

European Arrowheads and Crossbow Bolts

From the Bronze Age to the Late Middle Ages

By Carsten Rau

EUROPEAN ARROWHEADS AND CROSSBOW BOLTS

From the Bronze Age to the Late Middle Ages

Carsten Rau

With 473 illustrations and 445
hand-drawn sketches



Barbarus Books Berlin

Imprint

Copyright: © 2017 Carsten Rau
Address of author and publisher:
Treskowallee 36
10318 Berlin
Germany

Barbarus Books Berlin
ISBN 978-3-00-056255-6

1. Auflage 2017

Bibliographic information of the Deutsche Nationalbibliothek.
The Deutsche Nationalbibliothek records this publication in the
Deutsche Nationalbibliografie; Detailed bibliographic data are
available on the Internet at <http://dnb.d-nb.de>.

All rights of dissemination also by film, radio and television,
photomechanical transmission, phonograms of any kind, excerpt
reprinting or storage in data processing systems of all kinds, are
reserved and require the permission of the publisher.

Printed in Germany
Printed on acid-free and chlorine-free bleached paper

Cover design: Carsten Rau
Photo proof cover: © Carsten Rau. Various arrowheads and
crossbow bolts

Foreword

European arrowheads and crossbow bolts are relatively underrepresented in the literature and are usually treated only as minor aspects. Manifold monographs on arrowheads from individual cultural areas in Europe have been published that examine regional form-types that this book cannot offer. However, there is a lack of an overview of the various forms of European arrowhead typologies. This book intends to close this gap and give the reader an insight into the world of arrowheads and crossbow bolts. A complete depiction and description of all arrowhead forms and types cannot be given in this book and would, in fact, be unreliable due to the variety of European arrowheads and crossbow bolts. More profound occupations in regional and temporal special forms of arrowheads can only take place by means of specific subject literature. Further publications on specific arrowhead forms are enumerated in the bibliography. This list of literature allows readers the opportunity to immerse themselves in the topic.

The book is divided into three main chapters because there is a metallurgical distinction between bronze and iron as well as a mechanical distinction between the bow and the crossbow. In all three chapters, unique formal-typological distinction criteria have been developed, even though the epochs overlap in time.

I have attempted to include as much as possible about the most important, frequent and sometimes unusual and rare form-types in this book. For the determination of arrowheads and crossbow bolts, this guide is useful as a directional guide. However, the location of arrowheads and other associated finds must be available in order to make more precise chronological classifications.

Where no pictures and illustrations could be obtained for this work, hand-drawn sketches of the different form-types were made. The spectrum of arrowhead types is, to a large extent, presented here in order to offer a comprehensive reference for the reader.

It is sometimes difficult to distinguish between spearheads and arrowheads. In this book, only arrowheads, which are cataloged as spearheads in other specialized literature, are outlined. However, a directive or a specific weight cannot be used as a characteristic for an accurate categorization, whether or not a spearhead or an arrowhead is available. On the other hand, developments and regional preferences in weapons manufacturing and general armaments have been different across Europe. All the arrowheads presented in this book are therefore only of this typological form group.

The differentiation in hunting and weapon technology provenance is not always clear, because accurate statements cannot be made on the basis of missing or incomplete associated finds. As far as cataloging permits, the nomination of the construction purpose is given in the descriptions of the arrowheads.

The arrowheads and crossbow bolts shown in this book have not been imaged to the correct sizes, and I have a special eye on improved visibility. The corresponding measuring units are shown in the respective figures.

Carsten Rau, Berlin, September 2017

Legal notice

Please respect the legal regulations and laws of the purchase country before buying an antique. While there are more liberal provisions on national artifacts in Great Britain, export regulations are only possible in Greece, Ukraine and Turkey in narrow legal frameworks and often require authorization. If you have made a finding, you may consider the laws of your state to notify a competent authority.

Acknowledgment

This book could not have been created without the help of the private collectors whose expertise I was able to access. By providing their collections, they have helped me present detailed illustrations in this book. Their respective collections have grown over the decades and usually represent exact chronological images of specific cultural areas.

I would especially like to thank Victor K. Norin of Russia for providing the Scythian and Southeast European bronze and iron arrowheads. For the genesis of the Iberian chapter, I would like to express my sincere thanks to Olga Melina, whose large collection I was able to examine and present in this work. Last but not least, I would like to express my gratitude to Keith Millers of Australia, who has built an impressive private collection of medieval European arrowheads and crossbow bolts. His collection is also presented in parts of this book.

Table of contents

Chapter I - Bronze arrowheads	1
Arrowheads from the Early and Middle Bronze Ages.....	4
Nomenclature of an arrowhead.....	6
Middle Bronze Age to the beginning of the Urn Period.....	13
Greek cultural area I.....	14
Middle and Late Bronze Age Central Europe.....	16
Leafblade arrowheads.....	19
Arrowheads from the Late Bronze Age.....	27
Willow-leaved arrowheads.....	28
Arrowheads with shaft tangs France.....	29
Greek cultural area II.....	30
Arrowheads with thread fastening.....	35
Socketed arrowhead of the Late Bronze Age and Early Iron Age.....	38
Bodkin arrowheads.....	39
Hallstatt Period.....	40
Shaft-arrowhead of the Late Bronze Age.....	41
Scythian cultural area.....	42
Arrowhead money.....	43
Iberian Peninsula.....	64
Greek cultural area III.....	73
Bronze arrowheads in the Middle Ages.....	76
Chapter II - Iron arrowheads	77
Nomenclature of an arrow.....	79
Roman three-sided arrowheads.....	80
Roman spicular arrowhead.....	85
Roman bolts.....	86
Celtic arrowheads.....	89
Sarmatian arrowheads.....	90
Germanic arrowheads.....	91
Franconian arrowheads.....	93
Arrowheads of the Migration Period.....	95
Arrowheads of the Eurasian Avars.....	98
Slavic arrowheads with barbed hooks.....	101
Arrowheads of the Middle Ages.....	102
Arrowheads of the Vikings.....	103
Arrowheads with barbed hooks.....	106
Arrowhead with twisted socket.....	108
Arrowhead with four barbed hooks.....	111
Arrowheads with only one barbed hook.....	112
Arrowheads with long barbed hooks and short sockets.....	113

Table of contents

	Arrowheads with bent barbed hooks.....	114
	Arrowheads with simple socket shafts.....	115
	Rope Cutter arrowheads.....	117
	Blunt arrowheads.....	118
	Cone arrowhead.....	119
	Arrowheads with square cross-section.....	120
	Tetragonal Bodkin arrowheads.....	121
	Leafblade arrowheads.....	122
	Leafblade arrowheads of triangular shape.....	124
	Triangular arrowheads.....	127
	Arrowheads with short blades and long sockets.....	128
	Fire arrowhead with open-work blade.....	129
Tang fixation	Arrowhead with barbed hooks.....	130
	Arrowheads with several barbed hooks.....	134
	Leafblade arrowheads with oval lancet-shaped form.....	135
	Arrowheads with rhombic cross-sections.....	142
	Arrowheads with small rhombic cutting edges.....	144
	Arrowheads in rhombic form.....	146
	Leafblade arrowheads in diamond shapes.....	148
	Spontoon arrowheads.....	150
	Arrowheads with triangular shapes.....	154
	Chisel-like arrowheads.....	155
	Arrowheads with splayed, flat, rhomboid blades.....	157
	Hunting arrowheads.....	158
	Rope Cutter arrowheads.....	160
	Bumber arrowhead.....	162
	Three-sided arrowheads.....	163
	Blunt Bodkin arrowheads.....	168
	Tetragonal spicular Bodkin arrowheads.....	170
	Pyramidal arrowheads.....	172
	Fire arrowhead.....	176
	Mongolian arrowheads.....	178
Turkish arrowheads.....	183	
Arrowheads without fixations.....	184	
	Chapter III - Crossbow bolts.....	185
Socket fixation	Nomenclature of a crossbow bolt.....	189
	Crossbow bolts with square cross-sections.....	192
	Crossbow bolts in lancet-shaped form with square cross-sections.....	195
	Socketed crossbow bolt of a special spicular form.....	197
	Socketed crossbow bolts with long square cross-sections.....	198

Table of contents

	Socketed crossbow bolts in rectangular spicular form.....	200
	Socketed crossbow bolt in rectangular form.....	201
	Socketed crossbow bolts in rhombic lancet-shaped form.....	202
	Wall-piercing crossbow bolts in rhombic form.....	210
	Socketed crossbow bolt with three-sided tip.....	211
	Socketed crossbow bolt in tetragonal conical form.....	212
	Socketed crossbow bolts in lancet-shaped form.....	214
	Socket crossbow bolts with barbed hooks.....	216
	Socketed Rope Cutter crossbow bolts.....	217
	Socketed crossbow bolts with splayed, flat, rhomboid blades.....	218
	Madeisen.....	219
	Small hunting crossbow bolt.....	220
	Socketed blunt bolt.....	221
	Socketed military blunt bolt.....	223
	Crown bolts.....	225
	Socketed fire crossbow bolts, arrowheads and projectiles for firearms..	229
Tang fixation	Tanged spicular crossbow bolts with square cross-sections.....	231
	Crossbow bolt with round cross-sections and twisted tang.....	224
	Tanged crossbow bolts with rhombic cross-section	235
	Tanged crossbow bolts in lancet form.....	236
	Tanged crossbow bolts with barbed hooks.....	237
	Tanged crossbow bolts with splayed, flat rhomboid blades.....	238
	Tanged Rope Cutter crossbow bolt.....	239
	Square crossbow bolts with long shaft tangs.....	240
	Military crossbow bolt with a simple fixation.....	241
	Pyramidal crossbow bolts with wide tangs.....	242
	Eastern European and Russian pyramidal crossbow bolts.....	244
	Heavy square bolts with wide tangs.....	245
	Eastern European four-edged crossbow bolts with broad tangs.....	246
	Fire bolts of the crossbow.....	248
	Signal arrowheads.....	250
	Balls of clay and stone of the double-stringed stone bow.....	251
	Rifled guns and ballista arrows.....	252
	Copyright of illustrations.....	255
	Bibliography.....	256

Abstracts of explanatory texts

The basics of determining and dating arrowheads and crossbow bolts...1
Bow and arrow.....2
General about arrowheads.....3
Different European development periods.....5
Time periods of Europe.....5
Production of bronze arrowheads.....7
Arrowhead finds in Europe the Early Bronze Age.....8
The first bronze arrowheads.....8
The socket.....10
A regional example.....11
The midrib.....17
The Late Bronze Age.....24
Bronze plate arrowheads.....37
Why do some arrowheads have a hole?.....49
Bronze instead of iron in the Iron Age.....51
Scythian arrowheads at the early Celts.....62
Roman fire arrowhead.....84
Categorization of arrowheads with barbed hooks.....107
The frequent confusion between the Huns and the Mongols.....179
Classifications of crossbow bolts.....187
Medieval ballista arrows (torsion gun arrows).....254

Chapter I

Bronze arrowheads

THE BASICS OF DETERMINING AND DATING ARROWHEADS AND CROSS-BOW BOLTS

Arrowheads cannot be precisely determined by their shapes. While there are frequently used shape types that occur almost all over Europe, there are regional differences between them, which point to certain regional preferences and influences from other cultural groups. Find spots are helpful for dating arrowheads or crossbow bolts. Historic sites, such as former battlefields, deserted medieval towns or still-used agricultural areas, give initial indications of a time period.

In the case of arrowhead finds, there are usually no further examples, because arrowheads were mostly used for hunting and were often lost by huntsmen. However, associated finds, such as coins or equipment, may occur and lead to more accurate dating and determination. On former battlefields, certain arrowheads or crossbow bolts cannot be assigned to any particular war party, especially from the High Middle Ages, because smithies were adapted and the crossbow bolts in each army looked relatively similar.

Despite their partly delicate appearance, arrowheads and crossbow bolts were not created for beauty, but rather for killing an opponent or animal. Often, arrowheads from the Bronze Age have been badly and simply cast because their manufacturer planned for their loss. It would have been a waste of time and effort to construct elaborate and costly arrowheads just to lose them during a hunt or to leave them to the enemy, because an arrow should only be used once on the battlefield.

Offers from private collectors or auction houses can also provide incorrect dates as well as local classifications. Even well-known auction houses are not immune to mistakes, which, due to diffuse buyers, seem to take over the provenance unchecked. The most frequent misclassification is the dating of arrowheads to the Roman cultural period.

Particularly in Southeast European countries, there are numerous arrowheads of unknown provenance that can originate from illegal excavations. In this case, the buyer should refrain from purchasing them to avoid violating any cultural laws. Artifacts offered as “Roman arrowheads” often come from the Middle Ages and are usually simple hunting arrowheads. In general, the dating of finds to the Roman period allows sales to be increased, thus deceiving buyers. Unfortunately, this spreads misinformation to the buyer and conveys a false picture of a particular cultural area, which cannot be allowed in specialist literature.

BOW AND ARROW

The bow is a simple effective weapon that sends its ballistic cargo to its target quickly and nearly silently. However, the archer must have several skills to use this long-distance weapon. On the one hand, he must know how to focus on the appropriate object as well as the timing of the trigger. He must know his weapon and its function precisely, and he must know the technique to achieve the best possible results. On the other hand, his concentration and strength must be sufficient to hold a drawn bow for a certain time to find a suitable target. Even prehistoric hunters must have invested time into training and practice shots to achieve success during the hunt. The “shootout” only achieves a passable result in the fewest of cases.

The bow and its arrow must match. Faults can occur when the bow or the arrow is made of a material that is too strong. The high demands placed on archers caused the bow to be displaced by crossbows in the Middle Ages and later by firearms.

Arrowheads from the Neolithic Period proved to be surprisingly efficient and goal-oriented, according to several research papers. Although there is a lack of complete arrows from this period, test shots using replicas can simulate perfect hits. An arrowhead made of flint or obsidian cannot be reused after a hard impact. After a hit, the blades become increasingly blunt or deformed. Neolithic hunters tried to restore the sharpness of their blades with subsequent reworking. A hit from a hard object can completely destroy a stone arrowhead. Due to the relatively simple handling of flint and obsidian, few stone arrowheads survived the Bronze Age.

The shape of an arrowhead reveals the hunter’s or archer’s purpose. In addition to the sharpness of the cutting edges and the shape, the dimensions of the arrowhead decide how deeply it will penetrate a body. Arrows that are too light, despite their sharpness, will not cause deep penetration, even though they reach higher initial speeds than heavier arrows, because they lose too much energy during flight. Arrows that are too heavy, however, may also have reduced trajectories if the bow does not transfer sufficient energy to them. The kinetic residual energy that arrives at the target is important for the subsequent penetration, since it determines the depth of penetration in addition to the shape, form and weight of the arrowhead.

Narrow or thin arrowheads can penetrate deep into the body, because less resistance reduces less their energy. Arrowheads with wings can penetrate less deeply into the body, but cause greater organic damage due to their improved cutting effects. The fact that hunting bows were also used for martial or personal conflicts in the Neolithic Period is shown in numerous skeletal finds in Europe, which show stone arrowheads in the bones.

GENERAL ABOUT ARROWHEADS

The entire arrow must match the bow weight to transmit the optimum energy. Over time, an arrowhead-to-arrow weight ratio of 1:7 developed. The arrowhead therefore contributes only one-seventh of the total weight of the arrow. This ratio, however, is not necessarily predetermined. Iron-clad arrowheads reach much higher weights, which interfere with the optimal weight ratio. However, this development led to shorter flight duration and greater penetration power.

The classification of heavy arrowheads as spearheads or small lances, as carried out by some international historians, generated falsified results and was too easy to intend; the classification of larger weight classes alone does not constitute valid proof of a particular construction purpose.

Arrowheads of the Early and Middle Bronze Age
Central Europe 2200 B.C.–1300 B.C.



Weight: 2 g;
length: 3.1 cm

Neolithic arrowheads made of flint were still widely used in the Bronze Age. They were in Bronze Age tombs beside bronze swords and axes, important pieces of grave furniture, which is proof of their long time use. Arrowheads made of obsidian or flint were cheap, easily manufactured hunting weapons.

This exemplar derives from the Early Bronze Age. Finds.org offers a large public database of Neolithic arrowheads.

DIFFERENT EUROPEAN DEVELOPMENT PERIODS

The dating and classification of arrowheads and crossbow bolts, which are published here, are approximations, because different cultural developments in Europe took place at different times.

All periods mentioned here are taken from the Central European area. If more detailed information about a specific European region is required, please consult the specialist literature. The time periods published in this book come from specialist publications but are nevertheless considered suggestions, because the consideration of the development levels of all European regions goes beyond the scope of this book.

TIME PERIODS OF EUROPE

New Stone Age	5500–2700 B.C.
European Copper Age	2700–1900 B.C.
Early Bronze Age	1900–1500 B.C.
Middle Bronze Age	1500–1200 B.C.
Late Bronze Age	1200–750 B.C.
Early Iron Age	750–450 B.C.
Latène Period	450–15 B.C.

As an illustrative example of different regional developments, I have compared Southern Germany to the European continent:

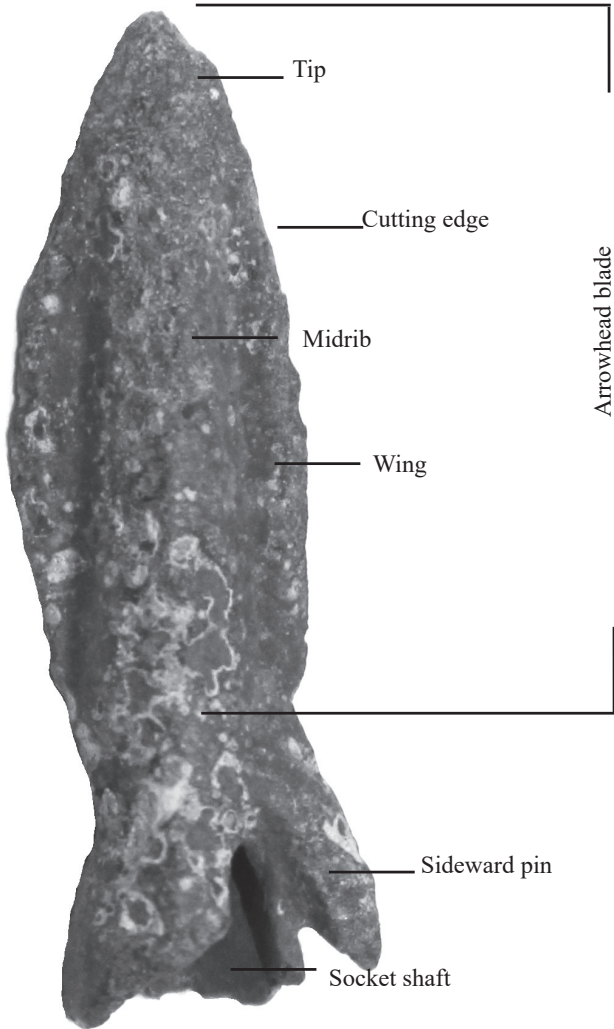
Time periods of Southern Germany

Late Stone Age	2300 B.C.
Early Bronze Age	2200–1800 B.C.
Middle Bronze Age	1500–1300 B.C.
Late Bronze Age (Urnfield Period)	1000–800 B.C.
Older Iron Age (Hallstatt Period)	700 B.C.

(Source: A. Hänsel, “Die Funde der Bronzezeit aus Bayern“)

The Bronze Age for Northern Europe is considered to have been from 1800 B.C. to 600 B.C.

Nomenclature of an arrowhead



PRODUCTION OF BRONZE ARROWHEADS

In the Bronze Age, bronze arrowheads were often poured from clay molds, and the oldest exemplars were poured from simple stone molds. These clay molds could only be used once, because the clay would be destroyed after hardening. There are also early arrowhead forms which were cut out from bronze plates. They were thin, small and only suitable for hunting small animals.

The regional development of arrowheads in Europe can be observed at different times during the Bronze Age. Between the 14th and 13th centuries B.C., new arrowhead forms emerged in the Black Sea region due to changes in manufacturing methods and technology. When the first bronze arrowheads were forged, and later improved by the bronze casting process and subsequent forging, completely cast bronze arrowheads occurred in Europe. The difficulty in manufacturing the socket was eliminated; thus, the amount of work required decreased. Arrowhead blades also changed and became larger in the Black Sea region in the 14th century B.C. and developed into rhombic forms.

In the casting process, the bronze was poured into a matrix with the blade tip of the arrowhead being the actual tail, the venting channel of the mold. After cooling the bronze, the matrix was either removed or destroyed, and the bronze casting seams were burnished away. The cutting edges as well as the tips could be sharpened in subsequent processing. In addition to clay, stone matrices were used for bronze casting, which could produce everyday objects such as fibulae and bronze needles. For this purpose, the underpart and topside of the stone were locked with weights or with pins through pinholes, and the bronze was introduced through a casting channel. For triangular arrowheads, a three-part matrix from the 7th century B.C., which can even form a sideward pin, was retrieved.

The casting had to be refined such that there were no or few gas bubbles; otherwise, the arrowheads and the weapons generally became brittle. Although arrows could only be used once, in order to resist Bronze Age armor such as leather, cloth, wood, linen and small bronze plates, arrowheads had to protrude without deformations. Bronze mainly consists of copper (about 90%) and tin (about 10%), with other metals contributing as contaminants of the alloy.

Lead was added to soften the bronze alloy, which facilitated subsequent cold-forging. If the bronze founders slightly increased the tin content, the bronze became harder, but more brittle. When manufacturing swords, it was a challenge to cast an elastic sword that did not deform during battle and thus become unusable. However, even a hard bronze alloy could render a sword useless if it were to break as a result of brittleness.

ARROWHEAD FINDS IN EUROPE THE EARLY BRONZE AGE

Bronze arrowheads occur with various frequency in Europe due to the continent's great, reciprocal history, cultural differences and different armaments. In some European regions, bronze arrowheads are rare. The few finds in some European regions do not allow for the renouncement of the bow as a hunting or war weapon, but rather as a modified burial furnishing. During the Late Bronze Age and the beginning of the Iron Age, archers were placed lower in society. The recruitment of simple archers in European armies also led to a neglected position within the armed forces. Like the slingers with their stones or almond-shaped lead missiles, the archers came from simple and poor social conditions, and these warriors could not afford elaborate burials. Therefore in warrior burials, often only swords, spearheads, daggers, jewelry and ceramics are found. Rarely are bronze arrowheads found, but they can, however, accumulate massively depending on the region. For the Sarmatians and Scythians, bows were frequent furnishings of male tombs, because the bow was the standard weapon for the general armament of these equestrian tribes.

Bronze arrowheads are often documented without any find context, which indicates their use in hunting. In a warlike context, more stray finds may appear in an area, which often makes it impossible to determine their origin due to a lack of associated finds. In Western and Southern Europe, bronze arrowheads mainly appear in former settlements.

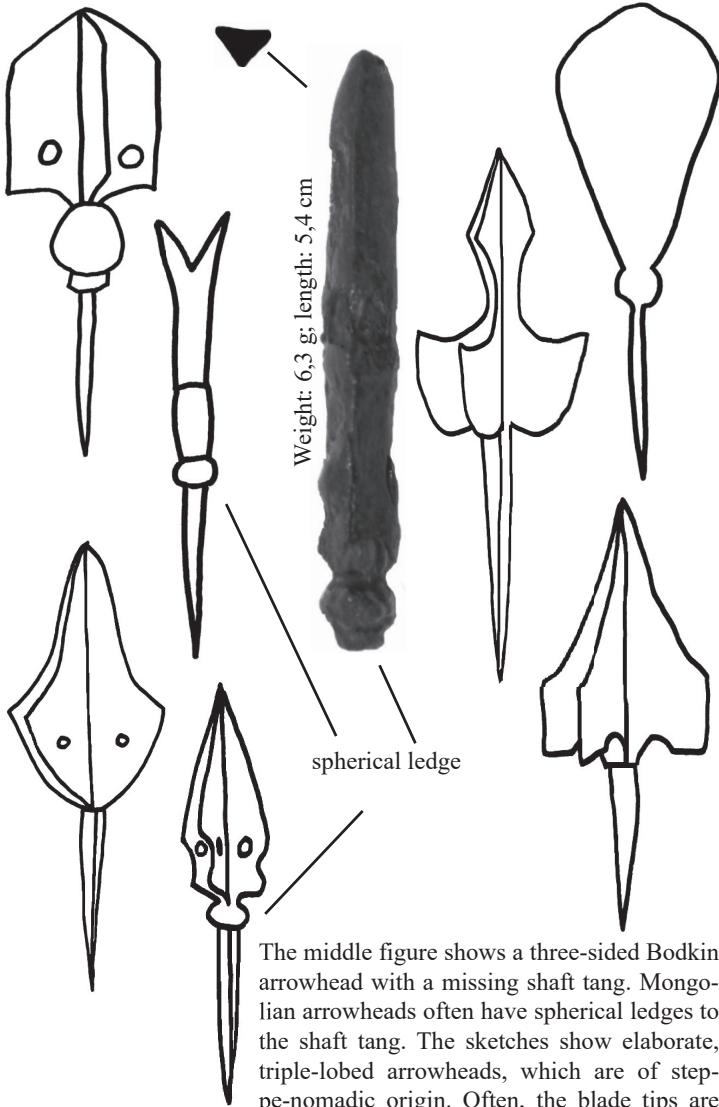
The Bronze Age is divided into different periods. Within Europe, the introduction and development of bronze proceeded in different steps. The influence of foreign cultures brought different developmental shifts in Europe, so a uniform Bronze Age period cannot be assumed. Along with rivers and trade routes, the development of the region as a whole was faster than the development of remote regions, such as the mountainous regions of Iberia.

Due to the rare use of metals for arrowhead production, this book begins from the Middle Bronze Age; in the Early Bronze Age, bronze arrowheads were rarely produced. Only in the Middle Bronze Age were arrowheads regularly made of bronze. For centuries, bone and obsidian remained the main raw materials used to produce arrowheads. In Greece, the production of bronze arrowheads began in greater numbers in the Middle and Late Mycenaean Periods.

THE FIRST BRONZE ARROWHEADS

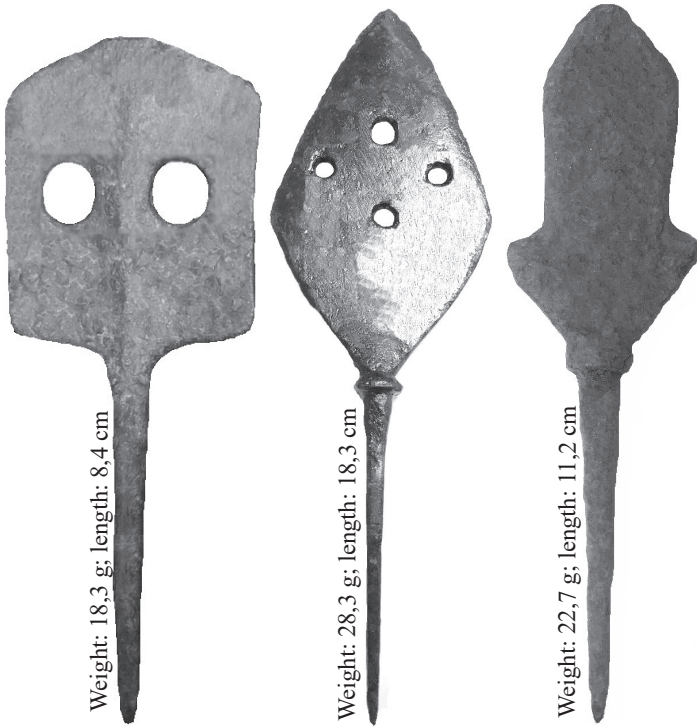
Bronze processing first came from western Anatolia to Southern Europe and the Iberian Peninsula. The Neolithic peoples in Europe had already learned how to process copper, gold and silver, but bronze processing brought a fundamental, albeit slow, innovation to the continent and mas-

Mongolian arrowheads
13th–14th century



The middle figure shows a three-sided Bodkin arrowhead with a missing shaft tang. Mongolian arrowheads often have spherical ledges to the shaft tang. The sketches show elaborate, triple-lobed arrowheads, which are of steppe-nomadic origin. Often, the blade tips are pierced with small holes.

Mongolian arrowheads
13th–14th century



THE FREQUENT CONFUSION BETWEEN THE HUNS AND THE MONGOLS

The term “Hun” refers to Central Asian equestrian tribes, who originate from the peoples of Mongolia and the Turkic peoples. They were feared and despised as mounted, composite-reflex bow archers, and for centuries, they were a serious threat to the empires of Europe. While the Scythian equestrian tribes spread their bronze double- and triple-sided as well as triangular and quadrangular arrowheads over the whole of Europe, in 4th century A.D., the equestrian tribes provoked a further development in arrowheads. From the Migration Period through the “storm of the Huns” from the East, which was triggered by them, power relations in Europe changed in a sustained way and technological progress began in many places.