

ON THE NATURAL FORMS WHICH HAVE SUGGESTED
SOME OF THE COMMONEST IMPLEMENTS OF STONE,
BONE, AND WOOD.

By T. McKENNY HUGHES, M.A., F.R.S., F.S.A., F.G.S.

INTRODUCTION.

There are few questions of greater interest than those raised by an investigation of the various methods by which primæval man has tried to supplement the appliances with which nature had endowed him in common with the lower animals.

I have been approaching the question in a tentative way for many years, and have from time to time brought forward instances in which it appeared to me that the forms of certain instruments were originally suggested by natural objects.¹ I have now gained so much additional knowledge respecting it that I have thought that I might bring the whole subject forward before the Institute.

When, with a view to such an inquiry, we are examining the instruments which are in use among races of low civilisation, we must consider whether they are works of art involving thought and experiment, or are merely an adaptation from natural objects, the use of which may easily have been suggested by accident; whether they are common appliances necessary to meet the requirements of every-day life, or articles of luxury or dignity, the manufacture of which would demand exceptional skill and direction.

In tracing the migration of man by the implements which he has left behind him, one of the first questions to be asked in respect of any work of art upon which we rely as evidence is this: Was it imported or made on the spot? In dealing with objects commonly made of wood,

¹ *Camb. Ant. Soc.*, October 21st, 1895,
"On the derivation of a boomerang
from a cetacean rib."

Soc. Ant. Lond., February 4th, 1897,

"On the derivation of the battle-axe, the
throwing-stick, and the boomerang from
the ribs of the cetacea."

or bone, or stone, we must inquire whether the trees, or animals, or rocks from which they were manufactured were native or foreign.

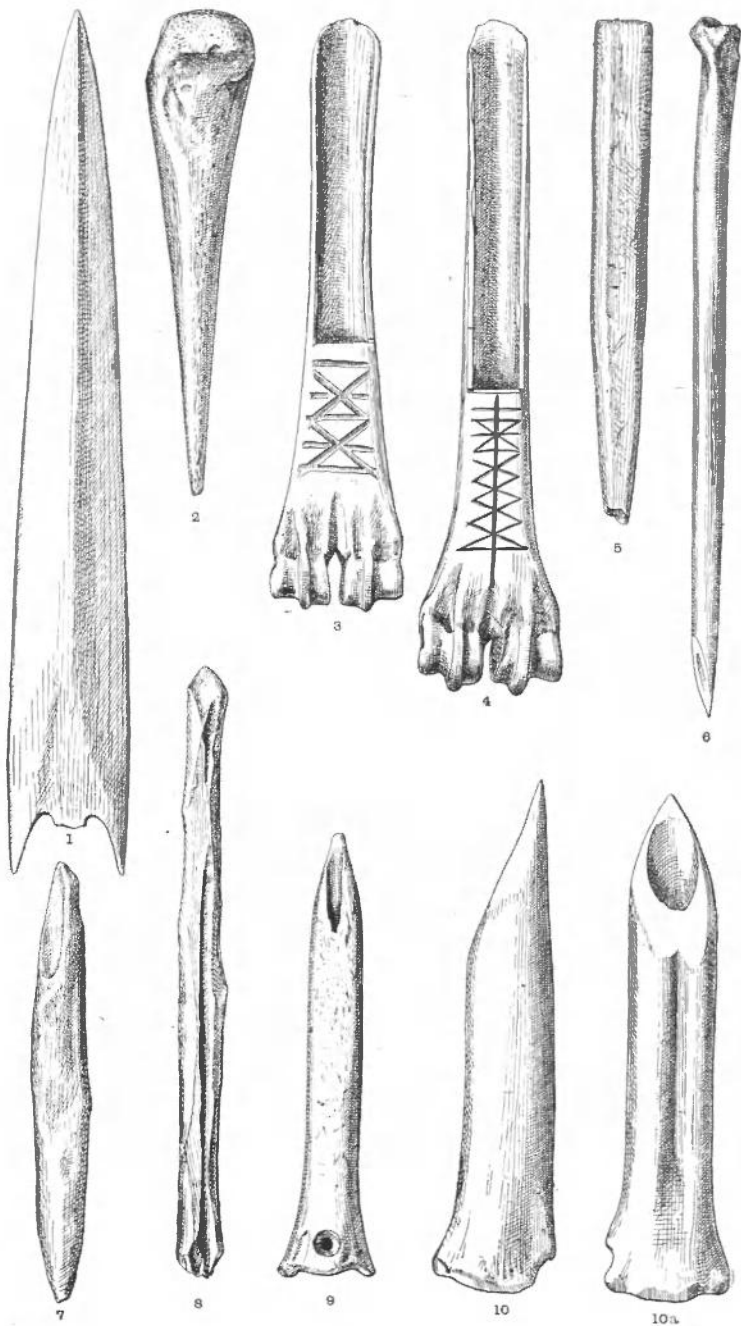
As I have elsewhere shown,¹ this line of inquiry leads to very important generalisations respecting the distribution of neolithic implements in the British Isles, where a difference of form confirms the inferences that would be drawn from the difference of material, and enables us in certain cases to distinguish imported from indigenous specimens.

THE IMITATIVE FACULTY AMONG RACES IN A LOW STAGE OF CIVILISATION.

From observation of the habits of races in an early stage of development we can often explain the origin of forms which have been modified and adapted to special uses in later times and under higher conditions of life. We can understand the cause of the conservatism which has been observed among savages, the conservatism of the more advanced in checking the unreasoning or careless experiments of the undeveloped intelligence, to which, nevertheless, much of the manipulation of the routine work of daily life must be left. The imitative faculty was thus strongly developed.

There are many instruments and manufactured vessels the form of which has been obviously suggested by natural objects. For instance, the gourd is obviously the original of many primæval water-bottles. Baron von Hügel has pointed out to me the resemblance of some stone drills and arrow-heads to sharks' teeth, and informs me that sharks' teeth are actually used by some tribes in the same way as the stone instruments; and it has often been shown that the earliest forms of metal weapons seem to be merely copies of those which had previously been made in stone. When, then, we find a battle-axe or *bâton de commandement* resembling a cetacean rib, not only in general outline, but also in many details of form, we may fairly indulge in the speculation as to whether this implement may not have originated in the bone from which it seems to be so closely copied, and we may, in

¹ *Cambridge Review*, XII, 44.



the same way, carry our investigations onward into many suggestions arising out of similarity of form, some of which will commend themselves, and some of which must await further evidence, but the greater the number of cases the stronger does the evidence for each become.

THE USE OF BONE.

Of all the materials suitable for the manufacture of weapons or objects of every-day use bone is the most generally available and suitable. It is of common occurrence and great variety of form. It is easily worked and yet most tough and durable. It comes halfway between wood and stone, and many an instrument, adapted from a bone, was reproduced in stone when greater hardness or a keener edge was wanted, and in wood if there was not time or opportunity to manufacture the required form in harder material.

The natives of New Guinea make their spears of the cassowary bone. In the hands of the Yule Islanders, the teeth of the kangaroo and "the tusks of the wild boar are implements of the greatest utility," and "the forks made from the leg-bone of the cassowary, with which they eat fish, are most admirably carved."

I exhibit a bone arrow-head (Plate I, Fig. 1) made by North American Indians (Sioux Indians, as I was informed). This, and the examples which I quote from New Guinea, do not illustrate so much the adaptation of natural forms as the selection of an everywhere available and suitable material.

Similar requirements produce similar results, but the forms into which the stones or bones of any district naturally break will always tend to suggest the particular shapes of the implements adopted there.

Thus many of the bone implements figured by D'Albertis¹ from New Guinea and the adjoining islands are very like those which I exhibit from people far removed in age and place, though it will be hardly suggested that the fashion was introduced into the British Isles from New Guinea or *vice versa*.

¹ *New Guinea: What I did and what I saw*, Lond., 1880, I, 50, 416, 417.

The splint-bone of a horse (Plate I, Fig. 2) I found in use in a farmhouse in Wales for making button holes.

Apple scoops made out of the radius or tibia of a sheep (Plate I, Figs. 3 and 4) have been in common use down to quite recent years.

Bone skewers and pins (Plate I, Fig. 5) have been turned out here and there with mediæval pottery in Cambridge. One specimen is made out of the bone of a bird merely whittled at one end into a pen-shaped point (Plate I, Fig. 6). Some of the others are cut out of large solid bones that do not suggest this form, and similar objects were dug up at Haslingfield with Saxon remains; *e.g.* Plate I, Fig. 7, which is a very rudely chipped bone, while Plate I, Fig. 9, appears to have been a kind of shuttle or bodkin.

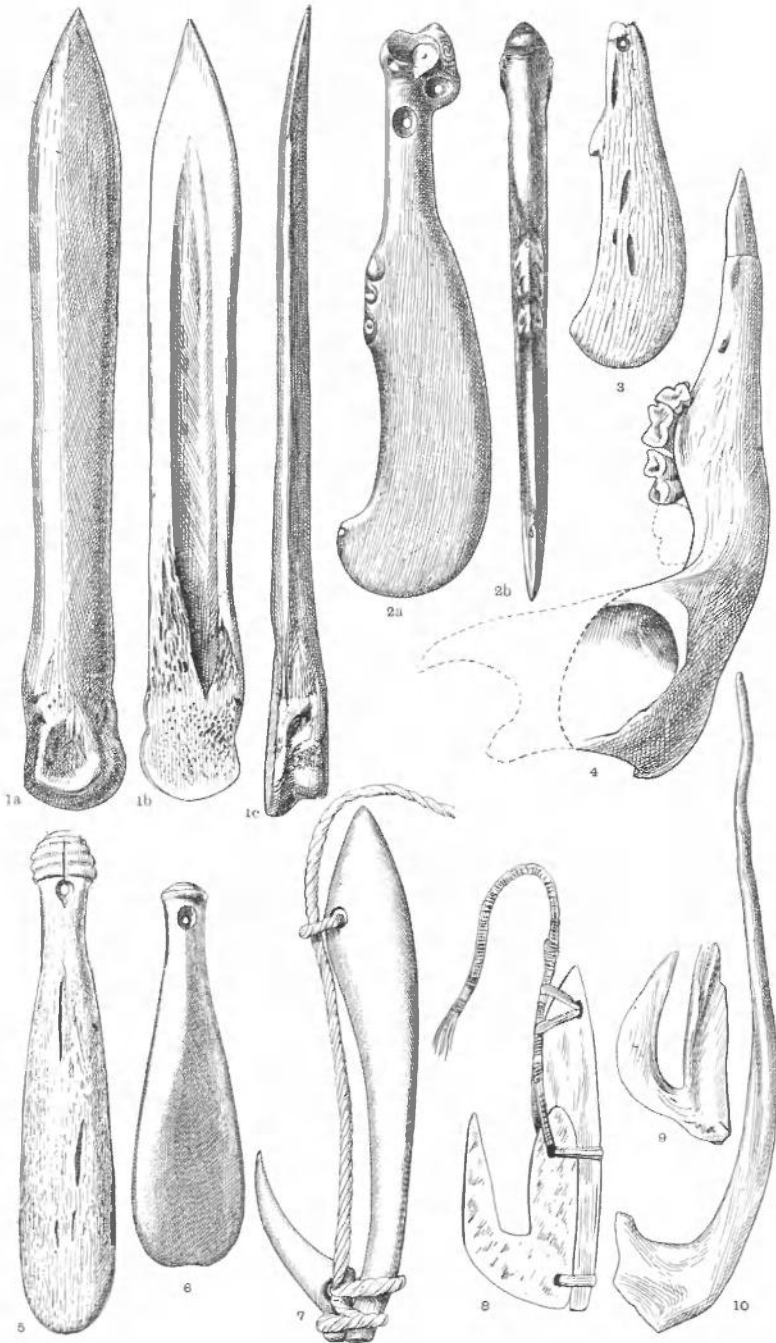
The pointed bone shown in Plate I, Fig. 8, I found in the refuse of the Roman potters' field at Horningsea, and it is not improbable that it may have been used for making the incised ornamentation on the pottery.

A slice of a hollow limb-bone makes an admirable instrument for many purposes. The "flayers" made from the radius or tibia of a small ox or deer (Plate I, Figs. 10, 10A; Plate II, Figs. 1A, 1B, 1C) are not uncommon in the Fens.

All of these are adapted with very slight modifications from the original form.

I need not multiply examples to prove that the bones found lying about on the surface of the ground or washed up on the shore were commonly used if of suitable forms or easily modified and adapted, and, when the demand for any form exceeded the supply, were reproduced in other material.

The rough hooks used for fishing by many races in a rude state of civilisation hardly seem the best that even they might have been expected to devise. But if we examine some of these more carefully, such, for instance, as those made by some of the South Sea Islanders of common shell (Plate II, Fig. 7) or of turtle shell (Plate II, Fig. 8), and compare them with certain bones in the head of our commonest fish, such as cod and haddock (Plate II, Figs. 9 and 10), we cannot fail to be struck by the resemblance between them.



It is in this connection that we have our attention specially called to those characteristics of all people in a primitive state to which I have referred, namely, their great imitative capacity and their tenacity in copying details even when they are unimportant or unfavourable.

Such features are sometimes seen among the works of art belonging to much higher civilisation, as when we find the structures which were necessary in wooden architecture imitated in stone; but in the simpler handiwork of ruder races they are much more common and strongly marked.

Now if we take the commonest weapons of the South Pacific, namely, the oval *patoo-patoo*, the bill-shaped *patoo-patoo*, the battle-axe or *bâton de commandement*, the axe for hurling, and the boomerang, we shall find that every one of them is either commonly made of the bones of cetacea or, by its form and the unnecessary reproduction of marks and protuberances, suggests that it was derived from such bones.

In different districts or countries a suggestion originating in one and borrowed by the other is often modified in the direction of the natural forms which offer the best substitute for the original material should it prove scarce or altogether wanting in the new locality. The oval *patoo-patoo* (Plate II, Figs. 5 and 6), and the bill or jaw-shaped implement (Plate II, Figs. 2A, 2B, and 3) seem to be cases in point.

It may as well be pointed out at once that there is no idea of urging that all these forms, no matter how much modified they may be or how far apart they may occur, must be traced to any one of the places where they are now found. All that is suggested is that they have a common origin in natural objects; that those which most resemble the bones of marine animals were probably first made by some people who lived near the coast, while others, like the jaw-bone of the ass in Samson's hand, were seized upon to meet the necessities of the time by dwellers inland. The cetacea are so widely distributed that there is no difficulty in accounting for the use of their bones in the South Pacific, while the former dispersal and separation of races will easily explain

the occurrence of forms, originally derived from them, among people since far removed from the sea.

The following extract from the *New Zealand Herald*, Monthly Summary, October 30th, 1896, records an example of a war club made from the jaw of a sperm whale. The *hoeroa* mentioned towards the end of the passage was of course made, not of what we should now understand by whalebone—that is, the elastic substance we obtain from inside the mouth of a right whale—but of a piece of the bone of a whale. The sperm whale has no whalebone in its mouth.

“Before his departure from the parliamentary arena, Mr. Thomas Mackenzie, M.H.R., was the recipient of a somewhat valuable and unique present from the Hon. Mr. Carroll. It was in the shape of a famous war club, made from the jaw of a sperm whale. The club is known as a *Katiatē*, or liver cutter, and was called Wharepakau, after an ancestor of Rewi Rangimio of the Ngatimaniwa, a sub-tribe of the Urewera. It was presented to Mr. Carroll by Te Tuhi at Ahikereru on March 6th, 1896. Major Mair, one of the best authorities on Maori weapons, writing about the club, mentions that when he first met the Urewera natives in 1865 this weapon was in the custody of Rewi Rangimio, who informed him that it belonged to a former ancestor (Wharepakau) over ten generations ago, and that it was greatly valued by the tribe, who traced the ownership from father to son for ten generations. The names of the previous owners are duly chronicled. It was Wharepakau, in connection with his brother-in-law Tangiharuru, who attacked and destroyed the once powerful tribe called Te Marangaranga, an ancient people who occupied the country about Galatea. Wharepakau came to his death at Tawhinau, near Galatea, in this manner:—He was startled by seeing a moa, which so alarmed him that he fell over a cliff, and the point of his *hoeroa*, a whalebone weapon which he carried, entered his side and caused his death. The place where he fell is still called *Te rere o Wharepakau* (‘The Leap of Wharepakau’). Wharepakau means ‘winged house.’”

THE PATOO-PATOO.

The oval *patoo-patoo* or *mere* (Plate II, Figs. 5 and 6), is made of bone, wood, or stone, ground into a long flat form such as would be readily suggested by the water-worn fragments picked up on the shore.

One of the specimens (Fig. 5) in Captain Cook's collection in the Library of Trinity College, Cambridge, is part of the jaw of a cetacean worked into a flat, elongate, oval implement with a handle terminated in a transversely grooved knob to prevent it from slipping through the hand and further secured by a hole bored through it to receive a thong. This specimen does not show any trace of the original form of the jaw out of which it may safely be inferred to have been fashioned from the texture of the bone and the foramina. Fig. 6 represents an implement in jadeite from the same collection, obviously made upon the same lines, although there was nothing in the stone to suggest the shape. A similar implement is found in wood.

It may be that the original of these was a water-worn shoulder-blade, the proximal expansion suggesting the handle.

Some of these implements may have been suggested by the jaw-bone of some smaller animal than a whale, in which case the form of the jaw may be expected to be retained.

Now among the specimens brought by Captain Cook from New Zealand and preserved in the Library of Trinity College there is one made of green jade, the side aspect of which (Plate II, Figs. 2A, 2B) reminds one strongly of a jaw in which three tooth-sockets remain, while the rest of the alveolar has been cut away.

When, however, we look down upon the supposed teeth (Fig. 2B), we find that instead of the three sockets we have the head and part of the body of a grotesque figure. This is in stone, so that there is no suggestion of there being any part of the actual teeth or of teeth-sockets remaining, but in the bone specimen (Fig. 3), which is actually part of a jaw, we see the origin of the suggestion. Other points of resemblance will be apparent on comparing

Fig. 2A with Fig. 4, which represents the jaw of a kangaroo, the dotted line cutting off the thin articulating processes as they would be by being knocked about on the shore.

The jaw-shaped *pato-pato* brought by Captain Cook from New Zealand may be derived from the jaw of one of the marsupials so characteristic of Australasia, or it may easily have been brought from countries where the larger mammals are common; for we must remember the traditions of the natives—the Maoris, for instance—that they migrated from other lands some centuries back.

THE BATTLE-AXE.

A long flat rib would make a very effective implement, and with little work might be shaped into a weapon like the wooden sword shown in Plate III, Figs. 1A, 1B.

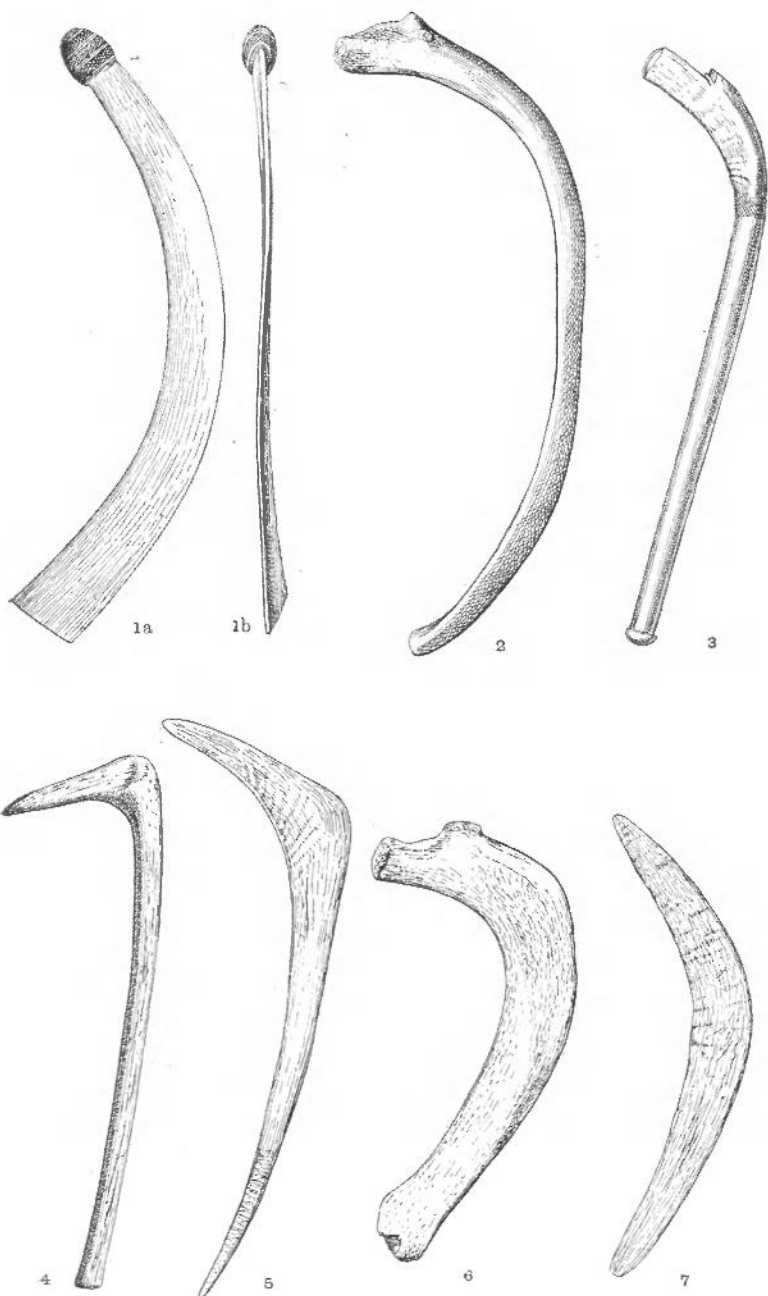
Mr. S. J. Freeman informs me that he saw a bone weapon like a large cavalry sword from 3 to 4 feet long in one of the camps of the natives at Corva Corva on the North Cape of New Zealand in 1878.

The rib of a cetacean (Plate III, Fig. 2) obviously suggested the common form of Fijian battle-axe or *baton de commandement* (Plate III, Fig. 3). The transverse process which rises from the upper side of the proximal end gives it somewhat the outline of an animal's head, while the small interlocking protuberance on the side suggests the eye, just as the hole for the hawser is commonly represented near the figure head of many a vessel, in which the hawser no longer passes through it but is attached differently from the original method.

Although the implements are made of wood, these very marked but unnecessary features are generally reproduced.

HURLING THE BATTLE-AXE.

In some of the balænoptera which are or were frequently seen round Australia and New Zealand the proximal end of the ribs which occur near the front part of the animal is prolonged below the vertebral



column into a long flat pointed process as represented in Plate III, Fig. 4.

The Australians have a wooden implement closely resembling this bone. The head is flat and pointed (Plate III, Fig. 5), and the end which is grasped is rounded and straightened for convenience of handling.

Such weapons are widely distributed. Owing to its flattened end and thin edge the missile offers less resistance to the air, and when it is made to rotate gains steadiness of flight as does a quoit. Discoidal and falcate implements of this class are known from India. Weapons of this form, intended to be thrown, were employed among all races. Even the battle-axe of Northern Europe was not only used, as is a cavalry sword, for cutting down the enemy at close quarters, but was sometimes hurled at him. The Rev. Edward Conybeare has kindly sent me the following references in support of this :—Procopius¹ (A.D. 539) tells how “the Franks marched into Italy to the number of 100,000 men. A few horsemen armed with spears surrounded the king. All the rest fought on foot, having neither bow nor spear, but each with a sword and shield and one axe. The iron of this axe is stout, sharp and two-edged ; the handle, of wood, is exceedingly short. At a given signal they all throw these axes, and thus break the shields of the enemy and slay his men.” Next year the Franks sent a threatening message to Belisarius that a reinforcement of 500,000 was on its way across the Alps “whose axes flying through the air will bury the Roman army in one heap of ruin.” Procopius was himself engaged in this campaign and forcibly describes how the Goths (who thought the Franks were come to aid them, and came out to greet them) were met by “a storm of flying axes.”

What more natural than that a native of the South Pacific Islands should pick up the axe-like rib of a cetacean which he found upon the shore and use it as a battle-axe at close quarters or a throwing weapon, especially in the case of the middle ribs, whose flattened ends adapted them admirably for this purpose ?

¹ Anecdota.

THE BOOMERANG.

The boomerang is a very curious implement, and we cannot suppose that savages calculated out and manufactured an instrument which should be so nearly flat and in one plane as to fly rotating in that plane, and which, further, should be chamfered off like two vanes of a windmill, so that, when the force of propulsion was dying out, the rotation should carry the instrument up into a higher position, from which it should glide down an air-incline to the place from which it started, or to some other place at the will of the thrower.¹ It might be inferred that, since they could not have elaborated such a complicated machine, they must have obtained it from some other people of higher civilisation, or be themselves the degenerate descendants of such a race.

But these difficulties are got over if we can show strong presumptive evidence that the boomerang itself might well be suggested by a common and world-wide natural object, and that a simple explanation can be offered of the adoption of that peculiarity of form in which the boomerang differs from the common axe adapted for close combat or to be hurled.

SUPPOSED USE OF THE BOOMERANG IN INDIA, EGYPT, EUROPE.

It has actually been urged as corroborative evidence of a common origin for some of the black races of India and of Australia and some of the early inhabitants of Egypt that this peculiar instrument, the boomerang, the characteristic weapon of Australasia, was used in India and figured on certain ancient monuments in Egypt.

There is some doubt as to whether the object represented in Egyptian sculpture was really a boomerang or one of those weapons just described which might be used as an axe at close quarters or be hurled at the enemy. Nor is there any necessity for inferring that, whatever it was, it must have been made or even used by

¹ See Walker, A. T., *Proc. Camb. Phil. Soc., Proc. R. Soc.*, Vol. LXI, No. 373, p. 239, "On Boomerangs."

the highly civilised Egyptians themselves, but only that it was in use at the time of the record by some race with which the Egyptians came in contact or perhaps even employed. At the beginning of this century there were, among the Russian troops, soldiers fighting with bows and arrows against the French.

It has been supposed by some that the *cateia* of Virgil was a boomerang—

“Teutonico ritu soliti torquere cateias.”¹

This was a foreign weapon of some kind which Virgil speaks of as Teutonic, a name then applied to the people of Northern Europe whether of Celtic or Teutonic origin. Isidorus calls it Gallic—

“Cateia est genus Gallici teli . . . quod si ab artifice mittatur, rursus venit ad eum qui misit.”²

That the Gauls used it as a weapon of war is suggested by Bezzenberger.³

According to Servius the *cateia* was like the *aclis*, or *aclys*, of which Virgil says—

Oscorumque manus : teretes sunt aclides illis
Tela, sed haec lento mos est aptare flagello.⁴

That is to say, they were thrown with a thong fastened on to a handle so as to resemble a small whip, and these thongs were known as *amenta*—

“Quibus ut mitti possint, vinciuntur jacula.”

It was

“Genus antiqui jaculi exigui et teretis, quod flagello seu loro longissime jaciebatur.”⁵

This was simply to give the thrower more leverage and to enable him to send it farther.

Some, however, forgetful of the form of the weapon, and not bearing in mind this method of hurling a javelin with the *amentum*, misunderstood the use of the thong, and saw in it merely a string attached to the missile, then, speculating upon its use, suggested that it was for pulling the weapon back to the thrower.

“Aclides tela sunt quæ fune religata, post inflictum vulnus retrahuntur.”

¹ *Æneid*, VII, 741.

² *Orig.*, XVIII-VII, 7.

³ *Beitrage*, XXI, 124.

⁴ *Æneid*, VII, 730.

⁵ *Facciolati*, references *sub voce*.

Servius says—

“Catejam quidem asserunt teli genus esse tale, quales acilides sunt, ex materia quam maxime lenta, cubitus longitudine, tota fere clavis ferreis illigata, quam in hostem jaculantes, lineis, quibus eam adnexuerant, reciprocum faciebant.”

Salmas, accepting this explanation, says, “*Ita fuisse loro illigatas, ut peracto vulnere ad jacentis manum redirent.*” Isidorus, however, says nothing about its having a string attached to it by which it could be pulled back, and describes it as a weapon “*quod si ab artifice mittatur, rursum venit ad eum qui misit,*” or, as Conington puts it, “he supposes that it returned of itself to the thrower like an Australian boomerang.”

Thus Virgil's whip-like *amentum*, or thong with a handle, grew into a string so long that with it the missile could be drawn back. Then the thong was lost sight of altogether, and it was said that this weapon if skilfully thrown would return to the thrower, that in fact it was a boomerang.

It may be that the traditional descriptions of two different weapons may have got mixed up: the one a javelin with a smooth round shaft, “*tereti mucrone,*” and thrown to a great distance with a thong, “*quod flagello seu loro longissime jaciebatur*”; the other a battle-axe studded with nails, “*clavis sit ferreis invicem religata,*” and never flying very far, but crushing through every obstacle against which it struck.

“Quæ jacta quidem non longe propter gravitatem evolat, sed, quo pervenit, vi nimia perfringit.”

It is clear that this was not the same thing as the javelin, of which each soldier carried two or more, “*earum binas saltem aut plures etiam ferebant milites in proelio,*” for each soldier could not carry a bundle of heavy battle-axes or clubs into the field.

Mr. Whitley Stokes informs me that he heard Hofrath Bühler say that he had himself “seen a tribe of Bhils in Central India using the boomerang. They employed it not in war, but (as well as I remember) for killing wild ducks. The weapon was a true boomerang which returned to the thrower.”

Whether or not the Indian wooden axe, adapted for hurling, had always the twist of a boomerang is not quite

clear. But if it ever had there is no reason why it should not have been the common property of the Negrito or other perhaps earlier race, and have originated anywhere along the coast of the Indian Ocean such as that ocean was when the people who first used the boomerang, and whose traces are seen in Australasia, in the Deccan, and in Egypt, travelled along its shore.

ORIGIN OF BOOMERANG.

If this be so it is improbable that the boomerang was the result of calculation and therefore the product of a very advanced civilisation. We must rather look for its origin in some common natural object, and seek a simple explanation of the adoption of that peculiarity of form by which the boomerang differs from the common battle-axe.

The front ribs of the cetacea generally differ much from all the others, and this difference is more marked in some species than in others.

They are flattened and almost equally broad along their whole length (Plate III, Fig. 6), and moreover the plane in which the bone lies is at right angles to the length of the animal's body, so that there is a tendency at the distal end to bend back to the normal position of the other ribs and lie parallel to the barrel, which, with the usual chamfering off at the proximal end, where there is an adaptation for overlap, gives the bone the form of two adjoining vanes of a windmill. This would produce no appreciable effect on the flight of such a heavy object as a cetacean rib-bone, and would be rather a disadvantage to it as a throwing weapon.

When, however, the bone weapons were reproduced in wood (Plate III, Fig. 7), and the form was closely imitated, these two vanes by their rotation would carry the light wood up to a higher level and let it glide back along an inclined air-plane to the thrower. The discovery would thus be made by accident.

I am informed by Mr. Walker, who has made the subject of boomerangs a special study, that it is only a small proportion of them that have the twist requisite to

make them describe a curved path or return to the point from which they were thrown.

As the ribs vary in different species of cetacea and also at different parts of the same animal, there is, as might be expected, much variety in the forms of weapon derived from them; but they pass gradually from one form to another through intermediate ribs, and so we find a similar series among the weapons, as has been shown by General Pitt-Rivers.¹ This suggested their being derived one from the other, as probably many were.

SUMMARY.

1. Bone is a commonly available material everywhere, and the forms of bones have suggested the shapes of the instruments independently in many and far distant countries.

2. The four characteristic weapons or implements of Australasia, namely, the *patoo-patoo*, the battle-axe, the hurled axe, and the boomerang, find their exact counterpart in the bones of cetacea which are thrown upon those very shores, which is too large a number to be referred to mere coincidence, especially seeing that two out of the four have been found made of cetacean bones as well as of wood or stone.

In the cetacean ribs there is not only a simple explanation of the shape of the *head* of the battle-axe, which has something of the profile of a wild swan's head, but also of the *form of the blades* of the boomerang, for some of the cetacean ribs have a twist in them due to the gradual change from the position of the front ribs, which are flattened in planes at right angles to the length of the animal's body, to the position of ribs which lie flat on the "barrel."

The heavy bone would probably never show the effect of the rotatory motion upon the two blades though they were inclined like the vanes in a windmill, but when it was imitated in lighter material by the savage, who

¹ *Journ. R. United Service Inst.*, Vol. XII, 1868, No. LI, p. 399, "Primitive Warfare, Section II: On the re-

semblance of the weapons of early races; their variations, continuity, and development of form."

copied essential or unessential characters, the form would at length be noticed and being found of advantage would be carefully reproduced.

Cetacea, such as the grampus, are of world-wide distribution, and the Ca'ing whale occurs round the shores of Australia, where the true rotating boomerang is most common.

The jaw of a kangaroo, or of some mammal carried by the natives from other lands, would explain the peculiar bill shape of some of the implements.