

### 3 Cuirasses

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The description and interpretation of cuirasses follows in major parts the recent publication by the author in the *Jahrbuch des Römisch-Germanischen Zentralmuseums*.<sup>777</sup> Bronze Age metal cuirasses are divided in the following into three main groups: Greek cuirasses, Carpathian cuirasses and western European cuirasses (Tab. 3.1). Each group differs from the other in terms of chronology, recovery, decoration and construction. The cuirasses consist of a breast- and a back plate, which were usually riveted together on the left side and shoulder. Only Greek cuirasses were furnished with additional bronze sheets in order to protect neck, shoulders, pelvis and upper legs.

The first metal armour appeared in Greece around 1500 BC, though the origins of plate armour might reach back as early as the 17<sup>th</sup> century BC, as indicated by the Mycenaean shaft grave breast plates.<sup>778</sup> No precursors of cuirasses from any other region are known. The spectrum of Greek armour ranges from single body part protection to panoplies.<sup>779</sup> This armour appears in LH II–IIIA2/B1 and was found more or less complete in both graves and settlement structures. Dendra and Thebes are still today the two most important find spots. The oldest plate armour, which derives from Dendra, grave 8, consists only of a right shoulder plate. However, the slightly later find from Dendra, grave 12, consists of a panoply of 15 separate pieces of bronze sheet armour.<sup>780</sup> A further two similar panoplies derive from Thebes, Greece, and were found in the Municipal Conference Centre and the arsenal, respectively. The Theban cuirasses differ slightly from the Dendra panoply in the following respects: the belt plates are narrower, the shoulder guards are smaller and lacking the ‘wings’ which cover the Dendra panoply at the chest and back. The lighter construction of the latter already point to a development towards less weight and higher mobility. Potential band sheets of further Greek panoplies, which were fixed to the bottom of the cuirass (see the Dendra and Theban panoplies) have been found at Phaistos, Mycenae, and Nichoria.<sup>781</sup> They all date to the short time frame of LH II–IIIB2 and served as protection for the lower parts of the body.

Shortly after the appearance of the first full metal cuirasses in Greece, plate armour was also adopted in central Europe, more precisely in the Carpathian Basin. A degree of adaptation accompanied it, including less weight and increased flexibility, with its reduction to a basic body cuirass, which permitted fast, flexible movement. Carpathian cuirasses are lightly decorated with pellet decoration, ribs, chased chevrons and stars, as well as sometimes decorative, riveted metal bands on the rim. The Bz D–Ha A1 cuirasses were deposited either in associated deposits, in heavily fragmented form, or complete in rivers. The most well preserved Carpathian cuirasses are the river finds from the Danube<sup>782</sup> and, as a Carpathian export, one from the Saône. Fragments of cuirasses are known from two Slovakian associated deposits, from Čierna nad Tisou and Dučové, and as a grave find from Čaka, again in Slovakia. Further fragments are known from the associated deposit from Nadap (Hungary), Ivančice 4 (Czech Republic), and a

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<sup>777</sup> Mödlinger 2014b.

<sup>778</sup> Molloy 2013.

<sup>779</sup> The term ‘panoply’, i.e. a complete suit of armour, is used in the following to distinguish between an armour protecting only the thorax (cuirass), and a set of armour protecting also shoulders, thorax, and upper legs (panoply). The best known example of such armour is the panoply from Dendra, grave 12.

<sup>780</sup> Verdelis 1967, 9–18.

<sup>781</sup> Andrikou 2007, 403; Mödlinger 2014b, 6, 27.

<sup>782</sup> Jankovits 1999/2000, 195, note 41; Szathmári 2003, 63; Petres – Jankovits 2014.

possible cuirass fragment from the associated deposit from Winklsaß (Germany). The high level of fragmentation of most of these Carpathian cuirasses makes it hard to detect traces of manufacture and use, and therefore in these matters we restricted our study to the two complete preserved river finds from the Danube and the Saône.

The cuirass from the Saône at Saint-Germain-du-Plain, representing a direct Carpathian import, provide an important connection between the Carpathian cuirasses and the more recent western European cuirasses. From the same region, we know of 14 more or less complete western European cuirasses, which were found in three deposits, at Marmesse, Fillinges, and Jura (given the uncertainty of the finds location at Graye-et-Charnay or Véria, we will simply refer to them as the Jura cuirasses, with Jura A (cat. no. 137) and B (cat. no. 138) respectively). The cuirasses from Jura were formerly associated with Grenoble (cat. no. 137) and Naples (cat. no. 138) as find spots. Two further unprovenanced cuirasses (cat. nos. 135 and 136), characterised mainly by their *Punktbuckel* ornamentation, also belong to this group. Western European cuirasses are decorated all over with different sized bosses and pellets, arranged so as to form lines, water birds and circles. Their chronology is still under discussion, since they lack any useful associations which might have contributed to their dating.

| Cat. No. | Find Site   | State | Type                       |
|----------|---|-------|----------------------------|
| 122      | Dendra  | GR    | Greek cuirasses            |
| 123      | Dendra  | GR    |                            |
| 124      | Arsenal Thebes  | GR    |                            |
| 125      | Municipal Conf. Centre, Thebes  | GR    |                            |
| 126      | Čierna nad Tisou  | SK    | Carpathian cuirasses       |
| 127      | Šarišské Michaľany  | SK    |                            |
| 128      | Čaka  | SK    |                            |
| 129      | Ducové  | SK    |                            |
| 130      | Saint-Germain-du-Plain  | FR    |                            |
| 131      | Pázmándfalu   | HU    |                            |
| 132      | Nadap   | HU    |                            |
| 133      | Ivančice  | CZ    |                            |
| 134      | Danube at Pilismarót  | HU    | Western European cuirasses |
| 135      | unprovenanced   |       |                            |
| 136      | unprovenanced   |       |                            |
| 137–138  | Jura A and B; the cuirasses were found in Graye-et-Charnay or Véria, France (formerly known as ‘Grenoble’ and ‘Naples’) | FR    |                            |
| 139–145  | Fillinges (seven cuirasses)   | FR    |                            |
| 146–152  | Marmesse (seven cuirasses)  | FR    |                            |

Tab. 3.1 Bronze Age European cuirasses.

It is often claimed that metal body armour derived from or replaced organic armour, and that this organic armour existed, due to reasons of lower cost and easier production, in far higher numbers than metal armour.<sup>783</sup> This might be true but as such organic or leather armour has not survived in Europe, must remain a purely speculative proposition. Due to the qualities of organic materials such as leather and its wider availability, as testified also by the use of raw-hide in the manufacture of Irish and Aegean organic shields, however, such a proposition is very likely. There are a few finds of organic jerkins with bronze applications, representing a simplified expression of Bronze Age body armour, suggesting that they served a potential defensive function. Such bronze applications might also have served only a more aesthetic or ritual purpose,

<sup>783</sup> Coles 1962; Chadwick 1976, 160; Harding 2000; Harding 2007.

without any practical function as armour. These bronze applications are known mainly as bronze bands, collars or phalerae.

Two bronze bands or collars, which were attached around the neck on the front side, are known (Fig. 3.1). The first derives from a deposit from Hesselberg, Germany, and dates to Bz D.<sup>784</sup> The decoration of the collar is similar to the cuirasses from Ducové and Saint-Germain-du-Plain. Another collar is known from a grave from hill C1 at Milavče, Czech Republic, and also dates to Bz D and the early Milavče-period.<sup>785</sup> O. Kytlicová described it as a flat bronze sheet collar aligned by nails and buckles, which had two discs with similar nails and buckles attached, as well as bronze-decorated pieces of leather.<sup>786</sup> The previously thought-to-be third collar from grave 40 at Kourion Kaloriziki, Cyprus,<sup>787</sup> has turned out to be two cheek plates (cat. no. 64).<sup>788</sup> B.-U. Abels noted 21 riveted bronze sheets with buckle decoration from the Heunischenburg, Germany, which might be the remains of leather jerkins with bronze applications, though these might also derive from rims or belts.<sup>789</sup>

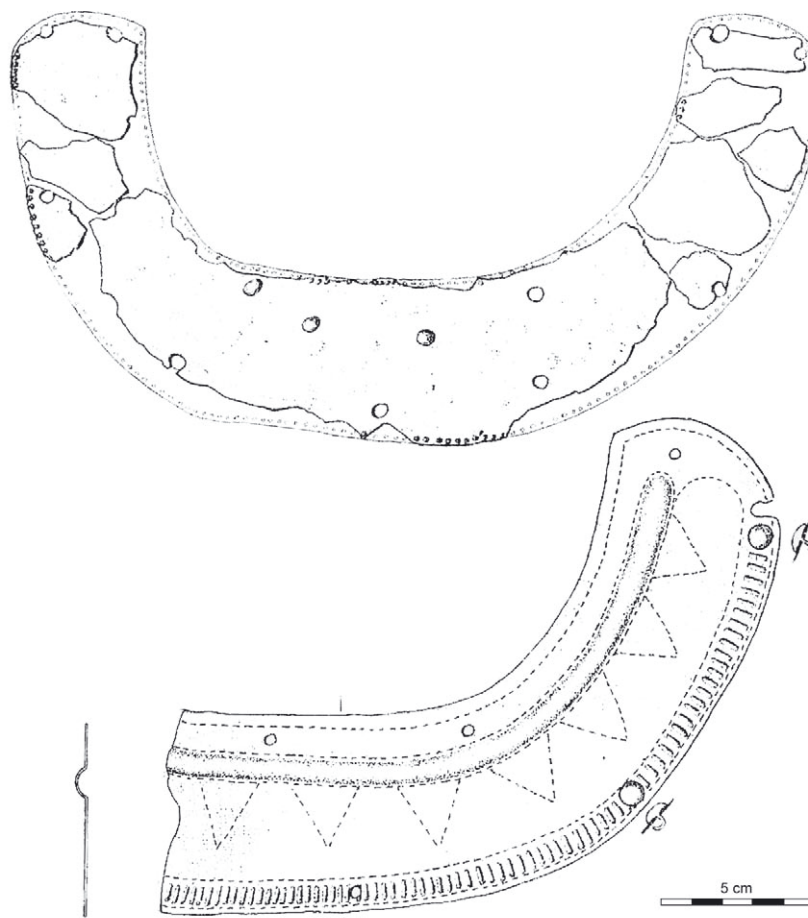


Fig. 3.1 Bronze sheet collars for organic cuirasses or corslets: Milavče, Czech Republic (above) and Hesselberg, Germany (below) (after Kytlicová 1988a, fig. 1).

<sup>784</sup> Kytlicová 1988a, 306–321, figs. 1.2; 2.2; Weiss 1998, 543, fig. 6.1.

<sup>785</sup> Kytlicová 1988a, 319; Jankovits 1999/2000, 195.

<sup>786</sup> Kytlicová 1991, 23, pl. 26.11–14, 18.

<sup>787</sup> Mc Fadden 1954, no. 35, pl. 26.35.

<sup>788</sup> Matthäus – Schumacher-Matthäus 2014.

<sup>789</sup> Abels 1985/1986, 14, fig. 19.8–17; Weiss 1998, 543, fig. 7.

The use of phalerae, which might have been attached to an organic base, remains unclear. Found in both graves and associated deposits, the context and character of the phalerae themselves do not support any one obvious interpretation for their use. Nonetheless, of note are three discs, of 16cm diameter each, found in Grave 3 at Trimbs, Germany. The discs have several holes parallel to the rim, which most likely served to fix them to an organic base.<sup>790</sup> Another pair of phalerae from the grave in Acholshausen, Germany, might have also been applied to an organic base and potentially had a defensive function.<sup>791</sup>

Whilst the Near East and Egypt must inevitably be considered as possible regions for the origin of metal cuirasses,<sup>792</sup> such armour has never been found there, though a few finds of scale armour are known (Tab. 3.2). The scarcity of such scale armour, however, is illustrated by the fact that from the entire Near East not enough scales have been recovered to reconstruct a single suit.<sup>793</sup> Despite this, several depictions of scale armour are known from Egyptian tombs (the tomb of Ramses III; the Theban tomb of Ken-Amun; the tomb of Paimosi), chariots (the chariot of Thutmose IV), and reliefs (e.g. Medinet Habu: Ramses III equipping his troops; the naval battle). Whether the LH II (or older) notes on Egyptian lists of goods from Syria (products of raiding or gifts), which make mention of ‘bronze battle dresses’ and ‘bronze cuirasses’, refer to scale or plate armour, cannot be ascertained.<sup>794</sup>

| Find Site                        | Date  |
|----------------------------------|---|
| Kanakia, Greece                  | cartouche of Ramses II                        |
| Mycenae (citadel house), Greece  | LH IIIC                                       |
| Enkomi, Cyprus                   | 12 <sup>th</sup> century BC                   |
| Gastria-Alaas (grave 12), Cyprus | 1075–1050 BC                                  |
| Pyla-Kokkinokremos, Cyprus       | LH IIIC                                       |
| Boğazköy, Turkey                 | 14 <sup>th</sup> –13 <sup>th</sup> century BC |
| Tell Açına, Turkey               | 14 <sup>th</sup> century BC                   |
| Troy, Turkey                     | 1400 BC                                       |
| Ras Shamra, Syria                | 14 <sup>th</sup> century BC                   |
| Nuzi, Iraq                       | 16 <sup>th</sup> –15 <sup>th</sup> century BC |

Tab. 3.2 Finds of Bronze Age scale armour (after Catling 1977a, 88–96; Molloy 2013; Yalouris 1960, 52–53).

### 3.1 Research History

G. v. Merhart published in the 1950’s the first comprehensive study of Bronze Age cuirasses.<sup>795</sup> According to him, Bronze Age cuirasses can be divided into two main groups: a western Alpine group and an eastern Alpine group. The western Alpine group consists of three subgroups: the first, dated to the 8<sup>th</sup> century BC, is formed by the cuirasses from Naples and Grenoble (Jura, as known today; see cat. nos. 137 and 138), as well as an unprovenanced cuirass (cat. no. 136); the second group is formed by the cuirasses from Marmesse, Fillinges, an unprovenanced cuirass (cat. no. 135), and the potential cuirass from the ‘Reiling-collection’ in Mainz,<sup>796</sup> and is dated to the 8<sup>th</sup> century BC; the third group is represented only by the cuirass of Saint-Germain-du-Plain, and dates to the 7<sup>th</sup> century BC. G. v. Merhart’s eastern Alpine group is formed by more recent 7<sup>th</sup> century BC cuirasses from Austria (Kleinklein) and Slovenia (Stična-Vrhopolje). Obvi-

<sup>790</sup> Sperber 2011, fig. 9.2.

<sup>791</sup> v. Merhart 1954; Schauer 1982a, 346.

<sup>792</sup> Schauer 1982a.

<sup>793</sup> Molloy 2013 citing Hulit – Richardson 2007.

<sup>794</sup> Müller-Karpe 1976, 70.

<sup>795</sup> v. Merhart 1954.

<sup>796</sup> Mödlinger 2014b, 29.

ously, important new finds have been made since, especially in terms of both cuirasses from the Carpathian Basin, represented by his third subgroup, and examples of eastern Alpine type.

G. v. Merhart put forward the same origin for all the European cuirasses, indicating they also influenced or initiated Greek cuirasses.<sup>797</sup> Only shortly after his study, the find of the Dendra panoply proved otherwise and strengthened the theory that Bronze Age armour has an Aegean origin,<sup>798</sup> which developed from organic jerkins with single metal plate protection.<sup>799</sup> This opinion is also followed here. J. Paulík instead suggested even after the knowledge of the Dendra find that locally produced Carpathian cuirasses influenced the Aegean workshops, and not the other way round.<sup>800</sup> He also suggested that the ancestor of Carpathian metal cuirasses were the leather jerkins with bronze applications, pointing to the idol from Kličevac, Serbia (Vršac-Žuto-Brdo Group).<sup>801</sup> Schauer suggested that the Dendra panoply was not connected with the development of Late Bronze Age cuirasses in the Carpathian Basin and western Europe.<sup>802</sup> Instead, western European and Carpathian cuirasses are the successors of local organic predecessors,<sup>803</sup> while he sees in the later Early Iron Age cuirasses from Austria and Slovenia (v. Merhart's eastern Alpine group) a direct influence from Greece. Schauer also linked the Dendra panoply with the depiction of scale armour in the Ken-Amun grave of Thebes,<sup>804</sup> stating that all cuirasses might have had the same ancestor, which he located in the Near East. However, as yet no older Near Eastern or Egyptian metal cuirasses are known and no technological or typological connection can be made between full metal cuirasses and scale armour, this assumption cannot be confirmed.

Considering the high value and importance of bronze cuirasses, the research interest in this category of body armour has been astonishing low over the last 35 years, especially with respect to the Carpathian finds. The cuirasses from Fillinges were studied by Y. Mottier and P. Schauer in the 1980s.<sup>805</sup> Most recently, a study of the Greek Bronze Age cuirasses, including recent finds as well as experiments with replicas of the Dendra panoply, was also published.<sup>806</sup> The author also published recently a holistic study on European Bronze Age cuirasses, which this chapter follows in wide parts.<sup>807</sup> One has to point out that the Carpathian cuirass from the Danube, on display in the Magyar Nemzeti Múzeum in Budapest since many years, was published at last, after it was discovered more than 40 years ago.<sup>808</sup>

### 3.2 Depictions

Finds of metal cuirasses are rare but definite depictions or miniatures of cuirasses are still rarer, primarily due to the fact that in most cases it is not clear if the depictions represent metal or organic cuirasses, or cuirasses made of a combination of materials. The most significant depictions of body armour – all of which are Greek – are listed in Tab. 3.3 and depicted in Fig. 3.2–3).

<sup>797</sup> v. Merhart 1954, 55.

<sup>798</sup> Müller-Karpe 1962b.

<sup>799</sup> Verdelis 1967; Mödlinger 2014b.

<sup>800</sup> E.g. Paulík 1968.

<sup>801</sup> Paulík 1963, 135.

<sup>802</sup> Schauer 1975, 307.

<sup>803</sup> Schauer 1982a, 129.

<sup>804</sup> Schauer 1982a, 121, fig. 8.

<sup>805</sup> Schauer 1982d; Mottier 1988.

<sup>806</sup> Andrikou 2007; Molloy 2013.

<sup>807</sup> Mödlinger 2014b.

<sup>808</sup> Petres – Jankovits 2014.

| Find Spot                  | Type                                    | Details   |
|----------------------------|---|---|
| Mycenae                    | krater/warrior vase (LH IIIC)           | It is still unclear if the cuirasses depicted were made of metal or of an organic material. In any case, the front and back of the cuirasses were held together at the sides. The depiction of organic cuirasses though seems more reasonable since the cuirasses expand until the wrist, which is rather unlikely for a metal cuirass. The arm protection though might have been attached around the armpit, as the depictions of the back side of the vase show; here, the breast plate is also divided (decorated?) with a horizontal white line above the breast (National Museum Athens, inv. no. 1426) (Fig. 3.2.1) |
| Tiryns                     | sherds (LH IIIB(2)–C)                   | Warriors with neck protection (Fig. 3.2.2, 4; LH IIIB(2)/C) and metal waist belts (Fig. 3.2.7; LH IIIC).  |
| Tiryns                     | fragment of a clay pinax or sarcophagus | The charioteer wears a unique helmet, neck protection and a metal (?) cuirass, as indicated by the curved line at the neck and the two points above the chest (Archaeological Museum Nafplion) (Fig. 3.2.3)   |
| Tiryns                     | sherd (LH IIIC)                         | The warrior wears a chiton, which is decorated with lines. Above the chiton he wears a (metal?) cuirass (Archaeological Museum Nafplion) (Fig. 3.2.5)   |
| Tiryns                     | sherd (LH IIIC)                         | The lower edge of a bell-shaped cuirass is visible as well as a potential waist belt. The armour is worn by a man who is accompanied by another in a chariot (Institute of Archaeology, University of Heidelberg) (Fig. 3.2.6)  |
| Tiryns                     | sherd (LH IIIC)                         | The warrior on the chariot wears a chiton and above it a metal (?) cuirass (Archaeological Museum Nafplion) (Fig. 3.2.8)  |
| Mycenae                    | sherd                                   | The warrior wears a cuirass with neck protection (Fig. 3.2.9)   |
| Mycenae                    | sherd (LH IIIC)                         | The warrior wears a ‘hedgehog’ helmet and neck protection (Fig. 3.2.10)   |
| Mycenae                    | sherd                                   | The warrior wears a chiton with checkered decoration under a cuirass similar to the one depicted on the warrior vase (National Museum Athens, inv. no. 1141) (Fig. 3.2.11)  |
| Mycenae                    | sherd                                   | The warrior wears a short chiton or metal cuirass (potentially indicated by stiffness and colour), and maybe a shield and greaves (National Museum Athens, inv. no. 2580) (Fig. 3.2.12)   |
| Mycenae                    | sherd (LH IIIC)                         | The warrior behind the horse wears potentially segmented or lamellar armour with ‘o-pa-wo-ta’ and neck protection (National Museum Athens, inv. no. 4691) (Fig. 3.2.13)   |
| Cyprus                     | sherd                                   | The warrior and the charioteer wear both a pointed (organic?) cuirass with similar neck protection (Archaeological Museum Nicosia) (Fig. 3.2.14)  |
| Lefkandi                   | krater (LH IIIC)                        | A warrior with large body armour and enlarged shoulder guards is depicted (Fig. 3.2.15).  |
| Iolkos                     | sherd                                   | The cuirass of the warrior is likely emphasising the chest and nipples (Molloy 2013, 289; Borchhardt 1972, 41, fig. 5).   |
| Mycenae                    | fragment of a fresco                    | The warrior seems to wear a chiton and above an organic or leather (?) cuirass (Verdelis 1967, 26).   |
| Mycenae                    | painted stele (LH IIIC)                 | The stele was found in 1893 in a chamber tomb in the area of the lower city of Mycenae. The warriors wear a short-armed chiton with fringes and a metal or organic (leather?) cuirass above (National Museum Athens, inv. no. 3256) (Fig. 3.3)  |
| Pyla-Kokkinokremos, Cyprus | krater (LH IIIB)                        | The charioteers depicted wear triangular helmets and long shirts ending immediately above the knees; the shoulders are exaggerated, maybe indicating shoulder protection (Larnaka Museum)   |
| Voudeni                    | sherd                                   | The warrior wears a ‘hedgehog’ helmet and a cuirass with embossed nipples (potentially of central European influence; Molloy 2013, 289).  |

Tab. 3.3 Depictions of Bronze Age cuirasses and shoulder protection (see also Fig. 3.2).

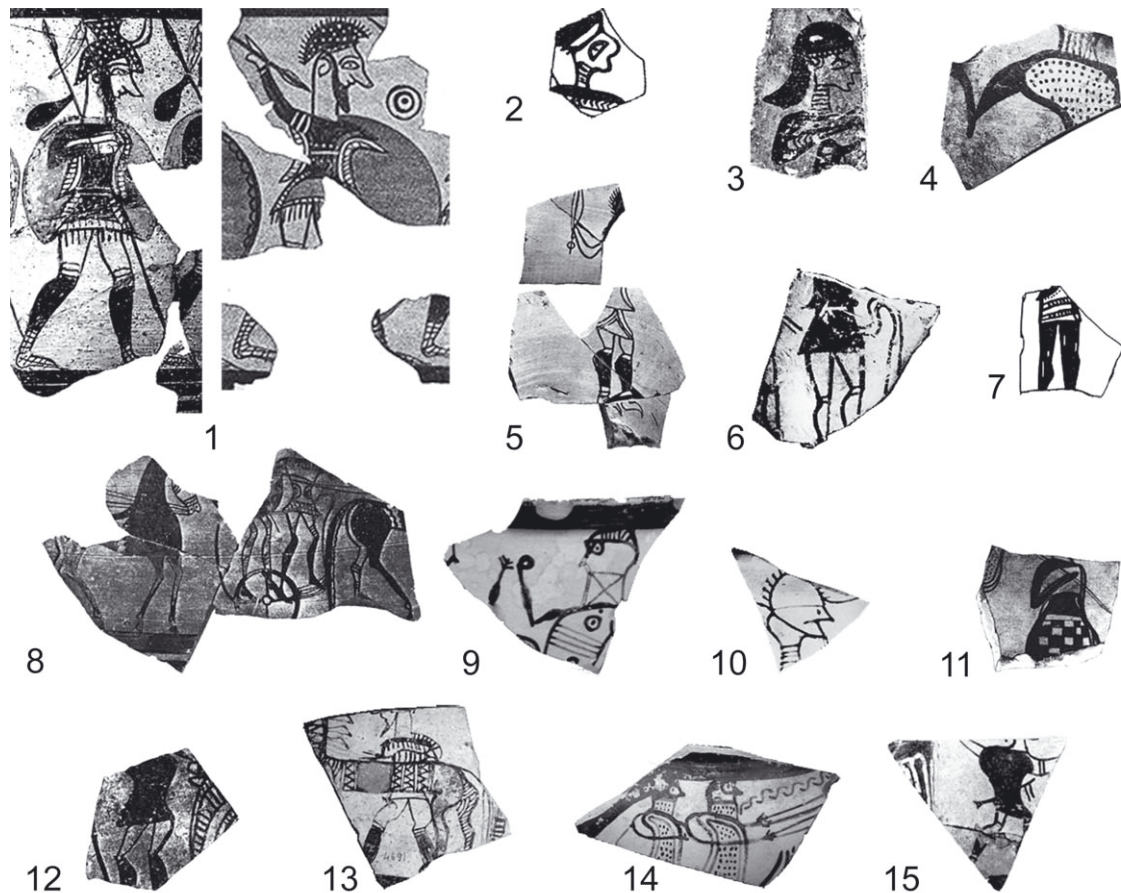


Fig. 3.2 Depictions of cuirasses and shoulder guards (without scale): **1.** Mycenae, Warrior Vase; **2.** Tiryns (after Verdelis 1967, suppl. 33.4); **3.** Tiryns (after Verdelis 1967, suppl. 34.2); **4.** Tiryns (after Vermeule – Karageorghis 1982); **5.** Tiryns (after Verdelis 1967, suppl. 33.3); **6.** Tiryns (after Verdelis 1967, suppl. 34.1); **7.** Tiryns (after Vonhoff 2008); **8.** Tiryns (after Verdelis 1967, suppl. 34.3); **9.** Mycenae (after D’Amato – Salimbeti 2011, fig. on p. 32); **10.** Mycenae (Cassola Guida 1973, pl. XXXVII.3); **11.** Mycenae (after Verdelis 1967, suppl. 33.2); **12.** Mycenae (after Verdelis 1967 suppl. 33.2); **13.** Mycenae (after Molloy 2013, fig. 9); **14.** Cyprus (photo courtesy by A. Salimbeti); **15.** Lefkandi (Vermeule – Karageorghis 1982).



Fig. 3.3 Painted warrior stele from Mycenae, Greece (after Verdelis 1967, suppl. 32.2; National Museum of Athens, inv. no. 3256).

The Linear B archives from the palaces of Knossos and Pylos contain several tablets listing armour ideograms.<sup>809</sup> So far, 152 tablets are known containing these armour ideograms: 140 tablets derive from Knossos (category Sc; LH IIIA) and 12 from Pylos (category Sh; LH IIIB2).

<sup>809</sup> Ventris – Chadwick 1956, 375–381; Verdelis 1967, 29–33.

The armour depicted on the Knossos tablets has a trapezoidal shape, curved lines indicating the shoulder pieces, and a varying number of horizontal lines within the trapezoid (Fig. 3.4). These lines probably indicate reinforcement bands or belts of segmented armour. The Knossos tablet L 693 lists a linen tunic and a copper weight, which J. Chadwick has taken to suggest composite linen and bronze armour.<sup>810</sup> Twelve of the LH IIIB tablets found in 1952 in Pylos contain a cuirass ideogram. We have to take into account that these tablets probably just record the very recent past and therefore only refer to the small number of armour that was in circulation.<sup>811</sup> The cuirasses are identified by a varying number of *o-pa-wo-ta* ('things hung or attached above'): of 20 cuirasses noted, 16 bear '20 large *o-pa-wo-ta* and ten small', the other four '22 large ones and 12 small'.<sup>812</sup> The armour ideograms from Pylos resemble significantly the Dendra panoply. However, the number of 30 or more *o-pa-wo-ta* seems to be too high for a metal panoply, even when taking into account the helmet. The tablets mention the cuirasses together with chariots; this is also supported by the two cuirass finds from Thebes, as these are the only cuirasses found together with war related objects in a settlement or palace structure, and not inside a war-

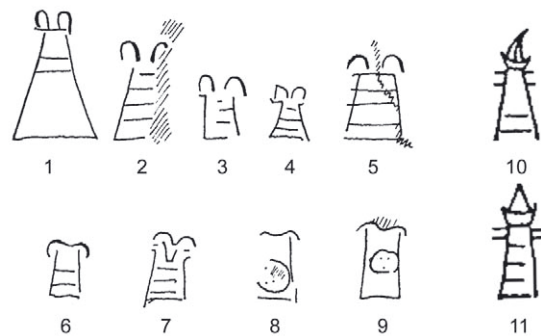


Fig. 3.4 Cuirass ideograms from Linear B tablets: 1–9. Knossos; 10–11. Pylos (after Verdellis 1967, figs. 6–7).

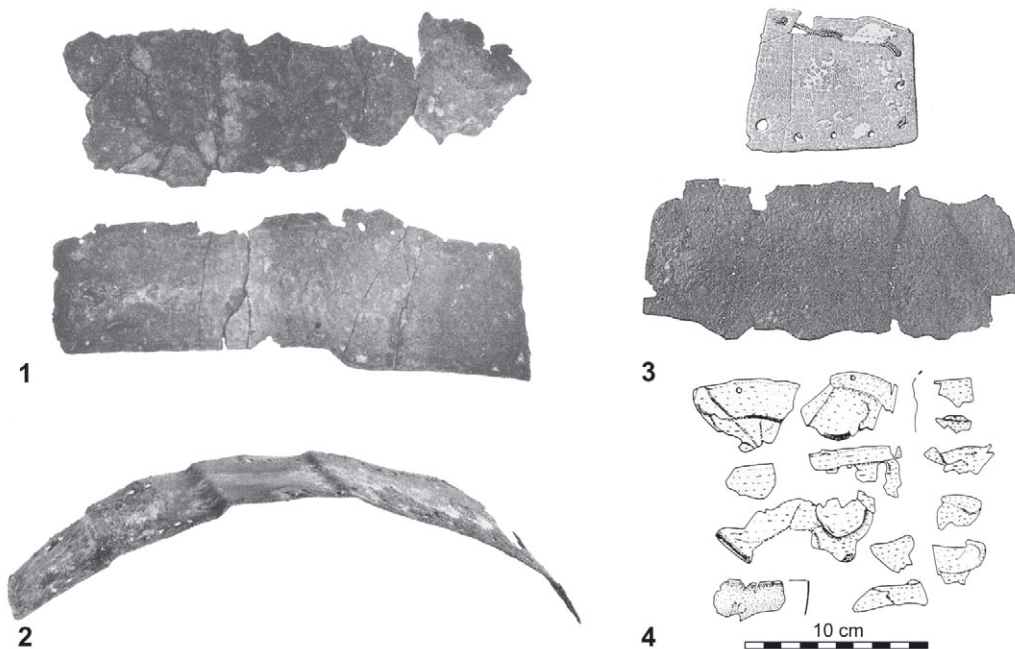


Fig. 3.5 Potential panoply parts and cuirass fragments: 1. Mycenae, shaft grave 15 (after Yalouris 1960, suppl. 25.1); 2. Mycenae, shaft grave 69 (after Yalouris 1960, suppl. 25.2); 3. Phaistos, Greece (after Savignoni 1904); 4. Midea, Greece (after Walberg 1998, pl. 112.M5–6).

<sup>810</sup> Chadwick 1976, 160.

<sup>811</sup> Molloy 2013, 286.

<sup>812</sup> Ventris – Chadwick 1956, 376.



rior's grave, and includes several depictions of cuirasses and chariots (Fig. 3.2). It is not clear yet how the *o-pa-wo-ta* parts mentioned on the Pylos tablets might have been arranged. Possibly such plates derive from the LM IIIA1 Tombe dei Nobili, Phaistos (Fig. 3.5.3).<sup>813</sup>

As well as the metal cuirasses and depictions of body armour, a few figurines wearing jerkins or cuirasses are also known (Figs. 3.6–7). A figurine from Chania/Gortyn, Greece (c. 1400–1450 BC) wears a potential cuirass.<sup>814</sup> Its rims are strengthened with rivets on jagged bronze sheets (as seen on the examples from Čaka and Pázmándfalu). The cuirass resembles a bell shaped cuirass or jerkin, with a lower, trimmed edge. The figurine from Kličevac, Serbia (13<sup>th</sup>/12<sup>th</sup> century BC), with its star-motif, also resembles the cuirasses from Čaka, Dučové and Saint-Germain-du-Plain. It is on the basis of this decorative element that the figurine from Kličevac is interpreted as wearing a cuirass.<sup>815</sup> However, as the star-motif appears also on the chin as well as on chest, a purely decorative character must also be considered. Several Sardinian bronze figurines (11<sup>th</sup>–10<sup>th</sup> centuries BC) wear organic or even metallic neck guards (Fig. 3.7).<sup>816</sup> They are moreover often protected by organic jerkins, which might have been combined with metal (?) plates.

As well as figurines, single miniatures of cuirasses are also known. An example from Knossos, was made of stone and served as a miniature vessel (height: 5.6cm; Museum Heraklion, inv. no. 2408).<sup>817</sup> This miniature was discovered before the excavation of the same area and should now be dated to LM IIIA1.<sup>818</sup> The Knossos miniature, the finds from Dendra, Thebes, and Mycenae, as well as the length of the depicted cuirass ideograms on the Knossos (LH IIIA) and Pylos (LH IIIB) tablets, indicate a trend towards short waist cuirasses, which is also visible in LH IIIC art (Fig. 3.8). A. Snodgrass notes further miniatures from Praisos (Heraklion archaeo-

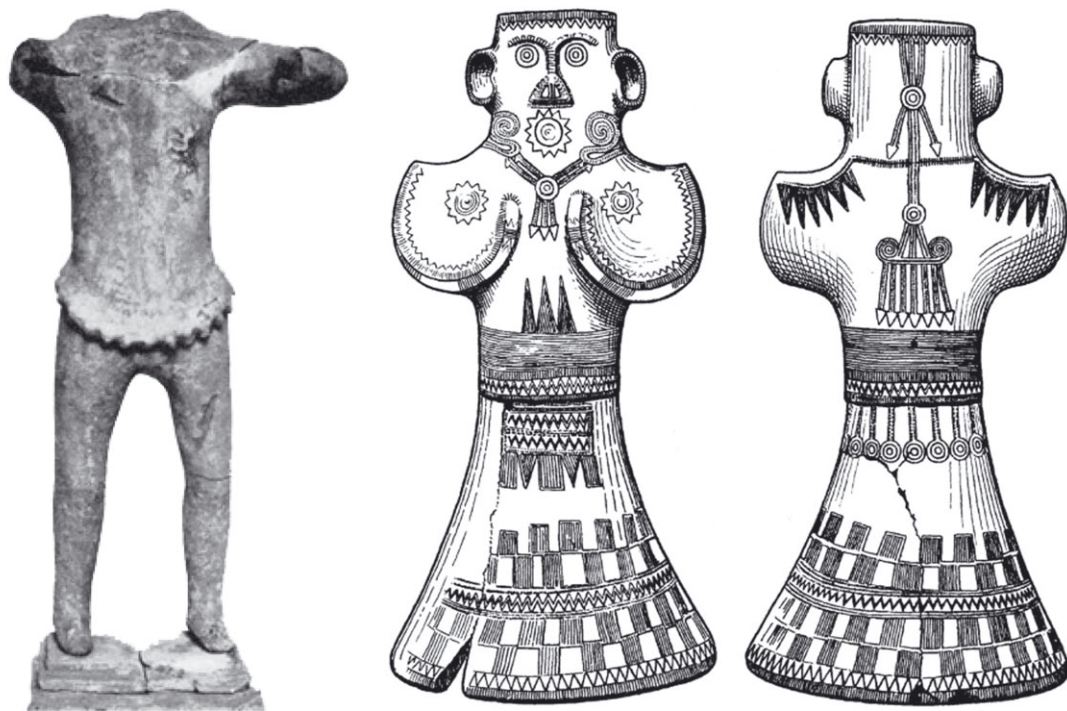


Fig. 3.6 Figurines wearing potential cuirasses from Chania/Gortyn, Greece (left; after Levy 1959) and Kličevac, Serbia (right; after Alexander 1972).

<sup>813</sup> Hood – de Jong 1952, 260; Ventris – Chadwick 1956, 375–376.

<sup>814</sup> Levi 1959.

<sup>815</sup> Paulík 1963, 135.

<sup>816</sup> For depictions of most of the Sardinian bronze figurines see Lilliu 1966.

<sup>817</sup> Verdelis 1967, 22 suppl. 23.1.

<sup>818</sup> LH IIB/IIIA1 according to Catling 1977a, 85.

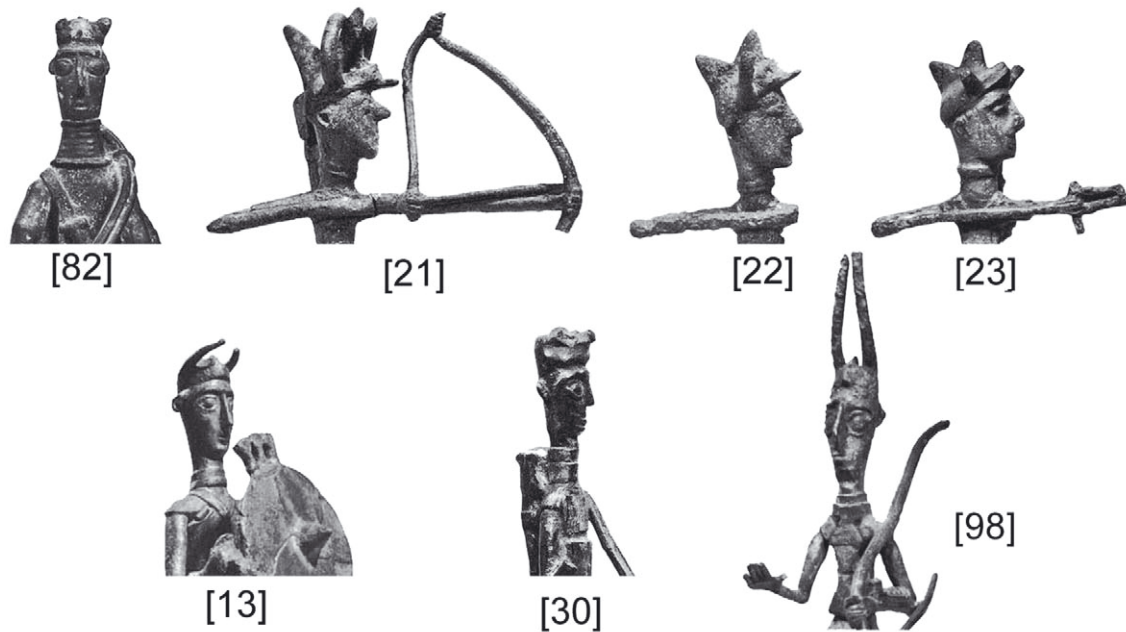


Fig. 3.7 Sardinian bronze figurines with neck protection (after Lilliu 1966; his catalogue numbers are placed in [brackets]). See also Figs. 2.37–38.

logical Museum inv. nos. 632–637, 639, 840, 870, as well as others) and Bassae, Greece,<sup>819</sup> though these might be more recent in date. Another miniature Bronze Age cuirass derives from Austria. The miniature belongs to a Bz D–Ha A associated deposit, which was found in Brandgraben, Bad Aussee,<sup>820</sup> and was made of high-tin bronze. The associated deposit consists of 234 objects, the oldest of which dates to the 14<sup>th</sup>/13<sup>th</sup> century BC.<sup>821</sup> The cuirass miniature depicts a waisted cuirass with an accentuated chest and concave rib, which follows the spine. The pectoral muscles are clearly visible. The lower edge is massive and decorated with alveoli. A loop rising from the neck would have allowed the miniature to be worn as a pendent. Due to casting defects, the hollow miniature bears two holes in the middle of the spine and on the neck on the back. It was cast in a bi-valve mould, as indicated by casting seam residues. Typologically, the miniature cannot be clearly identified as being of either Carpathian or western European type. The lack of decoration (apart from the alveoli) is most likely a result of the small size of the miniature.

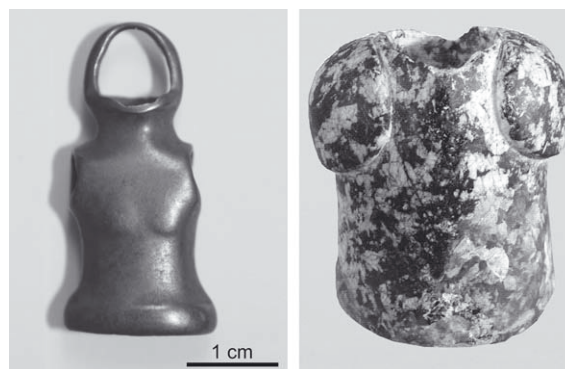


Fig. 3.8 Miniature cuirasses from Brandgraben/Bad Aussee, Austria (left; photograph: M. Mödlinger) and Knossos (right; after D'Amato – Salimbeti 2011, fig. on page 31).

<sup>819</sup> Snodgrass 1964, 74.

<sup>820</sup> Measurements: height: 3.3cm; width: 1.4cm; Kammerhofmuseum Bad Aussee, find no. 83. Windholz-Konrad 2008, 48–57, 137, figs. 53–55.

<sup>821</sup> Windholz-Konrad 2008, 50.



recognise or preserve examples from the archaeological record, resulting in the small, number of surviving examples of metal cuirasses and their uneven distribution.

The oldest body armour derives from a small area around the Corinthian Gulf: The major find spots of Dendra and Thebes are less than 100km distance from each other; whilst Mycenae, Phaistos and Midea,<sup>823</sup> which have yielded further possible cuirass or panoply fragments, are within a similar distance of one another (Fig. 3.9), with only Nichoria being more distant. The finds of shoulder protection, and the panoply, from Dendra were recovered from graves. The cuirasses from Thebes, however, come from a settlement: one from the arsenal (Fig. 3.10), the other from an annex of the palace, in the Municipal Conference Centre. These two Theban cuirasses are the only secure finds from a settlement site.



Fig. 3.10 Thebes/Arsenal, Greece. Parts of the cuirass fell into the collapsed cist grave. In the front, two wash basins (after Platon – Stassinopoulou-Touloupa 1965, fig. 8).

The second group of cuirasses is located in the northwestern Carpathian Basin and is chronologically closest to the Greek cuirasses. The core group of Carpathian cuirasses are the seven finds from Čierna nad Tisou, Čaka, Ducové, Šarišské Michaľany, Pázmándfalu and Nadap, as well as a complete cuirass found in the Danube. A further cuirass fragment derives from a deposit from Ivančice, Czech Republic, and a complete cuirass from the Saône near Saint-Germain-du-Plain. A potential cuirass fragment from the associated deposit of Winklsaß, Germany, might also belong to this group of Carpathian cuirasses (Fig. 3.11). The associated deposit from Winklsaß contains various eastern associations, such as a rib-decorated socketed axe, more commonly found in Slovakia, Hungary and Romania, sickle fragments of Type Uioara and a fibula of Type Röschitz. With these associations in mind, the possible cuirass fragment might well also be of eastern origin in the west (similar to the complete Carpathian cuirass from the Saône), rather than as a local imitation or adaptation proving a manufacturing link between Carpathian and western European cuirasses. The deposition of the armour as *pars pro toto* could indicate also a grave assemblage but due to the lack of human remains, or of burning, which often accompanies objects associated with a cremation, it might be best considered an associated deposit.

Due to local depositional practices, most of the Carpathian cuirasses are heavily fragmented (Čierna nad Tisou), or consist of just a few fragments (Čaka, Ducové, Pázmándfalu) or single

<sup>823</sup> Walberg 1998, pl. 112, M5–6.

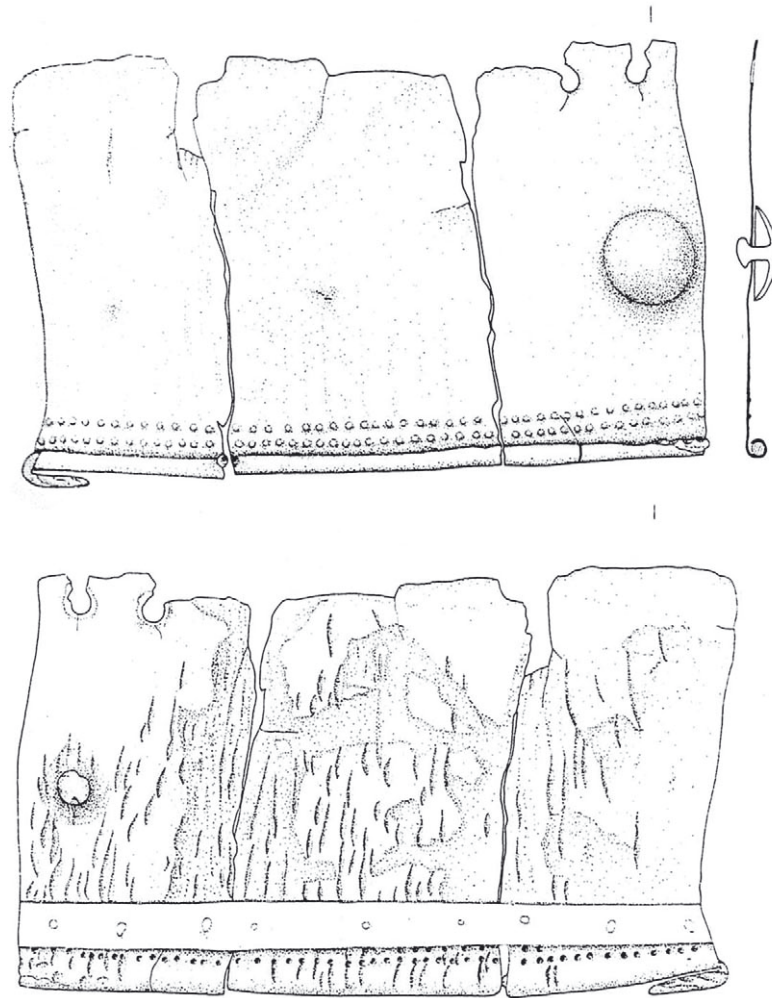


Fig. 3.11 Potential cuirass fragment from the associated deposit of Winklsaß, Germany. The back shows recent soldering on of a brass sheet (after Weiss 1998, 537, fig. 2) (scale 1:2).

fragments (Nadap, Ivančice, Šarišské Michaľany). The cuirass from Čaka derives from a grave and is, besides the Dendra finds, the only known find from a burial context. With the exception of Čaka and the two complete cuirasses from the Danube and the Saône, almost all other Carpathian cuirasses have come from associated deposits. The single find of a cuirass from Šarišské Michaľany could originally, therefore, also have been part of an associated deposit but no further finds have yet been recovered from this location which might confirm such a hypothesis. The cuirass from Ducové was found in an associated deposit within a settlement of the Velatice–Baierdorf culture. The cuirass from the Saône at Saint-Germain-du-Plain is considered an import. The fact that it is deposited in the same complete state as the cuirass from the Danube suggests that it was not only the object that travelled but also perhaps an associated rite of deposition as well, suggesting its date of deposition may also have been similar to that of the other Carpathian cuirasses. This is supported by the fact that the complete western European cuirasses were deposited differently, though in the same region: close to the Carpathian cuirass found in the Saône at Saint-Germain-du-Plain, a further 16 cuirasses have been found within a linear area of 230km, incorporating the finds from Marmesse (seven cuirasses), Fillinges (seven cuirasses) and Jura (two cuirasses). The original find location of two further western European cuirass (cat. nos. 135 and 136) remain unclear. The unprovenanced cuirass cat. no. 135 resembles so closely the cuirasses from Fillinges that the same workshop for their production may be assumed.

The cuirasses from Fillinges were found together with a bronze stick in an ash layer but without any significant evidence of fire exposure. At least seven of the cuirasses were torn apart, with each individual cuirass surviving as only either one breast- or back plate. These breast and back plates were deposited having been placed inside one another, similar to the Marmesse cuirasses (Figures 3.12). Indeed, none of the cuirasses or their fragments show any indications of having been exposed to fire. The depositional circumstances resemble less that of a grave and more the character of a sacrificial place, if not actual ritual sacrifice and cremation on a pyre.<sup>824</sup> v. Merhart and Mottier also note the possibility that the finds might belong to a hoard.<sup>825</sup>

The Marmesse cuirasses were deposited in the shape of a triangle. Two further cuirasses were deposited together in the Jura (cat. nos. 137 and 138). No associated finds are known, or if further cuirasses were found with them.<sup>826</sup>



Fig. 3.12 Three of the Marmesse cuirasses inside each other (Photograph A. Chauvet, C2RMF; by courtesy of the Musée d'Archéologie nationale et Domaine national de Saint-Germain-en-Laye).

### 3.4 Chronology and Typology

As recently discussed by Molloy, the development of Bronze Age cuirasses is directed towards the use of fewer and smaller attachments, and in general of a simpler, lighter form, which around 1200 BC results in the development of a cuirass without attachments, permitting a much higher level of mobility in use.<sup>827</sup>

During the transition period of LH II/III, defensive armour changed significantly in the Aegean. The tower and figure-of-eight shields were substituted with small round shields, which resulted in a greater need for more direct modes of bodily protection. That this process happened rather fast is demonstrated by the two armour finds from Dendra, which illustrate the rapid replacement of single body armour pieces (the shoulder protection from grave 8) by a panoply (grave 12). The shoulder protection of Dendra, grave 8, is dated to LH II and can be considered as the oldest piece of metal body armour. It appears to be slightly older than the famous panoply from grave 12,<sup>828</sup> which is dated to LH IIB. The potential fragment of a cuirass from

<sup>824</sup> Schauer 1982d, 92–130.

<sup>825</sup> v. Merhart 1969, 171, note 3; Mottier 1988, 144.

<sup>826</sup> Descamps 2005, 100.

<sup>827</sup> See also Greek vase paintings of armour in LH IIIC: Molloy 2013, 276.

<sup>828</sup> Verdelis 1967, 21–22; Andrikou 2007, 402.

Phaistos is contemporary with the Dendra panoply. The Theban panoplies or cuirasses are dated to LH IIIA2/B1, thus the Theban cuirasses are slightly more recent than the Dendra panoply.<sup>829</sup>

Peculiar is the chronological gap apparent between the Mycenaean cuirasses and the technologically successive cuirass from Argos, which is dated to the 8<sup>th</sup> century BC, as well as the geographical gap between the Aegean and the Carpathian Basin, from where no early cuirass finds are yet known. It is extremely likely, however, that cuirasses were produced and circulated but as a consequence of different life-cycle processes (e.g. recycling, deposition, loss, general disinterest of people in this specific form of armour), we have significantly different regional patterns of archaeological survival and recovery. However, contemporary to most of the LH IIIB Linear B texts, body armour appears in continental Europe in Bz D, indicating the rapid adoption of the use of the light bronze cuirasses, which, unlike the earlier heavier, more complex panoply, was less restrictive of speed and flexibility.

Carpathian cuirasses are, due to their occurrence in associated deposits, easier to date than their western European counterparts, and can be generally dated to Bz D–Ha A1. On the basis of associated finds, the associated deposit from Ducové dates to Bz D, or at the very latest to the transition between Bz D and Ha A1.<sup>830</sup> The associated deposits from Nadap and Brandgraben date to Bz D–Ha A1.<sup>831</sup> Grave 2 and the cuirass from Čaka date to Bz D, or at the latest to the beginning of Ha A1, as suggested by Hansen and J. Paulík.<sup>832</sup> The associated deposit from Winkelśaß is dated to Ha A1.<sup>833</sup> The recently found associated deposit from Pázmándfalu has also been dated to Ha A1.<sup>834</sup> The cuirasses from Šarišské Michaľany and Čierna nad Tisou are dated to Bz D–Ha A1, according to their similarity to other Carpathian cuirasses, since both lack any adequate associated finds for dating. There is no reason to assume that the cuirass fragments from Ducové, Nadap and Pázmándfalu were deposited after a long period of use, as it was suggested by Petres and Jankovits.<sup>835</sup>

The deposition date of the two river finds from the Danube and Saint-Germain-du-Plain is unclear. Their close connection to the Carpathian cuirasses in terms of morphology, construction and decoration, however, suggest a depositional date during Bz D–Ha A1. The date of the cuirass from the Danube with its unique breast accentuation is somewhat more complex. According to the application of decoration,<sup>836</sup> as well as the decorative elements themselves, which are also found on other Carpathian cuirasses and contemporary helmets, a date of Bz D/Ha A1, if not Bz D alone due to similarities with older Greek panoplies, is entirely reasonable. The half circles below the navel are also known on the cuirass from Saint-Germain-du-Plain but not on more recent finds. The breast plate and back plate are permanently fixed on the left side with four rivets, as known from other Carpathian cuirasses. On the left shoulder a rivet joining both plates and on the right shoulder a simple loop riveted on the back plate served as an adequate means of attaching the two halves. The attachment on the right side resembles that on the cuirass from Saint-Germain-du-Plain, even if additional rivet holes on both plates along the edge indicate an additional means of attachment, though these may have served to fix the organic inlay, as known on the Greek cuirasses and panoplies. The shape of the rivets on some cuirasses, however, suggest a different means of connection: those from Saint-Germain-du-Plain and Čierna nad Tisou both show conical headed rivets, while the rivets from the Danube cuirass are bigger and completely flat. The waisted profile of the cuirass resembles also the shape of the cuirass from Saint-Germain-du-Plain, while the neck guard is much higher than on any other cuirass with the exception of that from Dendra. G. v. Merhart connected the cuirass

<sup>829</sup> Verdelis 1967, 21–22; Andrikou 2007.

<sup>830</sup> Paulík 1968, 46; Hansen 1994, 12.

<sup>831</sup> Most recently Windholz-Konrad 2008; Uckelmann 2012.

<sup>832</sup> Paulík 1968; Hansen 1994, 12.

<sup>833</sup> Weiss 1998.

<sup>834</sup> Szabó 2013, 811.

<sup>835</sup> Petres – Jankovits 2014, 63.

<sup>836</sup> *Gleichbuckelsystem*; see Jockenhövel 1974, 39.

from Saint-Germain-du-Plain with the eastern Alpine Hallstatt cuirasses,<sup>837</sup> but it is now usually interpreted as an eastern piece deposited in the west of Europe.<sup>838</sup> Despite this, it was assigned a later date than the other Carpathian cuirass.<sup>839</sup> However, in the following it is suggested that a date in Bz D–Ha A1 is more reasonable.

Since all western European cuirasses lack datable associations, they have to be dated according to their decorative elements. Generally, these cuirasses have been dated to Ha B1, which corresponds to the Atlantic Wilburton/Brécy/Hío phase or later. The cuirasses of Fillinges were dated first by W. Deonna to the 9<sup>th</sup>–7<sup>th</sup> centuries BC or 7<sup>th</sup>–5<sup>th</sup> centuries BC.<sup>840</sup> G. v. Merhart, and later also Müller-Karpe, dated them according to their points-and-studs decoration and water bird depictions to a later period of the early eastern Urnfield period (Ha B1/B2).<sup>841</sup> Mottier followed the argument of v. Merhart but tended to date the cuirasses to Ha B2.<sup>842</sup> Schauer saw in the chest/nipple decoration of the late Ha B1 cuirasses from Fillinges, which he thought to be deposited in Ha B2, an abstraction of phalerae (generally dated to Ha B3/C; a few slightly more recent ones are, however, known), and was not concerned by this contradiction.<sup>843</sup> J.-P. Mohen dated the cuirasses from Marmesse to the end of the Bronze Age.<sup>844</sup> H. Steuer dated them to the 9<sup>th</sup>/8<sup>th</sup> century BC, chronologically between the cuirass from Saint-Germain-du-Plain and the cuirasses from Fillinges.<sup>845</sup> The decorative elements (ribs as well as pellets and bosses) on the cuirass from Jura A (cat. no. 137) seem to support a date to the very end of the Urnfield period. As pointed out by Jockenhövel, decoration with bosses/pellets of equal size started in Bz D/Ha A1.<sup>846</sup> It was followed by point and stud decoration, which appeared earliest toward the end of Ha A2 together with bird depictions (e. g. on cups of Type Kirkendrup-Jenišovice, vessels of Type Hajdúböszörmény and greaves of Type Kuřim), followed by the *Leisten-Buckel-System* at the very end of the Urnfield period. Only three of the 18 western European cuirasses with point and stud decoration bear bird depictions, which indicates either less importance being placed on the bird motif, or a slightly earlier date (or both).

The distribution of bronze sheet objects and weaponry between eastern and western Europe differs significantly during Bz D–Ha A(1) and Ha B1. The presence of armour, vessels and cauldrons in the Atlantic Bronze Age indicates complex relations and mutual influences between east and west in the 13<sup>th</sup> and 12<sup>th</sup> centuries BC. These connections were discussed recently for vessels and cauldrons by Gerloff, for shields by Uckelmann and for greaves by Clausing.<sup>847</sup>

The distribution of recovery and the associated deposit associations of sheet metal objects, demonstrates the strong presence of a central or eastern European/northwestern European trade route, which is more likely than a west Mediterranean/Iberian trade route,<sup>848</sup> at least concerning armour. So far, the only Bronze Age/Early Iron Age metal armour from the Iberian peninsula are the depictions of Type Herzsprung shields on the stelae,<sup>849</sup> and the fragments of helmets from the river Huelva (two helmets of Type Bernières d'Ailly (cat. nos. 117–118), and one helmet of eastern type, dating probably to the 7<sup>th</sup> century BC), indicating connections with northern France and the eastern Mediterranean, as well as further fragments of a crested helmet of Type Bernières d'Ailly from Vila Cova de Perrinho/Monte do Crasto, Portugal (cat. no. 119), and

<sup>837</sup> v. Merhart 1954, 52.

<sup>838</sup> E.g. Paulík 1968, 56, 60; Schauer 1982a, 125; Weiss 1998, 543.

<sup>839</sup> E.g. Schauer 1982a, 336, fig. 1 (beginning of Ha B); Bonnamour – Mordant 1988, 367 (Ha A2–Ha B1); Sperber 2011, 24–25.

<sup>840</sup> Deonna 1934b, 93–143.

<sup>841</sup> v. Merhart 1954; Müller-Karpe 1962a.

<sup>842</sup> Mottier 1988, 143.

<sup>843</sup> Schauer 1982a, 114.

<sup>844</sup> Mohen 1987.

<sup>845</sup> Steuer 2001, 336–337.

<sup>846</sup> Jockenhövel 1974, 39, note 90.

<sup>847</sup> Clausing 2002; Gerloff 2010, 106–114; Uckelmann 2012.

<sup>848</sup> Burgess 1991.

<sup>849</sup> Uckelmann 2012, 62, 166.



potentially also Grañón, Spain. The small number of finds, including weapons such as swords, points to a limited armour exchange during Bz D/Ha A1 with the Atlantic Bronze Age, which did not improve much during the following centuries.<sup>850</sup>

All western European cuirasses have been found in the north of the western Alps, in Haute-Savoie and Haute-Marne, within a distance of less than 230km. This area can be considered a key region, as emphasised by the presence of a number of rich associated deposits, such as that from Blanot, France.<sup>851</sup> This region was the meeting point of two main trade routes from west to east. Even though located at the periphery of the Atlantic Bronze Age, this region was the main axis for trading arms, such as swords of Type Monza, Arco and Rixheim, as well as armour. One trade route passed through the north Alpine region and continued overland to the Carpathian Basin and further southeast to the Aegean;<sup>852</sup> the other, southern route, passed through northern Italy (Po-Basin) and could have passed either overland to the Carpathian Basin (see the distribution of greaves) or continue through the Mediterranean (as indicated for certain types of swords). Cuirasses are rare both in northern Italy (no secure finds are known) and the north Alpine region, but were certainly known, at least in the latter region, as the cuirass miniature from Bad Aussee, Austria, and the potential cuirass fragment from Winklsäß, Germany, demonstrates.

The development of armour was also associated with the rise of the early *Griffzungenschwörter*; however, they do not show any overlapping recovery area. In comparison, the connection between certain rod-tanged swords of Bz D/Ha A1 (e.g. Type Pépinville, Arco-Terontola, Grigny and St. Ouen) with the western European cuirasses appears less certain, despite the fact that their similar recovery areas would seem to suggest otherwise.<sup>853</sup> The origin of these swords was formerly connected with the Alpine region, but new studies show a much higher occurrence in France, pointing more toward their Atlantic or at least western European development.<sup>854</sup> These swords are also found south of the Alps and in northern Italy and are associated with other Italian finds such as Type Peschiera daggers or violin bow fibulae from the beginning of the Late Bronze Age. How far these swords could travel or be traded and exchanged, is demonstrated by a European rod-tanged sword found in El Kantara, Egypt,<sup>855</sup> as well as a hybrid sword with the hilt of a Type Arco-Terontola sword fused with a more eastern style blade found in Ugarit, Syria. The latter also bears a cartouche of pharaoh Merneptah (1212–1202 BC).<sup>856</sup> Thus we might assume that seaborne trading routes to the east via the Mediterranean (Adria or Ligurian Sea?) are more likely, at least for these objects. Who transported these bronzes and for what purpose, however, must be discussed elsewhere.

Unlike these swords, armour and sheet metal work expanded outward from the Aegean to the Carpathian Basin, from where it eventually reached western Europe, a view which is supported by the lack of armour in pure Atlantic associated deposits of this period when compared with finds from the Carpathian Basin, as well as northern Italy and north Alpine regions. The most prominent examples of eastern armour reaching the Atlantic Bronze Age or at least its periphery are certainly the cuirass from Saint-Germain-du-Plain, the greaves from Cannes-Écluse (cat. no. 162), and the earliest western cauldrons.<sup>857</sup> As we know from shields, helmets and early cauldrons,<sup>858</sup> cuirasses might also have been locally produced in western Europe. This might be supported by the close vicinity of the find spots for the western European cuirasses and that of the Carpathian cuirass from Saint-Germain-du-Plain, as well as the lack of western European type cuirasses in eastern Europe.

<sup>850</sup> Mödlinger 2014b, 23.

<sup>851</sup> Thevenot 1991.

<sup>852</sup> In relation to cauldrons, see Gerloff 2010, 114.

<sup>853</sup> Cf. Mödlinger 2014b, 23.

<sup>854</sup> Matthews 2017.

<sup>855</sup> Type Pépinville/Type Monza, after Gerloff 2010, 114. Cf. Burgess 1991, 29.

<sup>856</sup> Burgess 1991, 30.

<sup>857</sup> Gaucher – Robert 1967; Gerloff 2010.

<sup>858</sup> Gerloff 2010; Uckelmann 2012.

Looking at the similar distribution of certain rod-tanged sword types and the cuirasses, it seems as if the same trading routes were used to bring eastern European cuirasses (such as the one from Saint-Germain-du-Plain) to the west and western European swords to the east, which resulted, at least in terms of the armour, in their quite rapid introduction but also in a very restricted local adaptation. We might, therefore, see the development and distribution of western European cuirasses as being the direct result of east/west and west/east trading connections. As a consequence, this would also shift their production period so as to be more in line with that of the Carpathian cuirasses. By concluding that the western European cuirasses were produced in Ha A2 also places them chronologically closer to early metal shields, the greaves from Cannes-Écluse (cat. no. 162), and the Carpathian cuirasses, and results in a more consistent image of the exchange of arms and armour between eastern and western Europe. Only the unprovenanced cuirass cat. no. 136 might be of more recent date, since its method of attachment, shape, and decoration, all differ significantly from other western European cuirasses.

### 3.5 Decoration

The Greek cuirasses are all undecorated. However, the depictions of cuirasses (Fig. 3.2) instead suggest that in the case of some cuirasses, especially organic cuirasses and those made of organic and metal, decoration was indeed applied.

Carpathian cuirasses, however, are, at least on the breast plate, decorated. The breast plate bears in most cases convex plastic ribs and fine lines of punched dots (comprising circles, chevrons, and chevrons arranged as stars) (Fig. 3.13, left and centre). The Danube cuirass is the only one without chevrons or jagged, riveted-on bronze bands. All cuirasses show one or two ribs parallel to the edge of the arm opening and the base. The Danube cuirass though has instead two lines of pellets parallel to the rim at the base. The two convex ribs close to the arm opening of the Ducové fragment are decorated with a line of dots in the middle of each rib, while on the Čaka fragment pellets are visible between the ribs.<sup>859</sup> This plastic decoration as ribs also increased the stability of the bronze plate.

Opposite to the breast plate, the back plate remained largely undecorated. The only decoration preserved on the back are one or two ribs or lines of pellets applied parallel to the rim. On the cuirass from Saint-Germain-du-Plain, these ribs are combined on the front only with chevron decoration. In the centre of the breast plate from Saint-Germain-du-Plain the two ribs parallel to the base rim form a semi-circle, with the area in between being filled with chevrons. On the Danube cuirass this semi-circle is instead formed by the two lines of pellet decoration. On the end of these two lines, where the breast and the back plate are joined together, there occurs a circle with a large central boss. These circles with large central boss are also found on other defensive armour (e.g. helmets of Type Lueg, and the helmets from Tiryns and Szczecin-Zdroje) as well as on one of the bronze cups from the associated deposit from Dresden-Dobritz,<sup>860</sup> demonstrating the close connection between different classes of armour. Similar decoration is also found on bronze sheets from Salaš Noćajski, Serbia,<sup>861</sup> Gușterița, Romania,<sup>862</sup> Techirghiol, Romania,<sup>863</sup> Pila del Brancon, Italy,<sup>864</sup> Dresden-Dobritz, Germany,<sup>865</sup> and in an Iron Age deposit from Sicily.<sup>866</sup>

The pectoral muscles of Carpathian cuirasses are usually outlined with plastic ribs, which connect above the sternum. Chevron decoration was applied on the cuirass from Saint-Ger-

<sup>859</sup> Schauer 1982d, fig. 4.

<sup>860</sup> Martin 2009, pl. 30.119.

<sup>861</sup> Vasić 1994, pl. 38.13.

<sup>862</sup> Bronze sheet fragment: Rusu 1990, 73, pl. V.5.

<sup>863</sup> Bronze sheet fragment: Petrescu-Dîmbovița 1978, pl. 215.17–19.

<sup>864</sup> Bronze sheet fragment: Salzani 1998, fig. 2.138.

<sup>865</sup> Bronze cup: Martin 2009, pl. 30.119.

<sup>866</sup> Egg 1983, fig. 2.4–5.

main-du-Plain in between these ribs, and an upwards bent semi-circle positioned immediately beneath it. Also, the rib underneath the neck has chevron decoration with downwards pointing chevrons applied. On the Danube cuirass, only one massive rib was applied to outline the pectoral muscles. The break on the fragment from Ducové below the breast is in the shape of a semi-circle, and indicates also for this cuirass the application of a semi-circular decoration to outline the muscles. Moreover, the Čaka cuirass might have had a decorated (double) rib that followed the outline of the chest. An additional circle or round decoration, as suggested by Paulík,<sup>867</sup> has no parallels amongst Carpathian cuirasses, however, it is visible on the cuirass from Jura A (cat. no. 137).<sup>868</sup>

The breast or nipples are characterised on the cuirasses from Ducové and Saint-Germain-du-Plain by two stars, formed by dotted, punched lines of chevrons around a usual empty centre (Fig. 3.13, left and centre). These stars are sometimes formed by separate attachments, as on the cuirass from Čaka. On this cuirass, a star-like disc was riveted onto the breast plate with small rivets located at the tip of each of the points of the star. Riveted-on breast decoration is also common on later Hallstatt period cuirasses from Kleinklein and Stična-Vrhoplje, as well as on an unprovenanced cuirass.<sup>869</sup> The breast decoration of the Danube cuirass consists of fine, positively embossed pellets only.<sup>870</sup> The nipples are indicated by three circles inside each other with a central boss; they are surrounded by a larger, open circle, indicating the breast.

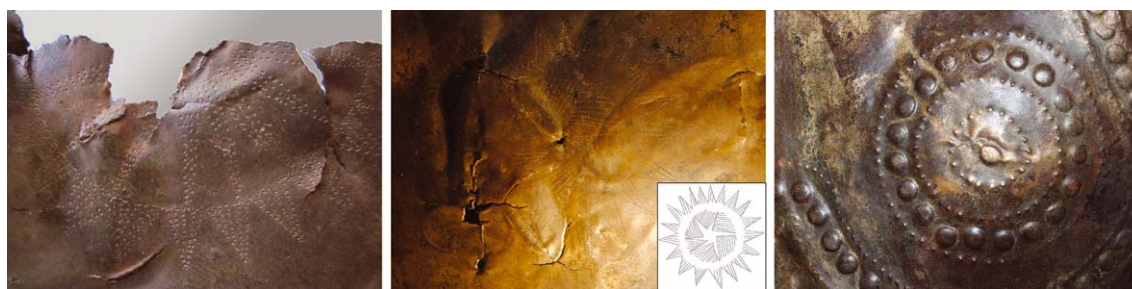


Fig. 3.13 Chest decoration: Ducové, Slovakia (left), Saint-Germain-du-Plain, France (centre) and Marmesse (right) (left: photograph M. Mödlinger; centre: photograph M. Uckelmann, by courtesy of the Musée d'Archéologie nationale et Domaine national de Saint-Germain-en-Laye; right: photograph A. Chauvet (C2RMF), by courtesy of the Musée d'Archéologie nationale et Domaine national de Saint-Germain-en-Laye).

Compared to Carpathian cuirasses, western European cuirasses are extensively decorated with lines and circles of different sized, positive bosses and pellets on both the front and back. These decorative elements are also common on cups (Type Kirkendrup-Jeníšovice), vessels (Type Hajdúböszörmény) and amphorae (Type Mariesminde).<sup>871</sup> Three western European cuirasses have additional decoration in the form of the heads of water birds (Jura B (cat. no. 138), Fillinges (cat. no. 140–141)). The bird heads are arranged differently on different cuirasses, however, most noticeably on the two cuirasses from Fillinges. On these cuirasses, the double embossed lines abstracting the chest are not completely closed, but open on the upper sides towards the armpits. The bird heads then are either a prolongation of the circles and located on top of them (cat. no. 140) or placed on top of the outer circle (cat. no. 141). The water birds are not connected with each other. Water bird decoration, as on the cuirass from Jura B (cat. no. 138) (also here without typical elements such as sun, boat or wheels), is also known from the crested helmets from Škocjan.<sup>872</sup> Here, the water bird heads are also an elongation of the decora-

<sup>867</sup> Paulík 1968, 48.

<sup>868</sup> Cf. Mödlinger 2014b, 24–25.

<sup>869</sup> The cuirass was part of the Guttman collection, inv. no. AG 1124. See Born – Hansen 2001, pl. VII. Today, it is in an Austrian private collection.

<sup>870</sup> *Gleichbuckel*; see Jockenhövel 1974, 39.

<sup>871</sup> Jockenhövel 1974; Wirth 2006.

<sup>872</sup> Hencken 1971, fig. 92.

tive band. Based on their decoration, the western European cuirasses can be distinguished into three sub-groups:<sup>873</sup>

1. Fillinges and the unprovenanced cuirass cat. no. 135
2. Marmesse
3. Jura A and B as well as the unprovenanced cuirass cat. no. 136

This classification is largely in agreement with the identification of different workshop traditions producing these cuirasses as described by Mottier.<sup>874</sup>

The unprovenanced cuirass cat. no. 135, as well as all the cuirasses and associated fragments from Fillinges, have the same type of decoration: immediately above the base of the cuirass, a parallel line of large bosses is surrounded below and above by a line of pellets. Some 10cm or so above these lines, two further horizontal lines of pellets are visible, embracing two lines of larger bosses, which have in between them a band of diagonal pellet lines, which is confined within two horizontal pellet lines above and below. From the highest horizontal line on, vertical bundles of lines (alternating lines of larger bosses and bands with diagonal pellet lines) spread upwards in the direction of the neck, if not interrupted by the breast decoration. Here, the nipples are indicated by two pellet circles and a large central boss. As noted before, two cuirasses (cat. nos. 140–141) have open circles and end in water bird heads. The navel is indicated by a central boss between the vertical bundles of lines. The back plates of the cuirasses are decorated similar to the breast plates<sup>875</sup> but without the decorative breast elements. Only the spine is indicated, by a massive, concave central rib, which divides the horizontal lines of pellets and bosses into two.

Two horizontal lines of bosses, accompanied by two lines of pellets above and below, follow the edge of the base on both breast and back plate of the cuirasses from Marmesse. The slightly convex breast and nipple is marked with two circles of pellets, which bear a circle of bosses in between. In the centre of each of these three circles, one central boss was applied. The pectoral muscles are indicated by two semi-circles of pellets and central bosses right under and partly parallel to the breast circles. The only differences between the cuirasses are vertical and horizontal lines of bosses underneath the semi-circles beneath the chest and in the centre of the cuirass: with the exception of one, all cuirasses have one horizontal line with three bosses and a parallel lower line with five bosses (cat. no. 148 has an additional line with seven bosses). Four cuirasses (cat. nos. 146–148, 150) have two short vertical lines under the semi-circles, consisting of three bosses each.<sup>876</sup> These small horizontal lines of bosses are repeated also on the back side of the cuirasses with the same number of bosses. The back plates, however, demonstrate more differences between each cuirass than do the breast plates, since the number of lines of pellets and bosses pointing upwards from the concave spine to the opening of the arms differs from cuirass to cuirass. The cuirass cat. no. 148 bears one more line than the cuirasses cat. nos. 146–147, 150. The cuirass cat. no. 149 bears three massive ribs with bosses and, instead of just the small central horizontal lines of bosses, it also has a line of bosses all along the back plate.<sup>877</sup>

Unlike the Marmesse and Fillinges cuirasses, the decoration of the two cuirasses from Jura differ significantly from each other. Apart from the horizontal lines of pellets and bosses around the waist, and the circles abstracting chest and nipples, there are no further similarities with the cuirasses from Marmesse or Fillinges. The front side of the cuirasses Jura A (cat. no. 137) is decorated with nine circles, each with three lines of pellets and a central boss. Two circles are placed above the chest and two on each side between the arm pits and the two central circles. Additionally, two smaller circles (two pellet lines with a central boss) were applied in the centre of the lower area of the breast plate, and two further circles of the same size under the two horizontal waistlines of the bosses. Similar circles (with or without the large central boss) are also

<sup>873</sup> Cf. Mödlinger 2014b, 25.

<sup>874</sup> Mottier 1988, 142–143.

<sup>875</sup> For a detailed description, see also Schauer 1982d, 103–112.

<sup>876</sup> Cf. Mödlinger 2014b, 26.

<sup>877</sup> Cf. Mödlinger 2014b, 26.

known from the Carpathian cuirasses and other defensive armour, such as on helmets of Type Lueg and the helmets from Tiryns and Szczecin-Zdroje. On both breast and back plate, three vertical lines of bosses were applied under the two waistlines of bosses. The pectoral muscles are heavily abstracted by a line of bosses; the circles indicating breast and nipples are surrounded by a semi-circle of bosses. The back plate of the cuirass is decorated in a similar way to that of the breast plate but has only three circles above the two waistlines, and only one central double-circle at the bottom.

The cuirass from Jura B (cat. no. 138) is completely covered with bosses and pellets. In *horror vacui*, both breast and back plate are covered extensively with vertical lines of bosses below the horizontal waist line. On the back plate, these vertical lines of bosses continue above the waist line and reach almost up to the neck. Immediately under the neck though, two heads of water birds, turning towards the centre of the back plate so as to each other, were applied. Behind each bird head a circle with a central boss was applied. The circles on the breast plate, which accentuate the breast, each consist of eight lines of pellets and bosses with a central boss. These circles are surrounded by a loop-shaped line, which spreads from the shoulder. Below the two breast circles, four heads of water birds are visible, facing each other; the inner two birds are touching each other with the beak. In between these water bird heads, bosses were also applied.<sup>878</sup>

The unprovenanced cuirass cat. no. 136 is unique and not comparable with the other Bronze Age cuirasses in terms of shape (it is significantly waisted, without becoming wider at the base), the connection of breast and back plate, and in its decoration. Three horizontal lines (two lines of bosses, one central line of pellets) around the waist separate a lower part, which is decorated with four vertical pellet lines and one central horizontal pellet line, from an upper part, which is decorated with three circles. The outer circles consist of four lines (two outer lines with bosses, two inner pellet lines), while the central circle consists of three lines (the outer line with bosses, the inner lines with pellets). All three circles bear a large central boss.

### 3.6 Cuirass Fragments and Potential Cuirass Finds

Several bronze sheet fragments were, or still are, interpreted as belonging to cuirasses. So far, this is only certain for the fragments from Phaistos, Mycenae, Nichoria and highly likely for Winklsaß. Further fragments, such as those from Kallithea, Lakkithra and Szentgáloskér, which were all previously interpreted as cuirass fragments, almost certainly belong to other objects. Other potential cuirass finds lack any further information,<sup>879</sup> as they could either no longer be located in their respective museum (e.g. Šulekovo), or were simply too fragmentary or equivocal in form to be confirmed as belonging to a cuirass (e.g. Plérimond, Grésine, Cannes-Écluse, Abensberg, Pfeffingen, Heunischenburg, Farkasgyepű, Podcrkavlje, Pila del Brancon), as will be discussed below.

Potential band-sheets from Greek cuirasses have been found at Phaistos, Mycenae, and Nichoria and are dated to the short time frame of LH II–IIIB2.<sup>880</sup> Two fragments were found in Phaistos, tombe dei nobili, (measurements: length: 29.5cm; height: 12cm) (Fig. 3.5.3), in chamber tomb 15, Mycenae (measurements A: length: 22.5cm; height: 6–7.7cm; measurements B: length: 17.3cm; height: 8cm), and finally in chamber tomb 69, Mycenae (measurements A: length: 45.6cm; height: 5.5cm; measurements B: length: 4.8cm; height: 5.9cm).<sup>881</sup> As typical for Greek body armour, they all have a row of small holes running along the rim, most likely used for fixing the organic lining. These fragments probably belong to the lower part of a panoply similar to that from Dendra.<sup>882</sup> One of the band-sheets from chamber tomb 69 is gilded, whilst the other is curved and appears to be part of a girdle. The band sheets have been interpreted as

<sup>878</sup> Cf. Mödlinger 2014b, 26.

<sup>879</sup> v. Merhart noted one cuirass he saw in the previous Reiling collection: v. Merhart 1969, 153, note 4.

<sup>880</sup> Andrikou 2007, 403; Mödlinger 2014b, 6, 27.

<sup>881</sup> Yalouris 1960, suppl. 25.3.

<sup>882</sup> Verdelis 1967, 22.

belts, breast shields or mitra, but the similarities with the lighter and smaller band-sheets of the Theban cuirasses is striking. We might also connect them with ‘things hung or attached above’ (*o-pa-wo-ta*) from the Linear B tablets.<sup>883</sup> A LH IIIA–IIIB2 (c 1370–1250BC) tholos tomb at Nichoria contained 117 fragments of bronze plate,<sup>884</sup> which might also belong to segmental armour similar to the panoplies from Dendra and Thebes. Some of the fragments have rolled edges and along the rim a line of small, punched holes some 1.2–2mm diameter. Other fragments have slightly larger holes further away from the rim. Bronze wire from the same grave was probably used to join together the breast and back plate. Also in the grave were four staples of plain, concave and convex bronze sheet (each approx. 4.5 × 3cm), which might also belong to the armour, since they have the same thickness as the sheets of body armour. Another fragment, which might belong to a neck guard, has a rolled edge. The major part of these fragments bears small holes along the edge for the application of an organic lining, while some have larger holes for attaching the plates to one another.

The associated deposit from Winklsaß, Germany, was found in 1911. The associated deposit itself was covered by 35 bronze ingots, beneath which were found pins, necklaces, arm-rings, foot-rings, belt-hooks, parts of fibulae, a piece of a sword blade, four fragments of spearhead, one complete and 36 fragments of sickle, seven axe fragments, a razor, fragments of knives and daggers, one ingot, ten bronze sheets belonging to a cauldron or bucket,<sup>885</sup> and a greave (cat. no. 229). The potential cuirass fragment, a bronze sheet, was folded over twice.<sup>886</sup> During restoration the fragment was unfolded and subsequently broke into three pieces. Previously, the fragment had been interpreted as a part of a vessel;<sup>887</sup> Müller-Karpe was doubtful of this but offered no alternative suggestion.<sup>888</sup> Schauer, however, suggested that it might be a fragment of a cuirass<sup>889</sup> but did not mention it in further publications or include it on distribution maps. Nevertheless, the lines of pellets, the wire and the thickness of the bronze sheet, all support its interpretation as being from a cuirass. The rim is bent around a 3mm thick wire. On the right, a convex decorative rivet is present, and above it, two torn-out rivet holes at the same height are visible, though these might be the result of antique restoration.<sup>890</sup> Vertical hammering traces are visible on the inside of the bronze sheet. Two lines of pellets parallel to the rim are similar to that found on the cuirass from the Danube. R.-M. Weiss suggests that the greave and cuirass fragment belong to the same set of body armour on the basis of similarities in their decoration.<sup>891</sup> In which case, the weapons from the associated deposit might also have been part of the same equipment.

In 1953 a late Mycenaean chamber tomb was discovered by a farmer in Kallithea. In chamber tomb A, the bones, presumably from a male, were reburied in a small pit in the back of the tomb. The second burial, another male, was buried in the shaft grave, which had originally belonged to the first burial. The grave contained ceramics (primarily *oinochoe*), a spearhead, a Naue II sword, and fragments of two greaves, which were placed on the legs of the second burial (cat. no. 199–200). The fragments in question preserved are bronze strips (24/27/17cm × 2.2/3cm), which are decorated with double ridges on both edges. In the centre, nails were driven through; they still seem to be straight and unbent.<sup>892</sup> Catling interpreted these fragments as from a precursor of the cuirasses from Fillinges.<sup>893</sup> This has previously been questioned by Clausing, who noted that there are no similarities between them.<sup>894</sup> As the recent find of a head-

<sup>883</sup> Andrikou 2007, 403.

<sup>884</sup> McDonald – Wilkie 1992.

<sup>885</sup> Gerloff 2010, 193.

<sup>886</sup> Weiss 1998, 537–538, fig. 2.

<sup>887</sup> Holste 1936, 2, 14.

<sup>888</sup> Müller-Karpe 1959, 285.

<sup>889</sup> Schauer 1982b, 134.

<sup>890</sup> Weiss 1998, 538.

<sup>891</sup> Weiss 1998, 545, note 82.

<sup>892</sup> Yalouris 1960, suppl. 29, figs. 1–2.

<sup>893</sup> After Schauer 1982a, 344.

<sup>894</sup> Clausing 1996, 429, note 31.

gear from the tholos-grave at Praisos-Foutoula, which is dated to c. 1200 BC,<sup>895</sup> showed, these fragments from Kallithea, but also similar fragments from Lakkithra, belong to the same type of tiara-like head protection.<sup>896</sup>

The Hungarian associated deposit from Szentgáloskér contained, besides a range of other bronzes, four small, rather thin bronze sheets of 0.2mm thickness, which are wrongly interpreted as fragments of cuirass (Fig. 3.14).<sup>897</sup> The four fragments form a band which has on one side a line of small, punched-through holes and on the other side an embossed rib with 7mm width parallel to the edge.<sup>898</sup> The biggest fragment bears on one side a small, thin bronze band. This band is decorated along the rim with a line of pellets and was riveted on with tiny, round headed rivets. On the back of the larger fragment, the bronze band was not riveted onto the fragment all the way along but overlaps with the straight edged fragment, forming a bow, indicating that there was a further piece of bronze riveted on but which is now missing. There are no similarities between these fragments and other known cuirasses to suggest what part of the armour the thin Szentgáloskér fragments might once have represented.<sup>899</sup>



Fig. 3.14 The fragments from the associated deposit of Szentgáloskér, Hungary, which are usually interpreted as belonging to a cuirass (photograph: M. Mödlinger).

G. v. Merhart noted that he had seen a complete cuirass whilst visiting the Reiling antiques shop in Mainz in 1928 (1969, 153 note 4). This could not have been the unprovenanced cuirass cat. no. 135 as this was bought by the museum 19 years earlier. However, it appears to be very similar to the finds from Fillinges, and v. Merhart assumed it might belong to the same assemblage. No further information on this cuirass is available.

In 1628, nine cuirasses were reported to have been found by a gardener in Rue Vivienne, Paris.<sup>900</sup> The cuirasses were deposited within the old northern riverbed of the Seine on an alluvial cone. The cuirasses were thought to be made for women since they are 'étoient relevées en bosse et arondies sur l'un et l'autre côté de l'estomac'.<sup>901</sup> Nothing is known from the cuirasses today, nor does any depiction or drawing exist, a fact already Nossiop complained about in 1864.<sup>902</sup>

The debris in front of the cave of Plérimond, France, contained amongst other objects, a pair of greaves, a further third single greave, a horse harness, phalerae, spear-heads, a Type Certosa

<sup>895</sup> Deger-Jalkotzy 2006, 714.

<sup>896</sup> See also Chapter 2.1.5.

<sup>897</sup> E.g. Paulík 1968, 50; Mozsolics 1985, 195; Jankovits 1999/2000, 195. Petres – Jankovits 2014, 60 suggest the fragment was from a cuirass, specifically deriving from the neck protection, such as that from Hesselberg. In fig. 15.1 the fragment is again named as a 'cuirass fragment' – as two fragments from helmets of Type Paks from Nadap (cat. no. 27).

<sup>898</sup> This rib is not visible in previous drawings but is clearly identifiable in Mozsolics 1985, pl. 115.6, 9.

<sup>899</sup> Mödlinger 2014b, 29.

<sup>900</sup> Bulard 2008.

<sup>901</sup> Poullain de Saintfoix 1763, 348.

<sup>902</sup> Nossiop 1864.

fibula, and a possible cuirass fragment.<sup>903</sup> The associated deposit is dated to the 6<sup>th</sup> century BC. Schauer noted a further potential cuirass fragment from Grésine, France.<sup>904</sup> The fragment bears *Ringbuckel* and the semicircular bent bands of points and bosses. Nevertheless, since no cuirass with similar decoration is known, this fragment is more likely from another type of object.

Schauer also mentions a fragment of a possible cuirass from the associated deposit of Cannes-Écluse.<sup>905</sup> He did not describe it explicitly nor refer to any specific drawing of the fragment. Most likely he was referring to the fragment described by Gerloff,<sup>906</sup> which is more probably from a vessel. Schauer also noted 16 fragments with rivets from Abensberg, Germany, which might also belong to cuirasses.<sup>907</sup> The find circumstances of these fragments, however, are not secure, unlike the finds with which they are compared (e.g. Welzelach, Austria, or Châlans, France) by the authors.

The Ha B1 associated deposit from Pfeffingen, Germany, contained three fragments, decorated with ribs and bosses. On one side of the fragments, the rim is bent around a bronze or copper wire. These fragments have also been interpreted as belonging to a cuirass.<sup>908</sup> Two holes right above the rim, however, would be quite unusual for a cuirass.

A fragment from the Heunischenburg, Germany, was interpreted as coming from a cuirass,<sup>909</sup> though it might also be from a vessel. French cuirasses do not have three parallel lines of large bosses but only two. If there are three lines, they are separated from each other by decoration, such as a line of pellets, and the lines are positioned further apart from each other.

Jankovits interpreted two deformed and probably fire-exposed bronze sheet fragments from a grave from Farkasgyepű, Hungary, as fragments of a cuirass.<sup>910</sup> The fragments are today stored at the Veszprémi Bakonyi Múzeum (inv. no. 1955.117.8–9). The bronze sheets have on one side holes running parallel to the edge. Beneath these, another small bronze sheet was attached with three rivets. Despite these characteristics, the thickness of the bronze sheets, of 0.1–0.2mm, does not support their interpretation as belonging to a cuirass.

When the Croatian Period II associated deposits from Podcrkavlje (found in 1962 at Dvorišta) and Slavonski Brod (found at Biliš) were brought to the Archaeological Museum of Zagreb in 1868, they were probably mixed together. The (new) associated deposit consisted of 277 objects, as well as two potential fragments of a cuirass or shield.<sup>911</sup> The fragments were broken before deposition and fit together. The rim is bent around a wire. Around 3cm above the rim, four bosses with a diameter of c. 0.7cm were applied parallel to the rim. It seems that above these bosses, a (rivet?) hole was applied. The resemblance with other known cuirasses, however, is slim.

The associated deposit from Pila del Brancon, Italy, was found 1.5km to the south of the Middle Bronze Age cemetery of Olmo in 1993.<sup>912</sup> It is possible that the deposit has not yet been completely recorded. At present, it consists of 51 largely complete or fragmented spearheads, 12 complete or fragmented swords (Types Allerona, Cetona and Arco), two daggers (Type Santa Agata and Pertosa), one fragment of a winged axe, 73 bronze sheet fragments, comprising both thin sheeting of unknown object Type and thicker fragments of vessels, and nails. The objects were intentionally destroyed by bending, breaking and exposure to fire. The objects date to *bronzo medio*, *recente* and *finale*. Jankovits tried to reconstruct a cuirass from the bronze sheets (mainly inv. no. IG VR 266.650 and IG VR 26.603).<sup>913</sup> However, we believe that the evidence is

<sup>903</sup> Schauer 1982d, 130, note 122; Boyer 2000; Boyer et al. 2006.

<sup>904</sup> Schauer 1982d, 129, fig. 13; after Deonna 1934b.

<sup>905</sup> Schauer 1982a, fig. 1.7; Schauer 1982b, 133.

<sup>906</sup> Gerloff 2010, no 28.

<sup>907</sup> Rind – Schauer 1997, 118, fig. 64.1–16.

<sup>908</sup> Stein 1979, 118–119, pl. 94.6; Seidl 1995, 108; Sperber 2011, 24.

<sup>909</sup> Weiss 1998, 545, fig. 7.1.

<sup>910</sup> Jankovits 1992, 37, 70–71, fig. 30; Jankovits 1999/2000, 195. The same again in Petres – Jankovits 2014.

<sup>911</sup> Potential fragment of a cuirass or shield (inv. nos. 3729–3730); after Holste 1951, 6, pl 8.29; Vinski-Gasparini 1973, 217, pls. 66–68.

<sup>912</sup> Salzani 1994; Salzani 1998.

<sup>913</sup> Jankovits 1999/2000, 189.



insufficient to base such a reconstruction: the fragments are too thin, too inhomogeneous and the rivets are too long for the metal sheets alone. Thus, they must have been fixed onto an organic backing on the inside as well.

Novotný noted the discovery of another possible cuirass fragment from Šulekovo, Slovakia. The fragment was found along with a bronze sword and other objects in a grave before 1880; the finds cannot be located in the museum today.<sup>914</sup>

In 2015, excavations by the University of Cincinnati (Jack L. Davis and Sharon R. Stocker) brought to light one of the richest warrior shaft graves of recent times at Pylos, Greece. The grave is significant for not having been robbed. The warrior was buried around 1500 BC with a sword with ivory hilt clad in gold, a gold-hilted dagger, a spearhead, gold jewellery, and about 50 stone seals. Bronze, silver and gold cups, a bronze mirror, six ivory combs, and an ivory plaque carved with a griffin. No pottery was placed in the grave. The warrior wore a boar tusk helmet. Thin bands of bronze atop the coffin might also have been part of the warrior's body armour. Analysis of the find is ongoing and awaits publication.

### 3.7 Construction

The construction principles (Figs. 3.15–17) for each of the three main groups of cuirasses – Greek, Carpathian, and western European – differs according to their distribution, chronology and decoration.

The construction of the Dendra panoply has elsewhere been described in meticulous form<sup>915</sup> and therefore need not be repeated in detail. The panoply consists of 15 bronze sheets:

1. one breast plate (41 × 46cm) and one back plate (52 × 55cm)
2. two triangular metal sheets (c. 9 × 18cm) placed over the breast plate to protect the chest
3. two shoulder protectors which both have an additional metal sheet to protect the upper arm (54 × 8cm on the right, 47.5 × 8cm on the left side)
4. the neck guard (height 8–15cm; diameter at the top 28.5cm; base diameter 21 × 24cm)
5. three bronze bands attached to the breast plate, and three bronze bands attached to the back plate (64–76.5 × 15–17.3cm)

Each of these bronze sheets has small holes of c. 2mm diameter positioned every 2–2.5cm all along the edge. These holes served to attach an organic lining, as the remnants of threads within the holes, and fragments of leather inside the breast and back plate, attest.<sup>916</sup> The lining was bent around the metal edge and fixed on both sides, thus preventing the warrior from cutting himself on the sharp edges of the metal sheets. Where the edge of the metal sheets is not bent outside, it was partly protected by an 8mm wide bronze band. The breast plate and the longer back plate were joined together at the shoulder by a loop, which was riveted onto the breast plate. The loop passed through a rectangular hole on the back plate and was fixed in place by passing a nail through the loop (Fig. 3.16). The back plates overlapped with the breast plate by at least 3cm at the sides in order to ease fastening. A metal bar fixed on the back plate on its left side held the plates together. The bar reaches from the armpits to the pelvis and can be inserted into a range of three rings, which are attached to the breast plate.<sup>917</sup> Thus, the cuirass was flexible on the left side, easing dressing, and closed on the right side. On the right side, the same loop-system as on the shoulders was used to close the cuirass.

The shoulder plates are slightly bent outwards from the body of the warrior but where the protective bands for the upper arm were fixed, the edges of the shoulder plates remained straight. A metal ring of 1.2cm diameter is riveted onto the top of the right shoulder plate. It might have served to fasten a strap for a sword or shield. The shoulder plates were fixed most likely on the

<sup>914</sup> Novotný 1966, 33.

<sup>915</sup> Verdelis 1967, 8–18.

<sup>916</sup> Verdelis 1967, 8.

<sup>917</sup> Verdelis 1967, fig. 5.



Fig. 3.15 Different ways of fixing the breast and back plate together on the right side: Saint-Germain-du-Plain (above left), Marmesse (below left) and Dendra (right) (above left: photograph M. Uckelmann, by courtesy of the Musée d'Archéologie nationale et Domaine national de Saint-Germain-en-Laye; below left: photograph A. Chauvet (C2RMF), by courtesy of the Musée d'Archéologie nationale et Domaine national de Saint-Germain-en-Laye; right: after Verdélis 1967, fig. 4).

breast plate only, since no larger holes are found on the back plate.<sup>918</sup> The arm plates were attached to the shoulder plates with threads, which would have passed through five holes on each side. The arm plates widen in the centre, and at the end have a rather pointed shape. The edge close to the arms is bent outwards, while the edge towards the shoulder plates is straight.

The two triangular breast plates were attached to the shoulder plates by rings passing through three pairs of holes on each plate.<sup>919</sup> The ends of the bronze sheet, which form the neck guard, are riveted together. Both upper and lower edge of the bronze sheet are bent outside in order to reduce the risk danger to the neck. No holes are found which might serve to fix the neck guard with leather strips, and instead, it was most likely clipped over the bent rims of both the breast and back plate. The protective band below the breast and back plate was attached to them with threads or strips, since they do not always match perfectly on each side. The threads or strips passed through three pairs of holes (c. 4mm of diameter) on the lower part of the breast and back plates on the left, in the middle and on the right. The bands are joined together in a similar way. Remnants of the leather bands or strips holding the bronze sheet bands together are still preserved. The wider bronze sheet bands are placed towards the bottom of the panoply.

The panoply from the arsenal at Thebes consisted of similar elements.<sup>920</sup> Its breast and back plate, however, are of equal length. Unlike the Dendra panoply, the edges of the different parts of the arsenal panoply (cuirass, shoulder guards and arm guards) are plain, and not rolled aside. The damaged panoply from the arsenal consists of:

1. one breast plate and one back plate
2. two triangular breast plates (length 27.7cm)

<sup>918</sup> Cf. Mödlinger 2014b, 32.

<sup>919</sup> Verdélis 1967, 16.

<sup>920</sup> Verdélis 1967, 21.

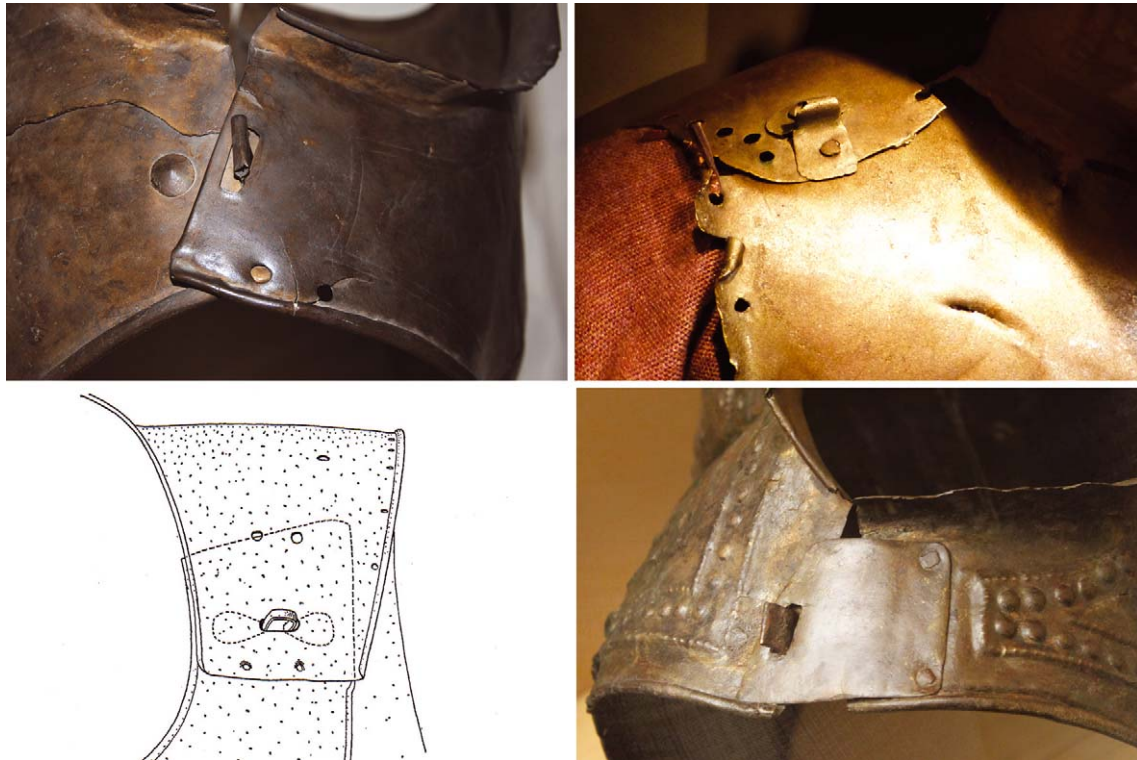


Fig. 3.16 Different ways of joining breast and back plate on the right shoulder: Dendra (bottom left), Saint-Germain-du-Plain (upper left), Danube (upper right) and Marmesse (bottom right) (bottom left: after Verdélis 1967, fig. 3; upper left: photograph M. Uckelmann, by courtesy of the Musée d'Archéologie nationale et Domaine national de Saint-Germain-en-Laye; upper right: photograph M. Mödlinger, by courtesy of the Magyar Nemzeti Múzeum Budapest; bottom right: photograph A. Chauvet (C2RMF), by courtesy of the Musée d'Archéologie nationale et domaine national de Saint-Germain-en-Laye).

3. two shoulder pieces (13.6 × 21.5cm and 14 × 19.5cm)
4. two arm plates (length 40cm)
5. 44 fragments of bronze sheet bands

The shoulder plates do not have the wide 'wings' which cover the Dendra panoply at the chest and back. The two triangular breast plates have a series of small holes (approx. 2mm in diameter) all along the edge (no larger holes to connect them with the cuirass are present). The arm protectors were attached to the shoulder guards with organic threads or strips, which passed through larger holes on the parts to be joined together. The arm protectors have a row of small holes along the edges which serve to fix organic parts onto the bronze sheets. Along with the panoply, a further 44 fragments of bronze sheet bands were also recovered. These bronze sheet bands most likely belong to belt fastenings on the cuirass, protecting the lower part of the body.<sup>921</sup> They do not necessarily have to be part of the associated panoply, however, and might have belonged to more than one panoply. All of them bear a row of 2mm holes along the edge. These bronze sheet bands are significantly smaller than the ones from the Dendra panoply. Some of the bigger fragments have larger holes, as seen on the upper arm plates, where organic threads passed through to connect the bronze sheet bands to other bronze sheets.

The panoply from the Municipal Conference Center, Thebes, is constructed in a similar way to the two other Greek panoplies. Though incomplete, we can still identify the main construction elements: the breast and longer back plate are fastened by two double-headed nails on the left side. On the right side there is a riveted loop on the breast plate, which passed through an elongated hole in the back plate to join the two plates together. These two plates would have

<sup>921</sup> Andrikou 2007, 402.

only been joined together once the cuirass was put on by the warrior.<sup>922</sup> The attachment of an organic lining is indicated by the small holes arranged all along the straight and unrolled edges of the plates. Larger holes occurring as pairs or in threes along the lower edge served for attaching the bronze sheet-bands below the cuirass. A fragment of a shoulder guard and one (triangular?) breast plate clearly indicate its close affinity with the Dendra panoply.<sup>923</sup>

Due to their state of preservation and the common occurrence of cuirasses as merely fragments, only the Carpathian cuirasses from Saint-Germain-du-Plain, the Danube and the fragments from Čierna nad Tisou will be discussed in the following.

The breast and back plates of the cuirass from Saint-Germain-du-Plain are joined permanently by four conical headed rivets on the left side (one of which is now missing), and one rivet on the left shoulder (also now missing). The rivet holes were punched through from the outside to the inside. The breast plate has a rectangular hole on the right shoulder to allow the wearer to grab the upwards-bent metal sheet, which is attached to the inside of the back plate with a conical headed rivet, in order to join the two plates together on the right side (Fig. 3.16).<sup>924</sup> At the edge of the breast plate, centrally located on the right side, a bronze sheet with a central, rectangular hole was riveted on. Through this hole, another loop-shaped bronze band could be passed and be fixed by means of a dowel passed through the loop (Fig. 3.15). This bronze loop-band was riveted onto the back plate with a slightly conical headed rivet. Under the right armpit of the breast plate we see an additional rivet hole of yet unknown function (which perhaps served for a cord which fixed the dowel in place). The edges of both breast and back plate (arms, neck and base) were bent over a wire made of rolled bronze or copper sheet. Vertical hammering traces are visible all over the inside of the neck and body of the cuirass. Several cracks present can be connected to the massive material deformation that the bronze sheets would have undergone during manufacture, as well as significant material stresses suffered during its subsequent use. Decorative elements were applied only on the breast plate, and different techniques on both the front (chevrons by chasing) and the back (e.g. ribs with repoussé) were used. The edges of the ribs on the front side of the breast plate were also further accented with a chisel.

The breast and back plate of the Danube cuirass were attached together by means of four rivets on the left side (if we assume that the upper and the lowest holes served for the attachment of an organic lining only), as seen on the likely contemporary cuirasses from Saint-Germain-du-Plain and Čierna nad Tisou. On the left shoulder the plates were riveted together by means of single rivet, now lost, while on the right shoulder a simple loop riveted onto the back plate was an adequate means of attachment, passing through a hole on the breast plate and then secured with a nail, as known from the Dendra panoply and on the cuirass from the Municipal Conference Center plot in Thebes. The rivets used on the Danube cuirass are plain, unlike the conical headed rivets, e.g. as on the cuirasses from Saint-Germain-du-Plain and Čierna nad Tisou. The edges of the breast and back plate are not reinforced with metal bands as found on the cuirasses from Čaka and Pázmándfalu, nor bent as on the Dendra panoply. A rolling of the edge around a bronze or copper wire, as found on most of the Carpathian and western cuirasses, is also not found. The edges are left straight, with only the neck guard being slightly bent outward. This neck protection is, compared to the other Carpathian and western cuirasses, astonishingly high and resembles much more closely that found on the Dendra armour, though not as a separate part. All along the edges (rivet?) holes are applied; they have a distance from each other of 4–6cm, a diameter of 4–5mm, and were punched through from the outside to the inside. Since the attachment of further bronze sheet elements by means of so many rivets does not seem likely, it is more probable that they served to attach an organic lining. The attachment of an organic lining with rivets inside the cuirass is similar to that on contemporary helmets. On the latter, and perhaps also on the cuirass as well, the organic inlay or lining was bent over the edge of the bronze sheet and riveted on both sides of the bronze sheet. The decoration was applied from the

<sup>922</sup> Cf. Mödlinger 2014b.

<sup>923</sup> Andrikou 2007, 402.

<sup>924</sup> Cf. Mödlinger 2014b.

inside of the cuirass with only two different sized punches: the pellet decoration (lines, circles, bows) was applied with a small circular punch, while the larger central boss located inside the four circles was applied with a bigger, round punch.

Four conical headed rivets located on the left side permanently fixed the breast and the back plate of the cuirass from Čierna nad Tisou. Apart a few fragments remaining around the rivets, nothing more is preserved of the breast plate. Around the rivets, fragments of one complete rectangular lining disc is preserved (Fig. 3.17). No original edging of the cuirass survives, and therefore it is unclear if the rim was rolled, bent or reinforced with riveted metal bands as known from Čaka and Pázmándfalu. A slightly bent edge, close to the original rim, does seem to suggest a rolled rim. As on the cuirass from Saint-Germain-du-Plain, the cuirass from Čierna nad Tisou has hammer traces on the inside of the back plate. Moreover, slight vertical hammering traces can also be seen on the outside of the cuirass. Since the breast plate is not preserved, we can say little about the decoration of the cuirass. However, the back plate is decorated with two c. 4mm wide ribs running parallel to the base and the armpits. The ribs were applied from the back with repoussé and their outline defined with a chisel (chasing), as already noted on the cuirass from Saint-Germain-du-Plain.



Fig. 3.17 Inside view of the left side of two cuirasses: Marmesse inv. no. 83.757 (left) and Čierna nad Tisou, Slovakia (right). Note the lining discs used for both cuirasses (left: photograph A. Chauvet (C2RMF), by courtesy of the Musée d'Archéologie nationale et Domaine national de Saint-Germain-en-Laye; right: photograph: M. Mödlinger).

Since they survive only in either a heavily fragmented state or as single fragments only, not much can be said about the construction of the other Carpathian Cuirasses. The Nadap fragment was bent around a bronze or copper wire, as was the Ivančice fragment, though no wire survives. Both fragments are decorated with two ribs parallel to the rolled edge. The ribs were applied using repoussé. The Ivančice fragment has a defined outline of the decoration, the same as on the Saint-Germain-du-Plain and Čierna nad Tisou cuirasses, which was applied with a chisel on the outside of the cuirass. On the inside of the fragment, hammering traces are visible, and on the outside, vertical polishing traces were detected. The wire from the inside is currently

undergoing analysis.<sup>925</sup> Due to its fragmentary character and the lack of any original edge, the construction of the cuirass from Ducové cannot be reconstructed. The decoration on the chest was applied with the edge of a chisel on the outside of the breast plate, while the two ribs were applied from the inside (*repoussé*), and their outline defined with a chisel (*chasing*), as already noted for other Carpathian cuirasses. Additionally, small pellet decoration was applied from the back inside the ribs.<sup>926</sup>

The cuirass from Čaka is, having undergone firing as part of a cremation rite, severely fragmented and incomplete. Most of the fragments without rim cannot be definitively associated with either the cuirass or the other objects which occur in the deposit. Nevertheless, aspects of the decoration (two ribs parallel to the armpit were applied using the *repoussé* technique), and the reinforcement of the edge, can be reconstructed: on the edge of (presumably both) breast and back plate a separate, straight (and never curved) bronze band was riveted on. The bands have a serrated edge with the points directed toward the centre of the cuirass and are decorated with lines of small pellets. Two different sized band types are noted, which were attached to two different edges of the bronze plate, as indicated by a corner fragment. On none of the bands is there any surviving indication as to how the breast and back plate were joined (such as rivet holes or an opening for the bronze loop on the right side, etc.). It therefore remains unclear how breast and back plate were joined. Comparing the fragments from Čaka with the new find from Pázmándfalu, no serrated bronze sheet decoration is found on the left side of the cuirass, and it seems highly likely then that the corner fragment derives either from the right lower edge of the breast plate (on the back plate the decoration would not be visible, since the back plate was usually fixed underneath the breast plate) or from the shoulder/neck area of the breast plate.<sup>927</sup> In the same style as the bands, two star-like, serrated discs were riveted onto the breast plate above the nipples. The discs were riveted onto the breast plate with small rivets placed at each ‘point’ of the star.

Edge fragments with one parallel rib and outwards rolled rim were also associated with the cuirass. Since these fragments are straight and not curved, they cannot derive from the opening for the arms (for a comparison, see also the fragments from Pázmándfalu, where the rim of the plates around the arms were decorated with a serrated bronze sheet), nor can they derive from the base or side of the breast or back plate, since these show the attached, decorated bronze bands. Also, the ribs on these edge fragments are far bigger than the ribs on the breast plate (on the cuirass from Saint-Germain-du-Plain all the ribs have the same width). The line of small holes all along the edge of the fragments did not serve for attaching a decorative band with serrated edge (this would need also a second line of small holes). More likely, they served to attach an inner lining, similar to the Greek cuirasses, if these fragments do indeed belong to a cuirass.

The fragments from the recent find from Pázmándfalu closely resemble the cuirass fragments from Čaka.<sup>928</sup> Unfortunately, only fragments from the rim survived. The decorative band with serrated side was attached with only one line of rivets, as was the edge of the armpits, parallel to the two embossed ribs. The ribs were applied in the same manner as on all other Carpathian cuirasses. Since all cuirasses are joined permanently on the left side, the Pázmándfalu fragments from breast and back plate, riveted together with slightly conical headed rivets, also most likely derive from the left side of the cuirass. As on the Čaka fragments, there are also two different thicknesses of serrated bronze sheet, with the thicker sheets having most likely been applied to the base of the cuirass, whilst the thinner bands served as reinforcement at the armpits and eventually on the shoulders, as the rectangular fragment with a riveted decorative band indicates.<sup>929</sup>

<sup>925</sup> Richtera et al. forthcoming.

<sup>926</sup> Cf. Mödlinger 2014b, 35.

<sup>927</sup> Cf. Mödlinger 2014b, 36.

<sup>928</sup> Gábor Szabó was so kind to show the author photographs of the fragments.

<sup>929</sup> Cf. Mödlinger 2014b, 36.

Mottier and Schauer already described in detail the construction of the cuirasses of Fillinges.<sup>930</sup> To avoid too much repetition, in the following only the main aspects of the assembly of the cuirasses will be discussed. Both breast and back plate are thinner toward the centre (chest, spine: 0.7–0.8mm) than on the edge (1–1.1mm).<sup>931</sup> The rim of both plates is bent outwards around a 2–2.5mm thick, round wire. The plates are joined together on the left side with five to six conical headed rivets. Breast and back plate were joined together on the left shoulder either by rivets or by bronze sheet bands which were riveted onto the back plate and passed through a rectangular hole on the breast plate.

Abstracted breast muscles are depicted by means of decoration on the front plate; on the back plate, the back bone is indicated by a massive, convex rib, which would also have increased the stability of the bronze sheet. Hammering traces are not only visible on the inside of the armour plates but also on the outside of most of the plates as well. The unprovenanced cuirass cat. no. 135 shows mainly horizontal hammering traces. This cuirass also closely resembles the cuirasses from Fillinges in its construction methods. It differs only in having a row of small, punched through holes all along the armpits, which most likely served for the application of the inner organic lining.<sup>932</sup> The cuirasses, as indicated by one of the examples from Fillinges, were decorated with different sized punches from the inside (*repoussé*). Since on some of the bosses the imprint of a ring is visible, we can infer the use of a ring die. The sketch of the decorative design, which was marked out with thin scratches on the inside of the cuirasses, is still visible. Such sketches are also known from the greaves as well (Fig. 4.12).

The Marmesse cuirasses have a very similar construction to the Fillinges cuirasses: breast and back plate were joined together permanently on the left side by four or five conical headed rivets with lining discs. Another conical headed rivet fixed the two plates together on the left shoulder. A central rectangular hole on the right shoulder fixes a metal band, which was riveted onto the back plate, and passed through the hole. The edges of the cuirasses are bent outside around a bronze or copper wire. Inside the cuirasses, traces of straight hammering are visible, being mainly vertical on the lower parts and horizontal on the upper parts between the shoulders. In the application of the decoration, two different sized round punches were used. Radiographs of some of the Marmesse cuirasses (e. g. cat. no. 148) revealed several cracks which had formed as a result of the high tension the metal underwent during the deformation process, and which were enlarged by corrosion over the years.<sup>933</sup>

As on all other cuirasses, the breast and back plates on the cuirass Jura A (cat. no. 137) were joined together on the left side. Both plates were riveted together by six conical headed rivets on the side and by two rivets on the shoulder. The back plate is placed under the breast plate but is not completely preserved and nor is the right shoulder. On the right side of the cuirass, the breast plate bears a central, rectangular hole. This served to fix a metal band which was riveted to the back plate. Further pairs of holes at the top and bottom of the right side of the cuirass served most likely for the additional securing of the plates, perhaps with leather bands. The decoration of the cuirass was applied from the rear of the bronze plates with four different sized round punches (*repoussé*).

Though the cuirass Jura B (cat. no. 138) differs in terms of decoration from the cuirass Jura A, it does not differ significantly in its construction method. The breast and back plate are fixed by conical headed rivets on the left side (five in total). At the centre of the right side of the breast plate, a rectangular hole (today ripped open) was used to fix a metal band, which was riveted onto the back plate. The left shoulder of the cuirass is not preserved. Also, only parts of the back plate survive on the right shoulder. In the centre of the shoulder a bronze band was attached with a conical headed rivet and bent around the edge, forming a flat loop, and then

<sup>930</sup> Schauer 1982d; Mottier 1988.

<sup>931</sup> Schauer 1982d, 112.

<sup>932</sup> Cf. Mödlinger 2014b, 36.

<sup>933</sup> Puniet – Balcar 2000.

bent backwards towards the inside of the back plate.<sup>934</sup> The rim of the breast and back plate (arms, neck, base) is rolled around a bronze or copper wire. The rib decoration right under the neck on the breast plate bears two punched-through holes, which most likely are connected to the restoration of the cuirass. Since all rivet holes on the left side are torn out but still present on the breast plate, the cuirass probably suffered significant damage during excavation. The decoration on the cuirass was mainly applied using three different sized, round punches from the inside of the plates (*repoussé*). Only one punch was used to form the ribs – most likely with the help of a die. Due to the high level of corrosion, no hammering traces are visible.

The unprovenanced cuirass cat. no. 136 differs significantly in its construction from the other Bronze Age cuirasses. Its breast and back plate are fastened to the shoulders by two hinges. Close to the rim of the breast plate and on each shoulder, a bronze sheet with the hinges attached was riveted on. Seven rivet holes along the neckline indicate the attachment of now missing decorative elements, with the three central rivet holes exhibiting different corrosion products in a circular shape, which might be the result of formerly riveted on organic or metal discs.<sup>935</sup> The cuirass had to be put on over the shoulders and was then fixed with organic strips on both sides, which passed through six holes on each side of the plate. The rim of both the breast and back plate is bent inwards, though the presence of a bronze or copper wire here is unclear. The decoration was applied from the inside with two different sized round punches.

### 3.8 Analyses

Until now, only a few Bronze Age cuirasses have been chemically analysed or undergone microstructure detection. These include the cuirasses from Čierna nad Tisou and Čaka, some of the breast and back plates from the Marmesse cuirasses, the two cuirasses from Jura, and the Dendra panoply, as well as the potential cuirass fragment from Winklsaß. Also, the cuirass miniature from Brandgraben underwent chemical characterisation.<sup>936</sup> Tab. 3.4 presents an overview of those analyses so far published for Bronze Age European cuirasses.<sup>937</sup>

The majority of the cuirasses analysed consist of binary copper-tin alloys. Only the back plates from the Marmesse cuirasses (cat. nos. 146 and 151) contain more than 3–4 wt.% Pb. The Sn amount ranges usually from 6.5–11 wt.%, with only the Dendra panoply reaching up to 12.6 wt.% Sn. Wire and rivets were studied only on the cuirasses from Jura, and their Sn amount ranges from 1.3–2.6 wt.%. According to the different analytical methods used, trace elements such as Ag, As, Ni, Sb, Pb, S, Zn and Fe were detected. These elements are connected with the copper ore.

Whilst on most of the cuirasses quantitative analyses were carried out, the Dendra panoply was analysed only qualitatively, on corroded surfaces, using a handheld XRF.<sup>938</sup> Copper chlorides, such as atacamite, nantocite, and paratacamite, as well as copper carbonates (azurite, malachite), tin oxides (cassiterite), and calcite (most likely due to the soil), were detected. After the removal of corrosion, the metallic surface was analysed again with the handheld XRF. The panoply contains 9.4–12.6 wt.% Sn, which matches the composition of other European armour, though western European cuirasses in general contain lower amounts of Sn. The cuirass and the neck guard from the Dendra panoply seem to be made of the same alloy. The triangular chest protection and the left shoulder protection were also made of the same alloy, as were the right shoulder protection and the two bronze sheet bands nos. 5 and 6 (see Tab. 3.4). Since several parts of the panoply were made of the same alloy, we can assume that the panoply was pro-

<sup>934</sup> Cf. Mödlinger 2014b, 37.

<sup>935</sup> Cf. Mödlinger 2014b, 37.

<sup>936</sup> Michel – Mohen 1970 (Jura A and B); Weiss 1998 (Winklsaß); Sofou – Katsarou-Moschona 2006 (Dendra panoply); Lehoërff 2008 (Marmesse); Taratori et al. 2008 (Dendra panoply); Mödlinger 2014b (Čierna nad Tisou, Čaka, Brandgraben).

<sup>937</sup> For the detection method of the metallographic analyses and alloy composition via SEM-EDXS see Chapter 2.3.

<sup>938</sup> Taratori et al. 2008, tab. 2.



| Find Spot            | Sample                       | Location     | Inv. No.          | Cu    | Sn         | Pb   | Sb    | As  | S        | Fe  | Zn   | Ni    | Ag    | Co    | Se | Mn   | Analytical Method |  |
|----------------------|------------------------------|--------------|-------------------|-------|------------|------|-------|-----|----------|-----|------|-------|-------|-------|----|------|-------------------|--|
| Marmesse, France     | P1                           | back plate   | 86.197            | ± 91  | +/- 8.5    | 4    |       |     | ± 0.2    |     |      |       |       |       |    |      |                   |  |
|                      | P2                           | breast plate |                   | 89    | 10.8       |      |       |     | ± 0.2    |     |      |       |       |       |    |      |                   |  |
|                      | P3                           | breast plate |                   | 88-89 | 10-11      |      |       |     | ± 0.2    |     |      |       |       |       |    |      |                   |  |
|                      | P10                          | back plate   | 83.753            | ± 91  | ± 8        | 3    |       |     | ± 0.2    |     |      |       |       |       |    |      |                   |  |
|                      | P8                           | back plate   | 83.754            | 90-91 | 9-10       |      |       |     |          |     |      |       | ± 0.1 | ± 0.9 |    |      | SEM (1)           |  |
|                      | P5                           | breast plate | 83.756            | 92    | 7.5        |      |       |     | 0.25-0.3 |     |      |       |       |       |    |      |                   |  |
|                      | P6                           | back plate   |                   | ± 91  | ± 8.5      |      |       |     | 0.3-0.5  |     |      |       |       |       |    |      |                   |  |
|                      | P7                           | breast plate |                   | ± 92  | 8          |      |       |     | 0.2-0.25 |     |      |       |       |       |    |      |                   |  |
|                      | P9                           | back plate   | 83.757            | ± 90  | ± 10       |      |       |     | ± 0.2    |     |      |       |       |       |    |      |                   |  |
|                      | P4                           | back plate   | 83.758            | 93    | 7          |      |       |     |          |     |      |       |       |       |    |      |                   |  |
| Jura A, France       | sheet                        |              |                   | 91.7  | 8.3        |      | <0.22 | tr. |          | tr. |      | <0.22 | tr.   |       |    |      |                   |  |
|                      | rivet                        |              | B 4 (FZ 6711)     | 98.7  | 1.3        |      |       |     |          |     |      |       |       |       |    |      |                   |  |
|                      | wire                         |              |                   | 95.5  | 2.6        |      |       |     |          | 0.6 |      | 1.4   |       |       |    |      | unknown (2)       |  |
| Jura B, France       | sheet                        |              |                   | 92.3  | 6.5        |      | 1.0   | tr. |          | tr. | tr.  | 0.2   | tr.   |       |    |      |                   |  |
|                      | rivet                        |              | Br 1132 (FZ 3683) | 97.4  | 1.5        | tr.  | 0.9   | 0.1 |          | tr. | tr.  | 0.1   | tr.   |       |    |      |                   |  |
|                      | sheet bands (media of 5)     |              |                   | 89.5  | 10.5 ± 0.5 |      |       |     |          | tr. |      |       | tr.   |       |    |      |                   |  |
| Dendra, grave 12     | sheet band no. 5             |              |                   | 88.7  | 11.2 ± 0.6 |      |       |     |          | tr. |      |       | tr.   |       |    |      |                   |  |
|                      | sheet band no. 6             |              |                   | 88.9  | 11.1 ± 0.6 |      |       |     |          | tr. |      |       | tr.   |       |    |      |                   |  |
|                      | cuirass (thorax)             |              |                   | 89.7  | 10.0 ± 0.5 |      |       |     |          | tr. |      |       | tr.   |       |    |      |                   |  |
|                      | shoulder protection (right)  |              |                   | 87.8  | 12.0 ± 0.6 |      |       |     |          | tr. |      |       | tr.   |       |    |      | handheld XRF (3)  |  |
|                      | shoulder protection (left)   |              |                   | 88.9  | 11.0 ± 0.6 |      |       |     |          | tr. |      |       | tr.   |       |    |      |                   |  |
|                      | neck guard                   |              |                   | 89.9  | 9.9 ± 0.5  |      |       |     |          | tr. |      |       | tr.   |       |    |      |                   |  |
|                      | triangular breast protection |              |                   | 87.1  | 12.0 ± 0.6 |      |       |     |          | tr. |      |       | tr.   |       |    |      |                   |  |
| Brandgraben          | drilling sample              | body         | Fdnr. 83          | 79.2  | 18.7       | 0.2  | 0.1   | 0.9 | 0.2      | 0.3 |      | 0.4   | 0.2   | tr.   |    |      |                   |  |
|                      | sheet                        | back plate   | 15/40             | 87.6  | 11.5       | 0.2  |       | 0.3 | 0.1      | tr. | tr.  | 0.2   | 0.1   | tr.   |    |      |                   |  |
| Čierna nad Tisou     | sheet                        | back plate   | I 8. 22025        | 88.8  | 10.5       | 0.2  | 0.1   | 0.2 | tr.      | tr. |      | 0.5   |       |       |    |      | SEM-EDXS (4)      |  |
| Čáka                 | sheet                        | back plate   |                   | 86.8  | 12.5       | 0.1  | tr.   | 0.2 | 0.1      | 0.2 | n.d. | n.d.  | 0.1   | tr.   |    |      |                   |  |
| Šarišské Michal' an  | sheet                        | front plate  |                   | 87.5  | 11.1       | 0.05 | <0.01 | 0.1 |          | 0.9 | 0.02 | 0.28  | 0.03  |       |    | <0.1 | LMA / PGS (5)     |  |
| Danube at Pilismarót | sheet                        | back plate   | 83.22.1-2         | 86.5  | 11.8       | 0.05 | <0.01 | 0.1 |          | 1.0 | 0.03 | 0.42  | 0.04  |       |    | <0.1 |                   |  |

Tab. 3.4 Results of all analyses on the alloy composition carried out on Bronze Age cuirasses so far, including the newly achieved SEM-EDXS data. Analytical method: (1) = Lehoërf 2008 (the analyses were carried out with SEM 'couple à un système d'analyse'); (2) = Michel – Mohen 1970; (3) = Taratóri et al. 2008; (4) = Mödlinger 2014b; (5) Petres – Jankovits 2014 (analyses were carried out with a laser micro-analyser with flat diffraction grid spectrograph) (tr. = traces; n.d. = not detected).

duced at the same time in a single location. This contradicts, at least in the case of the Dendra panoply, the documented practice of providing additional parts of armour for different well-equipped warriors, as described on the linear-B tablets.<sup>939</sup>

The cuirass miniature from Brandgraben has a completely different alloy composition, being a single as-cast object which did not need any further thermal treatment or plastic deformation. The material demands therefore differ significantly from the other, real cuirasses. The miniature contains 18 wt.% Sn, being significantly more Sn than any of the other analysed cuirasses and thus would have also had a different colour.

The cuirasses from Čierna nad Tisou (back plate only), Šarišské Michal'any, and Čaka were sampled.<sup>940</sup> Their alloy composition resembles significantly that of the cuirass from the Danube.<sup>941</sup> Due to the density of inter-crystalline corrosion, which outlined the microstructure, no etching was necessary (Fig. 3.18, above). The cuirass from Šarišské Michal'any shows the highest amount of tin, a low amount of total deformation (about 30%), and a final deformation. The sample also shows tentacle corrosion.<sup>942</sup> The alloy composition of the Čaka cuirass had to be evaluated by means of the analyses of single grains, since the sample showed a high level of corrosion. As a consequence, the actual amounts of each element concentrating preferable at the grain boundaries (such as arsenic or antimony) might actually be higher. Due to the cremation process, the sample showed a complete homogenised microstructure. Therefore, the last step of production, whether it was annealing, hammering or quenching, could not be detected. The

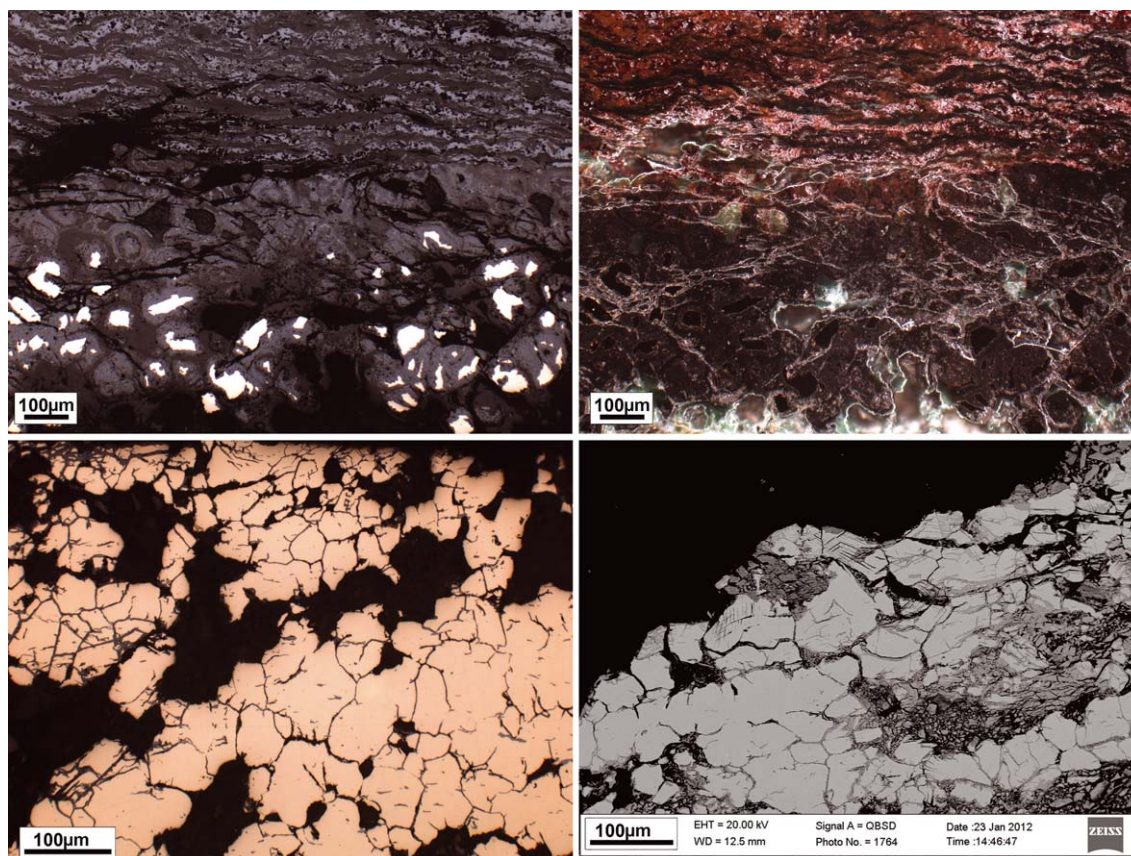


Fig. 3.18 Microstructure of the cuirasses from Čaka, Slovakia (above) and Čierna nad Tisou (below). The fragment of the Čaka cuirass is almost completely corroded, while the corrosion on the sample from Čierna nad Tisou outlined the microstructure.

<sup>939</sup> Andrikou 2007, 406.

<sup>940</sup> Mödlinger 2014b.

<sup>941</sup> Petres – Jankovits 2014, fig. 12.

<sup>942</sup> Piccardo et al. 2013.

$\text{Cu}_{2-x}\text{Fe}_x\text{S}$ -inclusions could not be clearly identified from the severely burnt and corroded fragment from Čaka. Therefore, the amount of total deformation, as well as the minimum thickness of the as-cast disc, could not be calculated.

The annealing temperature of the cuirass from Čierna nad Tisou was below the solidus curve of the  $\alpha$ -phase in the CuSn-equilibrium diagram, but high enough to homogenise the solid solution. The few, slightly deformed Pb inclusions distributed in the metallic matrix indicate a mild final deformation, which is also indicated by the slightly deformed grains and the presence of slip lines (Fig. 3.18, below right). The total biaxial deformation can be calculated to around 77% due to the amount of deformation of the  $\text{Cu}_{2-x}\text{Fe}_x\text{S}$ -inclusions.<sup>943</sup> This permits also the calculation of the minimum thickness of the as-cast disc used to produce the bronze sheet, which for the back plate was 3.6mm. However, this value does not take into account any material loss during the manufacture of the back plate from the flaking off of copper oxides, polishing and grinding.

The microstructure of the cuirasses from Jura had been analysed in the 1970'.<sup>944</sup> The texture reveals in both cases a recrystallised grain structure of  $\alpha$ -phase, not fully homogenised, with deformation twins. Unfortunately, the microstructure pictures do not allow for the identification of slip lines or  $\text{Cu}_{2-x}\text{Fe}_x\text{S}$ -inclusions,<sup>945</sup> and therefore the total amount of deformation could not be calculated. Six of the Marmesse cuirasses were also analysed.<sup>946</sup> The  $\text{Cu}_{2-x}\text{Fe}_x\text{S}$ -inclusions and therefore also the bronze was deformed by up to 90%. The cuirasses analysed contained between 9–10 wt.% tin.<sup>947</sup> The publication of the analyses on the other Marmesse cuirasses, as well as the cuirass from Saint-Germain-du-Plain, is currently in preparation by A. Lehoërff.

### 3.9 Use

Unlike the central and western European cuirasses,<sup>948</sup> the Dendra panoply was always considered effective as a piece of functioning armour and never as having served only ritual purposes or for display. It therefore seems strange why the other cuirasses should have been viewed this way. The interpretation of defensive armour as not practical was a view applied not only to the cuirasses but also to metal shields.<sup>949</sup> Like other armour, central and western European cuirasses were considered to be objects of prestige or symbolic armour, and more broadly as too precious to be used, avoiding an interpretation concerned with what they actual are: armour.

The use of the Dendra panoply has been variously interpreted, including for use exclusively on chariots, rather than on foot,<sup>950</sup> by infantry only, and impossible to use on a chariot,<sup>951</sup> and for duelling only, excluding use by both chariot and infantry.<sup>952</sup> A warrior may, of course, have used a chariot to reach the battlefield and then fought on foot.<sup>953</sup> However, the truth most likely lies somewhere in the middle, with cuirasses being versatile enough to serve in many different use contexts.<sup>954</sup>

The exclusive use of such a panoply on a chariot would raise the question as to necessity for greaves (as they were found together with the panoply), since the front of the lower legs would already be protected by the chariot itself. The inclusion of the high neck guard on the Dendra panoply (and also on the Danube cuirass) suggests that the warrior wearing it needed to be pro-

<sup>943</sup> Mödlinger – Piccardo 2013.

<sup>944</sup> Michel – Mohen 1970.

<sup>945</sup> Michel – Mohen 1970, fig. 11d for cuirass cat. no. 137 and fig. 12b–c for cuirass cat. no. 138.

<sup>946</sup> Lehoërff 2008, 95–106, fig. 3, including the location of sampling.

<sup>947</sup> Lehoërff 2008, fig. 7.

<sup>948</sup> E.g. Coles 1962; Harding 2000; Harding 2007.

<sup>949</sup> For an overview see Uckelmann 2012, 175.

<sup>950</sup> Littauer 1972; Bouzek 1981, 26–28.

<sup>951</sup> Drews 1993.

<sup>952</sup> Peatfield 2008.

<sup>953</sup> Andrikou 2007, 407.

<sup>954</sup> Molloy 2013.

tected from the likelihood of a fatal strike to the neck – an attack, which would happen only during face-to-face combat and certainly not on a chariot. According to the replica, and experiments to test the effectiveness of different armour materials, the weaknesses of the panoply were not the metal plates themselves but the gaps between them.<sup>955</sup> The Dendra panoply thus has ancillary plates to prevent the exploitation of this weakness, which would suggest its main use in face-to-face confrontations. An additional argument in favour of face-to-face combat with a sword is the small bronze ring attached to the top of the right shoulder guard. This ring most likely held the strap for either a sword or shield. The potential singular guard for the right arm,<sup>956</sup> which was found lying on the panoply<sup>957</sup> is another indication of its use in face-to-face fighting on foot. These recent experiments with a full size replica of the Dendra panoply<sup>958</sup> demonstrated that with an approximate total weight of 15kg,<sup>959</sup> the panoply did not significantly affect or hinder mobility. It turned out to be possible, without major difficulties, to shoot a bow, use a sword or hold a spear under the arm. However, the shoulder protectors did appear cumbersome in the use of a bow or spear. The ability to raise the arm vertically above the head was restricted but an over-arm grip of a spear was still possible. Also, the often depicted killing strike to the neck (as seen amongst the Shardana on the Medinet Habu relief of the ‘sea battle’, and on the seal from shaft-grave III from Mycenae) turned out to be possible, as were other depicted strikes. The warrior wearing the Dendra panoply would most likely have had to be right-handed, which is supported by the fact that the gap for the right arm is 2cm wider than the one for the left arm, leaving the fighter more space to use his weapons with his right arm.<sup>960</sup> We might therefore conclude that the warrior wearing the panoply, most likely a leader, arrived by chariot to the battlefield, as shown on several pottery depiction (Figures 3.2), and then fought together alongside his foot soldiers.

Every published depiction of combinations of different armour and weapons is largely hypothetical,<sup>961</sup> as so far only grave 12 from Dendra provides sufficient evidence to reconstruct a potential set of arms and armour that had been worn together. The Dendra panoply was combined with a boar tusk helmet with bronze cheek plates (cat. no. 63), greave(s) (cat. no. 227), a potential arm-guard,<sup>962</sup> and (potentially) also a wooden shield. The cuirass was made of a breast and back plate, onto which other bronze sheets were attached in order to improve the protection for the throat and neck, shoulders, chest, pelvis and upper legs. Each bronze sheet had an inner lining attached. The finds from Thebes indicate the level of variation possible when combining these elements with the basic cuirass, with such variability occurring contemporaneously rather than necessarily having to be a chronological development. The combination chosen for each panoply may have been connected to the warrior’s status, rank, battle or financial limitations. Also, we have to take into account that the palatial authority, as the linear B tablets suggest, provided selected persons with cuirasses, who paid back the value of the cuirass through compliance and thereby sustaining the system. We might also take into account the existence of faster and more flexible warriors, equipped only with the basic body cuirass and no additional metal attachments. These could instead be substituted with organic elements, as is clearly visible on contemporary pottery depictions (Fig. 3.2), and as found on the later Carpathian cuirasses. Amongst all the Carpathian and western European cuirasses, only the example from the Danube has along its edge a row of large (rivet?) holes, which served to attach or fix a substantial organic inlay. The cuirass was not worn in combination with a separate organic jerkin but had it attached permanently to the breast and back plate. On the other Carpathian and western Europe-

<sup>955</sup> Molloy 2013.

<sup>956</sup> See Chapter 5.

<sup>957</sup> Verdelis 1967, 40, fig. 9, pl. 18.

<sup>958</sup> Molloy 2013, 283.

<sup>959</sup> Which is far less than the previously estimated c. 30kg (Verdelis 1967).

<sup>960</sup> Verdelis 1967, 10.

<sup>961</sup> E.g. Coles – Harding 1979.

<sup>962</sup> See Chapter 5.

an cuirasses, no holes along the rim for the attachment of organic lining are visible, suggesting they had to be worn over a separate organic jerkin (similar to the medieval *gambeson*).<sup>963</sup>

It appears that the Dendra panoply and the two cuirasses from Thebes bear no significant evidence of use-wear or for repairs. Due to the heavily fragmented character of most of the Carpathian cuirasses, no traces of use can be identified on the fragments. While the cuirass from Saint-Germain-du-Plain does not show any clear traces of use or repair, the cuirass from the Danube has a 4cm long impact from a stabbing weapon, such as a sword, located above the right clavicle. There appears to be no central enlargement of the impact, which might have indicated that it was caused by a spear. No traces of repair are visible (Fig. 3.18). On the back plate, immediately opposite the position of the damage to the breast plate, a small impact is visible, indicating where the tip of the weapon exited from the cuirass through the body of the wearer. The back plate also demonstrates a severe sword impact, reaching from the left side of the neck protection to the right side of the spine. It seems as if the warrior was, after being stabbed from the front, attacked and almost beheaded from the back, potentially from a left-handed opponent. However, it does not seem very likely then that the warrior fell with his cuirass into the Danube, as suggested by Petres and Jankovits.<sup>964</sup>

Unlike the Greek cuirasses and those from the Carpathian Basin, the western European cuirasses are replete with evidence of repairs. These repairs are either the result of injuries during combat or manufacturing mistakes. As indicated in detail by Schauer, the three breast plates from Fillinges clearly exhibit impact damage from combat in the form of small holes with outwards bent edges at the neck.<sup>965</sup> These are most likely the result of weapon perforation from the front of the warriors wearing the cuirasses, if we do not want to consider these traces as a result of ritual or cultic action or sacrifice.<sup>966</sup> However they found their end, the cuirasses from Fillinges were certainly used as armour, as it is indicated by several repairs on one breast plate (cat. no. 141) and one back plate (cat. no. 142). The breast plate was repaired twice under the right nipple: a new piece of bronze sheet (3.1cm × 2.2cm) was fixed with four rivets<sup>967</sup> and another one (3 × 2.1cm), also with four rivets, in order to cover a crack caused by material stress. On the remaining parts of the back plate, two repairs can be noted close to the liver. The cuirass was repaired with a squared sheet (7.7cm × 4.5cm), which was attached with six rivets. An injury or a stab in this area certainly was deadly during the Bronze Age. Further small damage close by was maybe caused by an arrowhead.<sup>968</sup> The fragment inv. no. 16.932 has two little bronze sheets riveted partly above each other on the outside of the cuirass.<sup>969</sup>

The cuirass Jura B (cat. no. 138) exhibits damage in the form of a long, thin perforation from the outside (with inwards-bent edges) at the lower area of the liver, which might have been caused by a sword. The damage was (opposite to the similar one from the back plate from cat. no. 142 from Fillinges) not repaired (Fig. 3.19); similar traces are also known from shields.<sup>970</sup> On the right side of the chest and the neck, additional bronze sheets were riveted on to repair a previous, rectangular cut out damage of the cuirass.

The Marmesse cuirasses are probably the ones with the highest number of repair. The most significant repairs are on cuirass cat. no. 149, on the left side of the back plate and on the left side of the breast plate of a second Marmesse cuirass.

<sup>963</sup> A *gambeson* is an organic defensive jacket, usually padded or quilted, and constructed of linen or wool with varying staffing. It could be worn as armour separately, or combined with mail or plate armour.

<sup>964</sup> Petres – Jankovits 2014, 65. In addition, they note that a sword cut reaches from the neck down under the right scapula. Indeed, there is a short crack under the right scapula. Since it has also an almost 90° angle to it, it does not seem to derive from a sword cut, and is certainly not the result from a large sword blow from the neck to the armpit, whereby we would also expect damage directly above the scapula.

<sup>965</sup> Schauer 1982d, 101.

<sup>966</sup> Schauer 1982a.

<sup>967</sup> Mottier 1988, 121, figs. 10–12.

<sup>968</sup> Schauer 1982d, 107, pl. 41.1.

<sup>969</sup> Mottier 1988, 127, fig. 21.

<sup>970</sup> Cf. Uckelmann 2011, fig. 4.



Fig. 3.19 Traces of use on the cuirasses. The two cuirasses illustrate different types of use-wear from weapon impacts. The cuirass from Graye-et-Charnay or Véria, France, (left) shows the impact of a sword or spearhead in the area of the liver. The cuirass from the Danube (right) shows a c. 4cm long injury from a stabbing weapon as a sword above the right clavicle in the front and, on the back side, the injury where the sword tip exited as well as the impact of a sword slash from the left side of the neck, crossing the spine (left: photograph A. Chauvet (C2RMF), by courtesy of the Musée d'Archéologie nationale et Domaine national de Saint-Germain-en-Laye; above right: photograph M. Mödlinger, by courtesy of the Magyar Nemzeti Múzeum Budapest; bottom right: after Petres – Jankovits 2014, fig. 9).

Cuirasses were an affordable (for high-status warriors at least), useable and effective form of armour, which offered protection to the warrior in combat. According to the different size and measurements of the cuirasses from Fillinges and Marmesse, we can assume that they were made for specific individuals. Even though in Thebes the palatial authorities provided the armour (or at least the parts to be attached to the cuirasses), a cuirass would still have needed to fit properly, and was therefore likely individualised.

Moreover, the slightly different decoration on the back of the Marmesse cuirasses probably served to identify the specific person wearing the cuirass. The different number and thickness of the lines on the back perhaps indicating the status or rank of the warrior to his cohort, whilst the front instead provided opponents with a more uniform view of the warriors.<sup>971</sup> The increase of decoration over time, and its spread from southeast to western Europe, does not appear to be restricted to the mere identification of the warrior in front or a cultural tradition of decoration, and instead may have served a practical purpose.

The thickness of the bronze sheet of the cuirasses decreased significantly over time and, in order to maintain their efficiency, the cuirasses were reinforced through the application of decoration. Bending the rim around a bronze or copper wire, or strengthening the rim by riveting on additional bronze sheets, also increased the stability of these much thinner central and western

<sup>971</sup> Cf. Mödlinger 2014b.

European cuirasses. Most likely, this process was combined with the use of an increasingly thicker organic jerkin worn under the metal cuirass, whereas the Greek cuirasses permitted only the application of a thinner organic inlay, sewed onto the bronze sheets, as indicated by the line of small holes all along the edges. The metal cuirass worn over an organic jerkin, such as the Carpathian and western European cuirasses, and the metal cuirass with organic inlay, like the Greek examples, clearly offered a higher level of protection than simple organic armour alone. The greater protection offered by wearing a metal cuirass over organic protection increases the likelihood that these cuirasses belonged to the Bronze Age elite, contributing to and underlining the prestige and authority of the warriors that were wearing them.

It is important to point out that the design and construction of these bronze cuirasses would not have prevented the wearer from being killed were the fatal blow sufficiently powerful, but was effective in reducing casual injury whilst maintaining a degree of both flexibility and mobility in combat.<sup>972</sup> While the Dendra panoply placed greater emphasis on protective aspects (substituting the massive shields with a direct method of body protection), this emphasis changed with the development of the later cuirasses, as was already visible on the more delicate cuirasses from Thebes which had fewer and smaller attachments. This development was clearly orientated toward less weight and increased mobility. The massive Greek panoply was substituted or reduced to a basic body cuirass, which permitted faster and more flexible movement. This development, which permitted greater mobility of the warrior, can be connected to changes in fighting techniques, with the emergence of a faster, less static, closer method of combat around 1200 BC, and perhaps more generally with the possible upheavals connected with the ‘catastrophe’ in the eastern Mediterranean during this time.<sup>973</sup> Whether these adaptations to the design of cuirasses were the result of or related to general changes in fighting techniques and combat (including the introduction of new sword forms, facilitating a significant change from a primarily stabbing to a primarily slashing weapon), remains unclear.

## Catalogue

### *Greek Cuirasses*

**Cat. no. 122. Dendra, Peloponnese, Greece** – grave 8 – one shoulder protection. Measurements: height: 25cm; width: 32cm – Archaeological Museum Nauplion, inv. no. 22.956 – Pl. 23.122. References: Persson 1931, 21, no. 2; Verdelis 1967, 15, 21, pl. 23, fig. 2; Càssola Guida 1973, 52–53, pl. XVIII.3; Andrikou 2007, 402.

The shoulder protection was found in the grave without obvious indications that there had been further parts of metal armour. This might be the result of later deposition, robbery or the protection having been deposited as *pars pro toto*, or was perhaps the only metal part of an organic cuirass, intended to provide greater protection for the right shoulder. The latter interpretation seems to be the most likely, as organic defensive armour is well known from depictions, and increased protection of the right shoulder would have been necessary, as it was not protected by a shield during the use of a sword or spear. A detailed depiction of a single shoulder guard, as we know it from grave 8, Dendra, is found on a seal stone from Thisbe, Boeotia (LH II).

**Cat. no. 123. Dendra, Peloponnese, Greece** – grave 12 – complete. Measurements: thickness: approx. 1mm; total weight: originally c. 14.5kg – Archaeological Museum Nauplion, inv. no. 14.230 (old entry); 19.001–19.002 (new entry) – Pl. 23.123. References: Müller-Karpe 1962a, 280; Vanderpool 1963, 280–281, pl. 62.5–7; Åström 1967; Verdelis 1967, 1–53; Paulík 1968, 55; Càssola Guida 1973, 53, pl. XV; Greenhalgh 1980; Schauer 1982d, 115–124, figs. 6–7; Åström 1983; Taracha 1999; Everson 2004; Sofou – Katsarou-Moschona 2006, 325; Andrikou 2007; Taratóri et al. 2008.

<sup>972</sup> Molloy 2013.

<sup>973</sup> Drews 1993.

The grave was discovered in the north of chamber grave 10 during Swedish excavations in 1960. It was robbed prior to the start of the excavations but was also apparently disturbed in antiquity, most likely in preparation for a further internment which appears not to have taken place. The circumstances of the discovery, other grave finds, its construction, as well as the grave itself, are described in detail by Verdelis and P. Åström.<sup>974</sup> There were a number of associated finds, including what is presumable a piece of a dagger with leather residues, which was positioned close to the pelvis, a golden nail from a robbed sword, a silver cup of Type Vaphio, and fragments of other gilded objects. Boar tusks were found close to the skull. On the other side of the grave, the armour and the bronze vessel, as well as a few ceramic vessels, were stored. The panoply consisted of fifteen separate pieces of bronze sheet, which encased its owner from their neck, protected by a high collar, to their knees, and was held together with organic thongs. It was placed on the floor as if worn fully mounted. Beneath the right arm of the panoply a greave was found, which broke into several fragments during recovery. Two other sheets close by were interpreted as one or more further greaves.<sup>975</sup> Verdelis suggests that these were two greaves and the other was protection for the right arm, the left being protected by a shield.<sup>976</sup> Beneath the fragments of arm protection, residues of wood were also discovered (42 × 35cm). In vessel no. 8 two bronze cheek plates and boar tusks were found. Close to the second greave, a bronze mirror and some bronze vessels, as well as a small knife, were found. On the basis of the grave finds, Verdelis dates the assemblage to the first half of the 15<sup>th</sup> century BC.<sup>977</sup>

**Cat. no. 124. Arsenal, Thebes, Boeotia, Greece** – settlement – fragments – no measurements – Archaeological Museum of Thebes, inv. no. 40.520–40.555 – Pl. 24.124. References: Snodgrass 1965, note 7; Touloupa 1966; Touloupa – Symeonoglou 1967; Verdelis 1967, 21–22; Càssola Guida 1973, 53, 66; Demakopoupou – Konsola 1981, 53; Fortenberry 1990, 44–45, cat. nos. 29–31; Andrikou 2007, 402; D’Amato – Salimbeti 2011, fig. on page 39.

In the ‘Arsenal’ area of the palace, in the central corridor of the building, numerous bronze weapons, including spearheads, arrowheads, swords and knives, as well as pieces of horse harness, vessels (cherniva), and tripods, were found along with parts of a cuirass (shoulder pieces, triangular pieces which cross over the chest, and successive bronze plates below the main cuirass) in 1964. The bronze sheets are similar to parts of the Dendra panoply.<sup>978</sup> The bronzes fell into one of the 17 cist graves of the 17<sup>th</sup> century BC, when it collapsed.<sup>979</sup> Further important finds from the ‘Arsenal’ are LH IIIB sherds with Linear B signs.<sup>980</sup>

**Cat. no. 125. Thebes, Boeotia, Greece** – settlement – fragmented. Measurements: height: 31cm; width: 36cm – Archaeological Museum of Thebes, inv. no. 27370.1, 3, 16–17 – Pl. 24.125. References: Andrikou 2000, 292; Andrikou 2007, 402; Salimbeti – D’Amato 2009, fig. 4.

The cuirass was excavated from the Municipal Conference Center plot (northwestern part of the Mycenaean citadel) under difficult circumstances, since it was located partly under a street which could not be removed. Shoulders and part of the right side are missing.

#### *Carpathian Cuirasses*

**Cat. no. 126. Čierna nad Tisou, Okr. Trebišov, Slovakia** – associated deposit (?) – fragment. Measurements: height: 41cm; width: 46cm; thickness: 0.5–1mm – Archeologické múzeum

<sup>974</sup> Åström 1967; Verdelis 1967.

<sup>975</sup> Verdelis 1967, fig. 2.2.

<sup>976</sup> Verdelis 1967, 6.

<sup>977</sup> Verdelis 1967, 7.

<sup>978</sup> Verdelis 1967, 21.

<sup>979</sup> Platon – Stassinopoulou-Touloupa 1965, figs. 2, 8.

<sup>980</sup> Touloupa 1964, 27.



SNM, Bratislava, inv. no. 15.40 (old: 3483 and i. 23.122) – Pl. 25.126. References: Novotný 1966, 27–34; Paulík 1968, 41–44, fig. 2.

The cuirass was found at a depth of 2m during the building of a new freight railway station in 1947. Novotný mentions sherds, now lost, and a grinding stone, as associated finds.<sup>981</sup> The finds were bought by the Archaeological Institute in Martin, Slovakia, in the following year and are now stored in the Archeologické múzeum SNM in Bratislava. Only the back plate of the cuirass, without neck area, and right shoulder survive. The base of the cuirass is not completely preserved, and the wire, around which the rim was bent, is now lost, as is a large part of the left shoulder.

**Cat. no. 127. Šarišské Michal’any, Okr. Sabinov, Slovakia** – surface (single) find – fragment. Measurements: height: 22cm; width: 17.3cm; thickness: 0.8–1.6mm – private collection – Pl. 26.127. References: Lorenc et al. 2013, 165, fig. 66.1.

The cuirass fragment was found on the terraces of the river Torysa (close to Pri kaplnke). In the nearby surrounding, further finds such as a sickle fragment associated with the Kyatice/Gáva Culture, ceramics from the Hallstatt period, and two iron hammer axes, have been discovered (Lorenc et al. 2013, 165).

**Cat. no. 128. Čaka, Okr. Levice, Slovakia** – grave 2 – fragments – Archeologické múzeum SNM, Bratislava, inv. no. I 8. 22025 – Pl. 25.128. References: Knor 1952, 403, fig. 209; Točík – Paulík 1960, 59–124, figs. 13–21, 24; Paulík 1963, 324, 335, fig. 43.1; Paulík 1968, 49–50; Jockenhövel 1971, 74, no. 80, pls. 8.80, 59–60, 61.A; Novák 1975, 20, no. 77, pl. 12.77; Schauer 1984b, 226, no. 78; Paulík 1988, 11–25; Probst 1996, fig. page 408.

The cuirass was found during the excavations of A. Knor in 1950. As well as the cuirass, the grave contained alongside the cremated bone, pieces of flange hilted swords of Type Nenzingen,<sup>982</sup> two spearheads, two median winged axes,<sup>983</sup> one socketed chisel, one razor, fibula fragments, two pins, one with double conical head and one with a flat head, one phalerae, several small rolled bronze sheets, rivets, buttons, nails, fragments of a belt, further small bronze sheet fragments probably attached to textiles, as well as ceramics. In total, there have been over 40 fragments most likely belonging to the cuirass.<sup>984</sup> In 1963 Paulík reconstructed the cuirass with rib bows in triangle form.<sup>985</sup> Unfortunately, not all the fragments were published, and most of the cuirass fragments are now lost.

Paulík mentions bronze sheets with ‘buttons’ which had not previously been discussed, and suggests that these might be the remains of the metal parts of leather greaves.<sup>986</sup> These bronze fragments are without any chevrons or pointed ends. Some of the bronze sheets from the grave might also belong to such an object and not to the cuirass.<sup>987</sup> Additionally, Paulík tried to reconstruct a shield which had been buried in the grave,<sup>988</sup> with the intention of reconstructing a complete set of defensive armour.

**Cat. no. 129. Ducové, Okr. Piešť’any, Slovakia** – associated deposit – fragments. Measurements: height: 14.5cm; width: 8cm; thickness: 0.5m – Archeologické múzeum SNM, Bratislava, inv. no. I. Č. 22.025 – Pl. 26.129. References: Paulík 1968, 46, fig. 4; Schauer 1982d, 115.

The associated deposit accompanying the fragment of cuirass was found inside a fortified settlement connected with the Velatice-Baierdorf group at Ducové in 1965. The associated

<sup>981</sup> Novotný 1966, 27–28.

<sup>982</sup> Novák 1975, 20, pl. 12.77–77A.

<sup>983</sup> According to Novák 1975, 20 only one spearhead and one axe.

<sup>984</sup> Točík – Paulík 1960, 76, 108, 119–120, fig. 15, pls. 9–10.

<sup>985</sup> Paulík 1963, 324, 336, fig. 43.1. See also Probst 1996, fig. page 408.

<sup>986</sup> Paulík 1988.

<sup>987</sup> Paulík 1988, 24.

<sup>988</sup> Paulík 1988, 24.

deposit contained fragments of sickles, Type Peschiera daggers, bowl-headed pins with swollen neck, and median-winged axes.<sup>989</sup> The fragment of cuirass comprises the right breast with a star-like decoration around the nipple, the part immediately under the right arm, and a smaller part under the right arm pit. Originally the fragment was rolled together and was broke when unfolded during restoration. A part of the breast decoration with the double rib also appears to have broken off recently and was not found in the museum.

**Cat. no. 130. Saint-Germain-du-Plain, Dép. Sône-et-Loire, France** – single river find (river Sône) – complete. Measurements: breast plate: height: 50.3cm; width: 37.4cm; back plate: height: 52.6cm – Musée d'Archéologie Nationale, inv. no. 2757 – Pl. 27.130. References: Reinach 1921, 234; Bonnamour – Mordant 1988, 367; Mottier 1988, 142, fig. 38; Hansen 1994, 12.

The cuirass was a single find from the Sône from the beginning of the last century.

**Cat. no. 131. Pázmándfalu, Com. Győr-Moson-Sopron, Hungary** – associated deposit I and II – fragments – six fragments of different size – Rómer Flóris Múzeum Győr, no inv. no. References: Szabó 2012; Szabó 2013; Szabó 2016, 182–184, figs. 17–19.

The associated deposit I was found with metal detectors in December 2011. Archaeologists were informed immediately, and the remaining associated deposit was excavated to avoid further destruction.<sup>990</sup> The associated deposit I was disturbed by the plough but two thirds of the deposit remained in situ. Within 20m around the deposit, further bronzes, such as fragments of sword blades, a fragment of a sword hilt, and further tiny bronze fragments, were found.

The Ha A1 deposit contained hundreds of both undamaged objects, and damaged objects, having been broken and melted. Underneath the metal sheet objects, fragments helmet of Type Paks (cat. no. 26), an associated cheek plate (cat. no. 35) and fragments of a cuirass (cat. no. 131), were found. Further fragments belonged to a bronze cup. The group of undamaged objects included a winged axe, dagger, pendant, spangle and a phalerae.<sup>991</sup>

During the excavation and documentation of the associated deposit, another, so far undisturbed associated deposit, was found three metres away from the first. It consisted of four bronze spearheads, a bronze knife, a heavily bent sword, a shorter sword, a socketed chisel, as well as a pressed bronze sheet with rivets, which might derive from another cuirass.<sup>992</sup>

**Cat. no. 132. Nadap, Kom. Fehér, Hungary** – associated deposit – fragment. Measurements: height: 8.5cm; width: 11cm; thickness: 2mm – Szent István Király Múzeum Székesfehérvár, inv. no. 119 – Pl. 26.132. References: Petres 1983, 61–62, fig. 10a–c, h; Mozsolics 1985, 151; Hansen 1994, 12, 546, H 451; Makkay 2006, 7, pls. V–VIII; Uckelmann 2012.

For the description of the associated deposit see at cat. no. 9. As well as the currently identified defensive armour, including a helmet of Type Oranienburg (cat. no. 9), fragments of helmets of Type Paks (cat. no. 27), a pair of greaves, further fragments of another pair of greaves (cat. nos. 165. 170–172), and a fragment of a shield of Type Nyírtura, a further fragment of bronze sheet from the associated deposit might also be from a piece of armour.<sup>993</sup> A further 17 individual fragments decorated with embossed knobs and parallel ribs, which Makkay identifies as parts of a cuirass with flexible bronze bands, similar to Dendra,<sup>994</sup> belong instead to belt plates, such as those from Mačkovac, Croatia.<sup>995</sup>

<sup>989</sup> Paulík 1968, 46.

<sup>990</sup> Szabó 2013, 811.

<sup>991</sup> Szabó 2013, 811; Szabó 2016, 27.

<sup>992</sup> Szabó 2013, fig. 17; Szabó 2016, 27, fig. 19.

<sup>993</sup> Makkay 2006, no. 12.

<sup>994</sup> Makkay 2006, nos. 14–30.

<sup>995</sup> Karavanić – Mihaljević 2001, pl. 10.

**Cat. no. 133. Ivančice 4, okr. Brno-venkov, Czech Republic** – associated deposit – fragment. Measurements: height: 15cm; width: 12cm – Moravské zemské muzeum Brno, no inv. no. – Pl. 26.133. References: Mödlinger 2014b (wrongly cited as Brno-Řečkovice); Richtera et al. forthcoming.

The deposit was found in Ivančice 4, Rená settlement.<sup>996</sup>

**Cat. no. 134. Danube at Pilismarót, kom. Komárom-Esztergom, Hungary** – single river find (river Danube) – complete. Measurements: height: 44.7cm; width of base: 51.1cm; thickness: 0.7–0.8mm in the centre, c. 0.9–1.3mm at the edges of the neck and the arms – kept at the Magyar Nemzeti Múzeum Budapest; the cuirass belongs to the Szent István Király Museum, Székesfehérvár, inv. no. 83.22.1–2 – Pl. 28.134. References: Jankovits 1999/2000, 195, note 41; Szathmári 2003, 63; Petres – Jankovits 2014.

The cuirass was allegedly bought by the museum of Székesfehérvár from a private collector in 1982.<sup>997</sup> The cuirass was said to have been found on the east side of the Danube shore at Pilismarót, Kom. Komárom-Esztergom, in the north of Budapest, in the 1960'.

#### *Western European Cuirasses*

**Cat. no. 135. Unprovenanced** – complete. Measurements: 51 × 39.4cm – Metropolitan Museum New York, accession number 09.41 – Pl. 30.135. References: Schauer 1982d, 96–97, fig. 2; Mottier 1988, 127, 140–141, figs. 26–28.

The cuirass was bought by the Metropolitan Museum in 1909 from D. Reiling, Mainz. Before this it belonged to the Forman collection and was sold at Sotheby's on June 19, 1899 (no. 153). The cuirass is similar to the cuirasses of Fillinges in respect of a number of details, especially to cat. no. 139, that it seems highly reasonable to assume they were made in the same workshop or at least are closely connected. Next to the rim of the arm, which was bent around a wire, the cuirass has a row of small holes, most likely to attach an organic inlay.

**Cat. no. 136. Unprovenanced** – complete. Measurements: height: 36.8cm; height neck: 3.3cm; breadth: 34cm; diameter neck: 13.8cm – Museum für Kunst und Gewerbe, Hamburg, inv. no. 1917.1232 – Pl. 29.136. References: Pagenstecher 1917, 91, no. 10, fig. 10; Hagemann 1919, 121–122, fig. page 130; v. Merckling 1930, no. 838, pl. 46.2; v. Merhart 1941, 37; v. Merhart 1954, 37, figs. 1–2; Müller-Karpe 1962b, 57, note 126; Snodgrass 1964, 78; Hornbostel 1981, 25, no. 5; Stary 1981, 24–25; Mottier 1988, 141, figs. 33–34; Hornbostel – Spielmann 2004, 92, cat. no. I.34.

The cuirass was part of the Johannes W. F. Reimer collection (Hamburg) (inv. no. B 98). Unlike the cuirasses from Fillinges, Marmesse and Jura, this cuirass is not waisted and the breast muscles are not clearly visible. The breast is accented with dotted and bossed circles and a large central boss.

**Cat. no. 137. Jura A (former 'Grenoble'), Dép. Jura, France** – associated deposit – complete. Measurements: 47 x 43.5cm (breast plate), 44 × 44.6cm (back plate); thickness: 0.6–1mm; weight: 1.46kg (breast plate) 1.44kg (back plate) – Musée d'Armée, inv. no. B 4 (FZ 6711) – Pl. 29.137. References: Robert 1860; Carthailhac 1875/1878, 468; de Beauregard 1901, 308–315; Michel 1969; Michel – Mohen 1970; Mottier 1988, 141, figs. 31–32; Descamps 2005, 100.

The cuirass was bought by the museum in 1860, the same year as it was found. It was found together with a further cuirass (cat. no. 138), now owned by the Musée du Louvre, Paris (inv. no. Br 1132), in Graye-et-Charnay or Véria.

<sup>996</sup> Richtera et al. forthcoming.

<sup>997</sup> Petres – Jankovits 2014.

**Cat. no. 138. Jura B (former ‘Naples’), Dép. Jura, France** – associated deposit – complete. Measurements: 44 × 45.3cm (breast plate), 43 × 49cm (back plate); thickness: 1mm – Musée du Louvre, département des Antiquités grecques, étrusques et romaines, inv. no. Br 1132 (FZ 3683; old inv. no.: MNB 474; R 17; N III 1087) – Pl. 29.138. References: Robert 1860; de Nieuwerkerke 1868, 41; Carthailhac 1875/1878, 468; Chantre 1876, 150; de Beauregard 1901, 308–315, fig. 2; Déchelette 1908–1914, 237; de Ridder 1915, 5, no. 1132, pl. 66.1132; Deonna 1934b, 115; Millotte 1963, 162; Michel – Mohen 1970, 64; Briard – Mohen 1983, 155–156; Mottier 1988, 141, figs. 29–30; Rothé 2001, 405, 712–713; Descamps 2005, 100, no. 92.

The cuirass was found in Graye-et-Charnay or Véria in 1860, and is associated with a further cuirass now owned by the Musée de l’Armée, Paris (inv. no. B 4; cat. no. 137). The Musée du Louvre bought the cuirass in the same year as it was found.

**Cat. nos. 139–145. Fillinges, Dép. Haute-Savoie, France** – associated deposit – seven complete cuirasses and several fragments. Measurements see Tab. 3.5 – Musée d’Art et d’Histoire, Genève, inv. nos. 14.057–14.061, 14.181, 16.931–16.932, 23.451 and John Woodman Higgins Armoury, Worcester, Mass., USA, inv. no. 2875 – Pls. 30–31. References: de Beauregard 1901, 308–315; Dean 1921; Deonna 1933; Deonna 1934a; Deonna 1934b; Deonna 1935; Deonna 1946; v. Merhart 1954; Schauer 1982d, 92–130; Mottier 1984; Mottier 1988; Hamard-Frichet – Rey-Bellet 2000; Steuer 2001.

At the end of 1900, street workers widening the street of the small village of Fillinges, came across the deposit, which contained seven cuirasses, several fragments and a bronze wand.<sup>998</sup> O. C. de Beauregard carried out further excavations in August 1901.<sup>999</sup> He mentioned a horse jar, some ceramic sherds, further bronze sheet fragments, and a massive ash layer between 5–30cm thickness, spread over 10m<sup>2</sup>. De Beauregard also noted that according to ‘a reliable testimony’<sup>1000</sup> the breast and back plates had been placed inside each other, similar to those from Marmesse.<sup>1001</sup>

No documentation, publication or pictures were produced. Most likely, the cuirasses were found placed inside each other or, as noted by a worker who participated in the ‘excavation’, they were spread over the area.<sup>1002</sup> Immediately after finding the deposit, and so as to avoid sharing the objects with the land owner Ing. Gavillet, the find was split between two antiquarians, a notary and a doctor from Genève. Today the cuirasses are divided between two museums, the Musée d’Art et d’Histoire, Genève (cat. nos. 139–142; 145 and fragments inv. nos. 16.931–16.932, 23.451), and the John Woodman Higgins Armoury, Worcester, Mass., USA.<sup>1003</sup>

The basic measurements, and most important information, regarding each piece and associated fragments, are listed in Tab. 3.5. For a more detailed description of the cuirasses, see Schauer and Mottier.<sup>1004</sup> The bronze wand found with the cuirasses has a length of 45.3cm, a diameter of 3cm and a weight of 1.75kg (inv. no. 23.451). It is a unique piece without any parallel. Mottier mentions a tin content of 5% but makes no reference to other detailed results or sampling.<sup>1005</sup> The surface of the wand, and so also its decoration, was largely destroyed during the cremation process.<sup>1006</sup>

**Cat. nos. 146–152. Marmesse, Dep. Haute-Marne, France** – associated deposit – seven almost complete cuirasses – Musée d’Archéologie Nationale, France, inv. no. 83.753–83.758;

<sup>998</sup> For the detailed description of the find spot, see Schauer 1982d, 94.

<sup>999</sup> de Beauregard 1901, 308–315.

<sup>1000</sup> Warmenbol 2010, 565.

<sup>1001</sup> de Beauregard 1901, 311. Contradicted by Deonna 1934b, 96.

<sup>1002</sup> Schauer 1982d, 95.

<sup>1003</sup> Mottier 1988, 110.

<sup>1004</sup> Schauer 1982d, 103–104; Mottier 1988.

<sup>1005</sup> Schauer 1982d, 98, note 19; Mottier 1988, 114. The analyses were carried out with XRF.

<sup>1006</sup> Schauer 1982d, pl. 16.2; Mottier 1988, 114, fig. 4.

| Cat. No. | Inv. No. | Type        | Heigh (cm)   | Width (cm)   | Thickness (mm) | Condition       | Details   |
|----------|----------|-------------|--------------|--------------|----------------|-----------------|---|
| 139      | 14.058   | breastplate | 43.2         | 37           | 0.7–1.1        | almost complete |   |
| 140      | 14.059   | breastplate | 44.9         | 41.1         | 0.7–1.1        | complete        |   |
| 141      | 14.060   | breastplate | 45.6         | 36.9         | 0.7–1.1        | almost complete |   |
| 142      | 14.057   | backplate   | 49.9         | 47.6         | –              | almost complete |   |
| 143      | 2875     | backplate   | –            | –            | –              | fragmented      | The upper parts of the back plate are still present, while the lower third is missing |
| 144      | 14.061   | backplate   | 45.7         | 20.5         | 0.5–1          | fragmented      | only the upper right side remained  |
| 145      | 14.181   | backplate   | 19.3<br>22.4 | 39.2<br>19.4 | –              | two fragments   |   |
| –        | 16.931   | fragment    | 6            | 19.5         | –              | fragment        | fragment of the lower rim of one cuirass  |
| –        | 16.932   | fragment    | 7.9          | 8.5          | –              | fragment        | fragment of the side part of one cuirass with residues of ancient repair              |
| –        | 16.932a  | fragment    | 7.5          | 10.3         | –              | fragment        |   |
| –        | 16.932b  | fragment    | 6            | 6            | –              | fragment        |   |
| –        | 14.181a  | fragment    | 6.2          | 6.7          | –              | fragment        | fragment from the rim of the arm  |

Tab. 3.5 Measurements of the western European cuirasses from Fillinges.

86.197 and Chaumont, Musée d'Art et d'Histoire, 83.755 (FZ 8032) – Pls. 32–33. References: Mohen 1987; Mottier 1988, 141–142, figs. 35–37; Douau 1994; Jensen 1999, 99, fig. 4; Hamard-Frichet – Rey-Bellet 2000, 143–148; Puniet – Balcar 2000; Steuer 2001; di Mantova – Watelet 2003; Lehoërff 2008, 95–106; Huth 2012, fig. 5.

The cuirasses were found in 1974 during the quarrying of gravel in Marmesse at 'la petit Marais' in the Aujon-valley, close to a spring near a swamp. Three cuirasses had been placed inside each other. Further cuirasses and fragments were discovered in 1980 and 1986. According to the photographs from the find spot, two cuirasses were placed inside one another. The fragments were found close by. The photographs from the find spot seem to contradict the commonly held assumption that three groups of three cuirasses placed inside each other were deposited.

The inventory numbers correspond with the following catalogue numbers: cat. no. 143/inv. no. 83.753; cat. no. 144/inv. no. 83.755; cat. no. 145/inv. no. 83.756; cat. no. 146/inv. no. FZ 32.691; cat. no. 147/inv. no. 83.754; cat. no. 148/86.197; cat. no. 149/83.755 (FZ 8032).

