

once. This is the explanation given by the bushmen of the Kalahari. There is only one real rainy season in the Kalahari and Bechuanaland ; but a few storms may occur at any time, and it is obvious that if the *sama* seed germinated at once after a few showers and the plants then died there would soon be none left to carry on the race. However, from my own experience of the Kalahari I am convinced that the *sama* only grow once a year during the real rainy season from November to April, and the long period of germination noticed in my garden is probably to ensure the seeds only coming up during this season ; but on the other hand the seeds may not have been old enough. I still have some seeds left from the original consignment and it will be interesting to see whether they germinate more quickly next year, but in any case the explanation of this long period of germination does not seem at all clear. I believe it is the same in the case of Black Wattle seed, which I think is usually soaked in boiling water before it is planted. As an experiment I tried soaking *sama* seed in boiling water before planting, but none of the seeds ever came up.

I do not know whether any other seeds are known which have a similar long period of germination, or whether the object of this is known. Perhaps some member will be able to give us further information on this subject.

THE EVOLUTION OF THE ARROW

BY C. W. HOBLEY

This seems at first sight a trivial subject, but big issues sometimes hang on little things, and when one considers how through untold ages the fate of nations and the livelihood of mankind often hinged on this weapon its development may be considered worthy of some attention. It is beyond my powers to trace the history of the arrow through past ages, but my attention has been turned to the subject by some prehistoric arrow-heads which lately came into my possession and the various types of arrows used by the tribes in East

and Central Africa, and it is upon these that I propose to base my observations.

First with regard to the arrows of early man. These vary from the comparatively rude examples we find in East Africa and usually made of obsidian, to the beautifully finished Neolithic products of Europe. The better African examples are leaf-shaped and well worked, but the majority are very rudely fashioned ; but of course one finds more of the ' wasters ' or spoiled attempts than of those which were actually used and gradually lost in war or the chase.

There are several problems in connection with these stone arrow-heads, one of which is the mode of attachment to the shaft of the arrow ; it would be very interesting too, to know whether the users had any means of balancing the arrow, for

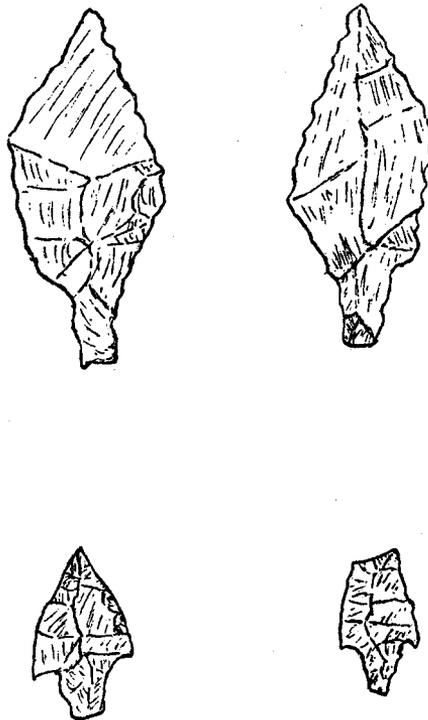


METHOD OF ATTACHING STONE SPLINTER TO ARROW. S. AFRICA.
(Peringuey.)

a stone head would naturally make it very top-heavy ; the other important point is whether these people poisoned their arrows.

Most of the hunter tribes in Africa to-day poison their arrows and the practice undoubtedly goes back a long way, and it would be interesting to endeavour to reconstruct the origins of this custom. It is comparatively easy to see what led primitive man to smear snake-poison on his arrows, but how he discovered that the sap of the *Morijo* tree (*Akokanthera Sdrinperi*) was an effective poison will probably never be adequately explained. Primitive man in Africa rarely got to the stage of fashioning a barb on his arrow points, and in South Africa, where thousands of arrow-heads have been found, only a very few are recorded in Peringuey's monumental work : two sketches from that work are given, as they show the development of the barb in stone. For examples of the leaf-shaped arrow-head from East Africa see ' Early Man in East Africa,' Part V of this Journal.

It may be difficult to understand how these rude stone arrows could have penetrated the vital parts of a bulky beast, but primitive man must have been a muscular fellow, for it was a revelation to me on one occasion to see at the British Museum a human pelvis with a flint arrow imbedded in the



STONE ARROW-HEADS SHOWING DEVELOPMENT OF BARBING. S. AFRICA: (Peringuey.)

bone of the arch ; it had evidently been shot into the buttock, had gone through the flesh and the point was protruding through the concave side of the pelvic arch.

We now come to present-day weapons, and I propose to divide the inquiry into two parts, viz. the development of the head and the development of the butt. The most primitive form of head is that which appears in some of the arrows of the Congo pygmies. The shaft of the arrow is often

made of a strip of the midrib of a palm and this is sharpened to a fine point and smeared with poison ; in other examples a long, tough thorn, probably from one of the Acacia family, is grafted on to the shaft, and one cannot help thinking that this use of a pointed stick or an attached thorn goes back farther into history than the stone arrow-head, and it certainly has survived the latter. For birds, the smaller mammals, and even for naked man it would be very effective, the proof being that if it was not it would have died out. If my premise is correct and this primitive arrow preceded the stone arrow-head, then it is probable that the use of poison goes back a very long way in time, as the efficiency of this class of arrow depends so much on its being poisoned.

The next stage is when this wooden point is made detachable. This was really a great stride, for it economises labour. Upon



WOODEN ARROW-HEAD MIMETIC OF ACACIA THORN. KAVIRONDO.

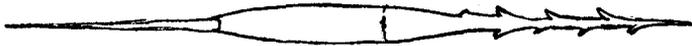
impact it is the point of an arrow which suffers, and it is easier to fashion a new point than entirely make a new arrow. It is also closely associated with the use of poisoned points, for when an animal is shot it is followed, the shaft falls off and is generally picked up by following the tracks of the animal, the poisoned point remains in the wound and is also eventually recovered.

The most primitive type of detachable point is, as is to be expected, a wooden one, and in East Kavirondo these are common ; they are slightly bulbous at the base, and it is believed mimic an acacia thorn, which is frequently of the same shape ; the inference is that the acacia thorn itself was first used, but being rather fragile it was superseded by a point whittled out of tough wood, but the original shape was preserved and survives to the present day.

A little later some one discovered that an improvement was advisable and small lateral barbs were carved on the wooden point. Attention became concentrated on the barbs and the bulbous shape disappears. A Kikuyu arrow may,

however, be occasionally seen where the barbs are beginning to appear but traces of the bulbous shape still remain. These lateral barbs were evidently suggested by some of the many thorny-stemmed plants which flourish in the bush in which the hunter spent most of his life.

Improvements in many directions have doubtless been tried, but our record only contains those which have stood the test of time and survived to the present day.



WOODEN ARROW-HEAD MIMETIC OF ACACIA THORN, BUT WITH INCIPIENT BARBS. KIKUYU:

We next come to the iron point. This must of course be always detachable, as an arrow entirely made of iron would be too heavy, and, further, the native has to be economical with his iron if he has to fashion it himself, and especially if he has to smelt it.

The most primitive type is a simple iron thorn, and such a point is still sometimes seen in Kavirondo and Nandi, but rarely. It is never made bulbous as the wooden points are, which shows that the makers had shaken themselves adrift



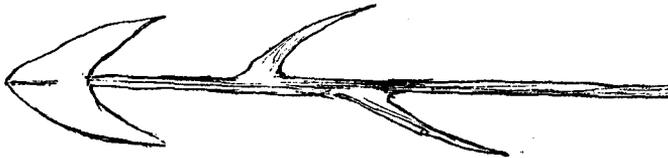
WOODEN ARROW-HEAD WITH WELL-MARKED BARBS MIMETIC OF A THORNY BRANCH. KAVIRONDO:

from the tradition of the natural thorn and speedily discovered that it was not necessary for strength. Most of these simple iron points are, however, barbed; the barbs undoubtedly began by being mimics of natural thorns, but in the hands of a skilled workman the barbs often develop to an extravagant extent, particularly in the centre of the African Continent, for use in war.

Many of the Mombuttu and Zandih arrows are barbed to a ridiculous extent and in a very varied manner.

In the quiver of one of the pygmies there will be found arrows fashioned out of a simple palm midrib and others

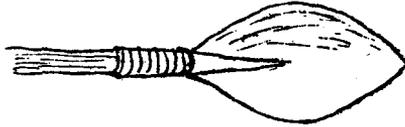
most fantastically barbed. It is believed that the use of barbed arrows among these primitive folk is due to their contact with the more highly civilised tribes, like the Zandih to the north, who are perhaps the best aboriginal iron-workers in Africa. Very little detailed information is yet available about these skilled craftsmen, but possibly each clan or family had its own particular fashion of barb.



MONBUTTU ARROWS WITH EXTRAVAGANT BARBING:

In East Africa proper this elaborate barbing of the arrow never reached a high development; the detachable point is usual, but the iron point is either leaf-shaped or of the usual sagittate form. Now, why is this? If one may venture a theory I am driven to the conclusion that the aboriginal peoples inhabiting the forests in the centre of the continent passed direct from the use of natural thorns to the use of iron points, but the people east of Lake Victoria began with natura

thorn points, passed through an age in which stone arrow-heads were used, and eventually passed into an iron age: this variation in development depended to a great extent on the absence or presence of suitable stone for making the arrow-points. The wooden point still survives, but only rarely, the stone point has died, but the leaf-shaped iron point used by some Kavirondo, Nandi, and also found among the Tharaka, is undoubtedly a copy in iron of the leaf-shaped stone arrow-head, of which good examples are now coming to light. Of course, these are only copies of the later and more perfect examples of the art of working in stone and with which the newer iron implements were for many years collateral in point of time. No barbed stone implement has as yet been found in East Africa, but it is yet early to say that in this

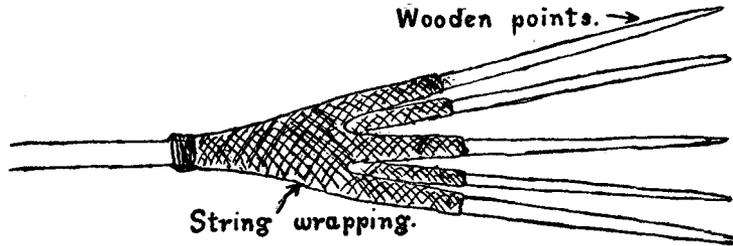


ARROW-HEAD OF IRON PROBABLY A COPY OF A STONE HEAD.
THARAKA (TANA VALLEY).

country the stone-barbed arrow-point did not suggest the iron one as in other countries. When the iron arrow-point became the vogue it was speedily discovered that a tang could be forged on to it, the tang being designed as a means of securing it to the shaft or to a wooden detachable point. In most East African arrows the tang is let into a small shaft of wood which is wedged into the main shaft of the arrow, and the small wooden shaft usually contains the clan-mark of the owner, and the iron head has stamped upon it the personal mark of the owner; and in a hunter tribe this is most essential, for if an elephant is wounded it is very necessary to be able to prove whose arrow was the cause of death in order to establish a claim to the tusks, to say nothing of the carcass. Among most of the hunting tribes the poison is smeared over the wooden shaft of the detachable point and the whole of this portion of the arrow is carefully wrapped with a thin strip of skin which has a double object, viz. to protect the owner

from an accidental scratch and also to prevent the poison from drying, as poison which has caked hard will not easily dissolve in a wound.

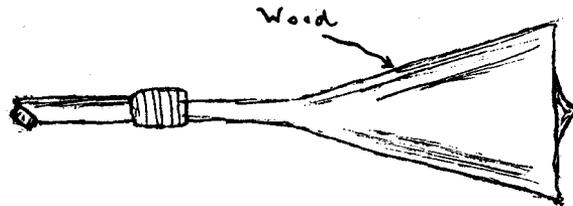
The sagittate form of iron arrow-head has now apparently reached a standard form in this part of Africa, and as Western civilisation has now intruded it is almost certain to be its



KAVIRONDO ARROW FOR KILLING RATS.

ultimate form, for every year native hunting will be more and more controlled and will undoubtedly speedily die a natural death.

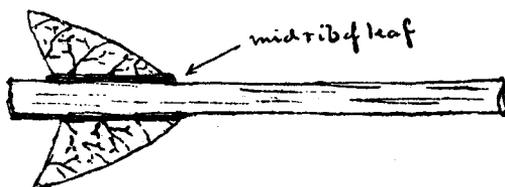
Occasionally in the lake region one sees peculiar variations of the arrow-head designed for special purposes, such as for shooting birds or killing rats ; sketches of two curious examples are given.



DETACHABLE ARROW-HEAD FOR KILLING BIRDS: KAVIRONDO.

We will now work our way to the butt of the arrow. There is very little to say about the shaft : it is always round ; the material varies—it is sometimes the midrib of a palm leaf, sometimes a reed, but generally made of tough seasoned wood free from knots. If it has a detachable point it is carefully bound round with catgut, made generally of the leg tendons of a domestic animal. This carries us to the base of the shaft

where we are accustomed to expect feathers and a notch in which the bowstring is fitted. But even this is not always the case, for in the arrows of the Congo pygmies the base is flat without a notch; they are so primitive in culture that they have not discovered the advantage of a notched arrow. Now with an ordinary twisted bowstring, unless the arrow is notched, it is almost sure to slip when the bow is drawn: the pygmies therefore make their bowstrings out of a flat strip of vegetable fibre apparently derived from a *Raphia* or some such palm. Of course there may be some good reason for this: vegetable fibres capable of being twisted into a round string may be scarce in the Congo forests, but one can hardly think that it would not have occurred to a hunting people to use the tendons



PYGMY ARROW WITH LEAF INSTEAD OF FEATHER.

of animals they killed and convert them into bowstrings, as many of the East African tribes do. It may, however, be that in the damp forests animal tendons are unsuitable for the purpose. The tendons of the back are usually used for this purpose by the East African tribes.

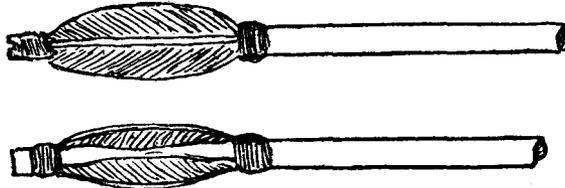
We now come to the feathering of the arrow. One occasionally sees an arrow without any, but it is believed they are only those used by young people for play. All tribes in East and Central Africa appear to be aware of the fact that some attempt at feathering an arrow is necessary to obtain precision. The most primitive form will again be found in the arrows of the Congo pygmies, and they simply stick a piece of tough, greenish-grey leaf through a slit in the arrow. This is doubtless a good rough-and-ready device, and if a leaf breaks off another can be readily obtained, because they rarely leave the forest. The next stage comes from the people on the edge of the forest east of Kenya, who insert a strip of thin hide through a slit

in the arrow. One cannot help suspecting that these people, like the Congo pygmies, first used leaves for the purpose, but eventually, as they gradually ventured farther afield, away from the forest into the more arid plains, they found that the leaves dried and crumbled to dust: and what more natural than to replace them by strips of skin from their quarry?



ARROW WITH LEATHER STRIP INSTEAD OF FEATHERS; MIVERU.

The next stage is the use of a bird's feather, which is almost universal in its range. The most primitive form seen is in the east portion of the Kavirondo, and these arrows are frequently seen with two or three whole feathers bound on to the base of the shaft. By 'whole' it is meant that both sides of the feather are used and it is not split longitudinally as we are accustomed to see, and it shows us that the mind of savage men rarely progresses by jumps but works on laboriously



KAVIRONDO ARROWS FEATHERED WITH WHOLE FEATHERS.

through successive stages before it reaches a final stage of efficient design.

The next stage is, of course, the one in which a feather is split longitudinally and a portion of it is cemented or tied on to the arrow. First we have two pieces of feather used, and later on it was discovered that three feathers were better. When one considers it, the transition from the leaf to the feather is not so great because both have a midrib, and in many leaves of monocotyledonous plants the veins of the leaf remind one of

the feather. The leaf, from its perishable nature, could not long stand the wear and tear of a hunting trip, and this led to a craving for something more durable. The great stroke of genius was the discovery that the attachment of a wing at the base of the arrow, be it leaf, leather, or feather, increased the precision of the projectile, and I confess that I am unable to guess how this was likely to have suggested itself to primitive man.

The most highly developed arrows in British East Africa are those of the A-Kamba, and the finish and balance of a good example is equal to anything that could be turned out in Europe.

Most of the hunting tribes mark the detachable heads of their poisoned arrows to enable a hunter to establish a claim to his quarry; the wooden portion generally contains the clan-mark, and the iron point the personal mark, of the owner.

THE 'MŪGUMO' TREE IN CONNECTION WITH KIKUYU CIRCUMCISION CEREMONIES

BY A. R. BARLOW

Many of the numerous 'Mūgumo' trees scattered throughout the Kikuyu country are found to be regarded by the natives as sacred and are places of sacrifice. This, however, is not the case with *all* trees of the species, which would appear to be a kind of parasitic rubber.

Especially in connection with the circumcision ceremonies does the 'Mūgumo' tree play an important part, a ceremony performed on the day preceding the circumcision morning being devoted particularly to it.

In the Mathira (Mazera), Trans-Tana, country this ceremony is known as 'Gūikia,' i.e. 'the throwing' ceremony, and the tree is one at which the ceremony has been held by successive generations from time immemorial: although should the original tree have fallen or have been cut down for any reason, a new tree will have been planted to take its place, the new