Historical Introduction and focus on Terramare Modena’s Area
(Federico Defendenti – Pavia University)

Hydrological description
(Arnaud Boblique – Reims University)

Terramare Pottery: Shapes and decoration patterns
(Carolina Ferrandi– Pavia University)

Terramare Pottery: Production technology
(Alvise Matessi – Pavia University)

Archaeometrical description of clays and petrographical analyses
(Alexandra-Mihaela Giurgiu – “Babes-Bolyai” Cluj-Napoca University)

Chemical analyses of pottery from the region
(Hugo Olvero Vargas – Paris-Est Marne la Vallée University)

Final interpretation
(Alvise Matessi – Pavia University)
Terramare Civilization:

**Etimological origin:**
Terramare = (from Modena dialect) terra + marna = marl-earth

**Living conditions:**
- Incineration graves
- Water proximity
- Settlements with trapezoidal form with streets arranged in a quadrangular pattern
- Houses built upon piles though on dry land
- 50-300 people

Images from: www.parcomontale.it
# Chronological Context

<table>
<thead>
<tr>
<th>BRONZE AGE (2300-1170 BCE)</th>
<th>Early Bronze Age 2300-1650 BCE EBA</th>
<th>No Terramare’s evidences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Middle Bronze Age 1650-1340/30 BCE MBA</td>
<td>Middle Bronze Age I 1650-1550 BCE</td>
<td>First evidences: No homogeneous archaeological phase</td>
</tr>
<tr>
<td></td>
<td>Middle Bronze Age II 1550-1450 BCE</td>
<td>Terramare civilization as a defined cultural identity and homogeneous settlements</td>
</tr>
<tr>
<td></td>
<td>Middle Bronze Age III 1450-1340/30 BCE</td>
<td>Cultural and economic strengthening</td>
</tr>
<tr>
<td>Late Bronze Age 1340/30-1170 BCE LBA</td>
<td>Late Bronze Age I/II 1340/30-1170 BCE</td>
<td>Apex of Terramare civilization</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gradual decay and disappearance</td>
</tr>
</tbody>
</table>

According to Cardarelli 2003
Geographical Context

Terramare civilization in North Italy

in Modena Area

Images from: Cremaschi – Pizzi – Valsecchi 2006
The main Terramare sites in Modena Area:
Hydrological description

The study of the evolution of fluvial forms is a good approach for understanding the history of human occupation of the plain of Modena and more generally that of Po. This research has confirmed, with details of that travel over east Secchia and Panaro west, downstream from the city of Modena, occurred in a tectonically active region characterized by intense subsidence. South of Modena, they flow to a level below that of the city, while to the north, they run over their floodplain.

Terramare people mastered the techniques of draining, dams and pipelines.
Geoarchaeological map of the Modena Plain with fluvial forms dating from the Neolithic to the Iron Age.

1: paleoriver at the plain level.
2: fluvial ridge.
3: alluvial fan and crevasse splay.
4: area with traces of abandoned braided streams.
5: depression.
6: location of Mutina (Modena roman town).
7: Neolithic and Bronze Age fluvial form.
8: Iron Age fluvial form.
9: surface neolithic and Bronze Age site.
10: surface Iron Age site.
11: buried Neolithic and Bronze Age site.
12: buried Iron Age site.

From CASTALDINI, CARDARELLI, CATTANI, PANIZZA and PIACENTINI 2007
Terramare Pottery - Shapes: Bowls/1

Carinated bowl without handles (it. ciotola carenata – fr. coupe carenée)

One-handled bowl

From Gorzano

Drawings from Levi 1997
Bowls/2

High loop handle bowl
(it. con ansa sopraelevata – fr. anse de panier)

From Casinalbo

Zoomorphic handle
(it. ansa zoomorfa – fr. anse zoomorphe):

From Redù
Bowls/3

Handle with horned projection (it. ansa cornuta – fr. anse à corne):

From Sant’Ambrogio
Pitcher (it. orcio – fr. jarre)

Handled deep vessel with wide mouth

From Tabina di Magreta

From Casinalbo necropolis
Dolium
(large storage jar)

Fragment section of a dolium

From Montale
Biconic jar

From Gorzano
Terramare Pottery: 
Decoration patterns/1

Dimpled ware (it. ceramica a bugnette – fr. céramique à bossette)

From Casinalbo

From Gorzano
Decoration patterns/2

Incised decoration (it. decoro inciso – fr. décor incisé):

From Gorzano

From Montale
Modeling techniques:

Methods of analysis:
• Observation of external features
• Radiographic scan

Results:
• No evidence of wheel technique
• Casting technique for open forms
• Coil technique for closed forms

Photo from Carpenito 2007
Drawing from Levi 1997
Firing atmosphere in MBA and LBA potteries from Gorzano (MO):

General consideration about MBA and LBA pottery production technologies in the Modena area:

- differences in the manufacturing procedures between closed forms (pitchers and jars) and open forms (cups and bowls)

Main manufacturing features for open forms:
- Modeled with casting technique
- Homogeneous oxidation during firing

Main manufacturing features for pitchers and jars:
- Modeled with coil technique
- Dishomogeneous oxidation during firing

production on a domestic scale

primitive forms of standardization of production
Petrography

4 main groups were identified in the pottery from Gorzano:

- three of them show an abundance of clasts added as temper (mean diameter of clasts is 0.2-2 mm);
- the last one is finer (mean diameter <0.1 mm).
Matrix and tempers
<table>
<thead>
<tr>
<th>Archaeological sites</th>
<th>Calcareous sand</th>
<th>Calcite</th>
<th>Grog+sand</th>
<th>Grog+calcite</th>
<th>Grog</th>
<th>Fine matrix</th>
</tr>
</thead>
<tbody>
<tr>
<td>Montale</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>71</td>
<td>6</td>
</tr>
<tr>
<td>Gorzano</td>
<td>2</td>
<td>3</td>
<td>6</td>
<td>5</td>
<td>24</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>Sample</td>
<td>Matrix%</td>
<td>Voids%</td>
<td>Fine Sand%</td>
<td>Medium Sand%</td>
<td>Coarse Sand%</td>
</tr>
<tr>
<td>------------</td>
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</tr>
<tr>
<td>mon6426</td>
<td>&lt;0.0625</td>
<td>2.45</td>
<td>12.10</td>
<td>0.43</td>
<td>1.24</td>
<td>1.64</td>
</tr>
<tr>
<td>mm</td>
<td>&gt;0.0625</td>
<td></td>
<td></td>
<td>0.125 - 0.25</td>
<td>0.25</td>
<td>0.5 - 1</td>
</tr>
</tbody>
</table>
47% of the clay samples do not contain calcite, thus they are compatible with the fine matrix pottery.

Minerals: quartz, albite, K-feldspar, illite/muscovite
CHEMICAL ANALYSIS

Two main chemical compositions in Gorzano pottery: 2 are tempered with calcite, 1 with grog which is chemically similar with the fine matrix of the pottery and 1 is only fine fraction.

The pottery without calcite temper shows large variability in the \( \text{Al}_2\text{O}_3/\text{SiO}_2 \) ratios and does not present significant chemical difference.

No relationship between chemical composition and ceramic shape or function.
P2O5 value ranges from 0.12 to 2.63% are higher than the typical maximum content of 0.5%: Terramare soils were extracted and utilized as fertilizers.

Gorzano pottery has a similar composition to the pottery from other Terramare areas.
Mineralogical composition (XRPD), quartz, albite, K-feldspar, illite (muscovite) principally.

The four petrographic groups from Gorzano show qualitatively very similar composition, the principal difference is related to calcium content.
CONCLUSIONS

Gorzano pottery technology is consistent with the traditional Bronze Age pottery.

The pottery production of several Terramare of Modena area is chemically and mineralogically homogeneous.

The main chemical and mineralogical difference between the four groups from Gorzano is the calcium content.

The fine fraction of the pottery is low in carbonates.

The clay samples which have a low % of carbonates are compatible with the fine matrix of the pottery.

The firing temperature is estimated to be lower than 800–850°C.

The ceramics from the sites of Gorzano, Montale and the other Terramare sites in the Modena province were locally produced, mainly on a domestic scale, and without the standardization processes typical of more complex societies.
Bibliographical References

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Thank you for the attention