

The Disc Phenomenon: A Technological Study of 50 Protohistoric Bronze Discs with Concentric Decoration, from the Abruzzo Region in Italy

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Abstract

Discs were made of bronze, bronze/iron or iron, and for centuries, they were used by all the Italic protohistorical cultures. Considered a single class of materials, for a long time, they were misconstrued as a whole, as components of armour; on the contrary, contextual discs with concentric decoration, where gender is recognizable, come from feminine burials. Research explores dynamics related to production, use and management of discs, alongside relations between production centres, local workshops, and technological changes from bronze to iron and *vice versa*. All 50 discs are sporadic, but the 60% of them indicate Fucino as provenience. This research proposes a diachronic analysis exploring the hypothesis that discs with concentric decoration have both independent origins and different functions from either armour pectorals or figurative samples. Discs with concentric decoration belong to a feminine sphere and, in order to process them in all these aspects, the dress code has been investigated through the study of decorations and suspension systems. About 25% of discs were repaired in the past. Therefore, particular attention was given to chemical compositions and technologies of the various constituent elements or parts of reparation, in order to compare data both inside the same disc or among those showing similar interventions: 1) Methodology and discussion; 2) Quantification of findings and data statistical treatment; 3) Technological and traceological analysis, by stereo Optical Microscope (80×); 4) Chemical characterization, by portable ED-XRF.

Keywords

Archaeometry, Archaeometallurgy, Bronzes, Discs, Italic Cultures, Iron Age, Protohistory, Fucino, Abruzzo

1. Introduction

Discs are made of bronze, iron or both, and they were used for centuries by all the Iron Age Italic cultures, particularly of the “medium Adriatic” horizon, which also includes the Abruzzo region. For a long time, the discs were misconstrued as components of armour, however, currently, they are more widely linked to the expression of social and cultural belongings and are associated with both genders.

Before the year 2000, Tomedi classified 412 discs with concentric decoration, of bronze and bronze/iron, nearly all of them were sporadic but, in the last decades, many samples have been properly dug up, with an exclusive predominance of feminine provenience contests for those with concentric decoration. By the findings’ map (**Figure 1**), it is quite evident that the Abruzzo region, and particularly the Fucino plain, is the area with the most relevant concentration of discs, in general, and specifically for some typologies. All the discs in the assemblage are sporadic, but 60% of them indicate Fucino as provenience. Lacking of reference contexts, for a long time, discs retained the complex evolution of two classes of materials: the Villanovian rectangular pectorals and the “early Roman” *bi-lobati* discs (Peroni, 1961; Papi, 1990; Tomedi, 2000). Both typologies are *kardiophylax*, a protection for the bust; they were a sort of rigid armours, and quite evidently, they were materials for a masculine world of warriors. On the contrary, contextual discs with concentric decoration, when gender is recognisable, they come from feminine burials, where they are generally found in couples, or more, of different diameters (Di Giandomenico, 2006). Couples of discs were arranged over body’s abdomen and pubis and when discs were more numerous, they lay on the shoulders area (Colonna, 2007a).

The quantification of all the sporadic bronze materials from Abruzzo in the Pigorini Museum shows that discs are the majority class among all classes of materials, and that the quantity of metals used in the MIA¹ for the production of discs with concentric decoration represents about 42% of weight of the entire inventory (Mascelloni, 2010).

Discs with concentric decoration refer to fertility rites and they may be associated with some kinds of sun cult, difficult to establish if of Nordic origin as Colonna (2007a) suggests, but what is utterly important for this research is that, in the Protohistory of central Italy, women played a primary role inside the clan. To summarize, discs with concentric decorations were linked to the feminine sphere of influence inside the Italic societies.

The research proposes a diachronic analysis of samples considering the hypothesis that discs with concentric decoration have both independent origins and different functions from either armour pectorals or figurative samples.

In order to process discs in all these aspects, their dress code has been investigated through the study of decorations, suspension systems and reparations.

2. Methodology

The whole assemblage includes 50 discs with concentric decorations and 4

¹MIA: Middle Iron Age. In Italian chronology, it is most frequently “Età Orientalizzante ed Arcaica”.

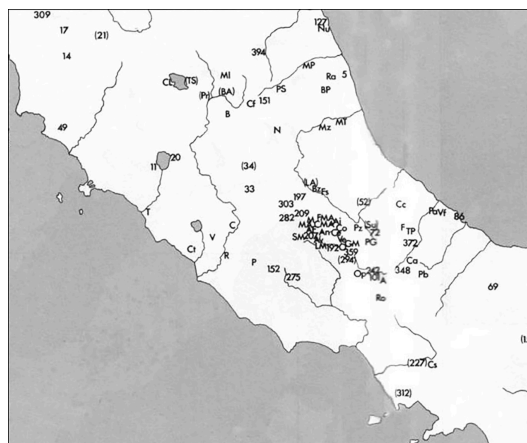


Figure 1. Disc finding map (after Tomedi 2000: p. 153, Figures 146-147).

figurative samples². Research focuses on discs with concentric decoration, and figurative samples are used for data comparison.

All the discs were technologically and traceologically analysed by optical microscope, instead, chemical characterization by XRF-ED was performed only on 27 of them³.

Since most of the discs appear frequently fixed during their life time, particular attention is given to chemical compositions and technologies of various constituent elements or parts of repairation, in order to compare data either inside the same artefact or among those showing similar interventions.

All the data were statistically analysed.

3. Result and Discussion

Discs typologies are defined by different combinations of decorative technics. Earliest samples are conical or slightly convex-thick sheets of bronze with strictly geometric decorations and with bronze or lead as constituent elements. In the late figurative samples, instead, bronze sheets are thinner and flatter and systematically back supported by iron sheets.

There are five geometric discs which do not belong to any typological groups and they are called simply “geometric” (Figure 2).

Dated to the X-IX century BC (Figure 2), the Aielli discs are thick sheets decorated only by dots, normally drilled but sometimes engraved. The Aielli discs present strict analogies with 7 iron drilled discs from the Fossa Necropolis, not far from Fucino (Figure 3).

Both typologies are drilled and the Fossa discs are always coupled and arranged over abdomen and pubis of the dead as well. They come from 4 different ²27 discs, part of the Bellucci Collection, owned by the Perugia Archaeological Museum; 26 discs of the Pigorini Museum of Rome; and 1 unpublished disc of the Ventura Collection, owned by the Celano Prehistorical Museum. Four-digit inventory for the Perugia Museum and five-digit inventory for the Pigorini.

³The 26 discs of the Pigorini Museum and the disc of the Celano Museum.

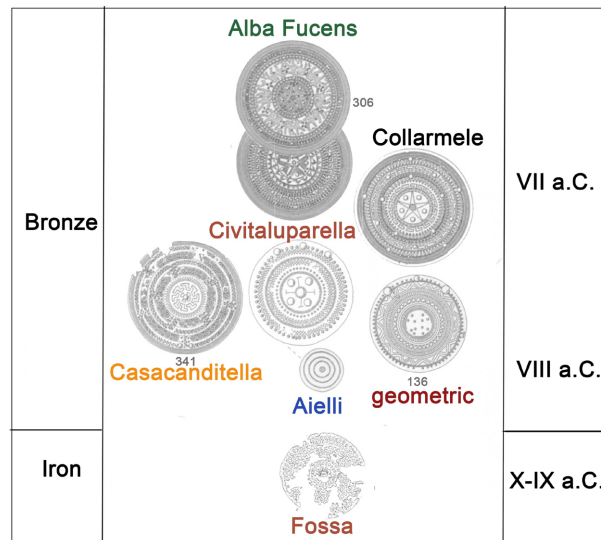


Figure 2. Disc chronology (after Tomedi, 2000: Figure 155).



Figure 3. Fossa necropolis iron drilled discs from tomb 190 (after Cosentino et al., 2001: tav. 35).

feminine burials (Cosentino et al., 2001). The Fossa discs had no relevant iron continuation⁴; discs were made for long lasting and most likely, iron did not satisfy the expectations, however their most relevant features were peculiar to the bronze discs with concentric decoration as well. It is also noticeable that the only concentric decoration disc of bronze showing of iron constituent components evidence, is a drilled sample (85251)⁵; the disc presents the fingerprint of an iron cerclage all along the rim (Figure 5).

As already mentioned, the formula of discs with concentric decoration summarizes formal, artistic and symbolic aspects that highly refer to astral cults. Concentric decoration follows an obsessive and rigid cyclicity. 39 discs out of 50 present astral symbols at the centre of the *umbone* (the central area): 26, a star; 10, a sun; and 2, both symbols. Moreover, a profusion of rays and meanders reminds the “sun wheel” symbology.

⁴A drilled iron disc, in poor condition, recently emerged from tomb 32 of the necropolis in locality Cretaro-Chusa, Avezzano (Ceccaroni, 2010).

⁵Casacanditella disc n. 85251 of the Pigorini Museum.

3.1. Suspension System

From the holes disposition in the centre and long the discs' rim, have been hypothesised four-hole patterns for their suspension (**Figure 11**):

- Centre: Only a central hole, mainly for small sized discs;
- Centre + n: The central hole plus a number of holes along the rim;
- Centre + 2 + n: The major group, the central hole and 2 adjacent holes plus a number of adjacent holes in the opposite side along the rim. Except for one case⁶, all the AF group belongs to the centre + 2 + n class (**Figure 4**);
- Rim: Only a variable number of holes along the rim, exclusive to the figurative typologies.

Some of them have riveted studs or show their fingerprints, others completely lack them. Whenever studs are *in situ*, they support rings or loop plates on the back.

By the position of the holes and the study of the surrounding areas by microscope observation, can be inferred five suspension systems (**Figure 11**):

- **Ring**: By a central ring on the back. In a drilled disc (85494)⁷, the central rivet, of a lead rich alloy, doesn't present any ring on the back and no evidence of breakage (**Figure 5**). Maybe drilled discs could have been suspended also by using drilling holes;
- **Iron**: By iron constituent elements. Two discs of the figurative samples and the drilled disc 85494 belong to this group (**Figure 5**)⁸. The drilled disc presents two large gaps on the body and, in this case as well, suspension by drilling holes can be suggested;
- **Stud**: This group gathers discs where all the holes support studs or show fingerprints of them;
- **Chain**: The group gather discs where all the holes, except the central one, show to have never supported studs. The holes elongated shape suggests chains or hooks as direct support;
- **Studs/chain**: These are discs where both holes are present. Except for one case, all the discs of this group show a hole pattern "centre + 2 + n" with 2 holes for studs opposite to a variable number of holes for chains.

Certainly, disc suspension presupposed a slow gesticulation and didn't leave much freedom of movement. Perhaps, many discs were used also for better balancing. In any case, disc dressing must have been very tiring.

All the discs show evidences of a long utilization time. Rims are worn out and variously deformed, mostly in correspondence with holes. On the other hand, more than 22% of discs are unbroken and 9% of them with a sole fracture on the rim (**Figure 9**).

Fractures are associated to the sheet working quality, to the decorators' ability and obviously to the suspension system.

⁶AF 53833 of the Pigorini Museum. It is probably one—trimmed and shaped—*umbone* of a bigger disc.

⁷Casacanditella disc 85494 of the Pigorini Museum.

⁸Two Alfadena discs: n. 61835 and n. 61836 and the Casacanditella disc n. 85251 of the Pigorini Museum.

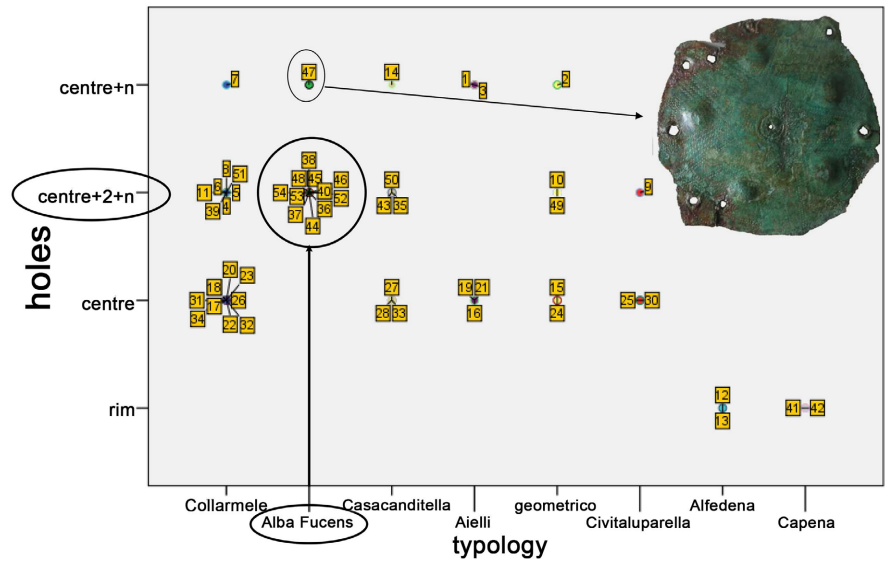


Figure 4. Ratio between hole patterns and typologies of discs. Top right: disc 53833 (see note 6).

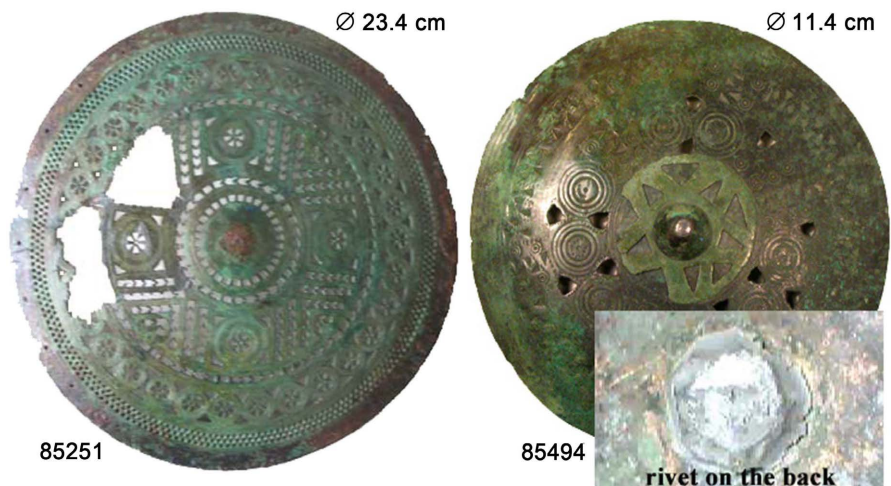


Figure 5. Disc 85251 and disc 85494 (Pigorini Museum).

Generally, connection between fractures and disc typologies shows that drilled samples have the worst degree of conservation (**Figure 6**). The hard working, connected to the annealing, sheet shape forming and decoration, seem to be the main causes of damage. Fractures follow the bases of the *umbone* embossing or the decoration lines (**Figure 7**).

Some fractures seem to have been occurred directly during the disc production, or immediately after, as in the case of the Casacanditella drilled sample 85493 which shows a fracture long a shrinking line, perpendicular to the *umbone* base (**Figure 8**). The 3 rivets of this almost invisible reparation probably sustained a little plate, now disappeared. XRF analysis of one of the rivets indicates that its composition is unusually consistent with the compositions of the other disc components.

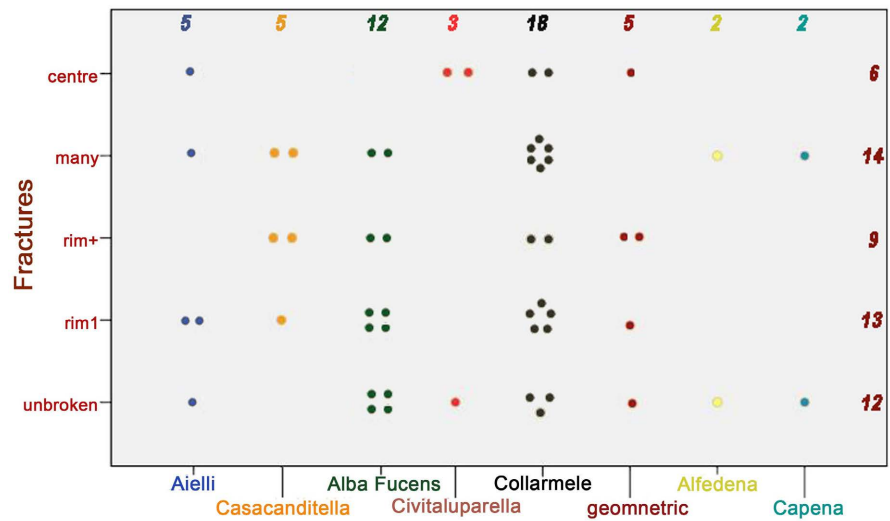


Figure 6. Ratio between fractures and typologies of discs.

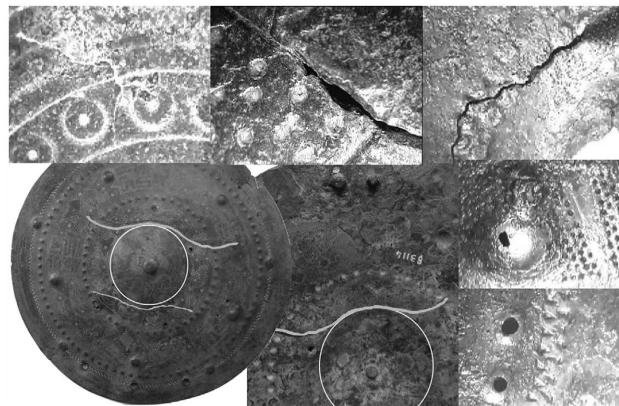


Figure 7. Fracture typologies.

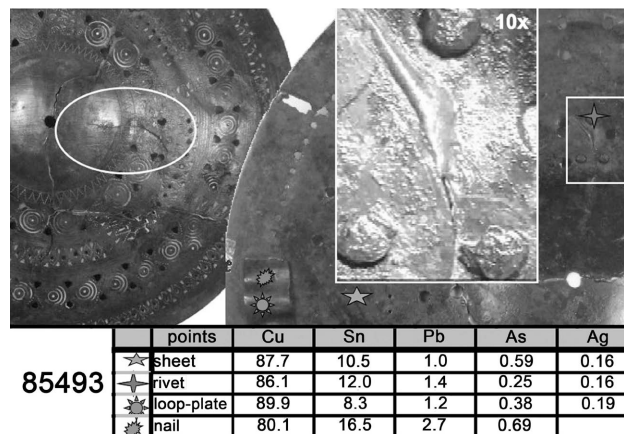


Figure 8. Reparation details and XRF analysis of disc 85493 components.

The Aielli discs present strict analogies with the Fossa samples and both of them served the same function linked to the feminine world. The reason why disc tech-

nology rised by iron is the most intriguing question raised by this research, but presently, the available data don't allow an exhaustive answer to the question. It is clear though that the disc phenomenon was utterly important for these communities to urge a technological change. More experimental phases started, soon after the bronze solution was found.

Casacanditella group is characterised by the fretwork, technically and stylistically more complex and evolved than in the Aielli-type discs, and also variously combined with the entire range of technical choices of full lamina decoration. Casacanditella discs are massive sheets with big thickness. They normally present circular decorated plates covering and supporting the *umbone*, where embossing is particularly pronounced and therefore the disc easily cracks.

Casacanditella discs appear to be earlier than Civitaluparella, Collaramele or AF ones. In one AF sample, there are fragments of a circular plate, used as reinforce, but it is only a late case; once technology improves, plates disappear.

The discs of the Civitaluparella type present a deep decoration technique on thick plates, and they totally lack the embossing technique.

Collaramele and Alba Fucens (AF) typologies share the same decoration techniques but the AF discs introduce figurative subjects in concentric registers, in line with the spread of the *orientalizzante* style.

AF discs have the best degree of conservation with two third of them in the unbroken and rim 1 fracture classes (**Figure 6**). They have mainly big diameters. Out of the 55 AF discs we know (Tomedi, 2000), only four samples have low diameters; two of them are in this assemblage, one "geometric" disc (53753) and the recycled *umbone* 53833 (**Figure 4**)⁹. On the contrary, about 70 % of Collaramele discs have low diameters. Perhaps it was common that Collaramele small discs accompanied AF bigger ones and, in general, that different typologies of discs were used together.

AF typology achieved a sort of balance regarding technology with ideal thicknesses ranging between 9 and 11 millimetres and diameters between 22 and 26 cm. Disc analysis suggests that AF typology represents an arrival point of disc production after a long experimental period and technological changes (**Figure 2**).

3.2. Reparations

About 25% of discs show to be repaired in their life time in 1 or 2 points (**Figure 9**). Reparations fix fractures along the rim, or around the *umbone*, with small plates supported by two or more bronze rivets, by iron or mixed.

Five discs present a real or latent trapezoidal gap on the rim and one of them (3501) a double hatch that preludes its occurrence (**Figure 10**). All the 5 samples are in a bad state and present more than a reparation, so it is possible that they come from one or more hoards where they were stored for chemical and physical recycling.

⁹Why they have been catalogued as Alba Fucens (AF) is a good question.

3.3. Chemical Composition

XRF analysis identifies 7 elements: Cu, Sn, Pb, As, Ag, Sb, and Fe.

Analyses have been taken on: 27 sheets; 2 loop plates; 7 nails; 1 plate and 1 rivet of two similar reparations from two different discs; and 1 rivet from 3 discs where plates were by iron (**Figure 11, Table 1**).

Except for two cases where lead was not detected, all the discs and their components have a ternary (tin/lead) bronze alloy composition with copper ranging between about 94% in one sheet and 73% in one rivet (**Table 1**).

The discs bulk is contained in ranges from 6% to 12% of tin and from 1% to 4% of lead (**Figure 8**).

As, Ag, and Sb, as trace elements, are rarely coupled, and never together; these facts suggest three groups of composition (**Figure 12**). All the Alba Fucens(AF) discs belong to the silver group, except for two samples from Menaforno. The bulk of the Casacanditella discs belongs to this group too. Frequently, iron is also present in association with silver.

More interesting data refer to finding associations of discs. In 6 out of 9 cases, disc associations are notably consistent in trace element composition. All the discs are sporadic, without any indication of finding contexts except sometimes about the sites; they probably are the result of fortuitous finds or illegal searches. Hoping that when they were sold, the discs of the various lots came from the same contexts, it can be conjectured that they shared the same depositions. In fact, the discs of the various lots have very similar patinas¹⁰.

More accurate investigations and more analysis points on selected discs could better define composition groups. On the other hand, the scarce consistence in composition of the reparation parts suggests that local workshops largely adopted metal recycling.

4. Conclusion

The disc phenomenon is still to be explored, considering the opportunity to extend and compare archaeometric data with new research lines: the recent contextual findings in the Cretaro-Chiusa Necropolis of Avezzano, the main town of the Fucino area, where a number of bronze discs with concentric decoration were found in fourteen female burials out of a total of eighteen graves (**Ceccaroni, 2010**); and the new interpretation of two lots of—alleged Umbrian—bronze materials, acquired at the beginning of the 1900s by the Archaeological Museum of Florence, which include at least 17 concentric decoration discs, between wholes and fragments, most likely of Abruzzo origin (**Colonna, 2007b**).

Traceological and chemical aspects suggest that local workshops operated in the Fucino area with their own strategies either compensating for the difficulties of acquiring raw materials or adapting technology to commissions. At the same

¹⁰The study of the patinas and chemical analysis were only possible for the materials of the Pigorini Museum. Unfortunately, the choice of the restoration lab of the Archaeological Museum of Perugia not to remove the residues of organic material from the disc deposition and not to clean and protect them in any way, has made it impossible to carry out in-depth studies on the materials.

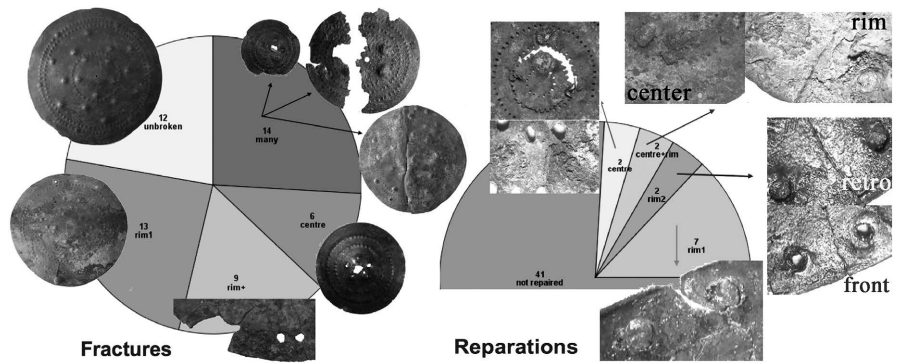


Figure 9. Fractures typologies and reparation interventions of discs (after Mascelloni, 2010: Graphics 11-15).

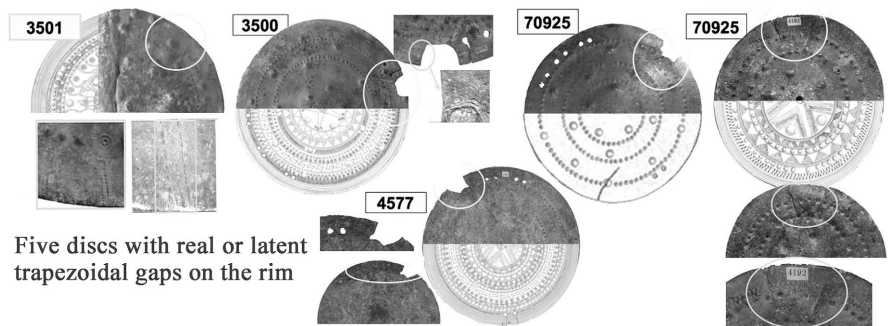


Figure 10. Five discs with real or latent gaps on the rim (after Mascelloni 2010: p. 14).

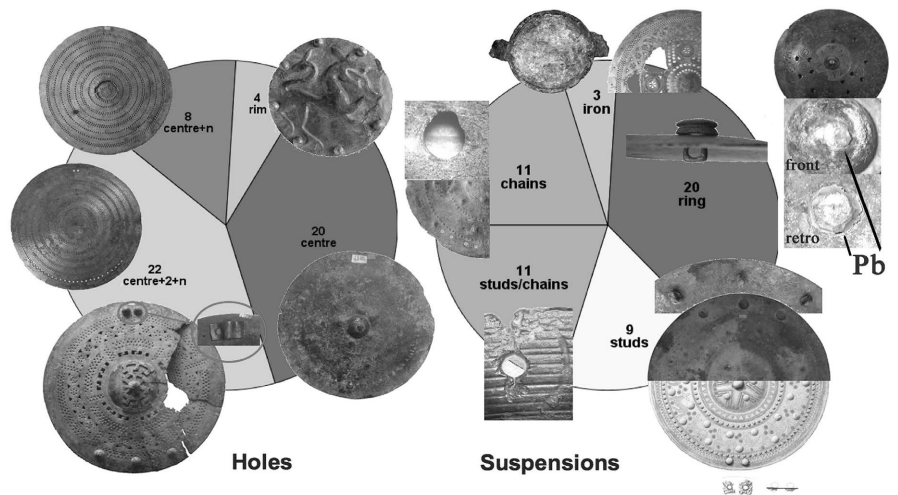


Figure 11. Hole patterns and suspension systems of discs (after Mascelloni 2010: Graphics 8-9).

time, technology and chemistry of discs show that production was performed by highly specialized bronze workshops, hardly to conceive in protohistoric Abruzzo at the state of knowledge.

On the other hand, some clues indicate an early occurrence in Abruzzo of metallurgical activity dedicated to the experimentation and production of iron artefacts. First of all, the strict analogies between the Aielli bronze discs and the

Provenience	Area	Tipology	Disc	As	Ag	Sb	Fe
Antrosano	Fucino	Collarme	53748	*			
Menaforo	Fucino	Alba Fucens	53752	*			
Menaforo	Fucino	Alba Fucens	53753			*	
unknown		Civitaluparella	53832		*		
unknown		Alba Fucens	53833		*		*
unknown		Civitaluparella	54072			*	*
Alfedena	Aquila	Alfedena	61835		*	*	*
Alfedena	Aquila	Alfedena	61836	*			*
Viterbo	Viterbo	geometrico	64269			*	
Fara	Chieti	Cascanditella	69431	*	*		
Fara	Chieti	Cascanditella	69432		*		*
Cascanditella	Chieti	geometrico	69433		*		*
Cascanditella	Chieti	Cascanditella	69434	*	*	*	*
Ortucchio	Fucino	Collarme	70925	*		*	*
Ortucchio	Fucino	Civitaluparella	70926			*	*
Capena	Roma	Capena	72490			*	*
Capena	Roma	Capena	72491	*		*	*
Collarme	Fucino	Collarme	80335			*	*
Collarme	Fucino	Collarme	80336	*	*	*	*
Collarme	Fucino	Collarme	80337		*	*	*
unknown		Alba Fucens	83114		*	*	*
unknown		Alba Fucens	85250		*	*	*
unknown		Cascanditella	85251	*	*	*	*
unknown		Alba Fucens	85253		*	*	*
Massa d'Albe	Fucino	Cascanditella	85493	*	*		
Massa d'Albe	Fucino	Cascanditella	85494				*
Ortucchio	Fucino	Collarme	Celano	*			*

Figure 12. Composition groups of the disc sheets. F = Figurative discs.

Table 1. XRF analysis.

ord log	provenienza	tipo	tipologia	data	n inv	punto	Cu	Sn	Pb	As	Fe	Ag	Sb
					85493a	rivetto	86.1	12.0	1.4	0.3		0.16	
					85493b	fascia	89.9	8.3	1.2	0.4		0.19	
					85494b	chiodo_centrale	23.7	10.5	65.7		0.17		
25	Castelnuovo di Massa d'Albe	Cascanditella	geometrico	09/08	85493	corpo	87.7	10.5	1.0	0.6		0.16	
					69434d	rivetto	90.1	8.2	1.2	0.3		0.18	
					69434b	fascetta	87.5	10.9	1.3	0.2		0.14	
26	Castelnuovo di Massa d'Albe	Cascanditella	geometrico	09/08	85494	corpo	87.0	10.6	2.0		0.41		
					85493c	chiodo	80.1	16.5	2.7	0.7			
					69434a	chiodo	89.2	9.2	1.2	0.3			
13	Cascanditella	Cascanditella	geometrico	09/08	69434	corpo	88.1	10.1	0.9	0.7	0.12	0.18	
12	Cascanditella		geometrico	09/08	69433	corpo	87.9	8.2	3.4		0.27	0.17	
11	Fara, S. Martino	Cascanditella	geometrico	09/08	69432	corpo	87.1	10.9	1.6		0.27	0.13	
					69431a	chiodo_centrale	85.6	11.1	2.6	0.5	0.05	0.16	
					53752a	chiodo	84.5	12.4	2.9	0.2			
2	Menaforo (oggi Gioia dei Marsi)	Alba Fucens	orientaliz	09/08	53752	corpo	88.8	8.3	2.5	0.4			
1	Antrosano—tra Cappelle e Antrosano (Massa d'Albe)	Collarme	geometrico	09/08	53748	corpo	91.0	5.9	2.6	0.6			
10	Fara, S. Martino	Cascanditella	geometrico	09/08	69431	corpo	86.4	9.0	4.6				
8	Alfedena, necropoli—vedi mappa + web (Parco naz. Abruzzo, Lazio e Molise)	Alfedena	figurativo	09/08	61836	corpo	80.5	17.3	0.6	0.2	1.41		
7	Alfedena, necropoli—vedi mappa + web (Parco naz. Abruzzo, Lazio e Molise)	Alfedena	figurativo	25/02/08	61835	corpo	81.0	12.4	5.9		0.10	0.6	
15	Ortucchio	Civitaluparella	geometrico	25/02/08	70926	corpo	90.9	6.0	2.2				0.8
18	Collarme—Campo Ciarleano	Collarme	geometrico	25/02/08	80335	corpo	99.1	0.9					
					80335a	rivetto	73.4	8.4	1.1		16.36		0.8
19	Collarme—Campo Ciarleano	Collarme	geometrico	25/02/08	80336	corpo	85.1	13.0	0.9	0.4	0.59	0.05	

Continued

20	Collarme— Campo Ciarleano	Collarme	geometrico	25/02/08	80337	corpo	80.5	14.1	4.0	0.67	0.10	0.7		
3	Menaforno vicino (oggi Gioia dei Marsi)	Alba Fucens	geometrico	25/02/08	53753	corpo	84.6	13.6	1.1			0.7		
					54072b	chiodo	85.6	12.2	1.2			1.0		
6	ignota	Civitaluparella	geometrico	25/02/08	54072	corpo	87.7	8.7	2.2	0.70		0.8		
9	sporadico, Civita Castellana		geometrico	25/02/08	64269	corpo	90.7	7.4	1.3			0.6		
					70925b	3-corpo	89.3	8.6	1.2			0.8		
14	Ortucchio	Collarme	geometrico	25/02/08	70925	1-corpo	76.6	21.1	1.6	0.65				
					70925a	2-corpo	93.6	2.7	2.8	0.4		0.6		
					70925c	4-piastra	86.4	12.0	1.0			0.7		
					70925d	5-rivetto	88.6	10.2	0.7	0.4				
16	Capena—S. Martino, T. 24—vedi mappa + web (Fiano Romano)	Capena	figurativo	25/02/08	72490	corpo	87.9	9.0	2.1			0.9		
					72490a	chiodo	94.4	5.6						
17	Capena—S. Martino, T. 24—vedi mappa + web (Fiano Romano)	Capena	figurativo	25/02/08	72491	corpo	81.5	12.3	4.8	0.5		0.9		
					72491a	rivetto	88.4	8.4	2.1			1.1		
					72491b	piastra	87.6	8.0	3.2			1.2		
4	ignota	Civitaluparella	geometrico	17/09/07	53832	corpo	85.3	13.1	1.5			0.04		
5	ignota	Alba Fucens	geometrico	17/09/07	53833	corpo	85.4	9.4	2.9	2.19	0.08			
21	ignota	Alba Fucens	I orientaliz	17/09/07	83114	_a corpo	89.3	6.9	2.4	1.35	0.05			
					83114a	_b chiodo	81.5	11.9	2.5	3.14	0.07	0.9		
22	ignota	Alba Fucens	I orientaliz	17/09/07	85250	corpo	89.6	5.2	5.2			0.04		
23	ignota	Cascanditella	geometrico	17/09/07	85251	corpo	85.1	10.1	3.9	0.5	0.47	0.04		
24	ignota	Alba Fucens	I orientaliz	17/09/07	85253	_a corpo	87.7	10.1	2.2	0.03	0.04			
	Ortucchio	Collarme					76.6	21.1	1.6	0.65		disco museo celano		
							Cu	Sn	Pb	As	Fe	Ag	Sb	analizzato da anna felici

oldest Fossa iron samples. Fossa discs still now represent a *unicum*, and as such it seems difficult to trace them elsewhere. Moreover, iron reparations of very early bronze Aielli discs, in connection with iron occurrence as a constituent element in late figurative bronze samples, suggest, at least for the Middle Iron Age, two different metallurgical traditions between local workshops and bronze production centres.

Except for the Cretaro sample (see note 4), the Fossa discs seem to have no relevant continuation in iron, discs were made for long lasting and iron did not satisfy the expectations, but their most relevant features are peculiar also to the bronze discs, showing an amazing investment in symbolic representations.

On the general point of view, this research strongly suggests that production of discs with concentric decoration was a primary need for the Italic societies of the central Italy, so much as to stimulate and encourage experimentation with both techniques and materials.

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Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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