

Investigating surface archaeology on the Po floodplain, northern Italy

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The floodplains of major rivers are dynamic environments that have both attracted and dispelled human settlement through the ages. Their archaeological study poses particular difficulties, many of which are being overcome by a joint British–Italian team working in the Po valley.¹ The main aims of the project are to develop new methods of investigation and to reconstruct the environmental and settlement history of the area.

The Po plain is not at first sight a promising area for archaeological field survey. Anyone who travels by road or rail across northern Italy, between the Alps and the Apennines, gains an impression of a vast flat area, entirely domesticated by human activity over recent centuries and used intensively today for both industry and agriculture. The intensive cultivation of the rich agricultural soils suggests that archaeological evidence above ground is unlikely to have survived, except where it is part of continuously occupied villages and towns that still exist. Moreover, although the agricultural landscape varies within the plain, everywhere it is created by modern, technological farming, involving large invasive machines that have the potential to cause massive damage to any underlying archaeology.

These first impressions are not wrong, but they do not represent the whole picture. Examined more closely, the appearance of monotonous flatness dissolves into a more variegated landscape with multiple minor changes in relief, some of which prove to be significant for the reconstruction of past environmental or archaeological features, such as low banks that may indicate former river courses or mark the enclosures of Bronze Age settlements. Even the most devastating modern agricultural machinery has not removed all the subsurface archaeology, so survey by field-walking can produce rich harvests of finds, and satellite and aerial photographs can provide valuable information about sites and landscapes that are invisible at surface level. Furthermore, the present-day

hydraulic management of the floodplain offers some specific opportunities to archaeologists. Drainage channels of all sizes, from major canals to field ditches, can expose sections through archaeological sites where stratified samples for dating and other purposes can be collected, without recourse to area excavation.

The survey area and the *terramare*

The area of our survey lies in the western part of the Veneto region, south of Verona. It was chosen for study as a zone characteristic of the environment of the lower Po floodplain and because it contained three well known Bronze Age sites: Fabbrika dei Soci, Fondo Paviani and Castello del Tartaro (Fig. 1). These sites are attributed to the Terramara Culture of the Middle to Late Bronze Age, so named after the distinctive settlements known as *terramare*. They are large embanked sites that stand out as low mounds rising above the flat Po plain, and most of them are located well to the south of our survey area in the southern part of the plain.

The *terramare* have played a notorious role in the development of Italian prehistory. In the later part of the nineteenth century they were imaginatively reconstructed by the pioneer Italian prehistorians Gaetano Chierici and Luigi Pigorini.² They pictured them as having been surrounded by water-filled moats and systematically laid out as towns resembling Roman military camps (Fig. 2). Pigorini subsequently argued that they were the settlements of the first true Italians, ancestral to all the so-called Italic groups of the Iron Age, including the Romans. In 1930 this view was challenged by another Ital-



Figure 1 The survey area of the Po floodplain showing the location of the six Bronze Age sites mentioned in the text.

ian archaeologist, Giovanni Patroni,³ who rejected the idea that the people of the *terramare* could possibly have been ancestral to the Romans; he accepted Pigorini's reconstruction of site plans, but interpreted these in terms of a primitive communist type of social organization that lacked any social differentiation, political or religious leadership, or family units. Then in 1939, the Swedish archaeologist Gösta Säflund⁴ introduced a much-needed dose of common sense into the discussion by establishing that all that was really known about the *terramare* was that they were situated in the Po plain and dated to the Bronze Age. More recently, the sites have again become the focus of research, culminating in an impressive exhibition (with accompanying catalogue) that was held in Modena in 1997.⁵ Our project has contributed to a new and better understanding of this culture.

The results of our research have so far demonstrated that the survey area has a complex environmental history, related mainly to changing river courses and flood regimes, which profoundly affected its

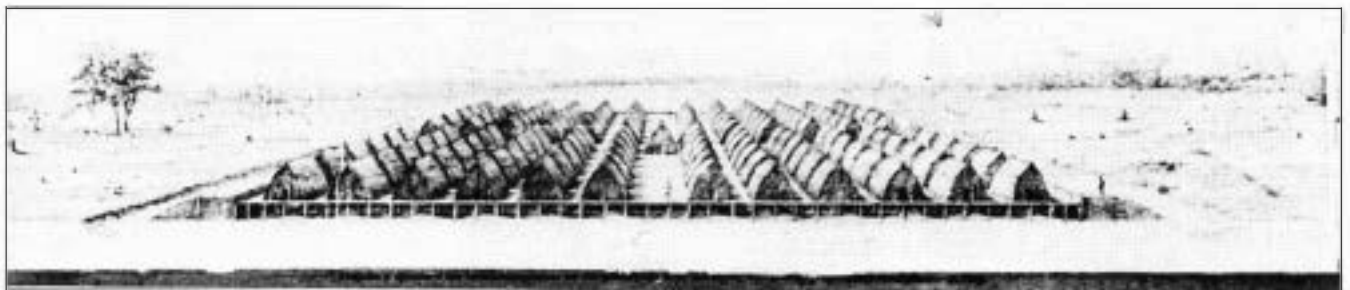


Figure 2 An idealized reconstruction by Chierici (see n. 2 below) of a Bronze Age *terramara* showing bank and ditch, (exaggerated) rectangular plan and (imaginary) street layout (from the reference cited in n. 5 below, p. 6).



Figure 3 Aerial photograph and plan of one of the main Bronze Age sites, Castello del Tartaro, showing natural water courses and artificial ditches of both Bronze Age and Roman date.

human occupation. We have good evidence of Bronze Age settlement but no definite signs of earlier occupation. The area was apparently wholly or mostly abandoned in the Iron Age, at a time of climatic deterioration and widespread flooding. It was then resettled in the Roman period, which was characterized by systematic drainage projects and intensive agricultural exploitation. The medieval and post-medieval periods saw new phases of deposition of alluvial sediments and the formation of peat, associated with relatively sparse human exploitation. The characteristic wetland environment was finally drained in the seventeenth century in the southern part of the project area and in the nineteenth century in the Valli Grandi Veronesi north of the River Tartaro (Fig. 1).

New approaches to surface archaeology

In our fieldwork we have employed a variety of methods: fieldwalking, geophysical prospecting, the examination of sections exposed in field ditches, and coring for soil and sediment samples. These methods are complemented by a range of analytical techniques: analyses of satellite and aerial photographs (including computer-enhanced images), radiocarbon dating, the identification of plant and animal remains, physical and chemical analysis of soils and sediments, and the typological and statistical analysis of artefacts. In many cases our procedures have been developed beyond the standard methods of field-survey projects and are innova-

tive. This can be illustrated with two examples, as follows.

The first, which involves the examination of stratigraphic relationships on a landscape scale, we have labelled the Harris project.⁶ We have access to excellent satellite and aerial photographs (Fig. 3), which reveal a complex palimpsest of many natural and artificial water courses, as well as prehistoric and later settlement sites and other cultural features. From the air it is possible to identify critical locations where the modern drainage system intersects with one or more ancient features. These intersections can be examined by cleaning up sections exposed in field ditches, or, in the case of the larger drainage channels and canals, by taking advantage of the regular cleaning programmes organized by the body responsible for the drainage system. This allows the relative chronology of different structures to be established, which we express in terms of a series of formal relationships (pre, post, synchronous with, within and indeterminate). For instance, we were able, using this approach, to establish the sequence of features in the area of the Bronze Age site of Fabbrica dei Soci (Fig. 4). This banked and ditched settlement had previously been thought to be contemporary with a water course visible from the air and to have been surrounded by a water-filled moat. Our investigations have established that the settlement was constructed on what was by then already a fossil river course (an earlier branch of the River Adige), whereas another river course and associated flood channels post-date

the settlement (and represent the course of the River Tartaro in the Iron Age). Roman-period drainage channels complete the archaeological sequence in this area.

The second example of innovative methodology relates to techniques of intensive field survey, practised on already identified sites. Whereas most surveys base their fieldwalking and collecting on some rectilinear division of fields (lines or grids), we use combinations of systems. One is based on the identification on the ground of different soil types and textures (laid out with coloured tape in advance of fieldwalking). A second system involves the identification of surface clusters of archaeological material (defined by density of finds, and identified in advance of collection). The collection strategy is then based on the intersections of these different units with a rectilinear grid. This procedure is highly labour intensive, but it allows more detailed interpretation of the layout of sites and their internal features than is otherwise possible. For instance, on this basis (combined with the examination of sections in field ditches) we have been able to suggest that, in the three main embanked Bronze Age sites of Fabbrica dei Soci, Fondo Paviani and Castello del Tartaro, there was a zone immediately inside the perimeter bank reserved for storage pits and granaries.

Settlement in the Bronze Age

There is evidence of Bronze Age settlement in the survey area throughout most of the second millennium BC, as is shown by radiocarbon dates on samples of wood,



Figure 4 A section (cut by machine for field drainage) through a Bronze Age bank and ditch at the site of Fabbria dei Soci.

charcoal and bone taken from stratified deposits in sections through settlement sites. The earliest site is that of Canàr (Fig. 1), a so-called lake-village (*palafitta*) settlement, established in a low-lying area, close to, or possibly built over, open water. It is assigned on typological grounds to the middle-late part of the Early Bronze Age. The age of the site has been determined from radiocarbon dates on waterlogged wooden posts, combined with analyses by the Verona dendrochronology laboratory, which has produced a local tree-ring chronology for the wooden structures found at the site. Although more work remains to be done on the sequence, the evidence indicates that the settlement was probably first constructed in the century 1900–1800 BC.

Some time after the Early Bronze Age, wetland settlement sites of the *palafitta* type were replaced by raised sites often surrounded by perimeter banks and ditches. They were established on marginally higher (and drier) ground, often on the gravelly banks left by former water courses, and some of them take the form of *terramare*. One of our most exciting recent discoveries is a series of artificial ditches that we believe were for drainage or irrigation, or both, and apparently constitute the earliest indicators of prehistoric water management in the Po plain. Two samples from the basal level of one of these ditches, at Stanghelle Est (Fig. 1), which produced

pottery of Middle Bronze Age type, gave calibrated radiocarbon date ranges of c. 1890–1670 and c. 1950–1540 cal BC. The later date (from a sample of bone) is likely to be the more reliable and we therefore suggest that the ditch was in use during the century 1800–1700 BC. There is then a gap of some two centuries in the sequence, followed by a series of dates for the large embanked settlements of Fondo Paviani, Fabbria dei Soci and Castello del Tartaro, which have been regarded as classic *terramare*. A fourth embanked site, Canova (Fig. 1), has not produced any radiocarbon dates, but is probably of comparable age.

The sections in the three main sites indicate phases of occupation or use preceding the main banked enclosures, as well as occupation layers associated with the bank defences. Remarkably, the radiocarbon dates appear to indicate that the bank building was undertaken at approximately the same time in all three sites. At Fabbria dei Soci and Castello del Tartaro we have relatively precise dates (in radiocarbon terms) for the bank construction, because there are dates from both pre- and post-bank construction levels that are statistically indistinguishable and should therefore indicate the date of the construction of the bank itself. The central calibrated dates for these samples fall between c. 1510 and c. 1480 cal BC. The situation at Fondo Paviani is a little less clear. One

date is associated with the first definite occupation phase of the site, a wetland settlement pre-dating the construction of the perimeter bank. This has a central date of c. 1520 cal BC, just slightly earlier than the phases of bank construction at the other two sites. The other two dates from Fondo Paviani are decidedly later, so at this site we cannot tightly bracket the construction date of the bank, although it was probably built between 1500 and 1400 BC, or possibly in the earlier part of that century, as at Fabbria dei Soci and Castello del Tartaro. These two sites, like most or all of the *terramare* south of the Po, were abandoned at the end of the Late Bronze Age, probably in the twelfth century BC, but Fondo Paviani survived rather longer, into the Final Bronze Age and was probably abandoned some time in the eleventh century BC.

The *terramare* ranged in size from 6 to 25 ha and were surrounded by substantial perimeter banks and ditches. There is evidence at them for the working of bronze, bone and antler on a large scale, and a few Mycenaean potsherds of Aegean origin indicate that the people living there were linked into long-distance trade networks. Among the most important discoveries made by our project is that these settlements were associated with large-scale hydraulic works for drainage, and probably also for irrigation, which are much more elaborate than the simple ditches

identified for the Middle Bronze Age. Elaborate systems of concentric and cross-linking ditches have been identified from aerial photographs and checked on the ground through examination of sections exposed in field ditches and test pits. High-intensity field survey, combined with analysis of the sections, suggests a consistent pattern of internal organization at the three main sites, with a zone of storage pits and granaries immediately inside the perimeter bank.

Large and complex as these sites were, they do not seem to have functioned as administrative centres in a hierarchical settlement system consisting of tiers of settlements of different size (towns, villages and hamlets). In spite of intensive survey, we have found no traces of smaller settlements in the survey area. The Bronze Age landscape seems to have been one of separate large sites, with only very small off-site features that may represent temporary shelters for shepherds.

Later prehistoric abandonment of the area

Before the end of the second millennium BC, all the Bronze Age sites had been abandoned and the survey area was devoid of human occupation or used only occasionally. In all our excavated sections the subsequent phase, which corresponds to the Iron Age, is represented by extensive flood deposits and the whole area seems to have become a hostile environment to human settlement. It is unclear whether this was the result of climatic change – we do not have good environmental data for the immediate area – but the wider picture for northern Italy suggests that climatic deterioration occurred several centuries earlier, rather than at this time. Some scholars have attributed the abandonment to specific historical events related to the collapse of Late Bronze Age societies in the eastern Mediterranean. However, another possible hypothesis is that it was the result of human failure to maintain, over the long term, the complex hydraulic systems that we have documented.

Although the techniques of drainage and irrigation probably sustained the development of large and complex settlements based on intensive cultivation of rich alluvial soils, they would have been very difficult to maintain indefinitely in the lower reaches of a major floodplain such as that of the Po and its tributaries. Even modern river defences are vulnerable in this environment: the last major flood involving large-scale loss of life occurred in 1951. It is significant that, after the Bronze Age, the next major phase of occupation in the survey area occurred in the Roman period, from the second century BC. It too was characterized by intensive drainage and irrigation systems. In the past, as today, successful human occupation of the area depended on efficient water management.

Notes

1. The research described in this article is part of the Alto-Medio Polesine–Basso Veronese project (Progetto Alto-Medio Polesine–Basso Veronese or AMPBV), an Anglo-Italian research project organized jointly by the University of Padova and the Accordia Research Institute of the University of London. The principal sources of funding for the project are the Regione del Veneto and the Soprintendenza Archeologica del Veneto. Most of the fieldwork was carried out between 1986 and 1995, since when minor field campaigns and post-surveywork have continued. Interim reports on the work of the project have been published annually since 1986 in the Italian journal *Quaderni di Archeologia del Veneto*, with English translations in *Lancaster in Italy 1986* (Lancaster: University of Lancaster, 1987) and later in *Accordia Research Papers* (London: Accordia Research Institute).
2. G. Chierici, *Le antichità preromane della provincia di Reggio nell'Emilia* (Regio Emilia, 1871); L. Pigorini, "Le più antiche civiltà d'Italia", *Atti della Accademia dei Lincei*, 61–9, 1903.
3. G. Patroni, *La preistoria d'Italia* (Milan: Vallardi, 1937).
4. G. Säflund, *Letteremare delle provincie di Modena, Reggio Emilia, Parma e Piacenza* (Lund: Gleerup, 1939).
5. See the exhibition catalogue: M. Bernabò Brea, A. Cardarelli, M. Cremaschi (eds), *Le terramare: la più antica civiltà padana* (Milan: Electa, 1997), and a note prompted by the exhibition: M. Pearce, "New research on the terramare of northern Italy", *Antiquity* 72, 743–6, 1998.
6. So-called after Edward Harris, author of *Principles of archaeological stratigraphy* (2nd edn) (London: Academic Press, 1989).