Unconformist Archaeology

Papers in honour of Paolo Biagi

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Cover illustration: Small glacial lake with the Val Camonica (Brescia Province, Italy) in the background, in the mountain watershed between Val Camonica and Val Trompia (Photo by E. Starnini, 2009)

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Chapter 1

RAPID RIVERS, SLOW FORESTS: EARLY NEOLITHIC CHARCOAL FROM NORTHERN ITALY

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Abstract

The paper first reviews some theories about the mobility/sedentariness of Early Neolithic groups in relation to the spread of forests across Europe, then takes into account the data referring to human settlement in northern Italy. Using the available record of on-site charcoal analyses, some suggestions are put forward. First, charcoal diagrams, documenting the systematic use of riparian vegetation, show almost invariably that the first farmers used open areas, close to rivers. Second, there is no reason to assume that these open spots formed as a consequence of deliberate man-made clearings over a long timespan; they were pre-existent to settlement. Third, this would imply that early farmers tended to avoid movement through woodland.

Key words: Early Neolithic, charcoal, mobility

Introduction

The spread of the earliest farming communities throughout continental Europe has been the object of countless papers for more than a century – that is, since it was first suggested that the loessic belt covering a large part of the European plains was quite unfavourable to the expansion of forests, thus allowing the diffusion of wide open areas, meadows and grassland (Penck 1887). The *Steppenheide-Theorie* (Gradmann 1906), therefore, was the first logical attempt at understanding the way agriculture moved across the continent from distant Asiatic nuclei. More and more distribution maps of Early Neolithic activity showed its progression along the valleys and/or the loessic belt which, according to various theories, were more suitable for agricultural purposes. These 'light' soils were considered most desirable to early farming for either hoe or plough agriculture. Furthermore, loessic soils on interfluves, where drainage conditions would have been unsuitable to the dense, closed forest of the Atlantic chronozone, would have provided excellent settlement conditions.

Woodland palaeoecological studies developed with the increase of pollen research, leading first to the conclusion that dense forests covered the majority of the continent and eventually to the concept of Neolithic 'landnam' clearances (Iversen 1941). The whole problem of soil, vegetation cover and Early Neolithic settlement would be subsequently reviewed in a well known polemical paper by G. Clark (1945). Using the more recent pollen and soil data available at that time, he demonstrated that the ways to Central Europe for the early farmers were to be found within the forests, and not on open areas. Pollen data proved that loess was able to sustain closed forest vegetation.

Within such a landscape, agriculture first spread, stone axes being the evidence of a strong human impact on a forested environment and the conclusion was drawn that the light, loessic soils of the forests had been chosen because of their high fertility.

Since then, many new data and new models have been developed. Following several authors, farming appeared in Europe with such an elaborate know-how that intensive agriculture was already possible and practised by the first farmers, and local but substantial change in the forest cover occurred subsequently, which can now be identified owing to new models of interpretation of macro- and micro-remains. Some evidence of early agriculture in the 7th millennium cal BC (i.e. during Mesolithic time) has also been suggested (Tinner *et al*. 2007). In general, this kind of evidence is ephemeral, based upon single pollen grains in peat or lake sediment and doubtful dates, and should be treated with caution (Behre 2007).

Settlement and forests

A controversial aspect concerns the ease of movement of people, products and ideas throughout the dense forests covering Europe during the Atlantic period. The problem of the real extension and density of the canopy has been long argued. This is not only because its compactness determines the amount of light on the ground, therefore favouring or hindering agricultural or pastoral activities (light being a crucial factor in the growth of the herb layer), but also because a high density of trees would cause obvious difficulties in the movements of mobile or semi-mobile societies. When small groups of farmers, with cattle, move from residential to peripheral camps, or to an entirely unknown area, a further problem arises. In an environment characterized, at least during many months of the year at

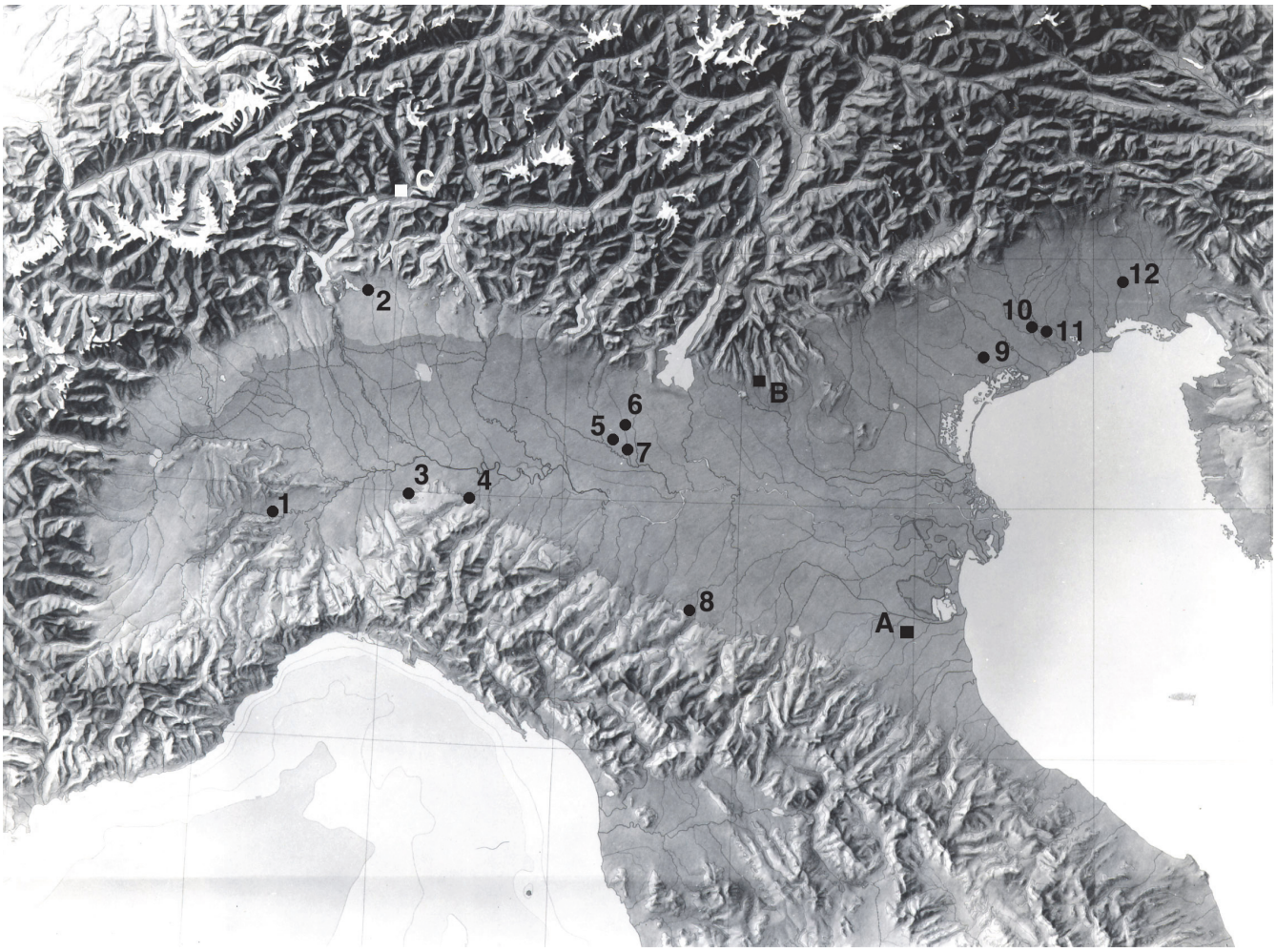

Figure 1.1 Location of sites mentioned in the text. Dots, sites with charcoal analyses (see diagrams): 1 Alba; 2 Pizzo di Bodio; 3 Cecima; 4 Travo; 5 Ostiano; 6 Isorella; 7 Vhò; 8 Fiorano; 9 Roncade; 10 Fagnigola; 11 Valer; 12 Sammardenchia. Squares, sites with huts, 'villages': A Lugo di Romagna; B Lugo di Grezzana; C Castel Grande.

European latitudes, by a cover of trees reaching or exceeding 40m, hiding the sky, and by a view from the ground that would barely attain 40 or 50m (Tilley 2007), any planned movement inevitably would be slowed down or even hampered.

Apart from this obvious but apparently neglected aspect, a major difficulty arises relative to form and size of the Early Neolithic settlement. In Central Europe several authors have argued that clusters of longhouses were commonly frequented for long periods of time:

> The length of Early–Middle Neolithic site occupations varies but is often of the order of several centuries; some large settlements were occupied for more than four hundred years (Bogaard 2004, 13, quoting Lüning 1997 and 2000).

However, the evidence could be interpreted in a rather different way. According to the same author:

> What appears to be a dense concentration of longhouses may represent the replacement of a single structure over time or include very few contemporary longhouses separated by considerable distances … many LBK settlements appear to consist of one to a few longhouses at any one time (Bogaard 2004, 13).

Many archaeologists have long debated the degree of sedentism or mobility in Early Neolithic times. In his survey on the Mesolithic–Neolithic transition, Barker (2006) argues that in the Mediterranean countries much of the previous style of life survived in the early 'farming' communities, maintaining a high degree of mobility and exploiting seasonal resources over wide areas, with 'a mix of foraging and farming'. In these early forager–farmer societies, from Dalmatia to Portugal, the impact on the landscape 'was essentially the same as those of their forebears'. In summary, Barker points to the difficulty of establishing a sound definition of 7th–6th millennium communities:

> ... all of whom can be categorized as Early Neolithic […] differed enormously in their degrees of sedentism, subsistence behaviour, diet, community organization, and ties to the land (Barker 2006, 350–356).

This appears not to be an isolated opinion, but rather a shared view. For Dalmatia, and within the Impressed Ware culture, Forenbaher and Miracle (2005, 524) maintain that, 'Rather than establishing permanent settlements [Early Neolithic people] may have made short-term, seasonal camps in caves and the open-air'.

For the western side of the Alps and Provence, Beeching (2003, 177) established that:

> ... the settlement model appears no different from that of the Mesolithic. As in the latter period, it would have been more a case of travelling the land, a question of natural mobility, exploration and exploitation of the environment, rather than the existence of a natural frontier (author's transl.).[1]

For the Cardial of the Franco-Iberian region, Guilaine and Manen (2007, 37) stated that, 'Recent research puts the accent on the variety of economic systems adopted but also on an organization based on a mobile system of resource exploitation'. For the whole Early Neolithic of southern France and the Western Mediterranean, Sénépart and Beeching (2009, 304) found that:

> The Early Neolithic settlement of Western Europe seems more varied. Because of its diversity, it probably reflects a gradient in the colonization of new areas, which does not proceed from one same place of origin and especially not the same place of arrival (author's transl.).[2]

For the Balkans, the rapid spread, demonstrated by radiocarbon dates (Biagi *et al*. 2005) also suggests a high mobility of the Early Neolithic farmers. A different situation might, however, be found along the western Adriatic coasts, where the ditched enclosures of Tavoliere (southern Italy), rectangular structures and shallow pits (Calabria, Apulia) have been claimed to belong to a sedentary way of life that lasted for centuries. Some authors, however, have urged more caution. Whittle (1996, 295, 299) stressed that:

> Few if any of these [Tavoliere enclosures] seem to indicate prolonged or large occupations […]. Other occupations may rather suggest impermanence and movement [...]. The enclosures may mark points of coming and going, places of fixed interest in a fluid landscape.

Similarly, Barker (2006, 349) understands these same features, 'in terms of semi-mobile forager communities developing a commitment to agriculture'.

Summing up, it is therefore evident that this aspect of Early Neolithic mobility is controversial owing to:

1. The poor preservation of many sites.
2. The wide differences in behaviour, social organization, objective diversities of the exploited landscape (climate, soil conditions, geomorphology, flora and fauna).
3. The model of 'neolithization' accepted by the different authors, in terms of either a local acculturation or a colonization from outside.

Whatever the case, there are no particular grounds for accepting permanent, long-lasting settlement as a normal lifestyle in the Early Neolithic.

Spread of forests

Similar difficulties arise when one takes into account the opinions of many palynologists concerning the character of the forests during the 7th and 6th millennia cal BC, in the Middle Holocene.

A mixed deciduous woodland, mostly formed by oak, lime, ash, elm (in some eastern regions of Central Europe also beech) has been thought to have been the dominant primeval Holocene woodland. A debate has arisen on the presence of frequent open areas, formed by the natural regeneration of the forest or – as has been suggested – by the deliberate activity of Mesolithic hunters, and possibly maintained by the subsequent action of browsing herbivores. However, it is commonly believed that the original forest was substantially undisturbed at least until the 5th millennium cal BC. According to most French palynologists, during the spread of the first farming communities the whole of Western Europe was covered by *une mer forestière* in which it is difficult to perceive large open areas, and some of these were to be found only on wet spots, along rocky outcrops, after natural fires or in the mountains (de Beaulieu and Goeury 2004).

Early signs of human impact on the local vegetation (end 7th–beginning 6th millennium cal BC) are sometimes observed. But in the case of several pollen sites of northeast France, anthropogenic pollen indicators never form a continuous curve. Rather, they point to a short or very short period of land use quite consistent with a mobile economy:

> For over a millennium, short phases of human impact are described, among which the woodland shows no apparent change detectable by pollen analysis (Richard and Ruffaldi 2004, 123; author's transl.).[3]

In other areas further east, for example the continental Balkans, similar arguments have been used suggesting there is no evidence of human influence on the vegetation before 5000 cal BC, therefore dating to the Middle Neolithic.

> This is not to say that the transition did not occur with the arrival of the first farmers but that it was not of sufficient intensity to be detected upon a landscape scale […]. The conclusion has therefore to be drawn that human impact was local in scale and did not affect regional patterns of vegetation. These results demonstrate that population densities at the Neolithic transition were low and that farming techniques had little or no impact on the existing vegetation (Willis and Bennett 1994, 237–238).

It seems there is a general agreement among palynologists in relation to the first episodes of well-defined clearings, as they appear only within the already well consolidated areas of Middle or Late Neolithic settlement. In the north Italian Apennines:

> Evidence for significant disturbance of forests, burning, flint scatters and soil erosion all indicate much more intensive activity in the mountain zone commencing in the Late Neolithic and becoming more intensive in the Chalcolithic to Bronze Age (Lowe *et al*. 1994).

The earliest pastures in the eastern Alps could not have been formed before 3400 cal BC (therefore of Late Neolithic age), though distinct clearances are clearly shown only from the Bronze Age onwards (Oeggl 1994).

There are, however, some different views claiming a more decisive and disruptive role of early farmers on the vegetation, at least at a local level. Central European LBK sites (5500 cal BC) would offer examples of high potential for human impact on the vegetation, as imposed by the Neolithic way of life (arable and pastoral farming). This has

left 'a distinct imprint [in pollen records] on the European landscape' (Kalis *et al*. 2003, 34), because Early Neolithic groups were full-time farmers cultivating their crops on permanent fields close to permanent settlements. The new economy would require open areas and, therefore, extensive clearance in a previously wooded landscape. As the AP/NAP (tree/herbs) ratio shows no particular changes before the Late Bronze Age, the authors dismiss this frequently used index as evidence of human impact on vegetation. However, we accept their arguments only if it could be proved that, 1) early farmers lived for long periods within the forests, and 2) they were fully sedentary. As we have already seen, the evidence for this is much disputed. More data will be presented suggesting a different explanation, at least for the northern Italy plains, which would better fit with the archaeological data relating to the penetration of 5th millennium cal BC populations.

Early Neolithic settlement in northern Italy

In the last twenty years, the Early Neolithic settlement of northern Italy has been reviewed by several authors (e.g. Bagolini and Biagi 1987, 1990; Bagolini 1990; Biagi *et al*. 1993; Binder 2000; Improta and Pessina 2000; Pessina 2000). The focus has been on the definition of different cultures, chronologies, ceramic and lithic aspects. Therefore, the specific problem of mobility/sedentism has been touched on only as a secondary feature of the still controversial Mesolithic/Early Neolithic boundary. In regard to the settlements, the interpretation of many of the most common Early Neolithic features (particularly pits) is far from being agreed. In particular, there is today a strong reaction against considering the large shallow pits as pit dwellings or *fondi di capanne*, as has been usual in the past. They may well represent archaeological structures of a mobile or semi-mobile group of farmers repeatedly visiting the same site, even for diverse cultural reasons (Pearce 2008).

A recent study carried out on the dwellings and related features of the first farmers in northern Italy (Cavulli 2008) reconsidered this topic. Out of *c*. 150 Early Neolithic sites (20% of which are rockshelter or cave sites), Cavulli found evidence of huts (three in total: Lugo di Romagna, Lugo di Grezzana and Castel Grande, the latter in Canton Ticino, Figure 1.1), trenches and palisades, postholes, channels, storage pits and terraces. In his opinion, the final reports on some sites like Lugo di Romagna, Lugo di Grezzana, Savignano, Sammardenchia, Campegine and Bazzarola would furnish a new picture of the Early Neolithic settlement, with villages, palisades, floors and a large number of minor features probably linked to agricultural practices. In his conclusions (Cavulli 2008, 346), however, he casts some doubt on the whole matter:

> Nevertheless one wonders on the one hand if the first Neolithic communities were not sedentary as so far presumed, or on the other hand if the dwellings were poorly structured and made of light building materials, such as tents, which leave faint traces on the ground … Some data could indirectly confirm a scarce sedentariness, while others categorically refute it (author's transl.).[4]

Moreover, in many Early Neolithic sites of the Po Plain the economic basis is largely of a 'Mesolithic' type:

> The data concerning the Early Neolithic Fiorano communities should be brought up to date on the basis of new excavations, even if the presence of cattle breeding and agriculture is certain, their overall importance, as regards hunting, fishing and harvesting activities, is apparently scarce (Bagolini 1981, 194; author's transl.).[5]

As already noted for other parts of Europe, therefore, the evidence from northern Italy is contradictory, pointing in the majority of cases to mobile or semi-mobile groups, in others to the presence of huts and structured, long-lasting spaces of use. If this is the case, we should not be surprised to get conflicting evidence also from the environmental data (particularly those relating to vegetation) within Early Neolithic sites, as these should be referred in the different sites to very different histories – that is, in terms of land use depending on how long communities locally manipulated and transformed their setting.

Early Neolithic vegetation in northern Italy

There is little palynological evidence of the Mesolithic/Neolithic transition in northern Italy, particularly in the plains. The most extensive research was carried out some 30 years ago in the Alps (Schneider 1978, 1985; Schneider and Tobolski 1985); in general, the pollen diagrams relate to off-site deposits (lakes, peat bogs, etc.). In her comprehensive review, R. Schneider (1985) published a table of the sites in northern Italy that were mentioned in the palynological literature up to that time. Out of 137 sites, 61 were on flat land or valley bottoms below 500m (i.e. where most of the Early Neolithic sites are located), but only in 14 cases is the Atlantic chronozone represented (Schneider 1985, table 1, 92–97). According to Schneider and Tobolski (1985), evidence of small clearances and agriculture can be seen in some diagrams around Lago di Ganna at a date between 4000 and 3200 cal BC. More extensive open areas are found around Lago di Biandronno, but only after 4140 cal BC, i.e. during the Middle and Late Neolithic. The Atlantic forest, before the Neolithic presence was dense and dark:

> As a whole, this period [the late Atlantic chronozone] is characterized by a dense forest cover … Finally [toward 6300 cal BC] the forest seems to have been totally closed (Schneider 1978, 81; author's transl.).[6]

In this site, 2km away from the well known Early Neolithic site of Isolino di Varese, no evidence of contemporaneous clearances has been detected so far.

We should mention, however, a different point of view by Accorsi *et al*. (1996). According to these authors, the Emilia Romagna Plain (the eastern segment of the Po Plain) was generally characterized by a relatively lighter AP (tree) cover than expected since the Pre-Boreal period. In particular, from the Boreal onwards, man-made clearings are present and no particular variations in the forest composition are detected through the entire Holocene. They suggest a very early (Boreal) human influence on the forest, and maintain that the landscape was a mix of woody and open

areas, the latter either natural, related to river environments, or anthropic.

In addition, the same authors admit that Boreal and Atlantic forests were fairly similar in composition, with an increase of dense, dark cover (particularly due to *Tilia* and *Ulmus*) in the latter period. These conditions changed from the Sub-Boreal phase, when the landscape was possibly a patchwork of closed forest remnants, park-like areas and more open sites that clearly match the charcoal and seed database for the same (Sub-Boreal) period. We should then conclude that human disturbance at the Mesolithic/Neolithic transition, if any, was ephemeral and short-lived.

Accordingly, Caramiello *et al*. (1996) reach similar conclusions in their review of the evidence for human impact in pollen diagrams of the western North Italian Plain. Using the AP/NAP ratio for the Atlantic chronozone (between 65 and 90%) they conclude that farming had an influence on the woodland vegetation particularly around 3800 cal BC, i.e. during the Middle–Late Neolithic, and not before.

On-site pollen analyses have been published in the last 20 years. We take into account the Early Neolithic site of Alba (Southern Piedmont), *Cooperativa dei Lavoratori*, where both pollen and charred wood were analyzed (pollen: Caramiello and Zeme 1995; charcoal: Motella De Carlo 1995). Two samples (US 28 and US 31) might be referred to the Atlantic period. According to the stratigraphic description US 28 belongs to, 'a sequence of natural sedimentation preceding the first occupation,[7] while US 31 is 'a flood deposit … which on archaeological evidence dates to the Middle–Late Neolithic (third phase)' (Venturino Gambari *et al*. 1995, 73; author's transl.).[8] The authors argue that:

> ... the low values of human presence seem to show a slight impact through the whole sequence from the Neolithic to the Bronze Age, even if at the time between the Neolithic and the Copper age higher values have been noticed (Caramiello and Zeme 1995, 244; author's transl.).[9]

In particular, US 28 (which seems to precede the first settlement) shows higher percentages of pine, juniper and hazel and in lesser quantity ash, alder, lime and aspen. This therefore points convincingly to the existence of fairly open, light-demanding vegetation before the human land occupation.

Charcoal and forests

In this same site of Alba, charcoal from fireplaces was analyzed by Motella De Carlo (1995). The published sample was collected in US 34, possibly of Early Neolithic age. The results broadly confirm the pollen data have a very high percentage of ash, followed by oak, aspen, plum, crab apple/pear. Quite rightly, the author concluded that this charcoal assemblage could be related to riparian and open areas, though she decided in favour of a strong anthropogenic impact on the local vegetation.

Charcoal diagrams provide good evidence for the reconstruction of the local woodland composition, integrating with pollen data. Moreover, in northern Italy the scarcity of on-site pollen diagrams requires other environmental data obtained by good sampling strategies (charcoal, seeds, molluscs, bones, etc.) in order to gain a better understanding of Early Neolithic settlement.

We shall take into account 12 Early Neolithic charcoal diagrams from the whole of the North Italian Plain (and surroundings hills or valleys). These have been presented, when data are available, as ubiquity (number of occurrences of a particular taxon in the sample total, Figure 1.2) or, otherwise, as a percentage of the total number of fragments (Figure 1.3).

There are some significant features common to all diagrams:

1. Oak (*Quercus* sp.) and ash (*Fraxinus* sp.) are dominant, followed by plum/*Prunus*, crab apple trees (Maloideae, Prunoideae) and hazel (*Corylus* sp.).
2. Riparian trees like aspen (*Populus* sp.) and alder (*Alnus* sp.) are always present.
3. Dense woodland, shade-tolerant trees like lime (*Tilia* sp.), maple (*Acer* sp.) and elm (*Ulmus* sp.) are generally much less well represented, both as site-presence (ubiquity) and number of fragments.

There is a general agreement (reviewed by Castelletti and Rottoli 1997) that these charcoal associations relate to growth in open areas, close to rivers, lakes or flooded valley bottoms. In some cases it has been argued that this environment may represent the regeneration phase following a long period of clearances and agricultural pressure on the local woodland by arable and pastoral farmers (in the majority of these sites cereal grains are also present). This belief rests, evidently, on the assumption – in our opinion not always supported by sufficient archaeological evidence – that the sites where human communities first settled, a) needed to be cleared because the forest was dense and unsuitable for any form of farming, and b) show a charcoal spectrum that refers to the last phase when, after decades of woodland management, light-demanding trees were eventually growing at the forest margins.

However, many authors (e.g. Vera 2000; Rackham 2003; Kreuz 2008) have convincingly demonstrated, on the basis of the growth physiology of the shoots, that a mixed oak woodland is permeated by light. We should therefore consider the *Querco–Fraxinetum* represented in our charcoal diagrams as a somewhat open association. Moreover, *Fraxinus* normally grows on river terraces and the frequency of its wood could be related to the greater presence of the trees around the sites and/or to a deliberate selection of its leaves for use as fodder.

> Man may have contributed toward its distribution by felling trees, as ash behaves as a pioneer tree. Therefore, in a later phase of settlement ash values could be higher than at the beginning and lower during periods of abandonment (Castelletti and Maspero 1992, 304; author's transl.).[10]

While this association, along with members of the Rosaceae family and hazel, points to open areas, the constant presence of riverside trees, namely alder and aspen, clearly indicates that most of the Early Neolithic sites were chosen for their location close to a stream. This particular aspect has been observed by many authors from throughout Europe.

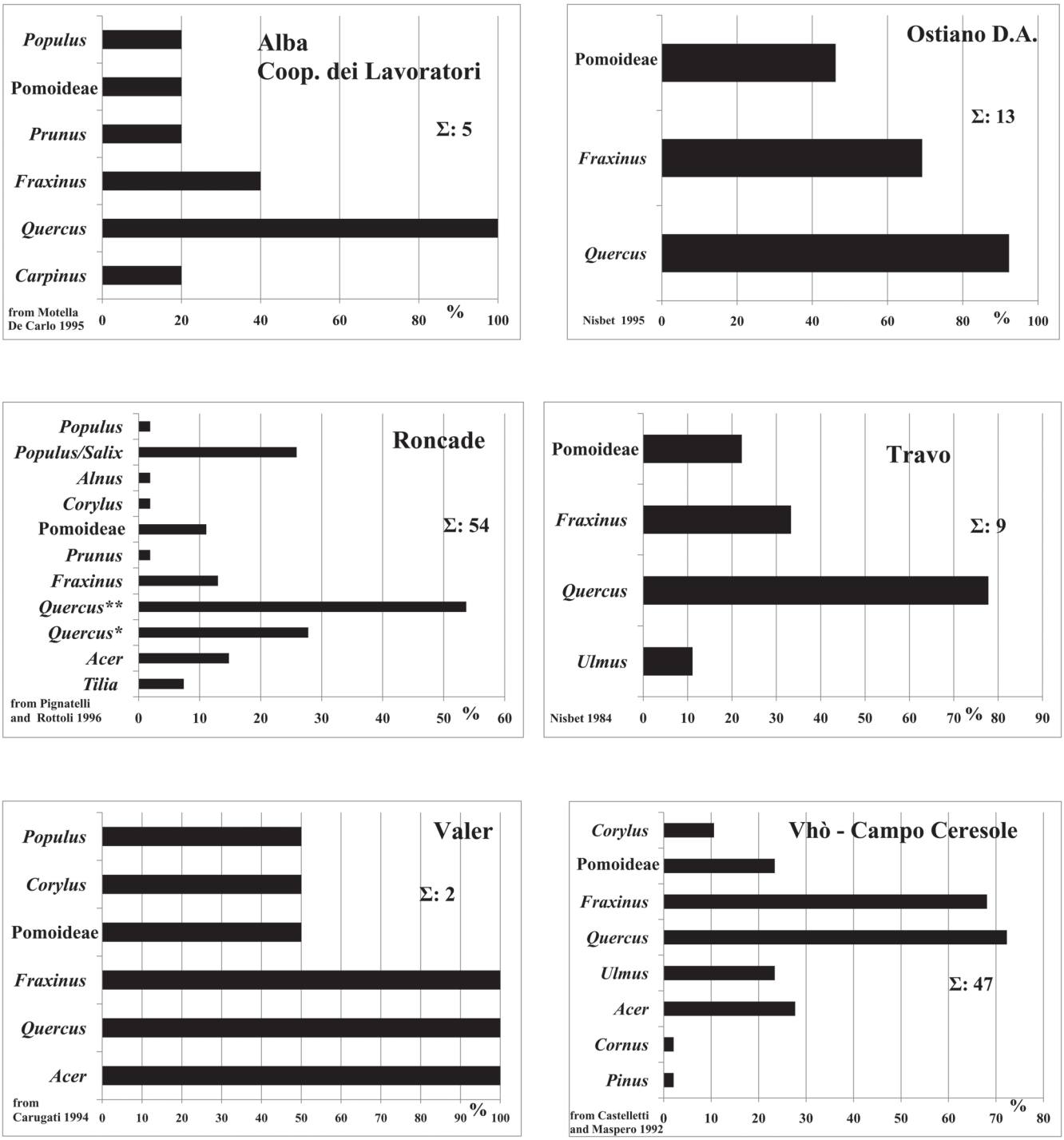

*Figure 1.2. Charcoal diagrams, Early Neolithic. Presence percent (ubiquity). In the Roncade diagram Quercus*** – Quercus sez. robur*; Quercus** – Quercus *sp.; Σ – number of samples.*

In Central Europe 'the location of Early–Middle Neolithic sites along river valleys […] may reflect a preference for relatively open vegetation' (Bogaard 2004, 14).

In the Western Mediterranean countries the Cardial Neolithic, along with its well known coastal sites, shows an 'early penetration into more continental domains, in particular along the main fluvial routes' (Guilaine and Manen 2007, 37).

In the Balkans, Körös sites:

> ... are usually flat and lined up along river courses […] Körös houses were single-room, rectangular structures with gabled roofs and wattle-and-daub or reed walls. Despite such apparently substantial structures, there seem to have been frequent shifts of settlements and perhaps only a semi-sedentary settlement pattern (Gronenborn 1999, 145).

Nowadays in the Po Plain, the riparian vegetation is mostly formed by aspen and willow colonizing alluvial sandy soils, with a sparse undergrowth of elder (*Sambucus*) and dogwood (*Cornus*). In the surrounding areas, a xeric

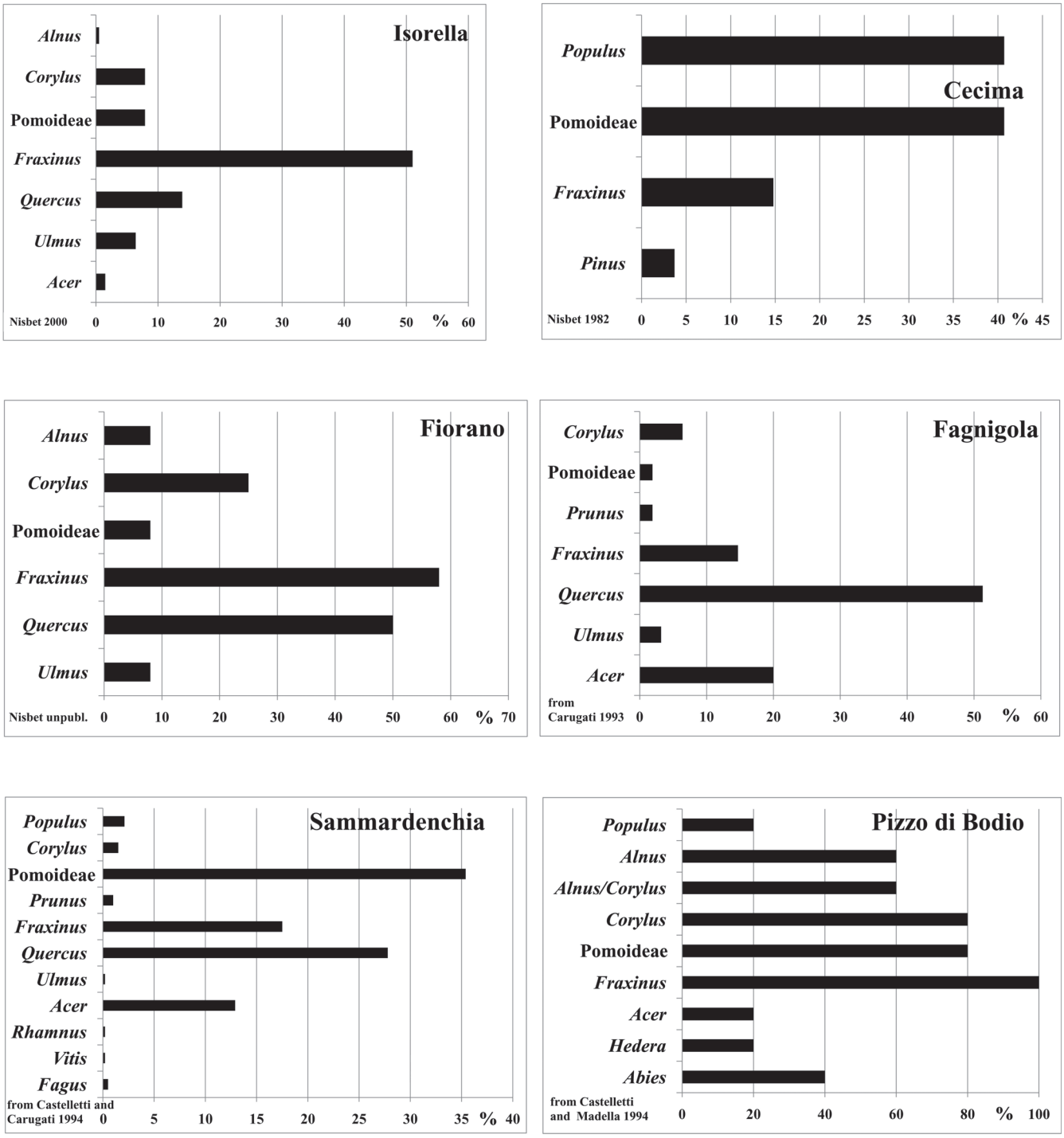

Figure 1.3. Charcoal diagrams, Early Neolithic. Fragments percent.

grassland is frequently found on drier and gravelly soils. According to Mondino (2007), in pre-industrial times a transition between the *Quercus–Carpinus* association and the riparian underbrush was formed by alder, aspen and pedunculate oak, growing on periodically flooded areas. These open belts along the rivers, undoubtedly present since the Early Holocene, were well known to the first migrants and their animals as they could provide water, food, fodder and good, well drained soil for short-lived camps. They provided excellent natural, pre-settlement locations, easily found both from the streams themselves and from the woodland hedges where the undergrowth did not constitute a problem for the movement.

Conclusions

Notwithstanding several millennia of intense use of woodland, *Medieval* Europe was still covered by a dense forest (Higounet 1966). According to this author, in some regions the woodland was reduced somewhat in extent, but about 70% of Europe remained densely wooded: the ideal environment for hermits, robbers, monks or anybody having some reason to disappear for months or years, certainly not for travellers. And even if we accept Wickham's criticism of his justified refusal of the late 1st millennium AD European woodland as a *horrendum desertum* dominated by *silvae densissimae*, we should conclude with the same author

(Wickham 1990) that the true, last deforestations occurred only in post-Carolingian times.

At that time, part of north Italy had already suffered major deforestation during the Bronze Age – that is, the 'Terramare' period – when the first proto-urban cultures largely changed the extent and shape of the previous forests. A site density of 9–10 per km^2 has been calculated (Cremaschi 1997) over a period of 4–5 centuries, with some larger sites reaching 10 hectares with 200–300 inhabitants. Requiring a huge use of timber, Terramare point evidently to the existence of large forests surviving in the region even after some millennia of Middle–Late Neolithic farming, when an increase in site numbers, demographic expansion and fixed villages caused the first wide and well documented expansion of open areas in the Holocene due to human activity.

Considering the early north Italian Neolithic, it should be stressed that sites with conclusive evidence of a long period of occupation, with a sound ^{14}C-based chronology, are extremely rare. For the greater part of them, the archaeological features are usually connected to pottery and flint scatters, post- and stake-holes, small pits, ditches, shallow depressions and other similar small features. It is thus not easy to see in this evidence, a 'village' or a lasting settlement. In order for a forest site, colonized by a resident group of Neolithic immigrants, to show changes in the charcoal sample composition (thus displaying with sufficient evidence a new spectrum, formed by trees favoured by the protracted human presence) several decades have to go by from its early occupation. In such a case, we should find a shift, in the charcoal composition from the use of close, dense forest trees, to a more open landscape. However, anthracology shows a quite different picture, representing an environment formed by heliophilous (light-demanding) trees and, together with these plants, others from riverbanks and gravelly or sandy soils.

This choice of fluvial terraces for occupation is by no means surprising. It has been described in Central Europe by several authors and recently Bogaard stated that:

> … it seems plausible that river valleys provided an important form of seasonal pasturage for livestock in an otherwise wooded environment. The proximity of Early–Middle Neolithic settlements to river valleys, therefore, may relate primarily to animal rather than to crop husbandry (Bogaard 2004, 158).

We should add to these priorities the need to avoid dense forests for the movement of a colonist group. In the North Italian Plain, river terraces were constantly walked and chosen for settlement. So it happened for almost all Early Neolithic sites of the Friuli flatland ('the first farmers settled on natural embankments of ancient riverbeds', Fontana 2000, 222; author's transl.),[11] where water was provided by the presence of resurgence streams. The same applies to many central Po Plain sites, like those of Isorella (Starnini *et al*. 2000; this site was previously considered by the present author to be a forest site), Vhò (Castelletti and Maspero 1992), Savignano (Bernabò Brea *et al*. 1990), Ostiano (Biagi 1995), Travo (Bernabò Brea *et al*. 1984), etc.

Interestingly, strong physiographic similarities can be found in the Late Mesolithic sites, which are generally located close to river terraces, watercourses or stream confluences (Franco 2011). This would raise the question of a possible competition for the same environment between Mesolithic tribes and the Neolithic newcomers.

In conclusion, if a site were occupied over a period of time spanning centuries, then we can agree that important changes in the local vegetation would have occurred. As such, the charcoal evidence would reflect these changes in terms of an increase of light-demanding trees and bushes, hazel, plum, etc. In such a case, however, we should also find clear proof of a stable settlement in terms of artefacts, huts, and other features. If the site were only a temporary one, frequented for years or a few decades at most, this short period of time would not be sufficient to substantially alter the local vegetation, allowing the growth and expansion of fringe species and their subsequent use in the last fireplaces kindled on site. As the archaeological evidence seems, in most cases, so scarce, we have to admit that our charcoal diagrams should be related to a cover that the moving group found – or, better, chose – on azonal vegetation (Kreuz 1990), such as would be present on river terraces and barren soils, and by no means the result of a deliberate long-term manipulation of the local landscape. If this frequent presence of naturally formed, large, open areas frequented by the Neolithic 'demic' diffusion in north Italy since the middle of the 5th millennium cal BC were an immediate consequence, or a relic, of the 8.2 ka BP 'climate event' in the Po Plain, as seems to be the case in other parts of Europe (e.g. in the Balkans: Budja 2007), or the result of much more limited, local situations, is a difficult question that still needs to be answered.

That is certainly not to say that, during the Early Neolithic, more or less wide, open areas of anthropic origin created for crop or pasture were totally absent or that permanent settlement never existed. In some instances, geomorphology and soil studies around a small number of sites have provided evidence of important, possibly man-made disturbances of which the case of the already mentioned Lugo di Grezzana site is perhaps the most impressive (Cavulli *et al*. 2002).

The main purpose of the present paper is to show, using on-site data from charcoal, that the similarities in the diagrams can be interpreted according to a different model, envisaging also the presence of short-period occupation sites, which had a low impact on the local vegetation and a preference for pre-existing open areas along streams and rivers. In this model there is at least one good reason for the periodical, seasonally-determined abandonment of the camp, i.e. recurrent flooding, as suggested by Whittle (1997). These arguments do not seem to be in contradiction with many current archaeological data and the well known choice of fluvial routes by early farming communities. If the streams themselves were actively used as a preferred solution to movement, it has not yet been fully recognized but has in some way already been suggested even in the case of Late Mesolithic hunters (Franco 2011, 184). Unfortunately, the evidence of north Italian Neolithic canoes does not start before the 3rd millennium cal BC and mostly relates to lake travelling (Barbaglio 2006; Rufino 2009). Therefore, the idea of the existence and use of early fluvial routes should await stronger evidence.

Notes

1. '... le statut des implantations [du Néolithique ancien] ne semble pas différer de celles du Mésolithique. Comme à cette époque, il s'agirait plutôt d'un territoire parcouru et d'une mobilité naturelle d'exploration et d'exploitation du milieu que d'un front pionnier'.
2. 'L'habitat du Néolithique ancien de l'Ouest européen apparait plus varié […] Par sa diversité, il est le reflet probable de gradients dans la conquête de nouveaux espaces qui ne procède pas d'un même lieu d'origine et surtout pas d'un même lieu d'arrivée'.
3. 'Pendant plus d'un millénaire, sont décrites de courtes phases d'anthropisation entre lesquelles s'intercalent des épisodes forestiers où apparemment aucune trace d'influence humaine n'est perceptible par l'analyse pollinique'.
4. 'Sorge tuttavia il dubbio da un lato che le prime comunità neolitiche non fossero sedentarie quanto finora supposto e dall'altro lato che le abitazioni fossero poco strutturate e costituite da materiali leggeri, come ripari-tenda, che lasciano scarse tracce sul terreno […] Alcuni dati […] potrebbero confermare indirettamente una scarsa sedentarietà, mentre altri la confutano in modo categorico'.
5. 'I dati sull'economia delle popolazioni di Fiorano necessiterebbero di un aggiornamento sulla base di nuovi scavi anche se è comunque certa la presenza di allevamento e di agricoltura, seppure con un peso complessivo apparentemente ancora scarso rispetto alle attività di caccia, pesca e raccolta'.
6. 'Dieser Abschnitt ist im gesamten durch einen starken Waldschluβ gekennzeichnet […] Endlich scheint sich der Wald vollständig geschlossen zu haben'.
7. 'una sequenza di depositi naturali preesistenti alla prima occupazione'.
8. 'un evento alluvionale […] che i materiali archeologici assegnano al Neolitico medio-recente (III fase)'.
9. '… i valori bassi dell'indice di frequentazione antropica sembrano indicare una modesta influenza dell'uomo lungo tutta la sequenza temporale dal Neolitico all'età del Bronzo, anche se nel periodo fra Neolitico e Eneolitico si osservano valori un po' più elevati'.
10. 'L'uomo può aver contribuito alla sua diffusione col taglio degli alberi, perché il frassino ha caratteristiche di albero pioniere. Quindi, nelle fasi non iniziali dell'insediamento i valori di frassino potrebbero essere superiori che all'inizio e diminuire poi nelle fasi di abbandono'.
11. 'i protoagricoltori si stabilirono sugli argini naturali dei paleoalvei'.

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