RUDOLF ECHT · MICHAEL MARX · VINCENT MEGAW · WOLF-RÜDIGER THIELE · LUC VAN IMPE · LEO VERHART

AN IRON AGE GOLD TORC FROM HEERLEN (PROV. LIMBURG/NL)

FIND HISTORY

In July-August of 1998, Nico Geurts and his father started with the digging of a foundation trench for a new conservatory in the side yard of Nico's house at the Heideveldweg 27 in Heerlen (**figs 1-2**). For the excavation of the foundation trench they used a small digging machine. After the construction of a small concrete foundation a low brick wall was made and the interior ground level covered with a concrete floor. The soil in the interior of the conservatory was not excavated. During the construction of the foundation the father worked at the base of the trench with a shovel at a depth of around 60-80 cm. The excavators did not uncover any archaeological finds.

During the construction of the conservatory and some weeks after the excavation, the wife of Nico Geurts, Yvonne, saw a metal ring in one of the soil heaps still lying in the garden. A part of the excavated soil had already been transported to a hilly wooded area at the back of the row of houses along the Heideveldweg and spread over the terrain. For years the inhabitants had dumped there their soil, building waste and other

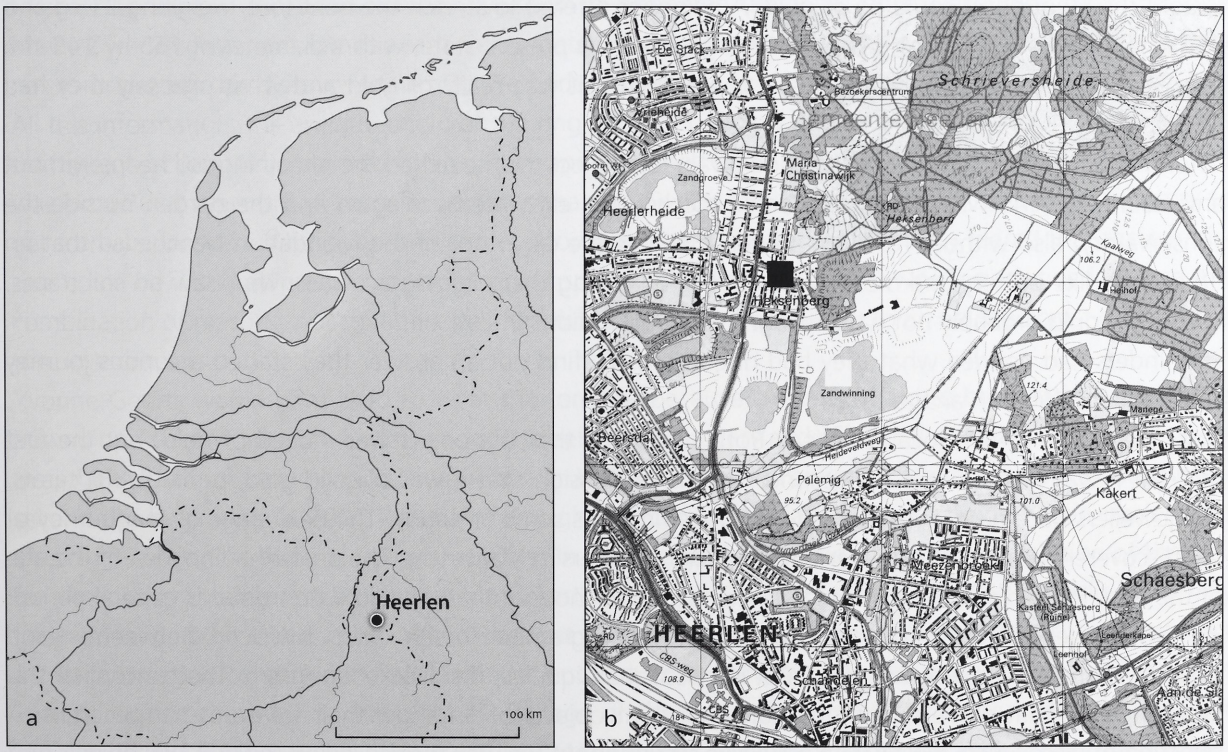

Fig. 1 The Netherlands with the location of Heerlen (**a**) and local topography of the find spot (**b**). – (Map O. Odé).

Fig. 2 Heerlen. – The house at the Heideveldweg 27 in 2009 with at the right the new conservatory where the torc was discovered during construction works in 1998. – (Photo L. Verhart).

trash. During this transport by wheelbarrow no archaeological finds were noticed. Yvonne Geurts thought at first that the metal ring she saw in the soil heap was from the wicket gate of the garden and probably made of brass. She picked it up and it appeared to be a more or less spirally twisted ring. Because of its weight they thought it could be of gold. A neighbor offered to stretch the bent torc, weighing 215 g and 480 mm in circumference, and bent it in his garage in its present state, with a diameter of 165 by 145 mm (fig. 3), before they started their quest to ascertain if it was really of gold and what precisely they had found.

After the recognition that they had found a valuable object they searched the remaining soil heaps without any result. A friend with a metal detector checked the excavated soil again and the garden outside the conservatory, also without result. In a later interview the excavator of the foundation trench said that no other finds like pottery and metal were discovered during their digging activities. They saw no soil traces, but they would probably not have recognized discolorations in the soil.

The finders had no idea what they had discovered. To find out an answer they started a curious journey without consulting an archaeologist.

First, they went to two local jewellers. Both confirmed that the object was indeed of gold, but the first thought it was plated while the second had the impression that it was of solid gold, probably 18 carats. The jewellers had the opinion that the precious ring was some antiquity. The next stage of the journey of the discoverers was a visit to the antique dealer J. Naebers in Maastricht. The dealer had no idea of the age of the ring. He had some books on early Celtic art and thought that it could date from this general period. He advised them to take part in a popular television programme *Tussen kunst en kitsch* (»Between art and kitsch«) to show the piece to a specialist in classical antiquities, drs. Mieke Zilverberg. The concept of this programme is that owners of supposedly important objects of art show their treasures to specialists. A selection of discoveries, mostly with attractive stories about the way they collected the precious objects and information of their provenance, were selected for showing in the programme. The torc was showed to

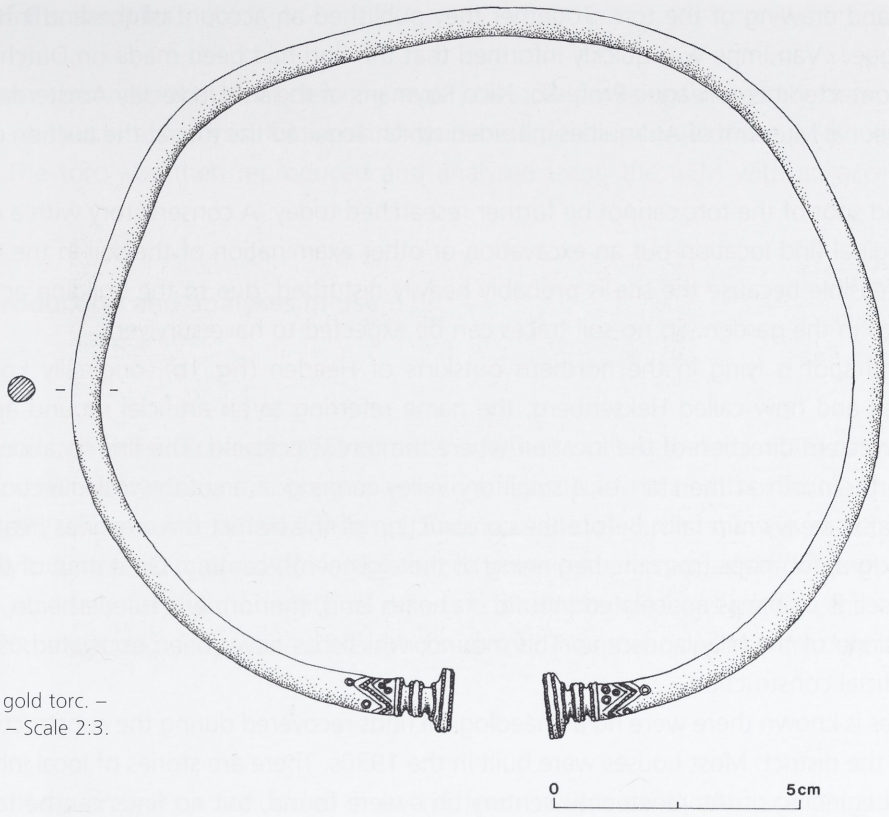

Fig. 3 The Heerlen gold torc. – (Drawing L. Verhart). – Scale 2:3.

Mieke Zilverberg in the Gallo-Romeins Museum in Tongeren (Belgium) on 6 December 1998. Because Mieke Zilverberg was not familiar with Celtic material, she was not sure about her attribution and decided not to broadcast this discovery. She told the finders that their golden ring was probably very valuable.

All this information, the antique origin of the ring and its possible value raised the suspicion by the finders that the object could be claimed by the State and that they had no rights of ownership because the find was circa 2000 years old. A complication was that the Geurts family had taken part in a long trajectory to get formal approval for building their conservatory from the local authorities. They feared that the permission could be withdrawn when the discovery of such a valuable find was known. They decided, due to this combination of reasons, not to report their discovery to the authorities nor to an archaeologist and put the torc in a drawer.

Yvonne Geurts would have liked to wear the torc but because she was afraid to break it as it had to be bowed open every time, the finders decided to sell their discovery and offered the golden ring to their relative, the Belgian art collector and antique dealer Joel Notebaert in Papignies, a hamlet south west of Brussels. In the beginning of 2000 Notebaert brought the torc to the auction house of the coin dealer Jean Elsen in Brussels. The auction house specializes in antique coins and medals. For the description of the torc for their sales catalogue they sought the expertise of Prof. Dr Simone Scheers (KUL-Catholic University Louvain), expert on Celtic coins. When she was working on her description Scheers met by chance her acquaintance and colleague the archaeologist Luc Van Impe from the IAP-Instituut voor het Archeologisch Patrimonium/Institute for Archaeological Heritage of the Flemisch Community (now: VIOE-Instituut voor het Onroerend Erfgoed/Flemish Heritage Institute) and on 27 January 2000 she asked him to assist her. Elsen was prepared to give the torc on loan to Van Impe from 1-7 February for documentation, photog-

raphy and drawing of the torc. Together they published an account of the find in the Jean Elsen auction catalogue[1]. Van Impe was quickly informed that the find had been made on Dutch territory and immediately contacted his colleague Professor Nico Roymans of the VU University Amsterdam. Roymans informed the National Museum of Antiquities in Leiden which acquired the torc at the auction on Saturday 18 March, 2000.

The find spot of the torc cannot be further researched today. A conservatory with a concrete floor covered the original find location but an excavation or other examination of the soil in the vicinity is however not really feasible because the site is probably heavily disturbed, due to the building activities itself and other diggings in the garden. So no soil traces can be expected to have survived.

The find spot is lying in the northern outskirts of Heerlen (**fig. 1b**), originally known as the village of Robroek and now called Heksenberg, the name referring to an artificial mound approximately 500 m in north-western direction of the location where the torc was found. The find location lies at the foot of the hills to the north at the start of a small dry valley running in a south-west direction which only contains water after heavy rain falls. Before the construction of the district the area was heath land as can be seen on topographic maps from the beginning of the eighteenth century. On a map of this period the Heksenberg itself is visible as an isolated mound on heath land, the formerly Heerlerheide, on the top of a rather steep slope of the hilly landscape. This mound, which has never been excavated, is currently regarded as an artificial construction.

As far as is known there were no archaeological finds recovered during the construction works of the buildings in the district. Most houses were built in the 1930s. There are stories of local inhabitants claiming that in the beginning of the nineteenth century urns were found, but no finds can be traced from this area in museums and other collections. There are no finds either from the vicinity of the find location recorded in the Central Archaeological Archives (ARCHIS).

The absence of indications for habitation and other finds leads to the conclusion that we are dealing with an isolated find. Despite its obvious value this is not an exception. Many of the hoards with – later – Celtic coins in the vicinity – like Echt/NL[2], Maastricht-Amby/NL[3], Beringen/B[4] and Heers/B[5] have been made as isolated finds. The only hoard in a settlement context is that from Niederzier, Kr. Düren/D)[6].

L. v. I./L. V.

ARCHAEOMETRIC ANALYSIS OF THE GOLD TORC FROM HEERLEN

As the gold torc of Heerlen (**figs 3-4**) has no archaeological context, it is first necessary to examine whether evidence can be found that indicates a modern manufacture. Should that not be the case, further examination must focus on details of the construction to date the artefact and localize its origin. The examination took place on 19 October 2007 in Saarbrücken. X-ray analyses took place in the Schweißtechnische Lehr- und Versuchsanstalt Saarbrücken; examination of the object, using a CAMSCAN 4DV scanning electron microscope was carried out at the Lehrstuhl für Werkstoffwissenschaft und Methodik der Fachrichtung 8.4 – Materialwissenschaft und Werkstofftechnik, Universität des Saarlandes.

The metallographic examination of the Heerlen ring was conducted using a CAMSCAN S4 raster scanning electron microscope (REM), a Freedom-EDX-Detector and Noran System Six Software from ThermoFisher for quantitative material analysis. The inspection focused on two parts:

1. The display of the ornaments and buffer terminals in order to ascertain the method of construction.
2. The identification of the composition of materials (chemical analyses) through energy dispersive X-ray analyses (EDX).

Preparation of the samples

No special preparation other than the usual cleaning took place. This was not necessary because gold builds no oxide layers. A structural analysis, for which abrasion and polishing would have been necessary, was not conducted. The torc was then reproduced and analysed using the REM with an acceleration voltage of 20 kV.

Modes of reproduction and analyses in use

Modes of reproduction

Depiction is possible through emission electron(SE)-contrast and back scattered electron(RE)-contrast. SE-reproduction is highly sensitive in relation to topography with a high degree of depth of focus. Therefore, it is possible to depict the whole buffer terminal in focus. Back scattered electrons show in addition to the contrast of topography a contrast in materials, meaning that different materials appear in different degrees of brightness. This is especially helpful in identifying inclusions or inhomogeneous parts in the material, which have no effect on the topography. Nevertheless, no such inhomogeneous parts were detected.

Modes of analyses

The energy dispersive X-ray analyses is conducted in two different ways: usually the local X-ray analyses (microprobe) is used, meaning that the electron beam is focused and fixed to one point during the whole course of the measurement. The quantitative evaluation of the measuring signal is determined by the Interaction volume. It comprises an area of 1 μm^3 around the point of impact of the electron beam on the surface. The local analysis procedure has the disadvantage of practically never providing a mean material composition due to inclusions of inhomogeneous material. For this reason integral analyses as well as local analyses were conducted. Thereby, an area as large as possible was screened during the EDX-spectrum scan. As a consequence, the information comes from the whole of the screened area but only to a depth of around 1 µm. The average of the inhomogeneity of the material is built over the whole extent of the measured area in this way. Local measurements are marked by the Index Ax and labeled on the respective figure. (»A« meaning the point of the measurement taken on the related figure and »x« representing a consecutive number)
The exactness of the quantitative analyses of the EDX-analytical method usually lies within 0.1% by weight, differing by the available total volume, the material itself and by the configuration of the sample. All the analyses were done without a standard measurement leading to a somewhat less exact result but having the advantage that all existent components of the material can be captured without the need of a quantitative standard of an approximately comparable compounding.

Results

The torc is completely preserved and weighs 219 g. As an open ring with a rod-shaped body, ornamented collar and contoured buffer terminals it is similar to early La Tène type 4 gold torcs (Echt 1994, 149). As is typical for these rings, the body is oval, but not uniformly curved showing two significant kinks (**fig. 4, 1**) at 7.00 and 9.00 clock. Its greatest diameter measures 165 mm. The unadorned rod with a diameter of 5.5-6.0 mm expands out to the moulded buffers.

sion of appliquéd filigree. The bands, which frame the narrow swelling, are of the same metal as the adjacent ridges (**fig. 4, 2**). From the early La Tène period imitated beaded bands in the form of notched bands are a part of the gold and bronze smith's ornamental repertoire.

While the buffer terminals remained without further ornamentation with the exception of the above mentioned bead strings, the otherwise plain bow shows on both sides a decorated collar (Pauli 1980, 248, Kat. Nr.83). The ornament collection was built by punching stamped circular patterns, engraved straight lines, and chiselled notched bands in the form of imitation pearled bands. The pattern consists of two triangles, framed by pearled bands between two deeply cut and inaccurately executed double lines. A radial eye-pattern marks the tip of the triangle. The surface of the triangle was filled using the same punch as well as the gusset between two triangles. These are not placed in the centre of the outer radius of the ring, but are moved from the median in order to make them completely visible to the observer.

Four radial eye-patterns fill the triangle, which can be seen in **figure 4, 2** on the left end of the ring, while the surface of the triangle on the back side shows only three radial eye-patterns. On the right end of the ring both triangles are filled with three radial eye-patterns, arranged in a triangular form. Such a pattern – three radial eye-patterns put in three corners – can be found repeatedly on bronze torcs and arm rings; for example: on a neck ring from Prosnes, dép. Marne (Pauli 1980, 248, Kat. Nr.83), an arm ring from Bucy-le-Long, dép. Aisne, tomb 5 (Lobjois / Ancien 1983, fig. 5, 2; 7, 5)[7] and on a neck ring from Worms-Herrnsheim, Kreisgraben 8, tomb 2. An arm ring or anklet from Kreisgraben 1, tomb 3 of the same cemetery shows clearly that the ornament derives from depictions of the human face (Zylmann 2006, 116 ill. below no. 2; 70 fig, no. 3). It is debateable whether the metal-smith of the Heerlen ring was aware of this visual reference or not. To be sure, a triangle filled with four radial eye-patterns, as on this ring, does not remind one of a face any more than does the bronze torc from Leimersheim, Lkr. Germersheim, tomb 12 (Engels 1974, pl. 43A) or the one from Chouilly »Les Jogasses«, dép. Marne, tomb 45 (Hatt / Roualet 1981, pl. 11 no. 1259), both of which display the same ornament.

Former analyses has resulted in the accumulation of substantial knowledge of the early La-Tène goldsmith's craft (Echt / Thiele 1994). In the case of this recent find from Heerlen one must ask if material, techniques of production, and ornamentation fit the picture drawn from existing information; if the information should be revisited and revised, or if the information drawn from this find collides with the knowledge gained from other early La-Tène artifacts. X-ray structural analysis and scanning electron microscopy technology were used to clarify the production technology, while microprobe analysis was applied to determine the material composition.

The X-ray images (**fig. 5, 1-2**) shows no variation in density. The buffer terminals as well as the adjacent parts of the body of the ring are shown lighter because the material is thicker, which leads to a higher absorption of the X-rays. This observation points to a homogenous material. The consistent absorption of X-rays over the whole width of the ring excludes the possibility of a hollow interior. This applies to the body as well as the buffer terminals. The smooth transition of grey tones in the direction of the body shows no indication of joints. All these examinations indicate that the body was cast as a single piece.

Scanning electron microscope analysis should confirm if this impression proves to be true. A particularly extensive examination of all possible areas where joins could be made was undertaken: transition from the body of the ring towards the buffer terminals and the boundaries between sections of the moulded buffer terminals. During the course of the topography survey, six micro-probe analyses were conducted to ascertain the elemental composition of the material.

Energy dispersive electron beam microanalyses are shown in **table 1**. The result is astonishing in the respect that, contrary to expectations, it shows no sign of a concentration of copper. Only two out of five samples display a faint peak at 8 keV, pointing to a very small amount of copper (**fig. 12a; 13b**). One of these

Fig. 4 The Heerlen gold torc. – **1** Complete photo (scale ca. 2:3). – **2** Detail of the buffer terminals. – (Photos J. Pütz, Institut für Vor- und Frühgeschichte und Vorderasiatische Archäologie der Universität des Saarlandes).

The highly polished surface shows no signs of usage or abrasion. An elongated scratch near the left buffer appears to be relatively recent. The convex parts of the moulded buffer terminals are highly polished as well. In contrast, the concave parts are only slightly burnished, while the end plates are coarsely finished (fig. 4, 2).

Both buffer terminals are identically shaped. Beginning from the outside, a flat cone follows a broad engorged base, leading to a narrow high throat; this is followed by a narrow low ridge and ends with a final narrow throat. All of these shapes are framed by bands of simulated droplets. These are sculpted bands cut from the material and notched vertically with a narrow straight-edged chisel to achieve the illu-

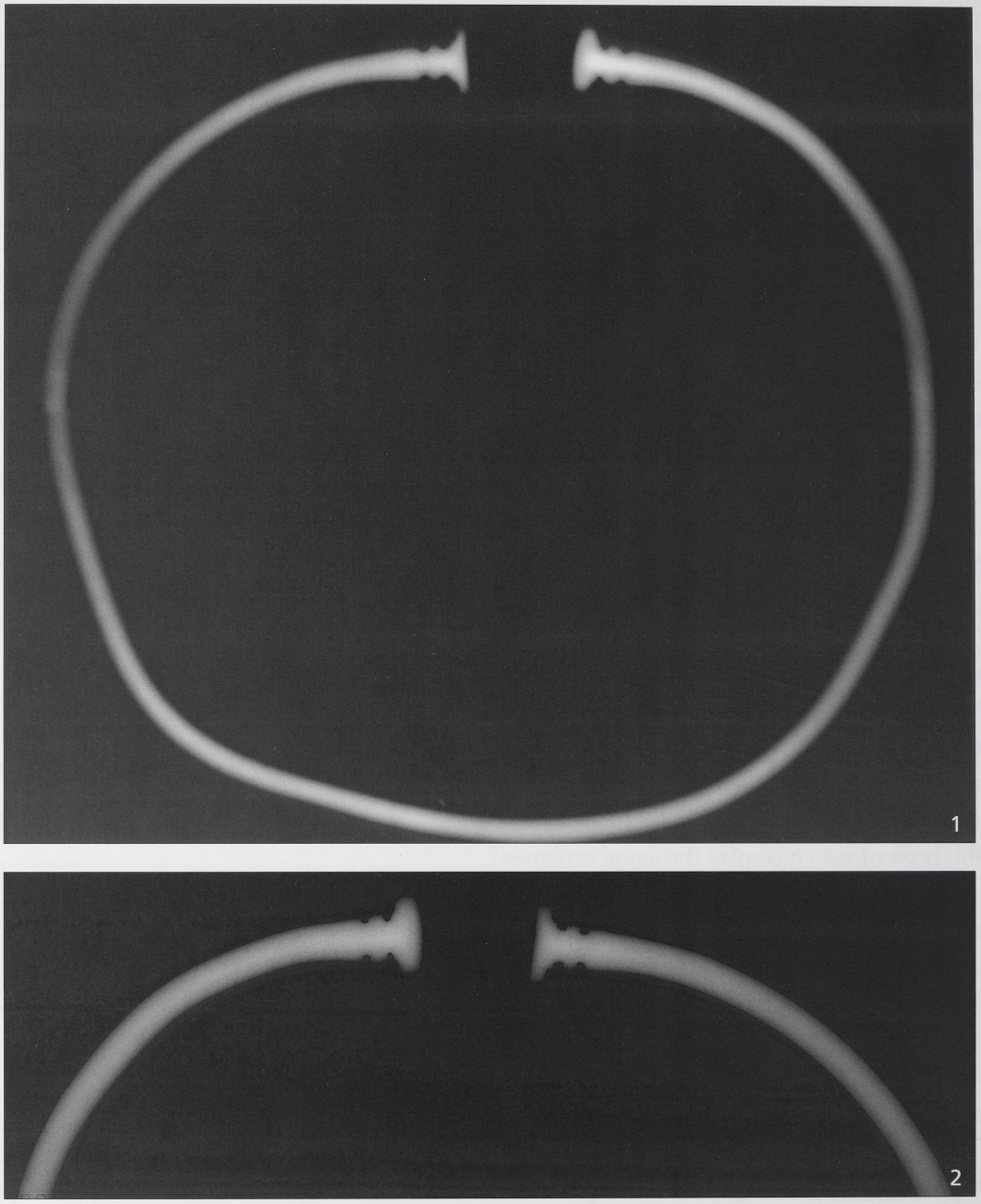

Fig. 5 The Heerlen gold torc. – **1** X-ray photograph, complete torc. – **2** X-ray photograph of the buffer terminals. – (Photos J. Roth, Schweißtechnische Lehr- und Versuchsanstalt im Saarland).

samples was taken from the surface of the innermost pearled band of the buffer ending (**tab. 1**, probe no. 6); the other one originates from the polished bulge at the end of the bow directly next to it. These two neighboring spectra might suggest a residual amount of copper in the material, which nevertheless is no longer detectable on the surface. Specific manipulation (annealing and acid bathing) at the end of the manufacturing process can lead to the removal of copper on the surface (Echt / Thiele 1994, 23-25). But selective corrosion while lying in the earth can result in a certain amount of copper leaching of the surface as well (Möller 1995).

No.	place of analyses	Au	Ag
1	on the end plate, rough surface (A2 on fig. 8)	100.00	0.00
2	on the end plate, rough surface	98.84	1.16
3	bow of the ring, in an engraved line (A3 on fig. 11)	98.31	1.69
4	buffer terminals, on the burnished rim (A1 on fig. 8)	96.84	3.16
5	bulge between the bow and the buffer terminal, polished surface	93.29	6.71
6	bow, bead string, polished surface (A4 on fig. 11)	93.23	6.77

Tab. 1 Results of energy dispersive electron beam microanalyses

A not very homogeneous alloy of gold and silver over the entire surface can be verified. The amount of silver measured at diverse points differs between 0 and 6% by weight. The highest contingent (3.16-6.77% by weight) appears on milled and polished areas of the surface, while the rough surfaces where engraved lines reach to deeper layers of the material show significantly lower amounts of silver (0.00-1.69% by weight). This can be explained through the solidification behavior of the gold-silver-system. After the cast the solidification process begins from the rim inwards with the gold-rich crystal mixture. If the surface is removed through grinding, the mixed crystals containing a higher amount of silver come to light. In the area of the engraved lines these measurements have to be handled with care though, because there is no possibility to distinguish the incised surface from a deeper lying layer with absolute certainty.

With a Brinell hardness of clearly under 50 HB[8] the ascertained alloy is classified as soft. It requires a rather high liquidus temperature of over 1050 °C for the process of casting. Its colour is of an intensive red-yellow and comes close to the colour of pure gold.

Pores can be detected over the whole surface of the ring, when using adequate magnification (**fig. 6**). Deeper lying places, where polishing is difficult, show wrinkles as well (**figs 9-10**). The end plates of the buffers are coarse and covered with pores (**fig. 7-8**). This is clear evidence that the original form was created through casting. Nevertheless, no flashes could be detected as they inevitably occur when melt runs into the joint between the upper and the lower halves of a two-part mould during the process of casting; nor were there any identifiable ridges where these may have been worked off. Therefore it can be assumed that the casting was conducted using the lost wax technique.

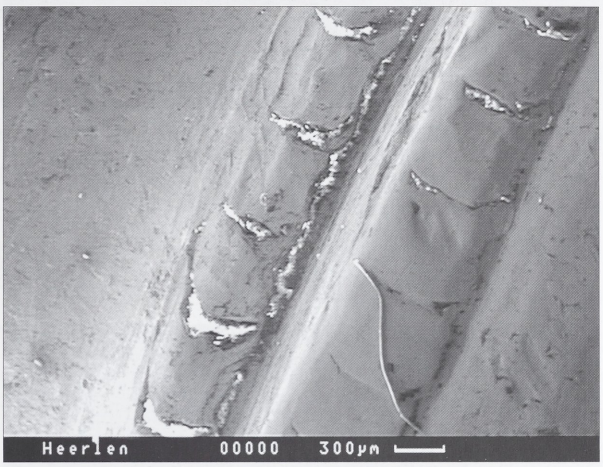

Fig. 6 Herleen. – Deeply engraved line between the conical and the concave outer part of the buffer terminal. – (REM photo M. Marx, Saarbrücken).

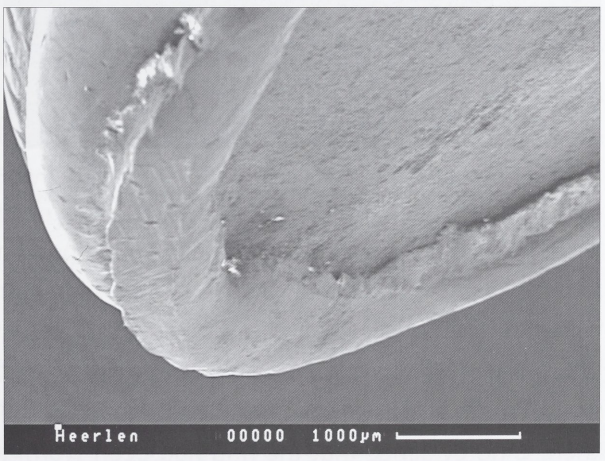

Fig. 7 Herleen. – Left buffer terminal. – (REM photo M. Marx, Saarbrücken).

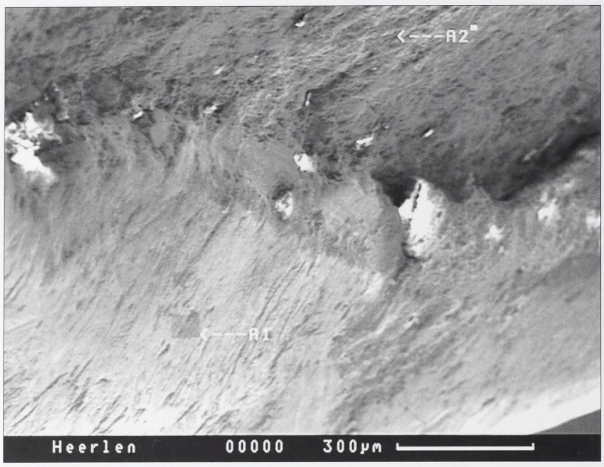

Fig. 8 Herleen. – Left buffer terminal with location of analysis A1 (3.16 weight-% Ag) and A2 (0.00 weight-% Ag). – (REM photo M. Marx, Saarbrücken).

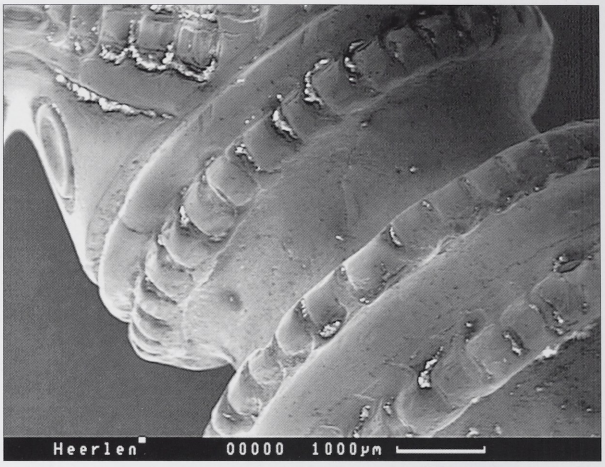

Fig. 9 Herleen. – Transition buffer terminal/bow. – (REM photo M. Marx, Saarbrücken).

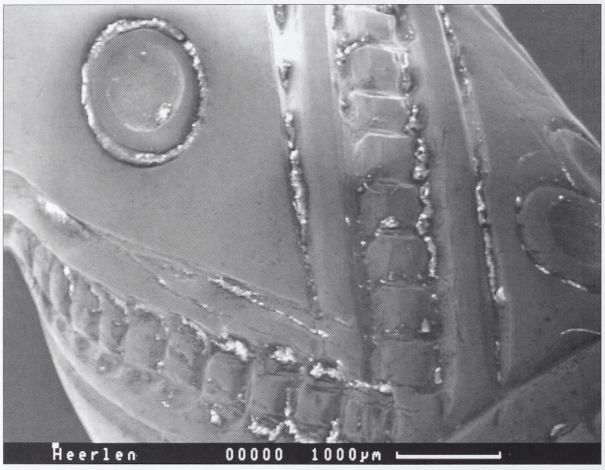

Fig. 10 Herleen. – Engraved and punched ornamentation on the collar of the bow. – (REM photo M. Marx, Saarbrücken).

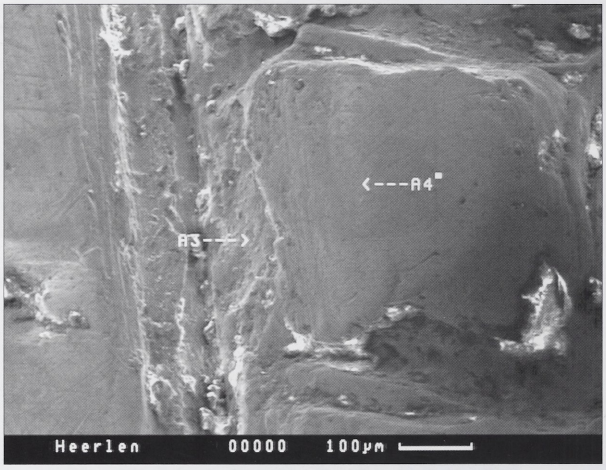

Fig. 11 Herleen. – Detail of the pearled string ornaments with location of analysis A3 (1.69 weight-% Ag) and A4 (6.77 weight-% Ag). – (REM photo M. Marx, Saarbrücken).

The question remains whether the ring was cast as a straight bar, then reworked into an oval shape, or if it was cast in a circular form from the beginning. The kinks mentioned above cannot be a result of use since there is no evidence that the ring had been worn. Hence one might want to explain the existence of the kinks as a result of re-forging the ring into an oval shape after it was cast in a straight bar. Such an assumption would seem to be a bold one since circumstances while the ring was buried or during the course of its recovery may have led to the present form, were it not for a second impartial argument for a straight original form: there are point-shaped depressions in the exact centre of the end plates. These depressions can only be interpreted as a centre hole to fix the rod in a lathe. Lathing was only possible as long as the torc was in a straight form. Polishing marks found on the piece confirm this assumption, for they run perpendicular to the longitudinal axis of the smooth body of the ring – which can be best explained through the theory that the straight form rotated around its own axis during the polishing process.

A certain detail of the ring endings is hard to explain (**fig. 4, 2**). Visible with the naked eye, the end plates of the buffers are depressed in comparison to the pearled rim. Through magnification under the REM, two different layers of metal are discernable. They show that the originally still higher rim was flanged (**figs 7-8**). Had the X-ray analysis not shown something different, one might assume that the buffers were hollow pieces, sealed with end plates.

Remarkable as this finding might be, it does not stand alone. Even more distinctive are the high edges of the buffer terminals on gold torcs made of four twisted square shafts and decorated with embossed dots and radial eye-patterns from Myjava, okr. Senica/SK (Zachar 1987, Tab. 30). The gold ring fragment from Maschlalm near Rauris, Land Salzburg (Jacobsthal 1944, no. 48; Guggisberg 2000, fig. 241) must be mentioned here as well. It shows decorations in the Waldalgesheim style, and considering the reconstructed diameter, it must have been part of a torc as well. Related by its style is a gold torc from Gorni Zibăr (alias Zibăr Varoš), obšt. Vălčedrăm, obl. Montana/BG (Jacobsthal 1944, no. 46; Venedikov / Gerassimov 1973, fig. 254-255) with plain buffers and asymmetrical tendril ornamentation on the collar. Moreover, the buffer terminals of the fragment of a torc from Podbořany-Oploty, okr. Louny/CZ show depressed end plates (Jacobsthal 1944, no. 47).

All of these gold torcs are isolated finds and can therefore only be dated on stylistic grounds to the Waldalgesheim or Vegetal style (Lt B1) and Jacobsthal's »Sword style« (Lt B2-C1). But the torc from Santa Paolina di Filottrano, prov. Ancona/I, tomb 2, epitomizing the best Waldalgesheim style, is known in its primary context and shows depressed, rough end plates as well (Baumgärtel 1937, pl. 19, 1; Jacobsthal 1944, no. 44). The associated crater of the Filottrano-painter give a *terminus post quem* of around the middle of the 4th century BC (Landolfi 1986, 24). This corresponds to the dating of the prototypical grave ensemble from Waldalgesheim, Lkr. Mainz-Bingen, to an advanced Lt B1 at the beginning of the last quarter of the 4th century BC (Joachim 1995, 211). The gold torc from Waldalgesheim also has moulded buffer terminals with end plates lying deeper than the pearled rim.

Why the cited examples, as well as the ring from Heerlen show a higher rim compared to the end plates is unknown for the present. While the rim of the torcs from Santa Paolina di Filottrano, Gorni Zibăr and Heerlen might be thought of as a frame for an inlay made of a different material such as coral, enamel or amber, such an alternative is out of the question for the rings from the Maschlalm, Waldalgesheim and Podbořany-Oploty. The end plates of these rings are decorated with sculptured, three-dimensional designs and cannot serve as a basis for an inlay. This presumably counts for the ring from Myjava as well, even if the rim might look similar to a serrated frame. One of the end plates indeed is plain, but the other shows punched ornaments similar to those on the collar of the ring, which would have been covered by an inlay. Therefore it remains to be said, that the gold torc termination buffers of Lt B (Santa Paolina di Filottrano, Waldalgesheim, Podbořany-Oploty, Maschlalm, Myjava) and probably Lt C1 as well, (Gorni Zibăr) regularly show end plates lying deeper than the rim of the buffers or are depressed regardless of whether the end plates are left plain (Santa Paolina di Filottrano, Gorni Zibăr) or if they show ornamentation (Waldalgesheim, Podbořany-Oploty, Maschlalm, Myjava). The gold torc from Heerlen fits perfectly within the parameters of the known Lt B gold rings as a result of this feature.

Further details of the manufacturing technique support this view. The two rings from Santa Paolina di Filottrano and Heerlen have the centre hole on the end plates in common. With the rings from the Maschlalm, Podbořany-Oploty and probably from Gorni Zibăr the Heerlen ring shares solid die casting[9] as its primary production method. Radial eye-patterns link the rings from Heerlen and Myjava. Finally the alloy used for the production of the Heerlen ring must be mentioned. The analyses as displayed in **table 1** show an average of 96.75% by weight for Au and 3.25% by weight for Ag. According to A. Hartmann's analysis, alloys with a purity of over 950/1000 seldom occurred in central Europe before the La-Tène Iron Age[10], but

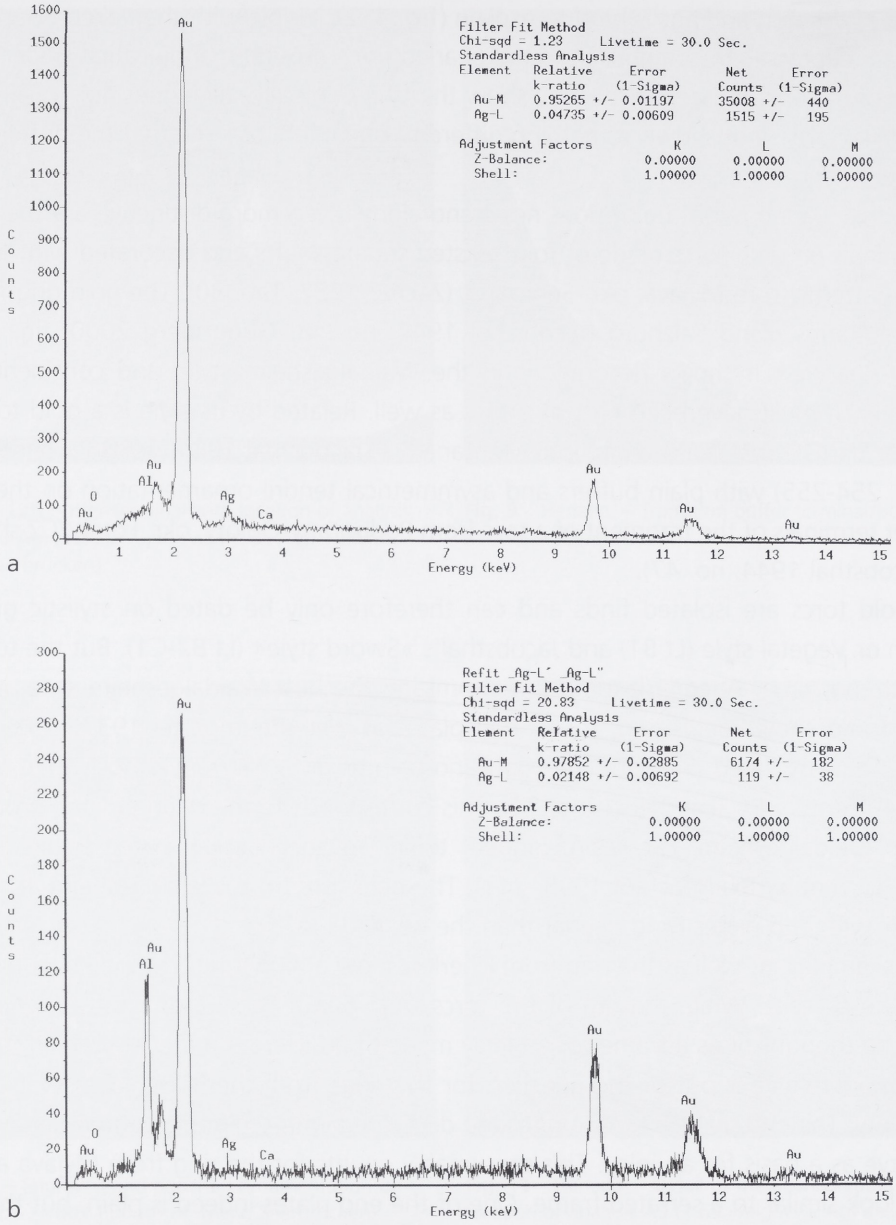

Fig. 12 Herleen. – **a** Spectrum of elements at the location of analysis A4 (pearled string ornament between buffer terminal and bow). – **b** Spectrum of elements at the location of analyses A1 (rim of the buffer terminal). Aluminium and oxygen point to clay deposits used as an abrasive.

for example were ascertained for a Lt A1 finger-ring from Dörth, Rhein-Hunsrück-Kreis, the Lt A3 set of gold rings from Reinheim, Saar-Pfalz-Kreis and the Lt B1 torc along with the two bracelets with figure decorations from Waldalgesheim. All these alloys hold a very small amount of Cu-microprobe analysis of the Reinheim torc did not yield any Cu content at all (Echt / Thiele 1994, 78). Therefore, the consistency of the alloy of the Heerlen torc fits well in the known pattern.

The weight of the Heerlen torc is the last consideration. In 1995 the present authors connected the exceptionally high purity of the gold rings from Waldalgesheim in with its weight and expressed the suspicion that the rings might have been made out of Achaemenid or Macedonian gold coins (Echt / Thiele 1995, 137-139). This suggestion was followed by Guggisberg. On the one hand he was able to confirm that as

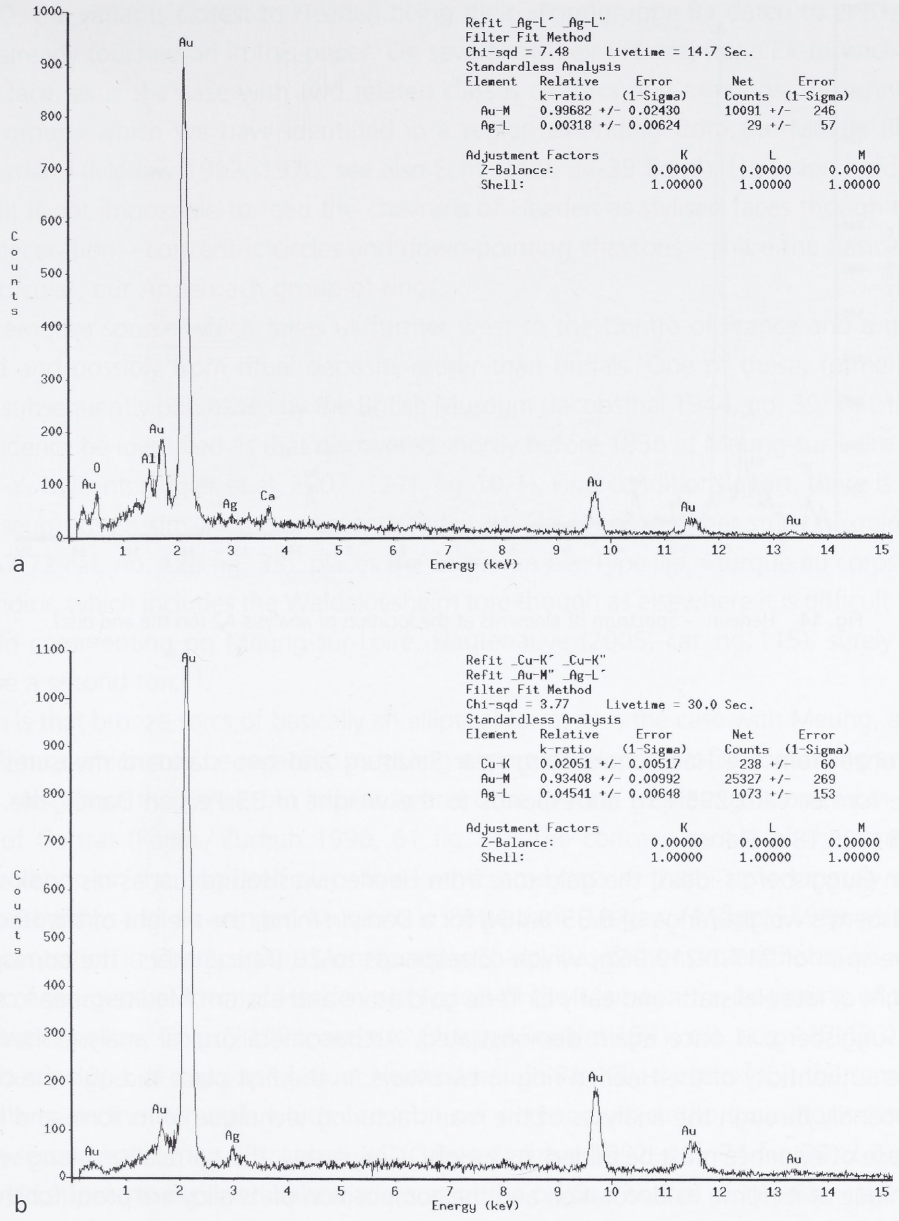

Fig. 13 Herleen. – **a** Spectrum of elements at the location of analysis A3 (in the chamfer between buffer terminal and bow). – **b** Spectrum of elements on the polished bulge at the end of the bow.

many as twelve gold torcs and armlets of late Hallstatt and early La Tène provenance, weigh an even multiple of Persian Darics, while another five objects show a half-weight multiple. On the other hand he was able to show that many of those pieces consist of an alloy noticeably different from the fine gold used for eastern Mediterranean coins. Therefore and because of the fact, that some of the rings weigh between 0.04 and 1.1 g more than the next even multiple, he concluded quite correctly, that an immediate connection between the weight of early La Tène gold rings and the Persian mint – through the usage of those coins as a raw material – is not given. Nevertheless Guggisberg considers the possibility: »dass das ökonomische Wertssystem der prämonetären Latènekultur auf einer Gewichtseinheit fusst, die dem persischen Dareikos nahesteht« (Guggisberg 2000, 100). To corroborate this hypothesis he cites a standard

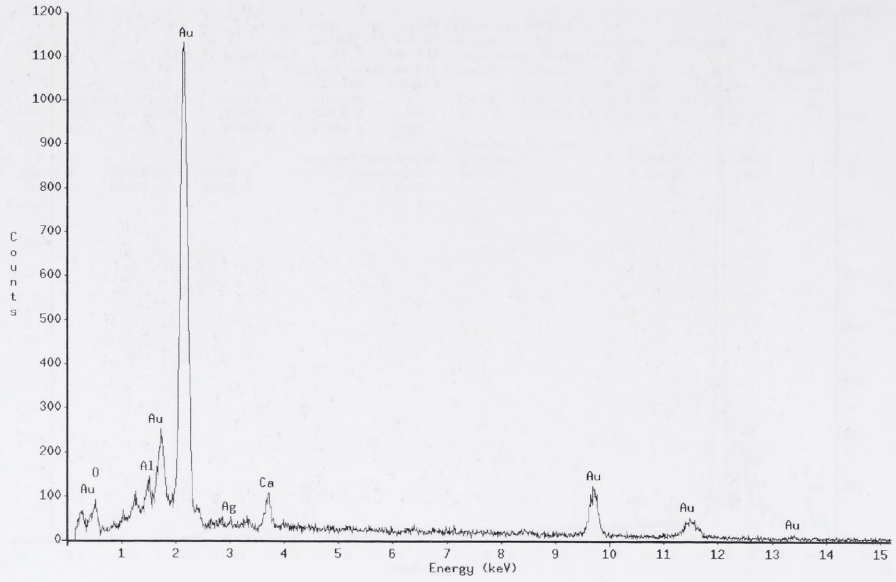

Fig. 14 Herleen. – Spectrum of elements at the location of analysis A2 (on the end disc).

measure of bronze from the Hellbrunner Berg near Salzburg and two standard measures of lead from Manching. The former with 295.15 g corresponds to the weight of 35 Persian Darics, the latter equal 6 (50.6 g) and 15 (125.18 g) Darics.

As if to confirm Guggisberg's ideas, the gold torc from Heerlen was found just as his book went to press. Keeping Guggisberg's weight range of 8.35-8.46 g for a Daric in mind, the weight of the Heerlen torc with 219 g fits in the span of 217.1-219.96 g, which corresponds to 26 Daric-Staters. The correspondence between the weight of late Hallstatt- and early La Tène gold attire and eastern Mediterranean coins, as rightly identified by Guggisberg, is once again demonstrated. Archaeometallurgical analyses have contributed evidence to the authenticity of the Heerlen ring in two ways: in the first place through the composition of its alloy and secondly through the analyses of the manufacturing technique of its form and its decoration. Now a third piece of evidence must be added: its weight. Conversely, this correlation along with the manufacturing technique of its form, its decoration and the composition of its alloy are proof for the authenticity of the gold torc from Heerlen. In addition, typology and style of ornamentation appear as autonomous circumstantial evidence.

R. E./M. M./W.-R. T.

THE HEERLEN GOLD TORC: SOME FURTHER TYPOLOGICAL AND STYLISTIC CONSIDERATIONS

While only brief accounts of the Heerlen torc have so far appeared (Scheers / Van Impe 2000; Hautenauve 2005, cat. no. 244; Verhart 2006a, 6-7; 2006b, 133. 135; 2008, 133. 135; Roymans 2007, 313) its basic form is clear enough – slender with tapering buffer- or horse-hoof terminals, chiselled vertical ridging and simple chevron decoration below the terminals. While Echt in his contribution to this paper has drawn attention particularly to the form of the terminals and a group of Lt B gold torcs – Filottrano, Waldalgesheim. Oploty and Maschlalm – in a detailed study Möller / Schmidt (1998, 561-570) and Möller (2000) have reconsidered bronze examples of the same basic type from the Marne and Hunsrück-Eifel which they place

in La Tène B1/2, the variants closest to Heerlen being their »Formgruppe B« dated to Lt B1a. There is another feature already touched on in this paper. On several of their »Formgruppe E« torcs chevrons morph into a human face, as is the case with two related classes of torcs and armrings, the »Andernach« and »Horchheim« groups which we have identified in a region extending from the Middle Rhine down to Western Switzerland (Megaw 1967; 1970; see also Echt 1999, 37-39 fig. 4). However, hard as one might try, it is difficult if not impossible to read the chevrons of Heerlen as stylised faces though the actual elements of the decoration – concentric circles and down-pointing chevrons – share the basic stylistic vocabulary of, in particular, our Andernach group of rings.

There is an alternative source which takes us further west to the Centre of France and a group of torcs, several in gold and possibly from ritual deposits rather than burials. One of these, formerly in a private collection and subsequently purchased by the British Museum (Jacobsthal 1944, no. 39; Tait 1976, no. 112), may with confidence be identified as that discovered shortly before 1836 at Meung-sur-Loire (dép. Loiret/F; **fig. 15**) (inf. P.-Y. Milcent: Augier et al. 2007, 127f. fig. 10, 1). Find conditions apart, there is no doubt that the British Museum torc is similar in general to Heerlen. H. Hautenauve in her study of gold torcs (Hautenauve 2005, 67-72 cat. no. 126 fig. 33), places the former in her Type IIIa, »torque au corps massif à tampons sans fermoir«, which includes the Waldalgesheim torc though as elsewhere it is difficult to support her classification. In commenting on Meung-sur-Loire, Hautenauve (2005, cat. no. 115), surely in error, considers this to be a second torc[11].

What is certain is that bronze torcs of basically an elliptical form, as is the case with Meung, are common in the Centre of France which may be regarded as having a more developed profile continuing an ancient tradition into Lt B1. Also from the Loiret, but in bronze and close in form to Meung, is one from grave 2 of the flat cemetery of Cortrat (Rapin / Zurfluh 1998, 61 fig. 14). The concave profile of the terminals and the manner of decoration on the ring itself place this in the same class as that – unfortunately without provenance – in the Boymans-van Beuningen Museum in Rotterdam (Megaw / Megaw 1988, with a partial list showing a concentration in Champagne). More recently Charpy has demonstrated that in his »secteur Beine-Suippes« torcs of the general form of Heerlen are typical of the Marne in the beginning of the 4th century BC (»La Tène ancienne IIa«; Charpy 1991; see also Charpy / Roualet 1991, cat. nos. 117-123). In bronze are the pair from barrow IV-1 of a group of six at Neufchâteau-le-Sart (B); these exhibit the same employment of regular striations on the terminals which occur on our ring and which the excavator notes as typical for the area in the second half of the 5th century BC (Cahen-Delhaye 1997, 46f. 74 fig. 38, 2-3).

Thus there would appear to be several alternatives as to the original source of Heerlen – the Middle Rhine, Central France, or indeed nearer at hand, in the Ardennes though it must be said of the second and third regions that there is little evidence of gold-smithing particularly in the relatively early periods cited here for potential parallels to Heerlen. What other imported early La Tène pieces found in the Netherlands have we got which might offer possible solutions to this question? Roymans (2007, 313f. figs 2-3) draws attention to two brooches, respectively a coral inlaid double duck-terminaled brooch from a disturbed grave at Andelst and a later and more complex inlaid Lt B1 Münsingen-type brooch dredged from the Waal at Dreumel. While the former indeed can be paralleled in the Middle Rhine and further south (see e.g. Binding 1993, pl. 12-15) the closest to the latter is not as indicated by Roymans to be found in Switzerland but rather in Western Hungary in grave 4 of the cemetery of Ménföcsanak, Kom. Györ-Moson-Sopron (Uzsoki 1987, 16. 35 pl. 1, a-c) though it has to be admitted that the Hungarian example in turn has no close parallels in Transdanubia and is best seen as an easternmost export just as Dreumel is the westernmost.

As concerns a scatter of early La Tène material from the north of the Netherlands comes the well-known dagger with openwork anthropoid handle from a grave on the Bisshopsberg near Darp in the municipality of Havelte (Drenthe). This appears to be only the most spectacular of a number of finds from the area

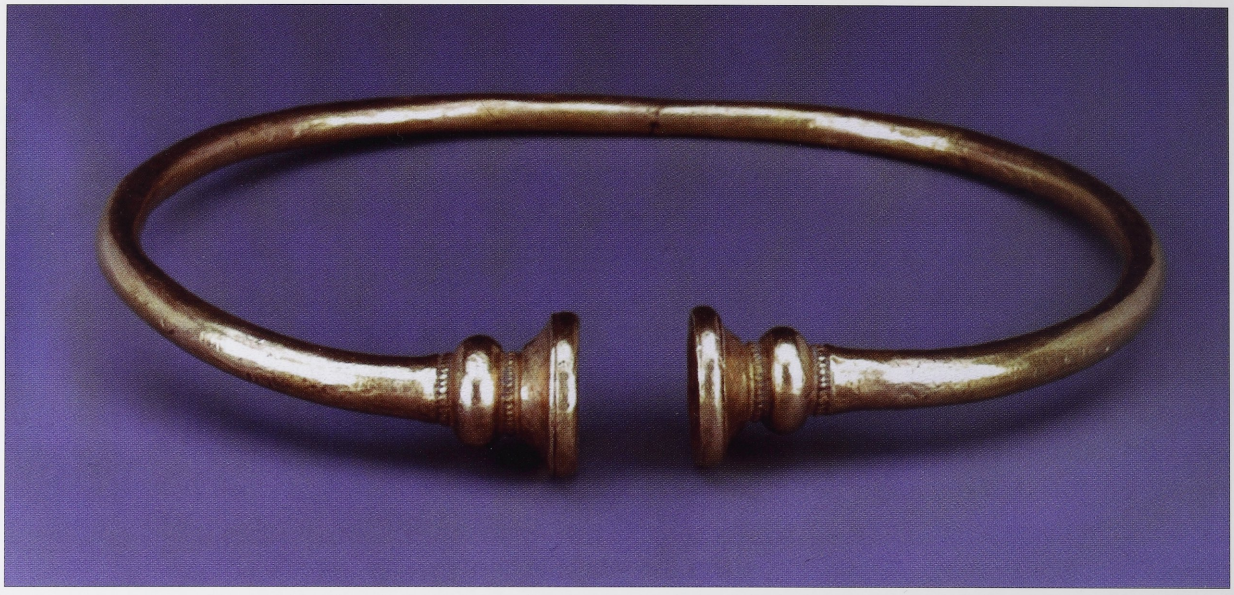

Fig. 15 Meung-sur-Loire (dép. Loiret/F). Gold torc. Diam. 152 mm. – (Photo courtesy Trustees of the British Museum, London).

including spears and horse-harness suggestive of a local élite with links to the Hunsrück-Eifel-Kultur (Kooi 1983; Beuker / van der Sanden / van Vlisteren 1991, 40-43 fig. 48; de Wit 1997). From Anloo also in Drenthe is a hoard (ritual deposit?) of bronze harness mounts. This important group, discovered in 1938 but which has yet to receive full publication, consists of three U-shaped mounts, a large and a small pair of undecorated phalerae, and two openwork phalerae exhibiting a complex compass-based design (Lenerz-de Wilde 1977, cat. no. 40 pl. 11, 2a; for an illustration of the whole find see Beuker / van der Sanden / van Vlisteren 1991, 42 fig. 49). The closest parallels for the openwork Anloo phalerae come from the Ardennes and the Marne extending to the Middle Rhine and with occasional more southern examples (for a useful selection see Schaaff 1973, pl. 46; see also Pauli 1983 and most recently the full discussion by S. Verger in: Desenne / Pommeruy / Demoule 2009, 387-392).

This is not the place for a full re-examination of the evidence for links between the Netherlands, North-eastern France and the Hunsrück-Eifel. There remain uncertainties concerning the origin of the Heerlen torc not least because of the widespread distribution of torcs and armrings of precious metal from élite LT A-C contexts (Schönfelder 2007, fig, 4). It is also particularly unfortunate that our knowledge of its original context is incomplete. Notwithstanding, Heerlen may certainly be added to the select list of objects and sites which indicate the occasional but significant links between the regions in the course of the 5th and early 4th centuries BC. V. M.

Acknowledgements

Nico Geurts and his former wife were interviewed nearly two years after the discovery. In autumn 2009 Yvonne Geurts, now Lenssen, was again interviewed to resolve some details about their discovery. We would like to thank them for their cooperation and help; further we thank Fred Brounen and Roelof Braad for helping in tracing information on old finds in the area around the Heksenberg, Prof. Dr.-Ing. Horst Vehoff, Dr.-Ing. Helmut Nies, Dipl.-Ing. Georg Schambil and material tester J. Roth of the Schweißtechnische Lehr- und Versuchsanstalt Saarbrücken for their collegial help. Thanks are due also to Jean-Jacques Charpy (Épernay), Hans-Eckart Joachim (Bonn) and Pierre-Yves Milcent (Toulouse) for discussing the possible affinities of the Heerlen torc and to Jennifer Bagley (Frankfurt am Main) for translation of German parts to English.

Notes

1) Scheers / Van Impe 2000.

2) Hiddink 2008.

3) The exhaustive studies on Heers and Maastricht are in full preparation by: Roymans, Creemers / Scheers (and probably others).

4) Creemers / Scheers 2007. – Van Impe et al. 1997/1998.

5) Creemers / Scheers 2007. – Scheers / Creemers 2002.

6) Göbel et al. 1991. – Joachim 2007.

7) For the typology of the armrings from Bucy-le-Long see now Desenne et al. 2009, 280-93.

8) This applies for casting samples which did not undergo cold processing but were annealed at 740 °C and quenched at around 400 °C. Cp. Sterner-Rainer 1926. – HB is the unit of hardness given by the Brinell test, HV the unit of hardness given by the Vickers test.

9) In the absence of metallographic analysis, this statement is based only on the macroscopic characteristics and the published weights.

10) Cp. the list with the results of the OES-analyses of prehistoric golden artifacts by A. Hartmann: Hartmann 1978; 1970; 1982.

11) It is worth noting that another puzzle object, or rather group of objects, in the British Museum is the gold torc and pair of armlets purchased in Belgium around 1930 (Jacobsthal 1944, no. 45; Tait 1976, cat. no. 114; Hautenauve 2005, cat. no. 276; Schönfelder 2007, 293 and fig.1-2). With a very general resemblance to the gold rings of Waldalgesheim, queries have been raised from time to time as to their authenticity. In answer to an enquiry Paul Craddock – at the time Senior Scientist in the Department of Scientific Research at the British Museum – responded as follows: »In response to your recent enquiry on the authenticity work carried out on the torc, reg. 1930, 4-11,1 and the two matching bracelets, reg. 1929, 12-21,1 and 2, I can confirm that the examination was carried out [...]. I can say that the further work that we did reinforced concerns raised by previous work, and we can say now that the present construction of the torc is certainly completely modern«. That would seem to put an end to the matter.

References

Augier et al. 2007: L. Augier / Ch. Mennessier-Joannet / P.-Y. Milcent / L. Orengo / S. Riquier, La France centrale aux IV^{e}-III^{e} s. av. n. ère (Auvergne, Berry et Orléanais). In: Ch. Mennessier-Joannet et al., La Gaule dans son contexte européen aux IV^{e} et III^{e} siècles avant notre ère. Actes du XXVII^{e} colloque international de l'AFEAF = Monographies d'Archéologie Méditerranéenne, (Lattes 2007) 117-176.

Baumgärtel 1937: E. Baumgärtel, The gaulish Necropolis of Filottrano in the Ancona Museum. Journal of the Royal Anthropological Institute of Great Britain and Ireland 67, 1937, 231-286

Beuker / van der Sanden / van Vlisteren 1991: J. R. Beuker / W. A. B. van der Sanden / V. F. van Vlisteren, Zorg voor de doden – vijfduizend jaar begraven in Drenthe. Archeologische Monografieen van het Drents Museum 3 (Assen 1991).

Binding 1993: U. Binding, Studien zu den figürlichen Fibeln der Frühlatènezeit. Universitätsforschungen zur Prähistorischen Archäologie 16 (Bonn 1993).

Cahen-Delhaye 1997: A. Cahen-Delhaye, Nécropole de La Tène à Neufchâteau-le-Sart. Monographie d'Archéologie Nationale 10 (Bruxelles 1997)

Charpy 1991: J.-J. Charpy, Esquisse d'une ethnographie en Champagne celtique aux IV^{e} et III^{e} siecles avant J.-C. Études celtiques 28, 1991, 75-125.

Charpy / Roualet 1991: J.-J. Charpy / P. Roualet, Les Celtes en Champagne: Cinq siècles d'histoire. Musée d'Epernay, 22 juin-3 novembre 1991 (Epernay 1991).

Creemers / Scheers 2007: G. Creemers / S. Scheers, Wichtige Fundstücke als Zeugnisse der Eburonen in Nordostbelgien. In: Krieg und Frieden 2007, 169-174.

Krieg und Frieden 2007: Krieg und Frieden. Kelten – Römer – Germanen [Begleitbuch zur Ausstellung im Rheinischen Landes-Museum Bonn 2007/2008] (Darmstadt 2007).

Desenne / Pommepuy / Demoule 2009: S. Desenne / C. Pommepuy / J.-P. Demoule (eds), Une nécropole de La Tène ancienne (V^{e}-IV^{e} siècle avant notre ère): Présentations et études: une approche de la population, des sépultures et du mobilier. Revue Archéologique de Picardie no. spécial 26. (Amiens 2009).

de Wit 1997: M. J. M. de Wit, Een aantal bijzondere Drentse grafvondsten uit de vroege en midden-ijzertijd. Paleo-Aktueel 8, 1997, 71-73.

Echt 1999: R. Echt, Das Fürstinnengrab von Reinheim: Studien zur Kulturgeschichte der Früh-La-Tène-Zeit. Saarbrücker Beiträge zur Altertumskunde 69 (Bonn 1999).

Echt / Thiele 1994: R. Echt / W.-R. Thiele, Von Wallerfangen bis Waldalgesheim. Ein Beitrag zu späthallstatt- und frühlatènezeitlichen Goldschmiedearbeiten. Saarbrücker Studien und Materialien zur Altertumskunde 3 (Bonn 1994)

1995: R. Echt / W.-R. Thiele, Zur Herstellungs- und Fügetechnik der Goldringe von Waldalgesheim. In: H.-E. Joachim (Hrsg.), Waldalgesheim: das Grab einer keltischen Fürstin. Kataloge des Rheinischen Landesmuseums Bonn 3 (Köln 1995) 111-140.

Éluère 1987: Ch. Éluère, Celtic Gold Torcs. Gold Bulletin 20, 1987, 22-37

Engels 1974: H. J. Engels, Funde der Latènekultur 1. Materialhefte zur Vor- und Frühgeschichte der Pfalz 1. Veröffentlichung der Pfälzischen Gesellschaft zur Förderung der Wissenschaften in Speyer 63 (Speyer 1974)

Göbel et al. 1991: J. Göbel / A. Hartmann / H.-E. Joachim / V. Zedelius, Der spätkeltische Goldschatz von Niederzier. Bonner Jahrbuch 191, 1991, 27-84.

Guggisberg 2000: M. Guggisberg, Der Goldschatz von Erstfeld. Ein keltischer Bilderzyklus zwischen Mitteleuropa und der Mittelmeerwelt. Antiqua 32 (Basel 2000)

Hartmann 1970: A. Hartmann, Prähistorische Goldfunde aus Europa. Spektralanalytische Untersuchungen und deren Auswertung. Studien zu den Anfängen der Metallurgie 3 (Berlin 1970).

1978: A. Hartmann, Ergebnisse spektralanalytischer Untersuchung späthallstatt- und latènezeitlicher Goldfunde vom Dürrn-

berg, aus Südwestdeutschland, Frankreich und der Schweiz. In: L. Pauli, Der Dürrnberg bei Hallein 3. Münchner Beiträge zur Vor- und Frühgeschichte 18 (München 1978) 601-617.

1982: A. Hartmann, Prähistorische Goldfunde aus Europa 2. Studien zu den Anfängen der Metallurgie 5 (Berlin 1982).

Hatt / Roualet 1981: J.-J. Hatt / P. Roualet, Le cimetière des Jogasses en Champagne et les origines de la civilisation de la Tène. 2. Description des tombes de la série marnienne. Revue Archéologique de l'Est et du Centre Est 32, 1981, 17-32.

Hautenauve 2005: H. Hautenauve, Les torques d'or du second Âge du Fer en Europe: Techniques, typologies et symbolique (Rennes 2005).

Hiddink 2008: H. Hiddink, Archeologisch onderzoek bij Echt op de vindplaats van een muntschat uit de Late IJzertijd. Zuidnederlandse Archeologische Rapporten 24 Amsterdam 2008).

Jacobsthal 1944: P. Jacobsthal, Early Celtic Art (Oxford 1944).

Joachim 2007: H.-E. Joachim, Die späte Eisenzeit am Niederrhein. In: Krieg und Frieden 2007, 48-58.

Kooi 1983: P. B. Kooi, A remarkable Iron Age grave in Darp (Municipality of Havelte, the Netherlands). Oudheidkundige Mededelingen uit het Rijksmuseum van Oudheden te Leiden 64, 1983, 197-208.

Landolfi 1986: M. Landolfi, Zum Grab II der Nekropole von S. Paolina di Filottrano. In: Beiträge zur Eisenzeit. Kleine Schriften aus dem Vorgeschichtlichen Seminar der Philipps-Universität Marburg 19 (Marburg 1986) 21-26.

Lenerz-de Wilde 1977: M. Lenerz-de Wilde, Zirkelornamentik in der Kunst der Latènezeit. Münchner Beiträge zur Ur- und Frühgeschichte 25 (Bonn 1977).

Lobjois / Ancien 1983: G. Lobjois / A.-M. Ancien, Les bracelets gaulois de Bucy-le-Long (Aisne). Revue Archéologique de la Picardie 1983/3, 16-23.

Megaw 1967: J. V. S. Megaw, Ein verzierter Frühlatène-Halsring im Metropolitan Museum of Art, New York. Germania 45, 1967, 50-59.

1970: J. V. S. Megaw, Further Early La Tène rings and other material of the »Horchheim« and »Andernach« classes. Germania 48, 1970, 126-30.

Megaw / Megaw 1988: J. V. S. Megaw / R. Megaw, A La Tène neckring of unknown provenance. Helinium 28/2, 1988, 271-277.

Möller 2000: C. Möller, Das Grab 13 von Leimersheim, Kr. Germersheim (Pfalz): Ein Beitrag zur Chronologie der Frühlatènezeit. Archäologisches Korrespondenzblatt 30, 2009, 409-428.

Möller / Schmidt 1998: C. Möller / S. Schmidt, Ein außergewöhnlicher Halsring der frühen Latènzeit aus Wippe, Gem. Friesenhagen, Kreis Altenkirchen. In: A. Müller-Karpe (ed.), Studien zur Archäologie der Kelten, Römer und Germanen in Mittel- und Westeuropa. Alfred Haffner zum 60. Geburtstag gewidmet. Internationale Archäologie Studia Honoria 4 (Rahden/Westf. 1998) 553-624.

Möller 1995: P. Möller, Electrochemical corrosion of natural gold alloys. In: G. Morteani / J. P. Northover (eds), Prehistoric Gold in Europe: Mines, Metallurgy and Manufacture (Dordrecht, Boston, London 1995) 357-367.

Müller 1981: F. Müller, Die frühlatènezeitlichen Flachgräber der Kantone Baselstadt und Baselland. Jahrbuch SGUF 64, 1981, 73-106.

Pauli 1980: L. Pauli (ed.), Die Kelten in Mitteleuropa. Kunst, Kultur, Wirtschaft. Salzburger Landesausstellung 1. Mai-30. Sept. 1980 im Keltenmuseum Hallein, Österreich (Salzburg 1980).

1983: L. Pauli, Eine frühkeltische Prunktrense aus der Donau. Germania 61, 1983, 459-86.

Rapin / Zurfluh 1998: A. Rapin / H. Zurfluh, Le cimetière celtique de Cortrat. Revue Archéologique du Centre de la France 37, 1998, 33-79.

Roymans 2007: N. Roymans, On the Latènisation of Late Iron Age material culture in the Lower Rhine-Meuse area. In: S. Möllers / W. Schlüter / S. Sievers (eds), Keltische Einflüsse im nördlichen Mitteleuropa während der mittleren und jüngeren vorrömischen Eisenzeit. Kolloquien zur Vor- und Frühgeschichte 9 (Bonn 2007) 311-325.

Schaaff 1973: U. Schaaff, Frühlatènezeitliche Grabfunde mit Helmen vom Typ Berru. Jahrbuch RGZM 29, 1973, 81-106.

Scheers / Creemers 2002: S. Scheers / G. Creemers Un trésor monétaire des Éburons à Heers (Limbourg, Belgique). Lunula. Archaeologia protohistorica 10, 2002, 80-85.

Scheers / van Impe 2000: S. Scheers / L. van Impe, Une torque celtique en or de 2e âge du Fer trouvé dans le sud des Pays-Bas. Jean Elsen, Liste 208 (Bruxelles 2000), 1-3.

Schönfelder 2007: M. Schönfelder, Considérations sur les élites celtiques des IVe-IIIe siècles av. J.-C. In: C. Mennessier-Jouannet / A.-M. Adam / P.-Y. Milcent (eds), La Gaule dans son contexte européen aux IVe et IIIe siècles avant notre ère. Actes du XXVIIe colloque international de l'AFEAF (Lattes 2007) 291-299.

Sterner-Rainer 1926: L. Sterner-Rainer, Einige Eigenschaften der Legierungen Au-Ag-Cu. Zeitschrift für Metallkunde 18, 1926, 143-148.

Tait 1977: H. Tait, Jewellery through 7000 years (London 1977).

Uzsoki 1987: A. Uzsoki, Ménföcsanak. In: T. Kovács / É. F. Petres / M. Szabó (eds), Corpus of Celtic finds in Hungary 1: Transdanubia 1 (Budapest 1987) 13-61.

Van Impe et al. 2002: L. Van Impe / G. Creemers / R. Van Laere / S. Scheers / H. Wouters / B. Ziegaus, De Keltische goudschat van Beringen (prov. Limburg) (met bijdragen van Br. Cooremans & M. Pieters). Archeologie in Vlaanderen 6, 2002, 9-132.

Venedikov / Gerassimov 1973: I. Venedikov / T. Gerassimov, Thrakische Kunst (Wien, München 1973)

Verhart 2006a: L. Verhart, Uit bagger en veen. Een kleine geschiedenis van Keltische topstukken. Archeologie in Limburg 102, 2006, 3-7.

2006b: L. Verhart, Op zoek naar de Kelten. Nieuwe archeologische ontdekkingen tussen Noordzee en Rijn (Utrecht 2006).

2008: L. Verhart, Den Kelten auf der Spur. Neue archäologische Entdeckungen zwischen Nordsee und Rhein (Mainz 2008).

Vitali 2009: D. Vitali, Ateliers transalpini e Senoni delle Marche: i problemi dello »Stile Vegetale continuo«. In: G. Cooney / K. Becker / J. Coles /M. Ryan / S. Sievers (eds), Relics of old decency: archaeological studies in later prehistorie – a Festschrift for Barry Raftery (Dublin 2009) 333-40.

Zachar 1987: L. Zachar, Keltische Kunst in der Slowakei (Bratislava 1987).

Zylmann 2000: D. Zylmann, Die frühen Kelten in Worms-Herrnsheim (Mainz 2000).

Zusammenfassung / Abstract / Résumé / Samenvatting

Ein eisenzeitlicher Goldhalsring aus Heerlen (prov. Limburg/NL)
Ein Zufallsfund im Jahre 1999 in Heerlen vergrößerte die ziemlich kurze Liste frühlatènezeitlicher Goldschmiedearbeiten aus den Niederlanden um einen Goldhalsring. Nach einer kurzen Beschreibung der Fundumstände werden die Ergebnisse der materialwissenschaftlichen Untersuchungen dargelegt und die sich daraus ergebenden Vergleiche mit anderen Goldhalsringen ähnlicher Zeitstellung in Europa gezogen. Ergänzende typologische Vergleiche zeigen Parallelen in Mittel- und Ostfrankreich, im Mittelrheingebiet und den Ardennen auf. Ein präzises Herkunftsgebiet ist daher nicht anzugeben. Materialwissenschaftliche, typologische und stilistische Argumente bestätigen indes den Goldhalsring von Heerlen als ein Erzeugnis des frühlatènezeitlichen Goldschmiedehandwerks, wie es in den Lt A/B1-Elitegräbern anzutreffen ist.

An Iron Age gold torc from Heerlen (prov. Limburg/NL)
In 1999 the coincidental discovery of a gold torc at Heerlen presented an addition to the relatively few objects of early La Tène fine metalwork to be found in the Netherlands. Following a brief description of the find circumstances a detailed metallurgical analysis compares the Heerlen torc with other gold rings of similar date from Europe. Further notes on the ring's typology, while noting parallels in Central and eastern France as well as in the Middle Rhine and the Ardennes, do not allow a precise definition of its provenance. Such parallels do however confirm that the Heerlen torc is a fine example of early La Tène metalwork as associated with Lt A/B1 élite burials.

Un torque en or de l'âge du Fer à Heerlen (prov. Limburg/NL)
En 1999, la découverte fortuite d'un torque en or à Heerlen a permis de compléter la liste relativement courte des pièces d'orfèvrerie de La Tène ancienne aux Pays-Bas. Après une brève description du contexte de découverte, les résultats d'analyses métallurgiques permettent de comparer la découverte d'Heerlen à d'autres torques en or de la même période en Europe. Les comparaisons typologiques montrent des parallèles dans le Centre et l'Est de la France, dans la région du Rhin moyen et dans les Ardennes. Une provenance plus précise n'a pas pu être établie. Les indices apportés par les analyses métallurgiques, typologiques et stylistiques confirment que le torque d'Heerlen appartient aux productions d'orfèvrerie de La Tène ancienne, telle qu'on les connaît dans les tombes de l'élite à Lt A/B1. *L. B.*

Een gouden IJzertijd-halsring uit Heerlen (prov. Limburg/NL)
In 1999 werd bij toeval een gouden halsring ontdekt in Heerlen. Het is een belangrijke aanvulling van de weinige vroege La Tène-sieraden die we kennen uit Nederland. Na een korte beschrijving van de vondstomstandigheden worden de gegevens van een metallurgische analyse vergeleken met andere Europese gouden halsringen uit die periode. Onanks parallellen in Centraal- en Oost-Frankrijk, het Midden-Rijngebied en de Ardennen kan op typologische gronden geen herkomstgebied worden aangegeven. Wel maken die parallellen duidelijk dat de halsring van Heerlen een goed voorbeeld is van edelsmeedkunst uit de vroege La Tène-periode en kan worden geasassocieerd met Lt A/B1 élite graven.

Schlüsselwörter / Keywords / Mots clés / Sleutelwoord

Niederlande / Frühlatènezeit / Goldhalsring / Metallanalysen
Netherlands / Early La Tène / gold torc / metallurgical analysis
Pays-Bas / La Tène ancienne / torque en or / analyses métallurgiques
Nederland / vroege La Tène-periode / gouden halsring / metaalanalysen

Rudolf Echt
Michael Marx
Wolf-Rüdiger Thiele
Universität des Saarlandes
Im Stadtwald
66123 Saarbrücken
r.echt@mx.uni-saarland.de
m.marx@matsci.uni-sb.de

John V. S. Megaw
Department of Archaeology
Flinders University
GPO Box 2100
Adelaide
AUS - South Australia 5001
vincent.megaw@flinders.edu.au

Luc Van Impe
Schapenstraat 67
B - 3000 Leuven
lf.vanimpe@telenet.be

Leo B. M. Verhart
Limburgs Museum
Postbox 1203
NL - 5900 BE Venlo
l.verhart@limburgsmuseum.nl