve gradually enlarges into three nodules, which are the first brain. Each nodule receives nerves from one part of the body—the fore brain receives the smell nerves, the mid brain the optic nerves, and the hind brain the taste nerves.

The most important section is the fore brain, for it gives the animal consciousness and links up past and present experiences. At first most experiences left only a momentary impression, but by degrees the impressions lasted longer, till at last they were numerous enough to give a distinct memory.

For a long time the only nerves going to the fore brain were those of smell; therefore the whole life of the creature was dominated by smell. It smelt its way along; it

smelt for its friends, its foes, and its food; and its few and vague memories were memories of smells and the feelings they awakened. The behaviour of the animal was conditioned by smell; its whole body responded to the stimulus of smell. By degrees a few nerves of touch and sight found their way to the fore brain also. This was a very important step, because they were entering the primitive organ of the mind and becoming part of memory. Until optic nerves went to the fore brain sight caused only a reflex action; their message was not retained, and so did not make a lasting impression on which future behaviour could be based. The same applies to touch and taste; they helped the animal to interpret its experience only when at length they were represented in the fore brain.

Some of the first touch nerves to reach the fore brain came from the nose, which had become extremely sensitive to touch, since for so long it had come in contact with things as the animal smelt them. Even before noses were evolved primitive creatures felt their way along with the front end of their bodies, as worms do. Many animals use their noses for this purpose when we think they are really smelling. The cat tribe has developed marvellously sensitive extensions of their nose—whiskers.

The emergence of sight and touch made a profound difference to an animal's life. It made fewer mistakes, it could vary its habits, and it became more active when sight directed its movements.

At each stage of evolution a great advance was made in the constitution of the brain. The fore brain of amphibia is larger than that of fishes because so many more nerves of sight, taste, and touch end there.

The brains of reptiles represent the next stage, where the various kinds of nerves had been sorted out so that each went to its own portion of the fore brain. The smell nerves still took up most of the space, but there was a thin layer of other nerve endings along the upper surface. This does not seem very important, but it was the foundation of all higher types of brain. Involved

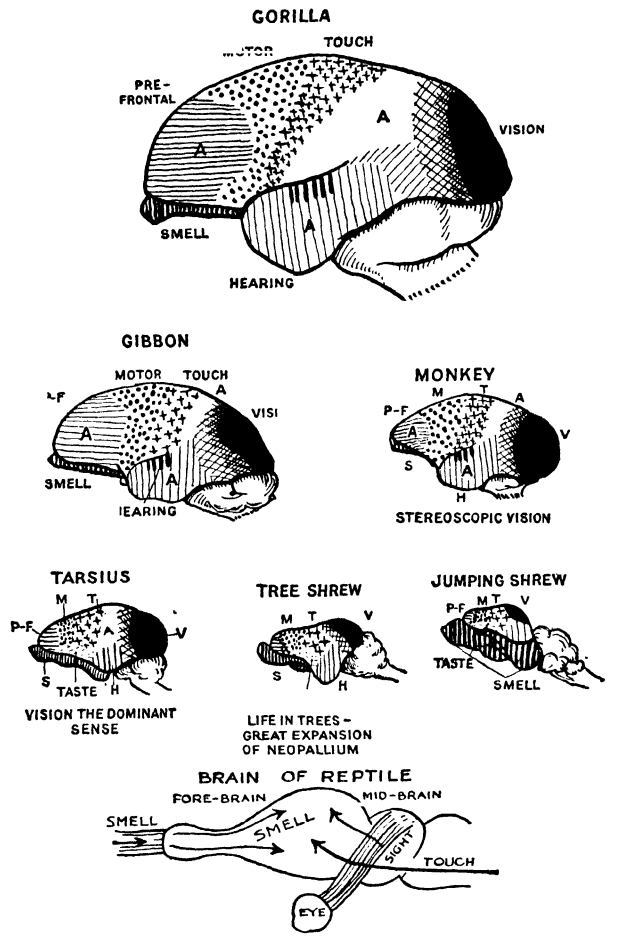


FIG. 3.—The Evolution of the Brain.

Showing how the Neopallium expands and the Pallium (smell brain, heavily shaded) shrinks. Also note the rapid growth of the Prefrontal (P-F.) and other Association areas (A) in monkeys and apes. Compare with Fig. 2.

with so many smell nerves, the others could not develop, but when they were localized on the upper surface they had room for expansion.

It was the rapid growth of this part of the fore brain that led to the rise of the first mammals. The value of this area is inestimable, and it well deserves its special name, neopallium. The smell part of the fore brain was called the pallium. From now onwards all interest centres in the neopallium, which becomes so vitally important that smell is used less and so shrinks—till in man practically all the fore brain is neopallium, and the old pallium is a small rod-like structure lying beneath it.

Early mammals gained in intelligence and dexterity because they received and retained such varied pictures of their surroundings, and so they became venturesome and even mildly inquisitive like the little jumping-shrews.

At last the growing neopalliums suggested to some of them that in case of danger or shortage of food they should climb into the lower branches of the trees. They found that this paid, and soon they made quite a habit of it. Consequently they became extremely agile, and eventually lived in the trees altogether. Now smell was very useful for grubbing along the ground, but the most sensitive nose in the world could not tell an animal where to place its feet, or how to judge the distance from branch to hand. There was wide margin for error on the ground, but in the trees life itself depended on sound judgment, based on sight and hearing.

Then touch-messages came to the fore brain from the paws instead of from the nose, and so paws became more sensitive, and began to alter in shape so that they could grasp and cling more securely. This was the beginning of the change that turned forefeet into hands.

Life in the trees was a splendid school. It reminds us of a Montessori children's house, where all the apparatus is designed to stimulate the senses of a child and enable him to learn from experience. A child with a defective brain could never progress there, just

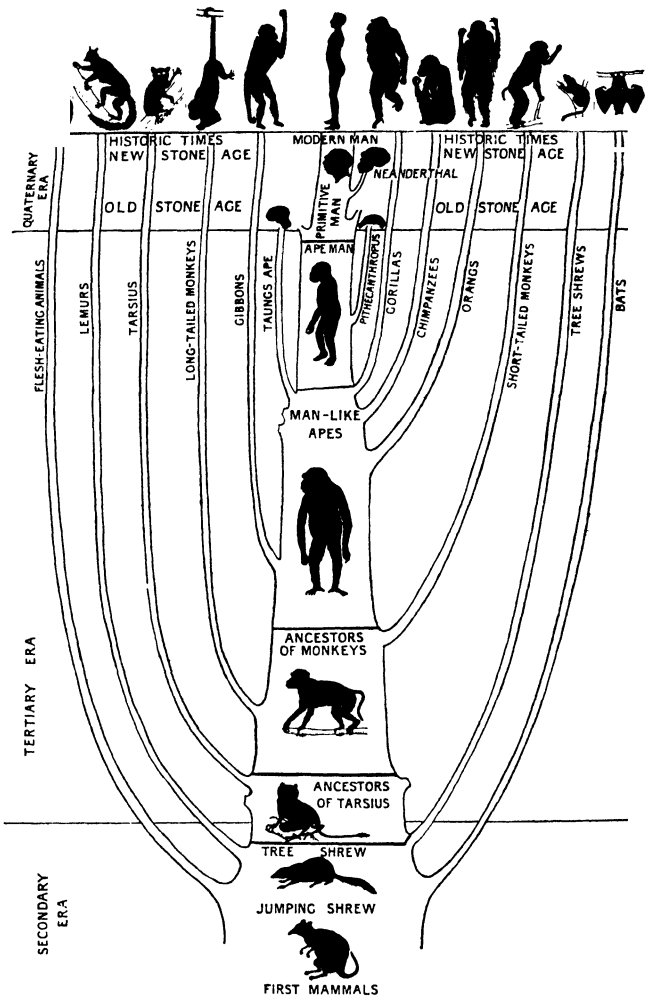


FIG. 4.—Man's Family Tree.

as animals with poorly developed brains received no benefit from life in the trees; but both tree life and a Montessori school provide an adaptable brain with exactly the stimulus necessary to develop it. So the neopallium led animals out of the rut, in which they had lived for so long, into new and varied experiences. They were now able to live amidst varying surroundings, and in time there emerged a number of distinct kinds of animals. These adopted different modes of life, and their brains and bodies became very different from those of their common forefathers. As ages passed some evolved into horses, others lions, elephants, cows, and so on. Most of these specialized in one particular way and moved only to a larger rut.

The greater part of the story of the evolution of animals is filled with instances of families which took one or two great steps forward, and then, discovering that their new powers enabled them to enjoy a life of ease, developed one characteristic only, thus debarring themselves from any further possibility of progress. Some went in for huge and strong bodies, which enabled them to dominate the world of their day; some found safety in flight; others burrowed in the earth; a few turned their legs into fins and took to the sea. Some specialized in fleetness of foot, and many found security in the possession of horns, sharp teeth, claws, and other weapons of defence. In each case the apparent gain was really a very serious handicap to the animal; the brain could not grow, because it received no adequate stimulus. For example, those animals which evolved four efficient legs for running gave up all chance of ever having a hand. What a tremendous stimulus the hand gives to the brain! It is through handicrafts that defective children are trained and their brains awakened. The sensitive, skilful, grasping hand sends innumerable and infinitely varied messages to the brain; and it must be remembered that a lazy brain never grows.

The life of an animal is very complex and delicately balanced. It is like a society of people in that the actions of one individual affect all the others, since an action

can never be isolated. The actions of the leader have the greatest influence, but every member of the society will either stimulate the others or be a drag on them. In the animal world the brain is undoubtedly the leader, and the whole story of the evolution of the human race can be understood only if its predominating influence is realized. But all the factors which led to the emergence of man reacted on one another, and the absolute value of the influence of any one is difficult to define.

Although most species of animals dropped out of the march of progress, there have always been some which remained sufficiently adaptable to evolve into a higher type, and by early Eocene days some descendants of Tree Shrews had become that interesting and important little animal fossil Tarsius (Anaptomorphus). Its bones (found in North America) prove that it was so like Tarsius now living in Borneo that a study of the modern animal gives a reliable picture of the common ancestor of men and

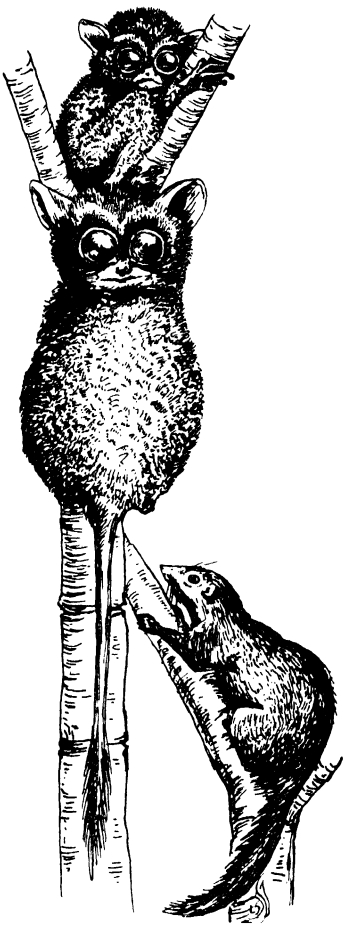


FIG. 5.—Tarsius and Baby.

The adult animal is clinging to the tree and has turned its head backward through an angle of 180°. Below is the Tree Shrew.

monkeys. Tarsius is a pretty little creature, about the size of a rat, and it lives entirely in the trees. Its brain is of a much higher type than any we have yet studied. As the animal's life was quite emancipated from the slavery of smell, the smell area shrank considerably. If lower animals lived by smell, Tarsius may be said to live by sight; not only do its big eyes see more than the eyes of lower animals, they also see better.

Sight must have meant little to the lower animals, and it is no wonder that they relied on smell. They saw no clear definite shapes, no difference between solids and shadows, no colour or depth.

They scarcely noticed stationary things, though they quickly perceived the same things when they moved. I have quietly sketched rabbits, as they calmly cropped their supper at my feet, but the slightest movement sent them scampering home.

The majority of animals have developed long snouts, and their eyes are on the sides of their faces, so that they look sideways instead of in front. Each eye sees a separate picture, a condition known as monocular vision. This is a great handicap, and prevents any considerable improvement of vision. In fossil Tarsius the snout had receded, and the eyes were able to come to the front of the face, so that it saw one picture in front instead of two pictures at the sides. This is called binocular vision, and is a vast improvement; but even bright-eyed Tarsius cannot see much texture, colour, or depth. Nor can it see sideways unless it turns its head, for the same nervous mechanism controls both eyes, and so they are both focussed for the same distance. When an object is directly in front it is the same distance from each eye, and the animal receives a clear image; but when the eyes are turned in their sockets they look obliquely, so an object is further from one than the other, and therefore the image is blurred.

Now, Tarsius perched in a perilous position in a tree top needs to see all around, yet it dare not move its body. So it acquired the habit of moving its head as far as possible, and in time became so expert that it

could twist its head completely round and look backwards to see what was happening behind it.

The dominance of sight means so much more than appears on the surface. It encouraged an animal to touch, to hold and to handle; therefore the forelimb, no longer needed solely for support, was free to obey the promptings of the brain. What a difference this made to an animal's appreciation of its surroundings! The sensitive skilled hands which learnt to convey food to the mouth were also responsible for the more human character of the face. Long snouts were needed only when animals picked up their food with their mouths; but Tarsius used its five-fingered hand for this purpose, and so the snout receded and the face became flat.

In two other respects fossil Tarsius was greatly in advance of any other animal. The ability to turn its head greatly assisted hearing. Animals whose head movements are limited cock their ears. Some boys are the proud possessors of rudiments of muscles which they can use for this purpose. These are keepsakes from their very remote ancestors.

When Tree Shrews hung by their forepaws from the branches their bodies were actually upright, and their descendants became so accustomed to this position that by the time of Tarsius they could actually sit upright and eat daintily with their forepaws.

The various means which led to the evolution of the higher animals are all so interdependent that it is difficult to consider one alone. The stimulating influence of sight in arousing curiosity led to the development of skilled movements. No one would expect a half-blind creature to be very agile. What a tremendous adventure agility made of life! Day after day new experiences crowded on Tarsius, exercising the brain constantly—no wonder it enlarged rapidly! The storehouses of memory grew so much that the centres for the various senses were pushed further apart. This expansion, together with the bulging area of sight, quite altered the shape of the head. The round head of Tarsius is a great contrast from that of most other animals.

The linked-up memories of past experiences reacted on the skilfulness of hand and foot. There was less waste of energy. Fruit that proved disappointing once was not sought after again—unnecessary movements were eliminated, and useful acts of skill became habitual, so that the discriminating power of the animal was free to be put constantly to fresh uses. Many animals spend the greater part of their lives making the same decision and judgment over and over again, because their association areas are so feebly developed that they have few memories.

But, most wonderful of all, out of the skilled movement, or motor area, there was growing, little by little, an entirely new portion of the brain. It is known as the prefrontal area, and from its humble beginning in Tarsius it has developed into the most important part of the brain (see Figs. 2 and 3). Its function is not so clearly understood as that of the areas already described, but it is well known that a feeble development is typical of a low type of man or animal. The prefrontal area controls attention and makes concentration possible. The highly skilled movements and wise judgments of the higher animals could never have been evolved if their attention had been distracted by all the hundreds of sensations, sights, and sounds sent to the brain by the nerves every moment. The prefrontal area made it possible for the growing consciousness of the animal to be used for a good purpose, and not to become a hindrance.

In some way this prefrontal area is responsible, as has been said, for the ability to think out complicated ideas and courses of action, and it unifies the whole life.

This portion, which lies immediately in front of the motor centre, is ill developed in Tarsius, and in fact is so small that this weird little animal has received only small benefit from it.

But even the smallest amount of such an extremely important section of brain substance was of incalculable value to the race. Once it was there it could be developed, and the story of its evolution is practically that of the rise of man to his present exalted position.

CHAPTER V

MONKEYS AND APES

THE next stage in man's evolution was reached when some descendants of the Tarsioids living at the end of the Cretaceous epoch had changed into monkeys. Then it was that man's branch of the family tree of animals was separated from that of all other creatures and rapidly progressed.

The greatest achievement of monkeys was the attainment of stereoscopic vision, somewhat like our own. No longer need the head be rotated in order to focus both eyes on an object; the eyes themselves were moved. Rounded things no longer appeared flat; they stood out stereoscopically as they do to us. Monkeys do not mistake shadows for solids, as horses do, and they can appreciate differences of texture.

A great number of intricate changes had to take place in the nervous system, and in the fore, mid, and hind brains, before stereoscopic vision was possible. When the two eyes look obliquely they are not both at the same distance from an object, and therefore extremely fine adjustments have to be made for each eye separately in order to focus each of them correctly. Also they must move in perfect harmony with each other, and all this must occur instantaneously to obtain a clear precise image. Again, animals with lower types of vision have to fix their eyes voluntarily, whilst we do it unconsciously; in other words, all the complex mechanism of vision is automatically linked together so that it acts without effort on our part.

For the control of the extremely delicate movements of the eyes a new part of the prefrontal area was de-

veloped, and as stereoscopic vision was perfected in apes and men this increased in size.

When the eyes saw stereoscopically another improvement was possible. The light waves were focussed on one spot of the retina which became wonderfully sensitive, and in the higher monkeys and apes developed into the macula lutea, by virture of which the power to perceive colour, texture, and minute details of form was very much enhanced.

Hearing also improved, and this was very important in view of the part it played later, when men-apes were developing into ape-men and learning to speak.

The agility of monkeys is proverbial, and it is the direct result of their improved vision. The growth of any part of the neopallium affects every other part, since all parts of it are so closely associated. Increased discrimination fostered skill, skill stimulated inventiveness, inventiveness made fresh calls on the whole neopalluim, and so the reactions went on, each enlarging the scope of the other.

The early monkeys were ever alert to take advantage of fresh opportunities, and they flourished exceedingly, spreading rapidly over the warmer regions of the earth where food was easily procured. Then most of them paid the price of an easy life and lost their plasticity. Probably monkeys of to-day have specialized so completely for forest life that they are less intelligent and progressive than their early ancestors.

One branch of the monkey family resisted every temptation to turn aside from the main line of development; by Oligocene days this branch had evolved into anthropoid apes. The skeleton of one, Propliopithecus, was found in Egypt. It is an early gibbon which had already learned to walk upright.

The next period, Miocene, is of unusual interest. It was a great land and mountain building age, when the Himalayas and the Alps were fashioned. The climate was cooler than in the previous age, but warmer than it is to-day. By this time apes had developed enormously. The Sivalik Hills in North India seem to have

been their headquarters, and thence they spread to Africa and as far west as Europe in great numbers.[1] Amongst them are generalized types such as Dryopithecus, which became extinct, and others which eventually evolved into chimpanzees, orang-outangs, and gorillas. These fossil apes had shorter faces, more rounded skulls, and more human teeth than modern apes. The adults must have looked very like the young apes of to-day, which pass through an ancestral stage before they reach the more specialized condition of adult life.

The ancestor of men and apes was very different from any ape we know, and no idea is more foolish than the popular one that men have descended from apes like the gorilla and chimpanzee. The ancestral creature was much less specialized, and probably more human. In fact, opinion is divided over the question as to when man's branch of the family tree separated from that of apes. Professor Elliot Smith places this separation in late Miocene times after the great development of the Sivalik apes; but Professor Osborn believes that it happened in Oligocene days before the great apes branched off in so many directions.

Although no living apes are exactly like man's ancestors, yet there is a resemblance which makes them worth studying.

The brains of apes are very much bigger than those of monkeys, and the areas of vision and hearing are as large as our own. The greatest expansion, however, took place in just those areas which are connected with intelligence and skill. The greater part of a monkey's brain consists of sensory areas, whereas in an ape's brain the association and prefrontal areas equal or exceed in size those of the senses. This is why an ape seems so "human," and can think out a course of action, deal with a new situation, and concentrate for a considerable time.

This active brain has at its command an adaptable

[1] See *The Search for Man's Ancestors*, p. 50.

body. The hands, never specialized for defence or locomotion, became increasingly used for a great variety of purposes.

Apes can, for a time, walk on their hind legs, though they prefer to use their hands as well. It is a mistake to think that man is the only creature who can hold himself upright. Squirrels sit upright, and even hold nuts in their forepaws; but this accomplishment has been of little use to them, because their brains are too primitive to make use of it. It is just because the ape ancestor had so capable a brain that it was able to make its adaptable hands and upright posture the means by which it climbed the family tree, until it evolved into an ape-man.

A good deal of nonsense has been written about the appalling savagery of early man, and part of the evidence put forward is the supposed savagery of apes.

This is one of the myths which has been killed by scientific investigation. Hunters, after attacking a gorilla guarding his family, generalized on the appalling ferocity of all apes. Any animal will fight in defence of its young or in self-defence; and a gorilla in a temper of righteous indignation is a very dangerous animal. It is now clear that apes have been badly libelled. They rarely attack men, though they often bluff. Gorillas make a terrific noise by shouting and beating their chests with their hands. This exhibition usually scares natives and white men, which is exactly what it is intended to do!

In a natural state, apes live peaceable lives, bringing up their children strictly and guarding their homes bravely. Fathers take their youngsters to the river for a wash, and teach them to respect their elders by cuffing them. Dancing is their favourite pastime, and their dances are singularly like those of some primitive peoples. The fact that young apes make splendid playmates for children, sharing their games intelligently, is proof of the high development their brains have reached. A fascinating book has just been published which describes an unusual experiment. A baby ape and a baby boy

were brought up together in exactly the same way, and their reactions to every experience carefully noted. This book is called *The Ape and the Child,* and is written by W. N. Kellogg and L. A. Kellogg. It is possible to learn a great deal from the illustrations alone.

The debatable question as to whether apes in their natural state use sticks and stones as weapons seems to have been proved in the affirmative—at any rate for chimpanzees.

A great deal has been learned recently about the mentality of apes, and their amazing cleverness is not more surprising than their rather unlooked-for limitations. So much of their neopallium is still under the influence of the senses, and the association areas are still so comparatively small that they cannot learn very much from experience. They have little creative intelligence, because they cannot foresee the results of their actions. Professor Köhler's chimpanzees discovered for themselves that two pieces of bamboo rod could be fitted together and used as a rake to bring bananas within the reach of their hands. On the other hand, they have never learned to balance boxes on each other. When an experiment was made with bananas hung out of reach, they quickly grasped the idea that large sugar boxes, lying near, would help them to stand higher. They fetched one, stood on it, and found it was not high enough. They dashed off for another, flung it on the first, climbed up whilst it was still moving, and then down crashed ape and box together. They did this repeatedly, and so by chance a box did sometimes balance on another; but they never learned how to balance it themselves.

Professor Köhler of Berlin and Mr. and Mrs. Yerkes of New Haven keep apes, not as pets, but as far as possible under natural conditions, and conduct carefully designed experiments with them. All students of human evolution will enjoy *The Mentality of Apes* by Köhler, and *The Giant Apes* by Mr. and Mrs. Yerkes.

The body of an ape is so like our own that exactly the same muscles and organs can be found in each,

though in man some are only rudimentary because they are no longer used.

Some diseases common to men and apes are unknown in other animals. Tests of the blood of men and apes, again, prove that there is a close relationship between them. Even the finger-prints of apes are so like ours that a Home Office expert might be baffled by them. Embryology also brings proof of this relationship. The embryo "climbs up the family tree," and in its last stage, just before birth, it has many apish traits.

It is when we consider the mind that the gap between men and apes becomes most pronounced, for not even in the cleverest ape does the mind approach that of the most primitive men. There are still many gaps to be filled before we can understand how apes became the first men.

We can only surmise that in Mid-Tertiary times our ancestral apes became sufficiently quick-witted and resourceful to dare to leave the shelter of the trees and amble clumsily along on the ground. They had not suddenly to make innumerable changes in their bodily structure in order to walk upright. Ever since the days of Tarsius tree-life had been training them to balance on two feet, so that the adjustments which had to be made were of a comparatively minor nature. The foot, with its prehensile toe, was fitted for tree-life, and had to be altered considerably before it could be used for sure and rapid movements on the ground. An ape walks on the outside of its feet with the inner part of the sole of the foot turned upwards, as babies do. By degrees the muscles of the legs, directed by the ambitious brain, pulled the soles of the feet level with the ground, and so the last difficulty in walking was conquered.

Occasionally we still hear primitive men referred to as tree-dwellers, and this fallacy seems to have a special fascination for teachers of young children. Man's ancestors were ground apes, who, no longer restricted to forests, were free to wander through almost every kind of country, and so gained new experiences which greatly stimulated their sensitive brains. New sights,

new sounds, new touch sensations were incessantly pouring into the brain and demanded storage room for themselves and for the ideas and conceptions which the association areas formed from them. Attention and the thinking-out of future actions were necessary for their safety day by day as new problems faced them, and so the prefrontal area grew rapidly.

It is just possible that the skull of the man-like ape found at Taungs in Bechuanaland in 1923 may represent this stage in human ancestry. Certainly it is more nearly related to our ancestors than either the gorilla

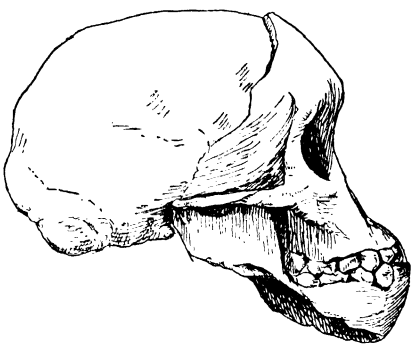


FIG. 6.—Side view of the Skull of the Taungs Man-Ape from South Africa.

or chimpanzee. It is difficult to tell exactly what this creature was like, because the skull belongs to a female about eight years old. It is well known that young apes have a much more human appearance than adults, but after comparing the Taungs skull with those of modern apes of the same age differences were found.

The Taungs skull differs from those of most other apes in being long instead of round. Also it is larger, the increased size being due to the expansion of the higher centres, and especially to the filling out of the prefrontal area at the sides and in front. There is also a slight swelling over the association areas. The brow

ridges and snout would never have been as prominent in the Taungs ape as they are in the gorilla and chimpanzee. In a word, it was an ape, but of a higher type than any alive to-day.

It is remarkable that it lived so much further south than any other ape. Other apes never ventured so far beyond the Congo forests—two thousand miles to the north. Probably the Taungs ape had reached the stage of development at which it was less dependent on its surroundings and was able to negotiate the difficulties and dangers of life in the open country away from the shelter of the trees.

It is impossible to say when it lived. The latest suggestion is early Pliocene times, but it is usually assigned to the Pleistocene epoch. Its position on the family tree is indicated on Fig. 4 (p. 17).

The transition from apes to men must have been very gradual, and taken an exceedingly long time to complete. Again the outstanding change took place in the development of the cerebral hemispheres, and the increased control over functions which in lower animals were regulated by the hind and mid brains. Therefore the number of automatic reflex and instinctive actions became fewer, and consciously controlled actions and feelings took their place.

It is to this cerebral control that we owe our finely balanced posture, our skill in learning games, and all complex movements. A cat can stand, if its cerebral hemispheres are removed, because its posture is regulated by its hind brain. If man's cerebral hemispheres are destroyed, however, he loses balance, and control of his limbs and movement. The nervous mechanism which controls posture is very complex. It is the result of co-ordination between hind and fore brains, so that the nerve centres in the former are under control of the higher centres in the cerebral hemispheres. In a marvellous way messages from the feet, from the semi-circular canals of the ear (which affect balance), and also from the eyes, are linked together so perfectly that exactly the right kind of commands can be sent to the

muscles which hold us upright, or enable us to move. This all appears to be automatic until we try to perform a new set of movements—for example, swimming. Then the attention has to be concentrated on each action separately, until our nervous system becomes sufficiently well trained to perform them habitually—then they seem to be automatic.

In man muscular skill reaches perfection. He is the only animal who can learn a complicated series of new movements. By the time he was evolved the thumb had become opposable, and so gained delicacy and refinement of touch and grasp. Then not only the hand section of the motor area of the brain was stimulated, but the whole was influenced strongly. Eyes had to be concentrated, the posture of every limb regulated, and the higher centres had to foresee, remember, and plan.

As a result of the co-ordination between perfect sight and delicate touch, the æsthetic sense developed, and, acting through sexual selection, brought about the refinement of the body.

Vision reaches a higher standard in man than in any other creature. The centre in the prefrontal area is enlarged, and the very minute movements of the eyes, as they follow the outline of an object, are so true that we get a perfectly clear and exact picture of every detail. Moreover, every part of the brain is in such wonderful communication with every other part that the perfect image given by sight is immediately linked up with numerous memories, sensations, emotions, and ideas. The extreme difficulty of appreciating what the world looks like through other eyes prevents us from realizing the wonderful advantages perfect vision gives to mankind. It takes a child years thoroughly to understand and appreciate the significance of the world about him, but it took our ancestors untold ages to reach the same stage.

Speech is one of the special attributes of man, and Professor Elliot Smith has pointed out that in a very real way vision makes speech possible. What was the use of naming things before they were clearly seen and

understood? Before man spoke he must have had something very definite and urgent to say. A baby understands and thinks long before he speaks. Also man must have had such a delicate discrimination of sounds that he could understand and remember the new ones used as words.

The first kind of speech was probably a mixture of grimace and gesture, helped out by cries such as animals use, with a very few words added. Soon, however, the brain, with its increasing store of pictures, ideas, and emotions, needed something more adequate and precise. The necessary muscles of the throat and face were already there, awaiting stimulation by the brain. Gradually the part of the brain over the ear (already the centre for hearing), which was close to the motor centres for the mouth, tongue, face, and ear, became enlarged, and was the first speech centre. Later, as language developed, three other centres (marked S on the diagram on p. 11) were also developed to control different aspects of speech. These four centres now work together so that we can understand the meaning of the sounds of words, can grasp the meaning of long sentences (a late achievement), and can appreciate the meaning of the written symbols of language. The development of these areas can be traced through all their stages in the skulls of early men.

Men's first words must have been connected with things that could not adequately be described by gesture and grimace, and would be concerned with actions rather than objects. Once the efficiency of the new calls was realized, nouns would follow imperative verbs. A few nouns, verbs, and adjectives, put together in sentences of two or three words, no doubt served generations of primitive men. Real sentences came much later.

It needs but little imagination to realize what an immense advantage speech was to man. It reacted on his thoughts, helping to crystallize them and stamp them more clearly on his memory.

Social life in the true sense was impossible till men were able to communicate their ideas and wishes to each other.

The faculty of speech also meant that the knowledge of an individual was no longer bound by his own experiences. He could draw on all the accumulated wisdom of the race. Ideas were passed down from generation to generation solely through speech; and ever since the earliest times man has been prone to depend rather on the ideas held by his race than on his own independent thinking. The individuals who thought out new ideas were remarkably few compared with the vast majority who throughout the ages were content to walk in the way of their forefathers, resenting any variation from the old ways with a fierceness and obstinacy which has made the lot of pioneers in all times anything but a happy one. Yet it is those comparatively few pioneers who are responsible for the evolution of civilization. Perhaps there is only one thing more important than speech in the equipment of man, and that is his thought and care for others.

The various qualities that were evolved in his progress to the higher forms of life nearly all tended to make man capable of looking after himself, though they could all be used in caring for others, if the desire arose. It did arise quite early in man's story. Almost all animals protect their babies when they are very young, but most of these baby animals are soon able to look after themselves, and then the bond between children and parents is broken. Tree-life altered that, as it altered so many other things. For one thing, it was a very unsafe nursery. A mother could not manage many babies there, one or two being as many as she could keep in safety. To add to her anxiety, her babies were very helpless when they were born, and were dependent on her for many years. Her mother-love was not allowed to flicker out in a few days or weeks, but was kept alive by the helplessness of her baby for such a long time that it gradually became a permanent part of her nature. Moreover, the very danger of tree-life for her babies added to its strength; for, having no safe place in which to leave them, the only thing she could do was to carry them about. The baby instinctively clung to its mother's

fur, and the mother soon clutched the baby too. Having this baby dependent on her, and always clinging to her, there developed in the mother that care and thought for others which are the foundation of all moral progress. Tree-life trained not only the mothers but also the fathers. As long as the baby was helpless the father stayed with the mother to protect them both.

Here we have the beginning of family life and the feeling for others, the importance of which, as the very basis of society, it would be very difficult to exaggerate. So we can picture these ape-men, the result of untold ages of slow progress from the earliest mammals, possessing the rudiments of all the qualities that make us what we are to-day.

CHART II. A chronological table of the Old Stone Age. No attempt has been made to show the relative length of the periods.

Glaciation.		Industry.		Peoples.
4,000 B.C., Gschintz.		Azilian-Tardenoisian.	NEOANTHROPIC PEOPLES.	Neolithic peoples. Mesolithic peoples.
6,000–10,000, Bühl.		Magdalenian. Cresswellian. Late Aurignacian. Solutrean?.	NEOANTHROPIC PEOPLES.	Long and broad-headed peoples. Capsian.
Achen retreat.		Solutrean. Late Aurignacian.	NEOANTHROPIC PEOPLES.	Capsian. Solutrean.
Würm, 4th glaciation.		Early Aurignacian.	NEOANTHROPIC PEOPLES.	Capsian. Crô-Magnon. Combe Capelle. Grimaldi.
,,	Levalloisian Flakes.	Mousterian (flakes).	PALEOANTHROPIC PEOPLES.	Neanderthal.
Riss-Würm, 3rd interglaciation.	Levalloisian Flakes.	Mousterian (flakes). Late Acheulean (cores). Middle Acheulean.	PALEOANTHROPIC PEOPLES.	Lady of Lloyds?. ?
Riss, 3rd glaciation.	Levalloisian Flakes.	Early Acheulean. Chellean (cores). Clactonian (flakes).	PALEOANTHROPIC PEOPLES.	?
Mindel-Riss, 2nd interglaciation.		Chellean (cores). Cromerian (flakes).	PALEOANTHROPIC PEOPLES.	Mauer jaw?
Mindel, 2nd glaciation.		Chellean (cores)?.	PALEOANTHROPIC PEOPLES.	
Gunz-Mindel, 1st interglaciation.		Pre-Chellean (core).		Piltdown, Java, and Peking men.
Gunz, 1st glaciation.		?		?
Late Pliocene.		Rostro-Carinates. Eolith.		?

CHAPTER VI

THE EARLIEST MEN

Now, at last, we come to the days when man first appeared. How distant these days were no one can tell. Guesses which have been made vary from half a million to a million years, and how long he had been in existence before we find traces of him is doubtful.

The earliest evidence of his existence are not his bones, but his tools. Because these tools were made of flint, or its substitutes, early man is said to have lived in the Old Stone Age.

Obviously man's first tools must be difficult to recognize, since the results of his earliest attempts must have been very like the natural sticks and stones he used for ages before some genius discovered a method of chipping them. Nature chips flint by the action of pressure, heat, frost, or water, and often it is extremely difficult to tell whether the chipping of a particular stone is natural or artificial.

As men used flint or its substitutes so exclusively, they must have lived originally in flint areas, of which there were by no means an unlimited number. Because they were dependent on flint, they passed by excellent hunting grounds, and settled only where the necessity of their life was to be found.

Very early in prehistory, flint-users seem to have been divided into two groups: those who utilized flint cores, and those who used flint flakes. Core tools were made by taking a nodule of flint and chipping it into the desired shape with a piece of hard stone. Flake tools were made by quite a different method. The upper surface of a flint nodule was chipped to the desired form, then one strong sharp blow detached a large flake with

the chipped surface uppermost and a flat under-surface, which showed a scar where it had been split from the nodule.

Until recently it was thought that the core tools were used for ages before flake tools, but now it is known that they were both in use in very early times in different parts of Europe, though probably core tools were the earlier.

The much debated question as to whether man made tools in the Pliocene epoch at the end of the Tertiary era is not yet finally decided, but scientific opinion is leaning

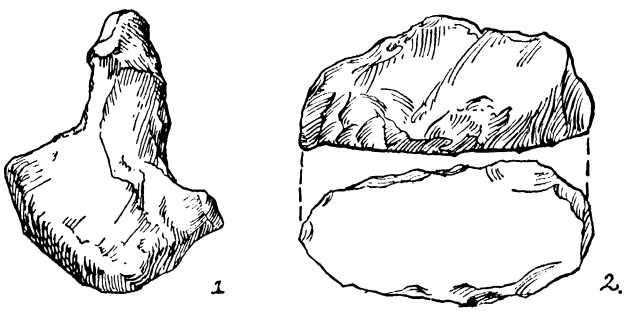


FIG. 7.—The Tools of Early Man.

1. An eolith. 2. A rostro-carinate flint—side and bottom views.

more and more to Mr. Reid Moir's view, that the chipped flints beneath the Red Cragg beds of the Norfolk coast on a Pliocene beach are truly the work of man.

The earliest tools are called Eoliths, or "dawn" stones. With these doubtful flints are others of more definite shape. The most famous are the rostro-carinate flints, which are now being found not only in Norfolk, but in many distant parts of the world. They are peculiar in shape; the lower side is flat and smooth, but the upper chipped surface rises to a keel, so that this tool resembles an upturned boat cut in half. It was probably used for scraping skins.

The reasons for accepting the Pliocene flints of Norfolk and Suffolk as the work of early man are the following :—

1. The flints have been made by blows struck from two directions only. Nature cannot select the direction in which her blows shall fall, and therefore, if pressure had chipped these flints, the blows would have come from all directions.

2. Bivalve shells with hinges intact have been found just above the flints; obviously the slightest pressure would have broken these delicate hinges.

3. Eoliths are found at definite levels only—probably old land surfaces.

4. Eoliths could not have been washed into these beds by floods, for all sizes are found together, and water grades its deposits.

If during late Pliocene and early Pleistocene days our knowledge of early man is scanty and fragmentary, there is a good deal of information available which enables us to picture the times in which he lived. The bones of extinct animals, the remains of trees and plants, the tell-tale marks left on rocks by glaciers of long ago, and the condition of the different layers of soil and rock of this period all combine to increase our knowledge.

The warm Pliocene period very gradually changed into the first Glacial period of the Pleistocene era, when glaciers and icefields covered Scandinavia, North Germany, and the Alps. During the cold time most of the warmth-loving animals left Europe, but a few grew thick coats and adapted themselves to their new conditions. Most geologists think that England was not glaciated at this time, though the temperature was very much lowered. East Anglia was then a shallow sea with a cold-loving fauna.

After an immensely long period the climate changed, and the geography of Europe was greatly altered. The land was raised, and Britain was joined to the continent by the North Sea plain and the English Channel valley. The Mediterranean was divided into two lakes by two land bridges, and across them the African animals passed to Europe. The routes to Asia were easily accessible, so

that the southern mammoth, the hippopotamus, and the oxen first migrated into Europe. The life of this period was very varied, and included the fierce sabre-toothed tiger, moose, wolf, giant beaver, wild boar, primitive horse, and a great variety of deer which were attracted by splendid forests.

Towards the end of this time men lived in the forests on the Norfolk coast, and on the foreshore picked up lumps of flint which they roughly shaped into heavy clumsy tools by knocking large flakes off the nodules and roughly chipping them. Core tools are very rarely found with them. This primitive industry is as yet only known at Cromer, and is named Cromerian.

Somewhere about this time, or a few thousand years earlier, three different types of men were living. This is a surprising fact, which proves that the ancestor of the human race must have lived in the Pliocene epoch, and that man was a roving animal at an early period, who wandered far from his home.

Java Man

The first human being of whom we have any knowledge is the man of Java, known as Pithecanthropus, because of his strong likeness to the apes. He lived probably about a million years ago. In 1891 the world was startled by the discovery of his skull and thigh-bone. In those days few people thought that such an ape-like skull could be human. This skull is about half the size of that of a modern man, and, though size is not a perfect guide to the capabilities of the brain, yet below a certain size a smaller brain does mean a more primitive man. The number and complexity of the furrows of the brain are another sign of the intelligence of the individual, and here again Pithecanthropus comes very much below the standard of any other type of man.

This skull is extraordinarily low and flat, with such a receding forehead that the prefrontal area was only slightly developed. Each area which has to do with thinking and skill, and develops last in children, was very small. Though Pithecanthropus must have been a very

slow and clumsy fellow, he possessed one of the greatest assets of the human race—he could, in some primitive way, speak. This wonderful fact is learned from the impression made by his brain on the skull, where, just over the ear, the speech area bulges slightly.

Probably if we met the Java man ambling along on the edge of the forest, we should regard him with as much

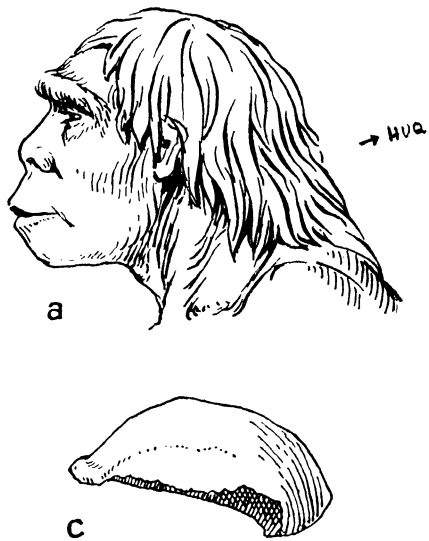


FIG. 8.—Pithecanthropus of Java.
a. Imaginary picture. *c*. Skull-cap.

horror as a gorilla. He would, indeed, be rather a startling apparition, for his body had not kept pace with his developing brain. His face, with its enormous overhanging brow-ridges, deeply set eyes, broad flat nose, protruding jaws, and receding chin and forehead, was rather apish. His head was thrown forward by a short thick neck, so that it appeared to rest on his shoulders. It could never be held upright, because this

man had not developed the four curves of the backbone which enable us to stand erect. His slouching gait, half flexed knees, and ungainly body make us forget that he is one of the wonders of the world, one of its first men —and a marvellous advance on the ancestral ape.

So much of the ape's brain is directly under the survey of the senses that the ape generally reacts to an experience in the most direct way, rather than by thinking out a course of action. Though so ape-like, Pithecanthropus must have been much more skilful and thoughtful than an ape, for his prefrontal and associated areas were far larger and more complex, and all the mechanism connected with vision was perfected. Nevertheless, he was not very wise, witty, or intelligent; his ideas were few and simple, and he was still the creature of impulse rather than reason. Like other primitive races, Pithecanthropus seems to have been an offshoot from the main human stem, and eventually to have died out, while in other parts of the world our direct ancestor survived and progressed.

About the time that Pithecanthropus was living in Java a totally different type of early man roamed over the south of England. He is known to us from a few pieces of skull, a jaw, and some teeth, which were found at Piltdown in Sussex. The reconstruction of the skull was most difficult, because a slight difference in the position of the fragments greatly alters its size and shape. Several reconstructions have been made, and that of Professor Elliot Smith seems most likely to prove correct in view of the evidence of the new Peking skull. The head seen from behind is very broad at the base, in contrast to most skulls which curve in towards the neck. This breadth is characteristic of young anthropoid apes. The forehead is smooth and low, and lacks the great bar of bone so typical of other early skulls. The size of the brain, however, is not nearly as great as appears from the outside, for the skull is thicker than any other human skull known, except that of the Peking man. The brain, though so small, is within the human limit, and the parts which control speech are

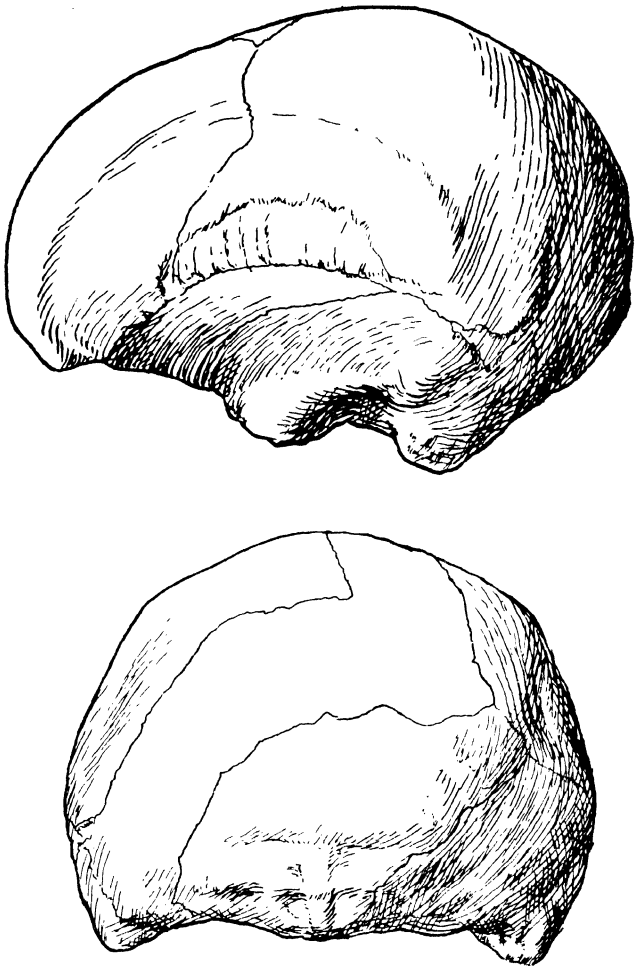


FIG. 9.—Reconstruction of the Piltdown Skull—side and back views.

Note the breadth of the base of the skull and compare with Peking skull, Fig. 10.

considerably developed. This man was right-handed, for the left-hand side of his brain is more fully developed than the right. On the whole, Professor Elliot Smith thinks that this is the most primitive human brain yet come to light, but that it belonged to an individual who diverged least from the main stem of the family tree, and so was almost a direct ancestor of our own. He is well-named Eoanthropus, the Dawn Man. His chinless jaw is so like that of a chimpanzee that until recently some scientists believed it belonged to an unknown ape whose bones, by a curious chance, had been deposited near those of Piltdown man. The view that this jaw was human, and belonged to the skull, is confirmed by the discovery that Peking man possessed a similar jaw. It is now clear that an apish jaw was not a peculiarity of Piltdown man, but a normal characteristic of very early races.

Peking Man

Our next glimpse of human life is found near Peking. There, in the Western Hills, another type of man was living in the early Pleistocene period. The remarkable story of the reasons which led to the search for this and other early types of men has been told in Professor Elliot Smith's interesting little book *The Search for Man's Ancestors*.

In 1928, on the evidence of a single tooth, Dr. Davidson Black dared to predict the existence of a new race, whom he called Sinanthropus Peking. This brilliant guess was amply justified later by the discovery of fragments of jaws and several brain-cases. The jaws are chinless, and closely resemble those of a young chimpanzee and Piltdown man. In fact, Peking man had much in common with his distant contemporary. His skull-bones were equally thick, and had the peculiar texture which was considered abnormal in Piltdown man. In these two skulls there is a layer of spongy bone between two thin plates of solid bone, whereas most ancient skulls have a thin layer of spongy bone. The thick spongy bone makes the skull very resistant to blows, but it is not an apish feature.

Peking man confirms Professor Elliot Smith's reconstruction of the Piltdown skull, in that it has the peculiar apish breadth at the base of the skull from ear to ear. This is well seen in a back view (Fig. 10, 3, and Fig. 9).

The general shape of the skull, its median frontal crest, and its great brow-ridges are very like those of Pithecanthropus, but it has a much better developed forehead. In some respects it is more primitive than

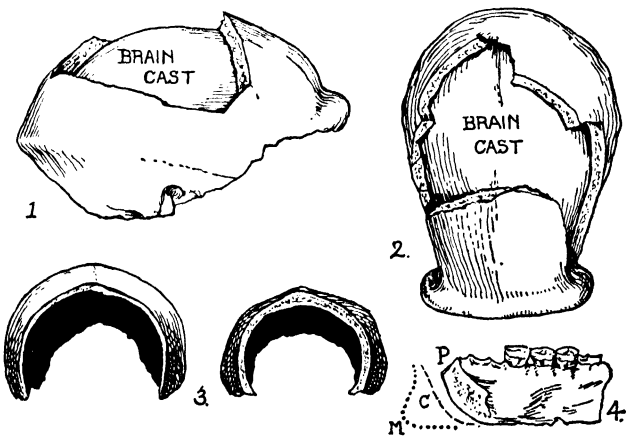


FIG. 10.—The Peking Skull.

1 and 2. Side and top views showing the cast of the brain inside the very thick skull.

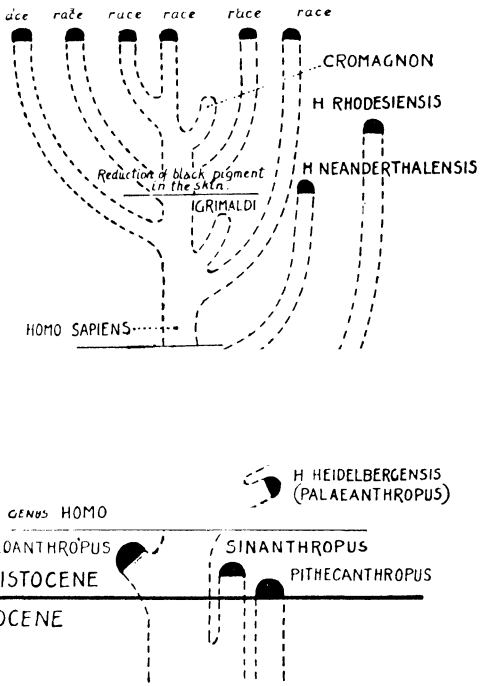
3. Sections across the back of a modern skull and the Peking skull. Note the difference in shape, size and thickness.

4. The chinless jaw of Peking man (P), contrasted with that of a chimpanzee (C) and of a modern man (M).

any other known skull, though, to add to the diversity of this creature, the articulation of the jaws is very modern! It has been well described as a compendium of all other known approaches to the modern *genus homo*, or, again, as a sort of Pleistocene Peter Pan. In a marvellous way it unifies all known types of early man, and yet it is less specialized than any of them, so that it probably gives us an idea of the nature of the common

generalized ancestor of mankind, who lived in Pliocene days.

It is fascinating to speculate on the whereabouts of the original home of the human race. Until recently



From G. Elliot Smith's "Human History": Jonathan Cape.

FIG. 11.—Tentative Scheme of the Relative Positions of the Different Members of the Human Family.

North India was favoured by most scientists because of the great variety of fossil apes who lived there in Miocene days. Very little change would have been needed to turn such an ape as Dryopithecus into either an ape man or a modern ape. On the other hand, a case can be made for

Africa, where all the great apes now live. The earliest fossil ape was Propliopithecus of Egypt, and several kinds of Miocene apes have recently been found in Kenya. The enterprising Taungs ape helps the African case also.

The fact that all early men yet discovered are offshoots from the main stem, and that they have travelled to the ends of the earth (Peking, Java, England), suggests that the original home was distant from each of these places, and therefore probably in the region between Central East Africa and North India. The highest types would evolve near the homeland, and the lowest types would be pushed farther and farther away.

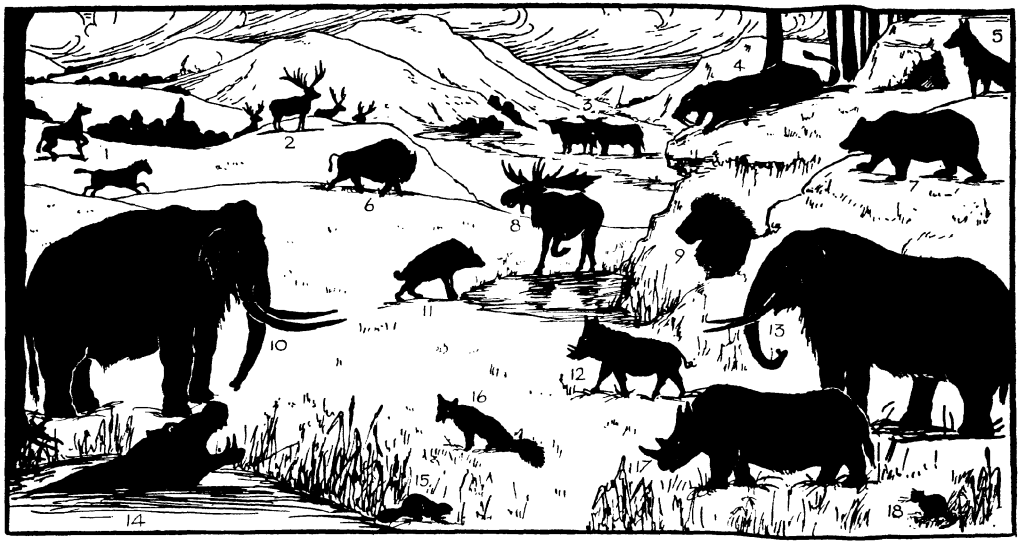


FIG. 12.—Animals of the Second Interglacial Period.

1. Primitive horses. 2. Red deer. 3. Primitive oxen. 4. Sabre-toothed tiger. 5. Wolf. 6. Bison. 7. Primitive bear. 8. Moose. 9. Lion. 10. Southern mammoth. 11. Hyæna. 12. Boar. 13. Straight-tusked mammoth. 14. Hippopotamus. 15. Giant beaver. 16. Fox. 17. Rhinoceros. 18. Wild cat.

CHAPTER VII

THE OLDEST HUMAN IMPLEMENTS

FOLLOWING the First Interglacial period, when several diverse races of men populated the world, came the most

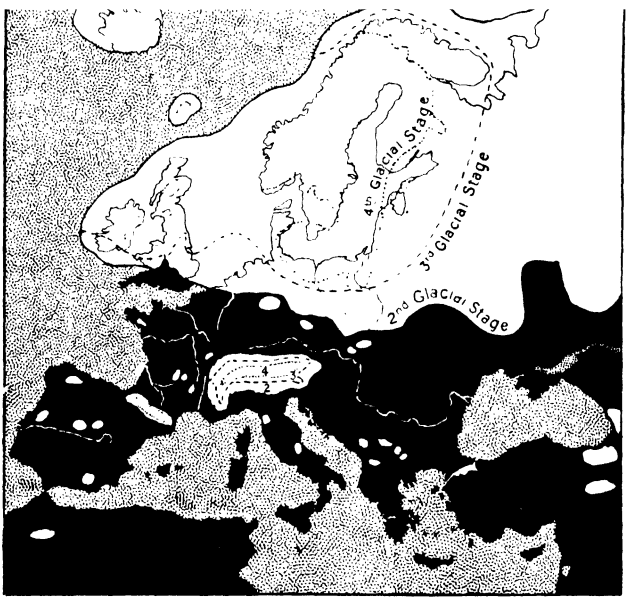


FIG. 13.—Map of Ice-sheets.
Ice—white; land—black; sea—stippled.

severe of all glacial periods, the second or Mindel. The map shows how much of Europe was locked in ice. The Scandinavian icefield pushed over the frozen

North Sea, and joined that which covered Britain down to the Thames. The Alpine ice-sheet reached Lyons; the valleys of the Pyrenees were choked with glaciers, and even the Atlas Mountains in North Africa were capped with snow.

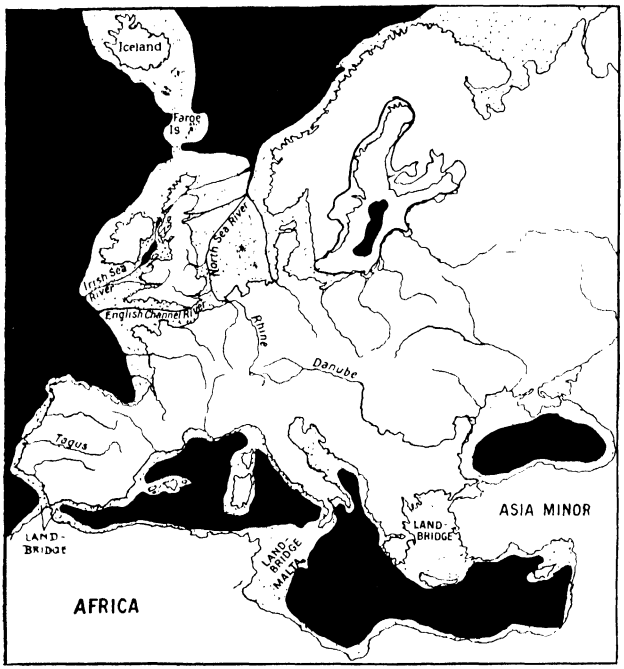


FIG. 14.—Map of Europe during time of greatest Land Elevation.
Present land—white; ancient land extension—stippled; sea—black.

This was a long dreary period of desolation. In summer violent dust storms swept over the country and great rivers flowed from the melting icefields, while in winter fierce blizzards raged. Of early man there is little trace; probably he retreated to Africa or Southern Europe.

At last the climate gradually changed, and the longest and hottest of the Interglacial periods began. Some scientists think it lasted 150,000 to 200,000 years. The

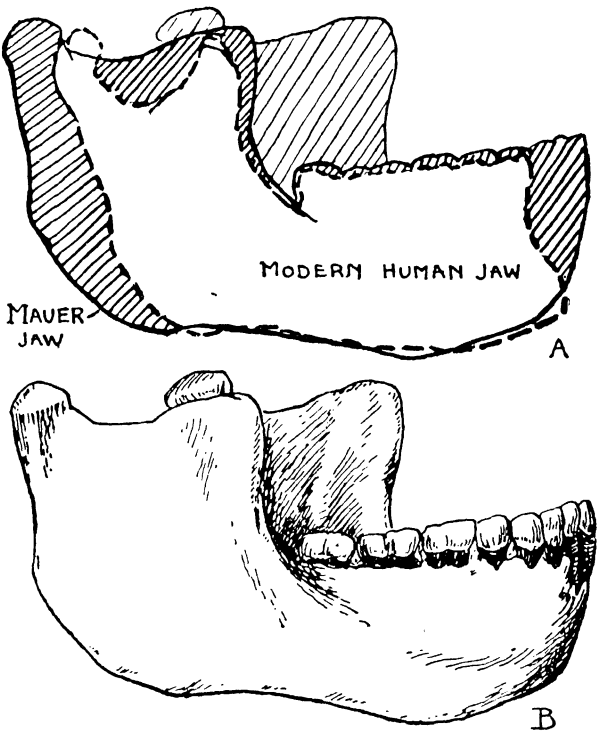


FIG. 15.

A. Comparison of Mauer and Modern Jaws. B. Mauer Jaw.

Alpine peaks were almost clear of snow, and much of Europe, with its splendid forests and its wide grassy plains, resembled the Africa of to-day. To this Eldorado came such a mixed assemblage of African and Asiatic animals that Europe must have resembled a huge Zoo.

Over the Mediterranean land-bridges travelled the clumsy broad-nosed rhinoceros, the straight-tusked elephant, the African lion, and the hyæna. The northern forests were the home of many varieties of deer; while great herds of wild oxen, bison, and primitive horses roamed over the vast meadow-lands. Bears, sabre-toothed tigers, wolves, boars, and giant beavers haunted the woods.

Amidst this imposing array of his deadly enemies lived the strong man of Mauer, near Heidelberg, Germany. Powerful and heavily made as he was, he must have relied on his wits rather than his strength to enable him to survive the dangers of his life. Unfortunately, his skull was not found, only his jaw. This is so large and massive that a modern jaw looks very small and frail beside it. The chin, like that of earlier man, is so receding as to be almost apish, and yet it too contains definitely human teeth. The most interesting question this jaw raises is, whether its size and shape would allow its owner to speak. The answer is "Yes."

Although this is the only human bone of this period so far discovered, we know that man was living in most parts of Europe, Africa, and India, for everywhere his tools are found. They are called Chellean, from Chelles in France, where they were first recognized, and are rough heavy handaxes (*coup-de-poings*) or scrapers. They were made from lumps or cores of flint crudely chipped on both sides till they were pear-shaped or oval, and had an irregular cutting edge most of the way round. Part of the core was left untrimmed at the base to give a smooth surface for grasping. With these tools men could scrape skins, dig up roots, or hack meat. During this time there was little specialization of tools, for the Chellean man's wants were few and simple.

These people lived in the open, roaming over the flint-yielding areas, and settling for a time where flint was plentiful. They seem to have entered Europe from Africa, where their industry is very widespread and very early. There is little trace of them in Central or Eastern Europe, so they could hardly have come from the east.

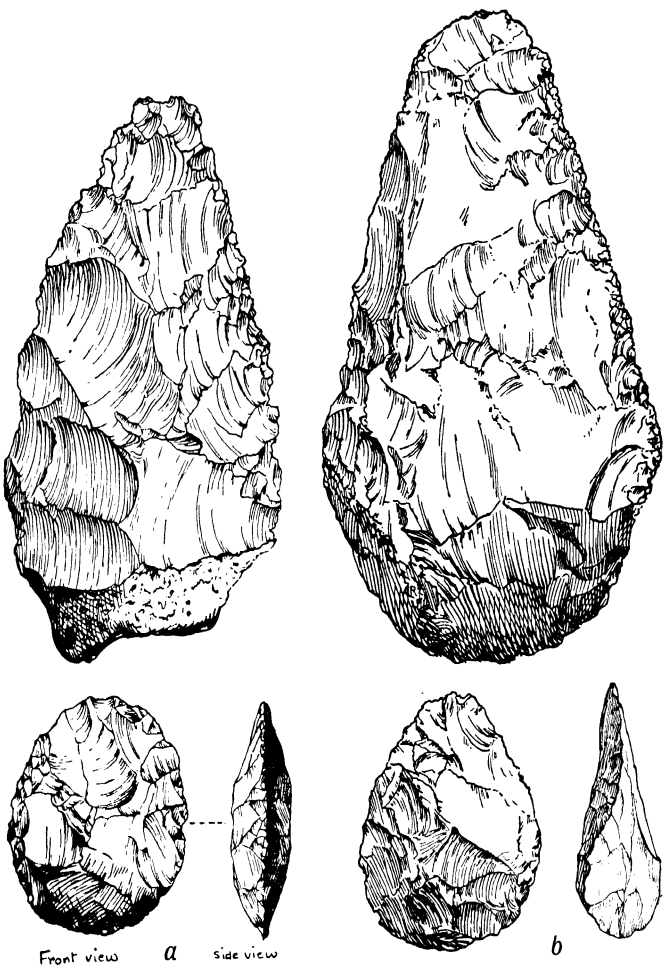


FIG. 16.—Chellean (*a*) and Acheulean (*b*) Flint Tools.

Before the end of the immensely long and widespread warm period between the Second and Third Glaciations much of the land was again submerged; the North Sea *plain and the English* Channel valley sank into the sea, and all land communication between Africa and Europe was cut off.

The climate became cold and dry, and once more the country was swept by wild dust- and sand-storms. These left thick layers of soil, called loess, which can be seen to-day between strata representing warmer and colder climates.

At last the Third Glacial Period arrived, but this time the ice-sheets did not extend quite so far south as during the Second Glaciation. The south of England had an arctic climate, and tundra animals once more made Europe their happy hunting ground. No human bones of this period have yet been discovered, but again man's tools carry on the tale of his slow evolution.

The Chellean flints were still made; but apparently there was a new immigration of men into Europe, who brought with them a much finer method of chipping flints. This new industry is known as Acheulean, from St. Achelles in France (Fig. 16, *b*). It is thought that the Acheulean flint knapper did not use a hammer-stone to fashion his nodule of flint, but a rough kind of wooden mallet which made more delicate flaking possible. The knapper no longer relied so much on weight for the effectiveness of his tool; his cutting edge was now even and sharp, and the shape of his tool beautifully symmetrical. He still made only pear-shaped handaxes and oval scrapers, though it has always been thought that men who worked flint so perfectly must have had wooden tools also. A wooden spear head found at Clacton in an Acheulean stratum seems to confirm this view.

While late Chellean and early Acheulean men were making their tools from cores, another group of men made their tools from flakes. In England it is possible that both core and flake workers were living near together at much the same time.

The English flake tools are called Clactonian, because

they were first found at Clacton. They slightly resemble the very old Cromerian flakes of late Pliocene days, but they are lighter and more carefully flaked. In Belgium similar tools are called Mesianian. Europe in these days seems to have been divided between a core culture, coming up from Africa and covering Spain, France, Italy, South-east England, and a few isolated stations in Poland, and an Asian flake culture coming through Russia and Eastern Europe to Central Europe. In North France and South-east England the two cultures

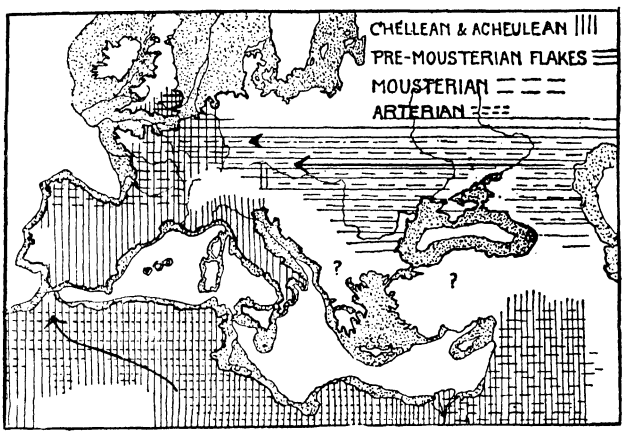


FIG. 17.—The Distribution of the Industries of the Early Old Stone Age.
Core industries entered Europe from the South and flake industries from the East.

met and sometimes seem to have existed side by side. This double invasion of the Continent has been discovered only in recent years, and further research in this direction may throw light on the origin of these peoples.

In the Third Interglacial period the same distribution seems to hold good, though a new and improved flake industry, known as the Levalloisian, had a wider range than any earlier ones.

Levalloisian tools were made in a very ingenious way.

A nodule of flint was carefully chipped till the upper surface had a flattened face. Then the sides of the nodule were flaked away, and at one end a few well-directed strokes made a small platform at right angles to the upper surface. On this platform the knapper gave one sharp blow which knocked off a large thin flake, with one smooth and one chipped surface. An Acheulean scraper of the same weight and thickness was very much more difficult to make.

For long ages the core-knappers and the flake-knappers revelled in the genial climate and plenty of food, and

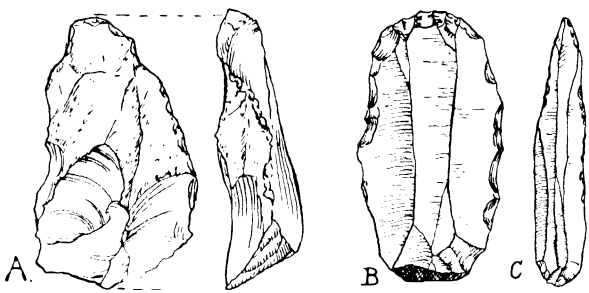


FIG. 18.—Flake Tools.
A. Clactonian. B and C. Levalloisian.

apparently their numbers greatly increased, for more of their flints are found than those of earlier peoples. This Third Interglacial was not nearly so hot or long as the Second, and in late Acheulean times it gradually grew colder, and high easterly winds swept another layer of dust or loess over much of Europe. Still men lived in the open, and when they died their bodies were not buried, so that in time their bones were often washed down by floods. They are known as River Drift men, in contrast to the Cave-men of the next phase.

The increasing cold must have tried these roaming hunters severely. Chellean man in Spain, at any rate, seems to have known fire, but it is not till Acheulean times that there are many traces of the hearths of these

early people. Fire made such a vast difference to the life of man that the question of how he first learnt to use it is of great interest and fascination. There are many theories and native legends, and many primitive ways of producing fire, and it is possible that in different parts of the world fire was obtained by different methods. Long before man learnt to produce fire he had conquered his fear of it, and used it. There are peoples living to-day, such as the Andamanese, who have fires, but have no idea how to make a new one. These fires are never allowed to die out, and when the people move from place to place smouldering wood is carried with them.

It is easy to imagine the terror with which fire was regarded in the earliest days: it must have seemed like a huge creature which fed on grass and trees. For ages men ran from it, and looked upon it as a deadly enemy. At last the cold became so intense that they ventured to the hot smouldering ground, and found that the fire did not "eat them up" if they treated it carefully. After many experiences of this kind, probably the braver spirits brought branches to feed the fire. As the flames shot up and did not harm them, but threw out a delightful warmth, they began to realize that fire might be their friend. It needed a great genius, however, to discover how fire could be produced. To-day friction is the universal method of fire-lighting amongst savages. Two pieces of wood, called fire-sticks, are rubbed against each other until sparks appear. These sparks are allowed to fall on a small heap of dried moss and wood, which quickly ignites. In this way a native can produce a bright blaze in a few minutes. All museums have specimens of native fire-sticks, but if the Acheuleans used similar implements, they will, of course, have rotted long ago.

Once men had conquered fire, how they must have revelled in the security it gave them! Night lost its terrors, and sleep was undisturbed. Lions, wolves, and bears might howl and roar with baffled rage, but none of them dare face the leaping, scorching flames round which the flint-worker and his family lay.

CHAPTER VIII

THE CAVE-MEN

THE arrival of the next inhabitants of Europe, the Neanderthals, was a noteworthy event in man's history, for they had advanced many stages beyond earlier races.

As long ago as 1848, a well-preserved skull was found at Gibraltar. At that time little was known of the evolution of man, and the wonderful significance of this old fossil was not understood. The next discovery, made eight years later in the Neanderthal valley, near Düsseldorf, in Germany, focused public interest on the evolution of man. Workmen clearing a small cave discovered what had probably been a whole skeleton. If this discovery had been made to-day, how differently it would have been treated! Specialists in different branches of science would have been summoned, the bones photographed as each layer of soil was removed, and finally great pains would have been taken to preserve the bones. The soil of the cave would have been so thoroughly sifted that not a tooth would have escaped notice. All implements, hearths, animals' bones, etc., found in each stratum of the soil would have been examined and their positions noted. In those days, however, little care was taken; the skeleton was broken up, and some parts lost.

A doctor from Elberfeld, who had for some time kept a watch on the excavation, rescued the bones before they were completely smashed, and took them to the Bonn Museum. The greatest excitement followed the publication of this discovery. As so often happens, people protested that these bones could not belong to a primitive man, simply because they did not want to believe it. "Oh, of course," they said, "the bones are

diseased or distorted, or else they belong to an idiot." A few scientists, among whom were the great Englishmen Lyell and Huxley, declared that this was undoubtedly an early type of man.

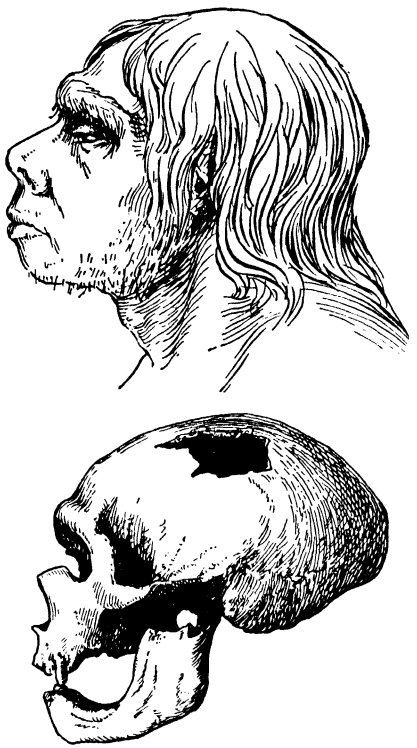


FIG. 19.—Neanderthal Man.
An imaginary picture and the skull from Chapelle-aux-Saints.

Since then numerous discoveries have been made of the bones of men, women, and children of this remarkable race, and it is now realized that there was considerable variety amongst them. The lowest types came from

Gibraltar and Rome, yet apparently the woman of Rome differed from other branches of her race in that she could walk upright. The teeth and bones of these people are so peculiar that they can be identified by a solitary heel-bone or a single tooth.

As Nature has left us such a plentiful supply of material, the least we can do is to try to reconstruct a picture of the race. The first impression we get of a Neanderthal head is the remarkable size of the face compared with the flattened forehead. The thick bars of bone over the eyes, the prominent snout-like jaws, and the small receding chins leave no doubt as to the very primitive and rather brutal appearance of these early men. Their skulls are a peculiar shape, and once seen are never forgotten. Looked at from above, they are pear-shaped, compressed at the sides of the forehead, and bulging behind; from the side view they are almost bun-shaped. They are, however, larger than our skulls, so that, if size were an absolute criterion of intelligence, these people would have been cleverer than we are. The large size of their brains is due to great development of the sensory areas, and the queer projection at the back is the centre of vision. The unbalanced development of the brain caused the uneven contour of the skull; for the higher centres formed depressions or flattened areas between the fully expanded sections for vision, touch, hearing, and action.

In all that makes for wisdom and skill Neanderthal man was seriously deficient, and he still acted "on the spur of the moment," rather than after careful reflection.

It is interesting to know that his speech-centres were sufficiently developed to enable him, in a simple and limited way, to talk. With such a brain, having only simple and coarse convolutions, he would not have many ideas to express.

His heavy brutish head was balanced on an extremely thick neck in such a way that it could never have been held upright, but was always pushed forward on a level with the shoulders. This was due to the shape of the spinal column, which was very short and massive, and

had not the four delicate curves which enable us to stand upright. The whole attitude of Neanderthal man was awkward and clumsy. His legs could never be fully straightened, but were always slightly bent at the knees, so that he ambled along in the ungainly way of a child beginning to walk. Indeed, in many ways his limbs resemble those of a baby. The foot is most interesting, and reminds us of the old tree-climbing ancestor. The big toe was well separated from the others, and could be used for grasping or climbing. In fact, all the toes were more mobile than ours, and so, to men of those times, more useful. The heel-bone is of a very distinctive type, due to the fact that these men had not learnt to walk equally on the soles of their feet, but put their weight mainly on the outside, so that the toes turned inwards. Their hand was definitely human, large, and short; but they had not yet attained that delicate play between finger and thumb which we possess. Yet these clumsy hands chipped flint, and both the form of the arm-bones and the increased size of the left side of the skull prove that the Neanderthals were right-handed.

What a curious sight Europe must have presented in those distant days! Down river valleys, skirting the edges of the forests, over frozen plains, trailed family after family of sturdy, short, clumsy people with rugged faces. Many turned aside to drive wild beasts out of the caves and settle therein themselves; but there were always some who pushed on, ever seeking the two necessities of their life—flint for making implements and caves to protect them from the heavy storms and bitter cold.

They first entered Europe during the warm days at the end of the Third Interglacial period, but they lived on for thousands of years during the severe Fourth Glaciation. It was a miserable time, for although the ice-sheet did not extend beyond North Germany, yet much of Britain and Europe was bleak and almost treeless. Life in this forbidding country was rendered still more intolerable by the heavy rainstorms and floods of

summer and the blinding snowstorms of winter. It was nearly always wet and cold, and the country was often enshrouded in heavy clammy mists. The tundra animals alone revelled in such a climate, and great herds of reindeer, the woolly mammoths, and woolly rhinoceros entered Europe from North Russia and Asia. The number of reindeer bones in any deposit is an indication of the severity of the climate.

Bodies of those ancient monsters, the woolly rhinoceros and the mammoth, have been perfectly preserved in the frozen bogs of Siberia, and explorers who dig them out find it difficult to believe that these creatures have been dead for thousands of years. The hair, skin, tusks, and even the food in the stomach are in a good state of preservation. In the Museum of Leningrad are splendid reconstructions of the very animals our forefathers hunted. They were as large as Indian elephants, and had curved tusks 23 feet long. Next to their thick skin was a thick undercoat of wool, and over that an overcoat of long, coarse brown hair. The heaviest rain or snow would make little difference to animals so well protected as these.

How the Neanderthals must have envied them as they watched them lumbering gaily over the plains, whilst they themselves sat round their fires shivering with cold, and drew their skin cloaks more tightly round them! In face of such inclement weather, it is little wonder that, in sheer desperation, they made themselves masters of the caves. The marvel is that they were able to oust the fierce animals which possessed them, for their weapons were ridiculously inadequate. Had it not been for the newly discovered weapon of fire, men might have perished in the cold. Nothing but burning suffocating brands thrown into their caves could have moved those savage beasts.

One of the greatest benefits fire conferred on man was the stimulus it gave to family and social life, and the occupation of the caves still further encouraged this. Life in the open, wandering and hunting from day to day, makes men unsociable, but how readily people will

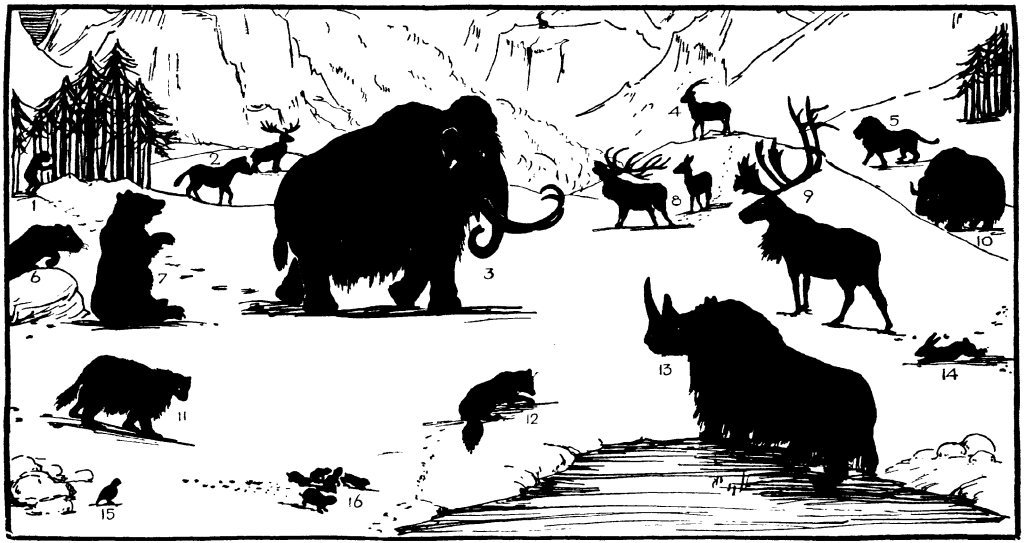


FIG. 20.—Animals living during the Cold Mousterian Period.

1. Man. 2. Steppe horse. 3. Mammoth. 4. Ibex. 5. Cave lion. 6. Cave leopard. 7. Cave bear. 8. Red deer. 9. Reindeer. 10. Musk ox. 11. Wolverene. 12. Arctic fox. 13. Woolly rhinoceros. 14. Arctic hare. 15. Arctic ptarmigan. 16. Lemmings.

collect round a sheltered fire on a chilly wet night! Even language must have received a fresh impetus. The long, dark nights and cold, wintry days, when there was little to do but gather round the fire, encouraged conversation and the exchange of ideas.

The Neanderthals did not live exclusively in the depths of the caves. Some open stations are known which were probably visited during the driest part of the summer, but the caves formed the more permanent homes. From the numbers of flints and animals' bones on the ground at the entrance to the cave, it seems probable that the people spent most of their time there, just under the shelter of the cliffs. The caves themselves would still be used in the severest weather or in times of danger. In those damp days caves and grottoes would not be the healthiest of abodes, as anyone will understand who has visited a limestone cavern after a shower of rain and slipped over its muddy floors and dodged the constant drippings from the roof. Once more the tell-tale bones provide evidence of the life of these people. Many of them tell of swellings, of inflammation, and disease caused by excessive damp. Life was decidedly unpleasant in Europe then! When the days were tolerably fine, Neanderthal man went slouching away through the wooded valleys and across the plains hunting for food.

We are at once struck with the contrast between his small and ineffective weapons and the enormous animals he killed. He was certainly a clever hunter, for none of the game was easy to secure, since the smaller animals were either very ferocious or else exceedingly fleet of foot. He must have had wooden weapons, which perished long ago; but, most of all, he probably relied on pitfalls and traps, as savages do to-day. He did not attempt to drag the whole carcass home, but cut it up where it fell, and carried away only the best joints, the skin and fat, and anything else which could be used. The debris in the caves proves the truth of this; for while there are many leg- and shoulder-bones, there are very few ribs or bones of the spine. Marrow was a great delicacy, and it was extracted from all the long bones

after they had been split open lengthways. Probably the hard life and uncertain weather had taught these people to dry some of the meat and store it for future use.

No clothing has been preserved, but many of the flint scrapers are most suitable for dressing skins. It was not till much later than this that the first needles were made—so dressmaking could not have been a very serious business. A few skins flung over the body and tied by their paws and tails perhaps made the chief garment of the day. Probably they painted their bodies; for, although they had no knowledge of art,

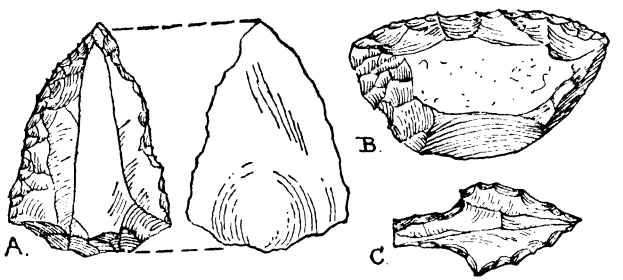


FIG. 21.—Mousterian Tools.
A. Point (knife). B. Scraper. C. Arterian arrow-head.

they left pointed chunks of black oxide of manganese in their caves.

The flint tools and weapons of these Neanderthal folk are known as Mousterian, from Le Moustier, in France. They are all flake tools, and were probably closely related to, if not derived from, the Levalloisian flints. The typical tool was a well-made point of triangular shape with a faceted or chipped striking platform at the lower end. Scrapers were very popular, and many must have been needed to prepare the skins used for clothing in those days.

The very workshops where flints were made have been discovered exactly as they were left in Mousterian times. It seems as though, even at this early date, there was

some division of labour, and that man had begun to specialize in different kinds of work. If this is so, it follows that the simplest form of barter had begun. To the flint workshop on the Thames, for instance, a hunter might bring the best of his game, taking in exchange a finely shaped hand-point. A woman, needing a new scraper to dress her skins or carve the family joints, would collect some prepared skins and wild fruits and also journey to the old flint-knapper. The fame of such a workman might spread far and wide, even in such a sparsely populated country as England was then, and his weapons be greatly prized.

Neighbouring peoples would copy his style of workmanship and probably obtain some of his flints, and in time their neighbours would copy them, and so the new ideas of flint chipping would circulate. We know that something of this sort actually happened; for the similarity of the worked flints from one end of Europe to the other shows that contact and intercourse took place between the widely scattered settlements. People far distant would hear of each other, and customs and ideas might well follow where fashions in implements were carried.

Workshops, which had been long in use, have been found on the Thames and at Mildenhall in Suffolk, showing that a fairly large population must have lived on the flint-beds of England. It is rather thrilling to see two heaps of flint chips, exactly as the Mousterian workman left them, one by each knee. How little he thought, as he squatted over his work, that they would be found intact some 35,000 years or more afterwards!

A very few bone-tools are said to belong to this age; usually Neanderthal man simply took a broken leg-bone, used the socket-end as a handle and the jagged end as a scraper. He also used shoulder-blades and pelvic-bones as chopping-boards on which to hack up his meat.

In some graves are small round stones, roughly pecked into shape. These are interesting, because similar stones are found with even earlier cultures in Africa, and to-day stones like these are used as bola or sling-stones in Africa.

Crude and primitive as these folk undoubtedly were, they had begun to think a little about the problems of life and death, and they left two distinct signs of the way in which their minds were working. Cave life facilitated the exchange and growth of ideas, and language must have been enriched in order to express new thoughts. Some of this enhanced reasoning power was brought to bear on the problems that presented themselves most forcibly and concretely, such as a long and safe life in this world and a continuation of life after death.

The result of this thinking is seen in their amulets and ceremonial burials. An ape would never wear an amulet to ensure his safety. But these primitive folk believed that shells were life-giving, or life-preserving, and valued them so highly that they were brought great distances.

Ceremonial burial from this time onwards has been an almost universal custom, and has always meant that the dead are supposed to be alive in some kind of way. The Neanderthals did all they could to ensure that their dead friends were well provided for life in another world similar to this. A good example of such a burial was found at La Chapelle. There a man was buried in a shallow grave He lay with knees contracted, the right arm under his head, and the left hanging by his side. Within easy reach were Mousterian flints and several joints of meat. A supply of food and implements was not considered sufficient to ensure his welfare, for twelve valuable shells from a distant shore were placed beside him. This is the best preserved of all Neanderthal skeletons.

When a boy of Le Moustier died, everything possible was done to make him comfortable and to provide for his further happiness. A stone pillow of carefully arranged flints was put under his head, and close by were no less than seventy-four flint implements. Beside his hand was a beautiful flint axe. Food had been placed by his head so that he could stay his hunger the minute he awoke. There is no sign of any fear of the dead in the Old Stone Age, only care and affection.

All the individuals found at La Ferrassie had been

buried in graves. Some of the bodies had been protected by slabs of stone. A very curious burial of a child of seven or eight was discovered in 1921. A triangular grave was partially covered by a slab of stone of a similar shape. The lower side of this stone was pitted with several hollows, called cup-holes, apparently arranged in pairs. The headless skeleton with flexed legs lay in the narrow end of the grave, while half a metre away, under one corner of the covering slab, was the skull, which had been badly damaged and had lost the bones of the face. Sollas says that the head must have been severed from the body before burial and buried separately. If this is so, it is the first trace of a peculiar custom which was in use at the end of the Old Stone Age—namely, the special interment of the head.

From these scraps of information we can see that the Neanderthals had developed well beyond the ape man stage, though it would be a great mistake to imagine that they had any clear-cut theories or cults; for they were taking only the first faltering steps along the road which ultimately led to religion, myth, science, and philosophy.

So the results of modern archæological discovery enable us to form a fairly clear picture of the life of Neanderthal man. Under the overhanging rocks at the entrance to a dark damp cave the members of a family squat round the fire. The father is a short but powerful man, with a face that would terrify a child to-day. With his receding forehead and chin, deep-set eyes under the shadow of the great shaggy eyebrows, thick lips, and broad nose, he reminds us, except for his height, of one of the giants of fairy-tales. He has also the same half-flexed legs and ungainly posture. When he squats on the ground with a hammer stone, and begins to chip flakes off a flint, his uncouthness is still more marked; for his hands are awkward and clumsy. He grunts a few words to his wife, an unlovely creature, who is busy scraping a bear-skin with a flint scraper, preparing the winter clothing. The children, heavy-faced and rough, like their parents, tumble about,

playing and fighting like young wolf-cubs. The elder ones sit at the edge of the cliff gnawing marrow-bones. Suddenly they jump up, gesticulating and yelling, and draw their father's attention to a herd of mammoths going down to the river to drink. The lethargy of the family has vanished. The father and elder boys prepare to go down the valley to see if their traps will catch one of the monsters. And, as the animals troop up from the river, one of them steps on the brushwood which covers the pit-trap and crashes through.

The others, trumpeting wildly, stampede through the forest, whilst the men rush to despatch the trapped animal. With their sharp flint " points " they hack off the best of the meat, leaving the rest of the carcass to the birds and beasts of prey, which are already hovering round. News of the kill soon reaches the neighbouring caves, and a small crowd gathers to share the forthcoming feast. The women cut up the joints, roasting steaks over the fire on sticks, and perhaps putting some to cook on hot stones. Then, with grunts of satisfaction, they all gather round the fire and feast, crunching up the tough half-cooked meat quite easily with their powerful jaws. When all the meat is eaten, the long marrow-bones are split and scraped clean of their contents. In the pleasure of the feast tongues are loosened, and one man after another recalls hunts of earlier days, probably acting the scenes to help out their meagre supply of words. Someone recalls the famous hunter who a short time before went to sleep one night in his cave. Since then he had neither spoken nor moved, so they had put him in a comfortable position, and placed near him the food and weapons they were sure he would need.

By and by the conversation dies away, and one after another curls up on the ground, till they are all fast asleep round the fire. Bears and wolves, attracted by the smell of meat, peer in at them from a distance, but dare not approach near that scorching blaze. So in a country infested by wild and fierce beasts they sleep the sleep of the gluttonous and come to no harm.

Chapter IX

ANCIENT FOLK OF MANY LANDS

So far as Europe and Palestine are concerned, it is almost certain that Neanderthal man made Mousterian tools; but outside these areas no Neanderthal bones have yet been found, and it is probable that this technique of flint chipping was adopted by other peoples. Peking man, away in China, made crude flake tools faintly resembling the Mousterian.

The core tool-makers seem to have migrated from Africa, but the flake tool-makers, including the Mousterians, appear rather to have been of Asiatic origin. Many Mousterian sites have recently come to light in Russia and the Crimea. On the other hand, Mousterian tools at Madrid are found with others of a different type which Obermaier calls pre-Capsian. Probably the Mousterians reached Madrid so late that Neoanthropic peoples were already straggling up from Africa (Fig. 17).

Mousterian culture seems to have divided in Russia, one section travelling west through Europe, and the other, after entering Palestine, passing to Africa. The North African industry, known as Arterian, was rather different from that of Europe. It was more varied and of better workmanship, and its characteristic tool was a neat little barbed point (see Fig. 21 C).

The Palestine Skulls

In Palestine Neanderthal man found the caves very convenient, and in recent years his remains and his tools have been discovered in several of them.

These people were rather different from the European Neanderthals, and have been given a special name, *Homo Palestinus*. Their skulls were higher, they had

definite chins and other characteristics which link them with modern races. On the other hand, they retained the Neanderthal brow-ridges, prominent mouth, peculiar teeth, and slouching gait. At Mugharet-et-Tabur a skull was found with a massive chinless lower jaw and heavy brow-ridges, but with thin skull-bones. On a lower level a jaw with a well-developed chin was dug out! It is evident that there was some mixture of races in Palestine, and the industry bears out this conclusion. Mousterian flints are found with gravers, back-blades, and other Neoanthropic types. There is no sign of degradation in either kind of implement, so probably Palestine was near the centre of dispersion of Neanderthal and Neoanthropic peoples.

Distant Relations of Neanderthal Man

The Rhodesian Skull

One of the sensations of prehistory has been the discovery in Rhodesia of the skeleton of an ancient woman. In this case it is not so much the shape of the bones that is the mystery, but their age and the fact that a Paleoanthropic skeleton has at last been found in Africa. The skull resembles the Neanderthal, but it may belong to a very much later period. If so, this is the first known instance of a type of ancient man surviving the fourth glaciation. Africa, the home of mystery and unexpected revelations of man's past, may yet provide the sequels to many unfinished chapters of the story of man in Europe.

This Rhodesian skeleton was dug out of a cave in the Broken Hill Mine. Most of the original hillock has been quarried away, and the whole of the cave exposed. Surely there are few such curious mines as this. The rock has been smelted for the minerals it contains, and with it have gone hundreds of tons of ancient animals' bones, which had become impregnated with zinc and lead.

These bones covered nearly the whole of the floor of the cave, and in many places almost reached the roof. The reason for this vast accumulation of bones, represent-

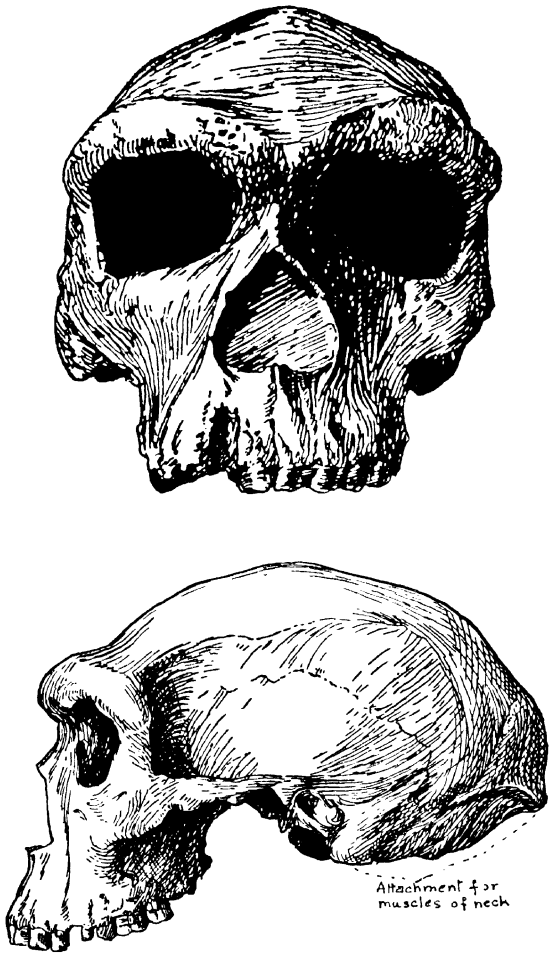


FIG. 22.—Rhodesian Skull.

Front and side views.

ing thousands of animals, is still a mystery. The human skulls were not found amongst the general mass of bones, but at the far end, 90 feet below ground level, and 120 feet from the entrance to the cave. A cleft in the hillock lay just above this part of the cave, so there is a possibility that anything immediately below may have rolled in from above. There was nothing near them except the smashed skull of an animal similar to a lion, and a round stone similar to that used by the natives to-day for grinding purposes.

The whole skeleton and a metallic cast of the body were discovered by negro miners, who destroyed a good deal of it before the overseers heard of the find. The only parts rescued were the skull, part of the pelvic-bone, two ends of thigh bones, and a shin-bone. A small fragment of another jaw was found close by, proving that the individual was a true racial type, and not a freak. In various parts of the cave were modern native implements, but none that one would expect to find with such an ancient type of man.

This skull has the most primitive face known. The enormous brow-ridges are even greater than the Neanderthal, and extend beyond the eyes, very much as in a gorilla. The eye-sockets are huge, the cheeks sunken, and the nasal opening large, merging into the face like that of a gorilla. With this broad flat nose was an unusually long and projecting upper jaw, which gave the face a more apish appearance than that of any other type of man—with the possible exception of Pithecanthropus, whose face is unknown.

This poor apish woman was afflicted with severe toothache, for she suffered from dental caries, which was supposed to be a modern disease. Her teeth were badly worn, indicating the coarse rough food she ate. Unfortunately, the lower jaw is missing, but it is interesting to note that the Mauer jaw fits this skull fairly well, although rather small. The whole face is very large. The palate is beautifully arched, and so this ancient young lady probably possessed a fine voice; but as her brain shows that her musical sense was singularly defective,

she probably used her voice for yelling—quite a useful accomplishment in those dangerous times.

Once again the brain had reached a higher standard than the face, though it was smaller and more primitive than the Neanderthal. This skull is rounder than the Neanderthal, and has not its peculiar compressed bun-shaped appearance. It is surprising to find that such a primitive type of skull has walls as thin as those of modern man—a striking contrast to the very stout walls of other early skulls.

Whether this tall and muscular lady held herself upright, or whether she walked head forward with the Neanderthal slouch, is a point which has not yet been decided; but certainly she had the thickest neck yet known.

So many discoveries have recently been made in Africa that it is amazing none of them has thrown any light on this proto-Amazon. She still remains a problem, and all that can be said about her is that she does not belong to any known species of mankind, but was most nearly allied to the Gibraltar branch of the human race. She was more primitive, and so probably resembled the original stock from which they both sprang.

Of great interest is the report of the discovery of the top of a skull from Florsbad Springs, South Africa. It is said to be of either Neanderthal or Rhodesian type, but its exact relationship cannot be stated until a more complete skull has been found.

Ngandong Skulls

Five fossilized skulls of a hitherto unknown type have recently been found in the Upper Pleistocene beds of the Solo Valley, Java. It is possible that these skulls may belong to descendants of Pithecanthropus who had progressed considerably. In some ways they resemble the Neanderthal and Rhodesian skulls, but are definitely more primitive than either, and much more ancient.

Special importance is attached to these skulls, because they may throw some light on the early ancestry of the Australian aborigines. They have much in common

with the Wadjak skull, which is a proto-Australian type.

The Left-handed Lady of Lloyds

One of the most tantalizing, and therefore delightful problems of prehistory concerns the skull of a very ancient personage who has achieved fame under the title of " The Lady of Lloyds." This skull was found during the excavations that were made for Lloyds' building in Leadenhall Street, London. It belonged to a woman, probably about fifty years old, who, according to the tell-tale impressions left by the brain on the skull, was left-handed. She lived in Mousterian times or even earlier, but she was no Neanderthal. In many ways this piece of skull resembles the skulls of the women of La Quina and Gibraltar; but in the fulness of the part of the back of the skull covering the cerebellum, the thinness of the bone, and the slightly greater development of the association areas, it distinctly tends towards the modern type.

Indeed, Professor Elliot Smith thinks that this woman may possibly have been an extremely ancient ancestress of modern man, the oldest member of our species, Homo Sapiens, yet known. If this is so, this skull is one of the most interesting relics in the world.

CHAPTER X

PEACE IN THE OLD STONE AGE

So pass from our sight these primitive men. All the worst features of a modern degenerate criminal and a brutal savage have been attributed to them without any justification at all. There are only two ways in which we can hope to form any idea of their character and mentality. One is by studying the lives of apes; and, as has already been stated, apes lend no support to this theory of brutality. The other line of investigation is the study of the most primitive peoples living to-day. First of all we must be perfectly sure that the peoples we study are primitive, and not merely degenerate. They, most emphatically, are not the well-known "savage" and warlike races of Africa, America, or the South Sea Islands. All such races have been very strongly influenced for hundreds of years by elements of culture coming from some stream of civilization.

This migration of culture started from Egypt, Babylon, Crete, and early India three thousand or more years ago, and has passed round the world, becoming more mixed, fantastic, and complex the further it travelled from its original home. A queer jumble of beliefs, cultures, and traditions was carried by sailors and prospectors, and planted amongst native peoples, who absorbed some of them, altered others, and forgot large portions. And so even such primitive people as the aborigines of Australia show traces of the impact of fantastic and sophisticated cults, and ideas which are highly complicated. Such people are not truly primitive, and so are no guide to the character of men of the Old Stone Age.

The most primitive peoples alive to-day are very different folk. They are quiet hunting tribes, existing

in many parts of the world. Amongst them are the Punam of Borneo, the Andamanese, the Negritos of the Philippines, the Pygmies and Bushmen of Africa, and to some extent the Eskimo.

In *Human History* Professor Elliot Smith has treated this question fully and convincingly. He finds several points in common between these primitive people, who now live in such different parts of the world and under such different conditions.

The social group is the family, and there is no differentiation of rank. All pay great respect to the elders, who manage their few affairs. Groups of families hunt together, as apes do. There is no village life and no tribal organizations. Children are treated very kindly, and they respond by good behaviour! Usually a man has only one wife. They have no property except a few personal belongings, and so are honest. They are extremely hospitable, kindly to strangers, and live at peace with each other.

Organized warfare is unknown. Those most influenced by outside cultures sometimes fight in groups; but amongst the most primitive there is no clash at all. None of the detestable customs of many native tribes, such as cannibalism, torture, or head-hunting, is practised by them.

They are cheerful, peaceable, honest, simple folk, living day by day, neither providing for the future nor worried by the past. If they are attacked, however, they will fight bravely in defence of their homes. They react violently to brutality and cruelty, soon learning to retaliate in kind; for, as Professor Elliot Smith says, "once the innocence of the Golden Age is demoralized, it requires the wisdom and magnanimity of the highest form of culture to recover the primitive virtues of tolerance and generosity."

Whether this picture of primitive man of to-day can be used to re-animate the dry bones of prehistoric archæology no one can say. Even the highest authority cannot dogmatise, but at least it fits in with such facts as are known about the men of the Old Stone Age.

And so, since the evidence of pre-historic cultures, of the mentality of apes, and of the character of modern primitive man all point to a decent, honest, kindly fellow as our ancestor, what grounds are there for so persistently describing him as the lowest type of scoundrel, and accrediting ourselves with all his worst instincts? The evolution of all types of civilization has brought enough trouble in its train without writers saddling humanity with supposedly ineradicable instincts which, if this theory were true, would ultimately lead to the destruction of mankind. Military enthusiasts are particularly prone to seek sanction for their activities from man's warlike instinct, and from the valuable stimulus war has given to evolution by killing off all the worst of mankind.

History and prehistory agree in proving these ideas to be absolutely untrue. War has always demoralized mankind, hindered the constructive forces of evolution, and exterminated the best of men.

CHAPTER XI

THE MODERN FOLK OF EARLY TIME

WITH the disappearance of the Neanderthals it might well be said that one volume of man's history was completed. It was here that the great division occurred, and not between the Old and New Stone Ages. Recently a new name has been given to all peoples who lived after this great change—that of Neoanthropic—while those who lived before are described as Palæoanthropic.

The contrast between the newcomers, the Crô-Magnons, and the older races is so complete that it is not easy to grasp.

The heavy slouching Neanderthals seem more like under-sized giants or gnomes than people of our own kind. There is a feeling of semi-darkness, weirdness, and unreality about a picture of their life that seems to fit the distant age to which it belongs. Then comes the great change! Weirdness and unreality vanish, and we meet a people so like ourselves that they might mix in a modern crowd without attracting special attention, except that they would receive many admiring glances and whispered compliments. The brains of these folk were as fine as their bodies, and anatomists say that if they were educated and brought up with us, they could take their place in our life to-day.

These were the first undisputed holders of the title Homo Sapiens; but when they entered Europe they were divided into races differing from each other as much as those of modern Europe. The finest race lived in France, especially in Mentone and the Dordogne valley. The typical skeleton was found at Crô-Magnon, and this name has, unfortunately, been applied to all the Neoanthropic races of the period. The true Crô-Magnon race

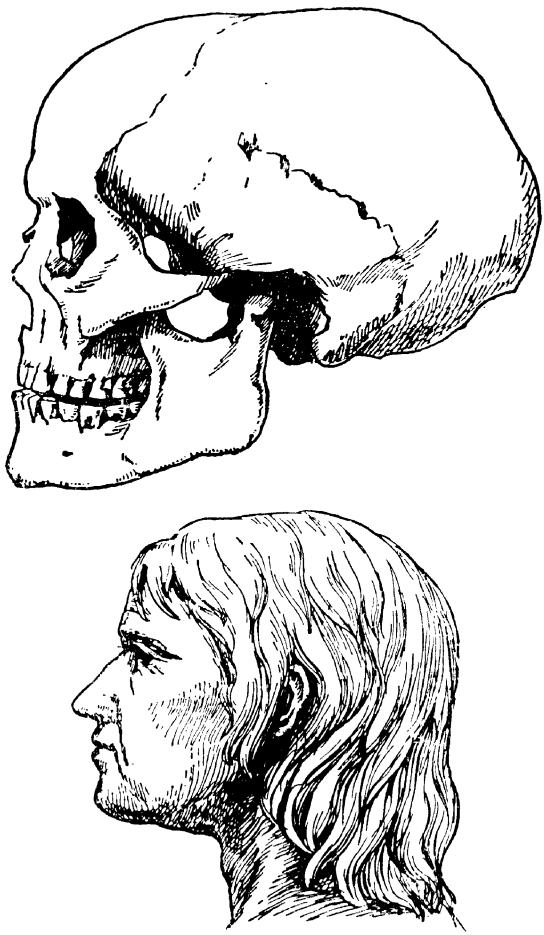


FIG. 23.—Crô-Magnon Man.
Skull and imaginary picture.

was tall—6 feet 2 inches—well-built, with very large handsome heads, and without a single feature suggestive of their forerunners in Europe. The outstanding peculiarity of their skulls is that they are disharmonic—that is, the faces are broad and the skulls long. In all other races a long head is accompanied by a long narrow face, and a broad head by a wide face. Very occasionally this peculiar type still crops up in the Dordogne Valley.

A typical skeleton of an inferior branch of these Neoanthropic peoples was found under a rock shelter at Combe Chapelle, also in the Dordogne Valley. Most members of this branch seem, however, to have lived in Central Europe, for at Predmost and Brünn in Moravia numerous skeletons have been found. Those found in France show signs of intermixture with the Crô-Magnons. The skulls of these people are very long, but extremely high and narrow; the faces also are long, with prominent cheek-bones and upper jaws. The brow-ridges are well marked (though not of the Neanderthal type), and the chins are weaker than those of the Crô-Magnons. This race is of great interest, because it is widespread and persistent, as we shall see when African and Australian races are discussed. Professor Fleure finds it to-day in Wales on the highlands round Plynlimmon.

The third of these races is notable because it is the first round-headed race of modern type. It may be that these were the fore-runners of the Alpine peoples who overran Central Europe in much later times.

In the Grotte des Enfants, Mentone, were discovered the two representatives of the fourth race; and many misstatements have been made about them. They have been described as an old woman and a youth of twenty. A recent re-examination of these skeletons has shown that the " old woman " was about twenty years old and the youth a lad of twelve or thirteen. They have always been spoken of as negroid, but this again is incorrect. They are merely a variety of the Neoanthropic race, in some ways related to the Combe Chapelle type, but having more ancient and primitive characters, which have suvived in primitive peoples till to-day. They have

more points in common with the Australian aborigine, the Predynastic Egyptian, and the Pre-Dravidians of India, than with any Negroes.

These various races dwelt amidst the same surroundings, held much the same beliefs, lived similar lives, and used almost the same bone and flint tools; so that one name which adequately includes them all is badly needed. Perhaps at present it is wisest to name them after their industry—Aurignacian.

In the early days of archæological research all peoples and industries were named after places (mostly in France) where typical specimens had been found. At that time the full extent and complexity of prehistory were not realized, so that now some of these names tend to complicate rather than clarify the subject.

The Neoanthropic races settled in Europe when the Würm glaciation was drawing to a close and the climate was improving. It was still cold, but the dampness was decreasing and the air was more bracing. Summers were warm, but the winters were still very severe. The bones of the animals living at this time give, as usual, a good idea of the climate. The presence of Arctic tundra animals such as reindeer, mammoth, woolly rhinoceros, musk ox, arctic fox, etc., tells of cold weather and open country, while the arrival from Asia of the wild ass and steppe horse point to conditions such as those prevailing now in South Russia. Over the vast stretches of meadowland in the warmer parts of Europe roamed immense herds of wild oxen, bison, and horses, and in the forests of the sheltered valleys cave bears, brown bears, and even a few lions found a home.

The people of this age were essentially good hunters, and never, in all its varied history, was Europe a finer hunting ground. Men could move freely, and they wandered over the fertile English Channel valley to England, then even to Paviland cave, in the extreme west of the Gower Peninsula, and as far north as the Cresswell Caves of Derbyshire.

A vast swampy plain connected South-eastern England with the continent, through which flowed the Rhine, the

Elbe, the Thames, and the Humber, till they all joined the great North Sea River and entered the ocean a little south of the Faroe Islands. Scandinavia still lay under an ice-sheet, and was not a fit home for man till thousands of years later.

As the climate improved, men were not so dependent on caves and rock shelters, and often lived in open camps.

The variety of tools made at this time shows that life

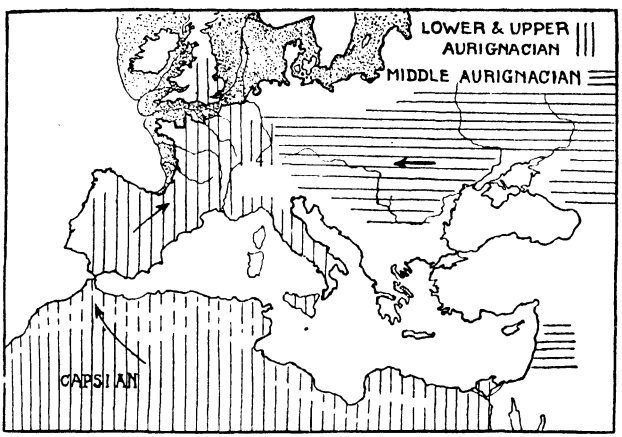


FIG. 24.—Distribution of Aurignacian Industries.

was becoming more complex and interesting. In the earliest stations Mousterian and Aurignacian peoples came into contact, and influenced each other's technique of flaking, so producing a transitional culture which is named after the rock shelter of Audi near Les Eyzies. For a time these two utterly different peoples evidently lived near each other, but gradually the Neanderthals disappeared. The reason for their disappearance is unknown. Terrible wars of extermination exist only in the imagination of writers. Scientific investigation finds

no evidence of such a state of affairs until very much later times, when the earliest civilizations were influencing the world.

Aurignacian industry is divided into three phases—Lower, Middle, and Upper. The first and last seem to have been due to migrations from North Africa, where the Capsian culture is very similar. Upper Aurignacian is obviously a continuation of the Lower, and apparently its normal development is seen in the African Capsian.

In Europe the Lower Aurignacian is followed by a rather different culture, the Middle Aurignacian, which appears to have been an intrusion from the East. Though it extends to France, it is found chiefly in Central Europe, South-west Russia, and Siberia, and recently it has been found in Palestine. Its special characteristics are statuettes of fat women, bone tools, and a peculiar kind of fluted flaking rather different from the parallel flaking of the African Aurignacian.

These eastern and southern streams of Aurignacian peoples may have left the cradle of the race after their culture had considerably developed, and then divided, one reaching Europe from North Africa, and one from the east. The northern or eastern stream also entered Palestine. Whence did it come? Some authorities have suggested the Capsian region. Others think that somewhere on the plains stretching from North Africa to Arabia and to India the home of these people will be located. Further exploration in these key-areas is much needed; at present only the terminii of cultures have been investigated. The problem is like a jig-saw puzzle with the pieces missing which are needed to fill in the right-hand side of the picture.

Aurignacian methods of chipping flint were different from those of the Mousterians. Long flakes were used that needed little retouching to turn them into serviceable tools, most of which were probably hafted. The typical Lower Aurignacian tool was a broad blade with a sharp cutting edge at one side and a chipped blunted back at the other. The blunted back made it possible for the finger holding it to exert considerable pressure without

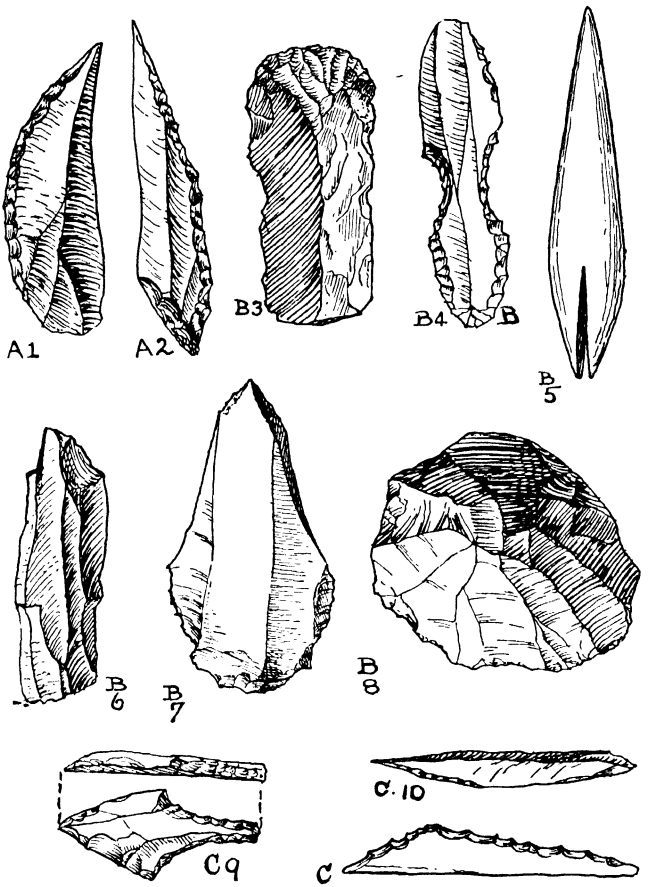


FIG. 25.—Aurignacian Tools.

A. 1 and 2. Lower Aurignacian. Chatelperron knives.
B. Middle Aurignacian. 3. Scraper. 4. Notched scraper for smoothing shafts. 5. Spear-head. 6 and 7. Graving tools for drawing. 8. Keeled scraper.
C. 9 and 10. Shouldered point or arrow-head and La Gravette knife.

being hurt. This Chatelperron knife, as it has been called, gradually became more slender, till in Upper Aurignacian times it was a thin pointed blade known as the Gravette knife. It was almost as useful as a modern knife. The scrapers of this time were long thick flakes chipped steeply at one end to form a kind of planing tool. They were used with an up-and-down movement.

Sharply pointed flakes were doubtless useful for a variety of purposes, but chiefly for engraving. They were easily sharpened. A blow on the top detached a short thin flake from the point that had become blunted. A great number and variety of these gravers or burins are found in Upper Aurignacian deposits.

Middle Aurignacian tools are very varied (Fig. 25, B. 3–8). The long knives are usually chipped all round, unlike the blunted-back blades. Scrapers are heavy and thick, rising to a keel in the centre, from which the flaking radiates downwards, sometimes towards the business end of the tool only, and sometimes all around. Flakes with notches chipped out of the side were probably used for smoothing and straightening arrow and spear shafts. The first bone tools are found with this industry. They are spearheads with a cleft base for secure hafting. A curious tool made from reindeer horn is called a bâton-de-commandment, though it is certainly nothing of the kind. Probably it too was used for straightening shafts, which were pulled through the hole after being softened over the heat of a slow fire (Fig. 35, 8).

The latest Aurignacian tools consisted chiefly of La Gravette knives, small keeled scrapers, gravers, small shouldered points, or arrowheads (Fig. 25, C. 9, C. 10).

Art. To the Aurignacians belongs the honour of being the world's first artists. Throughout the long history of man before their time there is not the slightest sign of art. In spite of ingenious modern theories, early man did not feel compelled to express in line or colour the beauty of the world or the likeness of his friends, nor did he draw because blind instinct urged him to do so. He drew because he felt that by so doing he was fulfilling some useful purpose. The best way to discover the

reason for this new venture is to study the art itself, and through it find the artist's motive.

Part of the fascination of this subject lies in the fact that we can see primitive man learning to draw; we can smile at his mistakes, admire his perseverance as he taught himself to observe more carefully and draw more accurately. We have his scribblings, his quick sketches drawn in an idle moment on bone or stone, and we have his paint tubes, crayons, flint pencils, and carving tools. In fact, we know nearly as much about his work and methods and outfit as we should know if he had studied in one of our Art Schools.

The very first drawings are like those of children who are learning to draw, though any art master, seeing these first attempts, would know that they were the work of very promising pupils. These, the earliest known pictures in the world, are vigorous drawings of animals, which show good observation and dexterity of touch. If an untrained man of to-day were asked to draw from memory some of the animals familiar to him, would the results equal those Aurignacian drawings? And, moreover, suppose that, instead of paper and pencil, the present-day man was given a slab of rock and sharp stone. Few people would make any attempt under such conditions; yet those early men, without any guidance, without any drawings to learn from, drew on the walls of their caves with sharp flints all the animals which interested them. The first drawings are naturally faulty in many ways, and the faults are those of children. Simple outlines only were attempted, and no effort was made to show any feature or surface marking within the outline—unless the eye was indicated by a mere dot.

They rarely put in more than two legs, for those farthest off presented a difficult problem. The figures were not always in proportion: the head was too small for the body (as in the case of the bear), and the extremities were entirely neglected. But it is by no means an easy thing for an artist to keep the proportion correct in a rapid drawing without the aid of an india-rubber.

Almost all little children press far too heavily on their

pencils, and thick black lines that can be seen right through the page are the result. The first artist did exactly the

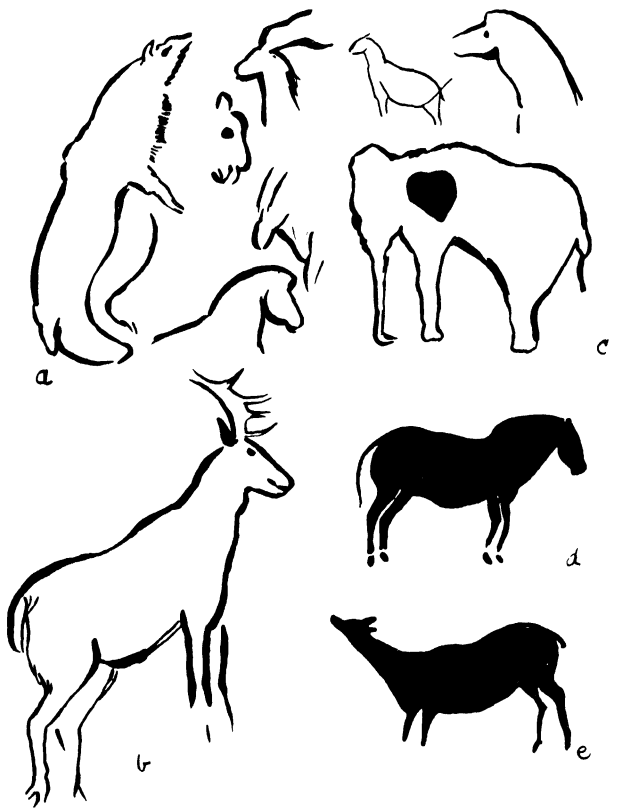


FIG. 26.—Aurignacian Art.

a and *c*. The earliest drawings—ill-proportioned and lacking in detail, but very vigorous. *b*. The next stage. *d* and *e*. Early painting.

same thing : he weighed heavily on his flint graving-tool, and scored deep lines on the rocks. It is no simple matter

to gain that delicate control over the muscles of the hand which is necessary if the thickness of the line is to be varied at will. Much practice is needed even with a pencil. Soon some attempt was made to suggest the surface markings by changing the character of the outline, as in the case of the long fur hanging round the animals' necks, where the steady line was interrupted and the fur shown by short straight strokes (Fig. 26, *a*). Eyes, ears, and hoofs were even attempted, with varying degrees of success. Scratches were made on the body of the animal to represent fur, and often four legs were drawn.

Painting seems to have been discovered about the same time as drawing, and was soon combined with it. The mere outlines proving rather stiff and unreal, primitive man had the happy idea of brightening the drawing with dabs of red or yellow paint, or sometimes with a wash of colour all over (Fig. 26, *d* and *e*).

Probably the very earliest paintings of all were silhouettes of hands. In the cave of Gargas, Hautes-Pyrénées, no less than 138 stencillings have been counted. Hands of all sizes and shapes—some of them children's and some fingers only—are dabbed about the wall of the cave without any attempt at order. A large proportion of the hands have parts of one or more fingers missing; probably, as we shall find later, they were cut off as blood offerings (Fig. 27, C).

Some authorities claim that the wavy lines, made with the fingers or a pronged stick dipped in colour, are of an even earlier date than the stencilled hands (Fig. 27, B). They closely resemble the marks left on the walls of caves by bears sharpening their claws. It is possible that the Crô-Magnons held the bear in high regard, for they used his teeth as ornaments, and so believed that there was some magic in the scratches he left behind. If the wavy lines were actually the earliest paintings, it is quite certain they had some meaning for the people who made them. A large number of dots and marks are also early work, and doubtless they too had their significance. These dots and marks are so numerous that it is

difficult to believe that they were just done in idle moments, when the hands were stencilled or when the animals were painted.

Sculpture. The people of the Middle Aurignacian culture had learnt to carve bone and stone with considerable skill, and their only implements were the flint points, blades, and chisels. They made many little statuettes of fat women, some of which have delicately modelled bodies. Unfortunately, they give us no idea of the

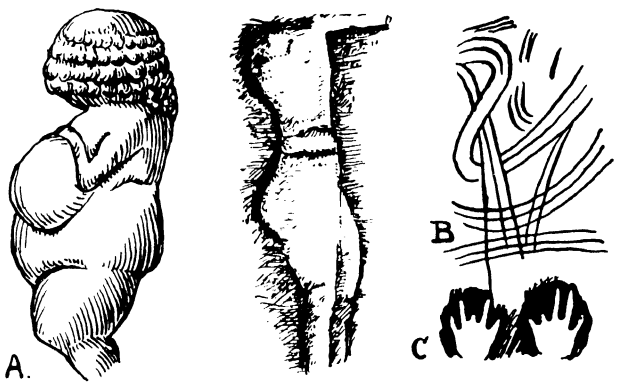


FIG. 27.

A. Aurignacian Sculpture in the round and in relief.
B. Wavy lines made with pronged sticks on cave walls.
C. Stencilled hands.

appearance of the women of that time, for the faces are blank, the arms and hands are very faintly indicated, the legs often end in a stump, and the bodies are so exaggerated that it is impossible to believe that they represent an average woman. Occasionally the hair is carved in little tight curls, and one head from Grimaldi has the face roughly indicated. Obviously the sculptors, from the west of Europe to Siberia, deliberately followed some established convention.

The few male figures yet discovered are normal. Under a rock shelter at Laussel five reliefs were found

cut in stone, and with them was a complete set of sculptor's tools. One figure is that of a corpulent woman holding a horn. The face is blank, but the body is carefully modelled and polished, and traces of red colour can still be detected. Another relief is the figure of a man wearing a girdle, with the head broken off (Fig. 27).

If no engravings or carvings had been found, it would be difficult to account for the hundreds and hundreds of pointed flints that are strewn over most Aurignacian stations. It seems as though towards the end of the period the flint-workers must have spent as much time making artists' tools as they did in making domestic and hunting implements.

CHAPTER XII

THE MAMMOTH-HUNTERS

IN Aurignacian times Europe was divided into two areas of culture. That west of the Alps, described in the previous chapters, differed considerably from that which stretched from Central Europe to Serbia.

One of the most thrilling stories in the annals of archæology is the discovery of the camps of these Eastern Aurignacians in Moravia, now Czecho-Slovakia. Over a hundred camps have been found, and it will take many years to clear them thoroughly. The most famous are at Predmost, Vêstonice, and Brüno. That of Vêstonice covers a thousand acres, and only a small part of it has yet been uncovered. The camps have been buried under layers of sand or loess, which has protected them so well that when they are completely cleared we shall have as vivid a picture of the life of the Aurignacians as we have of the inhabitants of Pompeii, whose town was buried under lava and ash.

These Aurignacians were great mammoth-hunters. At Predmost they brought home portions of no less than a thousand mammoths. When the enormous size of a mammoth is realized—a man could walk underneath one—no one can doubt the great skill displayed by these intrepid hunters.

They fought also with the great cave bears which stood 12 feet high on their hind legs, creatures far more formidable than the American grizzly.

It has always been thought that such gigantic animals must have been caught in pit-traps. Dr. Absolom believes that he has found such a pit-trap with the skeleton of a mammoth in it. He also thinks that large animals were killed, once they were caught in

pits, by huge boulders roughly trimmed to an oval shape. These would be placed in a leather sling and let down over the edge of the pit by several men. A few blows on the head with such a missile would crack even a mammoth's skull!

Lions, wolves, and smaller game were also hunted; but mammoth meat seems to have been the favourite dish, whilst mammoth bones and ivory supplied the material for most of their implements and ornaments.

From the excavations at Vêstonice it is now possible to know how these hunters arranged their camps. It was done in an orderly fashion. Side by side stood rows of skin tents or huts, and near by were the fireplaces and kitchen middens or refuse-heaps. The great numbers of bones left from their meals were carefully sorted and arranged in different heaps. Mammoth jaws, with all the teeth extracted, were in one heap, mammoth tusks in another, and in another skulls which had been opened to obtain that great delicacy, brain. In one part of the camp a whole field of huge pelvic-bones of mammoths has been found. Paths wound in and out of these mounds, so that the implement- or ornament-maker could quickly find his way to the particular store of bone or ivory he needed at the moment.

The centre of life seems to have been the hearth. Families gathered around the smaller hearths in front of the tents; but the very large hearths in which great fires must have burned were apparently the centres of industry, for beside them heaps of mammoth bones and implements have been found.

There the hunters carved clubs out of mammoths' leg-bones, assegais and spear points out of tusks, and made stone and ivory balls which were probably sling-stones. The smaller leg-bones of lions they pointed sharply, and used as stilettos. Mammoth ribs were shaped into shallow "spoons," which were too large for eating with, but may have been used for cooking. Two-pronged forks sound very modern, but they were perhaps used for pulling gut through in making thread.

The women had needles and bodkins of ivory prepared

for them, and needle-cases made from ducks' leg-bones.

Besides all this wealth of bone and ivory these people had great numbers of flint-tools made in the Aurignacian style. Dr. Absolom, the excavator of this site, estimates that he found no less than 40,000 flint implements. Around those roaring fires more frivolous articles were also manufactured. The jewellers of those days, with great patience, bored holes through thousands of shells, teeth, and bits of ivory, and then threaded them into necklaces, bracelets, etc. Ivory was used for beads, large clasps, buckles, pendants, and pins. Two teeth fastened together at the roots may have been worn on the nose, as Papuans wear similar ornaments to-day.

There were also artists at work in these camps; but, although they showed considerable skill in handling difficult material, they had not the fine artist spirit of their contemporaries in France. They cut small squatting figures of women out of the foot-bones of mammoths, and, though these works were very crude, they were probably valued by these folk as fetishes and charms with magical power. A few carvings of animals in relief are the best things yet discovered; they show some of the spirit and the reality of the French carvings.

At Vêstonice curious little modelled figures have been found. One is like the statuettes of fat women from the Russian Aurignacian deposits, but other crude human figures, such as a child would make, are very similar to those modelled by the Australian aborigines. These figures appear to be made of clay, but on analysis it has been discovered that the substance is a specially prepared mixture of charred and powdered bones and mammoth ivory bound together with clay. It is extraordinary that people who discovered how to prepare such a material as this never thought of using it in making pottery. The crude figures were found in the ashes of hearths, with implements and mammoth bones. Here is a new custom awaiting interpretation.

During one period of their occupation the mammoth hunters practised a peculiar kind of conventionalized

art which reminds one of that of the South Sea Islanders or the Maoris. It is unlike most of the naturalistic art of the west, although some French tools are decorated with similar patterns, but it closely resembles the late

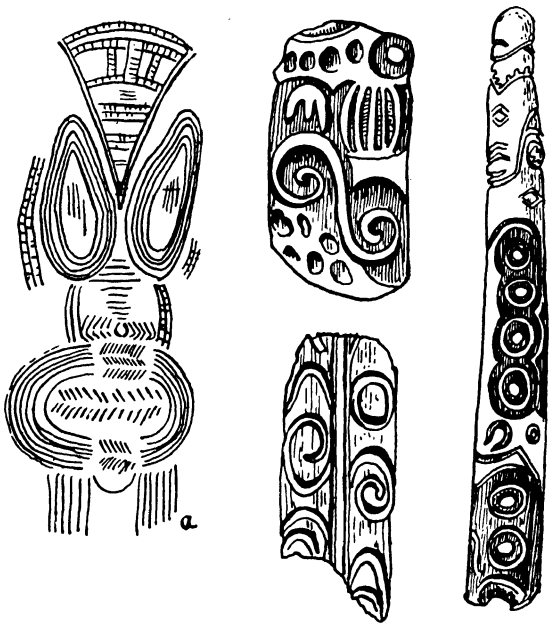


FIG. 28.—Conventional Designs.

a. Diagrammatic drawing of woman from Predmost. The other examples are from France.

Palæolithic art of Russia found at Kiev and Mezine. Pieces of bone and ivory, as well as implements, were discovered with intricate and conventional patterns made from circles, dots, spirals and entwining lines, dashes, and a rope-like line. Some tusks and bones have numbers of dashes and curious marks arranged in such a way as to suggest some form of memory-aid or

record of counting. The art, industry, and even the bodies of these folk seem to have been of blended types.

To complete our picture of this well-equipped race it must be added that they enhanced the gaiety of their appearance by painting themselves white, red, and yellow. Their grinding-bowls and stones still retain the traces of colour, and an ivory toilet-box made from a hollow bone holds the red ochre they used.

As both the art and the tools of these people were cruder than those of Western Europe, it is not surprising to find that they belong to the least refined type of Aurignacians, that of La Capelle. Their features present such contrasts that it has been suggested they were a mixed race with some Neanderthal blood in their veins. They came from the east, as apparently the Neanderthals did, and so it is possible that before they entered Europe there was some contact between them. In any case, the admixture must have been slight; for these folk were distinctly Neoanthropic folk, akin to other Aurignacian people. The women were of quite modern type, and had none of the contrasting features which distinguished the men. In the men, large long heads and jaws with strong chins were combined with heavy brow-ridges and prominent mouths. Their faces were more rugged and less refined than those of the Crô-Magnons.

At Predmost twenty people were buried in one large elliptical grave, and as there were eight children to twelve adults, it is thought that an epidemic may be the explanation of their death and burial together. (In other places, however, the number of skeletons of children is correspondingly large.) The grave was paved with stones and walled round on one side with mammoth's shoulder-blades and on the other with jaw-bones, the whole being protected by a thick layer of stones. The people buried here had practically no outfit with which to start the next life. Only one child had a necklace, and there was the skull of a fox in the centre of the grave.

For a very long period the mammoth-hunters lived in open camps, and then a change of climate drove them to the caves. The Solutreans do not seem to have entered Moravia, and the cave-dwellers were the descendants of the Aurignacians, who had been forced to adopt a new way of life.

Mammoths were extinct, and their place was taken by innumerable herds of reindeer and wild horses.

In some way these people had been influenced by Magdalenian culture, and although they still made their flint tools in the Aurignacian fashion, their bone tools were much more numerous and of the Magdalenian type. Harpoons appear for the first time, and there are many crudely engraved bâtons-de-commandment. Spears were ingeniously made in three sections which dovetailed together. Three interesting finds were flint tools neatly hafted into bone handles. Hammers and clubs were cut from reindeer horn, and polishers and shovels from animals' shoulder-blades. Ivory hairpins, lamps made out of reindeer skulls, whistles made from the metacarpal bones of deer, ivory chisels, spear-holders of reindeer horn, bone discs, and decorated pebbles were other objects used by these enterprising people.

Dr. Absolom reports the discovery of bone rods used as boring instruments for making fire, exactly like those used by the Eskimos. He agrees with Professor Sollas in believing that the Eskimos are related to the Magdalenians. The art of these two peoples has much in common, though recent comparison has shown that it is not so similar as was formerly supposed.

The art of the Moravian cave-dwellers was not of a high standard. A few engravings are vigorous and lifelike, but not well drawn. Human figures were rarely engraved, and always had masks on. A small female statuette of this time is so conventionalized that only an expert can tell what it is intended to be (Fig. 28, *a*).

The end of the cave-dwellers seems to have been sudden and complete. The layer of soil overlying the strata containing their implements is quite sterile. A period of heavy rain due to the last retreat of the ice-

sheet seems to have driven away the game on which their lives depended, and so probably they followed it.

For a long time after this Moravia was uninhabited, and then suddenly Neolithic agriculturists appear from the south-east.

The Palæolithic races of Moravia are of great interest to us because of their resemblance to the native Australians. Their skulls have several features in common, and there are striking similarities in their ornaments, decorative patterns, and statuettes.

The only possible explanation of this puzzling similarity seems to be that both the Australians and the early Moravians left a common home after a cultural tradition had been firmly established there. There is no reason to suppose that the aborigines reached Australia at a very early date, for they had the domesticated dog with them. We can trace Australoid skulls back through the Malay Archipelago to India, and a Central European type of art was practised in South Russia during the late Palæolithic times. So it is possible that the homeland lay between these two countries—perhaps somewhere south of the Caspian Sea. This region has been suggested as the original home of Homo Sapiens.

Neanderthal men seem to have come from the east, and so again we may ask whether the Australoid branch of Homo Sapiens became slightly mixed with them, while the Crô-Magnon branch remained pure.

Chapter XIII

THE LIFE AND THOUGHT OF NEOANTHROPIC PEOPLES

We are wonderfully familiar with the fads and fashions, the cults and habits, treasures and tools of the Aurignacian and Magdalenian peoples, and we owe most of our information to the provision made for the dead. They took every care to give their friends a happy, prosperous, and comfortable time in the next life, which they believed would be exactly like the one on earth.

In order to protect the body from the soil, blocks of stone sometimes lined the grave, and stone slabs were placed over the body, and especially the head, so that a rough sort of stone coffin was made. At Solutré, where people were buried in the large open camp, two stones were placed at the head of the grave—the first tombstones yet recorded. Similar stones are still used in Algeria.

Usually the dead were buried in caves. In the cave of Barma Grand, Mentone, three people lay in a trench-grave lined with stones and red earth. Near the entrance was a very tall man, who was probably dressed in a skin robe fastened with an ivory ornament. He wore a necklace and coronet of shells, fish-bones, and deer's teeth. Two precious cowry shells were placed on his knees, and a large flint tool lay ready for use close by his hand. At his side was a girl of eighteen similarly arrayed, and also provided with a flint knife. A large stone had been placed under her head, and she, like the man, looked out to sea. Next to her rested a boy of fifteen, who must have worn a skin cap heavily embroidered with shells and fish vertebræ. He too had a

beautiful necklace and a flint knife. Near by were the bones of oxen and deer, all that remains of the food provided for their journey to the next world.

These are typical burials of the finest type of Aurignacians. Women were evidently treated with as much honour and affection as men. There is no sign of the subjection of women till civilization developed. Children were loved then as now, and Aurignacian mothers delighted to make pretty clothes for them, spending days embroidering little skin garments with shells. Two children of Mentone were the proud possessors of little aprons on which were stitched over two thousand shells, and when they died no doubt their mother was comforted by the belief that the shells would protect them in the next life as surely as they had given them joy in this life.

Ivory bangles, rather like modern slave-bangles, were fashionable in those far-off days, and they too were given to children. They were made from rings of ivory cut with a flint point from the hollow part of an elephant's tusk, and then smoothed, polished, and decorated with notches. One was found with the man buried in a bed of red ochre in the Paviland Cave, Pembroke. Near it was a pendant, pierced for suspension, which its owner probably regarded as an extremely valuable amulet. It is a lump of ivory, which had grown in the broken part of an elephant's tusk, and close by was the very tusk in which it fitted (Fig. 29, *d*).

Shells were very much prized, and were carried long distances. A man buried in the Rhone valley possessed shells from the Mediterranean coast, and shells from the Indian Ocean were found in another grave. Over two hundred beads have been found at one station, and all stages of manufacture can be traced. First a cylindrical rod was cut from a piece of horn and rounded on a spokeshave, and then notches were made at intervals. These sections were filed away into little balls, which were pierced with a pointed flint. Beads made in this painstaking fashion must surely have been of great value (Fig. 29, *h*).

In Magdalenian deposits fine ivory needles are found which point to well-sewn skin garments. Probably the Aurignacians made skin clothes by lacing them with thongs threaded through holes pierced with a stiletto.

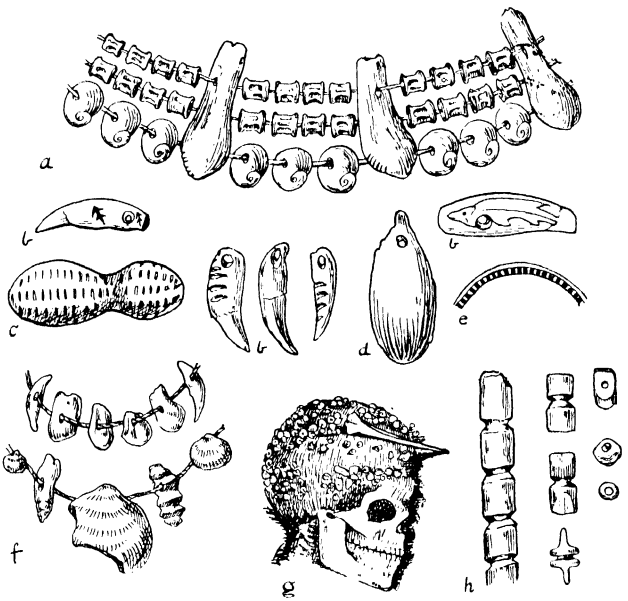


FIG. 29.—The Ornaments of the Crô-Magnons.

a. Necklace of canine teeth of stag, fish vertebræ and shells. *b*. Engraved teeth used as pendants. *c*. Ivory ornament. *d*. Nodule from diseased tusk of elephant. *e*. Portion of ivory bracelet. *f*. Shell necklaces. *g*. Skull decorated with shells, from Mentone. *h*. Ivory beads in various stages of manufacture.

Even when a lady or gentleman of fashion was arrayed in a shell-embroidered skin garment, decorated with a necklace and bangles, crowned with a coronet of shells and teeth, and girded with a shell waistband, he or she still did not consider the toilet complete. These modern folk of ancient times touched themselves up

with powder and paint. Red ochre was rather a vivid colour to choose, but it was probably chosen for its magic power rather than its beauty.

Against a background of dark overhanging cliffs, a handsome, richly dressed Crô-Magnon family must have made a striking picture.

Of their social life nothing is known. If they had chiefs, no sign is found of their existence. Probably groups of families lived together, ruled by elders. The large population of some regions, such as the Dordogne valley, or the Solutré camp, would surely necessitate some kind of simple organization.

Throughout most of Europe these people must have kept in touch with each other, and trade in shells, at any rate, must have been carried on. Of warfare there is no sign whatever. There are no pictures of fighting, no specialized weapons, or broken bones, such as are found in later times when wars were common.

As the Aurignacians had a higher standard of culture than any early peoples, so they had more advanced beliefs and ideas. The Mousterian held the germ of a belief in a life after death, and he was dimly groping for some solutions of the few vague questionings that entered his simple mind. To the capable Aurignacians these questions were much clearer and more numerous, and they found answers in which they firmly believed.

The idea of death has always been very difficult for primitive peoples to grasp, and the impulse to live was so strong that death seemed unnatural. They believed that their friends must still exist. This idea of the continuity of life has been expressed in many ways by various peoples throughout the ages. Most folk have felt that their departed friends needed the same things they used and cared for on earth; and so their treasured possessions were buried with them. This custom reached its climax in the immense store of food, furniture, and jewellery which were placed in the tombs of the Egyptian kings.

Even when the Aurignacians had provided their friends with food, tools, and clothes, they felt there was

something missing. Life had gone, and until it was restored all these things were useless. As death was considered abnormal, it was natural that they should look for a cause. The most obvious cause was loss of blood. In the animals they killed they saw quite clearly the cause of death, and probably many of their own number died from accidents which resulted in loss of blood. It is a well-known fact that amongst all primitive peoples blood has been recognized as necessary to life, and loss of blood as a cause of death; and all sorts of red objects have become connected with this belief. Red berries, red stones, red flowers, red sand, etc., have in different times and places been credited with the life-giving attributes of blood. It is astonishing to find this idea firmly held in times so distant as those of Aurignacian man. Red ochre was his substitute for blood. The connection between the two may seem very remote to a modern mind; but early man was constantly imagining that objects which resembled each other were endowed with similar properties. He used his logical faculty much as we use ours to-day, the great difference being that we, with ages of experience behind us, have to some extent learned to test the correctness of our analogies by experiment. It says much for the keen observation of these Crô-Magnons that they recognized the importance of the heart. One of the early Aurignacian drawings is that of a mammoth with a huge red heart painted in the right position on the animal's side (see Fig. 26, *c*). On the bison of Niaux are painted arrows pointing to the direction of the heart. We have so unconsciously absorbed the learning of centuries that it is difficult for us to appreciate that the recognition of an important physiological fact like this compares very favourably with modern discoveries—such as that, for instance, of the discovery of the circulation of the blood.

This earliest attempt at scientific reasoning is called Sympathetic Magic, and the use of red ochre is only one of the many ways in which it was practised in Crô-Magnon times. Another form of it was the use of

animals' teeth. Probably those teeth were worn because they were the weapons of a fierce animal, and through them the hunter hoped to absorb into himself some of the animal's ferocity and courage. Some of the teeth were painted red to make the magic doubly powerful. Shells also were full of magic, or why should they have been carried so many miles inland, and brought even from the Indian Ocean?

There was a reason behind every action and belief of primitive man. He did not use things that were merely beautiful, but rather things that he deemed useful. Shells were luck-bringers, life-givers, life-protectors, if we may judge from analogy with other primitive peoples. Also there is good reason to believe that they were the earliest forms of dress. The men of Mentone, who were so elaborately dressed in shells, no doubt felt that they were well protected from all dangers, and when they died their friends decked their bodies in the same shells and covered them with ochre, in the firm belief that by doing so they were renewing their life.

The silhouettes of hands with missing fingers also suggest the belief in the magical power of blood. To-day it is a common custom amongst some savage peoples to cut off a finger-joint as a blood offering to propitiate gods or spirits, and this custom can be traced back as far as this first of all cultures. It is impossible to say, however, to whom or to what blood was offered by the Aurignacians. Painted hands of a conventionalized type are found in many of the caves, and quite often they are painted on the picture of an animal.

There is only one possible trace of a deity, and even that is very uncertain.

It has already been said that the statuettes of corpulent women can hardly be truthful portraits of normal Aurignacian females. There seems to have been a rigid convention amongst sculptors of this time, for which there must have been an adequate reason.

Judging from analogies amongst later peoples, it seems probable that these statuettes were fertility amulets, the prototype of the Great Mother, whose cult

was so widespread amongst the first civilizations. Shells, especially cowry shells, have always been associated with her, and their popularity in the Aurignacian period raises the question as to whether this association began then. It is highly improbable that such early peoples had any clear-cut ideas about a deity. They were perplexed over many questions, and the remedy for most of their troubles, as well as the answer to most of their questions, seems to have been Sympathetic Magic. This was the natural result of reasoning from their observation of cause and effect, and one marvels at their persistent efforts to grapple with the secrets of life and death, rather than at the poverty and even absurdity of their conclusions. In these days of accumulated tradition and wisdom it is almost impossible to understand the position of those who, for the first time, were trying to fathom the unexplored world of reason.

CHAPTER XIV

THE MOTIVE BEHIND EARLY ART

ONE of the most fascinating problems connected with the Crô-Magnon race is that of their wonderful paintings. When one looks at the splendid work of these people (especially in Magdalenian times) it seems natural to suppose that they were true artists, and drew because they loved it; but the question becomes more complicated when we find that they painted their best pictures almost entirely in the dark recesses of deep caves, and often in places which were very difficult to reach. The entrances to the caves, the grottoes, and the rock shelters were rarely decorated. It is only when the modern explorer penetrates into the most difficult, dangerous, and tortuous passages, far from the entrance, that he finds any trace of art. To-day, even with electric lamps and climbing outfit, it is a feat of considerable skill to reach some of the remote corners of the caves, as the following descriptions of a few typical cases will show.

The cave of Combarelles (Dordogne) is a straight gallery 720 feet long and 6 feet wide, but the drawings do not commence until 350 feet from the entrance, where the cave is pitch dark. Here, however, every possible piece of smooth rock has been utilized, and some of the lines of the drawings are so exceedingly fine that they can scarcely be seen even with the rays of a powerful lamp. Yet they were drawn with no other light than that given by a tiny lamp fed with moss and fat!

The cave of La Pasiega (Santander, Spain) is another astonishing place to choose for an art gallery. It is entered from a small grotto 500 feet above the river. The way to the actual cave is a small opening in the

floor, a shaft in the limestone hardly large enough for an average man to slide down. This leads to a complete labyrinth of rooms, decorated with no less than 262 marvellous paintings and drawings. Moreover, that is not all, for another dangerous cranny gives entrance to the last chamber, which has been called the " Salle du Trône," from the natural seat of limestone which it contains. The Crô-Magnon men slipped, crawled, and scrambled down those dark, mysterious passages, where a false step meant disaster, and at last entered this room. They left some of their flints behind, they drew on the walls, and actually sat on the " throne." There is no doubt about this last fact, for their dirty finger-marks are still visible to-day on the arms of the throne. Was it mere love of adventure that lured them on to face the terrors of these unknown regions? Surely there must have been some stronger reason than that.

These are not exceptional cases, for many others are known. The grandest cavern in France is that of Niaux (Ariège), which extends 4,200 feet into a mountain. A subterranean lake bars the entrance, and must be crossed before the long passage is reached. There exploration is difficult, for there are pools to be swum, narrow galleries to be squeezed through, projecting rocks to be scrambled over; and yet the Crô-Magnon men went there regularly. Their footprints are still clearly seen in the mud on the floor!

The artists of Altamira must have lain on their backs to decorate the ceilings of the cave. At Combarelles the passages are so small that entrance can be gained only on hands and knees, whilst in other caves passages are so narrow that only slight people dare venture.

Quite recently a new cave has been explored at Trois Frères (Ariège), not far from Tuc d'Audoubert. " In a long passage is the engraving of a lion, while underneath, resting on a projecting rock, is a graving tool, probably the one the lion was drawn with. Farther on the floor is clayey, and descends deeply to a large alcove at the bottom, the magical part of the cave, six or eight feet wide. The two side walls and one in front rise

sheer, with smooth surfaces all covered with engravings. The front wall is pierced by a tunnel on the ground level, while high up, rather to the right, twelve feet from the ground, is another opening like a window. The tunnel mounts up steeply, and comes out at the window. Everywhere are drawings, as high up the walls as can be comfortably reached. The whole is dominated by the window. On the surface of the wall below the window is the figure of a masked man partly painted, partly engraved, with a stag's horns on his head and a tail behind. It is possible to get at this figure only by swinging out of the window and resting the toes on a small projecting piece of stalactite that juts out from the left wall of the alcove, ten or twelve feet from the ground. The figure of the man dominates a frieze of animals below" (Fig. 31, *a*).

Nothing could illustrate more clearly the absurdity of the idea that the Crô-Magnons drew simply for art's sake, unless the evidence is still more forcible from the recently discovered cave of Montespan in the department of Haute-Garonne.

This district is noted for its interesting caves. A few miles away is Aurignac, and the distance is only 17½ miles to the famous cavern of Tuc d'Audoubert. The entrance to Montespan is in the side of a wooded hill. Attempts have been made to explore it, but they have all failed because of a subterranean stream which flows through the cave and in places reaches the low roof. In August 1923 M. Casteret decided to explore it by swimming, and, being an expert swimmer, he succeeded in his attempt. The story of his exploit is one of the most thrilling in the annals of cave exploration. He found that the cave extended for three-quarters of a mile into the heart of the hill, and most of that distance he had to swim or wade in icy-cold water. In two places the roof actually touched the water, but, nothing daunted, he dived and swam under the water until the roof lifted again. He had, of course, no idea how long these tunnels were, but he took the risk, and was rewarded by one of the most remarkable discoveries

ever made. At the extreme end the cave opened out into a chamber with a clay floor. On this floor were upwards of twenty clay models of animals. The unique interest of this discovery will be realized when it is remembered that only two clay models were known previously—the modelled bison of Tuc d'Audoubert. At Montespan it is probable that the whole floor was once covered with models, but the water trickling through the walls and the flooding of the river must have destroyed most of them. Even those which remain have been seriously damaged, and in the case of only three of them is it possible to recognize what animals they represent. They are all horses. In the centre of the cave is a platform, and on it is a large clay model of a bear in a sphinx-like attitude. It is no less than $3\frac{1}{2}$ feet long and 2 feet high. It is headless, and was evidently intended so to be, for the section of the neck is carefully smoothed, and has a hole in the centre of it. Lying between the model's outstretched paws is the broken skull of a young bear, and it is surmised that the Crô-Magnons fitted the head of the real bear on to the model and fastened it into the hole in the neck with a plug. Perhaps, to complete the effect, a bear's skin was thrown over the model, when it would indeed look like a live bear!

Fixed against the cave walls are three large models of some kind of feline animals—probably lionesses. They are 5 feet long, and, though most of the clay has broken away, the outlines of the fallen parts can still be traced on the walls. A model of a horse's head is affixed to another wall at the height of a man's head, and on a bank of clay are a number of clay balls and half the body of a woman, modelled in clay.

The whole cavern is very clayey, and it is possible to see the marks of the flint tools with which the Crô-Magnons scraped away the clay for the models. A few discarded flints lie about, untouched for many thousands of years. These old artists traced innumerable patterns on the walls and ceilings with their fingers—a rather childish proceeding from our point of view, but no

doubt they had what they considered an adequate reason.

The most remarkable and interesting point about the clay models is that every one of them has been pierced over and over again with spears and assegais. The bear is covered with gashes, and thirty were counted on the neck and chest of one of the lionesses. They are so close together that they almost touch each other. All the animals were roughly modelled, and it is evident that they were made simply to be speared. Even a horse drawn on the clay floor with the finger has long gashes on its neck. The reason for this curious custom will be discussed later. The walls of the cave are decorated with the usual engravings, of which so many examples are known.

In April 1932 M. Casteret again distinguished himself by exploring an exceedingly difficult cavern at Labastide, not far from Montespan. After climbing down an almost vertical abyss, he came to a beautiful arcade that led to another shaft, round the edge of which he crept on a narrow ledge. In a very low chamber, where he had to creep on hands and knees, he lay on his back and turned his light to the ceiling, and there " suddenly the life-size outline head of a lion stood out, roaring with striking realism." Other animals were also drawn on this ceiling, sometimes six or seven on top of one another. Most of them were stiff, solid forest ponies with bristling manes and long stiff tails. Primitive man could hardly have found a more awkward or uncomfortable studio. In another cave was a drawing of a bearded man's head, as crude as the lion's head was perfect. M. Casteret thinks that it was a picture of a mask worn by the sorcerer who presided over the ceremonies which took place in this cave sanctuary.

A most interesting discovery was that of two circles of stones on a platform of earth at the end of the cavern. Inside these cromlech-like circles were ashes, burnt bones, jaw-bones, teeth of horses, flint tools, and assegai-heads of reindeer horn. With them lay limestone plaques on which were drawn horses, reindeer,

bison, mammoth, and a head of a bear. The curious point is that all these plaques were lying with the decorated side downwards. This could hardly have been the result of an accident, for M. Casteret remarks that the same thing has been found in other caves. So here is a new item of cave ritual which has not yet been explained.

Another interesting cave was discovered by an enterprising French schoolboy of fourteen called David. David lives in the department of Lot, and had been thrilled with the discoveries made by the Abbé Lemozi in the caves of the neighbourhood. One day David found a narrow hole in the hillside of his father's estate, and, being small, he was able to squeeze through it. Climbing up a narrow passage, he came to a large hall; but before venturing farther he went back to tell his father and the Abbé of his discovery. He and the Abbé soon returned, and explored the numerous passages and chambers—all most interesting and beautiful examples of cavern architecture. In some places the passages were so narrow that the explorers could hardly squeeze through at all. After exploring splendid halls adorned with pillars and cascades of stalagmite of beautiful colours, they had to give up the search. They paid more visits later, however, exploring another passage, and at length, after being nearly asphyxiated, they succeeded in reaching an immense gallery 115 yards long and 12 yards wide. Here there were few stalagmites, but the walls were covered with engravings and paintings in black and red of mammoths, horses, and fish, and there were ten silhouettes of human hands, as well as numerous signs and dots. One flint graving-tool was found, and a bear's tooth which had been carefully placed by a Crô-Magnon on a ledge of rock. On the floor were the animals' bones and the footprints of the men of long ago.

The ceiling, perhaps, is the most astonishing part of this cave. It is almost 23 feet high, and yet is decorated with engraved, interlacing designs. It is impossible to imagine how such work could have been accomplished.

Apparently those determined artists allowed no difficulty to stand in their way if they thought some good purpose could be served by drawing in a particular position.

The youngest discoverer of cave art was the five-year-old daughter of the Spanish archæologist the Marquis de Santuola. She accompanied her father in his search for flints in the newly discovered cave of Altamira in 1879. The cave was low, and her father was searching among the rubbish on the floor. The little girl, becoming bored, took a candle and began to wander away. She could easily walk upright, and looking up at the ceiling she suddenly cried out: "Bulls! bulls!" Her father was greatly astonished to find that the ceiling was covered with polychrome paintings of bulls. He made known his little daughter's very remarkable discovery, but, as no early art was known at that time, the significance of it was not realized by the scientists of the day, and it was forgotten. It was not until the little girl had grown to be a young woman of twenty that another discovery of a similar kind made people recall hers. M. Rivière cleared many layers of soil in the cave of La Mouthe (Dordogne), and found they were all deposits of the Magdalenian period. In his work he uncovered the entrance to an inner cave, which obviously no one could have entered since the Magdalenians blocked it up with their rubbish. On the walls were engravings and a few poor paintings, which was clear proof that people living before the Magdalenians were artists—a most astonishing suggestion at that time. We who are familiar with so many of their works can scarcely appreciate how amazing it is that people so ancient should have drawn so well, and that their work should have been preserved until to-day. The discovery of La Mouthe brought back to remembrance the bulls of Altamira, and scientists organized the search for other decorated caves which is still being carried on.

Of all the thrilling experiences that come the way of an archæologist few equal a tour of these Palæolithic caves. The sense of mystery, of bewilderment, of awe is overwhelming. If this impression is made on men of

modern thought, who understand the causes of cavern architecture, what must men of, perhaps, 25,000 years ago have felt as they penetrated for the first time into the fearful maze! See them with their tiny lamps, which light up only a little space immediately in front of them, slithering over slimy rocks, swimming pools whose size they could not guess, squeezing through narrow passages, wondering what would face them when they reached the end. It needed not only great courage, but some strong stimulus to slide down the limestone funnel of Pasiega when the depth was unknown, and when no one had any idea of what there might be at the bottom. There must have been some tense moments as the first man found his way, whilst the others stood around, holding their little lamps aloft and breathlessly waiting for some sound that would tell them of his safety. More light can be thrown on the question of what urged them on to such wild ventures by considering the pictures they painted.

It is surprising to find that such clever artists were absolutely careless about everything except the particular animal they were sketching at the time. Apparently people with so keen an artistic taste felt no regret in ruining a masterpiece by painting over it. Moreover, any wall space, however inaccessible, however difficult to see from the ground, was used, provided that it had a good surface. Nothing whatever seemed to matter, except that the animal should be painted or drawn as well as the artist could possibly do it. There was no slackness about the execution of the work, and time, difficulty, or danger was of little account if a good likeness of the animal were produced in a suitable place.

Why did those men do things which seem to us so futile, so contradictory, and so altogether unreasonable? Surely, if we could look into their minds, we should find some reason strong enough, and, looking at it from their point of view, logical enough to account for everything.

It has already been stated that all we know of the

habits of these folk leads us to think that they were founded on a strong impulse to live well and happily—to enjoy, as we should say, "good luck." Their flints, bone tools, ornaments, statuettes, burial customs are all the result of this strong impulse of self-preservation. It seems highly probable, therefore, that the same explanation must be applied to cave art. Almost all the animals portrayed are those on which Crô-Magnon man dined! The few exceptions are animals that were feared. Once more sympathetic magic comes into use,

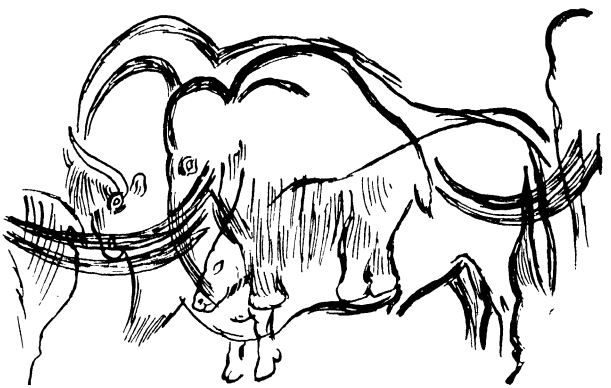


FIG. 30.—The Superimposition of Paintings.

and brings the desired animal into the power of the hunter. By means of sympathetic magic a representation of a thing may, for all practical purposes, be the thing itself. Otherwise, why burn Guy Fawkes? There are innumerable instances of this all the world over. An Arab takes care to bury his nail-parings, fearing that they should come into the possession of his enemy, who by cutting them could injure their owner. Some primitive people believe that a photograph is a highly dangerous thing, for, if an enemy obtained it, he would have complete power over the original. So it has always been since Palæolithic times.

The artists of Crô-Magnon days simply applied this belief to food-getting. Before the hunter went off to the chase he would have an exact portrait of the animal he wished to kill painted on the wall of the cave, and then he imagined that the animal would soon fall a prey to his weapons. Or he would make clay models, such as those of Montespan, and go through all the actions of killing the animal, being sure that such mimicry would help him to be a great hunter. We can imagine the joy with which the hunters would gather round the life-like model of the bear and spear him as they would have liked to spear all the bears who disputed the caves with them.

Perhaps the men who drew headless animals, animals without ears or eyes, and the men of Labastide, who seem to have turned their drawings face downwards, all felt that in these varying ways they were obtaining some hold over the creatures upon whom their life depended.

The question remains, however, of the position of the drawings in the caves—always in the deepest, most difficult parts. It is extremely likely that these caverns, which to-day fill men with feelings of awe and mystery, were to these simple folk holy places. Places so fearfully and wonderfully made must have been full of magic. What is so impressive now must have been much more so then, and the more difficult, dangerous, and remote the chamber, the more holy it seemed to be. What rites and ceremonies were performed there we cannot say; but they must have been many. The drawings would be part of a system of magic. It has been suggested that sacred dances formed part of the cult. At Tuc d'Audoubert the footprints, still seen in the sand, are those of heels only; and since these are not the natural prints left by people when they walk, Macalister explains them as the marks left by dancers. The pictures at Cogul (Spain) are said to represent a dance, but whether they can throw light on Crô-Magnon life is uncertain.

Much speculation has taken place over the masked

FIG. 31.—Masked Dancers.

a. The "sorcerer" of Trois Frères, Ariège, who dominates a cave decorated with pictures of animals.

figures, some of which are illustrated on Fig. 31, *b*. Some of them are moving in a lively fashion, and may well be dancers who performed in the very caves where the drawings were made. Amongst primitive peoples of all times ceremonial dancing has been considered a matter of great importance, and frequently it was used as a means of applying sympathetic magic. Just as children play the things they hope some day to do, so a savage acts the events he hopes will happen. If he wants to kill a bear, he goes through all the performance of hunting as a ritualistic dance, and often wears some part of the animal's skin. The imposing figure of a masked man which dominates the frieze at Trois Frères is apparently walking in animal fashion. It is tempting to wonder if this is a picture of the great magician who performed holy rites and ceremonies in that very "magic" room (Fig. 31, *a*).

On the other hand, when considering some of these masked figures it must be remembered that they may be pictures of hunters stalking animals, partly disguised by wearing skins or horns. Indeed, it is quite possible that the same pictures represent both the magical dance and the actual stalking of the animal. But whatever is the exact meaning of these particular paintings, it is clear that the wonderful art of those distant days, taken as a whole, was inspired by a belief in sympathetic magic. When artists went to the immense trouble of engraving lines on a ceiling 23 feet high, we may be sure that they hoped to receive considerable benefit for their labour. There must have been magic in it!

It would be difficult to believe that artists who drew so splendidly did not enjoy their work; but that was a secondary consideration. Utility came before beauty. As time went on, almost all tools and weapons were decorated, and it is reasonable to suppose that the same ideas were behind this art. In the best Magdalenian work the joy of the artist in his work is seen in the exquisite finish and style he gave to the smallest sketch or carving; but even then he doubtless hoped

that the figure of the animal carved on his weapon would enable him to hunt or fish more successfully.

All, therefore, that can be gathered of the thoughts and beliefs of the Crô-Magnons leads to the conclusion that many of the ideas connected with sympathetic magic, which has played such an important part in the lives of the people of all ages, have their roots in times as distant as those of Palæolithic man. It seems a far cry from the " lucky pig " trinket to the shell pendant of long ago, but the thread connecting them is unbroken. The glory of those old days is that what men did, they did well; for the time came afterwards when any make-shift was good enough, and never again until the days of the Egyptians did Art reach such a high stage of excellence.

CHAPTER XV

THE GREAT FLINT WORKERS

MYSTERY follows mystery as the story of our ancestors is unravelled. Just as the Aurignacians were attaining the full vigour of their art and culture they vanished, and no trace of them has yet been found. The newcomers, called Solutreans, often lived in their caves; but they cared nothing for the easy and effective method of flint-chipping of their predecessors, nor for the splendid art on the cave walls. Recent discoveries show that at the beginning and end of their sojourn in Europe they were in touch with the Aurignacians; but there is no sign of inter-mixture or of war. Probably the Aurignacians retreated to the south of Europe, where the Solutreans never penetrated. They seem to have come from the East, for their settlements are found along the plains of Central Europe, whence they spread to France and Northern Spain. England was visited by only a few intrepid explorers (Fig. 34). The most eastern stations have the earliest type of tools, and the best are in France; so these people must have developed their peculiar and very beautiful method of flint-flaking as they advanced westward. Another branch of Solutrean peoples seem to have turned south, perhaps by the Black Sea, and settled along the Nile, where a great number of fine tools have been picked up on the desert.

The Solutreans were artists in flint-work, and they discovered a much better method than chipping; they detached flakes by pressing a piece of bone against the edge of the implement. The even fluting on the best specimens looks like ripple-marks in sand. Both the shape of the implement and the flaking were so beautifully symmetrical that only twice subsequently have

they been equalled—by the Neolithic folk of Egypt and Denmark, who seem to have retained the Solutrean tradition. The typical tools are shaped like willow or laurel leaves, but scrapers and gravers were also made, and at the end of the period shouldered points and arrow-heads. These appear only in South-west France and Northern Spain, and so it has been suggested that they indicate a return of the Aurignacians who were making shouldered points of cruder shape just before they disappeared. The willow- and laurel-leaf flints are said to have been spear and javelin heads; but many of them are so thin that one imagines they would soon be broken. Yet surely they must have been valuable, if only because of the time taken to flake them. There is no doubt that the finest found in a hollow at Volgu, Sâone-et-Loire, were too fragile ever to have been used. They are translucent, from 9 to 13½ inches long, and of superb workmanship. They were votive offerings made for the dead, and one still shows traces of the red paint which was to give it magic power.

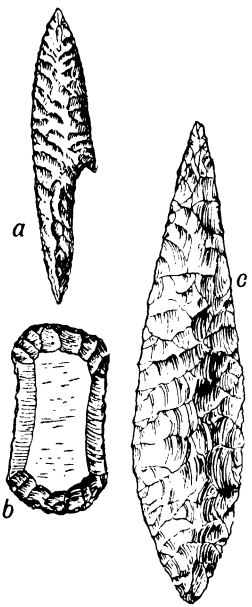


FIG. 32.—Solutrean Flints.

a. Shouldered point. *b* Scraper. *c*. "Laurel leaf" knife.

Bone was sparingly used for implements; but towards the end of the period the first bone needles are found.

Until late years it has been presumed that the whole energy and skill of these people were concentrated on the fine tool-making; but recently several carvings and engravings have come to light which prove that they too were true artists. They preferred relief work to sculpture in the round, and usually portrayed animals,

but never women. Their animal reliefs have a vitality, truthfulness, and artistic sense of which any people might be proud.

A wonderful discovery of a Solutrean camp was recently made at Le Roc, Charente. Under a rock shelter vast deposits of burnt bones, ashes, and flint tools accumulated during a long period of occupation.

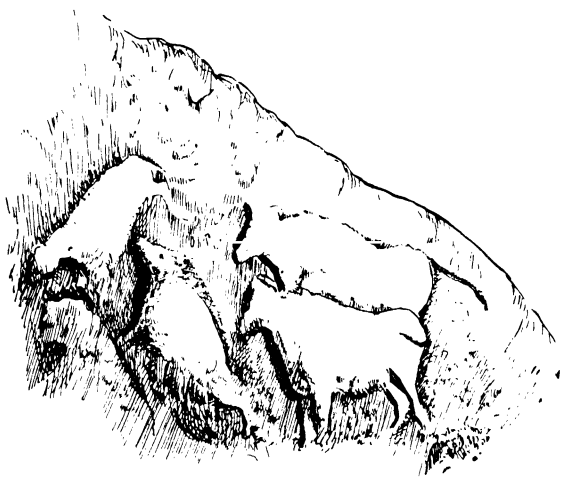


FIG. 33.—Solutrean Sculpture in relief.
From Les Bourdeilles, Les Eyzies, France.

A flint workshop covers 40 square metres, and by it is a large semicircle of overturned blocks of stone. When the explorer, Dr. Martin, had these blocks lifted, he was astonished to find that they were covered with relief carvings of animals on the under side. Evidently they had formed part of a frieze set on stone bases, in front of which the Solutreans had lived and worked. As all the blocks were found in the same position, Dr. Martin thinks that they were overturned by an invading people, who, however, did not settle there.

The reliefs are by more than one artist. Some are simply drafts, and some highly finished work. A scene showing a man with a stick on his shoulder fleeing from a charging musk-ox is a masterpiece, and the movement of most of the animals is excellently portrayed.

A unique and extremely interesting relief shows a composite animal, with the body of an ox, the head of a boar, or of a carnivore with elongated muzzle and pointed ears. Did the Egyptian passion for composite animals have its roots in this distant time? Although the superimposition of paintings is well known, here is the first instance where sculpture is known to have been so barbarously treated. The head of an ox was chipped away and a horse's head substituted. Some of these reliefs were originally coloured, and close by are the tools with which they were carved.

On one of the hearths by the frieze three skeletons were found under stone blocks. With them were many tools and reindeer bones. They are said to be of the much-debated Chancelade type, which will be described in the next chapter.

Unfortunately, very few undoubted Solutrean burials are known. The people seem to have been of Aurignacian type; in Eastern Europe they were purer than in France, where they mixed with other races.

The Solutreans are named after their open camp at Solutré, which covered 4,256 square feet. It was open to the south, and sheltered from the cold north winds by a high cliff. It was first used by Aurignacians, whose family hearths are surrounded by the bones of hundreds of horses, the relics of innumerable feasts. In the next layer are the large oval fireplaces outlined with stones where enormous fires burned, around which a number of families of Solutreans must have gathered for food and gossip. There was much overcrowding. The hearths were so close to each other that there was little space between, and everywhere old bones were piled together.

So these famous flint-workers lived and hunted, carved and sewed for many years, and then they, like

so many other interesting races, faded away without leaving any clue as to the cause of their disappearance. Their remarkable skill in flint-working lived after them, and was passed on from people to people, till eventually it spread almost round the world.

CHAPTER XVI

THE AGE OF ART

THE Solutrean period is followed in France and Northern Spain by the Magdalenian, which is a peculiar continuation of the Aurignacian. The skeletons, customs, arts, and crafts are so similar that there can be no doubt of the close relationship of the people living in these two periods.

Magdalenian culture was very localized, and while it was flourishing in France, Middle or Upper Aurignacian cultures were quietly developing in Mentone, Central Europe, and South-west Russia. A few Magdalenian implements have been found in Southern England, but at Cresswell, Derbyshire, there was an uninterrupted growth of pure Aurignacian industry from the coming of the first Neoanthropics to the end of the Magdalenian period. This is such a distinct culture that it has been termed Cresswellian. It is now being found in other parts of England.

Southern and Eastern Spain were still inhabited by people of Capsian culture, whose curious art will be discussed in the next chapter.

The few Magdalenian skeletons that have been found clearly belonged to the various branches of the Aurignacian race; but the type had deteriorated. The Magdalenians were short and slender, and had smaller heads than their predecessors.

A man buried at Chancelade was rather different from his neighbours, and much discussion has taken place about his peculiar skull. Some authorities believe that he was related to the Eskimo, and others declare that he was not normal, but a pathological dwarf, whilst still others think that the pressure distorted his bones.

Even his method of burial was peculiar. It is claimed that his legs were tightly flexed and bound to the body.

Several skull fragments have been found in Southern England, the best known coming from Aveline's Hole, Somerset. They belonged to both long- and short-headed people, very much like ourselves.

A curious custom seems to have been introduced at this time—the burial of the head only. In the great grotto

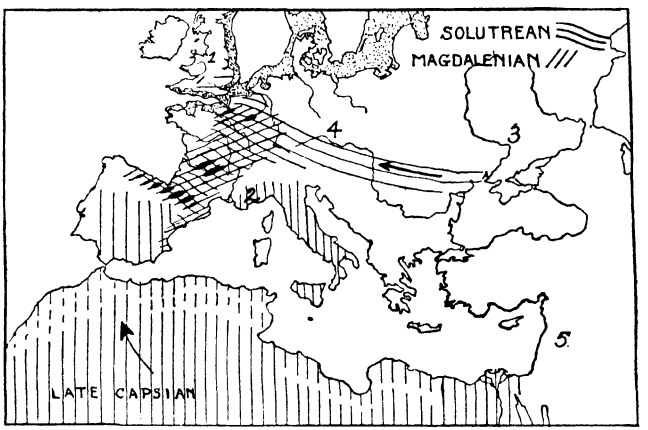


FIG. 34.—The Distribution of Solutrean and Magdalenian Cultures.

The figures indicate centres of Upper Aurignacian culture which existed at the same time as the Magdalenian culture.

of Placard, Charente, there are several groups of skulls clustered together. One skull was surrounded by perforated snail shells.

The Magdalenian industry shows not the slightest trace of the beautiful Solutrean technique, and yet the Magdalenians were familiar with it, for in early strata their own tools are lying near Solutrean flints. They either could not or would not flake a tool all over. They carried on the Aurignacian technique; but their

tools were thinner, lighter and flatter than earlier ones. They specialized in a great variety of sharply pointed gravers for etching and for making and decorating bone tools.

A very debatable point is the use of bows and arrows. No signs or pictures of bows have been found. The late Aurignacians made little tanged flints which look like arrow-heads, and arrows are certainly shown piercing some vital part of an animal on the paintings. Again, ii the Magdalenians did not use arrows, it is difficult to see why they made shaft-straighteners with holes exactly the size to take arrow-shafts. It has been suggested that they used darts rather than arrows.

From the beginning of this period bone was extensively used for a variety of purposes. The numerous javelin points were beautifully shaped and richly engraved. Javelins and darts were given a greater impetus by being thrown from a grooved rod called a javelin- or dart-thrower. The handles of these throwers were often cleverly carved into the form of an animal (see Fig. 41).

The Magdalenians were not such great hunters as the Aurignacians, perhaps because game was more difficult to procure, but they were keen fishermen. Though they sometimes fished with a line and hook, they generally used harpoons. The first harpoons were like assegai heads, with a few well-cut barbs down one side. Later, barbs were cut on both sides, and various experiments were made with shaping the lower end so that it could be firmly attached to a cord (Fig. 35, 10 and 11).

While the Magdalenian husband fished in the well-stocked rivers, the wife made the family's outfit. She cut out the finest skins with sharp flint knives, sewed them up with bone needles as fine as our crewel needles, and often embroidered them with pierced shells. Sometimes she lost her precious needles, and so decided that a needle-case was a necessity. She made one out of the hollow bone of a bird, and explorers found it in her old home just as she left it, packed full of needles. These enterprising people seem to have invented buttons, and they certainly had pins of ivory (Fig. 35).

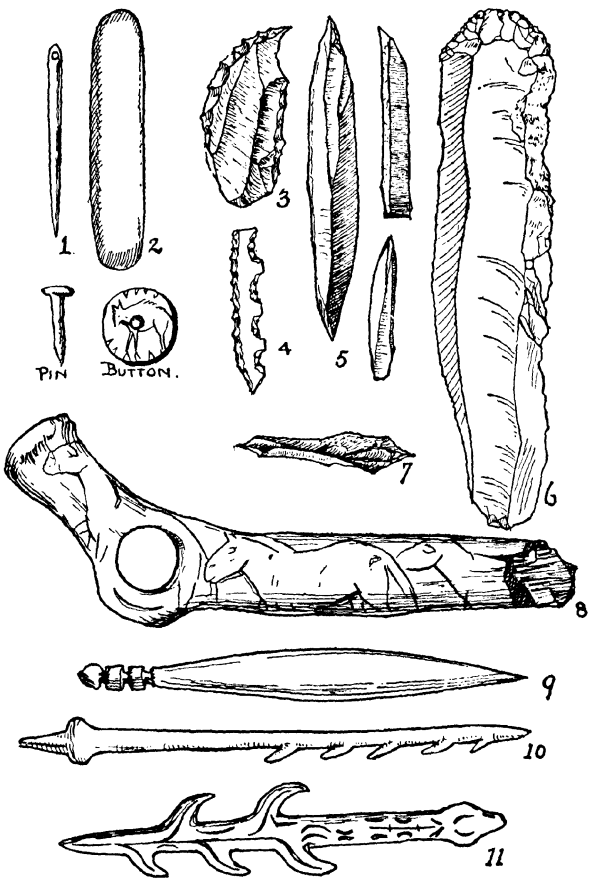


FIG. 35.—Magdalenian Implements and Weapons.

1. Bone needle. 2. Bone polisher. 3. "Parrot-beak" graver. 4. Notched flint. 5. Gravers for drawing. 6. Long and slender scraper. 7. Flint for boring eyes in needles. 8. Bâton-de-commandment. 9. Javelin points. 10 and 11. Harpoons.

A complete outfit for making needles can be seen in the British Museum. It consists of a lump of ivory from which splinters have been cut, a pointed cutter, a sandstone block with grooves in which needles were rounded, a notched flint for smoothing, an ivory polisher, and a very finely pointed flint for boring the eye.

Art. This was the most artistic age of early times, and of all peoples these artists appear most vividly before us. We seem to know them in an intimate way which bridges the gulf of the ages separating us. In the stillness of the caverns, surrounded by most wonderful and trivial evidences of the past, it almost feels as though the Magdalenian artist would come to life again, pick up from the ground his palette still covered with paint, his pencils and paint-tubes which are close at hand, and produce once more the artistic masterpieces of prehistoric times. We know the type of man he would be and what he wore. The fine bone needles tell of his well-made skin garments, and we are as familiar with his ornaments as with our own. The marks of his naked feet are even now on the sand of the cave floor, and his finger-prints on the clay he used for modelling. There are the outlines of the fish and ox that some of his friends drew in the sand with their fingers. All around are his tools in great variety for art and for home use, and poised on the ledge of a rock is the jaw of a bear exactly as he placed it after extracting the teeth.

The walls are covered with the masterpieces on which he spent so much time and skill, and with the curious signs and diagrams, the secret of which he has kept. Everything is there; only the spirit of the man is missing. Surely it is one of the most wonderful facts of history that we can be so familiar with people of whom we have no written record. It is a most fascinating study to try to reconstruct the life and thoughts of these folk from the relics they have left behind.

The increasing variety of small pointed tools of chipped flint tells of the improving standard of engraving. Outlines were not so heavy and deeply cut, but quite as firm and sure. Details were rendered with increasing

skill, and the outline was frequently broken to suggest different surfaces; for example, the hairy coat of the bison was drawn in long, detached vigorous strokes (Fig. 36, *d*). Some of the work of the period is so fine and so small that it can barely be seen in the powerful light of an electric torch; but the drawing is just as sure and beautiful as in the larger work.

All animals depicted are now well proportioned, little heads and big bodies being things of the past. Very frequently the artist has caught the spirit of the animal in a remarkable way. With a few deft lines, the poise, the movement, and the temper of the animal are unerringly portrayed.

Compare the wild and determined charging mammoth from La Madeleine with the dull slouching cave bear of Grotte de la Mairie (Fig. 36, *c* and *a*). In all cases the essentials which give the character of the animal have been firmly grasped, in spite of the fact that it is always so fatally easy to emphasize and elaborate unessential points. Children's drawings show how really difficult it is to decide intelligently which are the points that actually give the character of an object. They see a horse, but their drawing of the animal shows how few of the essentials they have retained. The character is lost, while unnecessary details, such as the mane, are drawn with painstaking care, so that the result is grotesque. Few art students could give as perfect a picture of an animal in so few lines as the Magdalenian artists. Their keenness of observation was remarkable, and equalled by their sureness of touch. Flint, rock, and bone are stubborn drawing materials; every false line shows, and there is no possibility of rubbing out. Yet the fact remains that there are scarcely any corrections in the best drawings. Some of them are so large that the whole drawing cannot be seen at once, but the proportions are always true. The artists who most nearly resemble them to-day are those of Japan, though their style is quite different. Japanese artists do not draw from a model. They watch the animal they wish to draw under natural conditions—watch it until they are absolutely familiar

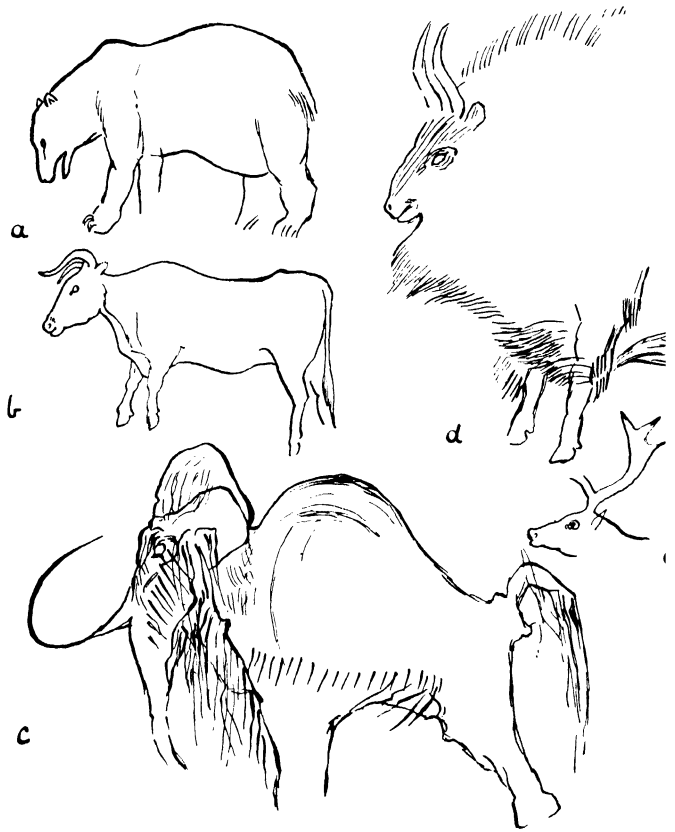


FIG. 36.—Fine Magdalenian Engravings.

a. Cave-bear from Grotte de la Mairie. *b*. Cow from Grotte de la Mairie. *c*. Charging mammoth from La Madeleine. *d*. Bison from Marsoulas.

with its every line and movement, and then sketch from memory with a few sure, clear lines.

One of the finest examples of Magdalenian engraving

is that of a browsing reindeer from Kesslerloch, Switzerland (Fig. 37). Here the more elaborate technique is seen, the coat and surface modelling of the animal being suggested by carefully placed wavy lines. Those who are familiar with the reindeer say that the pose is perfect, and the whole sketch accurate to the last degree.

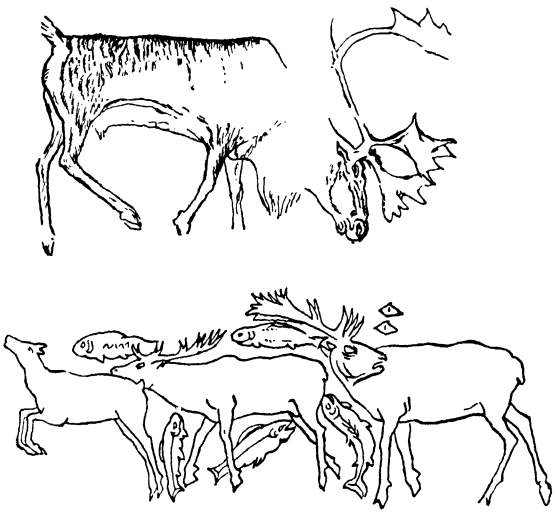


FIG. 37.—Masterpieces of Magdalenian Art.

Reindeer engraved on round piece of antler, from Kesslerloch, Switzerland. Restoration of an engraving of red deer and fish, from cave of Lorthet, Haute-Pyrénées, France (after Sir Ray Lankester).

The heads of the chamois engraved on reindeer horn are as full of life and individuality as they well can be, and prove how completely free from conventionality was the art of the time (Fig. 41, *d*). A lesser artist would have repeated the same head four times over; but here each chamois has a dozen little characteristics of its own. Sometimes the most trivial sketches are exquisitely drawn. How few lines have been used to portray the

steppe horse, and yet how full of character every line *is—nothing* more is needed, and *nothing could have* been omitted (Fig. 38).

As time went on, lines were used more frequently to indicate hair, and sometimes to suggest shading. Horses were drawn at all times of the year; for they are shown sleek and smooth in summer, and covered with a thick hairy coat in winter.

Gradually the vigorous lines of the best period gave way to meaningless scratches, which often covered the drawing. The old grasp of essentials was lost, and the over-elaboration of details was substituted for the few true strokes which gave so much expression and vividness to the best work. The artists had reached the sad state when they fancied that a large number of careless lines equalled a few intelligent ones. When that happens, the death of art is always near. And so it was in this case. Crô-Magnon art soon passed away, and never came to life again.

FIG. 38.—Quick Sketch by Magdalenian Artist.

Painting. Painting in Aurignacian days consisted of stiff outlines, or, at the best, a flat wash over the whole with a few brushfuls of darker colour to indicate the modelling; but in the Magdalenian Period there was a great advance in technique. Various methods were adopted, some of them very beautiful, but others decidedly ugly. In some cases the silhouette of the animal was composed of dots—a method employed by the Bushmen. But usually, whatever technique the artist used, his work was good. The outline was painted with fine vigorous strokes, and patches of colour were laid on in flat washes. Then the whole animal was covered with a bold wash of colour, and a little shading carried inwards from the black outline, with very effective results. Some of the exquisite "stump" drawings belong to

FIG. 39.—Examples of Late Degenerate Magdalenian Art (*a* and *b*) compared with (*c*) a vigorous drawing of the best period.

this period; one colour only was used, but it was shaded to show the modelling perfectly, and the high lights were scratched out with a knife.

Very soon painting and engraving were combined, and in the best examples the engraving is as delicate and perfect as if it were to stand alone. By this time the artists were reaching the height of their power. No longer satisfied with the use of one or two colours, they produced magnificent polychrome pictures, some of which are as fresh and vivid to-day as when they were first painted. Several colours were used—red, black, brown, and yellow.

At first they were laid on separately in patches. Soon, however, the artists discovered that they could shade one colour into another, and so obtain the most realistic effects. Many of these pictures are wonderfully free from convention and almost impressionistic. The colour, modelling, and variety of the surface texture are suggested in a manner which has never been rivalled in any primitive art. The Egyptians had a keener instinct for decorative effect, but they never produced anything so vivid and free as those early paintings of the caverns. Whole frescoes of these wonderful pictures have been found. In caves where the damp has penetrated they have lost their rich colour; but at Altamira (Spain) the ceiling is covered with figures of bison as brilliant in colouring as on the day they were painted. The cave of Font-de-Gaume has a magnificent series of animal frescoes—no less than eighty figures, all painted in polychrome, adorn the cavern walls.

Good painting lasted rather longer than engraving; but by degrees it too became purely conventional and lifeless, and in the end the wonderful cave paintings degenerated into signs and conventionalized designs of a very poor quality.

Sculpture. Sculpture in the round continued into the Magdalenian Period, but soon gave way to decorative sculpture, usually in high relief. The best examples known of the former are the two clay bison found in the cavern of Tuc d'Audoubert. They are beautifully

modelled and full of life and energy. In fact, they are so wonderful that they are regarded as one of the world's masterpieces. Near by is an unfinished bison, together with lumps of clay which still retain the impression of the artist's fingers. This work is so good that there can be no doubt that modelling was widely practised at that time.

At Cap-Blanc there is a remarkable frieze of six horses, each 7 feet long, cut in the limestone of a rock shelter. Osborn says this is the most imposing work of Mag-

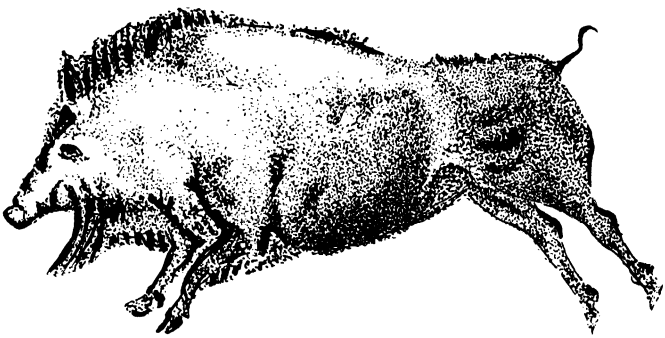


FIG. 40.—A Boar from the Cave of Altamira.
The original is a magnificent polychrome painting. The dotted effect is an attempt to indicate the shading.

dalenian art yet discovered. It is interesting to note that in front of the sculpture was a paved way.

Mobile Art. The modelling and the decoration of cavern walls were only two of the many forms of art practised by these versatile men of old. With a splendid sense of decorative values they began to carve their tools and weapons, and in a wonderful way adapted animal forms to the shape of the implement they were decorating (Fig. 41). The artists succeeded in steering a middle course between the two extremes of over-conventionalization and too naturalistic a treatment. The character of each animal used for decoration was always retained, but never at the expense of the design

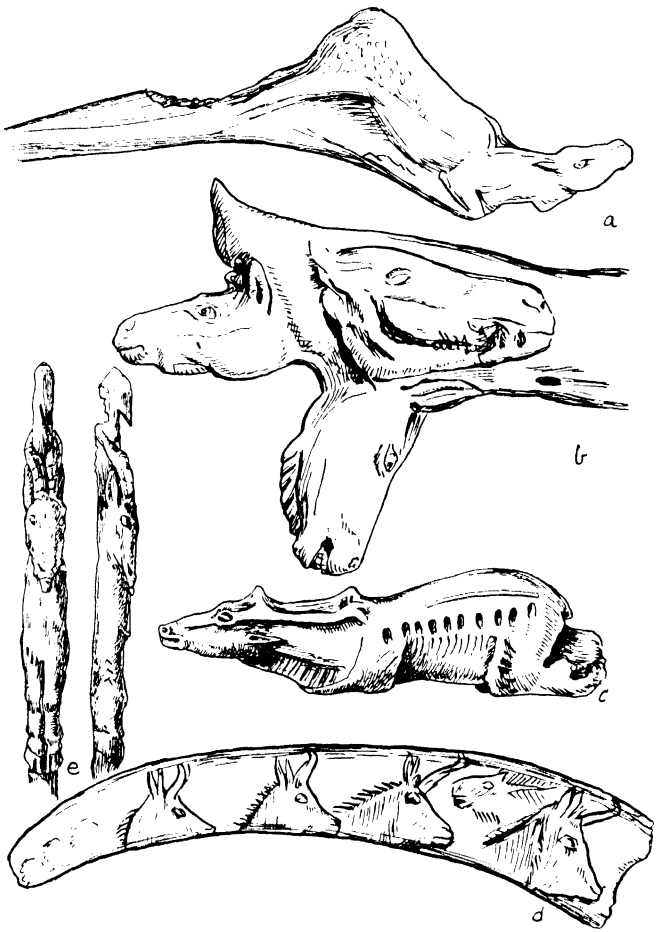


FIG. 41.—Decorated Handles of Tools and Weapons.
Note how perfectly the animal form was adapted to the shape of the implement.

as a whole. In most ingenious ways the artist used a particular pose which specially suited the form of his implement, with the result that there was little distortion of the animal form, which naturally followed the shape of the implement. Small pieces of bone and ivory carved into horses or other animals retain all the freshness of the larger work. There are few mistakes. The artist had a clear idea of what he was aiming at, and attained his end with the least possible expenditure of time and energy.

Subjects. The range of objects drawn by the artists was comparatively small; they repeated the same animals over and over again, used the same technique, and even the same style; yet each animal is alive, and in some degree different from any other. This is surely a proof that if the Magdalenians did not draw merely for the love of art, they certainly had the artistic impulse most strongly developed. Unconsciously it filled their minds with such a love of beauty that their pictures are full of truth and vitality.

All decoration, however, did not consist of the animals the Crô-Magnon needed for food and clothing. There are a few drawings of fishes, some being traced in the mud with the finger, and some engraved on rock and bone. They are as true to life as the animal drawings, and can be named to-day. The artist was apparently as fond of trout and salmon as we are! The seal was known to him, and he had also made the acquaintance of the serpent fish. He also drew or carved excellent portraits of swans, ducks, cranes, and other wild-fowl. For some unknown reason, plants had little interest for him: probably he preferred a meat diet.

Plant drawings have the faults which are so strikingly absent from the animal work: they are wooden, conventional, and not true to life.

There is no reason why the Magdalenians could not have sketched human beings as well as animals, and it is surprising to find that all such drawings are nearly as bad as they can be. When the features are shown they are mere caricatures (Fig. 42). Frequently the figures

do not look like human beings at all, probably because some of them are wearing animal masks. The sketches on Fig. 31 represent men dressed up in animal masks and skins, who appear to be dancing. By far the best example of a masked man is the one illustrated on page 116 from Trois Frères. The "thin" statuettes

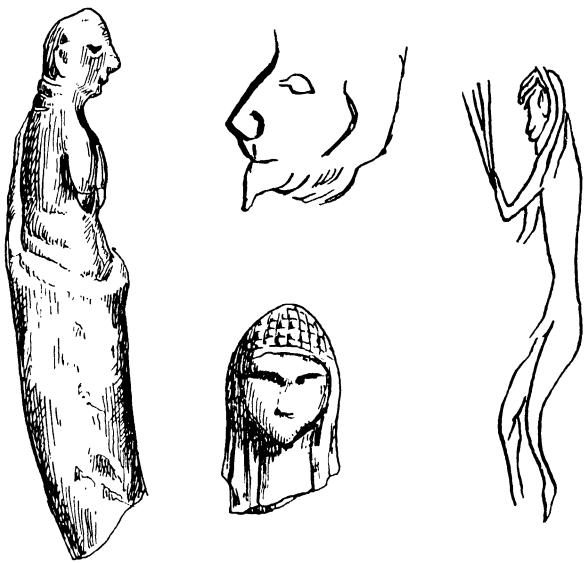


FIG. 42.—Magdalenian Statuettes and Drawings of the Human Figure (after Breuil and Piette).

belong to this period. The head of a girl from Brassempouy is interesting because of the careful treatment of the hair (Fig. 42).

The Magdalenians delight us with their animal pictures, but tantalize us with their curious signs. High up in a crevice in a rock is a group of these signs. No man would endanger his life to paint them in such a spot unless they had some important meaning. Are they a

magic spell in picture-writing? At the edge of a gloomy underground lake is another group of signs, and again over a ledge of rock which reminds us of an altar. In

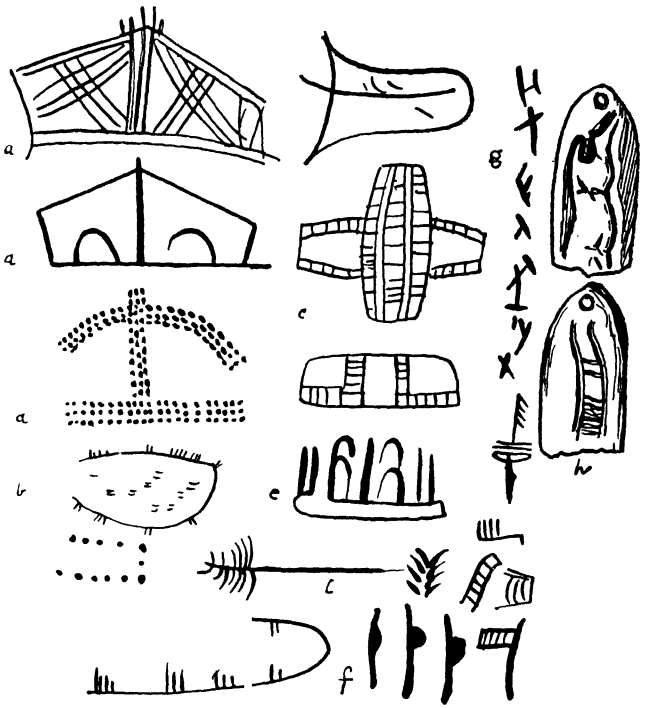


FIG. 43.—Magdalenian Diagrammatic Drawings.

a. Tectiforms representing tents or traps; *b.* enclosure with animal tracks; *c.* scutiforms, possibly nets; *d.* tallies; *f.* stone hatchets; *g.* signs erroneously called an alphabet; *h.* reindeer and sledge (?).

another cave only by lying on one's back can the signs on the ceiling of a small alcove be seen. In some caves signs seem to have been as important as pictures, and are as carefully drawn.

Signs which look like tents with a centre pole and sloping roof are called Tectiforms. Probably they represent traps (Fig. 43, *a*). On one side of a broken pendant is a galloping reindeer, and on the other a sign like a sledge; but in spite of the rather over-rated resemblances between Eskimo and Magdalenian culture, it is hardly possible that reindeer were domesticated so early (Fig. 43, *h*). Various marks which really do appear to have been some sort of

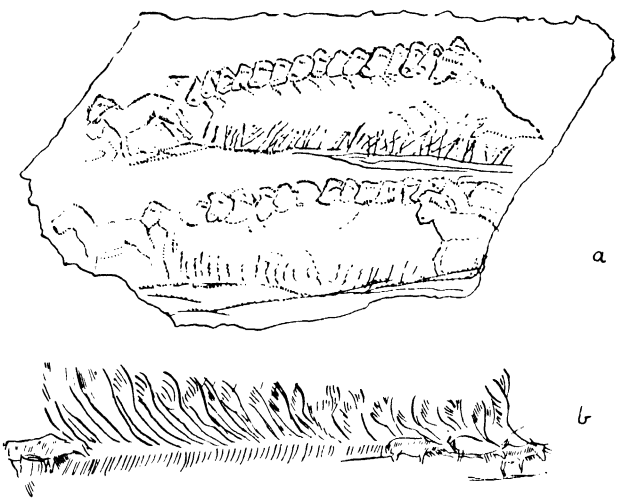


FIG. 44.—The only known Examples of Magdalenian Art showing Perspective.

sign were perhaps owner's marks; the numerous collections of dots and strokes were probably memory aids. There are also a number of extremely conventionalized drawings which have so completely lost their original form that it is only after prolonged study of intermediate forms that one can recognize their meaning. At the best all these theories are interesting guesswork, for the cave men have kept another of their secrets securely.

Characteristics. The Magdalenian style of art has

some very interesting characteristics. Although individual animals were drawn so beautifully they were never grouped into a picture. In one or two cases animals are shown following each other; but only two attempts at composition are known, and they, curiously enough, are remarkably good (Fig. 44). The herd of horses and the herd of reindeer, each with its leader, are also the only known instances of the use of perspective, and once again we are surprised. Few primitive peoples grasped the principles of perspective, and yet here these artists used it in a way which shows that they had thoroughly mastered it.

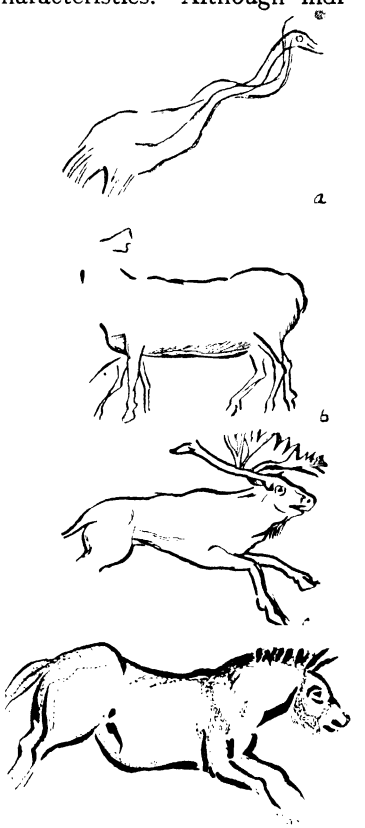


FIG. 45.—Magdalenian Drawings of Animals in Motion.

The first two show early unsuccessful attempts, and the last two perfect representations.

All the animals are drawn in profile—a characteristic of primitive art. They could, however, draw foreshortened views, as is proved by the picture of the deer with its head turned back, and the cow in the same position, and the curled-up bison on the ceiling of Altamira. There is little action in

Magdalenian art—usually only that of walking. In some of the earlier work the artists were very anxious to suggest the action of walking, but were puzzled how to do it. They saw the legs in so many different positions as the animals moved. To draw them in any one position seemed wrong; so they compromised by drawing fans of legs—that is, several legs where one should be, each in a different position (Fig. 45). What a tremendous gap there is between this childish conception and the later absolutely perfect rendering of the slow movement of the browsing reindeer, of the fierce charge of the angry mammoth, or the grace of the galloping horse and reindeer!

Some animals are drawn without heads—a curious thing for an artist to do. There must have been some good reason behind it. Such drawings are frequently made to-day, and are meant to represent the ghosts of animals.

The drawings so far considered have been complete; but there are a considerable number of very badly executed attempts at animal drawing, the meaning of which has not been discovered. Perhaps they were cheap magic.

Whenever a knob of rock or an irregularity of a piece of bone suggested an animal form it was eagerly seized on by the artist, and used as far as possible in his picture or carving.

The artist's indifference to any drawing except the one he was engaged on at a particular moment has been mentioned. It is astonishing to a modern mind to find the most beautiful paintings and engravings half obliterated and completely spoiled by an artist who was capable of painting pictures as good as those he ruined (Fig. 30).

Materials. Much is known of the methods and materials used by the Crô-Magnon artists. The small lamps with which the caves were illuminated have been found, and they are very similar to those now used by the Eskimo (Fig. 46, *b*). It has always been a mystery that the walls of the caves do not show signs of smoke;

for the light the little lamps gave must have been feeble, and they must have been held close to the walls. It is possible that this difficulty was overcome, as with the Eskimos, by using animal fat for oil and dry moss for wick.

The artists' exceedingly accurate memory has often been commented upon, yet they did not altogether rely

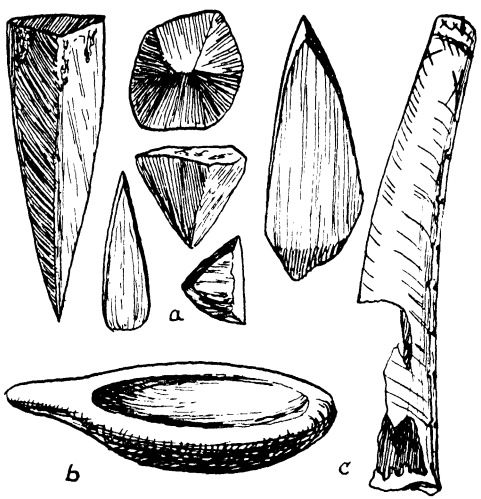


FIG. 46.—Articles used by Magdalenian Artists.
a. Crayons; *b*. lamp; *c*. paint tube made out of hollow bone.

on it. A modern painter usually makes numerous sketches from life before he starts to paint a picture, and then uses them to refresh his memory as he goes along. At Altamira a sketch of a deer's head on bone has been found, and on the cave wall near by an exactly similar head is engraved. Evidently the bone was the artist's sketching-block, which he had taken out into the meadows when he wanted to make a sketch from life, and then brought into the cave to help him with his

wall-picture. The sketch on the bone is clearly the first, for it is much more spirited than that on the wall.

Reference has already been made to the great variety of graving-tools used by the Crô-Magnons.

Paint was very extensively used, red, brown, yellow, and black being mixed together to form every possible shade. Palettes of stone or shoulder-blades of animals have been found with the paint on them, exactly as they were left long ago. Paint tubes of bone half-filled with paint, pigment made into crayons, and bone stumps still coloured with red powder at the tips make us feel that we are in the atmosphere of a studio rather than a damp dark cavern (Fig. 46, *a* and *c*). To prepare the colours, pigment was ground down very finely on a stone palette and then mixed with fat. This fat has so preserved the paint from damp that in many cases it is as brilliant now as when it was first mixed.

Towards the end of this period, art rapidly deteriorated. It lost all its vitality and buoyant freshness. For a time the artists tried to retain the traditions of their forefathers; but their fine taste and wonderful observation were sadly missing. Engraving degenerated almost to scribble. Fur was represented by innumerable scratchy lines conveying no meaning. At last all attempts at realistic work were abandoned, and only conventional designs of a very poor type remained. Once again everything is enshrouded in mystery. Like their predecessors, these wonderful people vanish, and leave us guessing as to the cause of their disappearance.

CHAPTER XVII

THE CAPSIAN CARICATURISTS

FROM the beginning of the Aurignacian to the end of the Magdalenian period North Africa and Eastern Spain formed a single archæological province with a distinct culture of its own, called Capsian.

The flint industry was a mixture of Lower and Upper Aurignacian types, which in Europe were separated by the long Middle Aurignacian period.

When the Magdalenian was giving place to the Azilian culture, the Capsian changed to a pygmy or microlithic industry with tiny geometrical flakes, many of which must have been inserted like teeth into a handle to form a tool.

The Capsians seem to have been roving huntsmen who followed the game over wide plains. In their day the Sahara was a magnificent hunting-ground, the home of lions, bears, cave hyænas, giraffes, huge wild oxen, deer, zebras, panthers, hippopotami, and ostriches. Probably the drying-up of the Sahara later drove the animals south, and started men on the long trek which carried Capsian culture down to South Africa.

The Capsians were artists of a totally different temperament from the Crô-Magnons. They were the world's first caricaturists, though possibly they did not know it. Unlike their northern neighbours, they delighted to paint men and women. The figures are strangely grotesque, and move in an absurd fashion. Some men look like animated sticks joined together; others have legs like balloons, waists such as would shame a Victorian belle, and the shoulders of a prize-fighter. They wear feather headdresses, two feathers stuck in the hair, or leather caps with side flaps and

tassels. Their bodies are naked except for bracelets and anklets, fringed girdles and fringed bands worn over the shoulders. The women, however, are dressed in tight bodices, bell-skirts, and pointed caps, and had waists as

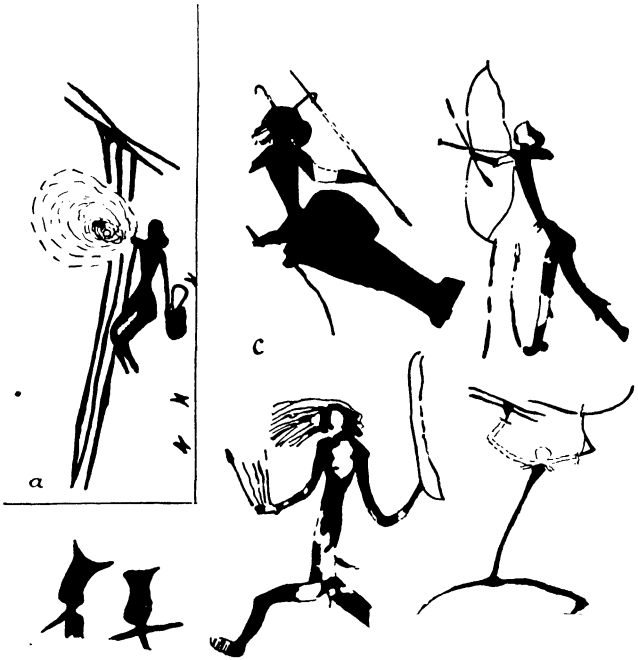


FIG. 47.—Capsian Figure Paintings from Eastern Spain.

a. Man gathering honey; *b*. typical headdresses; *c*. hunters and warriors moving very energetically.

small as their men-folk. It is startling to find that these paintings of women are exactly like those of ancient Crete, which belong to a much later time.

All the Capsian figures are intensely alive and busy; men stride along as though they wore seven-leagued boots, and archers fight with a fury that turns them into

contortionists. Action was always the first consideration of the artists, and, judged by their own standards, they were highly successful. Unlike the Crô-Magnons, they usually drew scenes—often of the hunt, and rarely of war.

Some of their animal silhouettes are excellent, and approach the beauty of the Magdalenian cave paintings; but on the whole the art is different in style and execu-

FIG. 48.—Comparison of Women from the Spanish Rock Paintings (*b*) and Cretan Frescoes (*a*).

tion. Was the motive the same in each case? It is difficult to say, for there are no caves in Eastern Spain, and the pictures were painted in the open on rock shelters. Therefore there is no mystery about them; but as the figures were small, they could not be seen from a distance, and it is possible that these rock shelters were as sacred as the painted caves of France.

Perhaps the grotesque forms of the figures were connected with magic. They may amuse us; but probably the hunter felt that the long legs and huge stride of the painted man increased his own speed, and the energy

of the drawings could be transmitted to himself, thus making him strong and skilful. The Crô-Magnons drew

FIG. 49.—Capsian Hunting Scenes.

the animals they hoped to kill in order to gain mastery over them; the Capsians left nothing to chance, and drew the ideal hunter also.

It is extremely difficult to date this art, but undoubtedly it spread over a long period. By studying the superimpositions of the paintings, it is possible to trace its growth from crude beginnings through a period of naturalism and caricature to the degenerate and stiff sketches which foretell its death.

The earlier paintings have been associated with people living at the same time as the later Magdalenians for the following reasons :—

1. Animals such as the bison, elk, and reindeer, which died out after Magdalenian times, are found in the Spanish paintings.

2. Some Spanish paintings of small horses and of deer are exactly like Magdalenian work.

3. The few remains of industries in the rock shelters are Capsian and Tardenoisian.

An extremely interesting comparison has been made between marks on early Egyptian pots and the drawings of people's dress in Eastern Spain. There are many exact likenesses. It may be that the artists were painting about the same time, or, on the other hand, the early Egyptians may have retained the costume the Capsian people wore years earlier. The only definite fact known about Spanish art is that it was practised before the advent of Neolithic peoples about 2500 B.C.

As the Egyptian Pre-dynastic races were living at 4000 B.C., and the Badarians probably earlier, there was plenty of time for fashions to travel from Egypt to Spain.

No skeletons of this period have been found in Spain; but it is usually presumed that the Capsians were the ancestors of the little dark Mediterranean folk who evolved most of the early civilizations.

In North Africa, however, two rather different races have been found associated with Capsian tools.

One is the Mechta race, named after skeletons found at Mechta-el-Abir near Constantine. The skulls are rather brutal-looking, and have heavy brow-ridges, receding foreheads, prominent cheek-bones, and square faces. They bear no resemblance to Mediterranean, Neanderthal, or negro types.

The other race, known as the Asselar race, is quite different. It is said to resemble the Hottentots and Bantus—especially in those features which are unspecialized and primitive.

Both these North African peoples, like the Natufians of Palestine, sometimes knocked out the upper incisor teeth in early life, a curious custom which may throw some light on their origin or association with other peoples.

CHAPTER XVIII

THE END OF THE OLD STONE AGE IN EUROPE

THE Capsian and Magdalenian cultures bring the Old Stone Age to a close, and yet their influence can be traced into the Transition Period which bridges the gap between the Old and New Stone Ages. The latter part of the Capsian Period drifts into that called the Azilian-Tardenoisian without any definite break. But, if it is difficult to define where one culture ends and the other begins, there is, nevertheless, a great difference between the essential characteristics of each. The Azilian-Tardenoisian had nothing that can be compared with the splendid art and fine bone industry or the careful burials of the Magdalenians. It was a time of degeneration for Europe, when old ideas had passed away and new ones had not yet travelled from the earliest civilizations of the Eastern Mediterranean to take their place.

The Capsian industry declined till all the flints were small—too small to have been used alone. Many of them must have been inserted into wooden shafts to make implements. These microlithic or pygmy flints are typical of Tardenoisian culture, and they spread northward from the Capsian stations of Eastern Spain. There this industry met and mingled with the new Azilian culture, which seems to have sprung from the degraded Magdalenian culture of the Cantabrian region.

The favourite weapon of the Azilians was a stag-horn harpoon, which is distinguished from that of the Magdalenians by its flat shape and by the hole in the base for the attachment of a thong. The Azilian culture is famous for its pebbles painted with geometrical patterns in red (Fig. 50, *a*). The study of the conventionalized figures of

Capsian rock-paintings has shown that many of these patterns were derived from them. Some signs which are not yet understood may be diagrammatic paintings of plants and animals. If these pebbles lack beauty, they do not lack interest. Probably they are another form of sympathetic magic; but it is not clear how it was applied. Some authorities think that they were the "soul houses" of departed ancestors, whilst others regard them as totem signs.

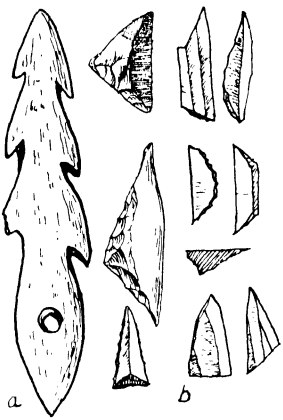


FIG. 50.—Azilian-Tardenoisian Implements.
a. An Azilian harpoon of stag horn; *b*. pygmy flints.

In some deposits it is claimed that the remains of the dog have been found, and if this is so, it is the first instance of the domestication of an animal, unless the earliest Pre-dynastic peoples of Egypt belong to this or an even earlier period. Unfortunately, no one knows when the Magdalenian Period ended; but recent evidence points to a much later time than was formerly thought possible. Therefore, the interesting Transition Period, when Europe was inhabited by poorly equipped tribes of people, probably related to the Mediterranean and

Alpine races, may have coincided with the dawn of civilization in Egypt. Certainly the people who brought

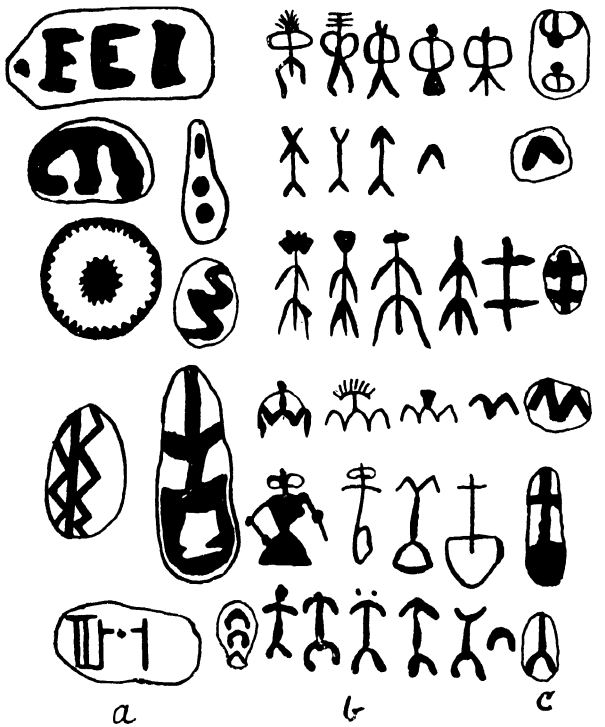


FIG. 51.

a. Painted pebbles from Mas d'Azil; *b*. diagrammatic drawings of the human figure from Spanish rock-paintings similar to the designs on Azilian pebbles.

new life to Europe were Neolithic agriculturists and miners whose culture was derived, directly or indirectly, from the Eastern Mediterranean.

CHART III. A tentative chronological table of the geological periods, the industries and races of Africa compared with those of Europe.

Europe, etc.	Kenya (Rift Valley),[1] Leakey.			Rhodesia (Bambata cave).		South Africa.
Gschintz. Predynastic Egypt. Neolithics in the Fayum.	2nd Post-Pluvial.	Late Stone Age.	Nakuran.	Wilton. Still Bay.	Late Stone Age.	Wilton and Smithfield B. & C. Wilton and Smithfield A.
Tardenoisian.	Dry.					
Bühl glacial advance. Capsians. Magdalenians.	1st Post-Pluvial.	Later	Elmenteitan.	Bambata.		Smithfield A.
Achen retreat. Solutreans. Capsians. Aurignacians.	Very dry. Red aeolian sand.		No life.	Bambata.		?
Würm glaciation. Aurignacian. Mousterian.	2nd PLUVIAL. Upper Gamblian.	Middle Stone Age.	Still Bay. Upper Aurignacian. Upper Mousterian.	Mousterian. Aurignacian. Mousterian. Aurignacian. Mousterian.	Middle Stone Age.	Fishhoek man. Still Bay. Springbok and Boskop men. Howieson's Port. Pietersburg. Glen Gray. Fauresmith.
Riss—Würm Interglacial. Acheulean.	Decreased rainfall.					
Riss glaciation.	Lower Gamblian.		Lower Aurignacian. Lower Mousterian.	Levalloisian. Acheulean.		
Mindel-Riss Interglacial. Levalloisian. Chellean.	Very dry.	No Very	life?. long period?.	?		?
Mindel glaciation. Gunz-Mindel Interglacial. Gunz glaciation. Pre-Chellean.	1st PLUVIAL or KAMASIAN.	Old Stone Age.	Acheulean and Kanam skull. Chellean and Kanjera jaw. Pre-Chellean.		Old Stone Age.	Stellenbosch. Acheulean. Levalloisian. Chellean. Pre-Chellean.

CHAPTER XIX

AFRICA'S PAST

FIFTY years ago Africa was the Dark Continent, unexplored and unknown, the home of mystery and weird tales. Even ten years ago little had been learnt of its prehistory, though a few persistent enthusiasts, like the Rev. Neville Jones, of Hope Fountain, and Mr. Van Riet Lowe, of the Transvaal, occasionally sent news which proved that Africa's past was worthy of the attention which that of Europe had received. Since then discoveries have been made at an ever-increasing speed, and to-day a review of the whole subject is much needed. Reports of discoveries are published in African journals which are almost unobtainable in England, so that it is difficult to keep in touch with the work that is being done. The complexity of the problem is increased by the fact that explorers have worked more or less independently, and have attached names of their own to the cultures they have discovered, for the immense distances separating them render it difficult to see each other's material. This makes the subject seem much more complex than it really is—especially as English museums are not yet well equipped with African specimens.

Owing to the immense size of Africa, knowledge of its archæology is in a very patchy state, only a few areas having been scientifically investigated, and large tracts not at all; therefore it is an exceedingly risky (though quite irresistible) venture to base theories on our present inadequate knowledge.

African prehistory is not a replica of that of Europe, but it is built out of the same cultures, some of which remained unaltered, some were changed to suit the nature of the materials at hand, and some mingled and influenced

each other so much that new hybrid industries were evolved. Scientists disagree as to whether the European names should be used or not; but, if they are used, we must remember that there is no warrant for presuming that the races of both continents were identical, or that these industries came from Europe. Everything we know of the past proves that migrations of culture were far more widespread than migrations of peoples.

Again, it is obvious that similar cultures were not always of the same date. Until quite recently it has been impossible even to guess the age of the various African cultures. The Ice Ages of Europe left records which make it possible to assign approximate dates to European finds, but Africa never had an Ice Age. However, a series of important investigations in the Nile Valley, in Lake Moeris, in the Jordan Valley, and in Uganda, Kenya, and South Africa have lately shown that Africa had a number of extremely wet and extremely dry periods; it is possible to say with some degree of assurance that these corresponded with the cold and warm periods of Europe.

The Southern Hemisphere had glacial periods as well as the Northern, traces of which are found in South America, New Zealand, and Australia. Their possible effect on South Africa is a subject awaiting investigation. That there were dry and wet periods seems certain, but their relation to those of other parts of Africa is not yet clear.

Speaking generally, Africa passed through two immensely long wet periods, or Pluvials, which were separated by a very long, hot arid period. The First Pluvial is correlated with the first part of the Pleistocene period up to the end of the Mindel glaciation, the arid period to the Second Interglacial, and the Second Pluvial to the Riss-Würm or Bühl periods.

During the First Pluvial or Kamasian period heavy rains made Africa a country of flooded rivers, huge lakes, and endless forests and jungles. The desert areas were much reduced, and most of the continent teemed with game. Until a few months ago it was thought that early

men lived there then, but now the question is being reopened (see Chart III, p. 154).

This long wet Kamasian period was followed by an equally long and widespread dry period. While Europe was basking in the genial warmth of the Second Interglacial, much of Africa lay parched and desolate, scorched into a series of deserts. Rivers and lakes dried up, grass and trees perished, burning winds and blinding sandstorms swept over the desert regions.

There has probably always been an immense equatorial forest on the borders of which primitive men may have sought sanctuary during arid periods, but the Rift Valley became a desert, and the present deserts were immensely larger than they are now. Probably most of South Africa was desolate.

After perhaps 100,000 years of these conditions, the descent of the ice-sheet over Europe drove the storm belt further south, and so rain came once more to the dead lands of Africa. Gradually the Second Pluvial dawned. Rivers and lakes brought life to the thirsty land, deserts blossomed into grass-lands, and forests sprang up once more.

Then the game returned, and with them men, men not merely of one kind or another, but of various races and a bewildering variety of cultures.

After this period (in East Africa, at any rate) came a time when the country was intensely dry, and covered with red sand. Probably South Africa also suffered from severe drought.

In more recent times there appear to have been smaller fluctuations of climate, which probably corresponded with the minor glacial advances and retreats at the end of the Pleistocene period.

The evidence on which these conclusions are based is too complex to be detailed here; but the following is a brief indication of the main lines of investigation.

1. The East African lakes have several ancient shorelines above the present level of the water. These shorelines are relics of the times when the lake shrank and expanded during the wet and dry periods of the Pleisto-

cene epoch. Lake Moeris, in the Egyptian Fayum, has been studied very thoroughly during the last few years by Miss Caton-Thompson and Miss Gardiner. They have worked out the different levels of the lake, and find that wet and dry periods must have alternated in Egypt.

2. In the same desert region these ladies discovered a new kind of record of past climates. In the Kharga oasis are numerous cones of rock which seemed to offer no good reason for their existence. Upon excavation they proved to be fossil springs; the mounds were the encrustations left by gushing water which once nourished that parched land. These springs corroborate the evidence of the varying lake levels. During wet periods they gushed forth with great vigour and left large rocky deposits; but as the dry periods approached the fountains grew weaker and the rings of encrustation became smaller.

3. The study of river terraces is perhaps the most usual method of gauging past climates. All rivers were once much larger than they are now, and their earliest banks were far away from their present ones, and at a higher level. During wet periods the rivers flooded great tracts of country and deposited layers of stones, gravel, or sand according to the speed at which the water was moving. As the climate became drier, they shrank and cut narrower channels. When the rain increased again, they once more deposited gravel, etc.; but these deposits did not quite reach to the level of the earliest banks, and so terraces were formed. The number of terraces equals the number of wet and dry periods, or in Europe glacials and interglacials. In some river valleys the terraces are very clearly seen like gigantic steps. Naturally the highest terrace is the oldest, and on it the most ancient tools of man are found.

4. The difference in the layers of rock, sand, or clay also gives information about past climates. A stratum of red sand, for instance, without any fossil plants or animals obviously records desert conditions; and a layer of clayey soil with reeds embedded in it tells of a time when a lake was slowly drying up.

5. The bones of different varieties of animals and

plants throw flashlights on the ancient world. When lions' bones and ostrich shells are dug out of the Sahara sand in quantity, it is clear, even to the uninitiated, that parts of the desert were once fertile.

By these and other methods scientists are adding fact to fact, and piecing together a picture of the climates, geography, and scenery of the past.

Chapter XX

EARLY MAN IN AFRICA

The Lower Old Stone Age

The first signs of man discovered in Africa are crude tools made from large river pebbles or lumps of rock roughly chipped to the shape of the Pre-Chellean or Chellean tools of Europe.

Whether this method of flint-chipping arose in North Africa or in a country further east, men probably learnt to manufacture tools in some district where flint was plentiful; for it was the easiest material to fracture, and early man used other and more difficult rocks only when flint was not available. The very fact that in many parts of Africa extremely hard stone was shaped into implements proves how deeply rooted was this tradition of flint-knapping. The conservatism of early man is one of the dominant facts of prehistory, though a fact which a rapid survey of the story is apt to pass over.

The African cultures of the Lower Old Stone Age are known as Stellenbosch, and they include rostro-carinate, Chellean, and Acheulean and early flake industries. The African industries differed from those of Europe in the increasing use made of flakes for the manufacture of tools exactly like the core tools of Europe. This was probably because nodules of flint were rare south of the Sahara, and men had to break flakes or fragments of rock when they wanted to fashion tools. The earliest tools were very large and heavy, and they certainly were not used by a race of weaklings.

One typical African tool is the cleaver or wood-chopper, which is very like the modern axe in stone. Until recently it was thought that cleavers were not

made in Europe; but the most recent discoveries in France have proved this to be untrue, for several cleavers have been found. It is also being realized that they were dug up by early excavators, who, not understanding that they were implements, threw them away.

In the later part of the Stellenbosch period flakes were used almost entirely, and very fine hand-axes, scrapers, and cleavers show that man had gained a remarkable mastery over very difficult material, and had evolved a variety of shapes.

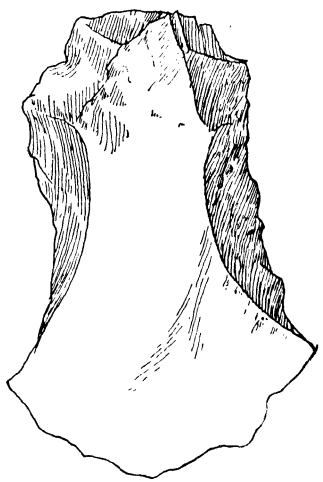


FIG. 52.—An African Cleaver of the Stellenbosch Period.

One of the amazing results of recent research is the linking up of cultures from distant parts of the world. Frequently they are found to be almost identical. This does not mean that the same people were responsible for the same industry wherever found, nor that similar industries were of the same date; but it does show how widespread was the migration of culture in the earliest times.

Those curious flints, rostro-carinates (see Fig. 7), from the early Pleistocene strata of Norfolk can be matched exactly in Rhodesia, Uganda, and other parts of Africa, and in Palestine and India.

Chellean axes made from cores or flakes are almost identical, whether they come from Kenya, North or South Africa, the Kharga Oasis, India or Arabia, or even America.

The interesting question arises as to which of these places was the home of that great pioneer, the first flint-

knapper. Europe, South Africa, and South India were termini of culture, and the original homeland must have been distant from each of them. Probably it was somewhere in the region that stretches from the Atlantic edge of the Sahara to the Persian Gulf.

Unfortunately, at the present moment it is impossible to suggest a date for the Stellenbosch cultures. Until recently they were generally assigned to the Kamasian or First Pluvial Period, in spite of the fact that Miss Caton-Thompson did not find them till the Second Pluvial in the Kharga Oasis, North Africa. The latest discoveries in the Rift Valley, Kenya, seem to prove that Chellean and Acheulean men were living there also in the Second Pluvial, and not in the First, as was formerly supposed. Whether we may still presume that the Stellenbosch of South Africa belongs to the First Pluvial is doubtful; for it seems unlikely that men settled there before the regions further north were populated.

If the Stellenbosch industry did appear in Africa during the First Pluvial, then Africa apparently led the way by thousands of years, but if it belongs to the Second Pluvial, then Chellean flint-makers probably reached Africa and Europe about the same time.

All lovers of archæology will follow future work in Africa with the keenest interest. The system of chronology, which is now challenged, is given on p. 154, and arrows indicate the changes that are likely to be made.

We have generally pictured the makers of the Stellenbosch tools as men similar to the primitive men of Peking, Piltdown, and Java, who were living about the time of the First Pluvial. Imagine, then, the astonishment that greeted Mr. Leakey's discovery in 1932 of a race of much more modern type!

At Kanam, on the shores of Lake Victoria, he found fragments of a moderately strong jaw with a marked chin near the remains of those extinct animals, the deinotherium and the mastodon, together with pre-Chellean tools. A committee of experts have confirmed Mr. Leakey's view that this jaw belonged to an ancestor

of ours, though not to a member of our species. The most exciting aspect of this discovery was the age of the jaw. It was said to have been found in early Kamasian deposits, and therefore of the same age as the primitive men of Java, etc. Now doubt is thrown on its age, and also on the age of the Kanjera skulls, which were found with Chellean tools in supposedly late Kamasian deposits. One of these skulls is thick, like those of Piltdown and Boskop, and, also like them, it has no brow-ridges. The fragments are not sufficient for a complete reconstruction; but there is no doubt these skulls belonged to a modern type of men of our own species, Homo Sapiens. If they really are of Kamasian date, they are hundreds of thousands of years earlier than any other known members of our species; but if the deposits in which the skulls were found belong to the Second Pluvial, they may not be very much earlier than the Lady of Lloyds.

Such is the state of African archæology to-day, bristling with delightful and startling problems, throwing out revolutionary suggestions and endless surprises, so that almost every new discovery raises new issues or throws a different light on old ones.

The Golden Age of Prehistoric Africa

Apart from the vexed question of the age of the Stellenbosch industries, the Second Pluvial offers for study a bewildering medley of men and cultures. Our neat tables of European pre-history will not fit Africa; they have to be mixed up, and even turned upside down in a way that in the present state of our knowledge is at once the delight and despair of the archæologist. Because this chapter of the story is so complicated, it is extremely difficult to do justice to it in a few pages; it demands a book to itself.

When the Stellenbosch industry disappeared, its place was taken not only by the Mousterian industry, but also the Aurignacian! This is an astounding fact; for the Mousterian culture did not reach Europe till the end of

the Third Interglacial, and the Aurignacian till the end of the Fourth Glacial Period, thousands of years later.

The question now being debated is whether these industries also appeared thousands of years earlier in Africa than they did in Europe. The present confusion is due to new discoveries of Aurignacian implements in the Rift Valley, Kenya. This strange valley is a deep long cleft running from north to south. It was formed by heavy faulting. Unstable conditions below the earth's crust caused a long tract of the crust to sink, so forming a flat valley with steep sides. Now, in the sides or cliffs of this valley is a Pluvial stratum containing Acheulean tools. This stratum was definitely cut through when the land subsided, and therefore must be older than the major faulting. Aurignacian tools were found in the soil of a Pluvial at the bottom of the valley, and so obviously the people who owned them must have lived after the valley was made.

This seemed very reasonable, and enabled the archæologist to suggest correlations with European Ice Ages. The Gunz–Mindel period was equated with the First Pluvial or Kamasian period, and the Riss-Würm with the Aurignacian–Mousterian or Gamblian period. This being so, the Mindel–Riss Interglacial provided the long time necessary for such a tremendous piece of work as the faulting of the Rift Valley. Such a sequence also separated the Stellenbosch from the later industries by a long gap, which the differences between the industries seemed to justify (see Chart III).

Then, just as this system was becoming familiar, Mr. Leakey discovered Aurignacian implements *in the cliffs which had been cut* by the subsidence of the valley! This, of course, implied that the valley was made in Aurignacian times; for now we have one Aurignacian deposit cut by the faulting, and therefore earlier, and another on the bed of the valley laid down after the subsidence had been completed. Apparently this tremendous disturbance took place much more rapidly than anyone believed was possible.

Consequently, if this new discovery is corroborated

by others, Chellean and Acheulean cultures must be placed in the early part of the Second Pluvial, and the Mousterian and Aurignacian cultures in the later part. Most probably the Second Pluvial actually extended to the end of the Bühl glaciation, and did not end with the Würm, as Mr. Leakey hitherto supposed.

Surely Kenya is the most thrilling corner of the world from the archæologist's point of view! Within the last few years Mr. Leakey has made the earth yield her secrets so rapidly that the scientific world feels slightly injured if he does not announce a new and startling discovery every few months. His own account of this work is given in his well-illustrated book, *The Stone Age in Africa*. This was written before his latest discovery, and must be read in the light of it.

The Gamblian or Second Pluvial period in Kenya and East Africa was undoubtedly very long. The lake deposits show in the middle strata that trees and reeds were growing into a shrinking lake, and therefore there must have been a drier period between two wet ones. In the lowest of those beds (there may be still earlier ones, as we have just seen) flake tools of Mousterian type with a faceted striking platform are found. Immediately above them are Aurignacian tools, and in some cases they are even contemporary. Then comes the drier interval when both develop. In Upper Gamblian beds Mousterian flints appear again, only to be ousted once more by the Aurignacian. Last of all come the exquisite flints of a type peculiar to Africa, known as Still Bay. They were the result of the fusion of Mousterian and Aurignacian influences, but whether they were made by either of the earlier peoples, or by a hybrid race blended from both, is not known. This state of affairs is paralleled in other parts of Africa, and is beginning to be recognized in Palestine; but in Europe it has not yet been found.

All Kenya Gamblian tools were made of black obsidian, a natural glass which flaked easily. There was a gradual improvement in the workmanship throughout the Gamblian period, and also an increase in the variety of the

tools made. The typical Aurignacian tool throughout was a keen edged knife with a blunted back, like a European Chatelperron blade. To test the usefulness of these knives, Mr. Leakey, with a blade 1½ inches long, disembowelled and skinned a small gazelle in twenty minutes. He also cut and prepared an arrow-shaft with a small knife quite easily, and doubtless he was not as expert as the prehistoric huntsman. All sizes and shapes of blades were made for different purposes (Fig. 53, 1).

Small half-moon-shaped flakes with a sharp straight edge greatly puzzled the excavators. Their use was discovered when eight of them were found lying four on each side of the decayed remains of a wooden rod. It was at once clear that they were barbs which had been inserted into a grooved shaft, and probably kept in place with gum. If they were tipped with poison, they would make a deadly harpoon. That such harpoons were used for hunting all sizes of animals from rats to lions is proved by the varying size of the barbs (Fig. 53, 6).

Another tool new to the excavator was a long, narrow, thick blade, triangular in section, with a blunted ridge on the back, which was often badly bruised. Mr. Leakey wondered how the thousands of tools he found were made; for there were no hammer stones, and even when he used a hammer stone to flake obsidian, an Aurignacian tool was never the result. So he guessed that the long thick flakes were fabricators, and a few minutes' experiment proved that he was right. Any of the tools he unearthed could quickly be made by pressure flaking with the blunted back of the fabricator (Fig. 53, 2).

Large numbers of blades with a jagged chisel end were found, and are thought to be sinew-frayers (Fig. 53, 4). Africans to-day place sinews on a piece of wood and scratch them with a jagged bone till threads can be pulled off. Breuil says similar jagged blades have been found in Aurignacian sites in Europe, but have not been described as a definite tool. Fabricators and lunates have not yet been recognized in Europe. Burins are common in

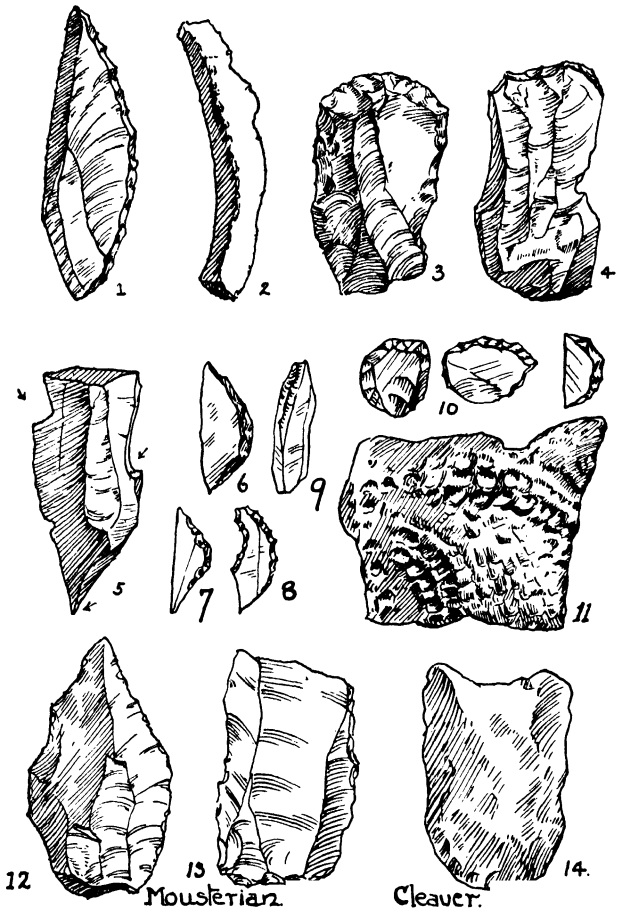


FIG. 53.—The Stone Age Tools and Pottery of Kenya (Rift Valley).

Aurignacian, 1–9. 1, backed blade; 2, fabricator; 3, scraper; 4, sinew frayer (?); 5, burin; 6–7, lunates; 8, notched blade; 9, burin. 10, Wilton microlithic tools. 11, Pottery from Gamble's Cave, Lr. Aurignacian level; 12–13, Mousterian tools; 14, Stellenbosch cleaver.

Upper Gamblian layers, and yet there are no carvings or engravings in Kenya (Fig. 53, 5 and 9). Mr. Leakey found, however, that they were useful for working wood. All kinds of scrapers—round, nosed, notched, etc.—are like the European Aurignacian. No cores were found, every bit of obsidian being so precious that it was made into a tool.

These Gamblian folk had many kinds of finely worked implements, but they had few ornaments and no art. Perforated discs of ostrich shell served as beads and pendants, and as ornaments for stitching on skin garments, and shells were worn as pendants also. Occasionally roughly shaped beads of hippopotamus ivory are found. There their list of jewellery ends! Compared with the rich array possessed by the European Aurignacians, the Gamblian folk seem to have been rather poverty-stricken. They never learnt to make needles, but pierced holes in skins with stone awls and then threaded thongs through the holes. They added a little to the gaiety of their attire by painting themselves with red ochre.

Although they seem so much cruder and less civilized than the Europeans, yet it is possible that they made a discovery which hitherto has been attributed to the New Stone Age folk; for, to everyone's amazement, fragments of pottery were found with their tools. One kind is very coarse and thick, and broke up when it was washed, a fact which may account for so little being found. The other piece has a pattern on it which showed that it may have been the clay lining of the inside of a basket. This vessel was probably filled with liquid, placed on hot charcoal, and left so long that the basket burnt away, leaving the clay lining as a pot. It has always been thought that an accident of this kind first gave men the idea of making pottery, so we should very much like to know whether the Kenya fragment was made by accident or design (Fig. 53, 11).

In the highest Gamblian layers were five skeletons, two of which were in good condition. They were buried with their arms and legs tightly flexed, the men lying

on the right side and the women on the left. What a contrast their grave presents to the generously furnished graves of Aurignacian folk in Europe! The only outfit they had for their future life was a thick covering of red ochre. These folk were not at all negroid, but resembled in a general way the Aurignacian skeletons, and in particular were very narrow-nosed.

Bambata Cave

One of the best stratified sites in Africa is the Bambata Cave in South Rhodesia, which was thoroughly excavated by Mr. Armstrong in 1930. The lowest layers contained typical Acheulean cleavers and coup-de-poings, and also three chipped balls which Breuil thinks were bola stones.

Then came deposits which showed that men using Mousterian tools settled in the front of the cave behind a defensive wall of rocks, and lit huge fires to frighten away wild animals. The next inhabitants were a band of Neoanthropic hunters using Aurignacian tools. They lived in the back of the cave, probably so that the smoke of their fires would not be seen by Mousterians who were still in that neighbourhood. For a long time these two peoples must have lived close together, and they inhabited the cave in turns, for there are three Mousterian layers and two Aurignacian. Then, at last, the two cultures, if not peoples, became fused and produced a typical African industry called Bambata. There are 12 feet of strata containing this industry, and it is fascinating to watch the development from layer to layer.

The rather rough Mousterian point was gradually refined till it became the famous Still Bay tool or lance-head which is so like a Solutrean flint. There was great joy in the scientific world when the ancestry of this puzzling industry was laid bare (Fig. 54).

Another interesting point has been cleared up by this excavation. On the walls of the cave are paintings resembling those of Eastern Spain, and they are superimposed. The lowest and oldest are yellow, the next red, and the last brown. Now, in the strata of the cave

floor, balls and pencils of chalk in these colours were found, and they came in the same order as the paintings. In the Middle Bambata layers were yellow chalks, higher were red, and near the top were brown. All show marks of rubbing on a gritty surface. This is the first time that African paintings have been dated, and so one of the most serious gaps in our knowledge of African prehistory has to a small extent been filled. If the early Rhodesian paintings were executed by Neoanthropic huntsmen in late Gamblian times, they were probably contemporary with the Spanish paintings which they so strangely resemble.

South Africa

It is impossible even to guess how many waves of immigrants travelled from North to South Africa, or how long any immigration took. Nor is it possible to date any of them; for, unfortunately, few stratified deposits are known in South Africa, and the history of the river terraces has not been worked out, as in Europe. Mr. Lowe has recently investigated the Vaal River terraces, and his conclusions tend to agree with the scheme of Pluvials and Dry periods which Mr. Leakey has formulated for East Africa.

All that can safely be said about South African cultures is that they always occur in a certain order, but that very rarely can they be assigned to definite geological periods. In this small book it is impossible to enter into the details of the different flint industries, but a table is given which may help with future reading. (Chart on p. 154.)

Chellean and Acheulean men wandered far and wide, and their tools are found right down to Capetown.

Then the first long arid period probably drove all kinds of life out of South Africa, as it drove them out of Kenya, and there was a long interval before people using Mousterian flints appeared. Pure Mousterian industry is very rarely found, and seems to have existed for a short time only. Very soon it was strongly influenced by Neoanthropic cultures similar to the Cap-

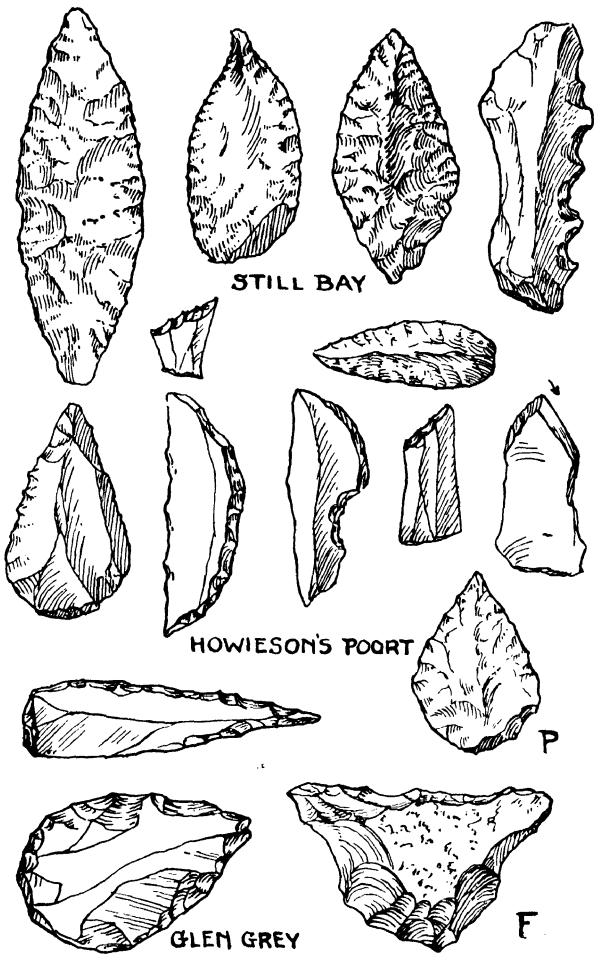


FIG. 54.—South African Tools of the Middle Stone Age.
F. Fauresmith.

sian or Aurignacian, or more often its place was taken by hybrid cultures due to the blending of Mousterian and Capsian cultures before they reached South Africa. The result of all this mixing and fusion is seen in the number of cultures of more or less distinct types peculiar to South Africa. Some are earlier than others; but the Mossel Bay, Still Bay, and Howieson's Poort were probably contemporary. All immigrants to South Africa had to cross the Zambesi near the Victoria Falls, and then travel through Rhodesia; but when they came to South Africa they spread out fanwise, and later criss-crossed each other's paths, as this was a terminus. Everywhere they found good hunting, for even the Kalahari desert is strewn with their weapons.

It is tantalizing to discover such an intricate system of African cultures and to know so little about the people who were responsible for them. In the South, however, our curiosity is to some extent satisfied, for several skeletons have been discovered. Again Africa surprises us. None of these skeletons belongs to the Neanderthal, nor any other race of Paleoanthropic men, though all are more primitive and less specialized than those of any modern races. They are the ground-work from which various races have since been evolved. None is like an ordinary negro skeleton, yet all have something in common with people living in various parts of Africa now.

No races seem to be further separated by physique, mentality, or environment than the Bushmen and ourselves; yet the further back our ancestry is traced the more we have in common. Bushmen are specialized and degenerate descendants of a fine, tall, big-brained race. A skull found at Boskop, in the Transvaal, represents such a type probably at the close of the Second Pluvial, for with it were Still Bay tools. This skull is enormous—much larger than our own—yet the brain is of a very simple type. Other primitive features are the flatness of the top of the skull, the thickness of the bone, and the massiveness of the jaw. The Boskop skull shows some affinity with the Crô-Magnons, yet it

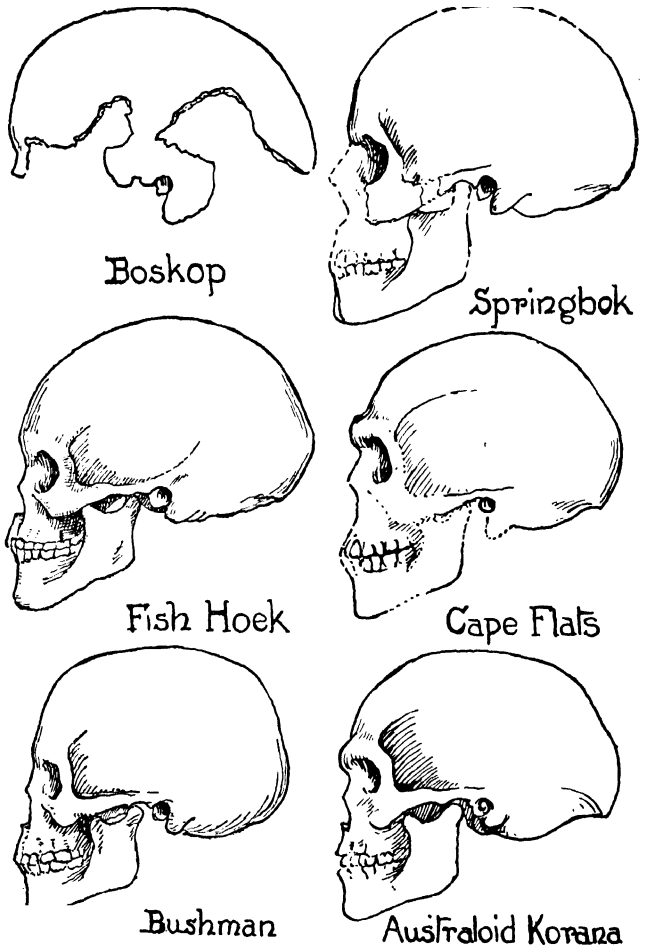


FIG. 55.—South African Skulls.

The Boskop and Springbok skulls are the oldest and also the largest.

was truly Proto-Bushman of a very early and generalized type. The gradual degeneration of Proto-Bushmen can be traced in other places where they are found to merge into the smaller Strandloopers or Kitchen-midden people of later times, who, in turn, gradually changed into Bushmen.

Another Proto-Bushman using Still Bay tools was discovered at Fish Hoek, near Capetown. His skull is smaller than that of Boskop man, but much larger than that of the modern Bushman. His head was specially long behind the ears, and his face small. He was almost a dwarf—5 feet 2 inches—and Sir Arthur Keith accounts for his small size and face combined with his large brain by supposing that he reached maturity in his early teens, for children's brains reach their full size before their faces and bodies are full grown.

Still another link in the Boskop–Bushman chain comes from Knysnain, where Professor Dreyer has found another variety of this race. They were a robust people of medium height with large thick skulls of Boskop type. Some have flat wide faces, and others snout-like jaws very reminiscent of Neanderthal man. They all have characters peculiar to primitive races, and they are perhaps hybrids, due to a mixture of Boskop, Australoid, and some unknown race. A few tools of Upper Palæolithic type were found with these bones.

Quite a different type of men lived on the rolling Springbok Flats, north of Pretoria. They had very modern skulls, yet apparently they lived with the extinct giant buffalo; for the skeleton of one lay in the same stratum a few yards away from the human skeleton. Here again was a tall, powerfully built man with an unusually big brain; and this time of modern type. His skull-bones were thin, and he had no brow-ridges. He had an extremely long face and a narrow, high, long head—a type that was very widespread in ancient times. There was nothing of the negro in his make-up, nor was he closely related to Boskop or Fish-Hoek men. The living people who approach him most nearly are the Hamitic races living in Southern Somaliland.

Of uncertain date, but of much more primitive type, is the skull from Cape Flats, near Capetown. The strong brow-ridges, receding forehead, and prominent jaws remind one of the North Australian aborigines. This Australoid type has been found in many parts of the world in both ancient and modern times. The Combe Capelle and Predmost people of Aurignacian Europe are variants of it, as are the Gamblian peoples of Kenya, and a number of South African skulls also show traces of admixture with it. The fossil Wadjak jaw from Java and the fossil Talgai skull from Australia cannot be assigned to a definite period, but they are of this proto-Australian type, having the general Australian form with very primitive characteristics. To-day the same type can be seen amongst the Koranas of South Africa, the Pre-Dravidians of South India, the Veddas of Ceylon, certain tribes of the Malay peninsula, and the aborigines of North Australia. These facts suggest that the Australoid type broke away from the main stem at a very early date, when our direct ancestors still retained many Neanderthaloid features, and were pushed on and on to the ends of the earth by later movements of peoples.

Various skulls found in South Africa show that the races of that great terminus of human migration were as mixed as the cultures; for there these people had to learn to settle down and live together—a thing they appear to have done quite well in spite of the popular belief that in such circumstances there must have been violent wars of extermination.

The Late Stone Age

There is no doubt that in Kenya, at any rate, the Second Pluvial was followed by a comparatively short period of great aridity, when red desert sand covered the country and man disappeared.

Then followed a short wet period, known as the First Post Pluvial. The disputed point is whether the Gamblian period included the Bühl glacial advance or not. Leakey believes that it ended with the Würm

glaciation, and correlates his First Post Pluvial with the Bühl, so making the people of this time, with their extensive knowledge of pottery, live thousands of years before other early potters, the Badarians of Egypt or the Painted Pottery Folk of Mesopotamia. Both these peoples made fine, polished pottery with a long tradition behind it; but they cannot be dated much earlier than 4000 B.C.

Some authorities place the Bühl glacial advance within the Gamblian period, and so bring the First Post Pluvial to the Gschnitz period, about 4000–6000 B.C., thus allowing the Badarians and the Kenya potters (known as Elmenteitans) to be contemporaneous. This seems more probable, for the Elmenteitan pottery is well developed, with a variety of shapes, sizes, rims, and it is polished. Neither in Egypt nor in Kenya has the first pottery been found, unless the Gamblian fragments are such.

The Elmenteitan flint industry is peculiar, and has no counterpart elsewhere in Africa, though it may be contemporary with the earliest Rhodesian Wilton and the Smithfield A of South Africa. It was developed outside Kenya, while the people were in exile during the arid period. Several skeletons of these folk have been found, and they resemble those of Springbok man.

After another short dry period there followed a Second Post Pluvial, which scientists who do not agree with this part of Mr. Leakey's scheme of dates place within the time of early dynastic or pre-dynastic Egypt. The industry of this time is like the Wilton of Rhodesia, but is called Nakuran.

Rhodesia. Rhodesia is the home of the finest and purest Wilton tools. They are delicately made pygmy flints, related to the late Capsian of North Africa, and more distantly to the Tardenoisian of Europe. The typical forms are like thumb-nail scrapers, tiny crescents, blades, and borers (Fig. 56).

These Wilton people made pots, baskets, string of twisted fibre, wore ostrich beads, and painted many of the later pictures of Rhodesia and South Africa. From

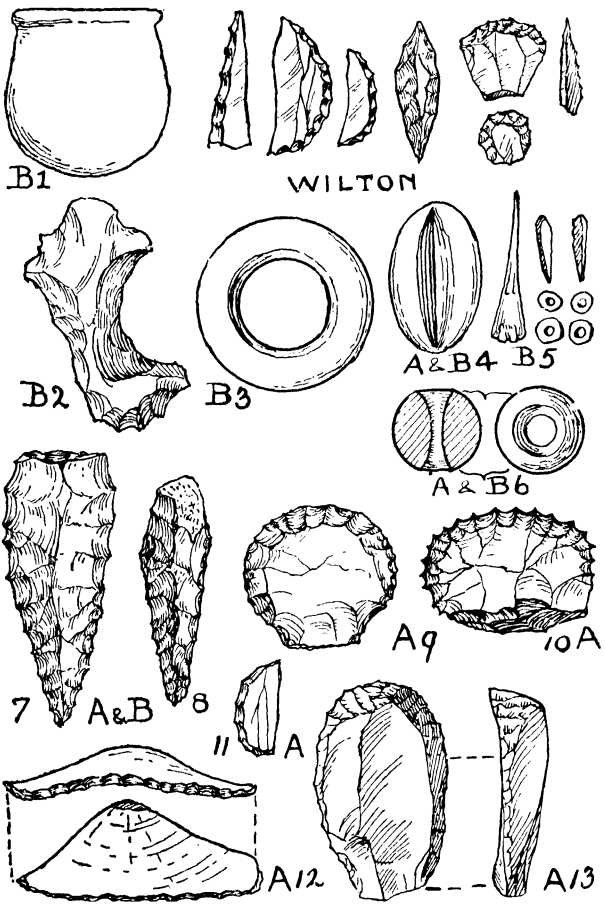


FIG. 56.—The Industries of the Late Stone Age of Africa.

A & B denote the Smithfield A and Smithfield B cultures. A 12, Concavo-convex scraper. A 13, Duck-bill scraper. A 9 and 10, Serrated scrapers. A & B 7 and 8, Knives. A and B 3 and 6, Stone rings. A & B 4, Grooved stones. B 5, Ostrich shell beads. B 2, Notched flake. B 1, Pot.

Rhodesia the culture spread to South Africa, Tanganyika, Uganda, and Kenya, becoming less pure the further south it went.

Smithfield. One of the best-known South African industries is the Smithfield, which is divided into three phases, A, B, and C. Unfortunately, it cannot be dated, though A is clearly much older than B and C, which may have been contemporary.

It is very localized, being found only near the Vaal and Orange rivers. A collection of Smithfield A tools recalls many types of the Middle and Old Stone Age, being, indeed, almost a museum of the past. Probably it owes its peculiarities to the fact that wandering hunters from the north, using Upper Capsian or Wilton tools, settled in a district where Middle Stone Age people were living, and copied some of their methods of flint-chipping. This is an excellent illustration of the way in which Africa has always retained the old while it absorbed the new.

Many Smithfield A tools were cleverly and quickly made, especially the chopper and scraper known as the concavo-convex scraper. A large flake was trimmed on the outer surface by one blow, and then removed from the core by a second blow immediately behind the first. The flake knocked off was thin, and undulated in a way that can best be understood from the illustration (Fig. 56, A 12). There are many small, neat, circular, and duck-billed scrapers, and some with a fine tooth-edge resembling the sickle-flints of the Neolithic peoples of the Fayum. Another influence is seen in the Still Bay type of point or lance head. Several kinds of grooved stones were used by these huntsmen for sharpening the points of their bone arrows, and perhaps for dipping them in poison, if we may judge from modern analogy (Fig. 56, 4).

Whether the A people made pottery is still open to question, but the B folk made pots shaped like the ostrich shells in which they used to carry water. These pots had small handles or holes through which grass ropes were threaded for carrying. The only ornaments

found are pierced fragments of bone, ostrich-shell beads, and pendants.

This culture seems to have been evolved by the ancestors of the Bushmen : for, with one exception, all the skeletons associated with it are of that type. These Smithfield people are chiefly of interest to us because they were artists whose work was similar to the very distant art of Eastern Spain.

CHAPTER XXI

AFRICAN PREHISTORIC ART

THE prehistoric art of Africa is rapidly becoming as famous as that of Europe. Unfortunately, it is not possible to date it as European art is dated, because it is so rarely found in association with any flint industry. Even when it is found occasionally with Smithfield A or Wilton implements, the problem is not solved; for there are grave differences of opinion as to the date of these industries.

The most reliable evidence obtained yet is from the coloured chalks lying at different levels in the deposits of the Bambata Cave.

In South Africa Wilton flints are often found near late paintings, and this agrees with all other evidence in placing the southern cultures in comparatively recent times.

The question is further complicated by the fact that all African art has been loosely labelled "Bush" art, because some of the old artistic tradition was still carried on by Bushmen even when white men first explored Africa; in fact, it certainly lingered into the twentieth century, and may still be practised.

It is interesting to find that the earliest pictures are the finest, and that later the art deteriorates until it becomes pedantic and mechanical. If the earlier work is of approximately the same date as the Magdalenian, the Eastern Spanish, and the North African art, what a long trail of artistic talent blazed from Western Europe to South Africa! Undoubtedly this prehistoric style of painting lingered on in Africa ages after it had died out in Europe. While races like the Bushmen remained stagnant, and lived as men of the Old Stone Age lived,

the near East and Europe were evolving civilization after civilization.

Engraving on rocks seems to have been the earliest form of African art. The first engravings are crude, stiff, and badly proportioned figures of animals. The outlines are not clear and deliberate like the best Aurignacian work, nor is the character of the animal captured with a few strokes. The incised outline is often filled in with fine and rather haphazard scratches more or less parallel. These engravings look like the drawings which children frequently make when they hastily scribble over a space to cover it in.

Another and perhaps later technique was pecking without any definite outline. Some sort of punch must have been used to chip bits of rock away and leave a pocked surface. Just as the earliest Aurignacian paintings show how the artists were experimenting with the problem of filling in their outlines with colour, so the African artists tried the effect of pecking part of the body of the animal they outlined. Sometimes faces, sometimes legs are covered with a patch of pecking, and the results are grotesque rather than beautiful.

In the Transvaal, however, where the best rock engravings are found, this pecking technique was used with magnificent effect. There, on immense rolling plains, slabs of rock jut out from the ground, and these were used by early artists as successfully as cave walls were used in other districts.

Some of the great achievements in the pecking technique have a special peculiarity. They show an animal perfect save for one feature (*i.e.* the back legs) which were apparently quite deliberately incorrect (*e.g.* an elephant with the hind legs of a rhinoceros). Probably this had some magical meaning, for the custom seems to have been widespread. It is seen in the Solutrean carvings Le Roc, Charente.

The Transvaal rock slabs are of metal-like hardness, yet the only tools men had were sharp stones, which must have crumbled away very quickly. With extraordinary determination and patience, the artists pecked

out startlingly life-like figures of the rhinoceros, extinct mastodons, and other animals. The rocks weather to beautiful shades of dull pink and rust; but when the surface is chiselled away the natural slate-blue of the rock is seen, and so the animal figures stand out as silhouettes of grey-blue against a warm rust background in a way that charms us, and must vastly have impressed prehistoric man. The finest equal any animal engravings of any time. The artistic restraint that chose such broad simple treatment, the delicate refinement of the few unnecessary details, and the dignity of the whole, mark these Stone Age men as splendid artists as well as skilled craftsmen. Their observation was so marvellously accurate that one feels that they might have tied a mastodon to a tree for a model!

Words can convey no idea of the delightful naturalness and artistry of the work, and it would be well worth while to look up the back numbers of the *Illustrated London News*, which contain photographs of these engravings. These were in 1929—April 6th, April 13th, April 20th, July 13th, July 27th, and August 31st.

Perhaps the finest published engraving is that of the white rhinoceros pestered by tick birds. The animal trots along with its head raised in vexation, and its tail swishing, throwing off the birds that cluster on its head and shoulders, but unable to dislodge them from its body. The eyes, the nostrils, and folds of skin are perfectly drawn, yet they do not detract from the simple dignity of the whole. This is no isolated example. A hundred and fifty are known in the Transvaal, and many are works of art, though some show that the artists were not always able to cope with their difficulties. On these rock slabs the extinct mastodon comes to life again, and the wart-hog, galloping at full speed with tail erect as a flagpole and legs doubled under him, is perfectly natural, as comparison with an instantaneous photograph of such an animal shows.

Scientists were extremely surprised to find drawings of no less than ten extinct species of animals pictured by these ancient artists; for until these engravings were

Herbert Lang, Transvaal Museum, Pretoria.

FIG. 57.—African Rock-carving. A Wonderful Petroglyph of a Long-headed Mastodon from the Transvaal (28 inches long).

The hard rock has been pecked away with sharp stones.

found, such creatures as mastodons were supposed to have become extinct long before man came on the scene. Evidently they lived on in the depths of Africa long after they had died out elsewhere. Although these engravings are old, there is no reason to suppose that they were executed 25,000 years ago, and in the present state of our knowledge it is impossible to date them at all.

Outside the Transvaal, engraving never reached a high standard, although it is found in many districts, including the dolerite district of the Orange Free State and Cape Province, the Grub district of Tanganyika near the Congo border, and North and South Rhodesia. Everywhere the latest engravings are weak, unreal, and mechanical.

A curious point is the discovery of pictures of hands and feet amongst the earliest work. Hands were depicted frequently in European cave art, and their connection with various kinds of magic has been constant since the times of ancient Egypt. Perhaps some sort of cult associated with them was widespread even in prehistoric times.

When the Abbé Breuil visited Africa in 1929 he found what he believes were the tools used for rock-engraving. It is a new Smithfield implement, and consists of an irregular fragment of rock 2 or 3 inches wide. The pointed end was always blunted and bruised, as though it had been used on a rough hard surface. If these are the tools that were actually used by the artists of the Transvaal, then surely never in the history of art did man triumph over difficult materials more wonderfully.

African prehistoric paintings are easy to discuss from an artistic point of view, but exceedingly difficult to deal with from the historical standpoint. Different cultural provinces have different styles of art, and it is almost impossible to discover how they are related to one another, for the superimpositions are not the same in each case.

The earliest paintings are, as one would expect, in Rhodesia, through which all immigrants to the south

had to pass. Some of the paintings resemble those of Eastern Spain, and it is thought that they may be nearly as old as these. Art was practised in Rhodesia, however, until quite recently.

In the Central Art group, which includes the Transvaal, the Orange Free State, and Cape Province, the art certainly began later than further north in Rhodesia, and much of it must belong to historical times. One of the problems of archæology is the fact that the style of painting practised here, with its quick movement and exaggerated figures, is exactly like that of Eastern Spain, though it is probably considerably later in date.

The Southern Art group is found along the coastal belt—often with Wilton tools—and is probably the latest of all. Although these pictures are very weak and poor, the style of the art was firmly established, and paintings hundreds of miles apart are extraordinarily alike.

Many of the early Rhodesian paintings are naïve silhouettes of animals in red or yellow, beautiful in their assured simplicity. The artists were not amateurs; they had adopted a distinct style which they used with a finish and certainty that proclaim the professional touch. There are no wavering uncertain outlines, no experimental dabs of colour, no corrections. The artist had a clear mental picture of the exact effect he wanted to produce. With a wonderful mastery of touch he drew long sweeping outlines with a few strokes of his chalk, and afterwards filled these in with colour. Elands were his favourite subject, and he must have watched them until he was perfectly familiar with their form and movements, for only so could he have kept their grace and beauty in face of the monotonous tradition that was handed down to him. Once an art has become "set" in a certain style, it is fatally easy for the artists to degenerate into mere copyists who no longer soak themselves in observations of living animals. It says much for the acumen of these early Rhodesians that they combined so well conventional tradition and personal observation.

In the Bambata cave the various styles of painting are all seen superimposed. The Frontispiece shows

one small part of the cave wall. It is impossible to gain any idea of the real effect of the pictures unless they are reproduced in colour or half-tone. Several coloured plates are included in Mr. Armstrong's original account of this cave given in the *Journal of the Royal Anthropological Society* for 1933, which can be seen at any large Reference Library.

At Bambata, as in other parts of Rhodesia, the later drawings are small chocolate-brown figures, usually of men. They are of the "daddy-long-legs" type, excessively thin and tall. In our illustration they move calmly and with deliberation, in contrast to the little red figure at the top, which is hurrying along in the usual Wilton fashion, and is the latest drawing of the series (A).

In the Central group the earliest paintings yet found depict hunting scenes, processions, dances, and some kind of ritualistic ceremonies. The figures are always moving, often swiftly and even violently; but there is a rhythm about the grouping, a love of gentle swaying curves, and a variety in the scenes which make these paintings attractive. The people are of the ridiculously exaggerated type seen in Spanish art. Sometimes their figures are composed of a series of bulges which make them look like home-made dolls fashioned out of stuffed stockings. The men, swinging along with tremendous strides, and carrying bows and arrows, the dress of some of the women, and the style and pose of some of the antelopes, not only remind us of Spain, but can actually be duplicated there. Surely this is one of the most surprising facts of prehistory; for if the original home of these artistic folk was the Sahara, a long time must have elapsed before they reached South Africa, and yet throughout their migration they kept the tradition of their art almost unaltered.

In some places elaborate scenes are painted in many colours on the cave walls. Long and impressive processions of men appear to be taking part in religious ceremonies, or men dance in a ring round a group of graceful elands, which appear so unafraid that it is surmised they were domesticated.

The artist usually did not attempt to paint animals in their natural colours, nor did he shade the different colours into one another in the effective style of the French cave artists. A more conventional and purely decorative method was adopted. Flat washes of colour were laid on, quite distinct from one another. Often an eland was painted white under its body, with a red-and-brown back, and sometimes—rarely—its face was delicately modelled in grey. The general effect of the polychrome pictures, with their red-browns, orange, and black, is very rich and satisfying, although the individual figures are often ridiculous. Sometimes the paintings of animals reach a high standard, and the grace and delicacy of various kinds of deer are especially well portrayed.

Discoveries recently made in Central Tanganyika have carried the southern trail of art a little nearer its northern home. Here, as in South Rhodesia, enormous masses of granite boulders have been piled up to a great height, and under them are rock shelters decorated with red line and silhouette paintings of animals. The best are pictures of giraffes, whose long necks and ungainly bodies are well shown, though their legs have no form at all! Here again are artists who are quite certain of the effect they wish to convey, and they carried out their ideas in a clear vigorous style. There are, however, many clumsy and feeble drawings. There is a distinct resemblance between the best of these paintings and the art of South Africa.

A puzzling feature of this district is the number of pointed pieces of granite found only in decorated shelters or those near by. These fragments are all shaped to a point, and often tanged; but whether they are the work of man or nature, it is impossible to say, nor is it easy to define their use, for there are no rock engravings in this country. Certainly men collected them; for they are found in some shelters carefully arranged according to size or the colour of the granite. Another small problem is waiting to be solved!

With all this variety of painting and engraving, it is

curious that no decorated implements have yet been found in Africa.

The latest art of Africa associated with Wilton tools is quite different from the earlier phases, and is decidedly poorer. Gone are the gay herds of elands, the joyous dancing figures, the energetic hunters, and the brilliant colouring. Life seems to have faded from the art; the vitality, the flowing curves, and the rhythm give place to tableaux-like scenes with stiff quiet figures, angular and wispy. Hunting pictures and religious ceremonies are replaced by funeral scenes, which, it is suggested, decorated burial-grounds. The figure of the dead chief is very large and conventionalized, and he is often dressed in an elaborate costume.

When these scenes were being painted it is probable that Egyptian ideas had percolated through to Central Africa. It is significant that the very late paintings of South Rhodesia are found in an area noted for its copper, tin, and gold mines. Here, as elsewhere, culture was spread by prospectors and miners who came from the great centres of civilization in Egypt, Mesopotamia, and the Eastern Mediterranean. It is even argued that certain figures on late African pictures wear Phrygian capes and others Babylonian caps, whilst one group appears to be portraits of Egyptian travellers. Yet with these paintings are associated others which are akin to those of Eastern Spain.

Old Bushmen and women living to-day can interpret many of the scenes of the late art, and when an artist showed them copies of the paintings they became very excited, declared it was their art, done by their people. They recalled old songs, old legends, old dances, and religious ceremonies. How far back these go no one dare venture to say, but surely the technique of this art remained fixed for hundreds or thousands of years while it was being used to express the customs and stories the Bushmen accumulated from various sources as time went by.

North African Art

The recent exploration of the Sahara Desert has brought to light many new groups of paintings and engravings which form links between the art of Central and Southern Africa and that of Spain. There is still a large gap between the most southerly paintings of the Sahara and the most northerly of Tanganyika. It seems remarkable that none have been found in Kenya; but apparently the most artistic peoples using Wilton and Smithfield tools travelled directly south.

It is puzzling to find that the Spanish and South African art groups resemble each other more than the North African group resembles either. However, only a very small part of the Sahara has yet been explored, and there is still hope that the home of these wandering artist-hunters may yet be found.

The North African art is as difficult to date as that of Central and South Africa, though it is easy to see that the earliest pictures were painted before the dawn of civilization. They depict animals like giraffes, lions, ostriches, wild cattle, and asses which need a grassland. At the latest they must have lived in the fertile tracts of country near the streams and around the lakes that remained after the Sahara began to dry up. On one side of the lake-beds are level shores strewn with stone tools, and on the opposite side rise vertical cliffs on which are painted large animal figures that stand out very impressively. On one rock wall is a giraffe 19 feet high, and the rhinoceros, crocodiles, and elephants are always life size. The ancient artists painted only on the cliffs under which there was sweet water.

Here, once more, the earlier drawings are the best. Although it must have been extremely difficult to cut perfectly true lines in the rock on such a large scale, yet these creatures are sometimes as life-like as the little sketches scratched by a Magdalenian on a piece of stone. The oxen are not so successful, because their enormous horns are always drawn from the front view and the animal from the side view.

In the dry river valleys many of these realistic drawings are also found; in fact, over all the wide extent of the Sahara the Capsian people lived and painted.

Some of the paintings can be duplicated in Spain, and others in South Africa. The women of Cogul, with their long skirts, narrow waists, and high hats, had sisters who followed the same fashions in the Sahara. Some of the painted animals are very similar to those of the Bushmen. However, the fact remains that the character of North African art is, for the most part, distinct from any other. Except in the best paintings and engravings, the outline lacks feeling and is hard and metallic, and the animals look stiff and wooden. They lack the charm, grace, and joyous life of South African and European art at its best.

The aim of the varied art of Africa is not easy to discover. Probably, as in Europe, the usual motive was a belief in the magical power it gave to men. The painted rock shelters of Rhodesia and Tanganyika are avoided to-day by the natives. Mr. Burkitt thinks that the earlier art of the northern and central groups was certainly magical, but that by the time it reached South Africa the magical element had become feebler, and that often the motive was purely decorative and historical. However, as even the latest paintings depict old Bush folklore and ceremonies (which certainly had a magical significance), it is quite possible that magic and painting were blended right to the end.

LIST OF BOOKS

For Children

Days and Ways of Early Man. D. Davison. 1927.

Books under 10*s.* 6*d.*

The Search for Man's Ancestors. G. Elliot Smith, M.A., LL.D., F.R.S. 1931. 1*s.*
Apes and Men. Fleure & Peake. 1929. 5*s.*
Hunters and Artists. Fleure & Peake. 1929. 5*s.*
The Evolution of Man. G. Elliot Smith, M.A., LL.D., F.R.S. 1930. 2nd Edition. 7*s.* 6*d.*
The British Museum Guide to the Old Stone Age. 1926.
The Old Stone Age. M. C. Burkitt, M.A. 1932.

Larger Books

Men of the Old Stone Age. H. F. Osborn, Sc.D., LL.D. 1916.
Ancient Hunters and their Modern Representatives. 2nd Edition. W. J. Sollas, Sc.D., M.A. 1924.
Pre-History. M. C. Burkitt, M.A. 1921.
The Old Stone Age. M. C. Burkitt, M.A. 1933.
The Antiquity of Man. 2nd Edition. Sir Arthur Keith. 1925.
Human History. G. Elliot Smith, M.A., LL.D., F.R.S. 1929.
Fossil Man in Spain. Dr. H. Obermaier. 1923.
The Antiquity of Man in East Anglia. J. Reid Moir. 1927.
The Upper Palæolithic Age in Britain. Dorothy Garrod. 1930.
New Discoveries Relating to the Antiquity of Man. Sir Arthur Keith. 1931.
Human Origins. Vol. I. G. G. MacCurdy. 1924.
The Ape and the Child. W. N. Kellogg and L. A. Kellogg. 1933.
The Giant Apes. R. M. and A. W. Yerkes. 1929.
The Mentality of Apes. Professor W. Köhler. 1925.
An Introduction to Pre-historic Art. E. A. Parkyn, M.A. 1915.
The Art of the Cave-Dweller. G. Baldwin Brown. 1928.
The Childhood of Art. H. G. Spearing, M.A. 2nd Edition.
The Stone Age Cultures of Kenya. L. S. Leakey, D.Sc. 1930.
South Africa's Past in Stone and Paint. M. C. Burkitt, M.A. 1928.
The Stone Age Cultures of South Africa. A. J. H. Goodwin and C. van Reit Lowe. 1929.

JOURNALS.

The Illustrated London News. Weekly. 1*s.*
Antiquity (Popular). Quarterly. 5*s.*
Man. Monthly.
The Antiquary's Journal. Quarterly.
Nature. Weekly. 1*s.*
Journal of the Royal Institute of Anthropology. Bi-annual.
L'Anthropologie. This is the chief source of information.
Annals of the South African Museum.
South African Journal of Science.
Palestine Exploration Fund. Quarterly Statement.

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