4 Greaves

At present, some 75 greaves of the Bronze Age and Early Iron Age, from 42 find locations, have been discovered (Fig. 4.1). Several fragments of further potential greaves would increase this number. The greaves were mainly deposited as either single fragments in associated deposits or, as in the case of the Mediterranean, complete as pairs in graves. With the exception of the greaves from Dendra, all greaves so far found have been decorated.

According to their technological features, two main classes of greaves can be identified: Class I with wire fixation, and Class II with perforations along the edge. Four subclasses are associated with greaves of Class I:

1. Subclass A: greaves with integrated wire loops, comprising types Desmontà, Lengyeltóti, Kuřim, Canosa and Limone
2. Subclass B: greaves with wave-shaped wire, comprising Type Kallithea
3. Subclass C: greaves with separate wire loops, comprising Type Grammichele
4. Subclass D: greaves with riveted on loops, comprising Type Ilijak

These main groups largely differ in respect of their distributions; Subclass A is distributed from the Danube westwards up to central France, and the Po Valley in the south. Greaves of Subclass B are known from southern Greece, Cyprus and southern Italy, while greaves of Subclass C are found in southern Italy only. Greaves of Subclass D are known from Albania and Bosnia-Herzegovina, as well as a single fragment from Olympia (cat. no. 226). Greaves with a perforation along the edge (Class II) are not chronologically or geographically related and have

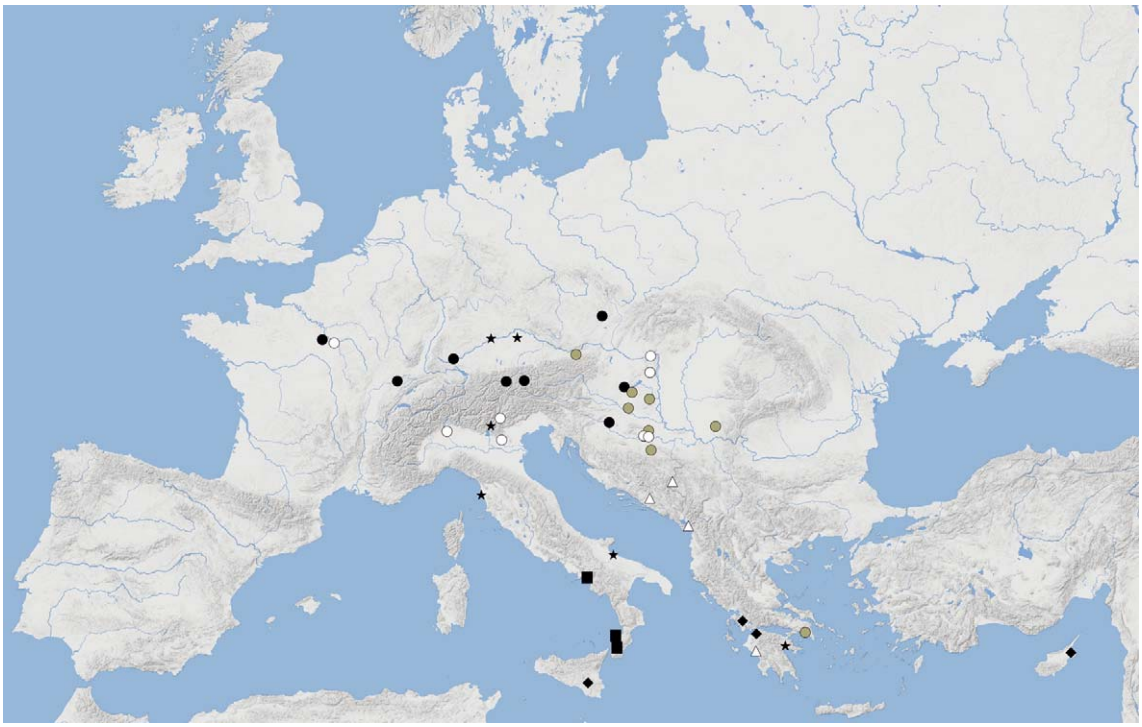

Fig. 4.1 Archaeological distribution of European Bronze Age greaves: ○ Greaves of Type Desmontà. ○ (grey) Greaves of Type Lengyeltóti. ● Greaves of Type Kuřim. ◆ Greaves of Type Kallithea ■ Greaves of Type Grammichele. △ Greaves of Type Ilijak. ★ Greaves of Class II and single types. Only greaves with known find spot are mapped.

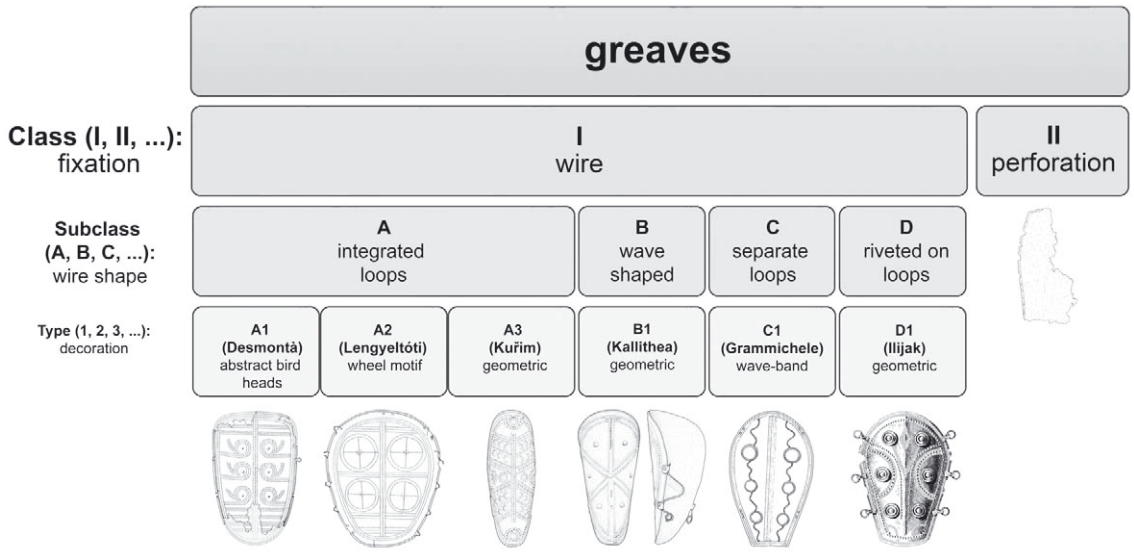

Fig. 4.2 Classification of greaves. Each greave type depicted consists of at least three greaves. Other greave types, represented by less than three greaves, fall under Class IA: Type Canosa (cat. nos. 193–194) and Type Limone (cat. no. 195), or Class II: Type Dendra (cat. no. 227), Type Schäfstall (cat. no. 228) and Type Winklsaß (cat. no. 229).

therefore been grouped on the basis of technological criteria only (Fig. 4.2). From northern and western Europe finds of greaves are, apart the finds from Bouclans (cat. no. 183), Boutigny-sur-Essonne (cat. no. 184), Beuron (cat. no. 185) and Cannes-Ècluse, unknown (Fig. 4.1).

Greaves of Subclass A can be divided into those with *Gleichbuckel* (Type Desmontà and Type Lengyeltóti), *Punktbuckel* (Type Kuřim) and *Leistenbuckel* (Type Canosa and Type Limone).[1006] Greaves of Subclass B and C are uniformly decorated with *Leistenbuckel*, while greaves of Subclass B may also show chevron decoration. Greaves of Subclass D bear geometric decoration. Greaves of Class II can be decorated with *Gleichbuckel*, as at Schäfstall and Winklsaß, or undecorated, as at Dendra (cat. nos. 228– 229 and 227, respectively).

Several Bronze Age miniature greaves are also known. They form two groups with different chronological and geographical distributions, represented by southern Italy and the Carpathian Basin. These miniature greaves measure c. 5.5 – 9 × 3cm and bear pellet decoration: one line of pellets running along the rim, and one or two centrally positioned vertical lines. In some cases, further lines of pellet decoration, arranged geometrically, were applied between the central line of pellets and those along the rim. As well as these bronze miniatures, two possible clay miniature greaves are known from the Gârla Mare culture in Bulgaria (Bz D).[1007]

In contrast to other armour, such as cuirasses, shields and helmets, greaves are rarely known from the Carpathian Basin further east of the Danube (the only finds so far from further east of the Danube are known from Kuřim (cat. no. 190) and Markovac-Grunjac (cat. no. 182). In contrast to other categories of metal armour, greaves is the only one which is regularly found associated with graves. However, grave finds of greaves other than those Subclass C and D are rare: only those from Athens (Type Lengyeltóti; cat. nos. 180–181), Volders (Type Kuřim; cat. no. 186–187), and Dendra were found in graves, and perhaps also the greaves from Desmontà (Type Desmontà; cat. nos. 154–155). Except the burnt fragments from Volders, all of these are more or less complete. Only the single find of an individual greave from Schäfstall is associated with a water context.

[1006] *Gleichbuckel*: decoration with equal sized pellets; *Punktbuckel*: decoration with pellets and bosses; *Leistenbuckel*: decoration with ribs and bosses. *Ringbuckel*: decoration with bosses surrounded by ribs. *Punzbuckel:* punched bosses.

[1007] Dietrich 2009, 91–96.

The first wide-ranging studies of greaves, by A. Hagemann and W. Gaerte,[1008] were primarily concerned with Greek finds, whilst v. Merhart was the first to publish a comprehensive European study of Bronze Age greaves. Here he drew an important distinction between older corded greaves and later clamped greaves.[1009] He suggested that the first type originated in the Danube area, on the basis of the increasing abstraction of the decoration found on the greaves. The discovery of the Dendra grave, with its range of early defensive armour, meant that an origin for the development of greaves in the Danube area could no longer be maintained, as argued by N. Yalouris, who suggested instead an Aegean origin for greaves.[1010] The work of Catling focused on the typology, symbolic interpretation, and dating of greaves.[1011] Müller-Karpe supported an origin for defensive armour in the Aegean, and noted that the greaves from Enkomi (cat. nos. 196–198), Kallithea (cat. nos. 199–200) and Rinyaszentkirály (cat. no. 168) all date to the same period. He dated the greaves from Kuřim and Beuron to the early Urnfield period, thus creating a scheme of chronological development for greaves beginning in the Aegean, and continuing throughout the Urnfield period.[1012] Snodgrass noted that Archaic greaves, whose shape did not change much over the centuries, are completely different from the Mycenaean and central European greaves, and that only the greaves from Kavousi and Praisos might stand typologically between the two forms.[1013] K. Kilian discussed in detail the southeastern European greaves of Type Ilijak, which date to the Early Iron Age, and drew special attention to the votive character of a fragment related to this type which was found in Olympia.[1014] Shortly after, B. Čović published a further pair of greaves of the same type from Bosnia-Herzegovina.[1015] Schauer distinguished different types of greaves according to their ornamentation, and separated Mycenaean and Early Iron Age greaves.[1016] He identified eight types for the Urnfield period. These types were not uniform in date or origin, and does the description of the types consistently match the allocated finds. Despite this, Hansen adopted the same scheme, arranging the greaves on the basis of their ornamentation into three main types (*Vogelbarke,* wheels and bigger *Punzbuckel*).[1017] The most recent and comprehensive study of European Bronze Age greaves, which incorporated a number of new finds, is by Clausing.[1018] He classified corded greaves primarily on the basis of technological details, which largely correspond with their classification according to associated ornamentation. Clamped greaves were not discussed, since they appear only in the Early Iron Age. Clausing distinguished three main types of corded greaves: those with integrated wire loops (greaves with wheel motif; greaves with small embossed decoration; greaves with embossed decoration; greaves with ribbed and embossed decoration) or separate wire loops (wave-shaped wire or separate wire loops), greaves with perforations along the rim, and greaves with riveted-on loops. The separation of greaves with integrated wire follows the stylistic definition and chronology of Jockenhövel's *Gleichbuckel-* (Bz D–Ha A1)*, Punktbuckel-* (Ha A2–B1) and *Leistenbuckel* decoration (Ha B2).[1019] It is worthwhile to note that the date of these different decorative styles corresponds with the general date of each of the greaves and their context, be it from an associated deposit or grave. The relationship between the different regional chronological systems, and their respective terminology, which will be used in the following discussion, is illustrated in Fig. 1.1.

[1008] Hagemann 1919; Gaerte 1920.
[1009] v. Merhart 1956/1957.
[1010] Yalouris 1960, 42–43.
[1011] Catling 1955; Catling 1977b.
[1012] Müller-Karpe 1962a, 275.
[1013] Snodgrass 1964, 87.
[1014] Kilian 1973.
[1015] Čović 1976.
[1016] Schauer 1982b.
[1017] Hansen 1994, 13–14.
[1018] Clausing 2002.
[1019] Jockenhövel 1974, 39.

Cat. No.	Find Site	Schauer 1982b		Hansen 1994	Clausing 2002		Mödlinger
		Motif	Type of Decoration	Motif / Type of Decoration	Technological	Motif / Type of Decoration	
153	Brodski Varoš, Croatia	bird heads	*Perlpunz-musterzier*	*Vogelbarke*	Group 1, A1: integrated loops	bird heads; other geometric decoration	Class I, Type A1 (Desmontà)
156–159	Pergine (3), Italy			*Punzbuckel* (related)			
160–161	Malpensa (2), Italy			*Vogelbarke*			
163	Poljanci I, Croatia			*Vogelbarke*			
165	Nadap, Hungary			*Vogelbarke* (?)			
162	Cannes-Écluse, France	arcs		*Vogelbarke* (related)			
154–155	Desmontà (2), Italy			*Vogelbarke*			
164	Esztergom, Hungary			*Vogelbarke* (?)			
166–167	Unprovenanced (Hungary?)						
168	Rinyaszentkirály, Hungary	bird heads & wheels	*Perlpunz-musterzier*	wheels	Group 1, A2: integrated loops	wheels	Class I, Type A2 (Lengyeltóti)
170–172	Nadap (3), Hungary	wheels					
174	Stetten, Austria						
177	Veliko Nabrđe, Croatia						
179	Malpensa, Italy						
180–181	Athens (2), Greece						
178	Boljanić, Bosnia and Herzegovina						
169	Nagyvejke, Hungary						
176	Slavonski Brod (2), Croatia						
173	Lengyeltóti, Hungary						
175	Poljanci IV, Croatia						
182	Markovac-Grunjac, Serbia						Class I, Type A1 or A2
185	Beuron, Germany		*Buckel, Bandmuster*	*Punzbuckel*	Group 1, A3: integrated loops	*Buckelzier*	Class I, Type A3 (Kuřim)
190	Kuřim, Czech Republic						
191–192	Kloštar Ivanić (2), Croatia						
183	Bouclans, France						
184	Boutigny, France						
186–187	Volders (2), Austria						
188	Weissenstein, Austria						
189	Várvölgy, Hungary						

Tab. 4.1 Typological diversity in previous publications on European Bronze Age greaves. The study of v. Merhart was omitted due to its early date and the small number of finds known until its publication.

Cat. No.	Find Site	Schauer 1982b		Hansen 1994	Clausing 2002		Mödlinger
		Motif	Type of Decoration	Motif / Type of Decoration	Technological	Motif / Type of Decoration	
193–194	Canosa (2), Italy		*Buckel, Perl-punzmusterzier*		Group 1, A4: integrated loops	*Linien- und Buckelzier*	Class I, Type A4 (Canosa)
195	Limone, Italy						Class I, Type A5 (Limone)
196–198	Enkomi (3), Greece	Late Mycenaean			Group 1, B1: separate loops (wave-shaped wire)		Class I, Type B1 (Kallithea)
199–200	Kallithéa (2), Greece			*Punzbuckel* (related)			
205–206	Castellace (2), Italy						
201–202	Portes-Kephalovryso (2), Greece						
203–204	Kouvarás (2), Greece						
209–210	Pontecagnano (2), Italy	Pontecagnano, Torre Galli			Group 1, B2: separate loops		Class I, Type C1 (Grammichele)
211–216	Torre Galli (6), Italy						
207–208	Grammichele (2), Italy						
217	Dobraç, Albania	Early Iron Age			Group 2: riveted on loops		Class I, Type D1 (Ilijak)
218–219	Dabrica (2), Bosnia-Herzegovina						
220–225	Ilijak (6), Bosnia-Herzegovina						
226	Olympia, Greece						
227	Dendra (2), Greece	Late Mycenaean			Group 3 A: perforation along edge		Class II
228	Schäfstall, Germany	arcs	*Perlpunz-musterzier*	*Vogelbarke* (related)	Group 3 C: perforation along edge		
229	Winklsaß, Germany				potential fragment		

Tab. 4.1 continued.

The diversity of typologies used in earlier studies of greaves is not as great as it might first seem. As is clear in Tab. 4.1, whilst the names might differ, the greaves were generally grouped in quite similar fashion. As is evident, the main differences are of a technological nature: central European greaves have integrated wire loops, while the southern Italian and Greek greaves have separate wire loops or wave-shaped wires. Greaves with integrated wire loops contain only one wire, around which the rim of the bronze sheet from which it was made was bent, and on the sides was used to form the external loops which the wearer used to secure them. Greaves with separate wire loops or wave-shaped wire incorporated several wires, with one running along the edge of the bronze sheet, around which the sheet was bent, and the other used to form the loops used by the wearer to attach the greave to their lower legs.

The differences between the typological approaches of earlier studies is small: Hansen considered the greaves from Pergine (cat. nos. 156–159) as being closely related to 'geometric greaves', such as that from Kallithea.[1020] In comparison, Schauer described the greave with bird heads from Cannes-Écluse, with bow-shaped pellet decoration,[1021] as being similar to the greaves from Winklsaß and Schäfstall. He also grouped the greaves from Kallithea, Enkomi and Dendra together and dated them as Late Mycenaean, whilst the greaves from Torre Galli (cat. nos. 211–216) and Pontecagnano (cat. nos. 209–210) were grouped separately.

4.1 Greaves of Class I, Subclass A

4.1.1 Greaves of Type Desmontà

4.1.1.1 Decoration

The 12 or 13 greaves of Type Desmontà share, with the exception of the greave from Cannes-Ècluse, common decorative elements, such as having at least three parallel, geometric, embossed lines (Tab. 4.2). These greaves exhibit different levels of abstraction of the bird heads, and seems to increase in abstraction from east to west (Fig. 4.3). It is important to note that the decoration was usually made with *Gleichbuckel*. On most of the abstract birds, however, the eye is represented by a much larger boss. The only example of bird heads facing each other, rather than turning away from each other, is on one of the greaves from Malpensa (cat. nos. 160–161; Fig. 4.3.3). This motif as a whole is rather rare, and is only otherwise known on an unprovenanced razor and two ceramic vessels, from Pianello di Genga and Frattesina, respectively.[1022]

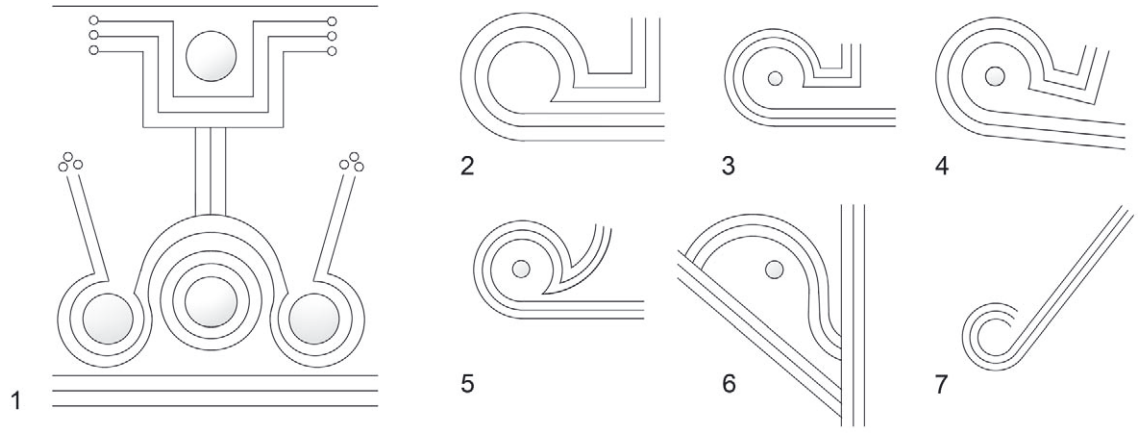

Fig. 4.3 Abstract bird heads on greaves of Type Desmontà: **1.** Pergine; **2.** Brodski Varoš; **3.** Malpensa; **4.** Poljanci; **5.** Desmontà; **6.** Malpensa; **7.** Cannes-Ècluse (not to scale).

[1020] Hansen 1994.
[1021] Schauer 1982b, 133.
[1022] Zipf 2004, 455, fig. 108.

On the greaves from Pergine, a rather clear abstraction of the *Vogelsonnenbarke* motif can be noted. Moreover, abstract human figures with wide, open arms are visible in between the birds (Fig. 4.3.1). Larger bosses are also used for the head of the human figure and the sun, while smaller bosses may indicate beaks and hands.

Cat. No.	Find Circumstances	Find Site	State	Condition
153	associated deposit	Brodski Varoš	HR	fragments
154–155	associated deposit (?)	Desmontà	IT	almost complete
156–159	associated deposit (?)	Pergine	IT	almost complete
160–161	associated deposit (?)	Malpensa	IT	almost complete
162	associated deposit	Cannes-Écluse	FR	half preserved
163	associated deposit	Poljanci I	HR	fragment
164	associated deposit	Esztergom	HU	fragment
165	associated deposit	Nadap	HU	fragment
166–167	unknown	unprovenanced (Hungary?)	HU (?)	fragments

Tab. 4.2 Greaves of Type Desmontà.

4.1.1.2 Distribution and Deposition

Most of the greaves of Type Desmontà were found in the Carpathian area west of the Danube. Unlike the greaves of Type Lengyeltóti, greaves of Type Desmontà have also been found more commonly in the west of Europe, such as that from the associated deposit of Cannes-Écluse, as well as the finds from the northern Po Basin and northern Trento (Fig. 4.4). The Italian finds, comprising Desmontà, Pergine and Malpensa, are also the only ones to have been found complete. In the case of all three finds, the possibility of them being grave finds has been suggest-

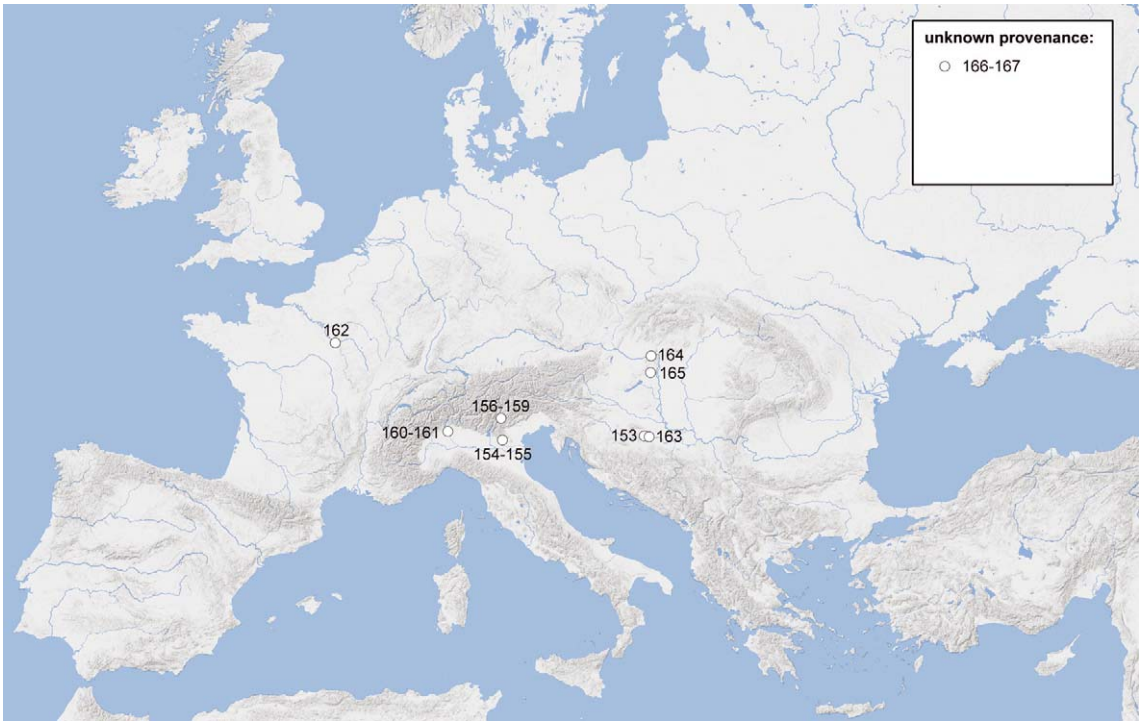

Fig. 4.4 Archaeological distribution of European Bronze Age greaves of Type Desmontà: **153.** Brodski Varoš; **154–155.** Desmontà; **156–159.** Pergine; **160–161.** Malpensa; **162.** Cannes-Écluse; **163.** Poljanci I; **164.** Esztergom; **165.** Nadap; **166–167.** Unprovenanced.

ed.[1023] All other finds are either heavily fragmented or are present only as a single fragment in associated deposits as a result of local depositional practices. Two of the greaves of Type Desmontà, from Malpensa and Cannes-Écluse, were found to have been folded several times before deposition. This folding of greaves before deposition, however, seems to have been more common for those greaves of Type Lengyeltóti.

4.1.1.3 Chronology

Like greaves of Type Lengyeltóti, the greaves of Type Desmontà are generally dated to Ha A1. Gaucher and Robert, Johannowsky, and Bouzek have suggested an earlier date of Bz D for the associated deposit of Cannes-Écluse.[1024] The greaves from Brodski Varoš, Poljanci I and Slavonski Brod (cat. nos. 153, 163 and 176) have been dated to period II, after Vinski-Gasparini.[1025] As noted before, the associated deposit from Nadap has been dated to Bz D–Ha A1, and the associated deposit from Esztergom to the Kurd horizon[1026] (cat. nos. 165, 170–172 (Nadap) and cat. no. 164 (Esztergom)).

The dating of Italian greaves of Type Desmontà is still a matter of debate. Most recently, Sperber suggested a date of Ha B1 for the greave from Pergine,[1027] following that of Müller-Karpe and Hansen.[1028] Salzani dates the greaves from Desmontà to the 10th century BC on the basis of their close relationship to the greaves from Malpensa and Pergine, though this is in fact somewhat earlier than the greaves from Pergine.[1029] Jankovits argues for an earlier date, in the 12th–11th century BC, on the basis that the necropolis, in which area the greaves have been found, might have started after the deposition of the associated deposit.[1030] Clausing suggests, following Salzani, a date between the 11th and 9th century BC according to the surrounding necropolis.[1031] Schauer interpreted the greaves from Pergine as the earliest of those with bird depictions, which Marzatico considered to be a result of transalpine influences.[1032] Subsequently, Marzatico connected them to a bronze vessel from grave 23, from the necropolis Valle La Fata, which dates to late 9th or beginning of the 8th century BC, on the basis of the bird depictions combined with human figures, therefore questioning their early 11th century BC dating.[1033]

An earlier date for the Italian greaves from Desmontà, Pergine and Malpensa, to between the 12th–11th centuries BC, is suggested by several other authors, including v. Merhart, who was criticised by Snodgrass, de Marinis and Peroni.[1034] However, an earlier date of Ha A1 is certainly in closer agreement with the finds from further east, and with the nature of east-west connections in general at this time,[1035] and the fact that the deposits of Nadap and Malpensa also contain greaves of Type Lengyeltóti (cat. nos. 165 and 160–161).

Catalogue

Cat. no. 153. Brodski Varoš, opć. and kot. Slavonski Brod, Croatia – associated deposit – fragments – thickness: 0.5mm; weight: 102g + 8g + 2g – Arheološki muzej u Zagrebu, no inv.

[1023] E.g. as Mira-Bonomi 1979, 43 for Malpensa.
[1024] Gaucher – Robert 1967, 210; Johannowsky 1970, 201–202; Bouzek 1981, 28.
[1025] Vinski-Gasparini 1973, 218; Clausing 2003, 200.
[1026] Mozsolics 1985, 118.
[1027] Sperber 2011, 16, note 32.
[1028] Müller-Karpe 1959, 64, 167; Hansen 1994, 16.
[1029] Salzani 1987, 141.
[1030] Jankovits 1997, 14.
[1031] Salzani 1985, 43; Clausing 2002, 155–157.
[1032] Schauer 1982b, 134; Marzatico 2002, 32–33.
[1033] Marzatico 2012.
[1034] v. Merhart 1956/1957, 115, who is criticised by: Snodgrass 1964, 86; de Marinis 1979, 511–514; de Marinis 1988, 161–163; Peroni 1989, 88, 278.
[1035] Burgess 1991.

no. – Pl. 34.153. References: Vinski-Gasparini 1973, 178, 212, pls. 55.22; 57.9; Müller-Karpe 1980, 804, no. 306, pl. 382.18; Schauer 1982b, 134, fig. 12.1; Hansen 1994, 14–15, 18, figs. 3.5; 15.6; Clausing 2002, 155, fig. 3.7.

The associated deposit was found in 1959 during work in a vineyard. Parts of the associated deposit were stolen but it still comprises more than 800 pieces, including arm rings, twisted and plain neck rings, fibulae, pins, discs, buttons, pendants, appliqués, sheet fragments, fragments of a greave, wire, rings, fittings, fragments of swords (Type Brodski Varoš, Type Aranyos, variant Buzija, Type Krško, Type Reutlingen, variant Genf, Type Mihovo, and various fragments), daggers, spearheads, arrowheads, knives, razors, socketed axes, winged axes, chisels, sickles, raw bronze as well as several unidentified fragments.[1036]

Cat. nos. 154–155. Desmontà, prov. Verona, reg. Trento, Italy – associated deposit (?) – a pair of greaves, almost complete – Museo Civico Archeologico di Cologna Veneta, inv. no. IG 89.542 and IG 89.541 – Pl. 34.154–154. References: Salzani 1985, 42–43; Salzani 1987, 141, fig. page 145; Hansen 1994, 14, 18, 426, no. 81, figs. 3.1; 5.12; Jankovits 1997, 14; Clausing 2002, 155, fig. 3.2–3.

The necropolis of Desmontà today consists of more than 320 graves and dates to the 11th–9th century BC.[1037] The two greaves were found in the area of the necropolis in a small pit without any other associated finds. One of the greaves was placed on or close to a piece of wood, and the second greave was placed immediately beneath, also on a piece of wood.

Cat. nos. 156–159. Pergine (Masetti), prov. Trento, reg. Trentino, Italy – associated deposit (?) – two almost complete pairs of greaves. Measurements: see below – Castello del Buonconsiglio e collezioni provinciali, Trento, inv. no. 7533 (other inv. nos. unknown) – Pl. 34.156–159. References: Fogolari 1943a, 4–11, figs. 1–3; Fogolari 1943b, 106–111; Fogolari 1944, 73–74, figs. 1–4; v. Merhart 1956/1957, 92, 102–103, 115–116, fig. 3.1–4; Müller-Karpe 1959, 64, 167; Fogolari 1975, 127; Giurletti 1978, 120, fig. 40.1–2; Mira-Bonomi 1979, 128–130; Schauer 1982b, 106, 118–119, 134, fig. 5.1–4; Passard – Piningre 1984, 102; Fogolari – Prosdocimi 1989, 84; Hansen 1994, 15, 18, 428, no. 166, figs. 4.6; 5.17; Jankovits 1997, 14, fig. 9.3–6; Clausing 2002, 155, fig. 3.6; Marzatico 2002, 31, fig. 18; Zamboni 2011, 172; Marzatico 2012 [with further literature].

The two pairs of greaves were found close to the small church of Au Massetti during work on a nearby street running through Valsugana in May 1940. The decoration on all four greaves is almost the same. One pair has four loops on each side (pair A), whilst one of the second pair has three loops on each side, whilst the other is not complete (pair B). Pair A, measurements: 29 × 13.2cm (inv. no. 7533) and 29 × 12.4cm.[1038] Pair B, measurements: 27.5 × 14.3cm and 26.5 × 7.7cm (only one side of the greave remained).[1039]

Cat. nos. 160–161. Malpensa, reg. Lombardia, Italy – associated deposit (?) – three almost complete greaves, two of Type Desmontà – Pl. 34.160–161. References: de Marinis 1979, 511–514; Mira-Bonomi 1979, 125, fig. 1.1–2; Schauer 1982b, 135, fig. 13; Mozsolics 1985, 27; de Marinis 1988, 161–163; Peroni 1989, 88, 278; Hansen 1994, 14, 18, 427, no. 128, figs. 3.2–3; 5.13; Clausing 2002, 155, fig. 3.4–5; de Marinis 2009, 148–154, figs. 6, 9; de Marinis 2016, fig. 12B; Gambari et al. 2017.

The associated deposit contained three greaves (cat. nos. 160–161, 179), ingots and ingot fragments, three spearheads and a spearhead fragment, two axes and a further fragment of axe, two sickles and a sickle fragment, and some bronze sheets now identified as from a helmet (cat. no. 61).

[1036] Vinski-Gasparini 1973, 212, pls. 52–65.
[1037] Salzani 1987, 141.
[1038] Fogolari 1943a, figs. 2, 4.
[1039] Fogolari 1943a, figs. 1, 3.

According to R. de Marinis the greaves were deposited independently of the history of the necropolis, and belong to a separate associated deposit dating to the 12th century BC, and therefore are contemporary with Rinyaszentkirály (cat. no. 168).[1040] Peroni also dates the associated deposit to the same period.[1041] Mira Bonomi, however, argues that the greaves are part of the inventory of a grave.[1042]

The three greaves do not belong to the same type. Whilst two of the greaves belong to Type Desmontà, they do not form a pair. The third greave belongs to Type Lengyeltóti (cat. no. 179).

Cat. no. 162. Cannes-Ècluse, Dép. Seine-et-Marne, France – associated deposit – half of the greave preserved. Measurements: 27.9 × 9.7cm; thickness 0.6–0.9mm; thickness wire: 1–2mm – Musée de Préhistoire d'Île-de-France, inv. no. unknown – Pl. 35.162. References: Gaucher – Robert 1967, 205–210, figs. 46–48, 51; Mohen 1977, 228; Müller-Karpe 1980, no. 941, pl. 471. E8; Schauer 1982b, 123, fig. 7.1; Passard – Piningre 1984, 102; Hansen 1994, 14, 18, figs. 3.6; 5.11; Clausing 2002, 155, fig. 3.1; Lehoërff 2009.

The greave was found in 1964 as part of an associated deposit, which was unearthed by a bulldozer. The associated deposit currently comprises 364 fragments (39 fragments of axes, more than 40 fragments of sickle, a bracelet or torque, bronze sheets, etc.) and two complete pieces, a bracelet and a chisel. The large fragment of greave was found folded together.[1043]

Cat. no. 163. Poljanci I, opć. and kot. Slavonski Brod, Croatia – associated deposit I – fragment. Measurements: 9.5 × 10.8cm; thickness: 0.6mm; weight: 29.4g – Brodsko Posavlje Muzej Slavonski Brod, inv. no. 1797 – Pl. 35.163. References: Vinski-Gasparini 1973, 183, 218, pl. 48.19; Müller-Karpe 1980, 805, no. 315, pl. 384.A5; Schauer 1982b, 134, fig. 12.2; Hansen 1994, 13–14, 18, 570, no. 223, figs. 3.4; 5.4; Clausing 2002, 155, fig. 3.8; Clausing 2003, fig. 64B.11; Miklik-Lozuk 2009, 67, cat. no. 80.

The associated deposit was found in 1958 during ploughing and consists of 178 bronze objects stored in a ceramic vessel: arm rings, neck rings, fibulae, decorated discs, buttons, pendants, a small bronze cow figurine, pins, fragments of flange hilted swords, knives, winged axes, chisels, sickles as well as fragments of a helmet (cat. no. 24) and a fragment of a greave.[1044] Vinski-Gasparini published 55 objects from the associated deposit.[1045]

Cat. no. 164. Esztergom-Szentgyörgymező, Komáron megye, Hungary – associated deposit I – fragment – Balassa Bálint Múzeum Esztergom, inv. no. 69.1.284 – Pl. 35.164. References: Müller-Karpe 1980, 807, no. 341; Mozsolics 1985, 116–117, no. 85, pl. 138.16; Hansen 1994, 13, 18, 538, no. 221, figs. 3.9; 5.1; Jankovits 1997, 6, 8, fig. 5; Clausing 2002, 155, fig. 3, 9.

The greave fragment could not be located in the museum. The associated deposit was found in the city area, opposite of the restaurant 'Kettős pince'. The associated deposit consists of 298 bronzes, most of them fragments, which were found in a ceramic pot.

Cat. no. 165. Nadap, Fehér megye, Hungary – associated deposit – fragment. Measurements: c. 21 × 9cm – Szent István Király Múzeum Székesfehérvár, no inv. no. – Pl. 35.165. References: Petres 1983, 58–59, fig. 4a–b; Mozsolics 1985, 151; Hansen 1994, 14, 18, 546, H 451, figs. 3.10–11; 5.2; Jankovits 1997, fig. 3.2; Clausing 2002, 155, fig. 3.10; Makkay 2006, 7, pl. IV; Uckelmann 2012, 17–18.

For description of the associated deposit, see cat. no. 27.

[1040] de Marinis 1979, 511–514; de Marinis 1988, 161–163.
[1041] Peroni 1989, 88, 278.
[1042] Mira-Bonomi 1979, 43.
[1043] Gaucher – Robert 1967, fig. 46.20a.
[1044] Miklik-Lozuk 2009, 45–46.
[1045] Vinski-Gasparini 1973.

Cat. nos. 166–167. Unprovenanced (Hungary?). Measurements greave 1, overall dimensions: 27.3 × 17.1cm, weight 192g; greave 2 is heavily fragmented – Hadtorteneti Muzeum, Budapest inv.no. 1993.791.II – Pl. 35.166–167. References: Tarbay 2015, figs. 8, 16.4; 17.5.

The pair of greaves is represented by 37 fragments. For the description of the assemblage, see cat. no. 12.

4.1.2 Greaves of Type Lengyeltóti

4.1.2.1 Decoration

Greaves of Type Lengyeltóti (Tab. 4.3) are generally decorated with *Gleichbuckel*. In all instances, the hub of the wheel is indicated by a larger boss and on some greaves, such as that from Nagyvejke (cat. no. 169), the spokes are emphasised by the addition of bows attached to the wheel. The wheel motif might have acted as an apotropaic symbol of protection,[1046] speed or power, since they are also found applied to a range of central and eastern European body armour, including an unprovenanced crested helmet (cat. no. 100) and a cheek plate from Podcrkavlje-Slavonski-Brod (cat. no. 67), which are rarely ever decorated. The wheel motif is more commonly found on belts,[1047] pins and pendants.[1048] Usually, the wheels consist of two circles, though the use of three circles is not uncommon (Nadap, Rinyaszentkirály, Slavonski Brod (cat. no. 176) and Stetten/Teiritzberg (cat. no. 174).

The greave from Rinyaszentkirály is the only known greave with both a wheel motif and a (naturalistic) water bird depiction. The greave is decorated with three lines parallel to the rim, and three further vertical lines positioned in the middle of the greave. In the centre there is one wheel on each side, and above and below these there are four water birds. The decoration of this greave indicates a close relationship to those greaves of Type Desmontà.

The greave fragment from Slavonski Brod II differs from those found in Slavonski Brod I, being both slightly bent, and having been decorated with this three-circled wheel. The fragment most likely belongs to a different greave, as this particular variant of the motif is rather rare on objects other than greaves.

Cat. No.	Find Circumstances	Find Site	State	Condition
168	associated deposit	Rinyaszentkirály	HU	complete
169	associated deposit	Nagyvejke	HU	fragments
170–172	associated deposit	Nadap	HU	fragment and 2 complete
173	associated deposit	Lengyeltóti	HU	complete
174	associated deposit	Stetten	AT	fragments
175	associated deposit	Poljanci IV	HR	almost complete
176	associated deposit	Slavonski Brod	HR	fragments of 2 (?) greaves
177	associated deposit	Veliko Nabrđe	HR	fragments
178	associated deposit	Boljanić	BA	fragments
179	associated deposit (?)	Malpensa	IT	complete
180–181	grave	Athens	GR	almost complete
182	associated deposit	Markovac-Grunjac	XS	fragment

Tab. 4.3 Greaves of Type Lengyeltóti. The fragment from the greave from Markovac-Grunjac, Serbia, might also be associated with greaves of Type Desmontà.

[1046] Bouzek 1981, 28.
[1047] Salaš 1997, pl. 24.612b.
[1048] Pare 1987.

From the associated deposit of Markovac-Grunjac, Serbia, which was recently published by D. B. Jovanović,[1049] a small fragment of the rim of a greave with partly surviving wire is known. Due to its fragmentary character, it is not clear if it belongs to those greaves of Type Desmontà or of Type Lengyeltóti. Another bronze sheet object, a disc, shows atypical pellet decoration, indicating that it was cut out from another bronze sheet object, potentially another (or the same?) greave: on the base, two incomplete, parallel circles are visible. On the upper end, five almost parallel, straight lines can be noted. In between these decorative elements two holes were punched through, most likely to fix the disc onto something. There is no loop or means of attachment on the rearside.

4.1.2.2 Distribution and Deposition

The 14 or 15 greaves of Type Lengyeltóti were generally deposited in associated deposits. The main recovery area is the Carpathian Basin west of the Danube. Only one greave fragment, belonging either to greaves of Type Lengyeltóti or greaves of Type Desmontà, derives from the eastern side of the Danube, from Markovac-Grunjac. The most western examples derive from Malpensa and Stetten/Teiritzberg, while a pair of greaves derives from Athens. This pair suggest possibly close contact between the different geographical regions of Greece and the western Carpathian Basin, and potentially to the greave from Malpensa, which may too have come from a grave (Fig. 4.5). Most of the Hungarian finds, as well as the greaves from Malpensa, Poljanci IV (cat. no. 175), and Athens, are almost complete, while in the associated deposits from Stetten/Teiritzberg, Boljanić (cat. no. 178), Nagyvejke, Veliko Nabrđe (cat. no. 177), and Slavonski Brod only fragments were deposited, perhaps as representations of the original whole artefact. This depositional practice can also be noted in the deposition of helmets of Class I, which are generally found as single fragments only in the associated deposits from former Yugoslavia, Germany,

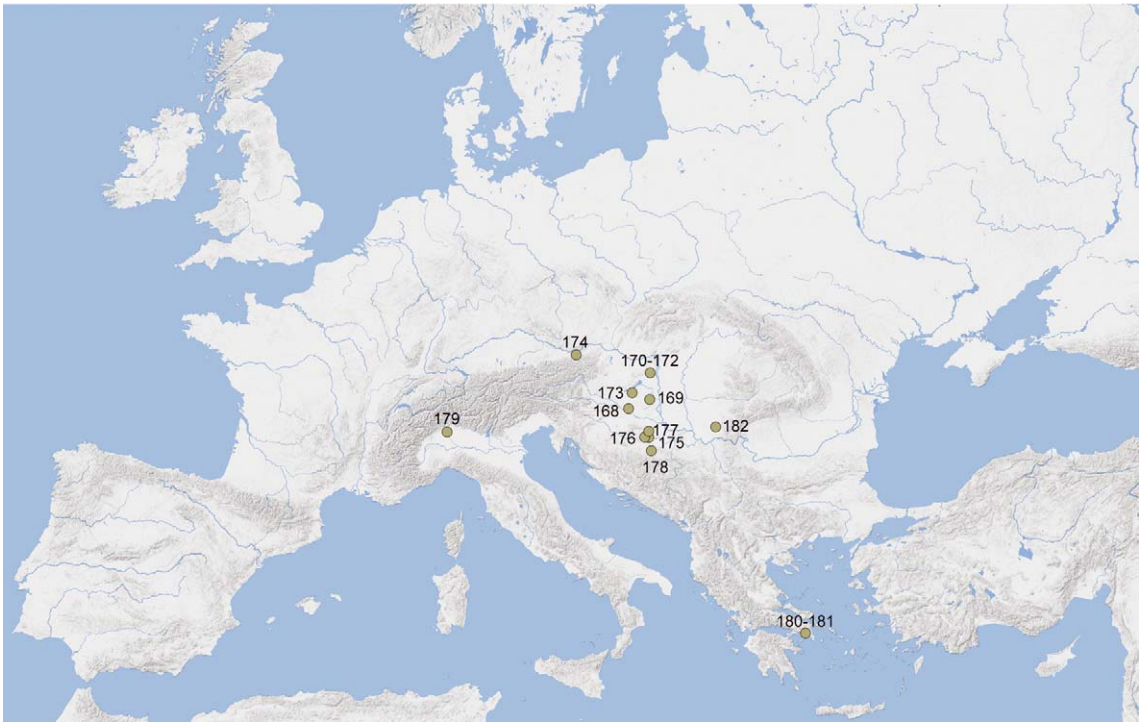

Fig. 4.5 Archaeological distribution of European Bronze Age greaves of Type Lengyeltóti: **168.** Rinyaszentkirály; **169.** Nagyvejke; **170–172.** Nadap; **173.** Lengyeltóti; **174.** Stetten/Teiritzberg; **175.** Poljanci IV; **176.** Slavonski Brod; **177.** Veliko Nabrđe; **178.** Boljanić; **179.** Malpensa; **180–181.** Athens; **182.** Markovac-Grunjac.

[1049] Jovanović 2010.

Austria and Romania, but are usually in a more complete state in the Carpathian Basin. At least five out of 14 or 15 greaves of Type Lengyeltóti were found to have been folded before deposition (Stetten, Poljanci IV, Malpensa (cat. no. 179), Lengyeltóti (cat. no. 173), and Rinyaszentkirály). Unlike the fragmented finds of greaves, which may have been deposited as representative of the original whole, we might interpret the act of folding less as indicating intentional destruction but more likely stemming from practicalities concerning their size during deposition.

4.1.2.3 Chronology

Greaves of Type Lengyeltóti are generally dated to Ha A1 or period II.[1050] v. Merhart, Kossack and Müller-Karpe suggested in the 1950's that the greave from Rinyaszentkirály be dated to Ha B1 (as did A. Persy for the associated deposit of Stetten/Teiritzberg, Jovanović for the associated deposit of Boljanić, and P. Patay for the associated deposit of Nagyvejke).[1051] Müller-Karpe later corrected his dating to Ha A1.[1052] Mozsolics also suggested the earlier dating of Ha A1 for the find from Rinyaszentkirály, as did Hansen on the basis of the axe in the associated deposit of Stetten/Teiritzberg, and P. König for Boljanić,[1053] whereas Johannowsky dated them as early as Bz D. Concerning the associated deposit of Nadap (Bz D/Ha A1), the deposition date during Ha A1 is already well-established.[1054] The greaves of Type Lengyeltóti from Boljanić,[1055] Slavonski Brod,[1056] Poljanci IV[1057] and Veliko Nabrđe, are generally dated to period II, following Vinski-Gasparini.[1058] Opinions on the dating of the greaves from Malpensa differs widely, with Jankovits and Mozsolics both suggesting Ha B1, and de Marinis arguing for a date in the 12th century BC or Ha A1 respectively.[1059] However, according to all other finds of the same type, its dating to Ha A1 seems to be far more likely, as it is also suggested here for the greave from Lengyeltóti. The slightly more recent date of early LH IIIC[1060] for the greaves from Athens, might be due to the fact that as an import the greave probably had a higher value and was not deposited immediately.

Though the greave fragment from the associated deposit from Markovac-Grunjac cannot be associated with the greaves of Type Desmontà or of Type Lengyeltóti, its chronological attribution to Ha A1, on the basis of the associated finds in the respective associated deposits, is clear.[1061]

Catalogue

Cat. no. 168. Rinyaszentkirály, Somogy megye, Hungary – associated deposit – almost complete. Measurements: 25.5 × 19.2cm; thickness: 0.1mm; weight: 126g – Somogy Megyei Múzeumok Igazgatósága, but today kept in the Magyar Nemzeti Múzeum, Budapest, inv. no. 3948 – Pl. 35.168. References: Hampel 1896, 104, pl. 215.1; v. Merhart 1956/1957, 92, no. 6, fig. 2.2; Snodgrass 1971, 47–48; Mozsolics 1972, 387, 390, notes 32–36; Müller-Karpe 1980, 811, no. 382a, pl. 377.D1; Schauer 1982b, 114, fig. 1; Mozsolics 1985, 27, 182–183, pl. 98; Hansen 1994, 15, 18, figs. 4.5; 5.3; Jankovits 1997, 1–2, fig. 1.1; Clausing 2002, 151, fig. 2.3; Clausing 2003, 65.

1050 Period II after Vinski-Gasparini 1973. See Fig. 1.1.
1051 Kossack 1954, 27, 48–49; v. Merhart 1956/1957, 115–117; Jovanović 1958, 35; Müller-Karpe 1959, 64; Persy 1962, 46–47; Patay 1990, 71.
1052 Müller-Karpe 1962a, 275.
1053 Johannowsky 1970; Mozsolics 1985, 183; Hansen 1994, 16, note 27; König 2004, 191.
1054 Most recently by Uckelmann 2012, 17–19.
1055 König 2004, 191.
1056 Clausing 2003, 200.
1057 Miklik-Lozuk 2009, 47.
1058 Vinski-Gasparini 1973.
1059 de Marinis 1982, 84; Mozsolics 1985, 80; Jankovits 1997, 12; de Marinis 2016.
1060 Mountjoy 1988, 29.
1061 Jovanović 2010.

The associated deposit was found in 1894 in a vineyard and, as well as a greave, contained decorated bronze sheet fragments, fragments of a vessel of Type Kurd, the hilt of a sword of Type Illertissen, one spearhead, two winged axes and two fragments of winged axes, nine sickle fragments, six socketed axes and fragments, one possible hammer, two fragments of axe, one pin, one arm ring, one fragment of a knife, one nail and 24 as-cast fragments.[1062]

Cat. no. 169. Nagyveike, Tolna megye, Hungary – associated deposit – fragments – Wosinsky Mór Megyei Múzeum Szekszárd, inv. no. 69.220.33/59/60 – Pl. 35.169. References: Mészáros 1971/1972, 32, pl. XIII.6, 13; Mozsolics 1985, 156; Patay 1990, 70, no. 117; Jankovits 1997, 6, fig. 4; Clausing 2002, 151, fig. 2.2; Clausing 2003, 65.

A number of objects appeared during ploughing in 1965, and the associated deposit was excavated in 1969.[1063] It was buried at a depth of 30–40cm in an oval pit some 45 × 70cm in size, with the objects irregularly placed inside it. The associated deposit currently comprises 164 objects, with some bronzes having been lost,[1064] including fragments of three axes and several fragments of socketed axes, eight more or less complete socketed axes, fragments of saw, 17 sickles (Type Terramare, *Griffzungensicheln,* and *Knopfsicheln*) and sickle fragments, fragments of daggers and knives, two fragments from swords of Type Ennsdorf, further fragments of sword, three spearheads and a spearhead socket, a phalerae, wire, *Riemenverteiler*, bronze buttons, a decorated disc in the shape of a double axe, several fragments of different types of bracelets (round cross-section and made of sheets), fragments of two Ösenkopfnadeln, two small rings, fragments of further pins, fragment of a *Violinbogenfibel*, fragments of bronze sheet, parts of a *Plattenfibel*, fragments of a bronze cup of Type Fuchsstadt, 20 fragments of casting cake.

Cat. nos. 170–172. Nadap, Fehér megye, Hungary – associated deposit – three greaves (an almost complete pair and a further greave fragment of Type Desmontà). Measurements: Pair: 27.5 × 22.5cm and 28 × 22.7cm; single greave fragment: 11.5 × 8.8cm – Szent István Király Múzeum Székesfehérvár, no inv. no. – Pl. 36.170–172. References: Petres 1983, 58–59, fig. 3a–d; Mozsolics 1985, 151; Hansen 1994, 14, 18, 546, H 451, figs. 3.10–11; 5.2; Jankovits 1997, fig. 2; Clausing 2002, 151, figs. 1.8–9; 2.1; Clausing 2003, 65; Makkay 2006, 7, pls. II–III; Uckelmann 2012, 17–18.

For the description of the associated deposit, see cat. no. 27.

Cat. no. 173. Lengyeltóti, Somogy megye, Hungary – associated deposit – complete. Measurements: 26.5 × 23cm, thickness: 0.3–0.4mm – Somogy Megyei Múzeumok Igazgatósága Kaposvár, inv. no. Ő 2015.17.1 – Pl. 36.173. References: Horváth 1995; Horváth 1997a; Horváth 1997b; Honti 2010, 27; Levente 2010, 253–262; Honti – Jankovits 2016.

The associated deposit was found in 1995, contained almost 700 objects, and has a total weight of 88.5kg. The bronze objects were found in a circular pit with 50 cm diameter in 60 cm depth. The associated deposit includes chisels, swords, axes, sickles and spearheads, as well as one complete greave, as well as casting cakes on the bottom of the deposit. The greave was folded several times along the longitudinal axis, and then hammered together along the folds.

The corrosion of the greave was removed with sodium hexametaphosphate, alkaline glycerol and Selecton B2 in distilled water during restoration. After heating the bronze over an open flame, the greave was unfolded. The formed oxide layers were removed with Selection B2 solution, as were chlorides. Sodium-sulphate dissolved was used to form an artificial patina layer. At the end, the greave was lacquered with Paraloid B72. Cracks and small fragments were glued together with *Uhu Hart*. Cavaties in the metal were filled with two-component Diamant Bronze resin.[1065]

[1062] Mozsolics 1985, 182–183.
[1063] Mészáros 1971/1972.
[1064] Mozsolics 1985, 156–158.
[1065] Horváth 1997b.

Honti and Jankovits[1066] note that on the greave 'X-ray emission analysis, electron microscopy analysis, and metallographic analyses' were carried out; however, the only results reported are: chemical analyses on the surface (61.74% copper, 31.25% tin), and 'in the deeper layer' of the greave (93.05% copper and 6.95% tin). No description of the microstructure, or further details of the alloy composition, such as the identification of trace elements, was noted.

Cat. no. 174. Stetten/Teiritzberg, Gem. Korneuburg, Niederösterreich, Austria – associated deposit – fragments. Measurements: 14 × 9.5cm – Naturhistorisches Museum, Vienna, inv. no. 75836–51 – Pl. 36.174. References: Persy 1962, 42–44, figs. 4–5; Mayer 1977, 155, no. 695; Eibner 1980, 285–311, fig. 12; Schauer 1982b, 140, fig. 15.1; Hansen 1994, 15, note 27; 18, figs. 4.2; 5.5; Clausing 2002, 151, fig. 1.7; Clausing 2003, 65.

The greave was found as part of an associated deposit in Teiritzberg, tract 406/1, in 1945. Soviet soldiers built a trench roughly 1.6 m deep and 60cm wide. During the work, they recovered sickles, knives or daggers and axes, amounting to some 15–20 pieces, which were left next to the trench. After the soldiers left, the farmers sold the finds to a scrap metal dealer. Just one axe was left in the field and later brought to the attention of F. Zeissl, who then searched for further finds, recovering two sickle fragments and several bronze sheets. The greave provides the only dating evidence for the initial group of finds that were sold off, and for those that were recovered later.

Cat. no. 175. Poljanci IV, opć. and kot. Slavonski Brod, Croatia – associated deposit IV – almost complete. Measurements: 17.5 × 13.3cm; thickness: 0.3–0.5mm; diameter wire: 2.4mm; weight: 183g – Brodsko Posavlje Muzej Slavonski Brod, inv. no. A–4029 – Pl. 36.175. References: Miklik-Lozuk 2004, 32, pls. X–XI ; Miklik-Lozuk 2009, 47, 109, cat. no. 260.

The associated deposit was found in 1991 by Croatian soldiers and donated to the Brodsko Posavlje Muzej Slavonski Brod the same year. It consists of 45 bronzes, including socketed axes, sickles, knives, a fragment of a saw, a fragment of a dagger, a fragment of a spearhead, A potential fragment of a helmet, a greave, jewellery such as rings, pendants, bracelets, a razor, parts of garments, appliqués, a ferrule, a coil, bronze sheet fragments and bronze ingots.[1067] The greave from Poljanci IV was found completely folded over and was unfolded during restoration in 2007.

Cat. no. 176. Slavonski Brod, opć. and kot. Slavonski Brod, Croatia – associated deposit – fragments of two (?) greaves. Measurements: see below – Römisch-Germanisches Zentralmuseum, inv. nos. O.40515–18 – Pl. 36.176. References: Schauer 1986, 900–904; Clausing 2002, 151, fig. 1.5; Clausing 2003, 65, fig. 3.11.

Detailed find circumstances are unknown, and therefore it is possible that its inventory of almost 260 bronzes is not the complete associated deposit. Clausing has provided a comprehensive discussion of the associated deposit.[1068] It consists of arms and armour (swords, spearheads, daggers, greaves), tools (axes, hammers, chisels, sickles, razors, knives), bronze vessels, jewellery (pendants, pins, fibulae, arm and neck rings, spiral rolls), and other objects (decorated discs, nails, weights, sheet fragments, raw bronze, etc.). It is possible that the greave fragments belong to more than one greave, as indicated by the nature of the scrap metal associated deposit itself, which consists largely of fragments.

Measurements inv. nos. O.40515/16: 3.8 × 2.15cm; 5.95 × 2.6cm; 6.8 × 8.4cm; 2.05 × 1.45cm; 3.9 × 3.3cm; 3.45 × 2.75cm; 7.75 × 2.95cm; 5.2 × 1.8cm; 1.83 × 1.3cm; 4.1 × 3.2cm; weight: due to the application of epoxy and glass fibres not possible to measure.

Measurements inv. no. O.40515/17: 8.7 × 5.95cm; weight: 15.7g.

Measurements inv. no. O.40515/18: 5 × 3.3cm; weight: 3.41g

[1066] Honti – Jankovits 2016, 75.
[1067] Miklik-Lozuk 2009, 47.
[1068] Clausing 2003.

Cat. no. 177. Veliko Nabrđe, mun. Drenje, dist. Osijek, Croatia – associated deposit – fragments – Arheološki muzej u Zagrebu, inv. no. 10.238 – Pl. 37.177. References: Vinski-Gasparini 1973, 186, 221, pl. 44.1; Müller-Karpe 1980, 805, no. 324, pl. 381.B8; Schauer 1982b, 140–141, fig. 16.2; Gabrovec 1983, 658, pl. 93.6; Hansen 1994, 15, 18, figs. 4.3; 5.5; Jankovits 1997, 9; Clausing 2002, 151, fig. 1.6; Clausing 2003, 65; Karavanić 2009, 118–121, fig. 58.3.

For the description of the associated deposit, see cat. no. 23.

Cat. no. 178. Boljanić, mun. Gracanica, dist. Tuzla, Bosnia-Herzegovina – associated deposit – two fragments. Measurements: 9.8 × 6.6cm, weight: 7.1g; 3.6 × 3.1cm, weight: 1.1g; thickness (both fragments): 0.3cm – Muzej istočne Bosne posjeduje Tuzla, inv. no. 3417; 3419 – Pl. 37.178. References: Jovanović 1958, 23–24, fig. 24a–b; Hansen 1994, 16, 18, 561, no. 25, figs. 3.12; 5.7; Jankovits 1997, 9; Clausing 2002, 150, fig. 1.1; Clausing 2003, 64; König 2004, 191, pl. 15.17.

The associated deposit was found in 1957 close to the river Suljagin. The bronzes were found in ceramic pot, now lost, at a depth of 30–40cm. Some finds show traces of recent damage. As well as the greave, the associated deposit contained an appliqué, a sword, five daggers (mainly Type Peschiera), ten axes, one chisel, two other bronze chisels (?), two bronze anvils, fragments of a decorated plate, two arm rings, rings, buttons, one ingot, one pendant, nails and one ceramic bead.

Cat. no. 179. Malpensa, reg. Lombardia, Italy – associated deposit (?) – three almost complete greaves; two of Type Desmontà, one of Type Lengyeltóti. Measurements: unknown – Museo Civico Archeologico di Varese, inv. no. 21.215 – Pl. 37.179. References: Mira-Bonomi 1979, 125–126, fig. 2; de Marinis 1982, 84, fig. 107; Schauer 1982b, 135, 141, fig. 15.2; Mozsolics 1985, 80; Hansen 1994, 15, 18, 427, no. 128, figs. 4.1; 5.13; Jankovits 1997, 9, 12, fig. 7.2; Clausing 2002, 150–151, fig. 1.4; Clausing 2003, 65; de Marinis 2009, 148–154, figs. 6, 8; de Marinis 2016, fig. 12B; Gambari et al. 2017.

See also cat. nos. 160–161. The greaves were folded prior to deposition. During the 'restoration' they were unfolded and broke into several pieces. R. de Marinis interprets the greaves as the remains of an associated deposit and not, as Mira Bonomi suggests, as grave goods.[1069]

Cat. no. 180–181. Athens, mun. and dist. Athens, Greece – grave – two almost complete greaves – inv. no. 9936.1: height: 30.4cm; inv. no. 9936.2: height: 30.9cm – National Museum Athens, inv. no. 9936.1–2 – Pl. 37.180–181. References: Megaw 1968, 5, fig. 4; Schauer 1982b, 142, fig. 16.1; Mountjoy 1984, 135–136, figs. 2–3; Mountjoy 1988, 29; Kunze 1991, 3, note 8; Hansen 1994, 15–16, note 28, figs. 4.4; 5.21; Clausing 2002, 150, fig. 1.2–3; Clausing 2003, 64.

The greaves were found in a chamber tomb, cut into the bedrock, on the southern side of the hill of the Acropolis. They were previously attributed to Early Geometric but P. A. Mountjoy has argued that the grave, as well as the greaves, date to LH IIIC on the basis of the similar European finds.[1070] As well as the greaves, some sherds and the bones of the deceased were found, a number of bronze objects, including two knives, two pairs of tweezers, one awl, and two razors or cleavers.

Cat. no. 182. Markovac-Grunjac, Vojvodina, Serbia – associated deposit – fragment – 5.8 × 1.4cm; weight: 4.4g – Gradski muzej Vršac, inv. no. 10.749 – Pl. 38.182. References: Jovanović 2010, 71, 91, no. 288, pl. 38.288.

The associated deposit contains over 1008 fragments with a total weight of more than 19kg, which makes it the largest associated deposit so far known from Serbia. Almost all objects are

[1069] Mira-Bonomi 1979, 143; de Marinis 1982, 84.
[1070] Mountjoy 1984, 135.

represented by fragments or unsuccessful casting products. Most of the objects are attributed to the Srem-Slavonian workshop 'circle' or group.[1071]

4.1.3 Greaves of Type Kuřim

The distribution area of the ten known greaves (Tab. 4.4) with geometric decoration and integrated wire loops, which we have here termed Type Kuřim,[1072] ranges from central France, southern Germany and Austria, to Moravia and Croatia. The greaves have integrated wire loops with attached rings and embossed decoration – usually with up to three different sizes of bosses.

Cat. No.	Find Circumstances	Find Site	State	Condition
183	associated deposit	Bouclans	FR	fragment
184	associated deposit	Boutigny	FR	fragments
185	associated deposit	Beuron	DE	fragments
186	grave	Volders (grave 309)	AT	fragments
187	grave	Volders (grave 349)	AT	fragments
188	associated deposit (?)	Weissenstein	AT	fragment
189	associated deposit in settlement	Várvölgy	HU	complete
190	single find (?)	Kuřim	CZ	complete
191–192	associated deposit	Kloštar Ivanić (2)	HR	almost complete

Tab. 4.4 Greaves of Type Kuřim.

4.1.3.1 Decoration

Greaves of Type Kuřim, with their integrated wire loops, *Punktbuckel* and geometric decoration, exhibit decoration which have been applied with at least three different sized round punches. All the greaves have in common the occurrence of decorative lines of pellets and small bosses parallel to the edge. The main decorative elements are vertical, central lines of pellets and small bosses. On both sides, at the top and bottom, are large centrally applied bosses with encompassing lines of pellets and small bosses. In the middle of the greaves, a horizontal separation is visible, created either by another pair of lines of pellets and small bosses (Bouclans, Kloštar Ivanić (cat. no. 191–192)) or by large bosses (Kuřim). In these delineated 'quarters' or areas, vertical decorative lines of pellets and small bosses were positioned. Unfortunately, most of the greaves are badly fragmented (Beuron, Weissenstein (cat. no. 188), Boutigny) or burnt (Volders), so their decoration cannot be completely reconstructed. The well preserved greave from Várvölgy (cat. no. 189) exhibits the vertical line of pellets and small bosses similar to the other greaves but has a completely different symmetrical arrangement of the decorative elements: on each side of the greave, six large bosses were placed alternating left and right, and in between them, a zig-zag band of four parallel lines of pellets is visible. It resembles the decorative arrangement of those greaves of Type Desmontà, though no actual bird heads motif is present.

4.1.3.2 Distribution and Deposition

Greaves of Type Kuřim are geographically distributed from Kloštar Ivanić, Croatia, in the east, to Boutigny in northeast France (Fig. 4.6). The only greaves from the central Alpine region are

[1071] Jovanović 2010, 81.
[1072] After Sperber 2011.

from Volders and Weissenstein. Most greaves were found in associated deposits, with only those from Volders coming from graves. The graves from Volders which contained the greaves (and potentially crested helmets as well) belong to the western Urnfield culture. Sperber suggests the presence of armour in the grave is due to their close proximity to the nearby copper mines, and can be related to the control of these resources. Similar such graves, especially though containing swords, continued in use up to Ha B1.[1073] The slow abandonment of interment in the Munich urnfields during Ha B1 might be connected with the decrease of copper mining in this area. The find circumstances of the greave from Kuřim are not entirely clear. However, on the basis of the formation of corrosion on the recovered greave, at least one further greave most have been deposited together with it. Only the greaves from Várvölgy and Kuřim were deposited complete, and the pair of greaves from Kloštar Ivanić are almost complete. All other greaves occur only as either single fragments (Weissenstein, Boutigny, Bouclans) or as several small fragments (Volders, Beuron).

Fig. 4.6 Archaeological distribution of European Bronze Age greaves of Type Kuřim: **183.** Bouclans; **184.** Boutigny; **185.** Beuron; **186–187.** Volders; **188.** Weissenstein; **189.** Várvölgy; **190.** Kuřim; **191–192.** Kloštar Ivanić.

4.1.3.3 Chronology

Greaves of Type Kuřim are generally dated to late Ha A2 and Ha B1. Müller-Karpe and Weiss dated the fragment from Beuron accordingly.[1074] Passard and Piningre dated the associated deposit of Bouclans to the beginning of *Bronze final*,[1075] while the greave should be associated with a more recent date. The associated deposit from Boutigny-sur-Essonne is known only from early drawings, but these were sufficient to allow at least for the typological classification of the greave fragment, and to attribute the associated deposit to *Bronze final* II.[1076] The greave from

[1073] Sperber 2011, 35.
[1074] Müller-Karpe 1962a, 275; Weiss 1998, 543.
[1075] Passard – Piningre 1984.
[1076] Mohen 1977; Clausing 2002, 160.

the associated deposit of Kloštar Ivanić is dated to Ha A2/period III,[1077] and is associated with the Zagreb group, though this earlier date is questioned by Sperber.[1078] Prüssing dated the greave fragments from Volders (grave 309 and 349) on the basis of the Type Jenišovice cup, which is attributable to later Urnfield period (Ha B1), while Sperber dates the graves to Ha B1a.[1079] The greave from Kuřim is dated to Ha B1 or later,[1080] similar to the greave from Pergine, which Sperber dates to Ha B1a.[1081] The greaves from Várvölgy[1082] and Weissenstein have been dated accordingly.

Catalogue

Cat. no. 183. Bouclans, Dép. Doubs, Franche-Compté, France – associated deposit – fragment – diameter bosses: 1.35cm; 4mm; 1mm – Musée des Beaux-Arts et d'Archéologie de Besançon, inv. no. A.980.2.2 – Pl. 38.183. References: Passard – Piningre 1984, 102–103, fig. 13.1–2, 4–5; Hansen 1994, 18, 410, no. 62, fig. 5.19; Clausing 2002, 158, fig. 5.2.

The associated deposit was found by M. Lambert in 1972. The associated deposit consists of some 55 pieces of bronze but may have contained more. So far, several axes, a knife with a massive hilt, sword fragments, spearheads, parts of belts, pins, arm rings, as well as other objects, are known and are mainly of local character.[1083] Most of the bronzes are fragmented.

Cat. no. 184. Boutigny-sur-Essonne (Grand Roche Pasloup), Dép. Essonne (formerly Seine-et-Oise), France – associated deposit – fragments – private collection (formerly Allain collection, Boutigny) – Pl. 38.184. References: de Mortillet 1908, 105–106, figs. 43–44; Hencken 1971, 183, fig. 150b; Mohen 1977, 117–118, 122–124; Gaucher 1981; Clausing 2002, 158, fig. 5.3.

The associated deposit is only known from older drawings. A. de Mortillet interpreted the fragments as parts of a helmet, as does Mohen despite Hencken having already questioned this interpretation.[1084] Schauer was the first to suggest that the fragments might belong to a greave.[1085] Clausing considers at least one fragment to belong to a greave.[1086] The other fragments most likely belong to vessels, as mentioned by Hencken.[1087] Gaucher notes that it is impossible to locate or identify the collection where the associated deposit is currently stored.[1088]

Cat. no. 185. Beuron (Paulushöhle), Lkr. Sigmaringen, RB Tübingen, Baden-Württemberg, Deutschland – associated deposit – fragments – Sammlung Schloß Sigmaringen, Germany, inv. no. unknown – Pl. 38.185. References: Lindenschmit 1860, pl. 24; Müller-Karpe 1959, 167, pl. 163.A1, 3, 10–13; Müller-Karpe 1962a, 275; Stein 1979, 107–108, no. 263, pl. 75.1–8; Bouzek 1981, 37, note 31; Schauer 1982b, 118, fig. 3.2; Hansen 1994, 18, 446, no. 100, fig. 5.16; Weiss 1998, 543, note 64; Clausing 2002, 158, fig. 5.1.

In the first publication of the associated deposit, a fragment most likely belonging to a greave but without the rim bent around a wire, was depicted.[1089] This fragment is not mentioned or depicted in subsequent publications. The composition of the associated deposit is now difficult to determine, as in the original publication much later finds are depicted together with the

[1077] Vinski-Gasparini 1973, 215.
[1078] Šimić 2008, 63; Sperber 2011, 19.
[1079] Prüssing 1991, 26; as does Sperber 2011, 14–15.
[1080] Müller-Karpe 1962a, 275 – 'not older than the 10th century BC'.
[1081] Sperber 2011, 14, 16, note 32.
[1082] Müller 2006.
[1083] Passard – Piningre 1984.
[1084] de Mortillet 1908, 108; Hencken 1971, 183, 185, fig. 150a–b; Mohen 1977, 118.
[1085] Schauer 1982b, 151, fig. 204.
[1086] Clausing 2002, 150, 160, fig. 5.3.
[1087] Hencken 1971, 183.
[1088] Gaucher 1981, 412: 'Il n'a pas été possible de retrouver la trace de cette collection'.
[1089] Lindenschmit 1860.

greave fragments, including a bronze dagger, a fragment of a median winged axe, a *Kahnfibel*, a *Schlangenfibel*, several fragments of bracelets and further unidentified bronze fragments.

Cat. no. 186. Volders, VB Solbad Hall, Tyrol, Austria – grave 309 – fragments – Heimatkunde- und Museumsverein Wattens-Volders, inv. no. unknown – Pl. 38.186. References: Kasseroler 1959, 126–127, pl. XV; Kilian-Dirlmeier 1975, 54, no. 137, pl. 14.137; Prüssing 1991, 25, no. 16; Sperber 1992a, 63; Sperber 1992b, 70; Sperber 1999, 643, note 60; Clausing 2002, 158–161; Clausing 2003, 150, note 379; Sperber 2011, fig. 1.

The grave consisted of only a small number of associated finds. This largely attributable to it being interned during a period when associated grave goods were reduced in number, as well as the funeral process itself: ustrina. However, the nature of the excavation may have also been a contributing factor, with most of the graves being opened from the side and not from above and with only the core of the grave, such as the urn, content of the stone setting, etc., being documented. Earlier graves were often reused for later burials,[1090] and it is possible that the grave may have been disturbed. The grave contained sherds from three different vessels, four bronze rings, three fragments of pins, a belt buckle, a handle from a knife of Type Pfatten, a fragment of a spearhead of Type München-Widenmayerstrasse, and between two and four fragments of a greave. These were interpreted by A. Kasseroler as belonging to a bronze vessel.[1091] Some further smaller fragments are also preserved but are distorted due to the cremation process. The belt buckle's corrosion differs from the other finds and it is also typologically older, belonging to the end of Bz D and beginning of Ha A1. It might be part of an older cremation and reburied in the wrong, later grave 309.[1092]

The greave fragments still retain the wire around which the sheet bronze was bent. 1cm below the rim, a line of pellets is visible.

Cat. no. 187. Volders, VB Solbad Hall, Tyrol, Austria – grave 349 – fragment. Measurements: 5cm × 1.5cm – Heimatkunde- und Museumsverein Wattens-Volders inv. no. unknown – Pl. 38.187. References: Kasseroler 1959, 139–140; Prüssing 1991, 25, no. 15, pl. 2.15; Sperber 1992a, 63; Sperber 1992b, 70; Sperber 1999, 643, note 60; Clausing 2002, 158, 161; Clausing 2003, 150, note 379; Sperber 2011, fig. 5.1–3.

The fragment of greave was placed in the grave with a cup, bowl, three profiled rings, several very small bronze rings, a fragment of a *Kegelkopf* pin, a fragment of a winged axe, an armring, several molten bronze pieces, a piece of a bronze cup, two massive bronze fragments, fragments from sickles of Type Windsbach, two small decorative buckles, and a fragment of a knife. The bronze sheet fragment of the greave has lines of pellet decoration, small bosses and one large central boss. The three rings most likely belong to the greave fragments, however, in this case the rings would be flat against the skin as their loops are twisted 90°. Sperber discussed the possibility of the rings belonging to ring pendants, a typical female grave good, and suggests it may have been a double grave, which would be atypical for the northern Tyrol compared to neighbouring regions. The presence of the greave would then be attested to by just one sheet fragment, which might be interpreted as the fragmentary remains of an older burial, accidently buried in the wrong grave.

Cat. no. 188. Weissenstein, Carinthia, Austria – associated deposit – fragment. Measurements: 6 × 4.3cm – Tauerngoldmuseum im Putzenhof in Großkirchheim, Austria; no inv. no. – Pl. 38.188. References: Gleirscher 2007, fig. 6.1.

The metal finds were placed in a ceramic pot. The find circumstances, as well as the full assemblage of possibly associated finds, cannot be reconstructed as the associated deposit was found illegally with a metal detector. As intimated, the following objects might belong to the

[1090] Sperber 2011, 7.
[1091] Kasseroler 1959, 127.
[1092] Sperber 2011, 7.

same associated deposit: fragments of socketed axes with angle- and bow decoration, a winged axe of Type Haidach, sickle fragments, a tongue-sickle similar to Type Hallstatt, a knife, Middle Bronze Age arm rings, a finger ring, pins including a *Spinnwirtelkopf* and a swollen headed pin with decorated neck, similar to Type Deinsdorf, chisels, a gold ring, a gold wire, and fragments of a golden arm ring.

Cat. 189. Várvölgy-Nagy-Lázhegy, Zala megye, Hungary – associated deposit no. 10 – complete. Measurements: length: 28cm; weight: 206g – Balatoni Múzeum Keszthely, inv. no. 2010.3.10.56 – Pl. 39.189. References: Müller 2006.

Between 2003 and 2006 excavations were carried out at the c. 160ha wide plateau of the Nagy-Lázhegy hill close to Várvölgy, and revealed the largest late Urnfield culture hilltop settlement in Transdanubia. Within the settlement area, 12 bronze associated deposits weighing between 0.1–36kg were found, along with a gold associated deposit weighing 110g. Associated deposit 10 contained the greave. Further publication of these finds is currently being prepared by R. Müller.

Cat. no. 190. Kuřim, okr. Brno-venkov, Moravia, Czech Republic – single find (?) – complete. Measurements: lenght: 29.2cm – Moravské zemské muzeum Brno, inv. no. Pa. 3.94 – Pl. 39.190. References: Skutil 1946/1947, 69, figs. 22–23; v. Merhart 1956/1957, 92, 173–174, no. 1, fig. 2.1, pl. 2; Podborský 1970, 202, no. 124, pl. 71.1; Müller-Karpe 1980, pl. 387.C; Schauer 1982b, 118, fig. 3.1; Passard – Piningre 1984, 102; Hansen 1994, 15, 18, 492, no. 312, figs. 4.7; 5.15; Clausing 2002, 158, 160, fig. 5.6; Gleirscher 2007, fig. 6.2.

The greave is said to be a single find recovered during earth works. The corrosion on the greave suggests that a second greave had originally been placed on top of the surviving greave. This second greave has not been recovered.

Cat. nos. 191–192. Kloštar Ivanić, kot. Kutina, Croatia – associated deposit – two almost complete greaves. Measurements: 19.5 × 11cm and 17.5 × 9.5cm – Arheološki muzej u Zagrebu, inv. no. 10.859–60 – Pl. 39.191–192. References: Vinski-Gasparini 1973, 181, 215, pl. 96.2–4; Müller-Karpe 1980, 804, no. 310, pl. 383.A1–2; Schauer 1982b, 139, fig. 14; Gabrovec 1983, 660–661, pl. 94.1–2; Passard – Piningre 1984, 102; Larese 1991, 94, no. 31, fig. 31a–b; Hansen 1994, 15, 18, 566, no. 27, figs. 4.8; 5.14; Clausing 2002, 158, fig. 5.4–5; Šimić 2008, 44, 63, 179, cat. no. 43.

The associated deposit was found at a depth of 1.5m to the southwest of the brickworks in 1967. The bronzes were stored in a ceramic vessel. Unfortunately, part of the associated deposit was stolen and destroyed. Today it consists of 277 pieces of bronze, including the pair of greaves, pendants, arm rings, discs, rivets, socketed axes, chisels, sickles, stabs, and Keftiu ingots.[1093]

4.1.4 Single Types and Miniature Greaves

The greaves from Canosa (greaves of Type Canosa; cat. nos. 193–194) and Limone (greaves of Type Limone; cat. no. 195) (Fig. 4.7), both Italy, are the only known greaves of their type. All have integrated wire loops and are decorated with ribs and bosses of three different sizes. They belong to greaves of Subclass A. Clausing suggests that these greaves represent a possible Italian variant of his greaves with integrated wire loops.[1094] The greaves from Canosa are dated to the 10th–9th century BC, while the associated deposit from Limone has been assigned to Ha B1.

Bronze Age metal miniature greaves are known from Italy, Hungary and Croatia. The Italian finds are generally dated to the *periodo laziale* I and the Carpathian finds to the Kurd horizon. Two possible clay models of greaves from a Bz D context in Bulgaria are also discussed.

[1093] Vinski-Gasparini 1973, 215, pl. 96.
[1094] Clausing 2002, 162.

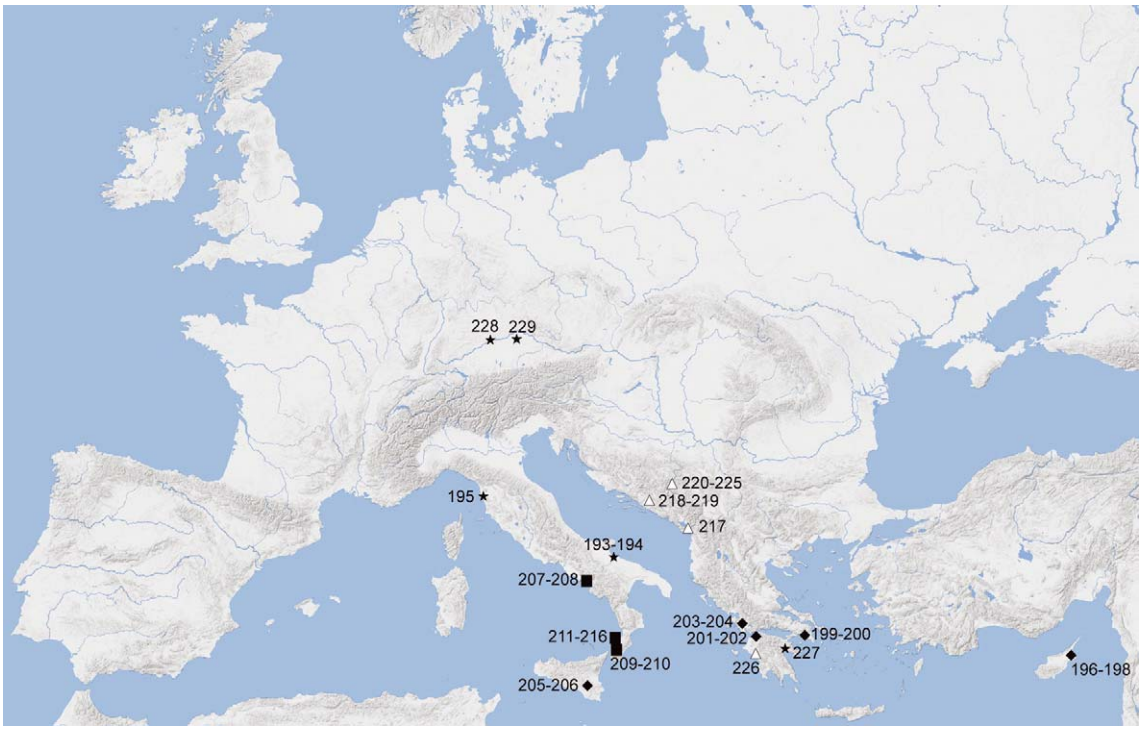

Fig. 4.7 Archaeological distribution of European Bronze Age greaves. ◆ Greaves of Type Kallithea: **196–198.** Enkomi; **199–200.** Kallithea; **201–202.** Portes-Kephalovryso; **203–204.** Kouvarás; **205–206.** Castellace. ■ Greaves of Type Grammichele: **207–208.** Grammichele; **209–210.** Pontecagnano; **211–216.** Torre Galli. △ Greaves of Type Ilijak: **217.** Dobraç; **218–219.** Dabrica; **220–225.** Ilijak; **226.** Olympia. ★ single types: **193–194.** Canosa; **195.** Limone; **227.** Dendra; **228.** Schäfstall; **229.** Winklsaß.

Cat. No.	Find Circumstances	Find Site	State	Type
193–194	unknown (grave?)	Canosa, Italy	IT	Canosa
195	associated deposit	Limone, Italy	IT	Limone
–	grave	Lavinio, Italy (grave 21)	IT	miniature greaves
–	grave	Quadrato di Torre Spaccata, Italy (grave 1)	IT	
–	grave	Santa Palomba, tenuta Cancelliera (graves 1, 2, 6 and 11)	IT	
–	grave	Santa Palomba, tenuta Palazzo (grave 1)	IT	
–	grave	Practica di Mare (grave 21)	IT	
–	associated deposit	Gyöngyössolymos (associated deposit IV)	HU	
–	associated deposit	Debrecen-Fancsika (associated deposit I)	HU	
–	associated deposit	Esztergom-Szentgyörgymező	HU	
–	associated deposit	Poljanski II	HR	
–	settlement	Ostrovu Mare	RO	clay greaves
–	cemetery	Orsoya	BG	

Tab. 4.5 Single types of greaves and miniature greaves.

4.1.4.1 Decoration

The decoration of the greave from Canosa is different from the ornamentation of all other greaves of Subclass A. In the centre there are vertical lines, surrounded by rows of small and medium sized bosses. The two blank areas created are decorated in the upper part with one large boss, from which lines of smaller bosses emanate, closely imitating the shape of pendants.

Parallel to the rim are lines of small bosses and two ribs. This part of the decoration resembles that of the greave from Limone. Unfortunately, the greave from Limone is heavily fragmented, so we cannot draw any further conclusions concerning its decoration.

Miniature greaves are decorated with *Gleichbuckel* only (Fig. 4.8). Their small size inevitably limited the variety of decoration that could be applied. While the finds from the Carpathian Basin do not necessarily follow the decoration of their full size equivalents, the Italian miniature greaves exhibit, partly at least, the central vertical lines (for example, the miniature greaves from Pratica di Mare (Lavinio), Roma).[1095] Two possible clay miniature greaves are known from the Gârla Mare culture in Romania.[1096] The oval, flat plates (size: c. 15 × 9cm) are decorated with symbols typical of the Urnfield culture, such as *Vogelsonnenbarke*, or sun wagons, and other decorative elements familiar on bronze greaves, such as dotted or straight lines parallel to the edge.

Fig. 4.8 Miniature greave from Esztergom-Szentgyörgymező, Hungary.

4.1.4.2 Distribution and Deposition

The find circumstances of the pair of greaves from Canosa are unknown, though their presence as a pair and their southern Italian origin indicates they were deposited in a grave. The greave from Limone, however, was deposited as a fragment in an associated deposit. The small number of finds does not, unfortunately, permit any further conclusions about the distribution of these forms of greaves.

Bronze Age miniature greaves are known from Italy (14 examples), Hungary (3 examples) and Croatia (1 example), thus forming two main distribution centres, one in southern Italy and the other in the western Carpathian Basin. The Italian greaves were usually deposited as pairs in graves, while the greaves from Hungary and Croatia were found in associated deposits. The largest number of miniature greaves was found in Lazio, Italy. Several graves contained not only miniature greaves but a whole set of miniature weaponry, such as shields, double shields, spear, sword with scabbard and knife, as well as miniature carriages in some cases.[1097] Further

[1095] Colonna 1991, 66, fig. 9; Bietti Sestieri 2011, fig. 5.
[1096] Dietrich 2009, 91–96.
[1097] de Santis 2011, 15.

miniature greaves from Italy were also found in Practica di Mare.[1098] Carpathian finds of miniature greaves derive from Esztergom-Szentgyörgymező, Gyöngyössolymos, and Debrecen-Fancsika, while one has also been found in Croatia (Poljanci, associated deposit II).[1099] The Hungarian finds are connected to the Piliny culture, where bronze miniatures of weapons, tools and ornaments were often placed in graves.[1100]

Potential miniature depictions of greaves made of clay are known from the settlement of Ostrovu Mare, Romania, and the cemetery of Orsoya, Bulgaria. These were associated with the Gârla-Mare culture,[1101] which is known for producing clay miniatures of various object types. Though their find spot was in the south of the Carpathians, we cannot exclude the possibility of a close connection to those areas where metal greaves were known.

4.1.4.3 Chronology

The greaves from Canosa, Italy, are generally dated to the 10th–9th century BC[1102] on the basis of their embossed decoration, even though their form is unique and their find circumstances are unknown. The associated deposit from Limone, which contained a fragment of a similar greave, is roughly contemporary, being dated to Ha B1.[1103] Most of the Italian miniature greaves date to the *periodo laziale* I (10th–9th century BC),[1104] whilst the Hungarian finds all date to the Kurd horizon.[1105] The find from Poljanci II dates to period II,[1106] or to Ha A, according to M. Bulat.[1107] The miniature depictions of greaves made of clay, which were found in the settlement of Ostrovu Mare and the cemetery of Orsoya, Bulgaria, are associated with the late phase of the Gârla-Mare culture (Bz D).[1108]

Catalogue

Cat. nos. 193–194. Canosa, Prov. Barletta-Andria-Trani, Apulia, Italy – find circumstances unknown (grave?) – two almost complete greaves. Measurements: 28.1 × 12.8cm (greave 1) 28.9 × 11.9 (greave 2) – Museo Nazionale archeologico di Napoli, without inv. no. (5616 and 5617 as in Johannowsky 1970 do not match with the greaves) – Pl. 39.193–194. References: Fiorelli 1869, 5, nos. 37–38; Johannowsky 1970, pl. 1; Schauer 1982b, 122–123, fig. 8.1–2; de Caro et al. 1996, 161–164; Clausing 2002, 161, fig. 6.1–2.

The pair of greaves were found before 1869. No details concerning the find circumstances or possible associated finds are known.

Cat. no. 195. Limone, Prov. Livorno, Toscana, Italy – associated deposit – fragment – 11g – Museo Archeologico Livorno, inv. no. 1798 – Pl. 39.195. References: Orsi 1887, 122–123, pl. IV.10; Cateni 1977, 14, fig. 6.7; 23, no. 50, pl. 2d; Bianco-Peroni 1979, 59, no. 301; Schauer 1982b, 124, fig. 8.3; Jankovits 1997, 16; Clausing 2002, 161, fig. 6.3.

[1098] Sommella et al. 1976, 291–311, pl. 75.A.

[1099] Esztergom-Szentgyörgymező: Mozsolics 1985, 74, 116–118, pl. 137.1; Gyöngyössolymos, depot IV: Kemenczei 1978/1979, 138, pl. V.2; Debrecen-Fancsika, depot I: Patay 1966, 76, pls. I.23–24; II.18; Mozsolics 1985, 47, 110, 124; Poljanci II, Croatia: Clausing 2003, fig. 70.145.

[1100] Mozsolics 1971.

[1101] Dietrich 2009.

[1102] Johannowsky 1970, 205–206.

[1103] Bianco-Peroni 1979, no. 301; Schauer 1982b, 138.

[1104] Sommella et al. 1976, 291–311, pl. 75.A; de Santis 2011.

[1105] Patay 1966, 76, pls. I.23–24; II.18; Kemenczei 1978/1979, 138, pl. V.2; Mozsolics 1985, 47, 74, 110, 116–118, 124, pl. 137.1; Hansen 1994, 17; Jankovits 1997, 9, fig. 6.5.

[1106] Clausing 2003, fig. 70.145, following Vinski-Gasparini 1973, 218.

[1107] Bulat 1973/1975, 28, 36–37, pl. XV.9.

[1108] Dietrich 2009, 91–96.

The associated deposit came to the museum in 1883 from the private collection of G. Chiellini. It was allegedly found in 1879 in the entrance area of a cave at the Monte la Poggia. The associated deposit consists of two spearheads, one knife of Type Bismantova, fragments of five other knives, five axes, a chisel and related fragments, a sickle and further fragments, a pin of Type Torri d'Arcugnano, fibulae, an arm ring and related fragments, a pair of tweezers, a razor of Type Fontanella, and the greave fragment.

4.2 Greaves of Class I, Subclass B

4.2.1 Greaves of Type Kallithea

Greaves of Type Kallithea have a separate, wave-shaped wire attached to the body of the greave (cat. nos. 196–206). The greaves have almost no decoration in the central part or are decorated geometrically, such as the greaves from Kallithea, with large central circles, and sometimes decorated with additional chevrons (e.g. Portes-Kephalovryso; (cat. nos. 201–202). The greaves are dated from the end of the 13th century to the 12th centuries BC. Today, we know of eleven greaves of this type (Tab. 4.6).

Cat. No.	Find Circumstances	Find Site	State	Condition
196–197	grave	Enkomi (grave 15)	GR	fragmented
198	grave	Enkomi (grave 18)	GR	almost complete
199–200	grave	Kallithéa	GR	complete
201–202	grave	Portes-Kephalovryso	GR	complete
203–204	grave	Kouvarás	GR	complete
205–206	grave	Castellace	IT	fragments

Tab. 4.6 Greaves of Type Kallithea.

4.2.1.1 Decoration

One of the greaves from Enkomi, grave 15, is well preserved, showing two ribs parallel to the bent rim and the remains of a punched circle with a large central boss, whilst the remains of the second greave are without any decoration despite the two ribs parallel to the bent rim (Fig. 4.9). On the latter, the lower edge and the left side are broken. In contrast, the greaves from Portes-Kephalovryso have a central, vertical rib, two ribs parallel to the edge, and on the two sides of the vertical rib a central, circular rib which is flanked on the outside with a line of chevrons. Chevrons are also found all along the inside of the inner, circumferential rib of the greaves, pointing inwards, and around two central circles on both sides of the greaves (with the chevrons pointing outwards). Such chevrons might be connected with the Carpathian cuirasses, which are also decorated with chevrons, being either engraved or plastic, and ribs (Saint-Germain-du-Plain, Čaka, Ducové, Pázmándfalu).

According to Bouzek, the decoration on the greaves from Kallithea imitates the stitching on leather.[1109] The two greaves consist of several small to tiny fragments joined together or amended with wax, and the decoration, which is described in detail by Yalouris,[1110] imitates spats. Six ribs are arranged geometrically, and cross over in the centre of the greave. There is one larger boss in each of the areas in between. The geometric order and arrangement of the decorative elements demonstrates a strong connection to the greaves of Type Kuřim.

[1109] Bouzek 1981, 28.
[1110] Yalouris 1960.

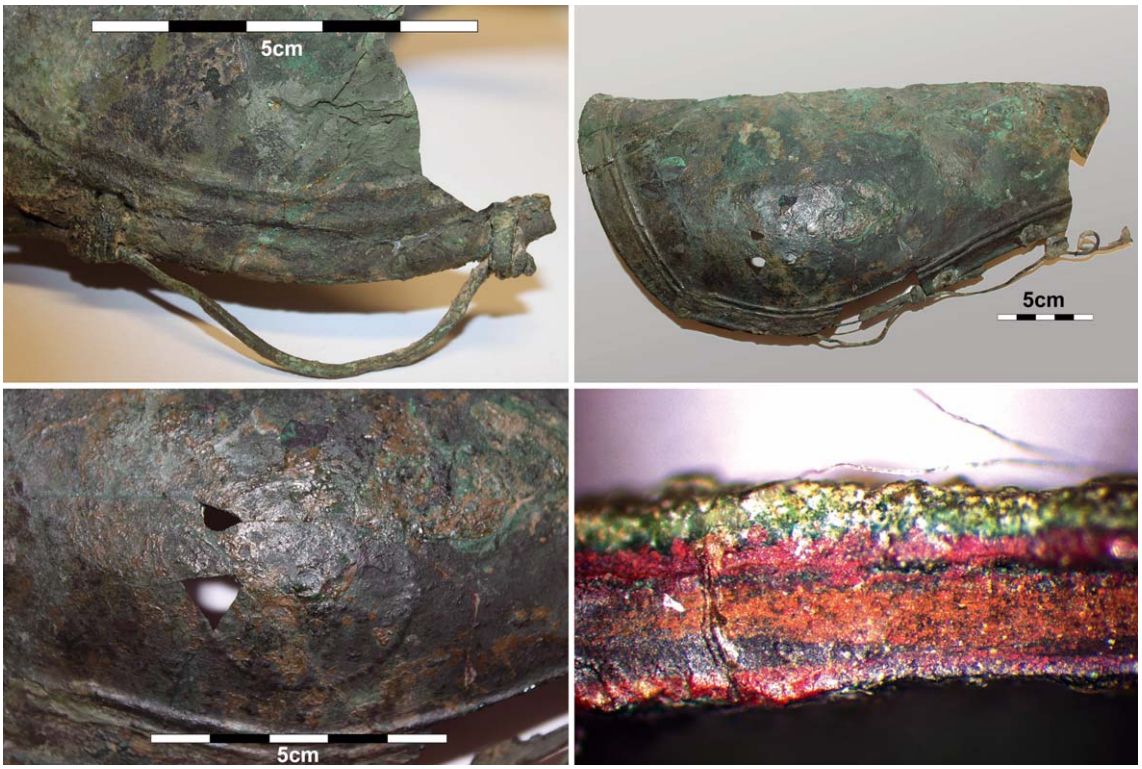

Fig. 4.9 Greave from Enkomi, grave 15. Note the attachment of the wire with riveted on bronze sheet bands and wire (above). The only decoration elements of the greave are two ribs parallel to the bent rim and the residue of one punched circle with a central, bigger boss (below left). The greave is completely corroded; no metal remained (bottom right; green: copper carbonates; black/red: copper oxides).

The greave from Castellace seems to be a hybrid of greaves of Type Kallithea and Type Grammichele, with separate wire loops, but no central decoration has been preserved apart from on the rim, which bears parallel lines of pellets and small bosses.

4.2.1.2 Distribution and Deposition

Greaves of Type Kallithea are known from central Greece, the northern Peloponnese and, most likely arriving there as a Greek export, from Cyprus and Castellace, Italy (cat. nos. 205–206). All of the greaves are grave finds. G. v. Merhart, who discussed Italian and eastern Aegean warrior graves, interpreted the graves from Enkomi and Knossos as the graves of foreign invaders.[1111] He saw the origin of the greave from Enkomi in Asia Minor and not in Greece, and the general origin of greaves amongst the Danube workshops. However, even today, no greaves have been discovered in Asia Minor. Catling agreed that the greaves from Enkomi were not produced locally but differed from Merhart in suggesting that they arrived from Greece together with the spread of the Naue II sword.[1112]

4.2.1.3 Chronology

The greaves of Type Kallithea are generally dated to the end of the 13th century to the 12th centuries BC. The greaves from Enkomi, grave 15, are generally dated to LC IIC–III(A),[1113] while

[1111] v. Merhart 1969, 219.
[1112] Catling 1955, 21, 35; Catling 1964, 140–141.
[1113] Catling 1955, 26–27; Yalouris 1960, 49; Müller-Karpe 1962a, 275; Clausing 2002, 164.

the greaves from grave 18 are slightly later and date to the end of the 13th century BC or LC IIC/LH IIIB.[1114] Catling suggests that the greaves are an import from the Greek mainland, as is the accompanying sword.[1115] The chamber tomb and the greaves from Kallithea are dated to LH III B/C, early LH IIIC, or LH IIIC.[1116] On the basis of the possible associated finds, including a Naue II sword of Type Stätzling/Allerona, a spearhead, a dagger, and bronze bands which were parts of a 'tiara-like' headdress, the greaves from Portes-Kephalovryso can be dated to either LH IIIA[1117] or, more likely, to LH IIIC,[1118] while the greaves from Kouvarás (cat. nos. 203–204) are dated to LH IIIB.[1119]

M. Pacciarelli dated the greaves from Castellace to the 12th century BC on the basis of its close connection with the greaves from Enkomi and Kallithea.[1120] The spearhead from the same grave supports this dating.

Catalogue

Cat. nos. 196–197. Enkomi, Cyprus – chamber tomb 15 – two almost complete greaves – inv. no. BM 1897/4–1/1531: c. 26.7 × 12.4cm; weight: 245g; inv. no. BM 1897/4–1/1532: 17.6 × 10.4cm, weight: 116g – British museum, inv. nos. BM 1897/4–1/1531 and BM 1897/4–1/1532 – Pl. 40.196–197. References: Murray et al. 1900, 16, fig. 26; Catling 1955, 29–30, figs. 5–6; v. Merhart 1956/1957, 94, no. 8a–c; Snodgrass 1964, pl. 28; Catling 1977b, 145–146, fig. 24, pl. 15a; Matthäus 1985, 16, note 23, pl. 122.A; Clausing 2002, 163, fig. 8.1–2.

The pair of greaves was found during the Turner Trust Excavation in 1896 and bought by the British Museum in 1897. Further finds comprise two decorated gold bands, three bronze bowls, fragments of further bronze bowls, a tripod, dishes of grey stone and perhaps also a bronze oinochoe (in the original documentation of the excavation, no ceramics are mentioned). One of the greaves from grave 15 (inv. no. BM 1897/4–1/1531) is decorated with an embossed circle and a large boss in the middle of the circle. Parallel to the rim at a distance of 1cm, are two ribs which follow the edge. On the edge of the greave, a double rib parallel to the rim is visible.

The other greave (inv. no. BM 1897/4–1/1532) is in a poor state of preservation and the surface is heavily corroded. The greave is almost complete but the ankle guard and most of the left side are broken off at the shin line. On the inside of the greave a thin strip of bronze was riveted onto the greave along its vertical edge.[1121] The strip contains holes which would have held rings through which the lacing wire passed. The double ribs parallel to the edge are less prominent and the lacing attachment is more similar to that found on the greave from tomb 18 than to the other greave in this tomb (tomb 15). The rings holding the wire are attached directly onto the greave. No decoration is visible on the surviving fragments. On the basis of these not insignificant differences, it might be possible that the tomb contained two single greaves rather than a pair of greaves.

Cat. no. 198. Enkomi, Cyprus – chamber tomb 18, skeleton VI – fragmented; possibly two greaves. Measurements: c. 22.5 × 13cm – Cyprus Museum Nicosia, inv. no. 129 – Pl. 40.198. References: Catling 1955, 22–23, figs. 1–4 [with older literature]; Yalouris 1960, 48–49; Catling 1977b, E 155; Schauer 1982b, 115, fig. 2.1; Matthäus 1985, 16, note 31; 20, note 61; Clausing 2002, 163, fig. 8.3.

[1114] Catling 1955, 34–35; Yalouris 1960, 49; Clausing 2002, 164.
[1115] Catling 1955, 34–35.
[1116] LH III B/C: Hansen 1994, 17; early LH IIIC: Yalouris 1960, 42–43; LH IIIC: Clausing 2002, 164.
[1117] Moschos 2000.
[1118] Giannopoulos 2008, 207, note 27.
[1119] Stavropoulou-Gatsi et al. 2012, 255.
[1120] Pacciarelli 2001, 193, 199.
[1121] Catling 1955, 30.

The greave from grave 18 was excavated by the Swedish Cyprus Expedition in 1930 and was initially interpreted as helmet.[1122] It belongs to skeleton VI, one of the final two burials in the tomb. The deceased was buried with a number of grave goods, including a Naue II sword and Levanto-Helladic pottery. The greave is in a poor state of preservation, and survives only as a few badly corroded fragments. It is not possible to confirm whether a second greave is represented amongst the fragments. The rim of the greave was bent outwards, so the greave is 6mm thick on the edge. The rim is partly decorated with a form of 'cable' pattern.[1123] Through metal loops (diameter 8mm) made of wire, which were fixed by means of small holes positioned to the rim, the greave could be attached to the leg, using organic strips guided through the metal loops. Three loops on the left side and two on the right side are still preserved. During the restoration it turned out that the greave or greaves were partially flattened before being placed in the tomb. Unlike the greaves from grave 15, on the fragments from grave 18 separate wires were guided through holes on the inner side of the rim.

Cat. nos. 199–200. Kallithéa-Rambandánia, Achaia, Greece – chamber tomb A – two complete greaves. Measurements: c. 25.5 × 12.6cm – Archaeological Museum of Patras, inv. no. unknown – Pl. 40.199–200. References: Yalouris 1954, 124–125, fig. 25; v. Merhart 1956/1957, 94, no. 7a–b, fig. 7.4; Yalouris 1960, 42–43, suppl. 28; Müller-Karpe 1980, 775, no. 116, pl. 250. C4–5; Schauer 1982b, pl. 4; Mountjoy 1984, 135, note 3; Matthäus 1985, 16, note 31; Hansen 1994, 13, notes 15, 18, 22, figs. 4.9; 5.20; Clausing 2002, 163, fig. 8.4–5; Giannopoulos 2008, 213–216; Stavropoulou-Gatsi et al. 2012, fig. 11.B.

In 1953 a farmer discovered a late Mycenaean chamber tomb. The bones of a presumable male (grave A) had been reburied in a small pit toward the back of the tomb. The second burial (grave B), another male, was buried in the shaft grave originally belonging to the first burial. The main finds of grave A are ceramics, mainly oinochoe, a Naue II sword, a spearhead and the fragments of two greaves, positioned lying on the legs of the buried person.

Cat. nos. 201–202. Portes-Kephalovryso, Greece – tomb 3 – two complete greaves: unknown – Archaeological Museum of Patras, inv. no. unknown – Pl. 40.201. References: Papadopoulos 1999, 271–272, pl. 59a; Kolonas – Moschos 2000; Moschos 2000; Kolonas 2001, 260; Giannopoulos 2008, 205–207, fig. 26.

The grave was discovered in 1994. Obviously it was placed intentionally under an early Mycenaean tumulus to give the impression of a grave hill. Besides the pair of greaves, the tomb also contained a Naue II sword, a spearhead with remnants of the wooden shaft, a dagger or knife, bronze bands forming parts of a 'tiara-like' headgear, and a bronze bowl.

Cat. nos. 203–204. Kouvarás, Aetolia-Acarnania, Greece – cist grave – two complete greaves. Measurements: length: 29.8cm – Museum of Agrinio, inv. no. 1553 – Pl. 40.203–204. References: Stavropoulou-Gatsi et al. 2012, 255, fig. 7.

The isolated, single cist grave was excavated in 2006. Some 150m to the north, a sub-Mycenaean phase cemetery was discovered. The weapon finds from the cist grave comprised a pair of complete greaves, a Naue II sword of Type Allerona with gold wire decoration on the grip, a Mycenaean sword of Type F with ivory hilt plates, and a bimetallic knife with ivory hilt plate, a spearhead, and an arrow head. Only finds included a belly-handled amphora and krater, a golden kylix, and a bronze tripod cauldron.

Cat. nos. 205–206. Castellace, Com. Oppido Mamertina, Reggio Calabria, Italy – grave 2 from 1929 – fragments. Measurements: unknown – Museo Nazionale della Magna Grecia di

[1122] Catling 1955, 21.
[1123] Catling 1955, 24.

Reggio Calabria (Museo Oppido Mamertina), inv. no. unknown – Pl. 40.205–206. References: Costamagna – Visoná 1999; Pacciarelli 2001, 193, fig. 112.A1; Clausing 2002, 163, fig. 8.6.

Grave no. 2 contained, as well as the greave fragments, a spearhead of Type Pahzok,[1124] which points to close contacts with the Balkans, such as the necropolis from Vajze e Patos in Albania.

4.3 Greaves of Class I, Subclass C

4.3.1 Greaves of Type Grammichele

Greaves of Type Grammichele have a separate, looped wire and wave-band decoration (cat. nos. 207–216). The greaves have double ribs parallel to the rim and several larger bosses surrounded by punched circles. The greaves are dated to the 11th–9th centuries BC. Greaves of Type Kallithea most likely influenced greaves of Type Grammichele, which imitated the wave-shaped wire of the eastern Mediterranean greaves of Type Kallithea in their decoration. Today, we know of ten greaves of this type (Tab. 4.7).

Cat. No.	Find Circumstances	Find Site	State	Condition
207–208	grave	Grammichele	IT	complete
209–210	grave	Pontecagnano	IT	complete
211	grave	Torre Galli (grave 65)	IT	fragmented
212	grave	Torre Galli (grave 206)	IT	fragments
213	grave	Torre Galli (grave 86)	IT	fragmented
214	grave	Torre Galli (grave 99)	IT	fragmented
215–216	grave	Torre Galli (grave 239)	IT	fragmented

Tab. 4.7 Greaves of Type Grammichele.

4.3.1.1 Decoration

The greaves from Grammichele (cat. nos. 207–208) are the only Bronze Age examples with a complete horizontal base, whereas in the case of the fragments from Winklsaß a possible flat, lower end is not completely certain. The decoration consists of centrally arranged, vertical parallel ribs, and to the left and right of them three large bosses surrounded by narrow, punched circles. The circles are connected with each other and the rib (which is parallel to the edge) by a wave-shaped, punched pair of lines. The decoration of the greave from Pontecagnano consists of central, vertical parallel ribs, and to the left and right of them are three large bosses surrounded by narrow punched circles. The circles are connected to each other and the rib, which is parallel to the edge, by a wave-shaped pair of punched lines. The decoration of the greave from Torre Galli, grave 99 (cat. no. 214), is slightly different to that on the greaves from Grammichele and Pontecagnano, as it has no vertical decoration and wave-like, double lines of pellet decoration are visible. In comparison, the almost complete greaves from Torre Galli, graves 65 and 86 (cat. nos. 211 and 213), resemble closely the greaves from Pontecagnano (wave-shaped, punched pair of lines, central vertical ribs, ribs parallel to the edge, large central bosses). The greaves from grave 239 at Torre Galli (cat. nos. 215–216) do not survive and nor do any drawings. The greave from Torre Galli, grave 206 (cat. no. 212), is too badly preserved to say much about its decoration apart from that is resembles the ones from Pontecagnano. The combination of large bosses connected to each other by wave-shaped lines on the greaves with looped wire

[1124] Bietti Sestieri 2008, 24.

and wave-band decoration could be interpreted as a further abstraction of the *Vogelsonnenbarke* motif or, more likely, as an abstraction of the wave-shaped wire found on the older greaves of Type Kallithea.

4.3.1.2 Distribution and Deposition

Greaves of Type Grammichele are only known from Italy and have been found from Pontecagnano (Salerno) in the north to Grammichele (Catania, Sicily) in the south. Their rather small recovery area indicates local production. Morphologically, we see close connections to the earlier greaves of Type Kallithea with wave-shaped wire, which found its way to southern Italy as a decorative element during the increasing *orientalisation* of the western Mediterranean.

Greaves of Type Grammichele are generally found complete or almost complete as pairs in graves (Fig. 4.7). For the greaves from the cemetery of Torre Galli we cannot be sure in every case of they were deposited in each grave singularly or as pairs, since the recovered greaves are either heavily fragmented, and may represent the partial of one or more greaves, or because recovered fragments cannot be unequivocally identified as coming from a greave.

4.3.1.3 Chronology

The greaves of Type Grammichele are dated somewhat later than the greaves of Type Kallithea, to the 11th–9th centuries BC/beginning *prima età del ferro*. According to the alleged associated finds, such as the sword of Type Contigliano, the greaves from Grammichele can be dated to the 11th century BC, and are therefore the oldest of this type.[1125] The greaves from Torre Galli have been dated to the 9th century BC, as have the greaves from Pontecagnano,[1126] with the grave dated on the basis of its alleged association with a sword dating to the later part of the Early Iron Age,[1127] while the necropolis itself dates to the 11th–9th centuries BC.[1128]

Catalogue

Cat. nos. 207–208. Grammichele, Prov. Catania, Sicilia, Italy – Madonna del Piano, grave 26 – two complete greaves. Measurements: unknown – Museo Civico Archeologico Grammichele, inv. no. 70.630 – Pl. 41.207–208. References: Albanese Procelli 1994, 155, fig. 1; 167, pl. 1a–b; Clausing 2002, 166, fig. 8.7–8; Giumlia-Mair et al. 2010.

Grave no. 26 contained, as well as a pair of greaves, a sword of Type Contigliano.

Cat. nos. 209–210. Pontecagnano, Com. Pontecagnano Faiano, Prov. Salerno, Campania, Italy – grave 180 – two complete greaves. Measurements: unknown – Museo Archeologico Nazionale di Pontecagnano, inv. no. 13760 – Pl. 41.209–210. References: D'Agostino 1965, 671–672, pl. 136a; Kilian 1974, 52, pl. 11.B4; Schauer 1982b, 146, fig. 18; D'Agostino – Gastaldi 1988, 132, figs. 1.4, 6, top left; 57.11–12; pl. 24.63; Clausing 2002, 166, fig. 8.9–10.

The grave has been dated on the basis of the associated sword, which has been identified as belonging to the later part of the Early Iron Age.[1129] The necropolis itself, some 10km south of Salerno, dates to the 9th–11th century BC.[1130] The grave also contained a bronze scabbard, three fibulae, two pots, a razor, as well as the greave.

[1125] Clausing 2002, 166.
[1126] Clausing 2002, 166.
[1127] Kilian 1974, 53.
[1128] D'Agostino 1965, 671.
[1129] Kilian 1974, 52–53: Type IIId.
[1130] D'Agostino 1965, 671. Clausing 2002, 166 dates the grave to the 9th century BC.

Cat. no. 211. Torre Galli, Com. Drapia, Prov. Cantanzaro, Calabria, Italy – grave 65 – one fragmented greave. Measurements: 23 × 11cm – Museo Nazionale Reggio Calabria, inv. no. unknown – Pl. 41.211. References: Orsi 1926, 52–53, fig. 34; Schauer 1982b, 141, fig. 4.2; Pacciarelli 1999, 159–160, pl. 56.8.

Orsi mentions the presence of organic residues on the inside of the greave.[1131] Alleged finds comprise three ceramic bowls, a sauroter (?), a ferrule, a short iron sword with bronze scabbard, and an iron knife or dagger. Schauer interpreted the greave as arm protection.[1132]

Cat. no. 212. Torre Galli, Com. Drapia, Prov. Cantanzaro, Calabria, Italy – grave 206 – one fragmented greave. Measurements: 14 × 6.5cm – Museo Nazionale Reggio Calabria, inv. no. unknown – Pl. 41.212. References: Orsi 1926, 105–106; Pacciarelli 1999, 188, pl. 139.7.

The greave is completely fragmented, with only the wire and some fragments of the larger bosses surviving. Orsi also notes a 3mm, black organic layer above the greave. Alleged finds comprise an amphora, a further smaller amphora, ceramic bowls, a ferrule, a spearhead, an iron fibula, and a short iron sword with bronze scabbard.

Cat. no. 213. Torre Galli, Com. Drapia, Prov. Cantanzaro, Calabria, Italy – grave 86 – one fragmented greave. Measurements: 27 × 13.5cm – Museo Nazionale Reggio Calabria, inv. no. unknown – Pl. 41.213. References: Orsi 1926, 59–61, figs. 43–44; Schauer 1982b, 141, fig. 4.3; Pacciarelli 1999, 163–164, pl. 66.7.

The greave was found positioned on the lower right leg, and in the drawing of the whole tomb by Orsi it is depicted complete. Alleged finds comprise two amphorae, two ceramic bowls, a spearhead, a ferrule, a fibula, an amber bead, and an iron short sword with bronze scabbard. Schauer interpreted the greave as arm protection.[1133]

Cat. no. 214. Torre Galli, Com. Drapia, Prov. Cantanzaro, Calabria, Italy – grave 99 – one fragmented greave. Measurements: 29 × 12.2cm and 29 × 7.6cm – Museo di Vibo Valentia, inv. no. unknown – Pl. 41.214. References: Orsi 1926, 67–69, fig. 51; Schauer 1982b, 119, 141, fig. 4.1; Pacciarelli 1999, 166, pl. 72.A7; Clausing 2002, 166, fig. 8.11.

Alleged finds comprise a fibula, a ferrule, a spearhead and a short iron sword.

Cat. nos. 215–216. Torre Galli, Com. Drapia, Prov. Cantanzaro, Calabria, Italy – grave 239 – two greaves, fragmented. Measurements: c. 26 × 14cm – today lost. References: Orsi 1926, 114–115; Schauer 1982b, 141, note 153; Pacciarelli 1999, 195, 384, pl. 158.B; Clausing 2002, 166.

Only the wire around which the sheet metal was bent, as well as few tiny fragments, survive from the second greave. The decoration cannot be reconstructed. A bowl, an iron and a bronze spearhead and ferrule, as well as an iron sword with bronze scabbard, were also found in the grave. The greaves are now lost and no depictions survive.

4.4 Greaves of Class I, Subclass D

4.4.1 Greaves of Type Ilijak

Greaves of Type Ilijak were previously classified as greaves with riveted on loops.[1134] They have on each side three small, riveted-on loops made of bronze sheet used to attach small rings which serve to attach the greave onto the leg of the wearer. So far, ten greaves of Type Ilijak are known from four find spots (Tab. 4.8). They form a geographically and chronologically consist-

[1131] 'Tracce in una sottile massa fibrosa nera': Orsi 1926, 52–53.
[1132] Schauer 1982b, 141, fig. 4.2.
[1133] Schauer 1982b, 141, fig. 4.3.
[1134] After Clausing 2002, 168–169: 'Beinschienen mit angenieten Ösen'.

ent group, ranging across southern Bosnia-Herzegovina to Northern Albania, whilst a related fragment is known from Olympia.

Cat. No.	Find Circumstances	Find Site	State	Condition
217	unknown	Dobraç	AL	complete
218–219	single find / grave	Dabrica	BA	complete
220–221	grave	Ilijak (hill 2, grave 1)	BA	complete
222–223	grave	Ilijak (hill 3, grave 9)	BA	complete
224–225	grave	Ilijak (hill 13)	BA	complete
226	votive deposit	Olympia	GR	fragment

Tab. 4.8 Greaves of Type Ilijak.

4.4.1.1 Decoration

Greaves of Type Ilijak are, apart from those from Dobraç and Dabrica (cat. nos. 217 and 218–219), decorated with geometric *Leistenbuckel* motifs and *Ringbuckel*.[1135] The greaves from Dobraç and Dabrica are decorated with pellets and bosses only, including imitation *Ringbuckel* by means of pellet decoration. Some of the decorative elements on these greaves resemble not only the pair of greaves from Ilijak, hill 3, grave 9 (cat. nos. 220–221) but also one of the greaves Type Grammichele, suggesting that they might derive from Southern Italy.[1136] This connection is, however, somewhat tenuous given that the Italian greaves form a very uniform group with otherwise quite different decoration from that of the greaves from Dobraç and Dabrica.

As well as these possible western connections, northward connections are indicated by the greaves from Ilijak hill 13 (cat. nos. 222–223), which resemble, in their alignment of decorative elements, the greaves of Type Kuřim. An exceptional and somewhat unique example of recycling are the greaves from Ilijak (cat. nos. 220–221), where both greaves were made out of former belt plates, as it is indicated by similar such finds.[1137]

These greaves are both engraved and embossed, which enabled Benac and Čović to reconstruct the chronological order of the function of the bronze sheets.[1138] According to the overlapping and different orientation of the decorative elements, the bronze sheets (then still functioning as belt plates) were engraved (with wheels, spirals, animals and circles), and then, once reshaped into greaves, further decoration in the form of embossed motifs were added, so as to resemble greaves of Type Ilijak. According to similar local finds of belt plates and their associated decorative motifs,[1139] the greaves from hill 3 (and therefore likely the other greaves from Ilijak) were produced locally. This suggests that the related fragment of a greave of Type Ilijak from Olympia associated may have been imported, representing a 'foreign' votive deposit.

4.4.1.2 Distribution and Deposition

Greaves of Type Ilijak form a geographically and chronologically consistent group, ranging from southern Bosnia-Herzegovina to Northern Albania, with a related fragment occurring as a 'foreign' votive deposit at Olympia. Despite the latter, and possibly also the greave from Dobraç, whose find circumstances are unknown, all greaves of Type Ilijak have been found in pairs in graves. The greaves from Dabrica were found just 10cm under a stone cist grave con-

[1135] *Ringbuckel*: decoration of bosses with rings around them.
[1136] Benac – Čović 1957; Kasper 1972, 96.
[1137] See Kilian 1973, 531, notes 16–17, fig. 5.
[1138] Benac – Čović 1957.
[1139] Kilian 1973, 531.

taining a skeleton which lacked any accompanying grave goods. No other indications of Late Bronze Age/Early Iron Age activity were noted. The greaves may have been placed in between the stones of the pre-existing older burial, and therefore need not necessarily be directly connected to it or even contemporary.

4.4.1.3 Chronology

Greaves of Type Ilijak are generally attributable to the 8th–7th century BC. Kilian noted that the fragment of greave of Type Ilijak found in Olympia must belong at least to the 8th century BC, since such votive donations are not known to be older than this.[1140] The associated finds from Ilijak also suggest a date in the 8th century BC. The latter greaves were associated with Glasinac IV–B, representing the very end of the Hallstatt period, most likely during the middle of the 7th century BC.[1141] The original belt plates used to produce the greaves from hill 3 are dated, on the basis of similar finds during Glasinac IV–A, and therefore their subsequent fashioning into greaves must be somewhat later.

No finds are known to have accompanied the greaves from Dobraç and Dabrica. Typologically speaking, these two greaves are certainly older than the greaves from Ilijak, since they demonstrate decorative elements of the late Urnfield culture, as does the greave from Ilijak hill 13, which is probably the oldest from the cemetery. Their typological relationship to the greaves of Type Grammichele suggests a likely date in the 10th–9th century BC.

Catalogue

Cat. no. 217. Dobraç, Shkodër, Albania – find circumstances unknown – complete. Measurements: 34 × 18cm – Muzeut Popullor, Shkodër, inv. no. unknown – Pl. 42.217. References: Kilian 1973, 528–529, fig. 1; Prendi 1975, 109–110; Schauer 1982b, 143–147, fig. 17; Clausing 2002, 168–169, fig. 10.1.

The greave was bought by the museum in 1947 from a private collection.

Cat. nos. 218–219. Dabrica/Stolac, Općina Berkovići, Bosnia-Herzegovina – single find (?) – two complete greaves. Measurements: greave 1: 31.8 × 21.2cm; greave 2: 32.1 × 21.8cm thickness both greaves: 0.7–0.8mm – museum and inv. no. unknown – Pl. 42.218–219. References: Čović 1976, 21–22, figs. 2–3, 5, pl. 1a–b; Clausing 2002, 168–169, fig. 10.2.

In October 1969, two bronze greaves were found c. 10cm under the soil. Further excavations the following year revealed a stone cist grave containing a skeleton, unaccompanied by any grave goods. There were no further indications of any Late Bronze Age/Early Iron Age activity. Most likely, the greaves are of a later date, and were deposited between the stones of the pre-existing older burial.

Cat. nos. 220–221. Ilijak, Općina Pale, Bosnia-Herzegovina – hill 3, grave 9 – two complete greaves – c. 33.6 × 22.7cm – Zemalski Muzej Bosne i Hercegovine, Sarajevo, inv. no. unknown – Pl. 42.220–221. References: Fiala 1895, 11–12, figs. 23–24; Benac – Čović 1957, 69–70, pl. 16.2–3; Kilian 1973, 528–529, figs. 3–4, pl. 41.1–2; Schauer 1982b, 125, 143–147, fig. 9; Clausing 2002, 168–169, fig. 10.5–6.

As well as the greaves, the grave contained an iron sword with wooden scabbard, a further iron weapon (dagger or sword?), an iron socketed axe and an iron *Ärmchenbeil*, and jewellery in the form of two arm rings, a bronze tiara, and several ceramic sherds.

[1140] Kilian 1973.

[1141] Benac – Čović 1957; Kilian 1973, 535.

Cat. nos. 222–223. Ilijak, Općina Pale, Bosnia-Herzegovina – hill 13 – two complete greaves – c. 34.4 × 19cm – Zemalski Muzej Bosne i Hercegovine, Sarajevo, inv. no. unknown – Pl. 43.222. References: Fiala 1895, 15–16, figs. 39–40; Yalouris 1960, 50, fig. 1; 52, note 25; Schauer 1982b, 123–124, 143–147, fig. 10.1–2; Clausing 2002, 168–169, fig. 10.7.

As well as the greaves, the grave contained an iron sword, an iron spearhead, several fragments of further spearheads, jewellery and a bronze cup.

Cat. nos. 224–225. Ilijak, Općina Pale, Bosnia-Herzegovina – hill 2, grave 1 – two complete greaves – c. 32.8 × 22.5cm – Zemalski Muzej Bosne i Hercegovine, Sarajevo, inv. no. unknown – Pl. 43.224–225. References: Fiala 1895, 6–7, figs. 8–9; v. Merhart 1956/1957, 174, no. 6a–f; Benac – Čović 1957, 70, fig. 6, pl. 19.1–2; Yalouris 1960, 50, fig. 2; 52 note 25; Schauer 1982b, 128, 143–147, fig. 11; Clausing 2002, 168–169, fig. 10.3–4.

The greaves were positioned on the lower legs of the deceased. Further associated finds include an iron sword with bronze hilt, still sheathed in its wooden scabbard, around 50 'knobs' located on the breast of the buried person, a bronze cup, bronze dishes (*Perlrandbecken*, a bronze cup with iron handles, an omphalos-cup), two massive bronze rings, a wheel-pendant and a grindstone.

Cat. no. 226. Olympia, Elis, Greece – votive deposit – fragment. Measurements: c. 27.7 × 13cm – museum and inv. no. unknown – Pl. 43.226. References: Furtwängler 1890, 49, no. 329, pl. 20.329; Kasper 1972, 94–96, no. 213, pl. 36.2; Kilian 1973, 528–529, fig. 2; Krahe 1981, fig. 57, no. 14; Schauer 1982b, 127, 143, fig. 10.3; Kunze 1991, 3, note 8; Clausing 2002, 168–169, fig. 10.8.

4.5 Greaves of Class II

Bronze Age greaves with perforations along the rim are neither a morphologically or chronologically close group (Tab. 4.9). The two unique greaves from Dendra and Schäfstall,[1142] as well as the associated greave from Winklsaß, are only placed within the same 'group' on the basis of their specific technological characterisation.

The greave from the associated deposit of Winklsaß, Germany, was discovered having been rolled up, prior to deposition, and when unrolled broke into four pieces. Each individual piece exhibits different details of the same overall decoration scheme, consisting of fine lines of dots. Holste, and a number of subsequent authors, have interpreted the fragments as belonging to one or more bronze vessels, whilst J. Hrala interpreted the fragments as parts of a belt.[1143] Schauer suggested that the fragments were originally part of a greave, and Weiss noted that they fitted together.[1144] Their interpretation as greaves has since been questioned by Clausing, as he considers the decoration to be completely different to that on other known greaves, especially as the bent rim with integral wire, as well as the holes for attaching the organic backing or loops, are all missing.[1145]

The greave from Winklsaß has been assigned to this group on the basis of its decorative similarities to the greave from Schäfstall, even though on the preserved fragments no perforation along the edge is visible as it is on the latter. We should also note that one of the greaves of Type Desmontà, the greave from Malpensa, has secondary perforations along the whole edge. The perforation might have been applied after four of the five loops on the left side had broken, requiring secondary modification so that it could still be attached to the leg. Nevertheless, this greave is linked with the greaves of Type Desmontà.

[1142] Schauer 1982b, 133.
[1143] Holste 1936, 2, 14; Hrala 1966, 11, note 20; Stein 1976, 174, note 134; Stein 1979, 168.
[1144] Schauer 1982b, 123, 133, 153, figs. 7, 19; Weiss 1998, 535–554.
[1145] Clausing 2002, 182.

Only from the 6th century BC onwards do greaves with perforation along the rim form a morphologically and chronologically consistent group, comprising finds from Aups, Roquefort, St. Julien, Mailhac, La Palma, Can Canyis/Banyeres, Solivella, Granja Soley, Entremont and Plerimond.[1146]

Cat. No.	Find Circumstances	Find Site	State	Condition
227	grave	Dendra	GR	fragmented
228	single find / river	Schäfstall	DE	almost complete
229	associated deposit	Winklsaß	DE	fragment

Tab. 4.9 Greaves of Class II.

4.5.1 Decoration

The greave from Dendra is the only Bronze Age greave without any decoration. The greave from Schäfstall has pellet decoration only, consisting of a double central line of pellets dividing the greave in two. Each half has in the upper and lower parts three bows inside each other, with each bow consisting of three lines of pellets. These bows all end at a double line of pellets running parallel to the rim of the greave. However, somewhat similar decoration to that on the greave from Schäfstall is also known on the greave from Cannes-Ècluse.

The greave from Winklsaß also has only pellet decoration. However, as only a few fragments of the greave exist, the decoration can be only partially reconstructed. Similar to the greave from Schäfstall, the greave from Winklsaß has a double line of pellets running parallel to the rib. On the top and bottom, as well on the central left and right, three bows, each with a line of pellets, were applied inside each other. In some respects, the decoration on the greave from Winklsaß, with its half-circles on both sides as well as on the top and bottom, is reminiscent of the structure of the geometric decoration on the greaves of Type Kuřim. Nevertheless, the central 'X' is formed with four boat-shaped figures, made of two parallel lines of pellets, and does not have any equivalent.

4.5.2 Distribution and Deposition

Greaves with perforations along the rim are known from Dendra, Schäfstall and potentially Winklsaß but there are no further morphological or chronological connection between them. Consequently, their distribution and the circumstances of their deposition differs widely. The Dendra greave was, as are all other eastern Mediterranean greaves, with the exception of the fragment from Olympia, deposited in a grave. The Schäfstall greave was instead recovered from a wet context, having been discovered in an old tributary of the Danube. The fragments of the greave from Winklsaß formed part of an associated deposit, which may also have included the remains of a cuirass.

4.5.3 Chronology

Greaves with perforation along the rim are not a chronological or geographical homogenous group, and are associated on the basis of technological criteria only. The Dendra grave dates to the first half of the 15th century BC,[1147] while the greave from Schäfstall, which may have been

[1146] Dehn 1980; Clausing 2002.
[1147] Verdelis 1967, 7.

from an associated deposit, is dated to Ha A1.[1148] The date suggested by S. Wirth,[1149] on the basis of a number of possible associations, is somewhat problematic, as the greave is a single find from a gravel pit in the area of an old tributary of the Danube, and cannot therefore be securely associated with the other bronzes from the same gravel pit. Schauer links the greave to the Aegean examples since it does not have a bent rim but rather perforations all along the edge.[1150] Nevertheless, the similarities in decoration with that of the greaves from Cannes-Ècluse and Winklsaß cannot be ignored. The associated deposit from Winklsaß is dated to Ha A1.[1151]

Catalogue

Cat. no. 227. Dendra, Argolis, Greece – chamber tomb 12 – one almost complete greave. Measurements: 32.5 × 4–8cm – Nafplion Archaeological Museum, inv. no. unknown – Pl. 44.227. References: Verdelis 1967, 35–36, fig. 8, suppl. 19; Verdelis 1977, 45–46, fig. 13, pl. 22.1–3; Müller-Karpe 1980, 773, no. 108, pl. 242.8; Schauer 1982b, 121, fig. 6.1; Clausing 2002, 171, fig. 12a–c.

For find circumstances and context, see cat. no. 123. It is still not clear if there was one or two greaves in the grave, as there remain a considerable number of unassociated fragments which might potentially belong to a second greave.[1152] The greave from Dendra has few similarities with other greaves from Greece, which are elliptic, short and decorated, while the Dendra greave is long, thin and undecorated. All along the rim of the greave a row of perforations is visible, some of which still contain residues of fibre or twine, which may have served to attach an organic lining or, more likely, to attach the greave to an organic wrapping applied around the leg.

Cat. no. 228. Schäfstall, St. Donauwörth, Lkr. Donau-Ries, RB Schwaben, Bayern, Germany – single find, old Danube arm (gravel pit) – length: 27cm – Archäologisches Museum Donauwörth, inv. no. unknown – Pl. 44.228. References: Dehn 1980, 29, fig. 8; Krahe 1981, 77, fig. 58; Schauer 1982b, 123, fig. 7.2; 133; Hansen 1994, 14, 18, figs. 3.7; 5.10; Jankovits 1997, 9; Weiss 1998, 540; Wirth 1999, 590, notes 76–77; Clausing 2002, 178–180, fig. 19.

The greave was found in a gravel pit in the area of an old tributary of the Danube, close to the estuary with the Lech and Wörnitz, which was used as a ford between north and south. From the same gravel pit several other Bronze Age objects were recovered, including axes, sickles, spearheads and swords.

Cat. no. 229. Winklsaß, Bavaria, Germany – associated deposit – fragments. Measurements: c. 26 × 20cm; thickness: 1mm; weight: 80g – Stadtmuseum Landshut, inv. no. A 447 – Pl. 44.229. References: Holste 1936, 2, 14, pl. 2.31, 34–35; Müller-Karpe 1959, 156, 285, pls. 148–149; Torbrügge 1960, 56, 78, no. 164; v. Brunn 1968; Stein 1979, 112–116, 166–167, pl. 111.4–18; Schauer 1982b, 123, fig. 7.3; Hansen 1994, 14, 17, figs. 3.8; 5.9; Weiss 1998, 535–554, fig. 3; Clausing 2002, 182, fig. 23.

In the summer of 1911 woodworkers found more than 100 individual fragments of bronze in the forest around 1300m north of Winklsaß, Bavaria. The associated deposit was buried at a depth of 30–40cm, and was covered by 35 casting cakes. As well as the greave, the associated deposit contained pins, necklaces, arm rings, foot rings, belt hooks, parts of fibulae, a piece of a sword blade, four fragments of spearhead, seven fragments of axe, one complete sickle and 36 sickle fragments, a razor, fragments of knives and daggers, one ingot, bronze sheet fragments and a possible fragment from a bronze cuirass.[1153] One of the finders was certain that he had

[1148] Hansen 1994, 13–14.
[1149] Wirth 1999, 590, notes 76–77, fig. 18 ‘probably older Urnfield period’; Wirth 2000, 88.
[1150] Schauer 1982b, 133.
[1151] Weiss 1998.
[1152] Verdelis 1967, 35, note 125.
[1153] See Chapter 3, p. 171.

found pure gold, indicating the minimal patina on the bronzes. The associated deposit was sold to the *Historischer Verein für Niederbayern*, who sold it on to the museum in Landshut.

4.6 Potential Greave Finds

Numerous fragments of bronze sheet have, with varying degrees of certainty, been interpreted as the remains of greaves. All of these have been found within the distribution area of other known greaves.

The bronze sheet fragment from the associated deposit of Reventin-Vaugris, believed to be from a greave, is bent at the edge and decorated with three parallel punched lines. According to Clausing there is no basis for interpreting the fragment as part of a greave.[1154]

The Ha B1 associated deposit from Braud appears now to be lost[1155] and therefore confirming certain morphological indicators for their being greaves, such as the presence of bent rims or from their cross section, is no longer possible.

According to Jankovits, the associated deposit of Pila del Brancon, Italy, also contained fragments of a greave and a helmet.[1156] Since these do not resemble any known body armour, they more likely belong to belt plates or some other bronze sheet object. The associated deposit contained objects dated to between *bronzo medio* and *bronzo finale*,[1157] and Jankovits suggests a date of Bz D–Ha A1.[1158]

The associated deposit from Schönberg bei Niederwölz, Austria, contains a small bronze sheet fragment which might also belong to a greave. It is decorated with four circles inside each other. There is no indication of a wheel motif and the fragment is too small to allow for the reconstruction of any further decorative details.

The possible greave fragment from the Bz D–Ha A1 associated deposit from Brandgraben/Kainischtal, Austria, is decorated with three dotted lines parallel to one another, each bent once at a right angle.[1159] The sheet is bent around a small, twice folded, thin bronze sheet. The decoration does not resemble that on other known greaves. The thickness of the sheet and the straight edge point also suggest that it is from another type of bronze object.

Though they do not exhibit decoration similar to that known from other greaves, E. Borgna and E. Montagnari suggest that some of the bronze sheet fragments from Škocjan, Slovenia, are also from greaves,[1160] though it is more likely that the sheets fragments are from helmets or decorated belts.

The bronze sheet fragment from the Bz D associated deposit from Čermožiše, Slovenia,[1161] might indeed be from a greave on the basis of its decoration but the thickness of the sheet is somewhat greater than that normally found on greaves, and the decoration is not as delicate due to its thickness.

A fragment from the associated deposit of Slavonski Brod III might belong to a greave, though the lack of wire, around which the edge would have been bent, might suggest that it is from another object (Fig. 4.10).[1162] The decoration consists of two dotted lines running parallel to the edge. Three further dotted lines are almost perpendicular to the edge, and below (or above?), four dotted lines form a semicircle. At the other end of the fragment, a larger boss is visible.

[1154] Clausing 2002, 183, note 126.
[1155] Clausing 2002, 180, fig. 20.
[1156] Jankovits 1999/2000, 189, fig. 1.1, 4–5.
[1157] Salzani 1998, 66–74.
[1158] Jankovits 1999/2000, 189.
[1159] Windholz-Konrad 2008, 48–57, 137, fig. 2.3.49
[1160] Borgna – Montagnari Kokelj1999, 137, fig. 2.4, 6.
[1161] Smodič 1955, 92.
[1162] Clausing 2002, 184; Clausing 2003, 130–131, fig. 40.126.

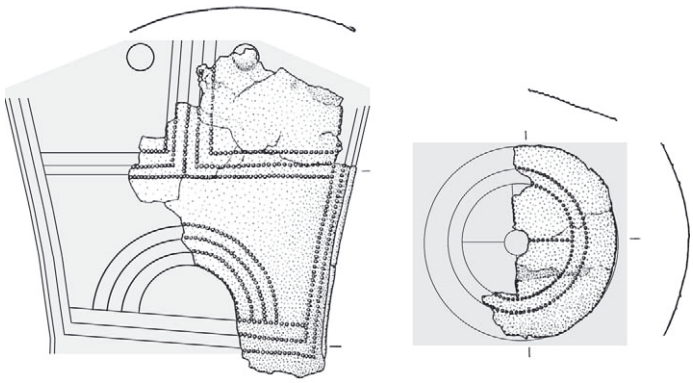

Fig. 4.10 Fragments of two potential further greaves from Slavonski Brod, Croatia, associated deposit III (after Clausing 2003, figs. 3.12; 40.126).

Paulík, in relation to the Čaka grave, mentions previously undiscussed bronze sheets with 'buttons' and suggests that these might be the remains of the fittings from leather greaves. The bronze fragments are without any chevrons or pointed ends.[1163] However, the reconstruction of a greave from these fragments is not convincing since the shape is not at all ergonomic and bears no similarities to any other known greave. Since he also reconstructed a shield from further unspecified bronze sheet fragments, the inferred greave seems to be based mostly on the wish to reconstruct a warrior grave with a complete set of defensive armour.[1164]

Schauer notes further possible fragments of greaves from the associated deposit of Guşteriţa, Romania, on the basis that they exhibit embossed decoration.[1165] However, it is more likely these fragments also belong to bronze bowls or vessels, as was recently discussed by T. Soroçeanu.[1166]

Several fragments from the associated deposit of Uioara de Sus, Romania, might belong to greaves of Type Desmontà or greaves of Type Lengyeltóti. This concerns the fragments inv. nos. III–6025, III–5795, III–7448, and III–5997.[1167]

Also, further fragments of potential greaves are known from the associated deposit from Várvölgy-Nagy-Lázhegy, Hungary. However, the fragments are far too large and the pellet decoration too poorly applied when compared to other known greaves, including the complete example from the same find, for them to come from a further greave.

4.7 Analyses and Construction

In the following, the results obtained by metallographic and chemical characterisation (SEM-EDXS; light optical microscope)[1168] are described. Eight Bronze Age greaves from Austria, Bosnia-Herzegovina and Croatia were sampled for metallographic and chemical characterisation (Fig. 4.11). The compositional analyses were performed on cross sections of micro-fragments which were mechanically sampled from the greaves or from drilling samples, taken with a 1mm drill. The eight greaves belong to three different types. The greaves from Enkomi, grave 15, unfortunately could not be studied, since they are already completely corroded (Fig. 4.9, bottom right). Three further Bronze Age greaves were already analysed non-invasively.[1169] Generally, greaves were made out of one sheet of metal and one wire, around which the edge of the metal

[1163] Paulík 1988, 24.
[1164] See also Hansen 1994, 13.
[1165] Schauer 1982b, 151, note 202.
[1166] Soroçeanu 2008, no. 33a: bowl of Type Satteldorf; no. 124: vessel of Type Kurd.
[1167] See also Rusu 1990, pl. II.
[1168] See Chapter 2.3.
[1169] Mödlinger et al. 2014.

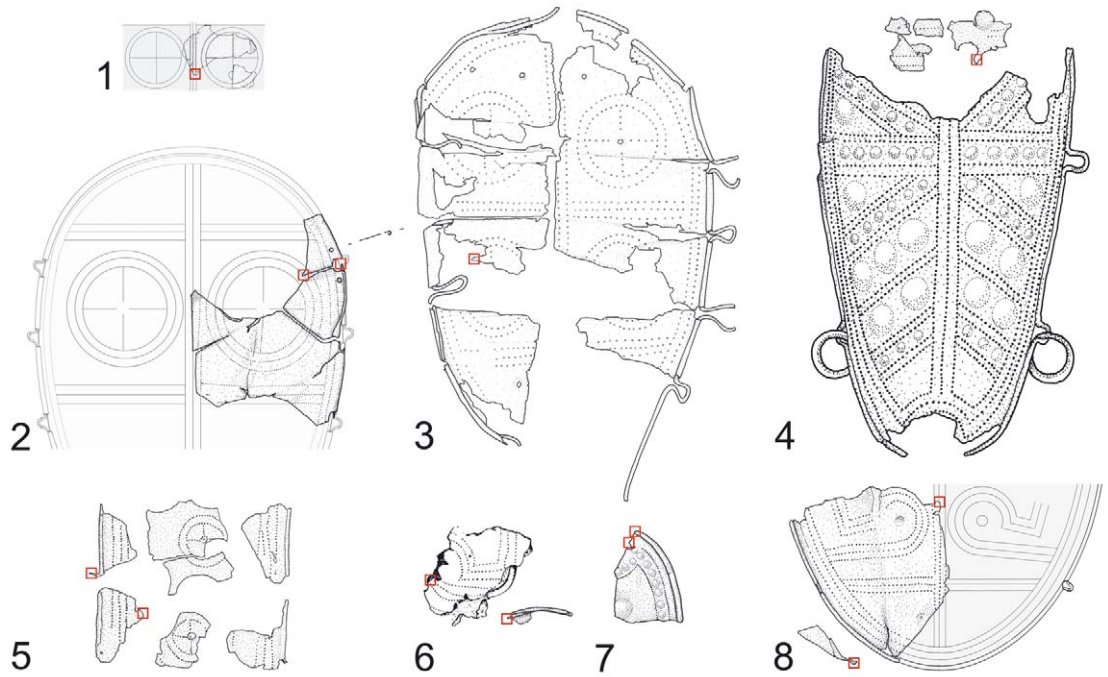

Fig. 4.11 The greaves analysed: **1.** Boljanic; **2.** Stetten/Teiritzberg; **3.** Poljanci IV; **4.** Kloštar Ivanić; **5.** Veliko Nabrđe; **6.** Brodski Varoš (after Clausing 2003, fig. 3.7); **7.** Weissenstein; **8.** Poljanci I. The sample area is marked.

sheet was bent, in order to strengthen the rim. Obviously, for those greaves of Subclasses B and C, additional wire was necessary. For greaves of Type Kuřim and Subclass D, rings were also needed, and according to the evidence for casting seams, these were cast in bi-valve moulds.

4.7.1 Alloys Characterisation

Descriptions in the *Iliad* concerning the manufacture of greaves (e.g. *Iliad* 18.613) refers to greaves made of tin, resulted in much controversial discussion concerning the alloy composition of the Greek greaves, most without analytical basis.[1170] Until now, only a few greaves were analysed, including the greaves from Grammichele (cat. nos. 207–208) and those from Kallithea and Kouvarás (cat. nos. 199–200 and 203–204).[1171] The greaves from Grammichele were made of tin-bronze with 10% Sn and 1 wt.% Pb,[1172] the greaves from Kouvarás with 14 wt.% Sn and the Kallithea greaves with 11.5 wt.% Sn and over 1.8 wt.% Pb.[1173] The eleven greaves discussed in the following belong to the three main central European types. On six greaves, the wire, which surrounds and reinforces the metal sheet, was analysed as well. The results of compositional analyses of the greaves are outlined in Tab. 4.10. The greaves are, apart from some of the wires, all made of tin-bronze, with the concentration of tin ranging from 7–12 wt.%. These compositions are consistent with the amount of tin found in wrought bronzes used during the European Bronze Age.

Tin is the only alloying element, with further elements such as Pb, As, Ag, Ni, S and Co, appearing only as minor elements and can partly be classified as trace elements (as were often Sb, Fe, Zn and Mn). Generally, there was an increase in the usage of Pb from Ha B1 onwards. However, on the three greaves from this period (greaves from Várvölgy, Kloštar Ivanić and Weissenstein) this is not noted, and might be connected with the thickness of the greaves, which

[1170] As summarised by Hansen 1994, 17.
[1171] Stavropoulou-Gatsi et al. 2012, 259, 261.
[1172] Giumlia-Mair et al. 1980.
[1173] Stavropoulou-Gatsi et al. 2012, 261; further details were not mentioned.

is below 0.5mm. Adding Pb would not have eased the manufacture of a bronze sheet of such a narrow width. Nevertheless, the greaves from Brodski Varoš and Boljanic show slightly higher amounts of Pb with 0.5–0.6 wt.%. The two greaves of Type Desmontà have, at 7–10 wt.% Sn, lower amounts of Sn than the other greaves, which have a range between 10–12 wt.%, and only the wire from the greave from Weissenstein having 9 wt.% Sn. An amount of Sn around 10 wt.% makes perfect sense, since the fluidity of a 10% tin-bronze is even higher than that of pure copper, an important aspect since the flatter and thinner the as-cast plate can be, the less deformation work has to be undertaken in order to achieve the final preferred thickness.

As a consequence of the small number of greaves preserved and analysed overall, any discussion of the results of these analyses for sheet and wire are unlikely to be representative of any whole individual greave type. In the case of the greave from Veliko Nabrđe, and maybe also that from Brodski Varoš, we might rightly assume that the same alloy was used for the production of wire and metal sheet. However, different alloys appear to have been used for the wire and metal sheet in all other greaves where both sheet and wire were analysed.

Cat. No.	Find Spot	Type	Sample	Cu	Sn	Pb	Sb	As	S	Fe	Zn	Ni	Ag	Co	Au
153	Brodski Varoš	Desmontà	sheet	**91.1**	**7.4**	**0.5**	0.2	0.2	0.3	tr.		0.3	0.2		
			wire	**91.8**	**6.9**	**0.2**		0.3	0.2	0.1		0.5		0.1	
163	Poljanci I	Desmontà	sheet 1–2	**88.8**	**9.7**	**0.2**	0.2	0.4	0.3	0.1		0.3	0.2		
168	Rinyaszentkirály	Lengyeltóti	sheet	**90–92**	**7–9**	**0.3–0.5**									
173	Lengyeltóti	Lengyeltóti	sheet	**89–91**	**6–14 (9)**										
			wire	**99**	**0.6–1**	**0.3–0.5**									
174	Stetten	Lengyeltóti	sheet	**87.3**	**11.3**	**0.2**	0.3	0.4	0.5	tr.	tr.	0.3	0.2	tr.	
			wire	**88.3**	**9.9**	**0.2**		0.4	0.8	0.2		0.2	tr.	tr.	
175	Poljanci IV	Lengyeltóti	sheet	**89.2**	**9.8**	**0.2**			0.1	0.1		tr.	0.6		
177	Veliko Nabrđe	Lengyeltóti	sheet	**87.1**	**11.7**	**0.2**		0.3	0.3	0.2		tr.	0.1	0.2	0.1
			wire	**87.0**	**11.6**	**0.1**		0.3	0.4	0.1		0.2		0.2	0.2
179	Boljanic	Lengyeltóti	sheet	**88.5**	**10.1**	**0.6**	tr.	0.3	0.2	0.1		0.2	0.2	tr.	0.2
188	Weissenstein	Kuřim	sheet	**87.5**	**11.1**	**0.2**	0.3	0.2	0.4	0.2		tr.	tr.	tr.	
			wire	**89.8**	**8.9**	**0.2**		0.1	0.6	0.3		0.0	0.2		
189	Várvölgy	Kuřim	sheet	**89**	**10–11**										
			wire	**99–100**	**0–1**	**tr.**									
191–192	Kloštar Ivanić	Kuřim	sheet	**87.1**	**11.9**	**0.2**	0.2	0.2	0.2	tr.		0.1	0.1	0.1	0.2

Tab. 4.10 Average composition of the SEM-EDXS analyses on the samples from the greaves in wt.%. The greaves cat. nos. 168, 173 and 189 were analysed non-invasively (Mödlinger et al. 2014) with PGAA, PIXE and ToF-ND. These results show a wide range due to the low sensibility of the PGAA for Pb, and analyses on the corroded surface via PIXE. The focus on the analyses was on the detection of alloying elements as Sn and Pb. Results clearly deriving from analyses on severely corroded areas were excluded.

As visible in Tab. 4.10, we can make also the following points:

1. The amount of tin (7–12 wt.%) is consistent with bronzes suitable for mechanical deformation and typical for the period of production in the European Bronze Age
2. Sulphur and iron are present as $Cu_{2-x}Fe_xS$-inclusions (see below), and visible in the micrographs, though their quantities remain maximal at the level of trace elements
3. Lead is present in every greave, ranging from 0.1–0.6 wt.%
4. The measured minor and trace elements as Pb, As, Sb, Fe, Ni, Co, Ag and Zn are remnants of the copper ore and are usually enriched in inclusions and grain boundaries

4.7.2 Manufacturing Process – Microstructural Observations

Due to the generally high level of corrosion, etching was not necessary in every case, especially since the intergranular corrosion surrounds and follows the structures of recrystallised grains with slipping bands and mechanical twins which cross over each other (Fig. 4.12, centre and bottom left; Fig. 4.13, centre). Further corrosion features noted were pitting corrosion and further peculiar features such as 'tentacle' corrosion recently discussed[1174] (Fig. 4.12, bottom right). The cross-sections of the greave fragments are characterised by an almost homogenous metallic

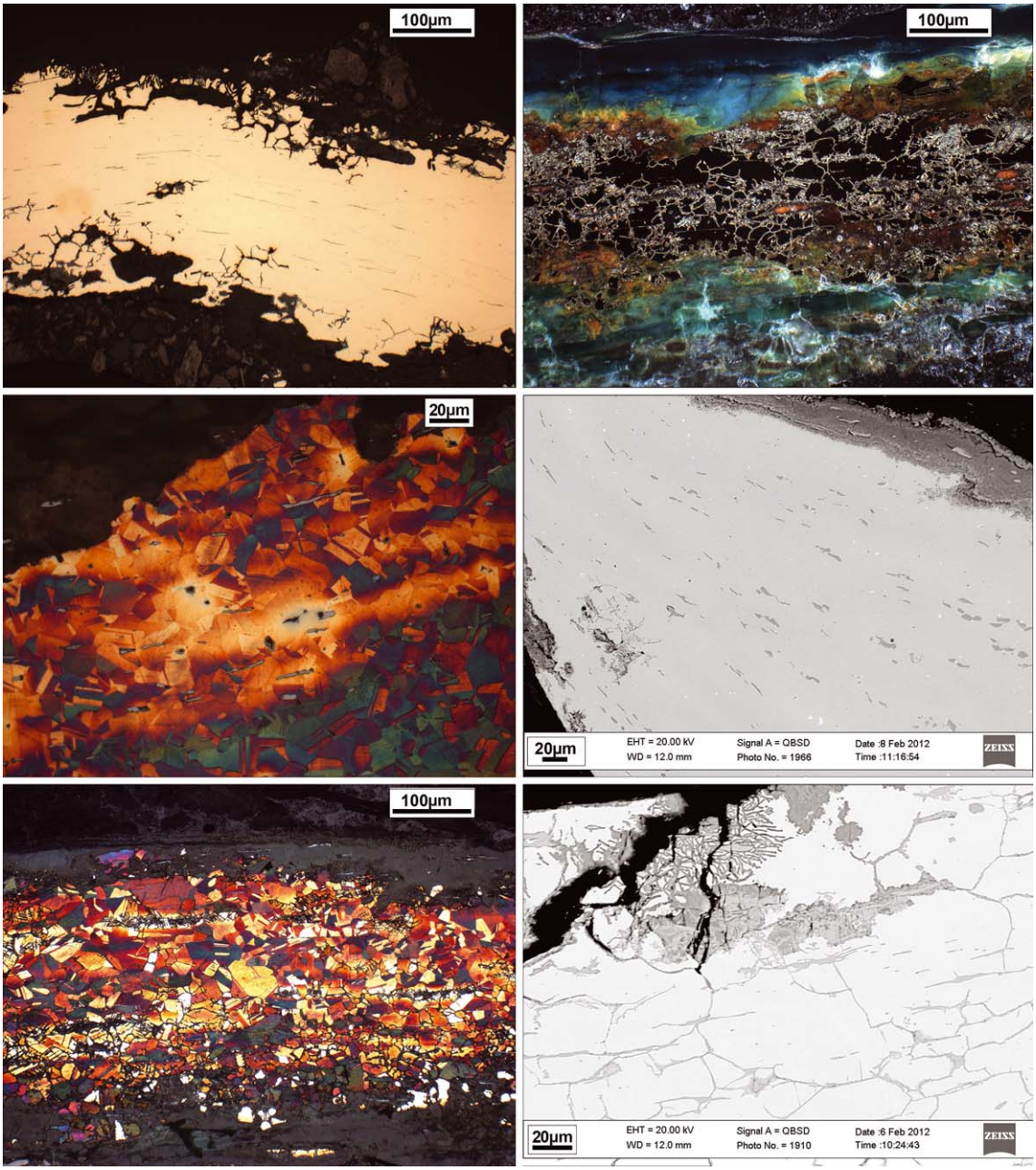

Fig. 4.12 Microstructural features of European Bronze Age greaves. Above, left: Poljanci IV, sheet, unetched. Above, right: Poljanci IV, sheet, unetched in polarized light. Centre, left: Brodski Varoš, sheet, etched with Klemm I. Centre, right: Weissenstein, sheet, unetched; SEM-image. Below, left: Poljanci IV, sheet, etched with Klemm I. Below, right: Veliko Nabrđe, sheet, unetched; SEM-image.

[1174] Piccardo et al. 2013.

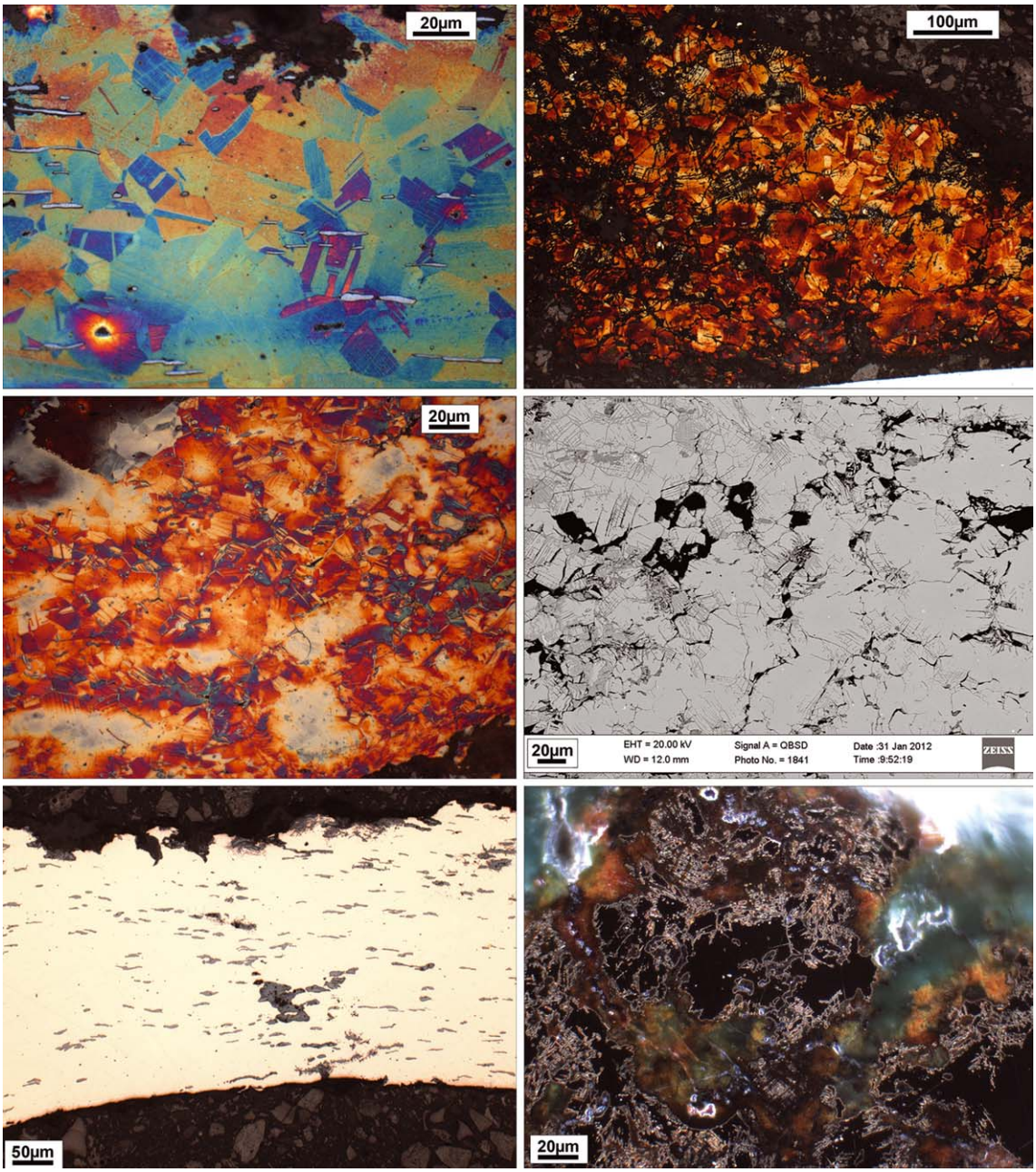

Fig. 4.13 Microstructural features of European Bronze Age greaves. Above, left: Poljanci I, sheet, etched with Klemm I. Above, right: Kloštar Ivanić, sheet, etched with FeCl3. Centre, left: Poljanci I, wire, etched with Klemm I. Centre, right: Kloštar Ivanić, sheet, unetched; SEM-image. Below, left: Stetten/Teiritzberg, sheet, unetched. Below, right: Stetten/Teiritzberg, wire, unetched in polarized light.

microstructure, with recrystallisation annealing indicated by polygonal grains with thermal twins, followed by light cold mechanical deformation testified by mechanical twins (Figures 4.12–4.13). The annealing temperature applied was below the solidus curve of the alpha-phase in the Cu-Sn equilibrium diagram, but high enough to homogenise the solid solution. However, this effect could not be obtained during one heat treatment only, and was the result of a number of alternating annealing/cold deformation sessions. The grain size of 10–50mm and the homogeneity of the solid solution suggest an annealing temperature between 550–630°C. Within this temperature range, the solubility of tin achieves its maximum with 15.8 wt.% in copper. Therefore, due to the higher kinetics of diffusion, the recrystallisation process, that usually has its

onset temperature between 300–400°C, is fast.[1175] After the short and rapid recrystallisation, the bronze sheets were most likely water quenched. Due to the last annealing and cold deformation processes, water quenching did not leave traces as β-phase. We might nevertheless consider it as part of the manufacturing process, as this prevents the growth of brittle phases such as δ-phase (which was not observed on any sample) at the grain boundaries, thus facilitating the working process.

As a final step, the bronze sheet was slightly cold deformed and not further annealed. This hardening work provides additional strength to the metal sheet so that it does not bend easily during use. However, we have to consider the possibility that the cold deformation noted might also be due to the final application of the decoration, so the actual last step of thermo-mechanical treatment might have been a final annealing, which is supported by the generally low deformation of the crystals. A final annealing would also have eased the application of this decoration and the bending of the rim of the bronze sheet around the wire. The wires used were either of round or square cross-section of c. 2mm diameter and were produced by hammering. Drawing dies are as yet unknown in prehistory.

The total amount of biaxial deformation, as well as the minimum initial thickness of the as-cast bronze sheet from which the greave was made, can be calculated by the deformation grade concerning the shape factor (SF) of the $Cu_{2-x}Fe_xS$-inclusions, which are embedded in the metallic matrix.[1176] Tab. 4.11 reports the hardness, the average total deformation applied, and the estimation of the minimum thickness of the as-cast bronze sheet, for the production of greaves.

Cat. No.	Find Site	Thickness metal (mm)	Def. (%)	Min. Thickness D as cast (mm)	Vickers-Hardness (HV)
153	Brodski Varoš	0.4	83.2	2.4	130–140; 240
163	Poljanci I	0.36	87.5	3.1	130–170; 210–220
174	Stetten	0.4	85.6	2.9	120
175	Poljanci IV	0.4	88.4	3.9	100–120
177	Veliko Nabrđe	0.4	86.0	3.0	120
178	Boljanić	0.21	87.1	1.8	190–205
188	Weissenstein	0.32	79.3	1.7	205–215; 150 (wire)
191–192	Kloštar Ivanic	0.5	72.8	2.0	180–200

Tab. 4.11 Hardness, average total deformation applied (bi-axial) and estimation of minimum thickness of the as-cast bronze sheet for the production of greaves.

According to Tab. 4.11, all greaves show a slightly different intensity of deformation (ranging between 70–90% of thickness reduction and 100–240 HV). The wire of the greave from Brodski Varoš, with 240 HV, indicates the highest amount of deformation applied during the last step of work. Of the two fragments sampled from the greave from Poljanci I, one was taken close to where the decoration was applied, and the other further away from it.

The final thickness of the metal sheet, as measured on the basis of cross sections, corresponds to c. 0.4mm. The percentage of deformation allows for the conclusion that the original cast was already a minimum of 3mm as a result of high quality casting. The calculated minimum thickness of the as-cast bronze sheet is, of course, an approximation only, and smoothing, polishing and other finishing of the surface, which would reduce the thickness of the metal sheet, cannot be taken into account. The calculated thickness must be regarded as the minimum original thickness of the as-cast bronze. This would have depended on several factors, such as shape, material and temperature of the mould material, the temperature and speed of casting, as well as the composition of the alloy. So far, no moulds for bronze sheet production have been knowingly recovered. Obviously, casting techniques which left no traces in the archaeological

[1175] Ammannati et al. 2006.
[1176] Mödlinger – Piccardo 2013.

record include sand casting or lost wax technique. Since lost wax casting was one of the most frequently used casting techniques, it might be reasonable to assume that bronze sheets were cast in baked clay moulds using the lost wax technique. Whilst clay moulds or refractory evidence for weapons or tools are reasonably easy to identify amongst ceramic assemblages, it is not hard to imagine the more morphologically ambiguous refractory evidence for armour being overlooked or misidentified. This, as well as the much easier sand casting, would explain the lack of casting moulds made from other materials, such as stone.

4.7.3 Manufacturing Process – Macroscopic Observations

Once the desired shape and thickness were achieved, all traces of hammering, flattening and thinning the metal sheet were eliminated with a planishing hammer and a *Treibfaust.* The surface of the bronze sheet was smoothed and polished, so no traces of hammering or anvil marks were visible. The last polishing was always carried out vertically, never horizontally (Figures 4.14, left; 4.15, right). Polishing traces are still visible on several greaves. After polishing, once

Fig. 4.14 Common manufacturing traces on greaves. Polishing traces from top to bottom are visible on the outside of the greaves (upper left: Weissenstein; lower left: Kuřim). Scribed lines were used to place the plastic decoration in line (upper right: Rinyaszentkirály; lower right: Kuřim).

the bronze sheet was approximately 0.2–0.4mm thin, the edges were cut out or chiselled off in order to achieve the oval form of the final greave. A bronze wire with a round or rectangular cross section of approx. 2mm diameter was then placed inside the outwards bent rim of the greave in order to strengthen the metal sheet. On greaves of Type Desmontà, Type Lengyeltóti and Type Kuřim, the bronze sheet was only partially bent around the wire, so that the wire could be used to form the side loops on the outside of the greave which were used to attach it securely to the lower leg of the wearer, most likely by means of an organic strip. Greaves of Subclasses B and C exhibit, in addition to the wire which was completely encompassed by the

Fig. 4.15 Detail of the greaves from Bouclans (left; © Musée des Beaux-Arts et d'Archéologie de Besançon) and Várvölgy (right). Note the vertical polishing traces and the sharp edges on the applied bosses, sometimes also showing a first de-central try to emboss the boss on the greave from Várvölgy.

rim of the metal sheet, several pairs of holes positioned close to the edge for securing the separate wire loops.

Once the metal sheet was strengthened by bending the edges around the wire, the decoration could then be applied. This decoration did not serve just aesthetical requirements but also served to enhance the stiffness of the greave. In order to place the plastic decoration in line, inscribed lines were applied on the inside of the greaves. These were used as a sketch to guide the application of the final punched decoration (Fig. 4.14, right). The greaves of Subclass A are an exception in that all decoration was applied with round punches. The application of several round punches is seen on the greave from Rinyaszentkirály, Hungary, where a second punch was used for the reproduction of the tip of the peak, the eye and the parson's nose of the water bird (Fig. 4.16, left), whilst up to three different sized punches were used in the decoration of greaves of Type Kuřim (Fig. 4.15). The only greave with chevrons, which were applied with a chisel or punch, is the example from Portes-Kephalovryso.

4.8 Use

The round to oval shaped greaves measure approximately 25 × 20cm, and were attached to the lower legs of the warrior by means of strips of leather or other organic material. These strips were fixed to the greave using separately attached wire loops or rings, or using by the outward-bent loops formed by the internal wire around which the edge of the metal sheet of the greave had been bent (Figures 4.4, 4.14–16). The greaves were never worn directly against the skin,

and instead an organic backing was positioned beneath the metal greave and fixed separately, or the strips used to fix the greave onto the leg or the greaves themselves were directly sewed onto the lining (Dendra, Schäfstall, potentially the greave from Winklsaß and, after the loops had broken, also the greave from Malpensa, where later perforations had been added all along the edge).

Interestingly, the warriors from Torre Galli appear to have been buried with just one greave (the only exception perhaps being grave 239). These greaves were found positioned always on the right lower leg. To what extent this can be connected to a specific burial tradition, or an aspect of religious or cultural ideology, or simply an indicator that only one greave was used during battle (perhaps with the left leg being afford protection by the use of a shield), remains unclear. However, as indicated by the few Bronze Age depictions of greaves that are known, for example the older battle frieze from Hall 64 at Pylos, usually two greaves were worn.

Since the earliest discussions of bronze body armour, debates concerning the use of greaves have been controversial. Interpretations have varied from them providing protection for the warrior from his own shield hitting his lower legs,[1177] as protection for rarely harmed areas of the body, as protection against rough undergrowth or shrubs,[1178] and as protection against arrows.[1179] However, these interpretations seem unreasonable since the shield was usually carried on a person's back when walking, and arrows rarely hit the lower leg. Moreover, it seems very unlikely that the shield would hit the lower leg during fighting, since the centre of the body was in greater need of protection, and the diameter and weight of contemporary shields meant they were unlikely to reach the area of the lower leg. There is only a single description of greaves protecting the warrior in the *Iliad*, where Achilles is protected by his greaves when Agenor throws his spear. On Greek vases, in scenes of putting on armour, the warrior attaches his greaves first. This need not be taken as an indicator of the importance or higher status of greaves but may represent simple practicality, as it would have been harder to attach the greaves once the warrior was already wearing a cuirass.

On central and eastern European greaves, no firm evidence indicating use has been identified. The only greaves with clear traces of damage are those from Roquefort, France, which are dated to the 6th century BC.[1180] Due to the common occurrence of weapon perforations visible on the greaves, we might consider this to be an indication of their ritual destruction. However, traces of use do not necessarily need to be directly inferred from damage.

Evidence for the use of greaves is indicated by the extent of repairs, which have been noted on a number of complete greaves. Most common are vertical cracks on the central part of the top of the greave, which were repaired with holes that had been punched through on both sides of the crack, so that a wire could be threaded through in order to hold the sheet together and stop further cracking of the bronze sheet (Fig. 4.16).

Other common repairs noted include, as seen on the greave from Kuřim, the addition of punched holes to replace the broken separate wire loops. In contrast to direct traces of use, repairs seem to have been quite common, at least on the few complete greaves available for direct study from Austria, Bosnia-Herzegovina, Croatia, Czech Republic and Hungary. In all cases were repairs were noted, either a crack or a broken loop had been repaired. In both cases, small holes had been punched through the metal on either side of the crack or below the broken loop. This can be seen on the greave from Stetten, where a loop had broken and been repaired (no wire remained in the newly punched holes), on the greave from Lengyeltóti, where two loops were broken and had been repaired, as well a vertical crack on the top of the greave which had also been repaired. The same type of central, vertical crack can also be seen on the greave from Rinyaszentkirály, and on two greaves of Type Lengyeltóti from Nadap. One of them has a small bronze sheet which was attached by wire to fix the crack. The same greave has another

[1177] Schauer 1982b, 101.
[1178] Drews 1993.
[1179] Hansen 1994, 17.
[1180] Clausing 2002.

Fig. 4.16 Traces of use-wear on greaves. Left: Rinyaszentkirály, outside (above) and inside (below). Above, right: Lengyeltóti. Crack with two rivet holes punched from the inside to the outside. Below, right: Stetten/Teiritzberg (Prähistorische Abteilung NHM Wien, inv. no. 75836–51; photo: M. Mödlinger). In addition, here, the holes were punched from the inside to the outside in order to place a wire to hold the two sides of the crack together.

crack in the upper right area and a broken loop on the lower left side that had been the subject of attempted repairs. These cracks and broken loops are most likely a result of material tension, in combination with the greave being attached too tightly to the leg, and therefore being unable to adapt to the owner's movements whilst worn. The lack of clear, obvious traces of use on greaves, such as the weapon perforations known on shields[1181] and helmets, might be due to several reasons:

1. the lower legs were not an area which was commonly vulnerable during combat, at least for the (high status?) person wearing them, and the greaves might have served more to afford protection of the legs in rough terrain
2. greaves were not generally used during actual combat by their owner, perhaps because of their social status. This does not necessarily mean that greaves were not made for combat or no used. Here, a useful analogy would be with early modern period parade armour
3. greaves were used for display only, being a status symbol and a more expensive, highly valued version of organic leg protection
4. greaves or any kind of leg protection might have been also used on horses. The usage of horses in battle is known from the battlefield of Tollense, Germany[1182]

Evidence for the actual use of greaves during war or combat may be derived from figural depictions. Bronze Age depictions of greaves are, aside from Greece, known only from the Sardinian bronze figurines, and their variation suggest that far more forms of greaves existed than that indicated by actual finds. Most of the depicted greaves on the bronze figurines are worn by

[1181] Uckelmann 2012.
[1182] Jantzen – Terberger 2011.

warriors, such as archers or those bearing sticks, swords or spear and shield, as well as over-armed, ritual(?) warriors, and appear to have mainly been made of organic components.[1183] It is probable then that only a small number were made of metal. Moreover, the few potential metal greaves depicted on the Sardinian bronze figurines do not appear to resemble any of the known preserved examples of bronze greaves. Unlike depictions of other categories of bronze armour, such as the helmets and shields, the greaves do not appear on the Bronze Age stelae of the Iberian Peninsula either.

Even using the Bronze Age depictions of greaves on ceramics and frescos in Greece, it is hard to be certain as to the materials used in leg protection, but it is clear that the greaves were always worn by warriors, and in some cases these were also depicted in conjunction with fighting. Sometimes a rounded line in between the upper and lower fastening area is visible on the greaves, but always on one leg only. There are no colour differences in the depictions, however, to indicate the use of potentially different materials, especially in the use of an organic backing. Despite this, greaves are well attested in a number of LH IIIA–B depictions, including on a fragment of fresco from the palace of Orchomenos, showing the lower parts of greaves with strings with depiction of an elliptical line, on a fresco from the *Megaron* in Mycenae, where long white (linen?) greaves with knee protectors worn by a warrior are depicted, whilst similar greaves are also known from other frescos from Mycenae, including the 'House of the Oil Merchant' and the palace itself. All the greaves have leather (?) strings (black, red or dark brown) to secure the greaves onto the leg. On the frescos from Pylos, the free ends of fastening thongs are sometimes visible. In LH IIIC a shorter form of greaves appeared in Mycenaean art. These greaves do not have any rigid knee protection and are depicted using dark colours. The fastening strips, textile- or leather bands are usually visible above the knee and around the ankles. The most famous depiction of these greaves is on the Warrior Vase and stelae from Mycenae. This type of leg protection is generally considered to have been made of leather, but bronze greaves worn over more comfortable organic material should also be considered. In some of the other depictions, such as on pottery from Mycenae, Tyrins, Leukandi and Ugarit, the fastening thongs are also visible.

Whilst there are a variety of interpretations as to the function of greaves, their use as armour is supported by the presence of repairs and their frequent connection to warriors, such as the Sardinian bronze figurines, their depictions on ceramics and frescos, and the deposition of greaves in warrior tombs. Even though they might not be as large as successive greave forms, such as the later Hoplite greaves, whose function as armour is never questioned, we must remember that we know very little about the nature of the organic lining, such as the material, its shape or size and thickness, all of which would have made a considerable contribution to its function. Consequently, we still do not fully understand the whole piece of armour but only its outer metal part, which does not fully attest to the actual effectiveness of the entire leg protection. Nevertheless, as the evidence for manufacture and use documented on central European greaves indicates, the greaves were made to be an effective category of armour, and which were, for whatever reason, used and required repair. The use of the greaves in relation to different fighting techniques, and in combination with other categories of armour, both bronze and organic, sadly remains a matter of speculation.

[1183] For detailed images, see: Lilliu 1966.