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WAR WEAPONS as an INDEX of CONTEMPORARY KNOWLEDGE of the NATURE and SIGNIFICANCE of CRANIOCEREBRAL TRAUMA*

SOME NOTES ON STRIKING WEAPONS DESIGNED PRIMARILY
TO PRODUCE INJURY TO THE HEAD

CYRIL B. COURVILLE, M.D.

Whenever one wishes to reconstruct the ways of life of ancient civilizations, particularly those leaving no extensive record of their doings, recourse must be had to other sources of information. Of such sources none are more valuable than those which portray pictorially the personal appearance, the activities, and the accoutrements of the people. Even when a written record is available, the photographs, the sculptured monuments, the mural paintings, and decorations painted or molded on pottery or woven into their textiles also shed much additional information on these aspects of life. This is taken as fundamental, for it may be assumed that the ancient artist made an effort, for the most part, to portray what he actually saw.

If the subject under investigation happens to be one of medical or surgical interest, the

search is decidedly handicapped without a written record, for not often do such features intrude themselves in the end-result of the artist's handiwork. Nevertheless, if the question is one which is tied in intimately with the daily life and occupations of the people, it is often surprising what can be learned from such sources. This is quite the case in the matter of craniocerebral injury.

In the past the present writer has undertaken several investigations into the history of trauma to the skull and enclosed brain, studies which have been based largely on the available written records (Courville [1944], [1946]) or on the effects of such injuries as found on extant crania which have come to light in the case of the ancient Incas (Courville and Abbott [1944]) or of the American aborigines (Courville [1948]). In the course of these researches there has come to light a number of illustrations suggesting or portraying mythological or historical examples of such injuries. In many of these pictures there is evidence not

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The photographs used to illustrate this article were taken by Mr. Claire Grounds.

only of the fact of the injury but also of the nature of the instrument or the weapon with which it was produced, and it is often clearly evident that the weapon was designed just for such a purpose.

This observation leads the more curious to look further into this subject, for perhaps a study of the weapons themselves, with special reference to their design, may lead to some conclusions as to contemporary concepts of the nature and seriousness of certain types of injury of the skull and brain. This temporary pursuit has led the present writer into fields far from the beaten paths of medicine, but it has brought to light many interesting facts which have a definite bearing on the problem. Moreover, a study of the offensive weapons has logically been followed by an investigation of the means (helmets) to protect the head from such injuries. And, since the labors have been expended, it seems worth while to record briefly what has been learned. In this report we shall have to do with the individual weapons, drawing a few pertinent conclusions as to their apparent design in the accomplishment of lethal injuries to the head. In another study attention will be given to the development of helmets as a means of protection against such injuries.

CLASSIFICATION OF WEAPONS OF WAR

Although it is not always possible to analyze the design of ancient armorers as to what the specific purpose (if indeed they had any specific purpose) of each individual weapon was, it therefore being difficult to classify them strictly on this basis, an effort in this direction is to be desired. The classification of Cowper (1906) has much to commend it. He divides the weapons of war into (1) striking and bruising weapons, (2) piercing and thrusting weapons, (3) weapons designed for capture, (4) serrated weapons (edged cutting weapons), (5) missiles and projectiles, and (6) aux-

iliary weapons. In the first large group he includes the clubs ("which arm the hand"); the maces, battle hammers, ball-and-thong weapons, and battle-axes he puts into a second group of weapons which serve to "reinforce the arm"; the missiles and projectiles are considered in the group of weapons which injure at a distance. The first of these two larger groups will be considered briefly in this study.

Under his designation of "hand weapons" Cowper included (a) the clubs, and (b) the striking weapons, which are essentially a combination of a wooden club and a head of some heavier material, as stone or metal. In the case of striking weapons, the ancients added a stone head to form a mace (a club + a blunt head of stone or metal) or an ax (a club + a head with a sharpened edge or blade). As modifications of these two specialized forms of hand weapons, we have the war hammers and the weapons of the ball-and-thong type. As this study progresses, it will be pointed out that this group of striking weapons has as its chief purpose physical injury to the cranium, which stands out in contrast to other piercing or thrusting weapons designed chiefly for injury to the body and extremities. In this latter group is to be included the sword, which though it is also a hand weapon, is chiefly of value as a weapon of injury to soft tissues with consequent disabling results, together with other pointed weapons such as spears, javelins or darts, and arrows (including cross-bow bolts), which are designed to injure enemy individuals at increasing distances from the person using them. A study of the effects of these cutting or piercing weapons suggests that the ancients soon learned that their chief lethal effects were to be accounted for on the basis of penetration of some vital organ, or, of still more significance, on the severance of some large vessel, with death resulting from hemorrhage. To be sure, injuries to the head were not infrequently produced by such weapons,

and at times by definite design, but it is to the group of striking weapons that chief attention needs to be given in this connection.

The subject of hand weapons planned presumably with the primary purpose of cranial injury will be considered under the headings of (1) war clubs and allied weapons, (2) battle maces, (3) war hammers, (4) weapons of the ball-and-thong type, and (5) battle-axes. In this brief review only a mention of the important features of each type of weapon, including something of its history, development, and physical characteristics, is possible.

WAR CLUBS AND ALLIED WEAPONS

The war club is very likely the most basic weapon of combat, certainly insofar as the peoples of simpler cultures are concerned. Among some, notably the South Sea Islanders, it remained essentially the only important weapon up to the time of the introduction of gunpowder. We find its modern counterpart in the Irishman's shillelagh and policeman's billy. Even when more refined weapons were available, it is almost the rule to find that some form of simple club continued to be used contemporaneously (i.e., by the Assyrians, Egyptians, and more recently the Incas). One cannot say, then, that it was necessarily the most primitive weapon. As shown in case of weapons of the Polynesians and the Melanesians, the simple straight club is used at the same time as the many and variable refinements of war clubs which, though they approach in form the mace and the battle-ax, are still made almost exclusively of wood.

It is difficult to make a satisfactory classification of war clubs, even when one limits himself to those striking weapons which are made of but one substance, most commonly wood, more rarely stone or bone. The reason for this is that in so many instances any refinement of the weapon beyond that of a straight or slightly curved stick approaches technically

the battle-ax or mace. Taking a broad view of the weapons of Samoa and Fiji, Churchill (1917) designated all wooden striking weapons as clubs. Reviewing the types of a large collection in the University of Pennsylvania, he divided them into (1) missile clubs (short, large-headed throwing clubs), (2) serrated clubs (a flat club with bilateral reinforced projections), (3) mushroom clubs (club with flattened end whose outline has a mushroom shape), (4) crescent club (club with flattened end with crescent-shaped distal edge), (5) billet club (a simple straight club with a slightly increasing diameter to its distal end), (6) rootstock club (club whose head is made of the trimmed-off roots of a sapling), (7) pandamus club (club with curved neck and expanded head marked by multiple rings of spikes forming a collar and a terminal prong), (8) ax bit club (club with a flat, ax-blade-shaped head set at an angle on the shaft), (9) staff (simple stick with a progressively decreasing diameter to its distal end), (10) lipped club (gunstock-shaped club with a projection extending from its curved head), (11) mace club (short or long club with extended head marked by numerous circumferential spikelike projections), (12) *talavalu* club (short or long club with lateral teeth), (13) coconut-stalk club (flattened or diamond-shaped section club carved to represent the coconut stalk), (14) paddle club (long club with flattened or partially flattened end resembling a canoe paddle), (15) carinated club (club with flattened paddle-shaped end with transverse reinforcement), and (16) the *Nifo'oti* or hooked club (a short, flattened club with lateral hook on one side). If one would include the so-called serrated clubs and carinated clubs as described by Churchill in a single group of paddlelike clubs, and if what he designates as a paddle club included the sword-shaped club of other writers, it would be possible to have a classification more uni-

versal in its application. The clubs of the various peoples and civilizations fall pretty well into fewer simple groups, however, being mostly of the staff, missile,* knotted-head, and sword types (the latter being used by the Aztecs, Mayas, and Incas, as well as by the South Sea Islanders).

But clubs were used as well by all the ancient civilizations.† We find them used by the Assyrians (Rawlinson [1879]), the Egyptians (Wilkinson [1879]), the Ethiopians (Diodorus [1721]),‡ the Arabs, the Syrians, and no doubt many of the other contemporary peoples (Wilkinson [1879]). The Greeks and Romans, however, used more formal equipment. Though this point is not clearly established in the mind of the present writer, it would be surprising if the Germanic tribes did not use clubs of one sort or another. At any rate, in some of the medieval armies of Europe the club once more came into use, and

* A word on the missile or throwing clubs is in order in this connection. The Egyptians were evidently the first to use throwing sticks, usually curved, chiefly in hunting waterfowl. The Romans also used a throwing stick in hunting, possibly having borrowed the idea from the Egyptians. The idea seemed to spread into other parts of Africa, for we find that in Djibouti a throwing club (*lisan* [tongue]) was used. The boomerang, thought to be characteristic of Australia, seems also to have been used in India. The throwing stick of the Indians of Arizona (the Hopi) and those of southern California is still another type of weapon, used occasionally in assaults on man as well as in hunting rabbits. Cowper (1906) implies that the use of throwing sticks developed independently in four quarters of the globe—in Egypt and in Central Africa, in India, in Australia and the surrounding Islands, and in America. In these four areas at present the type of throwing weapon differs quite widely, and yet, some forms are strikingly similar, the throwing stick of the Egyptian, the boomerang of the Indians and Australia, and the throwing stick of the Indians of the Southwest all being curved. Only the boomerang of the Australian aborigines was so made as to return to the thrower, however (Pitt-Rivers, cited by Cowper [1906]).

† Clubs were used by some of the ancients other than as weapons of war, but not necessarily in innocent play. One of the ceremonies held at Papremis of early Egypt was that attendant upon the attempted introduction of the god of war into the temple. One group of men armed with clubs attempted to prevent the entrance of the god, whilst his votaries, similarly armed, came to his aid, "and a combat ensues between the two parties, in which many heads are broken, and I should suppose many lives lost, though this the Egyptians positively deny" (Herodotus, Book II, LXIII). Among the Tauri, one of the smaller nations in Asia Minor, captives were sacrificed to a virgin god by striking the victim on the head with a club. (Herodotus, Book IV, CIII.) In an annual festival to the goddess Minerva the young women of the Ausenses (residents of the shores of Lake Tritonis), dividing themselves into two bands, fought each other with clubs and stones. The young women who displayed the most warlike talents were given the privilege of wearing a Corinthian helmet on a chariot ride around the lake (Herodotus, Book IV, CLXXX). It is said that the Vikings used a special club kept in their temples to do away with their aged or infirm parents.

‡ Diodorus described these clubs of the early Ethiopians as "a great Stake burnt at one end." It is clear that many native people learned independently that wood could be hardened by burning its outer surface. In this case it was to harden the wood of war clubs; usually it was to harden the tips of wooden arrow or spear points.

it is to be assumed that it was an heirloom of earlier times (Laking [1921-22]). Diener-Schönberg (1907) noted the use of short clubs with knotted heads in the seventeenth century, clubs which, he stated, came from the Tartars. War clubs have been used by many of the African tribes, and specimens of knob-headed weapons are not too rare (Figure 5). Wooden clubs were also used by certain of the tribes of American Indians (Virginian [Strachey, 1849] and Pueblo [Bolton, 1916]). In certain of the tribes of the Southwest (the Hopis in particular) there was used a short wooden "potato masher" type of club with a row of sharp projections on each of four sides of the heavy head of the club. This is roughly reminiscent of the "mace-clubs" of the South Sea Islands. The Alaska Indians used a short round or flat club of bone or stone which seems to be characteristic of the region, although it suggests the short *kotiate* and *patu paraoa* of bone and the *patu onewa* of stone of the Maoris.

In South America the Indians of the different civilizations used clubs of various types, but the simple billet club or club with an expanded or rounded head, at times carved, was a part of the armament of many individual tribes, including those of Brazil and of ancient Peru.

As one studies the forms of clubs used by the various peoples, it becomes apparent that a number of separate types evolved. One sees the simple stick, more or less uniform throughout its extent (the baton or staff). In some areas this was modified by being made out of metal and of a smaller size. Originating apparently with the Assyrians and Egyptians, this form was later adopted by the Chinese and Japanese, who made it appear as a short sword (often equipped with a hook or "sword-breaker") with no point and with no cutting edge. The wooden form, often with a curved distal end, was also used in Asia Minor and

Egypt, and found in recent years among Polynesian peoples of the South Pacific.

One of the paradoxes in the history of the development of war clubs is the persistence in the use of the simple stick or staff, straight or slightly curved at its distal end. Such a simple weapon has, of course, been used throughout the ages by all peoples as a readily accessible weapon against predatory animals or marauders. The shepherd's staff is a classic example of such a defense. We find it used by the Egyptians (*lissan*) in the form of a straight stick (which was apparently metal-tipped) or one slightly curved at its distal end. A similar stick was carried by some Inca warriors. It seems that such clubs were used chiefly as ceremonial objects and are even used today in Polynesia. A revival of an ancient weapon of India, the *lathi*, consisting of a piece of bamboo with a metal head, is now being advocated as a defensive weapon for Moslem women because of the recent outbreaks in that country.

The various types of flattened clubs, or paddle clubs, as they are sometimes called, deserve special mention. These may be divided into the short, often stubby paddles, and the longer two-handed weapons which are reminiscent of canoe paddles. It is evident that either type might be, and sometimes was, merged into, or modified to become, a sword club, which was essentially a cutting weapon such as was used by the ancient Aztecs and Mayas. The longer and usually (but not always) narrower weapons were used primarily as clubs and for the purpose of producing crushing injuries to the head or perchance fractures of the bones of the limbs. Whereas the edges of such a club were sharpened, they were not sufficiently sharp to produce an incised wound. The shorter clubs, on the other hand, were apparently designed to produce a cutting wound, as their sharper margins and lack of weight would imply. This seems to be true especially of the short *kotiate* of the New Zealand Maoris, who have been assumed to deliver a cutting thrust to the abdomen, usually with the weapon retained in the hand. It was sometimes used, however, as a throwing weapon. Of this paddle type of weapon the sword club seems to be a modification.

The sword club was one which had a flattened blade, sharpened on the two edges and often with a more or less sharp point also. The earliest form of the sword club was apparently used in Egypt, an example over four feet long made of sycamore being found in the tomb of Prince Tuau of the seventeenth dynasty at Thebes and now in the Cairo Museum (Maspero [1897]). It was a common weapon among the Incas at the time of the conquest. A modified form was used by the Mayas and Aztecs, narrow blades of obsidian being inserted along either edge to form an almost continuous cutting edge. (This weapon was repeatedly designated as a "sword" by Bernal Diaz [1927].) A similar club but apparently of heavier type was common among the South Sea Islanders (Figure 1).

Another common form was that of the knob-headed club (knob kerrie), which came to be used in short lengths as a throwing or missile weapon, or in the longer lengths as a true war club (Figure 1).

It is of particular interest that in the majority of cases the enlarged head was so carved as to leave a number of sharp projections in the forms of spikes or teeth which had the obvious purpose of producing additional damage by lacerating the soft parts or by producing a penetrating wound of the skull. This is definitely proven in the case of the Polynesians, who had specific terms for threatened or actual blows to the head (Samoan, *toulu*—to take a blow on the head with a club; Tonga, *hahau*—to strike brandishing [a club] over the head; Niue, *punuti*—a guard in fighting when the club is held horizontally over the head; Fiji, *sakuta*—to knock on the head). The club-makers designed the clubs so that the additional weight in the head would add to the force of the impact in a smashing blow. However, it is clear that two types of wounds were considered in making the clubs (Churchill [1917]), a wound of incision directed at the soft parts, and injuries of contusion. It was also apparently recognized that a slashing wound was only a disabling one and would require another *coup de grâce*, perhaps with another club. A particular effort was made to deliver a blow to the head from above or to guard the head from a similar blow on the part of the enemy (Niue, *akau punuti*). What may have been the effect of concussion from such a knock-out blow was indicated by the terms *fanene* and *manene* (to sink to the ground when the knees give way).

A special word should be said for the so-called pandanus type of war club, which was a long, two-handed weapon (Figure 1) made from a sapling having an acute angle at the root. The head was surrounded by a ruff of short, spikelike projections and a terminal

impact in the exact moment of success in order that the weight and sharp spikes of the pandanus head may not mar a perfect work" (Churchill [1917]).*

If all the facts could be known, there is little doubt but that the primary objective of the

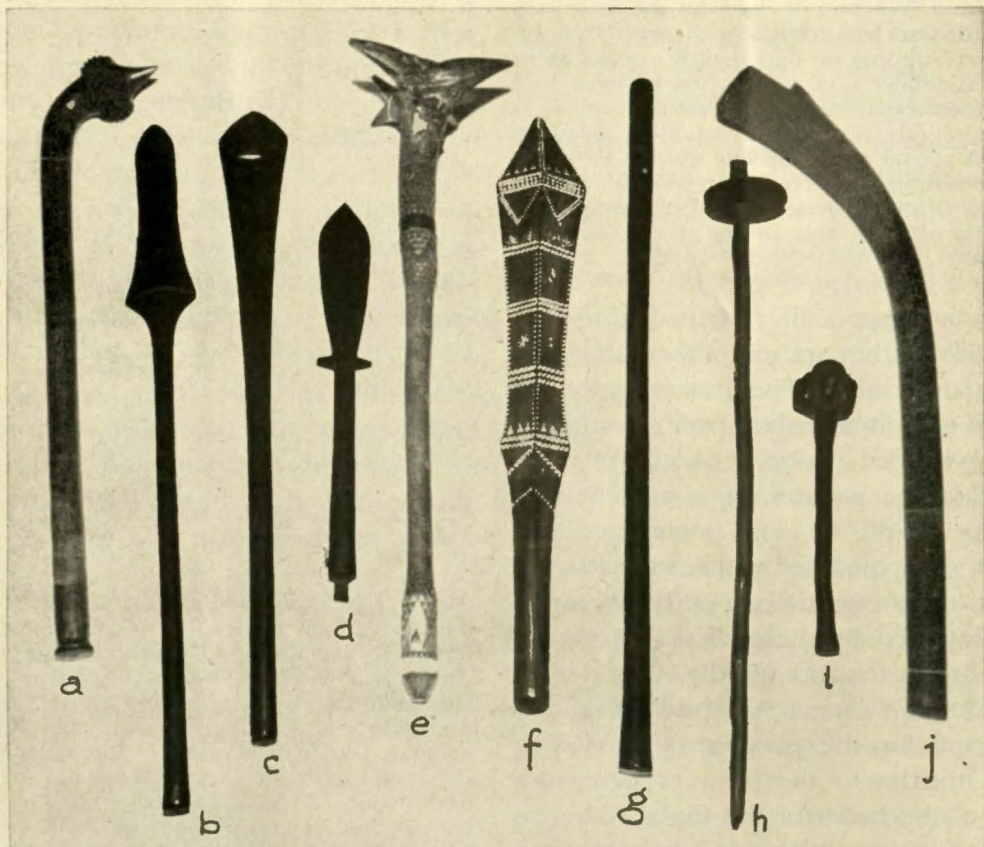


Figure 1.—War clubs of South Sea Islanders. *a*. Pandanus club (*Totokia*), Fiji. *b*. Carinated club, Samoa. *c*. Paddle club, Fiji. *d*. Short paddle club (origin?). *e*. Rootstock club, Fiji or Tonga. *f*. Paddle club, Fiji. *g*. Billet club, Fiji or Samoa. *h*. Stone-headed club or mace, New Guinea. *i*. Missile club, Fiji. *j*. Lipped ("gunstock") club, Fiji. Museum of Department of Nervous Diseases.

prong. The name of the club, *totokia* (to peck as by a bird), was derived from this terminal spike. "The crown [of the enemy] must be pierced exactly with the spike of this deadly weapon, but the skull must not elsewhere be split; it calls for extreme nicety in delivering the winning blow to be able to check the

* An interesting side light on such fractures of the skulls in natives of the South Seas is to be found in the *Catalogue of the Pathological Cabinet of the New York Hospital, etc.* (New York, S. S. & W. Wood, pp. 22, 23, 1860), in which such a specimen is described as follows: "Skull of a Feejee Islander—Fractured. The man to whom this skull belonged was killed in battle. The injury consists in a circular fracture two inches in diameter and very slightly depressed, involving the angles of junction of the two parietal[s] with the occipital bone. From the depressed portion, a line of fracture passes directly down into the foramen magnum, on reaching which, it sends out a branch right and left, running to the base of each mastoid process. The left condyle of the lower jaw has been broken through its neck, and on the right side the zygomatic arch has been removed."

blow of the clubman was the head of his opponent. The language of combat of the Fijians and Samoans, already cited, seems to make this clear. The Indians of North America evidently also recognized that the function of the stone-head clubs was "to brain people" (De Laguna [1947]). To do this more effectively, many of the native peoples made a head for their clubs out of shell, stone, or metal, making the club a forerunner of the more refined battle mace.

THE BATTLE MACE

It has already been pointed out that the battle mace is but a modified or composite club whose head is constructed of some heavier substance than the shaft, such as shell, stone, or metal. (The term *mace* is derived from the Latin *massa*, meaning a lump or nugget.) Although the mace is to be considered as a more highly refined weapon, we find among the contemporary arms of the ancient civilizations, for reasons not entirely clear, both clubs and maces. But it is evident that it was soon learned independently by the various peoples that a heavier head on this improvised weapon was capable of greater execution, perhaps not only because of its increased weight, but also because of its tendency to produce crushing injuries to the skull. This is certainly the case among the ancient Egyptians, who designated the early Pharaohs and their maces as "crushers of foreheads." A study of the weapons of the various periods of history makes it clear that this weapon was used and developed by both the "civilized" and native peoples. It is a weapon whose use has come down to our own day, for some 30,000 spike-headed maces were manufactured for use in the Austrian armies in the first world war, although for some reason they never came into wide use.

The mace is a weapon of great antiquity. From the primitive graves of the early Chal-

deans or Babylonians at Senkareh there was taken a clay tablet depicting a man assaulting a lion with what appears to be a mace-ax (Rawlinson [1879]). As to the Assyrians, the evidence is much more abundant. At least in some periods of Assyrian history, whole corps of the army were armed with maces, and in addition this weapon was carried as an auxiliary weapon by the foot archers. It was also used to execute condemned captives and criminals.* From the carved monuments it is evident that the battle mace was an ornately decorated weapon. Its handle was rather short and thin, made either of some tough wood or more likely of metal (Rawlinson [1879]). The head was often beautifully modeled to represent a flower, rosette, or the head of an animal. At the lower end of the handle, or helve, a loop or string was attached to ensure a firm grip. In later Assyrian history, two-handed maces came to be used as weapons of war. Herodotus (1836) stated that the Assyrian troops of the armies of Xerxes were armed with wooden clubs knotted with iron (Guhl and Koner [1898]), an illustration of which is found in Jähns atlas of the weapons of antiquity (Jähns [1878]). The mace was also a symbol of royal power, for in the sculptured monuments the attendants of the king are usually seen to be carrying his mace in ceremonials, the hunt, et cetera. A hawk-headed figure on the walls of Nineveh and a colossal lion-headed figure at the gate at Kouyunjik bear round-headed maces, suggesting their implication as a symbol of authority.

Strange as it may seem, the ancient Persians did not adopt the mace from either the Chal-

* On this point Rawlinson (1879) writes: "Another very common mode of executing captives was by beating in their skulls with a mace. In this case, the victim commonly knelt; his two hands were placed before him on a block or cushion; behind him stood two executioners, one of whom held him by a cord around the neck, while the other, seizing his back hair in one hand, struck him a furious blow upon the head with a mace which he held in the other." In describing an extensive bas-relief from the walls at Kouyunjik showing the torture of war prisoners by the Assyrians, Layard (1853) describes another method of execution with the mace. A prisoner is depicted sitting on the ground with his hands tied behind him. "The brains [of this prisoner] were apparently being beaten out with an iron mace, whilst an officer held him by the beard."

deans or the Assyrians, with whom they were so much in conflict. As will be presently shown, however, the mace became a favored weapon of the more modern Persians, and from them it was adopted by the Indians and possibly the Chinese.

The Egyptians, on the other hand, developed independently the use of the battle mace. This is known from the earliest sculptural records. For example, we find it indicated in the carved records, both in hieroglyphics and bas-reliefs on the rocky walls of the Wady Magharah near Sinai, where the Egyptians mined many of their metals. Here is engraved the story of the early Pharaohs, with sculptures showing the king crushing the heads of enemy prisoners, evidently the neighboring Bedouins, who had interfered with his mining operations. The same story is told of Senoferu, of the third dynasty; Khufu, of the fourth dynasty; and of Sahura, of the fifth dynasty.* The Egyptian mace seems to follow but one pattern, having a fairly large ball- or pear-shaped head of stone (limestone or alabaster have been specifically mentioned), either plain or with bas-relief carving, with a simple handle about two feet and a half in length. At first it would appear that the mace was used exclusively as a weapon of royalty, but later on it is evident that whole sections of the Egyptian armies were so equipped (Wilkinson [1879]). The handle was sometimes bound with bronze (the royal mace of Horus Na'ar was covered with gold), with a strip of metal projecting from its lower end. This was supposed to represent a guard, although in the sculptures the hand is often found to be gripped above it while the blow is being de-

livered. The mace-ax or pole-ax, in which the ball of the mace was combined with a short blade, will be described under the axes, with which it properly belongs.

The Greeks apparently did not formally adopt the mace as a common battle weapon, although we find it referred to in mythology (the tree-stump club of Hercules, and an iron club made for this hero by Hephaistos as mentioned in the *Iliad*). Another reference (not verified) in the *Iliad* describes the use of an iron mace in battle, by Areithous, who broke through the phalanx of the enemy with it. According to Wilkinson (1879), the Greek mace (*koryne*) resembled that of the Egyptians and was made of iron.

Among the Romans the mace was not used as a weapon of war, although the *secutores* used lead maces in gladiatorial combat against armored opponents (Cowper [1906]).

The Saracens inherited the battle mace from the early peoples of the Near East, but the line of descent is not clear, for, as previously stated, the ancient Persians had not adopted it as a war weapon. We find that the mace was varied and adapted for use both as a military weapon and as a ceremonial staff until recent times. Cowper (1906) shows three interesting types of dervish maces: one with a cow's head with projecting horns, a second with a devil's head also with horns, and a third consisting of a small head of an animal on a shaft placed transversely at the end of the helve (Figure 2).

It is apparently from the Saracens and the later Persians that the peoples of India learned to use the mace as a weapon of war, for in many instances it is not always easy to know from the appearance of the weapon alone from which country it came. (The type of carving and language engraved on it often makes this clear, however.) The variety of maces developed by the inhabitants of India is particularly interesting.

* This portrayal of the Pharaoh striking down his enemies with the mace, thus earning the title of "crusher of foreheads," is to be found in many places and under numerous circumstances. It was found on one of the flanking towers of an early Egyptian temple, the figure being colossal in size, on a number of the sculptured monuments. It was on a small ceremonial palette of state dedicated by King Narmer of the first dynasty and placed in the temple of Hieraconpolis found in one of the royal tombs and on an ivory tablet of King Usephais of the first dynasty. It was also damascened in gold on a bronze ax found in the grave of Ahmose I (Breasted [1912]).

Among the various types of battle-maces made and used by the armies of India is the characteristic bladed type, with a varying number of blades differing in shape and thickness; some had the typical sword type of grip and guard, while others had a plain handle. (This was the so-called *Garz* weapon.) A similar type, but with a much smaller double head and equipped with a much larger number of blades was a more decorative weapon. Still another type had a spindle-shaped head, often damascened with gold, and apparently adopted from the Persians. A fourth type

a ceremonial weapon. One of the typical *Garz* type of weapons is shown with other hand weapons from India [Figure 2].

The Chinese also utilized the mace in several forms as a weapon of war, but whether this was done independently (as the types of weapons would lead one to conclude) or adopted from the Near East cannot now be

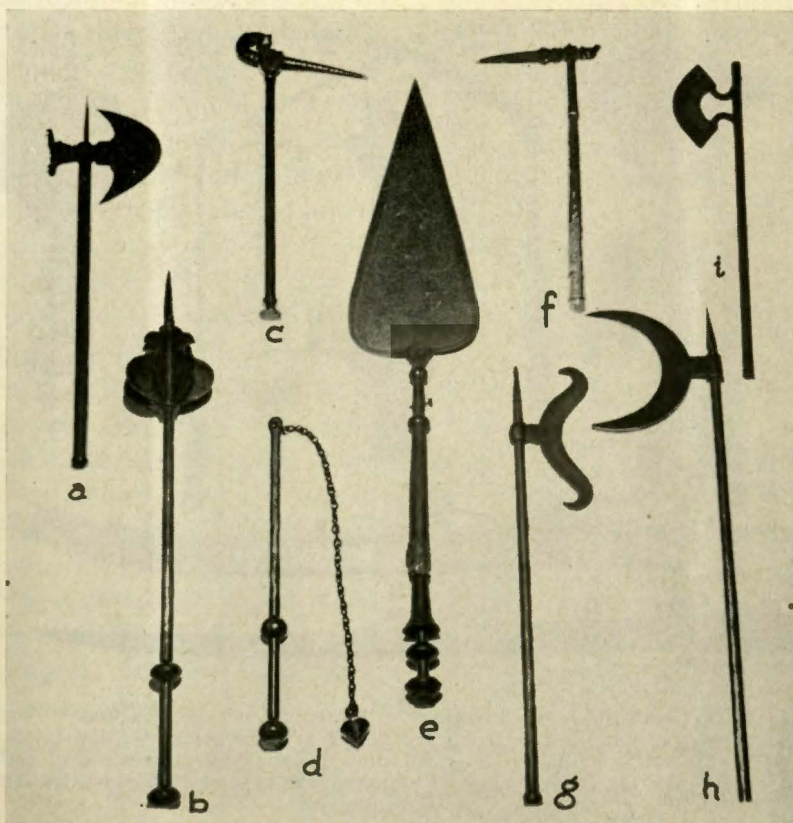


Figure 2.—Hand weapons of India, Persia, and North Africa. *a, g, h,* and *i*. Various types of battle-axes from India, the blades of *g* and *i* being inlaid with silver. *b*. Indian battle-mace with multiple blades (*Garz*). *c*. Persian mace (used by dervishes). *d*. Ball-chain-handle weapon from India. *e*. Spear-type battle-ax from Morocco. *f*. Bill-type battle-ax ("crow-bill buckie") from India. The head is ornately decorated and inlaid with precious metals. Museum of Department of Nervous Diseases.

had a globular head of steel and a steel shaft. The *Khundi p'hansi* consisted of a scroll-work head and an ornamental shaft. Either the front of the loop or the small knobs at the end of each limb could serve as the traumatizing surface, if indeed this was anything but

stated with certainty. The earliest type of mace was in reality a battle hammer, which will be described under that section (Werner [1932]). An unusually old form of mace is to be found

in the Museum of the Department of Nervous Diseases (Figure 3), a heavy brass disk surmounting a brass dragon-head socket for the helve. The disk is bordered by irregular projections shaped to resemble flames (as arising from the sun). This heavy weapon was used "to crush heads," so said the ancient Chinese, from whom it was obtained.

presumably of metal. It must have been a very effective weapon, even against the helmets and body armor of that day.* The several examples illustrated in books of folklore suggest their general similarity, aside from a slight variation in the butt end of the handle. It was a weapon used both by horsemen and foot soldiers.

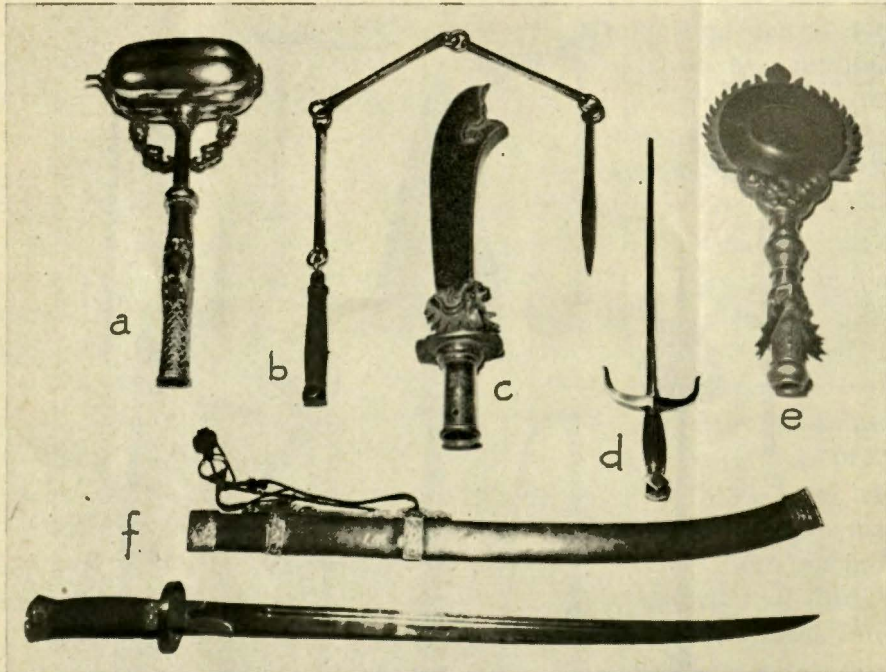


Figure 3.—Ancient Chinese hand weapons. *a.* Battle hammer of brass, melon-shaped. *b.* Military flail of unusual type. *c.* Spear-type (*ch'u*), brass battle-ax. *d.* Metal club and sword-breaker. *e.* Ornately decorated brass mace. (Note dragon's-head socket for *a*, *c*, and *e*.) *f.* Sword with sharkskin scabbard. Museum of Department of Nervous Diseases.

The present writer is unable to learn whether the Mongols used any form of true mace, but, insofar as such records as were available testify, such seems not to be the case. It is therefore entirely possible that the weapon developed by the early Japanese was entirely original with them. This consisted of a long, two-handed, hexagonal-shaped wooden weapon, each of whose sides was studded throughout the length with projecting knobs,

But it is from a study of maces developed in medieval Europe that we are able to get the clearest concept of their wide variance in type and use. Even here the history of their origin is not entirely clear. They certainly did not come either from the Romans, the Franks, or the early Germanic tribes, for among none of

* In addition to this long, two-handed mace and the thong-hafted weapon shown elsewhere, the early Japanese also had a short, swordlike mace which was designated specifically as a "helmet crusher." Many of the Japanese policemen's clubs were, in fact, short iron maces.

these peoples was the mace used as a distinct weapon of war.* According to Diener-Schönberg (1907) some of them at least came from the Tartar tribes of Russia or Asia Minor. Since, as has already been pointed out, there is a direct line of transmission already established from ancient civilizations through the Saracens, this is very likely the correct assumption as to their source. Made doubly necessary by the development of a metallic armor, especially helmets, battle maces came to be one of the standard weapons of warfare.

From a survey of illustrations of the various types of weapons used, it is possible to classify battle maces (*Streit-* or *Streibkolben*) into the long-handled weapons for the infantry and the short-handled maces (*Sattelkolben* or *Toppeis*) carried at the saddle pommel of the armored knights. The foot soldier demanded a long-handled weapon to equalize somewhat his combat abilities with those of the horsemen. On the other hand, the mounted knights needed a convenient, short-handled weapon to crush in the helmets of either his mounted opponents or his foot adversaries, the iron-hatted pikemen or the crossbowmen. The efficiency of this weapon in this respect is suggested by its almost universal use during this period by the English, French, Swiss, Slavic, Austrian, Hungarian, and Roumanian armies. The knights also used them at times as a throwing weapon against mounted opponents (Laking [1921-22]).

It was the head of the mace which showed the greatest evidence of ingenuity, for after all the helve or handle could only show a limited degree of variation. These heads may be classified as (1) spherical, (2) pear-shaped, (3) cubed, (4) ridged, (5) knobbed, (6) bladed, or (7) spiked. The *spherical* or *pear-shaped* mace-head was reminiscent of those used by the early Egyptians and was dependent entirely for its effectiveness on the weight of the metal head and the force

* A bit of indirect evidence of the use of the mace as a weapon by the early Greeks is furnished by a modern portrayal of an early Byzantine Greek (known to Sicilians as *grifoni* or "plunderers"). A colossal figure used in historical pageantry in Messina before the last war is armed with a six-bladed mace strongly reminiscent of medieval weapons. The authenticity, of course, is in question (National Geographic Magazine 83:260 [Feb.] 1943).

with which the blow was delivered. The *square-headed* maces were uncommon, an example being illustrated (Plate LVII) by Meyrick (1854). The *ridged* or *knobbed* head, however, was made additionally effective by the presence of the projections from the cylinder or ball which aided in creasing the protecting helmet or armor. The *bladed* maces, which came to be almost universally used because of their even more effective penetration of such armor, were equipped with a series of blades set at right angles to the shaft, four, six, or eight in number (usually six), which were made an integral part of the head of the weapon. These blades were variously shaped, but in the majority of examples each leaf came to a rounded curve, a point, or was actually surmounted by a sharp spike toward the distal end of the head. This prominence aided still further the penetrating qualities of the blade. At times additional spikes were set between the blades (Swiss types), or in a collar about the distal end of the weapon. The head itself often terminated in a knob or spike. The *spike-headed* maces consisted of a metal ball (sometimes a cylinder [Jähns (1878)]) "bristling with flamboyant spikes" (Cowper [1906]). These weapons came to be called "morning stars" (*Morgenstern*) because of the radiating aspect of the spikes.

The helves of maces were usually of wood, particularly the long-handled variety. But in the case of the short-helved weapons used by mounted knights, the entire weapon was often made of metal. Under these circumstances they were often very ornately decorated, many of them being, in fact, works of art. They were comparable in this respect with the armor of man and horse, also often decorated.

With the introduction of firearms both armor and maces became progressively less useful, until finally both were discarded entirely. It was obvious that a man with a mace could scarcely hope to compete with one with a gun. As implied above, however, as a vestigium of medieval times, maces of the "morning star" variety were made for the Austrian army for use in World War I, perhaps because of the introduction of metal helmets and trench warfare. They were never put into wide use, perhaps for fear of reprisals.

While the so-called civilized peoples of the world were trying to settle their differences with the more refined types of iron maces, the savages of the various continents were working

out their own weapons in stone or bronze, weapons which came to resemble more or less closely those of their more advanced contemporaries. They too came to learn by experience that a stick with a heavier-than-wood head was more effective than an all-wood club,

(but not edged) stone, (3) ball-shaped club heads, (4) ovoid club heads, (5) flat, sharp-edged, round, ovoid, or irregularly outlined stone heads, (6) flat clubs with notched edges (true clubs), and (7) knobbed clubs which resembled quite closely the medieval battle

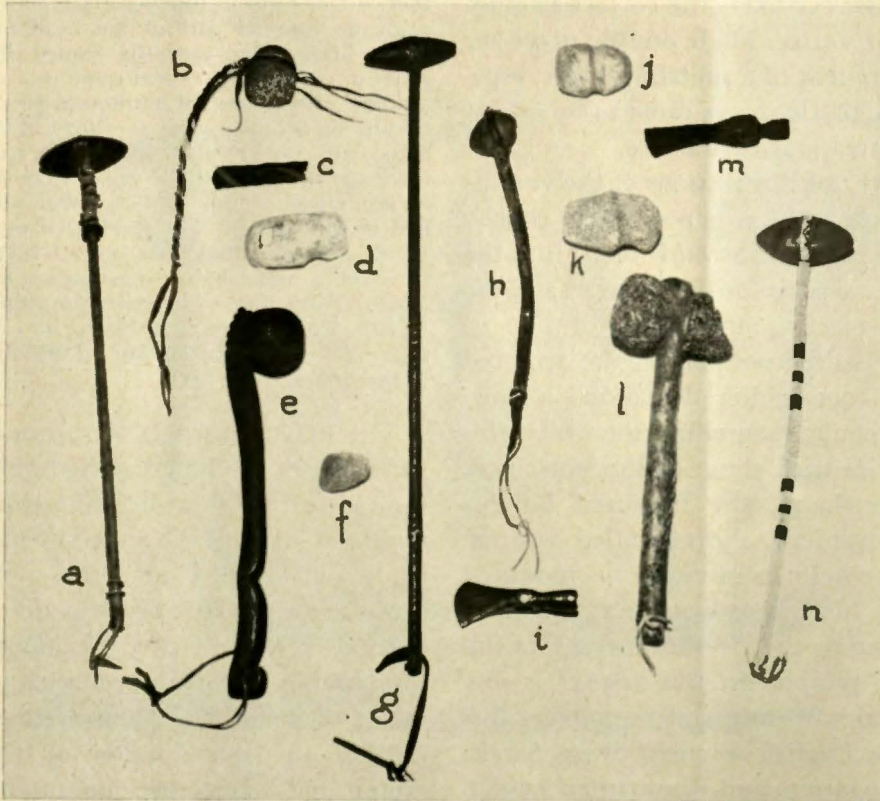


Figure 4.—Hand weapons of the American Indians. *a*, *g*, and *n*. Tomahawks used by the Sioux and Arapaho tribes. *b*. Ball-and-thong weapon of the Sioux Indians. *c*. Ancient celt, or ax, thought to be beaten out of meteoric iron. *d*, *f*, *j*, and *k*. Ancient stone axes with groove for helving. *e*. Wooden war club (replica) of Midwestern tribes. *h*. Indian stone-headed club with bones for handle. *i* and *m*. "Trade-axe" pipe-tomahawks, *m* being an ancient piece found in French Canada. *l*. War club used in "Modoc War." Head is a piece of lava; handle is covered with buffalo hide. Museum of Department of Nervous Diseases.

even though the terminal enlargement of the club was larger and covered with projections, natural or otherwise. This is suggested by the types of weapons used by the natives of British New Guinea (Haddon [1901]). They developed (1) natural stone clubs, or those which required only a minimal amount of working, (2) clubs with heads of small, circular, flat

maces previously described. It is the latter type of club which is closely allied with true maces, differing only in the material with which the head is made.

In a stricter sense the weapons which can be classified as true native types of maces may be divided into the following groups: (1) clubs with small round or oval stone rings,

(2) clubs with spindle-shaped heads, (3) clubs with heads of flat disk-shaped stones, (4) clubs with round or oval stone heads, (5) stone axes, (6) clubs with pointed stone or bone head, (7) clubs with knobs inset into enlarged distal ends, (8) clubs with cylindrical stone heads, and (9) clubs with star-shaped heads.

Clubs with *round* or *oval stone rings* are typically found in Polynesia. These native maces consist of a relatively long, thin helve on the end of which is a small, doughnut-shaped stone. The end of the club is slightly enlarged to prevent the head from slipping off. The stone head is also marked with an external and internal row of small teeth to assist in fixing the head to the staff. The effectiveness of this type of weapon lay in the force developed in the wide swing of the long-handled club. A direct blow could well produce a local depressed fracture of the skull.

Clubs with *fusiform* or *spindle-shaped* stone heads are apparently characteristic of those used by the ancient Incas, with the helve inserted into a socket drilled into one end of the spindle. The widened intervening ridge constituted the traumatizing edge. This type is known to the writer only in ceramic illustrations of Inca warriors.

In the clubs fitted with flattened, sharp-edged disks of stone, one approaches the ax type of weapon, but with a blade that cuts at right angles to the helve. The stone head usually measured about 4 to 5 inches in diameter; the staff was about three feet long. Some difference in the shape of the head is to be found in the various individual weapons—round, oval, or shield-shaped. This type of mace is native to New Guinea.

Clubs with *round* or *oval* stone (nonperforated) heads constitute one of the types of native maces common to many peoples, but especially characteristic of the Indian tribes of North America. A water-worn stone of convenient size was chosen and a shallow groove made about its middle. This stone head was fastened by means of rawhide to a helve of wood [Figure 4]. The size of the head, the nature of the stone used, and the length of the handle varied within wide limits.

The so-called *stone axes* [Figure 4] of the various tribes of Indians of both North and South America are in reality but another type of native mace, for only rarely was the edge sharp enough to produce an incised wound (one notable exception was the unusually flat stone axe from the British West Indies [Fewkes (1907)]). Such stone heads were helved in a similar manner as those of the previous type. The cranial injury produced by such a weapon was a compound comminuted depressed fracture of elongated type.

The *pick-ax* type of native mace was also found typically among the Indian tribes. William Strachey (1849), in describing the weapons of the early Indians of Virginia, mentioned this type: ". . . But oftentimes they use for swordes the horne of a deare put through a piece of wood in forme of a pickaxe. Some use a long

stone sharpened at both ends, thrust through a handle of wood in the same manner . . ." This type of mace was evidently used widely throughout the eastern part of North America. It also represents the type of weapon with a longer handle once used by the Siouan Indians of the north Midwestern part of our country [Figure 4].

The *knotted head* type of mace, in which knobs of stone or bone are set into a wooden club with a heavy end, is evidently a rare type of weapon. The only example known at the moment to the present writer is one from Central Africa in which a mace of this type is found on one end of a short spear, a combination weapon [Figure 5]. Particularly in view of the wooden maces made by the South Sea Islanders, it is strange that maces of this type were not elaborated. Instead we have representatives from these people of the last two types.

Cylindrical stone heads, marked by rows of projecting knobs, are a relatively rare type of native mace. It is found typically in New Guinea and the surrounding islands. It is possible, as Churchill (1917) has intimated, that some of the wooden clubs were actually patterned after some of these native maces with cylindrical stone heads, the wooden "maces" being easier to construct and being just about as destructive in their action. In three specimens illustrated by Churchill two, three, and up to six rows of projecting knobs had been constructed from an elongated stone made into a cylinder. These ingenious stone mace heads were fitted onto relatively thin helves to which they had been adapted by means of a finely woven grass padding interposed between the head and the handle.

The *star-shaped mace*, developed simultaneously in the New Caledonia-New Guinea area and in ancient Peru, represents the acme of the native mace makers' art. Truly fine workmanship is evident in specimens from these two regions. The amount of labor necessary to produce such a stone weapon must have been indeed tremendous. The heads were usually six-pronged, each prong terminating in a blunt point. The collars were usually narrow, but in one specimen from the South Seas (Plate V, Churchill [1917]) it consisted of an elongated cylindrical shaft. In Peru, of course, this type of mace head was also cast in bronze, silver, and even in gold (for the emperor's weapon).

With this rather extended discussion of this, the most interesting of the hand weapons, we must turn to a brief mention of a related but somewhat different weapon of much more limited distribution and use, the battle hammer.

BATTLE HAMMERS

This hand weapon, which must be considered as a modified mace, was not very widely used. For this reason it is very difficult to piece

together any sort of history from the scattered fragments of information available to us. The early peoples and later those of the civilizations of Egypt, Persia, Greece, and Rome did not have such weapons, as far as the present writer is able to determine. We find the battle hammer to be characteristic of the early Chi-

head of this hammer, shaped like a melon, is cast hollow in brass and is quite heavy. The stem and bud of the melon are indicated by small metallic projections (Figure 3). Such a weapon falling through a relatively short arc of space is heavy enough to produce a severe concussion, and a well-directed blow with any

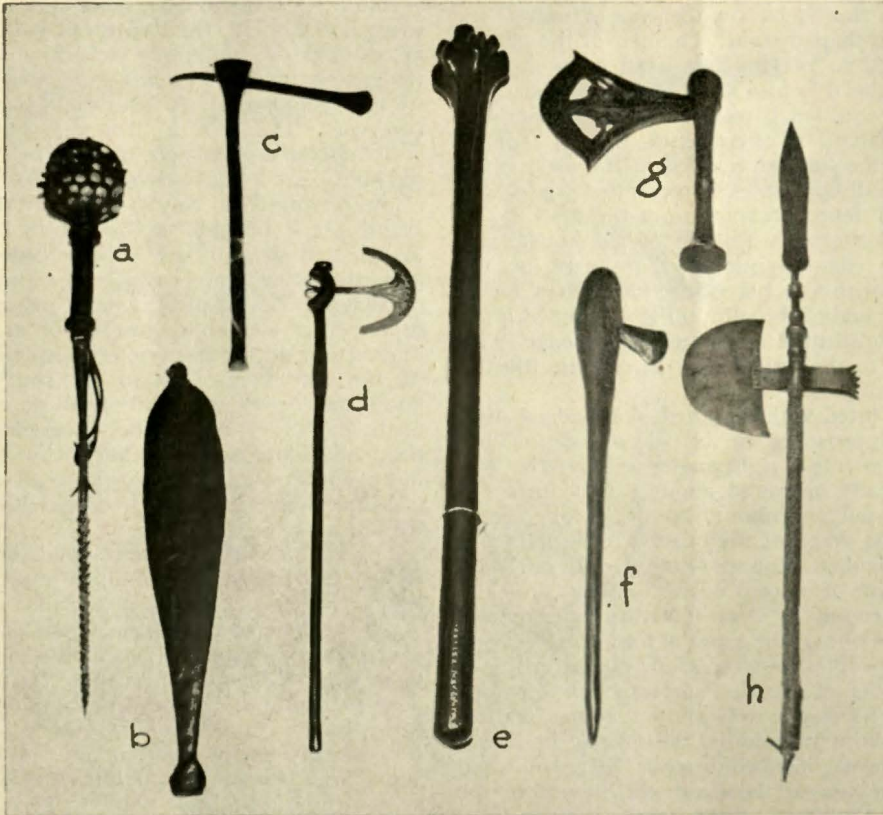


Figure 5.—Native African hand weapons. *a*. Spear-mace with wooden head studded with flat and projecting metal plugs. *b*. Paddle-type war club. *c* and *f*. Simple types of battle-axes. *d*. Battle-ax with thin, engraved blade. *e*. Knob-headed scepter, war club of tribal chief. *g*. Battle-ax from the Congo country with ornate iron head and copper handle. *h*. Spear-ax, apparently modeled after medieval halberd. Handle is covered with snake skin. Museum of Department of Nervous Diseases.

nese, who developed a crude weapon which looked much like a heavy sledge (Werner [1932]). In subsequent periods these hammers became more ornately decorated, in keeping with the other weapons of the Chinese. One such hammer is to be found in the Museum of the Department of Nervous Diseases. The

force could crush the skull like an eggshell.

It was in medieval Europe that the battle hammer was most fully developed. This may be attributed to its specific adaptation as a weapon *contra* armored opponents. As far as can be learned from available sources, this weapon was used by the Celts and early Ger-

manic tribes (Jähns [1878]), who in turn may have inherited it from the Saracens. At least Potier (1907) described the heads of two such weapons which he discovered in a bazaar at Sarajevo (now in Jugoslavia); both were beautifully engraved and inscribed in Arabic. Whatever may have been their true origin, it is obvious that they came to play an important part in affairs military in the Middle Ages. The general pattern of these *martels-de-fer*, as

that a sharp blow with a small-headed instrument of this sort was capable of doing just this. The pick or ax end of the hammer was designed to be inserted between the chinks of the enemy's armor in an effort to unhorse him. It was also capable of making a hole in his helmet and producing in turn a penetrating wound of the skull. The handle, or helve, was also of metal as a rule. Many of these war hammers were very ornately decorated and are now preserved in museums as pieces of the armorers' art. This would lead one to believe that such weapons were a part of the equipment of kings, nobles, and wealthier knights. On the other hand, an armorer's copy of such a weapon now in the Museum of the Department of Nervous Diseases is quite simple, suggesting its use by any mounted soldier (Figure 6). This is a true example of a *martel-de-fer*.

The hammer head presented a number of different styles. Some were cylindrical or square with a flat surface, much as that of a hammer of more utilitarian function. Others were marked with a number of jagged corners to increase their efficiency as penetrating instruments. In still others a peen type of head was made, which in some instances was surmounted by a short spike or button. Sometimes a double head in series was constructed, the purpose of which (other than as a possible decorative feature) is not clear. In some instances the terminal end of the handle was surmounted by a spear point, a knob, or a bar; in others the head was perfectly flush with the end of the helve. The handle was usually from 18 to 24 inches long, although some had handles as long as 3 feet (Jähns [1878]).

A long-handled type of weapon was also developed for the foot soldier. As a rule, however, the hammer feature was combined with a pike or spear, a pole ax, or a mace. Thus a multiple-purpose pole-arm was developed in which the presence of the hammer was but in-

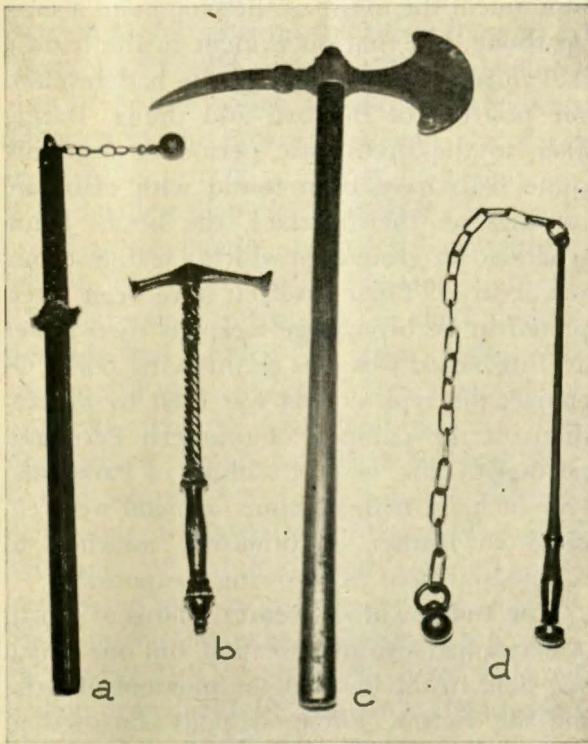


Figure 6.—Hand weapons of Medieval Europe. *a* and *d*. Weapons of the ball-chain-handle type (*a* is an armorer's model; *d* is original). *b*. Battle hammer, armorer's model. *c*. French battle-ax, ancient type. Museum of Department of Nervous Diseases.

they were designated, was that of a hammer head at one end and a slightly curved pick or narrow blade at the other. The hammer head was designed for a specific purpose—to strike a blow at the helmet of an enemy in an effort to render him unconscious and therefore helpless. It was evidently learned by experience

cidental. It was probably not especially efficacious, since it does not seem to be very widely used.

HAND WEAPONS OF THE BALL-AND-THONG TYPE

Perhaps the most interesting, if not the most common, of the various hand weapons are those which Cowper (1906) has designated as of the "ball-and-thong" type. These weapons are defined as a ball or bar of wood, stone, or metal which is attached to a thong or chain which may be held in the hand or more often attached in turn to a shaft or haft, usually of wood. The term *sling hafting* is sometimes applied to them. This group of weapons has been subdivided by Lane-Fox (1874) into three groups: (1) "morning stars," (2) flails, and (3) "holy-water sprinklers." Cowper suggests that this type of weapon is of Mongol origin, the earliest ones resembling the whip usually carried by Tartar horsemen. As we shall presently show, the different types of weapons of this group were actually developed and used in a number of countries, apparently independently of each other.

Cowper (1906) has elaborated a classification of these ball-and-thong weapons which seems to be very satisfactory and which will be used in this discussion. Four classes of weapons are to be distinguished: (1) those in which a ball is attached to a thong held in the hand, (2) those in which a ball on a thong or chain is attached to the end of a wooden shaft, (3) those in which a handle has two or more chains attached, each chain terminating in a knob or heavy ring, and (4) those in which a bar is linked to a staff.

Ball-and-Thong Weapons.—These are obviously the simplest of the various possible types of sling-hafted weapons and seem to have been used since earliest historical times, either as a weapon of war or as a hunting arm. Early Assyrian monuments show what appears to be a ball-and-thong weapon in the hands of

the king, who is in the act of slaying a young lion. The remains of the Propylaeum, or outer gateway at Khorsabad, show what is evidently a heavy thong of some type in the right hand of the king. A similar figure is to be found at the grand entrance of the city and at the entrance of the palace of Sennacherib at Kouyunjik (Layard [1853]). It is presumed that there was some sort of weight at the end of the thong, although in the above sculptures this is not clearly evident. In still another monument the figure of the king holds a similar thong, but there is evident in the hand a ball of some sort, as though he had reversed the position of the ball and thong. Dating back to the prehistoric period of Scotland, stone balls have been found with elaborate carvings on their surface, the bosses being separated by grooves in which a leather thong was secured. These artefacts have been interpreted to be bronze-age weapons used either as sling-hafted weapons or throwing bolas. Of course, the typical bola was used by the Indians of the pampas, of southern Peru and northern Chile, as well as those of Patagonia. One or more balls of stone or metal were encased in leather or otherwise attached to thongs and used as throwing weapons.*

The Indians of the central plains of North America had a similar weapon, but one which was held in the hand at the moment of striking the victim. These weapons consisted of oval stones with a rawhide thong fastened by means of a shallow groove about the middle of the head. One such weapon is found in the Museum of the Department of Nervous Diseases (Figure 4). According to Evans (1872), the Eskimos had a similar weapon in which the strip of hide used for a thong passed through a hole in the stone head. We thus see

* There is in the Smithsonian Institution a skull of a South American (Argentinian) Indian which presents a depressed fracture in the parieto-occipital region which was produced by a bola. Though it is true that this weapon was used to entrap the legs of horses and other animals, the fact that it was also an offensive weapon is often overlooked. It was capable, as this skull so eloquently testifies, of producing a serious and even fatal injury to the head.

that the most ancient of this group of weapons has survived down to our own day.

Ball-Thong (or Chain)-Staff Weapons.—

This type of weapon is apparently not so ancient. It can be traced back only to the time of the Romans. One type of ball-thong-staff weapon was used in the gladiatorial combats, the combatants being armed with a club at the end of which were several thongs terminating in leaden bars. Still another type, evidently a military weapon, was one in which the thong terminated in one or more bronze rings. Meyrick (1854) illustrates three of these rings (Plate XLV) and writes: "Three dentated rings of bronze which appear to have been suggested by the murex shell and placed on the whirling arm of a military flail. This was of the smallest diameter near where it was attached to the handle, so that the centrifugal motion only tended to fix the rings tighter."

Similar weapons were used by the Kalmuks, Mongols, and Chinese (Cowper [1906]). According to Evans (1872) the ball was made of iron and weighed about two pounds. The thong passed through a hole in the ball. The Kalmuk weapon, which had a handle thirteen inches long, was used in hunting wolves. Several types of ball-chain-staff weapons were used by the soldiers of India, one of which is shown among the various arms from this country (Figure 2). One unusual type of Oriental weapon described by Jähns (1878) had a complex trefoil terminal piece.

In England a weapon of this type with a spiked ball (hence the term *morning star* sometimes applied erroneously to this weapon [Demmin]) came into being about the time of the Norman Conquest and was used for a period of some four hundred years. But it was in Slavic and Teutonic Europe that this type of hand weapon came to be extensively adopted. Among the Russians the *knute* consisted of a heavy iron ball attached to a short handle by a strip of leather (Jähns [1878]).

Among the Germanic peoples it came to be known as a *Flegel*. It was also one of the popular weapons of war among the Swiss.*

The variety of this type of weapon as displayed in the various museums and shown in the occasional monograph dealing with weapons of war is almost endless. In length of the handle, the means of attaching the chain to the handle, the length and type of chain, and the size, shape and markings of the terminal-ball one can find almost any combination. At one end of the list is found the very short-handled weapon used in South Germany, in which even the links of the chain near the terminal ball are marked with lateral knobs (the *Schlachtgeissel*) (Jähns [1878]). At the other end of the series we have the weapons with very short chains, at times only a figure-of-eight link, which attached the metal head to the short shaft seldom over two feet in length. In between we have shafts and chains of varying lengths. The wooden shafts, usually round but sometimes square, may be bound or splinted with metal. Some are helved with fairly long shafts (four to five feet). The chains have variously sized links; instead of a chain one may find a series of long metallic shafts (Potier [1902-5]).† These longer-shafted weapons were said (Boutell [1870]) to have been used in the defense of walls, where the defenders had better opportunity to make a wider swing at their adversaries.

Oddly enough, a very similar type of weapon was used by a number of the Indian tribes of North America. The Sioux and Shoshone Indians used a weapon designated by them as a *Poggamoggon* or *Puckamoggon*, which is described by Worcester (1945) as follows: "A war club made of a round stone enclosed in leather and slung to a shank in the form of a whip. It was developed from the war club formerly used, and adapted to mounted combat."‡ It is stated on good authority

* According to Cowper (1906) a number of the pieces of statuary in Europe show this type of weapon as a part of the soldier's equipment. Among those cited are pieces in London ("Magog" of the Guildhall), Nauenberg and Verona. This would imply that it was a weapon used quite commonly.

† There are a number of fine examples of the *Puckamoggon* displayed in the Southwest Museum, an institution devoted to a study of Indian life of the Western United States. The present writer is obligated to Mr. Edwin F. Walker for his courtesies in letting him inspect these and other Indian weapons.

‡ In the Museum of the Department of Nervous Diseases at the College of Medical Evangelists there is to be found a curious type of ball-chain-staff weapon of Chinese ancestry which was secured through the efforts of an elderly Chinese gentleman, Mr. F. See On. It is made up of a brass handle bound with red cord to which is attached, through the medium of three brass bars eight inches in length and connecting rings, a terminal, pointed head of iron. It is evidently some sort of weapon of the flail type. This item is shown in the accompanying illustration (Figure 3) of Chinese weapons. The present writer has seen two other examples of this peculiar instrument, which seemed to be of European origin. Unfortunately its history is unknown.

that this type of weapon was used by the Indian women in "mopping up" on the field of battle by crushing the skulls of wounded enemy braves. The Apaches of Arizona covered a rounded stone with the tail skin of a buffalo and placed within this skin a pliant stick which gave some rigidity to the thong. The Algonquin Indians used a similar type of weapon.

Multiple Chain-Ball-Shaft Weapon.—In this group of sling-hafted weapons, multiple thongs or chains were attached to the end of a handle, each chain terminating in a metal knob or heavy ring. This sort of offensive weapon, apparently adapted from the Roman scourge or the cat-o'-nine-tails, may actually have had some other derivation. It seems to be chiefly an oriental weapon, although a modification of it was used in medieval Germany. The extant Japanese example described by Lane-Fox (1872) consisted of a metal handle about thirteen and one-half inches long, with two chains somewhat longer than the helve, each terminating in a small spiked ball. A generally similar weapon has been found in southern India (Madras Presidency) with a fifteen-inch handle and two nineteen-inch chains, each ending in a plain ball. Other Indian weapons are characterized by multiple (four) chains with terminal rings or quoits (Demmin [1894]). The German weapon (called the scorpion) was used in the fifteenth century and consisted of four hafted chains ending in rings of larger size than the links of the chain.

Flails.—The fourth type of thong or chain-hafted weapon is the flail, a weapon which has been adapted directly from the agricultural instrument of the same name. The essential principle of this weapon is to increase the force of a delivered blow by having the terminal piece, or swingle, sweep through a larger arc than the handle. The exact derivation of this weapon is uncertain, but the evidence

points to its origin from the common flail used to thresh grain, for its first appearance on the field of battle dates back to the time of the Peasants' Revolt. It is possible, however, that it has a much older ancestry, for some odd-shaped elongated stones have been found which are thought to have been used as swingles of paleolithic war flails. Whatever may be the case, it is certain that once introduced in Central Europe about the fourteenth century, this weapon came to be used for some two hundred years by the armies of Russia, Germany, and Switzerland.

Two types of flails were developed; a short-handled one for the foot soldier and a longer one which came to be used in the defense of walled places, much in the same manner as the long-handled ball-and-thong "morning stars." The short flails were sometimes designated as "holy-water sprinklers." In either type the handles were usually made of wood. In most cases the hammer, or swingle, was also made of wood, and under these circumstances it often bore a series of iron knobs or spikes either driven through the wood or mounted on iron bands. In some instances the entire swingle was made of iron, however, and consisted of a short bar eight to ten inches long. The distal end of the bar was sometimes larger than the shaft, the sharper corners and edges increasing its traumatizing efficiency. An unusual type of flail was reported by Demmin (1894) as being found in Geneva, Switzerland. In this case the hammer consisted of an expanded, oval, open meshwork of iron. This was slotted into the end of the handle so that the hammer could swing in only one plane. This is in contrast to most flails whose two or more links permitted wide movement of the terminal segment.

THE BATTLE-AX

As a hand weapon of war, the battle-ax has had a history as long and as varied as the war club or its more refined offspring, the battle

mace. Though related to the cutting weapons because of its blade, it resembles also the mace in that its effectiveness is partially dependent upon its weight. Because of the greater number of possibilities in the size and shape of the blade, and because of the variability of its hafting we shall find that the story of the ax as a weapon is one with many ramifications. Certainly there is no more interesting subject in the field of armamentation. Its effectiveness as a weapon in the production of cranial injuries is not to be gainsaid, as the testimony of its users and the silent evidence of its victims, ancient and modern, so well aver. But before we dip into its story, a few words as to the weapon itself will be in order.

All axes, whether weapons or instruments of more peaceful pursuits, consist of a bit or blade, a head or poll, and a handle or helve customarily attached to the ax proper by an eye or socket, but originally by other means. Any description of a battle-ax must necessarily include pertinent details about these various features. We shall learn that since each of these features shows such manifold variations it is almost impossible to classify such weapons. Most writers on the subject prefer to describe the development of the weapon on a national basis. We shall be wise to follow this same course.

The ax as an instrument of warfare has indeed a hoary history. It seems to have arisen practically as soon as the club itself in this respect. We find that in the prehistoric epochs of most countries some form of stone ax is to be found as an important instrument of their stone-age civilization. It must be accepted as axiomatic that these axes were made originally for some more utilitarian purpose than to cleave the skulls of one's enemies. Their usefulness in the erection of shelters, in the shaping of wooden tools, and in the making of boats must have been paramount objectives kept in mind during the long hours spent grinding out the individual pieces. But that it did not take long to learn of their deadly effect as a weapon must also be admitted, for with the occupational pieces we find also those

whose specific use as a war implement is clearly shown in the contemporary sculptured monuments as of Assyria and Egypt. That this gruesome fact perhaps was learned as a lesson of the chase is suggested by one of its earliest-known pictorial representations, a tablet from a primitive grave at Senkareh by Loftus (Rawlinson [1879]), which shows a combination of ax and mace or hammer being used in an attack on a lion. In some of the Assyrian bas-reliefs of hunting scenes the king is found to carry an ax in each of two extra quivers of arrows. It is in the sculptures of Assyria that we also find unequivocal evidence that the ax was used as a war weapon. It evidently became more popular with the passage of time, for it is reported that "toward the close of the empire . . . there were distinct corps . . . of axe-bearers" (Rawlinson [1879]). This same author points out that two types of battle-axes were used. "Some were made with two blades, like the *bipennas* of the Romans, and the *labra* of the Lydians and Carians; others more nearly resembling the weapons used by our own knights in the middle ages, having a single blade, and a mere ornamental point on the other side of the haft." The neighboring Scythians also used a double-bladed ax of similar type.

But more than three thousand years before Asshur-bani-pal led his corps of ax bearers into the final wars of the empire, the predynastic Egyptians carried their double-bitted stone axes at their sides as they went out to hunt the lion. And during the long history of dynastic Egypt we find in the bas-reliefs and paintings abundant evidence that the battle-ax was one of the characteristic hand weapons of the armed forces. At least four characteristic types were used—the hatchet, the battle-ax, the pole-ax or mace-ax, and the falchion or sword-ax.

The *hatchet* was a simple weapon of characteristic type. The wooden helve was from two to two and a

half feet long, with a forward curve to the handle which often terminated in a foot-like expansion ("gazelle's foot"), at times very much like that on the lower end of a modern ax. The handles of the hatchets of members of the royal house (as those found in the tomb of Ahmose I) were often covered in whole or in part with gold. Several specimens preserved in the Museum at Thebes and in the British Museum (Wilkinson [1879]) were bound or wrapped with thongs of leather which served to prevent the handle from splitting from its upper end where it was slotted to admit the blade. At times at this upper end a woven leather case bound the head in place. The expanded tangs of the blade were held in place by bronze pins. The blade was roughly rectangular, with concave upper and lower margins and a convex bit or cutting edge. The blade, usually of bronze, was at times engraved, damascened, or cut away to form a lattice-work of some figured design.* On the march, the hatchet was carried in the hand or suspended on the back, blade downwards. This weapon was apparently used also as an engineering tool in breaking down gates in sieges and felling trees to construct war-engines for assault on walled cities. The multiple purpose of the hatchet did not detract from its efficacy as a weapon, for it was widely used. Moreover, there is evidence to support the idea that it was used specifically in producing wounds of the head.†

The *battle-ax*, on the other hand, was a longer-handled and somewhat differently constructed weapon. The flat bronze or steel blade consisted of half a circle or the smaller segment of a larger circle, from which smaller circles had been cut out of the back. The longer type of blade thus became in fact a *vouge* or glaive. These fenestrations of the blade served to make it a more decorative and lighter piece. In some of the more ornamented battle-axes the edges of these openings were reinforced by a thickened lip. The length of the half-circle blades was ordinarily from 6 to 8 inches; the arc-segment blades were somewhat longer, usually from 12 to 15 inches. The three tangs at the back of the blade were inserted into a helve of wood or metal and fastened in place by metal nails. From the bas-reliefs or paintings, the handles of the semicircular blades were relatively short, being *circa* 18 inches to 24 inches in length. The arcuate blades, on the other hand, were bound in longer handles, estimated to be from 3 to 4 feet in length. Ornamental bands were sometimes added at the sites of insertion of the tangs into the handle. In some of the more ornate battle-axes, the handles consisted of a silver tube, in which originally a wooden handle may have been inserted.

* On one of the hatchets of Ahmose I, already referred to, the middle damascened figure shows Pharaoh striking a captive on the head (Breasted [1912]).

† The implication that the battle-ax was intended primarily as a weapon *contra cranium* is to be found in the battle paintings and inscriptions on the walls of the great temple of Karnak, memorializing the victorious campaigns of Seti I (XIX dynasty—1366 B.C.). The translation of one of these inscriptions reads (Brugsch-Bey [1881]): "Thou hast quenched thy wrath upon nine foreign nations. The Sun-god himself has established thy boundaries. His hand protected thee, when thy battle-axe was raised above the heads of all peoples, whose kings fell under thy sword."

The weapon described as a *pole-ax* was in reality a combination of a round- or oval-headed mace to which an elliptical blade was attached. This weapon is shown in some of the sculptures in the hands of the king. The weight of the metal ball, estimated (Wilkinson [1879]) to be four inches in its longest diameter, must have increased considerably the difficulty in the use of the weapon. Its handle varied between 2 and 3 feet in length. When delivered with skill, the effect of the blow must have been disastrous. Occasionally an entire corps of soldiers was equipped with this ax, but it seems to have been one utilized primarily by officers, and this may have signified their allegiance to Pharaoh, the primary user of the mace-ax.

The *sword-ax* or *falchion* (*Kopsh*) was a rather interesting weapon. It was used also by the Arabs and the Etruscans, the former being enemies, the latter allies, of the Egyptians. This weapon consisted of a heavy blade of bronze or iron, weighted at its back by a reinforcement of these same metals or of brass. The blade was somewhat offset from the handle at an oblique angle, from which it was separated by a simple cross bar. On one of the flanking towers of an ancient Egyptian temple we find a colossal sculptured figure of the king of lower Egypt dispatching a row of enemy prisoners with such a knife-ax by striking them on the head. This weapon was carried by the lightly and heavily armed troops alike and was used by both officers and men. Since the falchion seems to have been preferred over either the sword or the knife, it may be assumed to have been the characteristic cutting weapon of the Egyptians.

Thus it is made clear that the battle-ax in some form was a popular weapon among the Egyptians. It was apparently used by them to an unusual degree in comparison with other armies, except perhaps the Persians, with whom it was almost the national weapon.

The Persians very likely inherited this weapon from the Chaldeans, the Assyrians, or perhaps one of the regional peoples who, like the Bactrians, were commonly armed with a hatchet (*sagaris*), according to Herodotus (1836). Although this writer, in describing the forces and arms in the great army of Xerxes, did not mention the hatchet or ax as a weapon of the Persians themselves, Xenophon (1876) states specifically that axes were carried by soldiers in the army of Cyrus, and Diodorus (1721) implies that in the conflict between Alexander the Great and the Persian hosts of Darius the battle-ax was perhaps the characteristic weapon of the Persians. It was

for this reason that one of the peristyliums of the chariot that carried Alexander's body back to Macedonia was decorated with figures of "Persians that bore battle-axes." Rawlinson (1878) states that the battle-ax was one of the weapons "carried occasionally by the Persian footmen." Since the cavalry was armed much like the foot soldiers, it is probable that the horsemen too carried axes. According to the meager information available, these axes were either bipennate or had a single blade. The handles were relatively short (Rawlinson [1878]).

The legacy of the battle-ax was transmitted down through the centuries to the Persians of the Christian Era, and through them to the Saracens and the peoples of India. It is possible that the use of the battle-ax in Europe of the Middle Ages may have come, directly or indirectly, from the Near East. Certain it is that it was not acquired either from the Greeks or the Romans, who did not use this weapon. The Romans got their first taste of the bite of this weapon in their conflict with the Gauls and later with the early inhabitants of England. But the history of the ax among the early peoples of Europe is another and a later story. We must first consider the hatchet and ax as weapons of the Chinese.

When someone asked the emperor Cheng the best way to prevent war, he replied that it was by reciting in prayer the names of the five weapons—*ta fang* and *t'ai shang*, the swords; *ch'u chang*, the bow; *p'ang huang*, the arrow; *yüang wang*, the crossbow; and *ta Chiang-chün*, the halberd. The emperor apparently did not have available such a weapon as a battle-ax to appeal to, or he would have included it also. It was about the time when the sixth dynasty of Egypt held sway that this weapon was introduced in China (*circa* 2600 B.C.). It is said that one "Hsüan Nü made a battle-axe of gold, and this was the beginning of the use of the axe in China as a military

weapon" (Werner [1932]). Both large and small axes were used. In the earliest types the blade or head was inserted through a hole in the handle. Later there appeared an unusual form of wooden ax with only the edge made of metal. The general pattern of the long-handled and short-handled weapons was more or less independently developed. One of these, which came to be called "the great spear," was introduced during the Shang dynasty (1766-1401 B.C.); this was in reality a glaive whose convex edge was used as an ax. A second type, also used by horsemen, closely resembled the halberds of medieval Europe.

A great variety of short-handled hatchets of almost every kind of material, including jade, were also used, these being utilized to their fullest extent in the Chou dynasty (1122-255 B.C.). According to Werner (1932), many of these were generally rectangular in shape; others resembled a knife thrust into a handle (like some of the Indian steel tomahawks); some were made like an adz with the blade at right angles to the helve, and still others had an angular cutting blade inserted in a handle, serving as a halberd. Some of the axes were decorated and presented a crescentic cutting edge, making a very picturesque weapon. One socket type of weapon closely resembled the semicircular and arcuate types of the Egyptians, the Phoenicians, and others. The design of some of these hatchets suggests that they were developed independently in China. On the other hand, many of the weapons closely resemble the early ones found in Halstatt, Austria, strongly suggesting some link hitherto not understood (Janse [1930]). It seems strange that the true ax was not adopted as a war weapon by either the Mongols or the Japanese.

In that reservoir of arms, the Near East, the intervening centuries had preserved the battle-ax of the Persians, a weapon which presumably had been continuously used by the

tribes of the desert. At any rate, when the Saracens, under the aegis of Mohammedanism, began to invade Africa and Europe, they carried the ax as one of their weapons, though it was not so popular with them as their long, curved scimitars. It is therefore not surprising that the Moors were also armed with this weapon when they invaded Spain. An example of one of their axes is still to be found in the Royal Armory of Madrid (Calvert, 1907).* Some weapons of this type were undoubtedly carried into Central Africa and served as models for some of the axes manufactured by the native tribes. Others were obviously developed *de novo*.

The axes of *native African peoples* may be grouped into several types. The simplest one is simply a narrow blade of iron inserted into a handle of wood [see two examples in Figure 5], evidently a native improvisation. A second type, which is characteristic of the Congo region, consists of a short copper, club-shaped handle with a complex fenestrated or reticulated iron blade armed with prongs or spikes [Figure 5]. A third type is apparently derived from the medieval halberds, a blade, spear, and prongs being attached to a handle [Figure 5]. Still another type is what is known as a "throwing ax" and was evidently adapted from the Moslems, although its history is not clear. Some of the weapons designated as "throwing knives" are in effect axes because of their size and weight. There are probably other native types which have not come to the observation of the writer.

Within the past few centuries it is possible to see traces of the heritage of the Persian battle-ax in the weapons of the peoples of North Africa (particularly Tripoli and Morocco) and of Persia and India. Five types of axes were used: (1) the thin-bladed, crescent-shaped, single- or double-bitted, usually ornately engraved ax (Figure 2); (2) the smaller, triangular, heavy-polled hatchet (*tabar*); (3) the pickax type (crow-bill buckie) (in which a knifelike blade was attached to a helve) (Figure 2); (4) the spear type (Figure

2); and (5) the glaive, which was largely reserved for ceremonial use. Among the variants of the thin-bladed axes, the Khonds especially developed a peculiar type of weapon characterized by a thin, crescentic cutting blade (Figure 2) but presenting some odd variations. The types of axes found in the Malay Peninsula and the East Indies strongly suggest that they were derived directly from the weapons of India, although some special types were obviously native to these regions.

Meanwhile, the indigenous peoples of Europe were developing their own types of weapons. We have available for study descriptions of several of them, including a variety of hatchets and axes, representative of the various peoples of the Mediterranean basin (particularly those of Italy and Sicily), of the Norsemen, and of the early Britons. In a study of the prehistoric arms of Italy, Sicily, and Crete, Mosso (1908) searched the various museums of the region and brought to light several types of axes and hatchets: (1) *Accetta piatta*, or small flat hatchets of copper found in Sicily, a weapon which evidently must have been helved by inserting between the lips of a split handle; (2) *bipennas* of bronze, either flat-bladed or resembling sledges in their shape, found at Micene; (3) *flanged celts* of copper, found in various parts of Italy; and (4) a rare type of bronze *winged celt with widened blade*. Occasional axes of other types were found, along with a number of votive hatchets of no interest to us in this connection.

The axes and hatchets of Britain and of Continental Europe followed in general a similar pattern. Cowper (1906) describes five types of celts or axes which he believes were copied or modified from the polished stone celts. These were (1) a celt with a plain blade, (2) the flanged celt with raised edges mounted on a split beaked shaft, (3) the winged celts, the flanges being beaten out to form a double socket, (4) the pocket type of flanged celt with

* It seems very likely that some of these Persian axes made their way into Europe. Some of the small ceremonial axes used on formal governmental functions in some of the Balkan countries, and to some extent in Austria and Hungary, are almost exact duplicates of similar axes coming from Moslem North Africa. This suggests a common source.

a thinner top flange, and (5) a socketed celt in which the piece was cast hollow, with the end opposite to the edge open to receive the point of a beaked shaft. The last group was usually equipped with rings to help bind the helve in place. The socket type frequently had such rings, but the winged celts had them only occasionally. Cowper (1906) pointed out that the British axes used as weapons were smaller and more carefully finished than those which were tools. Four specific types were developed in Britain by the early Saxons: (1) the adz, a rare type used either as a tool or as a weapon, (2) the ax-hammer, with the hammer end of a mushroom shape, (3) the ax-pick, and (4) the double-bitted ax. Hewitt (1860) has described a number of these prehistoric axes found in Britain, these illustrated examples following fairly closely the classification of Cowper.

The use of the ax as a weapon among the Vikings or Norsemen sheds considerable light on the problem of cranial injury by this type of agent. There were two periods of metal development among these people: the early, or bronze, period and the later, or iron, epoch. During the bronze period several types of weapons were in use, all of them more or less ornately engraved (Du Chaillu [1890]). The most common type was the single-bladed, butt-ended, heavy, sledge type of ax of rectangular outline. A second type of ax was the ax-hammer with an expanded cutting edge and a mushroom type of hammer head at the opposite end of the poll. A third type was a socketed flanged celt with a button type of hammer head on the opposite end of the poll. A fourth type consisted of a flat crescentic blade attached to a helve or handle by a socket, with a button-shaped knob opposite the blade and, surmounting the helve, a weapon which may have been ceremonial. On the other hand, the iron axes were a heavier and cruder type of weapon. They were characterized by the fact

that part of the blade was cut away to leave an expanded cutting edge or bit (Cowper [1906]).

The importance of the battle-ax as a part of the armamentarium of the Vikings is obvious. Ax-bearing figures are not uncommon on ornamented pieces (i.e., the golden horn discovered at Mögeltönder in 1639). It was required by law (Earlier Gulathing's law) that each freeman was to have either a sword or broadax, a spear, and a shield made to certain specifications. It is obvious from this that the ax was considered to be a weapon equivalent to a sword. To ensure the possession of these legally required weapons, meetings (*Vápnathing*) were called from time to time, at which time every *boenar* was required to appear and present his equipment for inspection. For any deficiencies or imperfections a fine had to be paid.

A study of the sagas further brings out the fact that a blow with the ax was frequently directed to the head of one's opponent. This is shown in the story of the death of Silfri (*Vatnsdaela*, c. 41, 42): "Thorkel walked into the room and so near Silfri that he touched his foot; Silfri pushed him away and called him the son of a bondmaid. Thorkel jumped up on the next seat and struck his [Silfri's] head with the axe (*taparöx*); Silfri at once died, and Thorkel said the axe was not too dear." The same fact is implied in the story of the killing of Klerkon with evident exposure of the brain by the ax-cut (Olaf Tryggvason, *Fornmanna Sögur*, I, p. 81): "One day Olaf was in the market-place, which was crowded. There he recognized Klerkon, who had slain his foster-father, Thorolf Lusaskegg; he had a small axe in his hand, and went up to Klerkon, and cut his head down to his brains." *

* A skull recovered from a grave at Varpelev (Du Chaillu [1890]) shows a triangular deficiency in the left frontoparietal region, lying across the coronal suture. This was interpreted as a possible sword wound, but the short, precise cuts with short extension of "splints" from two lower corners of the defect, as well as the absence of true edged grooves on the regional skull strongly suggest that it is more likely the result of a blow from an ax.

The other Germanic tribes in Europe used axes as weapons which were very similar to those used by the early inhabitants of Britain; indeed, they were probably introduced into Britain by the Angles and Saxons when they migrated thither. The antecedent history of this development, however, is not known at the present moment to the writer, and the subject will not be pursued further in this connection.

Interesting as a study of these early European weapons may be, it is clear that the battle-ax which came into use during the Middle Ages is a direct descendant of that used by the Franks. These inhabitants of Gaul came into conflict with the Roman armies from the time of the Caesars, and their posterity came to be characterized as being armed with the ax, the *frangi*, which took its name from that of the tribe. Not only were they armed with this weapon, but it was one used with a great deal of skill, either in its long-handled or short-handled form. The latter was used as a throwing weapon, either to destroy or make ineffective the shield of the enemy, or to deliver a crippling blow to his person. The French inherited this weapon in its pure form, for it was used particularly by them in the various conflicts of the Middle Ages. This battle-ax generally assumed the form of an expanded blade on one end of the poll and either a pick or a blunt-butted hammer head on the other (Figure 6). The weapon was apparently used with both hands, for the handle averaged between three and four feet in length.

The story of the various types of ax-like weapons which were used during the Middle Ages is a long one, too long to consider in any detail. Suffice it to say that three general types, with many modifications of each type, ultimately came into being. The *halberd*, in its many forms, was in reality a long-shafted battle-ax. The ax head, however, was not particularly heavy; indeed, it could not be, when mounted on the long, thin pole so commonly found. With the terminal spear or pike point, and the hook, points, or spear mounted opposite to the blade, it was a multi-purpose weapon

and served to equalize the status of the foot-soldier with that of the mounted knights.*

The second type of pole weapon of this group was really a form of heavy sword- or spear-ax and corresponded to similar weapons used by the Egyptians (the falchion) and the Chinese. There were four distinct types of this sword-ax, or spear-ax, as it might be called, as well as a number of combined forms: (1) the *bill* or *war scythe*, which as the name indicates was in reality a heavy scythe-like blade mounted on a pole, the cutting edge being on the concave side of the elongated blade; (2) the *glaive* or *scythe-knife*, which had a similar outline to the first but with the cutting edge on the outer convex margin; (3) the *guisarme* (or *gisarme*), a more complicated multi-purpose weapon edged on both sides and armed with lateral hooks and terminal spear; and (4) the *voulge*, a weapon used by both the Swiss and the French, which had its edge only on the convex side and was armed with lateral hooks or spears.

The third type of ax was designated as the "*foot-soldier's pole-ax*." This was a heavy, two-handed weapon with an elongated blade having a sweeping crescentic edge. The handle likewise was heavy, so that it took a strong man to wield it with any degree of efficiency. Every well-landed blow must have been completely disabling to horse or man. Its great disadvantage was that a wide swing of the weapon exposed the defenses of the bearer to any smaller and more easily manipulated weapon with which his enemy might be armed. This type of ax was used by the early Normans as well as by the Scotch, German, and Russian soldiers of the Middle Ages.

With the introduction of firearms the axes, long and short, fell into disrepute and were ultimately discarded altogether. It is of interest, as well as being pertinent to the sequence of the history of these weapons, to know that the soldiers—Spanish, Portuguese, and English—who first entered the New World still carried halberds as part of their armament. Thus the ax types of the Old World came into direct opposition with those of the New. But it was gunpowder, not halberds, that settled the issue in favor of the invaders. The ax weapons in the hands of the Indians with whom they came into conflict may now be considered briefly.

* The halberd was a weapon which was used against the trunk and extremities as well as the head. Ambrose Paré reported the case of a halberd wound of the head in a soldier in the French Army of his day, a wound delivered in a quarrel with one of the victim's fellow soldiers. One of the sharp points of the halberd (presumably the pick opposite to the blade) penetrated the skull and brain, and entered the left lateral ventricle. The wounded man died within a few days in convulsions while his wound was being dressed.

Among the Indian tribes of South America the weapons of the ancient Peruvians are the best known because of the preservation of so many of them. Mention has already been made of their clubs and maces, but any consideration would be quite incomplete without some description of their war axes. Two essential types are known: the long-helved variety, which was almost identical (according to the Guaman Poma MSS [Rowe (1946)]) to the halberds of their Spanish conquerors. These weapons had a flattened blade at one end of the poll with three spikes opposing it; they also had a terminal spear or pike. Evidently more common were the short-handled axes which were composed of a flattened bronze head having either a roughly rectangular blade or one with a flaring crescentic bit. These axes were helved either by the help of two tangs at the back of the blade, which were inset in the handle and bound to it, or by means of an opening in the flat side of the head. In this case the cutting edge was at right angles to the helve, thus resembling an adz. Some socketed axes have also been recovered (Bennett [1946]). These axes were evidently cast weapons, for among the Incas the making of such pieces from molds was a characteristic art. The efficiency of these axes when the fighting came to close quarters was definitely experienced by the Conquistadores, some of whom made the fatal mistake of getting their heads, helmeted or otherwise, within the range of these weapons.*

A study of the early cultures of the peoples in Colombia, Ecuador, Chile, and Argentina suggests that some of the tribes of these countries also used the ax as an offensive weapon. In most cases, however, these axes were of stone, for the art of casting had not been acquired by them.

* Such an experience is recorded by Prescott (1847), being cited from an ancient manuscript, the *Relaciones* of Pedro Sancho. He writes: "Several cavaliers had fallen, one of them by a blow from a Peruvian battle-axe, which clove his head to the chin, attesting the power of the weapon, and of the arm that used it."

As for the Indian tribes of North America (in reality, only those north of the Rio Grande, since the Mayas, the Aztecs, and associated peoples apparently did not make use of the battle-ax as such), mention has already been made of the types of hand weapons used before the advent of the white man. The wooden club, the stone-headed club (which, even though made with a sharp edge could scarcely be considered to be more than a mace), and the crude pickax weapon (in which an antler tip or sharpened stone was thrust through a stick) were among the weapons used. Whereas in ethnological parlance we speak of the sharpened celts and grooved "axes" of the prehistoric Indians, and whereas there can be no question but that such crude instruments served as cutting tools, they were not a weapon capable of producing the clean-edged wound of the skull now recognized as characteristic of the ax or hatchet wound. It was not until the Indians began "trucking" with the whites that they acquired "thousands of our own [metal] hatchets, such as they be," as Strachey (1849) so quaintly put it. In fact, these so-called "trade-axes," or hatchets, came to be one of the standard items of commerce between the Indians and the fur traders. The English and French vied with each other to supply these tomahawks, which came to replace entirely the war clubs of the Indians' forefathers. These iron or brass hatchets were used as both hand and throwing weapons, the Indians by practice becoming very adept in their use. Both in intertribal warfare and in conflicts with the whites this weapon was indeed found to be "extremely destructive in hand-to-hand fighting" (Worcester [1945]).†

† This destructive effect was not infrequently expended upon the head of the victim. We learn that some of the early Christian martyrs on the American continent met death in this way. It is said that Father Isaac Joques at first escaped the fate of two of his companions at the hand of the Mohawks, but that "eventually his tomahawked head was spiked on the Indian palisades." The famous Pontiac finally met his death at the hands of Indian associates, being found dead with a tomahawk embedded in his brain after a drunken debauch. There are at least two specimens of crania in the Smithsonian Institution (Museum Nos. 5249 P. S. and 5528 P. S.) which show tomahawk wounds of the skull.

To make such implements doubly attractive, they were often equipped with a pipe bowl at the opposite end of the poll, the handle being bored to serve as the stem of the pipe.

One of the by-products of the introduction of metal hand weapons among the Indians was the development of a special type of tomahawk similar to the older pickax clubs and probably patterned after them. In these cases a small spike of metal was embedded into a ball-headed club to make a perforating wound, or a triangular blade of steel was inserted into a flattened helve whose upper end somewhat expanded and bent away from the blade in the shape of a gunstock. While some of these tomahawks, handsomely decorated with paint and brass studs, became ceremonial weapons and insignia of authority in the hands of the chiefs, many of them were true battle weapons, and many a cranium was undoubt-

edly penetrated by the blade of this deadly instrument. It was used quite extensively by the Eastern tribes, particularly the Iroquois.

With this weapon, more or less native to the original inhabitants of our country, it is best to close this review of one aspect of "man's inhumanity to man," of his diabolical desire to cleave the skulls of those who happen to be on the "other side." In this study of his efforts to create something with increasing effectiveness to this end we have a glimpse into his contemporary knowledge of the seriousness and lethality of such cranial wounds. We have also learned something of the actual effects of such weapons in the little side lights which have come down to us through the ages. By this method we have had the opportunity to study, albeit somewhat obliquely, another facet of the many-sided question of the history of cranial injuries.

EDITORIAL NOTE: For the historical section of the Departmental Museum the author of this article is at the present time making a collection of such hand weapons as were used more particularly to produce cranial injuries. He requests correspondence with any of our readers who are in a position to secure native or modern weapons of the nature of war clubs, battle axes, maces, or battle hammers of the North American Indians (especially of the Northwest United States, Canada, and Alaska), the people of Mexico and Central America, South America (especially Peru, Ecuador, the Guianas, Brazil, Argentina and Chile), Australia and the South Sea Islands, China, Japan and India, and the various native peoples of Africa.

Any reference to helmets, particularly those used by native peoples, will also be much appreciated.

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