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2 Theory and Practice for Trypillia Megasites

In this chapter, we outline recent trends in the global debate on urbanism and seek to locate Trypillia megasites within that debate. We pinpoint a tipping point in our understanding of megasites, leading to a definitive break from the Maximalist position of very large, permanent, all-year-round occupations to alternative, shorter-term or seasonal positions based upon three models of Nebelivka settlement – the Distributed Governance Model, the Assembly Model and the Pilgrimage Model. Using Ben Anderson's concept of 'imagined communities', we try to imagine the possibility of creating a megasite for the first time, leading to the development of a theoretical framework for such a creation. We develop the notion of the Trypillia Big Other, relating it to Bourdieu's *habitus*.

We also introduce the methodologies specific to each of the eight Project research questions, which sought to deliver a complete geophysical plan of Nebelivka, a well-dated internal sequence for the megasite, the local and regional settlement contexts for the megasite, an assessment of the human impact of a megasite on its landscape, the experimental construction, burning and excavation of a 'Neolithic' house, an interpretative model of the growth and decline of Nebelivka, its architecture and artifacts, and the placing of Trypillia megasites in the context of global urbanism.

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2.1 The Theoretical Debate on Urbanism

The AHRC-funded Project "Early urbanism in prehistoric Europe?: the case of the Trypillia megasites" concerns the growth of early urbanism in prehistoric Europe. The fundamental approach to stages of human development was enhanced in the 1950s by Childe, who argued in a diffusionist manner for the priority of Near Eastern complexity over that of Europe (Childe 1950). The current view remains that the earliest states in Europe – the Minoans – were 'first-generation secondary states' (Parkinson & Galaty 2007, 118), dating to after 2000 BC. This view has consistently ignored the appearance of Trypillia 'megasites' in 4th-millennium Eastern Europe, the largest of which were bigger and earlier than Late Chalcolithic Phase 5 at Uruk (Müller & Pollock 2016, 282). In 'The limits of settlement growth', Fletcher (1995) identified the Trypillia megasites as the sole exception to his global model of constraints on agricultural settlement expansion. It is clear that the megasites have been neglected in the narratives of urban change and that a targetted investigation of one megasite and its hinterland would greatly aid our understanding of their settlement complexity.

The primary aim of the project was thus a re-evaluation of Trypillia social and settlement developments through the inter-disciplinary study of a single megasite in its local, regional, and Eurasian settlement contexts. A second, theoretical aim of the project was the development of interpretative archaeologies dealing with urban developments, since, with a few exceptions (e.g., Christophersen 2015; Smith, M.L. 2003), interpretative archaeologies since 1990 have largely ignored one of the 'Big Questions' of social evolution – urban origins. This 'Big Question' of social evolution has been dominated by 'top-down' hierarchical approaches rather than a 'bottom-up' approach building on local household nodes, Neighbourhoods and networks. This project seeks to redress that imbalance by combining recent approaches to landscape and community identities, scientific methodologies and social modelling. In this chapter, which considers the theory and the practice of Trypillia megasite archaeology, we begin by cutting a pathway through the jungle of current urban theories, before discussing the Ukrainian theorization of the megasites and examining the theoretical approaches which we use to understand this phenomenon.

A good place to start is with an explanation of the term 'megasite'. The term 'megasite' has been taken up in modern business parlance as a land development by private developers, universities, or governments to promote business clusters. These organizations develop the land so that it is "shovel ready" for big business, by improving the infrastructure (roads, utilities, and landscape). The first university megasite was developed by Stanford University as an industrial park in the 1950s and evolved into Silicon Valley (https://stanfordresearchpark.com/about).

Particularly large sites appeared and then disappeared at different times and places throughout the general trajectory of increasing settlement size noted from the

Palaeolithic to Megalopolis, usually without leaving any obvious settlement legacy. But these so-called 'megasites' constituted exceptions to the normal settlement size of any given period/region, often being larger than 10 times the usual settlement size. In this sense, the megasites were relationally significant in their social contexts.

An early use of the term in prehistoric research was Gary Rollefson's (1989) use of 'megasite' to describe 'Ain Ghazal and other PPNB[15] sites in the Southern Levant that were larger than 10ha, in comparison with 'usual' settlements of 1–2ha. Similar unusually large sites are now known in other areas of the Near East, such as Çatalhöyük (13ha) and Abu Hureyra (16ha). This shows that a relational appreciation of size coincided with the early use of this term. The relational approach was essential in the still earlier case of Levantine megasites in the Epipalaeolithic, with megasites such as Khareneh IV and Wadi Jilat 6 ca. 2ha in size in comparison with 'usual' sites of 0.2ha (Martin et al. 2010). Unusually large sites in the Neolithic and Copper Age of Western Europe have been called 'megasites' in recent years, such as the 3rd millennium BC Iberian Copper Age enclosures of Valencina de la Concepción (García Sanjuán et al. 2017), Perdigões and Marroquíes Bajos (Milesi García 2018). All of these sites present similar issues of population size and density, seasonality and site function to those featuring in our discussions of the Trypillia megasites. The same is true of urban megasites.

2.1.1 The Global Debate on Urbanism

"The concept of 'city' is notoriously hard to define". This is the opening statement of Childe's (1950, p. 3) seminal article 'The urban revolution'. Almost 70 years later, this task has not become any easier. The demand for global narratives and generalizations of human history (e.g., Service 1962; Trigger 2003) that is constantly fuelling cross-cultural comparisons has cemented an essentialist and evolutionary perspectives of 'the city'. The current sea of available archaeological literature on cities utilizes three major definitions of 'city': 'archaeological' – a re-statement or a re-worked understanding of Childe's ten criteria; 'sociological' – variations of Wirth's (1938) core definition of a city as a 'relatively large, dense and permanent settlement of socially heterogeneous individuals'; and 'functional' – urban settlements are 'centres whose activities and institutions, whether economic, administrative or religious, affect a wider hinterland' (Smith, M. E. 2007, p. 4).

Despite excellent scholarship to the contrary, there are several stubborn associations with urban development that are proving very hard to break. In addition to the evolutionary framework, these are the pairing of states and cities, urban

15 'PPNB' stands for the Pre-Pottery Neolithic B period, in which domesticated plants and animals are used but no pottery was made (Simmons 2007).

and civilizations, urban and inequality, the urban-rural dichotomy and urban and social complexity. To these we can add the 'size' of both the settled area and/or number of occupants, that is particularly exacerbated in the uncritical equation of 'sherds=people=population number=site size' in Big Data sets (for an exception, see Whitelaw 2013).

Recent decades saw a surge of diverse themes and regions in urban debates, within which three dominant themes and three dominant regions have, willingly or not, affected the tone of the discourse. The themes are origins, functions (political, economic and ritual) and, most recently, scaling. The dominant regions are the Near East/Mesopotamia/Egypt, North America and Europe, the last-named being almost exclusively represented by the Greco-Roman evidence. More often than not, other regions and periods are trying to 'fit' the dominant themes or the generalized narratives perpetuated in the dominant regions to their own particular cases. However, the greater the diversity of urban cases across the globe, the more difficult it is to fit them all into *any* definition of urbanism, as a number of dissenting voices have been claiming (e.g., Kusimba et al. 2006; McIntosh, S. 1995; Wilkinson et al. 2014). This meant that our understanding of urbanism had to change.

The identification of a new and important category of 'city' was prompted by the Medieval Khmer capital at Angkor, that showed the importance of 'low-density dwelling' in global perspectives of urbanism (Coe 2003; Fletcher & Evans 2012). The low density of structures beyond a small high-density core covered a huge area of 1,000km^2, with the extensive open space in the Angkor landscape making it almost impossible to define its boundary (Pottier 1999; Fletcher & Pottier 2002; Evans et al. 2007). The low-density landscape of Angkor became the stimulus for a current research agenda for identifying, mapping and ultimately explaining the rise and fall of such globally distributed sites.

Low-density urbanism was initially defined in contradistinction to the classic highly nucleated urban capitals discussed by Childe, such as Uruk, Baghdad, Rome and Paris (Fletcher 2009). Low-density cities can now be found across all continents of the world except Antarctica, taking the form of sites whose obvious differences from high-density cities have led to names such as 'Big Weird Sites' or 'Anomalous Great Sites' (see above, pp. 15–16). The proposal here is that the term 'megasite' should not be restricted to certain classes of large sites, whether Epipalaeolithic sites in the Levant, Iberian enclosed sites or Trypillia settlements, but should instead be generalised to become the standard term for these anomalous settlements. The reasons for this proposal are fourfold, based upon widespread agreement that: (a) after a decade's fruitless search for a common denominator, a new term is urgently needed for these places; (b) the term 'urban' no longer captures the essence of these big sites (5, 2013); (c) these settlements were unusually large for their local and regional cultural context; and (d) a relatively new term such as 'megasite', with far less intellectual baggage than 'urban', helps to unite these disparate places in a meaningful manner which allows comparative study. The practice of low-density urban dwelling is of particular

relevance to the Trypillia megasites, since they appear to be the earliest such cases in the world. But what was the social context of such megasites?

Another approach to the impasse in urban studies has lain dormant, widely overlooked since 1938. Although most of Wirth's sociological definition (see above, p. 21) is widely accepted, few have taken up his injunction that any definition of a city should be contextually informed (Wirth 1938, p. 6). This insight has suffered from its incompatibility with the favoured cross-cultural comparative approach; here, it is vindicated in the shape of a relational approach looking for meaningful markers within a region rather than for fixed universalities. In a relational framework, categories emerge, develop and integrate only *in relation* to each other rather than absolutely. The intensity of social practices at urban sites, some of which were predicated by their size, makes these sites very different from (*in relation* to) other smaller sites, and more importantly were experienced and perceived differently by their inhabitants, visitors and neighbours.

At an early stage in the project, it became clear that there were several ways in which the Trypillia evidence did not fit the dominant urban accounts. Therefore, we decided to build on the critiques of, and alternatives to, the dominant model as discussed by authors such as Wirth (1938), A. Smith (2003), Cowgill (2004), Campbell (2009), Fletcher (2009), Wengrow (2015), Ur (2014), Jennings and Earle (2016), Hahn (2016) and Gaydarska (2016; 2017). In particular, we noted the relational difference between Tryillia megasites and smaller Trypillia sites. This difference was underpinned by the high intensity of social practices and network centrality, perhaps qualifying the megasites as different kinds of sites in a Trypillia context. This hypothesis invites consideration of Trypillia megasites as 'cities' in a global context.

2.1.2 Trypillia Megasites – the Theoretical Debate

Archaeological theory behind the Iron Curtain was very different from its counterpart in the West. While this is not the place to praise, justify or criticise it, it is very important to underline a few of its characteristics that continue to have a devastating legacy. First and foremost is the now tacit, but nevertheless no less powerful, division between theory and practice. Cohorts of field archaeologists were compiling data, with their efforts rewarded as masterpieces of empirical studies. Explanations were provided by a few powerful theorists – explanations that in turn were firmly embedded back into the cohorts of archaeologists (Klejn 1982). There were no paradigm shifts, just shifts of powerful people. Secondly, the political regimes not only favoured but imposed social evolutionary thinking and revolutions as the prime drivers of social change. Even if archaeologists wanted to take a different route, the pool of theoretical resources was very limited. It is in this context that current thinking on Trypillia megasites should be set.

At the start of the project, the Ukrainian debate about the nature of the Trypillia megasites fitted well with the essentialist, evolutionary, 'archaeological' definition of urban. A formal definition of what did or did not constitute a megasite as a '(proto) city' was never put forward. The small group of advocates of the proto-city hypothesis considered megasites as economical, political, military, administrative and religious centres of local groups. One member of this group, Mykhailo Videiko (initially with Shmagli; for full list see Videiko 2013), presented evidence for monumentality and well-developed crafts (e.g., pottery consumption and hence production at Majdanetske) as comparable to that of Uruk: Videiko 2013)[16]. Videiko argued that (proto)cities did not appear overnight and involved a developmental process, which started in the Southern Bug-Dnieper interfluve but was not restricted to that area. Indeed, sites larger than 100ha first appeared in the S. Bug-Dnieper interfluve but were soon followed by others in other areas (Videiko 2013, Fig. 86), with their distribution again contracting to the initial area in Phases CI–CII. Nonetheless, the largest settlements developed in this interfluve, so some special status was assigned to the people living there. For Nebbia (Chapter 3), there are no evident environmental reasons for why Trypillian groups should have settled and developed so many megasites in that area – however, the 'mega-cluster' apparently sat at a conjunction of two major hydrographic basins in Ukraine. Another visible pattern is that megasites appeared at the Southern edge of the currently known Trypillia area of influence so as to mark a sort of "border". This would complement the notion that Trypillians gathering at megasites may have been interacting with bordering steppe communities.

Critics of the 'proto-city' hypothesis emphasised that, in contradistinction to the Trypillia sites, true early cities were administrative, economic, cultural and religious centres of a rural hinterland[17]. Since there were no small sites around the megasites, all the population was believed to have been living *in* the megasites and thus, with no rural hinterland, there were by implication no cities. Childean criteria of urbanism, such as populations of over 5,000, writing and monumental architecture in the form of palaces and temples, were claimed to be absent at the large Trypillian settlements (Korvin-Piotrovskiy 2003, p. 5). Arguments for monumentality in the shape of two-storey buildings forming the so-called 'living-walls' and large geophysical anomalies were considered unsubstantiated. Despite the high number of inhabitants that points to urban population levels, the density of population was very low in comparison to smaller sites and there was no evidence for differentiation such as cult features or craft quarters. Another line of criticism took a diachronic and cross-cultural approach (Monah 2003). Quoting mainly Romanian examples, Monah argued that

16 It is clear that Videiko changed his view that the megasites were not centres of crafts and trade (Videiko 2007, p. 272).

17 It is important to point out that this is a conceptual rather than literal translation of the common understanding of proto-cities in the Ukrainian and Russian literature.

fortification and population size cannot be considered as criteria for urban life. Equally, some elements pertinent to towns and cities, like streets, markets, spaces and buildings for common use, were found also in rural Chalcolithic communities. Thus, for Monah, the key issue was the ratio between artisans and other units of population. Although he admits that Cucuteni (and by extension Trypillia) painted vessels were real masterpieces, this did not constitute evidence, even for Monah, for the kind of specialized production characteristic of urban economies. Indeed, Wengrow identified the replacement of elaborately decorated pottery by much more standardised ceramics at the transition to the first cities of the Late Uruk period in the Near East (Wengrow 2001).

On a general level, the prevailing views of Cucuteni-Trypillia specialists about the nature of megasites were built on shaky theoretical foundations. The proponents of the 'proto'-urban hypothesis have conflated Childe's two revolutions – the Neolithic and the Urban – in an evolutionary, stage-based framework (Service 1962). Although the agrarian nature of Trypillian cities is certainly a research avenue to be pursued, it needs to be properly theorized, instead of relying on a implicit, narrow understanding of both revolutions. The absence of a settlement legacy of the megasites jeopardizes the evolutionary account towards urbanism, since there were remarkably few post-Trypillia settlements known in this region until the Late Bronze Age.

The opponents of the 'proto'-urban hypothesis adopted a similar evolutionary stance in seeking to reconcile an essentially 'Neolithic package' with agglomerations of thousands of people – hence the term 'settlement-giants' (Korvin-Piotrovskiy 2003). Estimates for scaled-up operations were provided (Kruts 1989) but theorization was preoccupied with the origins of the megasite through internal or external conflict, migration and population pressure (Diachenko & Menotti 2017). The obvious contradiction of how small-scale Neolithic subsistence practices could possibly sustain such massive aggregations remained unaddressed. If subsistence was dependent on thousands of smallholdings (the basic Neolithic unit: Childe 1958; Chapman 2009), what was the underlying social structure and was it a *Neolithic* structure? A secondary issue concerned the environmental depletions caused by such massive agglomerations, which forced people to move on to another megasite.

It should be emphasised that the reasons for the development of megasites were identical for those in favour of and *contra* Trypillia megasites as 'proto-cities' – internal or external conflict, migration and population pressure (Videiko 2007, p. 274; Diachenko & Menotti 2017). Echoing Chernysh (1977) and Gimbutas (1977), Kruts (1989) argues that the principal threat to Trypillia communities came from the Sredni Stog groups in the steppe zone to the South and East. However, even 10–20ha Trypillia sites would have been large enough to deter small groups of armed Sredni Stog raiders – removing the military need for much larger agglomerations.

Dergachev (2002) uses his findings of a higher ratio of fortified to non-fortified sites, and higher numbers of arrowheads per site to suggests that Phase BI was a 'society … literally under siege' (2002, p. 103), in a 'state of war owing to outside

threat' from the steppe (2002, p. 106). While this view can be used to support the appearance of early megasites, it offers no support for the military explanation of megasites in the more peaceful Phases BII and CI.

By contrast, Videiko (2007, pp. 274–5) proposed an internal social conflict for the origins of megasites, describing Trypillia chiefdoms as 'in a state of perpetual internecine war' because of the expansive nature of Trypillia agriculture, with soil exhaustion causing megasites to move on to capture more arable land every 70 years. However, Videiko ignores the large unsettled areas in the Southern Bug-Dnieper Interfluve, while the evidence for perpetual internecine war is limited to a single archery attack on the small site of Drutsi I, in Moldova (Ryndina & Engovatova 1990). More compelling evidence derives from the Verteba Cave, where 11 out of 25 buried crania have clear indications of trauma (Madden et al. 2018). Stratigraphic observations suggest that there were two episodes of interpersonal violence and subsequent skull deposition. However, none of the 11 examples has been directly AMS-dated and the long duration of neighbouring dated contexts (e.g., Stratum B – 3805–3707 cal BC and 3946–3774 cal BC, and above Stratum A, range between 3950 and 2578 cal BC) makes any suggestions for the timing of the two violent episodes highly speculative. In addition, the Verteba Cave is far from any megasite, thus jeopardizing any potential link between the two phenomena.

It is clear that migrations can show how people moved across the landscape but do not provide a reason for any particular settlement form – say, megasites rather than village clusters. This leaves internally-driven or externally-imposed warfare as the principal traditional explanation for the rise of megasites – not the outcome predicted by Gimbutas' (1977) peaceful matriarchal Cucuteni-Trypillia society! It is also worth noting that many of the problems with these traditional explanations are tied to basic maximalist assumptions about the megasites themselves.

Paradoxically, the question about the collapse of the megasites is very often conflated with their origin. The two traditional responses to this question have focused on invasion and defence (Passek 1949a; Rassamakin 2004; Manzura 2005; Anthony 2007, pp. 279–282) and migrations caused by the unsustainability of such massive populations over a long period. Since the AMS-based gap of several centuries between the demise of the megasites and the earliest barrows makes an external threat untenable, we are left with Trypillia internal conflicts (Chapman et al. 2019) – an explanation subject to the same criticisms as for the origins of megasites.

The second postulated cause of megasite collapse – the lack of a sustainable resource base – has been discussed more frequently in the last decade (Kruts 2012; Diachenko 2016a; Ohlrau et al. 2016). While Kruts et al. (2001) maintain that the combination of the high demand for construction timber and the daily demands for firewood for heating and cooking at Taljanki caused a resource crisis after 50 years, Videiko (2007, p. 276) avers that the disappearance of the megasites reflected the crisis of an extensive agricultural economy. In comparison with Shukurov et al.'s (2015) thorough and multi-faceted modelling of the Trypillia agro-pastoral system,

other studies claiming to be investigations of Trypillia carrying capacity (Diachenko 2016a; Ohlrau et al. 2016) are based upon poorly quantified palaeo-environmental data (cf. Section 4.1) and a weak grasp of the complex interactions between a farming population and the carrying capacity of the soil on which those people depended (see Chapman 1988 and critique in Gaydarska & Chapman 2016, pp. 183–4). In any case, environmental over-exploitation has been based upon maximalist population estimates, which we shall show to be unrealistic (see below, pp. 32–34). This is not to say that environmental over-exploitation did not occur – only that it has not yet been clearly documented. We should not throw the environmental baby out with the demographic bathwater.

Currently, the only two well-documented local palaeo-environmental records derived from Nebelivka and Majdanetske. The post-megasite sediments in Nebelivka Core P1 fall in Zone 8 (Albert et al. 2019). Here, forest composition significantly changed to a gradual dominance of *Quercus*, perhaps related to cooler climatic conditions (Harper 2016). Cultivation indicators in the post-megasite period were not so obvious as in the megasite phase but there is spore evidence for the continued presence of grazing animals in the catchment. The Zone 8 data does little to support the interpretation of an environmental collapse, nor even a gradual decline.

The second proxy record, from Majdanetske, concerns the creation of a 'cultural steppe' landscape through the megasite's impact on the mosaic vegetation patterns of the forest steppe (Kirleis & Dreibrodt 2016, p. 177). The main evidence in support of this notion is the change in soils from a fertile forest cambisol before the start of dwelling at Majdanetske to a chernozem developing under steppic conditions (cf. Kruk 1980 for the TRB period in Little Poland). Kirleis & Dreibrodt imply the loss of soil fertility from cambisol to chernozem at Majdanetske, but this idea is contradicted by the high fertility of Ukrainian chernozems (Kubiena 1953). With their dense rootlet system, chernozems may have been harder to cultivate than cambisols (Chapman 1990) but once the practice of hoeing or ploughing in the interval soon after rain was mastered, the fertility of the chernozems was unmatched. The absence of any long-term improvements in Trypillia agriculture (Kruts 1989; Pashkevitch 2005) was perhaps related to the high fertility of the chernozem soils.

In summary, there is little or no palaeo-environmental evidence for such degradation as to force megasite abandonment, although this may be found in future. We cannot claim that the same minimalist arguments applying to Nebelivka should automatically apply to all other megasites but one obvious reason for the lack of environmental degradation would have been a much smaller population than envisaged by the maximalists for Taljanki and Majdanetske (see Section 6.2).

Two internal social scenarios for the demise of megasites stem from Müller and Rassmann's (2016) observation that the greater social complexity that comes with higher populations caused greater vulnerabilities that had to be addressed by some form of adaptation. Although these authors never amplify what these vulnerabilities actually meant at Majdanetske, they consistently refer to the problem of scalar stress

that would have adversely affected massive megasite populations (Müller et al. 2016a, p. 265; Chapman 2017; Hofmann et al. 2019). Müller and Rassmann (2016, p. 5) suggest that the lack of writing in Trypillia society limited the range of adaptations they could develop in the face of internal conflict or tension. The first internal scenario is thus an expression of the recurrent political and/or administrative failure to deal with huge population size and complex lifeways. However, this explanation is incompatible with the cyclic re-appearance of megasites over a period of 800 years.

The second scenario concerns Diachenko's (2016a) proposal that the end of the megasites involved a transformation in the Late Trypillia political economy from centralized chiefdoms to dispersed chiefdoms based upon a shift from centralized agricultural settlements to semi-autonomous households, decentralized staple production and network-based exchange systems. Thus the need for megasites disappeared because it was impossible to control large territories with such dispersed networks. But Diachenko allows that social hierarchies were maintained through practices causing material inequality in the latest Trypillia (CII) phase. Despite several other problematic assumptions (for critique, see Gaydarska & Chapman 2016), this model has the potential of explaining the end of the megasites with social arguments as well as questionable traditional accounts involving migrations and climatic fluctuations. It is not, however, clear how the model explains the decline of earlier cycles of megasites.

The view of Trypillia megasites as overgrown villages or settlement-giants remains the preferred explanation till this very day. Its inherent contradictions are exacerbated by the results of modern high-precision geophysics, which, in some cases, have increased the number of houses at megasites by up to 48% (e.g., for Majdanetske, compare 1,575 (Kruts 1989) with 3,000 (Ohlrau et al. 2016)). The resultant eyebrow-raising population number of 46,000 quoted for that site (Rassmann et al. 2014), later reduced to a maximum of 31,700 (Ohlrau et al. 2016) and now to 10,000 (Müller et al. 2018), is still believed to have lived in rural settlements that at best were qualified as 'social experiments' aided by a developed transport system with sledges allowing larger agglomerations (Müller & Pollock 2016, p. 286). A very useful point of comparison here is de Vries' (1984, Table 3.4) conclusion that, in AD 15th century Europe, there were only 18 cities with a population exceeding 40,000. What was the social foundation of such megasites?

2.1.3 The Social Formations of the Trypillia Megasites

The traditional view of the social structure of the inhabitants of megasites is a reflection of their size, permanence and significance as central places in the forest steppe landscape (Masson 1990; Kruts 2012; Videiko 2013). These views on society are ultimately founded on the Sahlins – Service evolutionist paradigm (Sahlins 1958; Service 1962) and focus on the level of social complexity represented at the megasites

– whether simple chiefdoms, complex chiefdoms or proto-urban, stratified elites. Masson (1990) considers the megasites as 'early complex societies' that have taken a non-urban route of development with its political equivalent being a chiefdom. One of the clearest statements on Trypillia social structure came from Kolesnikov (1993), who divides the group into tribes, communes, descent groups and multi-family households. In his view, the multi-family household consisted of two – four families (10–12 people), who developed neighbourly relations with other households and jointly owned land, animals and tools. The descent group consisted of many households and performed tasks such as house-building, preparation of the land for cultivation, rituals and ceremonies and also conflict-resolution within and between descent groups. The commune consisted of many descent groups, amounting to 350–500 people, and was run by the representatives of each descent group. The main functions of the commune were regulation of land and relationships, organization of rituals and defence. The highest level is the tribe of ca. 4,500 people, who regulated conflicts between communes over land ownership, since the supreme land-owner was the tribe. The tribe was also responsible for regulation of inter-tribal relationships, for example flint supplies from the Volhynian tribe. This summarises a classic socialist interpretation of prehistoric social relations (for variations on a similar theme for the Bulgarian Copper Age, see Raduncheva 2003).

Overlapping in part with Kolesnikov but developing the spatial scale more widely, Videiko (2013) proposed a three-tier settlement system with a chiefdom controlling an area of 10–20km in radius and consisting of a 'capital' (viz., a megasite) covering an area from 50 to 200ha, dependent towns ranging from 10 to 40ha and villages of 2–7ha. However, the scale of these chiefdoms seems far too small to accommodate the widespread interactions of the Trypillia Big Other (for definition, see below, pp. 37–39), which covered 250,000km^2.

In a recent article, the German expedition working at Majdanetske published their most comprehensive view of the social organisation of what they continue to regard as massive rural settlements (Müller et al. 2018). Although, for the maximalists, megasites could not have emerged without favourable environmental conditions and technological innovations (p. 254), the authors propose that the creation of the megasites was "primarily a political decision, made by several groups of people, previously not so closely connected, to live together in the same settlement" (p. 253). Five forms of socio-spatial groupings are recognised at Majdanetske (2018, Fig. 11) – the *household* as the basic unit; the *Neighbourhood* as a group of houses, the *Quarter* as a group of 50–150 houses centred on a Mega-structure[18] which may have been the focus of political decision-making; a *supra-household economic grouping* based upon the distribution of kilns (p. 257); the *lineage*, each of which matched a single concentric circle (p. 258); and the *entire settlement* for collective decision-

18 The Kiel group uses the term 'mega-structure' to mean what we have termed 'Assembly House'.

making. Given the absence of archaeological evidence for stable central institutions, there were no hierarchical relations at the megasites but, rather, each individual was bound into the five different social groups whose residential structure created the social organisation of the megasite (p. 258).

With the exception of the lineages and the supra-household economic groupings, this social model rests on a number of entities conceptualised for the Nebelivka megasite (household, Neighbourhood and Quarter: Chapman et al. 2014) and repeats the household model proposed for Majdanetske House 51 (Müller et al. 2016, Fig. 4). There are two major problems with the later version of this model – a macro-issue and a micro-issue. The macro-issue concerns the lack of any explanations of how the overlapping socio-spatial entities relate to each other. This is most serious for the Quarters and the supra-household economic groupings, which are almost coterminous in some cases while quite distinct in others; it is also problematic for the relations between lineages and Quarters, whose architectural manifestations cross-cut each other. The micro-issue concerns the unfortunate Majdanetske individual whose identities were split into many different parts. There are alternatives to such individual conditions as appear at Majdanetske but they have not been discussed in the 2018 model (see below, pp. 31–32). In short, this over-complicated social model actually operates at the structural level rather than considering real residents, who suffer from the polarities of the structures rather than making day-to-day decisions about them.

In this volume, we reiterate our support for the basic social units of households, Neighbourhoods and Quarters (Chapman et al. 2014; for architectural details, see below, Sections 4.2 and 4.3.1) and discuss two forms of descent groups linking different settlements – the clan and the lineage. There has been a long debate on the variable relationships between 'houses' and 'households' (for a summary, see Souvatzi 2008). In the Trypillia case, we make the distinction between small structures used for storage or production but not for residence (living, sleeping), houses above a certain size (a general threshold of 20m^2) which were large enough to contain the full range of dwelling practices, and larger structures, termed 'Assembly Houses', which were built and burnt as public buildings. An important question concerns the relationship between 'families' and 'individual dwelling houses': it is possible that families were spread over several houses/households, perhaps even small Neighbourhoods. To the extent that households were relatively independent from the megasite as a whole (Ur 2014), households formed vital building blocks of the entire social order at Nebelivka and the practices which contributed to the materialisation of their identities must have constituted a significant part of the heterogeneity of the megasite as a whole (see VGA, Section 4.3).

The Neighbourhood is a social term for a group of houses defined as separate from other house groups and having a minimum of three houses (the Nebelivka maximum for a Neighbourhood is 27 houses). The term makes the assumption that those living in the houses in the same Neighbourhood were more closely related to each other

than to those living in different Neighbourhoods. There are architectural, spatial and artifactual ways of assessing this assumption (see below, Chapters 4.3.1–4.3.2 & 5.1). Another assumption is that the number of houses in a Neighbourhood is a proxy for its overall duration – a proposition currently untestable with AMS dates. Michael Smith (2010, 137) has emphasised the importance of Neighbourhoods in urban development, due to 'their status as communities with social ties among members (''neighbors''), and the diverse functional roles they play within a city'.

The third term – the Quarter – has an amount of historical baggage (e.g., Wilkinson et al. 2014) but it was found important to define a supra-Neighbourhood grouping smaller than the entire site level. A complex, multi-dimensional mechanism for defining the boundaries of the Nebelivka Quarters has been proposed (see below, Chapter 4.1), which gives a result of 14 Quarters of considerable heterogeneity. The construction of one or more Assembly Houses in the vast majority of the Quarters suggests their centrality to public practices (see VGA, Section 4.3).

These three social groupings formed parts of a nested social arrangement, such that each house could be part of only one Neighbourhood and each Neighbourhood was part of only one Quarter. Such an arrangement was compatible with a broader, regional, descent-based social formation of the types familiar from social anthropological studies of kinship.

Cutting across the nested social groupings was the term 'Limited Interest Group' (or 'LIG'), introduced by T. Taylor in the 1990s (for discussion, see Chapman & Dolukhanov 1993). The term refers to any group of persons with shared skills or interests – nowadays, left-handed piano players, ice-skating enthusiasts or owners of Saab 90 cars: in the past, copper metallurgists, bone tool-makers or deer-hunters. The importance of a LIG would have increased with the diversification of a craft tradition, since LIGs provide useful channels for the dissemination of skills or innovations. LIG members would also be members of a household and a descent group.

The classic form of lineage is an unilineal descent group that can demonstrate their common descent from a known apical ancestor. Unilineal lineages can be matrilineal or patrilineal, depending on whether they are traced through mothers or fathers, respectively (Friedman & Rowlands 1977). Clans are less clearly defined as to origin than lineages, sometimes lacking in a founding ancestor but also sometimes claiming an ancestor who symbolises the clan's unity. Conical clan symbols often constitute an important visual differentiation of clan identity, whether as a cultural or biological referent (Friedman & Rowlands 1977). In their model, Friedman & Rowlands (1977) link lineages as constituent units to conical clans and the same is proposed for the Trypillia group. Residents at, and visitors to, the Nebelivka megasite would have been members of one of several lineages, each lineage itself forming part of a conical clan. It seems most likely that the majority of people in a Quarter were members of the same lineage or at most two lineages. In the wider settlement network, the tendency of both descent-group forms to practice exogamous marriage contrasted inclusivity at a regional level with exclusivity at the site level. The higher-

level conical clan structure would have underpinned the Trypillia Big Other through spatially extensive co-ordination of clan rituals and other practices involving the mobilisation of local lineage leaders. In this way, the nested Trypillia social formation would have generated centrally-placed megasites where major social practices integrated a large number of smaller sites. But how big were the populations of the Trypillia megasites?

2.1.4 The Maximalists, the Minimalists and the Middle Way

A recent article comparing the structurally similar sites of Çatalhöyük and the South-West American pueblo of Awat'ovi reaches conclusions of direct relevance for the Trypillia megasites (Bernardini & Schachner 2018). Despite the similar architectural footprints, reconstructions of population for Çatalhöyük and Awat'ovi differ dramatically by a factor of 4x–6x in favour of the former. On these calculations, Awat'ovi remained below the threshold of 2,500 people (+/–500 people) above which formal, hierarchical leadership was almost always present but Çatalhöyük exceeded the threshold. The authors discuss several factors causing what they regard as an over-estimation of the Çatalhöyük population, of which the most important for us is the under-estimation of communal open space and the unwarranted assumptions of coeval occupation of all or most of the Neighbourhood clusters. All of the objections to the over-estimates for the Çatalhöyük population are matched in the Trypillia megasite case.

We have termed the characterisation of megasites as long-term, permanent occupations with tens of thousands of people as the 'maximalist' view (Fig. 2.1). Such 'maximalist' views build uncritically on the existing models and interpretations of settlements-giants, claiming for one megasite (Majdanetske) contemporaneity of all buildings on the basis of 0.3% of the total number of houses dated with AMS determinations (Müller et al. 2017). Because of the adherence to the 'archaeological' definition of cities (see above) with its inherent check-list, the failure to tick the boxes of the urban-rural dichotomy and elaborate urban management (e.g., seals and property declarations) has relegated the megasites to the status of massive rural settlements (Müller & Pollock 2016).

The views presented in the current volume challenge the premise of the city exclusively as a massive, high-density, permanent occupation, positing instead that emergent cities are very different from developed cities and thus much closer to pre-urban social formations. The alternative to the 'maximalist' approach (Müller et al. 2016) is the 'minimalist' or the 'middle' way developed here in terms of three different models of distributed governance, assembly and pilgrimage. Each model involves bottom-up agency and non-hierarchical social power and all seek to reconcile the footprint of 1,445 houses built at Nebelivka with the environmental evidence of low

human impact and lack of massive fires to account for so many *ploshchadki* (see below). They were also designed to fit the models of coeval house numbers developed from the AMS dates.

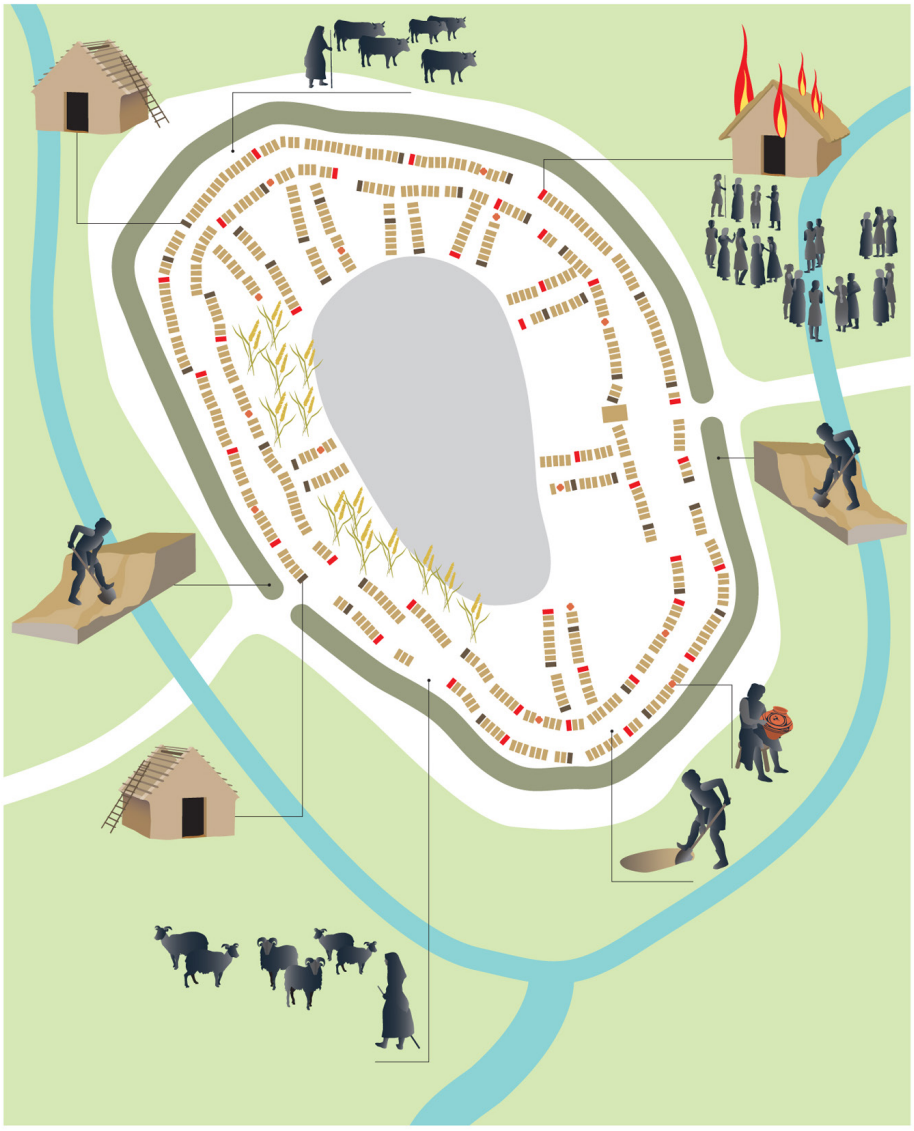

Figure 2.1: The 'Maximalist' model (by C. Unwin).

The choice of modelling megasite household and population trajectories stemmed from the difficulties of creating an internal site chronology caused by the wiggle in the calibration curve in the early 4th millennium BC (see pp. 49–50 and Section 4.8). The absence of a precise AMS-based model of changing house numbers left us with a choice of models which retained the key factor of the temporality of dwelling at Nebelivka. Any general statement about coeval house numbers (e.g., the claims for Majdanetske in Müller et al. 2016, 2017) would be immediately susceptible to challenge from the lack of diachronic changes in the life of the settlement. It was a requirement of two models – the Assembly and the Pilgrimage models – to build in temporal changes using the device of five 30-year generations; the permanent occupation of the Distributed Governance model makes generational time less significant (for definitions of the three models, see below, pp. 32–35). After that stage, the success or otherwise of a model could be explicitly measured against four criteria: (a) the number of houses built in the model could not exceed, or fall far short of, the footprint of 1,445 houses built at Nebelivka; (b) the number of houses burnt in the model could not exceed, or fall far short of, the footprint of 1,077 houses burnt at Nebelivka; (c) the effects of building and burning houses at any stage (generation) in the model could not produce a major human impact on the surrounding forest-steppe; (d) the number of houses in the model could not exceed the number of houses modelled using the AMS dates for each decade. It was clear from the outset that any model failing to meet all four criteria would be rejected.

The three models used to account for the Nebelivka megasite are all variants on the theme of 'assemblies' but it is clear that each model characterizes 'assembly' (or 'aggregation' or 'congregation') in a different way. In her recent review of archaeological claims for 'assembly sites, Milesi García (2018, Section 13.1) concludes that the term 'assembly' is not very useful as an all-encompassing analytical term, requiring closer definition in terms of the three key variables of time, space and social process. Milesi García's complaint that the term 'assembly' has rarely received explicit definition is confirmed in a recent *World Archaeology* issue on 'Gatherings' (Semple 2018), in which contributors (ourselves included!) offer a guide to what happened at an assembly place without providing an explicit definition of the key term. The two processes Milesi García identifies in her Iberian Copper Age examples are settlement population concentrations and short-term gatherings in monumental places – two processes which have often been used to define opposed interpretations of these enclosures. However, Milesi García shows how both long human occupations and seasonal stays were found at Iberian megasites but at different times. In view of her strictures, we offer a variant definition of 'assembly' for each of the three models.

What all three models share is a large population aggregation at a very large site that, if it is not monumental at the start of dwelling, becomes monumentalised within a decade or so through the large-scale construction of one- and two-storey houses and Assembly Houses. Where the models differ is in their temporality and

underlying social processes. Two of the three models portray the megasite assembly as a combination of a small 'local' population who lived there permanently and seasonal 'visitors' who came to Nebelivka from their own home communities for a month or several months *per annum* (the Assembly Model and the Pilgrimage Model). The Distributed Governance model factors in a larger permanent local population, one segment of which provided resources for all the residents for a year in concert with their home community. Thus each version of assembly hinges on the relations between 'locals' and 'visitors'.

The Distributed Governance model (Gaydarska, submitted) works on the premise of a permanent but substantially scaled-down contemporary occupation of 400 houses, with each of 10 clans living in 40 houses and each clan providing resources and leadership for one year in a 10-year cycle.

The Assembly model is based upon a month-long seasonal congregation of increasing number of visitors at a centre maintained through the year by a small number of permanent guardians (Nebbia et al. 2018).

The third model considers a concept hitherto rarely developed in prehistory – the megasite as a pilgrimage centre (Chapman & Gaydarska 2019). An intensive initial building phase to create the centre is followed by a long phase of gradual expansion of pilgrims' dwelling houses, which cumulatively created the plan of the megasite as we know it.

The choice of testing three alternative models of megasite assembly was made for two reasons. A larger number of models would have introduced undesirable overlaps which are, by and large, avoided in the three versions selected. However, the choice of only one model, or even two, would have given the impression of a certain confidence about the outcome – which we did not share then and do not share now. Therefore, the compromise solution of three models provides both appropriate variety and ambiguity.

While each of these models is based upon severe reductions in megasite population estimates, the same size and scale of the settlement *layout* remains central to each model. The initial assumption of each of these models remains that a megasite is *possible*, that a combination of pre-existing layouts, households, Neighbourhoods and Quarters *would* result in a site form where successive generations of people would live in relative harmony until a perhaps inevitable decline. It is time, now, to step back from this comfortable assumption which, although strongly supported by hindsight, at any time from the mid-5th millennium BC onwards may not have worked out. In other words, with Benedict Anderson (1991) our guide, we turn to the *possibility* of Trypillia megasites.

2.1.5 The Possibility of Trypillia Megasites

In *Imagined Communities* – the influential study of the anomaly of modern nationalism[19], Anderson (1991, p. 4) reminds us that all communities larger than a single village are 'imagined communities', because separate communities have, by definition, never lived together with a second group. We suggest that integration of people beyond their normal, face-to-face groups required a vision of how those diverse communities could live together to derive benefits from the new settlement form that were considered greater than the difficulties this linkage may have brought. After all, there is a long tradition, beginning with Childe (1958), of praising the advantages of autarky – living in independent, face-to-face communities – which has, by and large, limited the scale of settlement nucleation in prehistoric Europe. Nonetheless, the existence of the Trypillia megasites clearly transcended small-scale communities, while their scale and size engendered an equally sizeable problem of how such communities were imagined in the first place.

For let us be under no illusions: on the Eurasian continent of the 5th–4th millennia BC, the Trypillia megasites were unique in size and scale. There was nothing anywhere else on the planet, at 4200 BC, to compare with the Phase BI megasite of Vesely Kut, covering an area of 150ha – no analogies from which to derive this extraordinary place. We should never forget the *unprecedented* nature of Trypillia megasites, which have created immense problems of explanation and understanding but, first of all, problems of *imagination*. This discussion of how the Trypillia megasite communities were imagined will examine three crucial issues: what was the cultural background from which they emerged?; what were the changes in the Trypillia world to which megasites were a possible response?; and what (dis)advantages did Trypillia megasites bring to their world? Answers to these questions will frame what has become the Project's approach to the Nebelivka megasite and its place in megasite developments in general.

There are four inter-related elements of the cultural background of the Early Trypillia group (5000–4000 BC) which helped to create the possibility of the megasites: large-scale site planning, inter-regional networks, a pre-eminent symbolic order which we shall term the 'Trypillia Big Other' and everyday social practices. The general planning elements of oval house circuits, a wide inter-circuit space, the construction of large, public buildings, inner radial streets and a large central empty area were all known from Phase A–BI–I/II sites, although it is becoming increasingly likely that not one single large site earlier than Phase BII materialised all of the planning elements. The handful of Phase BI/II megasites[20] invented new planning elements on sites of

19 We are not, of course, suggesting that Trypillia megasites were in any way reflected the development of Ukrainian nationalism.

20 Videiko (2007) mentions six Phase B I/II sites with sizes of 100ha or over, five of which are located

unprecedented size; it was only later that all the elements came together, through a process such as bricolage, in the creation of the massive BII megasites.

Inter-regional exchange networks were particularly strong at the time of Trypillia A/Precucuteni III. One of the widest networks – the so-called Varna network – stretched from the Volga basin (the Hvalynsk cemetery) to Brittany, via Varna and North Pontic mortuary sites such as Giurgiuleşti (Chapman 2013). Prestige goods made of gold, copper, *Spondylus* and exotic lithics were exchanged over this network, one of whose nodes was the Karbuna site with its extraordinarily rich hoard dated to Phase A (Dergachev 1998). However, by the end of the Varna cemetery, ca. 4450 BC, this network had dramatically contracted to be dominated by two-way ceramic exchange between Skelya and Cucuteni-Trypillia communities, with rare *Spondylus* exports from the Black Sea to Lysaya Gora and an even rarer serpentine bracelet from the pre-Caucasus deposited in Novi Ruşeşti (Chapman 2002, Table 5.2). The exchange of high-quality Prut-Dniester flint Eastwards to the Bug-Dnieper Interfluve brought many communities into occasional but regular contact, contributing to Early Trypillia cultural interaction.

The third widespread pre-existing linkage constitutes the domain of symbolic order, which we call the 'Big Other'. The original notion of the Big Other is derived from Lacan's (1988) perception of the world consisting of three registers – those of the Real, the Imaginary and the Symbolic. Although initially inspired by his training as a psychiatrist, Lacan's ideas were disseminated mainly through his annual seminars, having a lasting influence on philosophers, anthropologists and other social scientists alike. According to Lacan, the 'Big Other' is a qua-symbolic order consisting of fictional ideas of anonymous authoritative power and/or knowledge such as Law, Nature, Science, God, the State or Ideology (Johnston, A. 2013). An underpinning theme in Lacan's work is that the 'unconscious is structured like a language'. The important implication of this claim is that the unconscious, i.e. the symbolic, is not chaotic and unruly but rather it is ordered and consistent. S. Žižek (2012, pp. 86–90) clarifies further the concept of the Big Other by discussing the efficiency of such a symbolic fiction which is constitutive of reality while being neither objective reality nor subjective inner experience. It is a virtual order that exists only through its subjects believing in it. Crucially, there are many cases in which individuals may stand for this symbolic order (Žižek 2012, p. 92). The implication for archaeology is that material culture may also stand for such a symbolic order. In the Trypillia context, the material world standing for the symbolic order comprises pottery, figurines and houses (Chapman & Gaydarska 2018) – the three most studied components in Trypillian archaeology and each contributing in important ways to everyday Trypillia life on all sites (Fig. 2.2). The sense of the Big Other recurs in Curta's (2014, p. 2508) reminder that, for ethnic identities, it is not so much the group that endures as the idea of the group.

in the Southern Bug-Dnieper Interfluve.

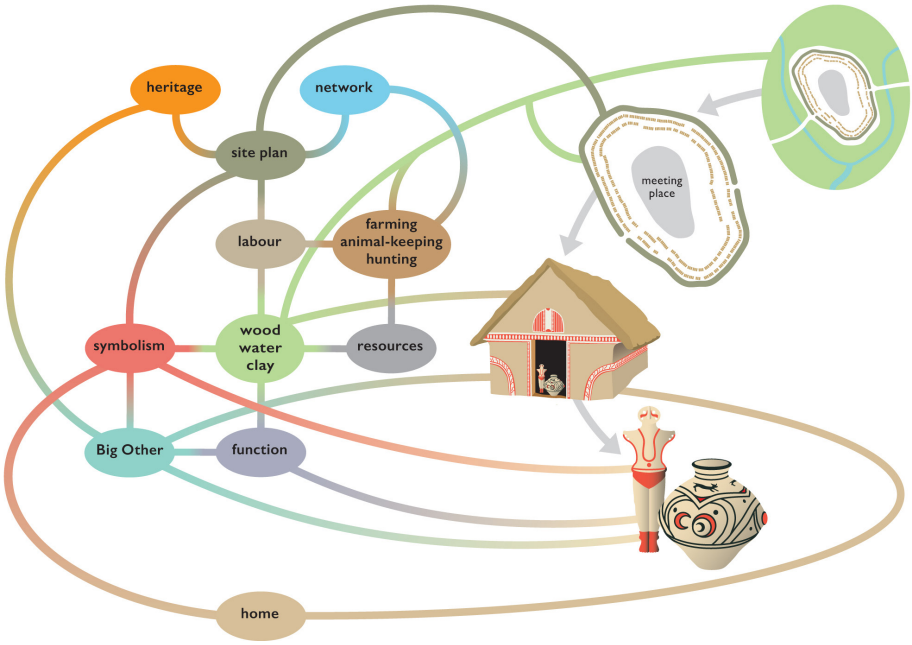

Figure 2.2: The Trypillia 'Big Other' (by C. Unwin).

The last pre-existing element is linked to the Big Other but operates at a different, more intimate scale. Although the Big Other is a material part of the everyday life, it works at a larger scale well beyond the level of one settlement or a single person (Kohring 2012, Fig. 2). Bourdieu's (1977) notion of the *habitus*, on the other hand, is practice-based and therefore very much part of the personal, communal and inter-communal engagement of each person with the world on a quotidian basis. The two concepts are nested in each other and complement each other.

The concept of the *habitus* has been widely used in archaeology over the last 30 years, giving rise to a widespread practice theory (Hodder 1990; Barrett 1994; Dobres & Robb 2000; Thomas, J. 1999). Bourdieu's (1985, p. 14) definition is that *habitus* is 'a relationship of ontological complicity with the world'. In other words, social practices are implicit – they go without saying because they come without saying. Critiques of the *habitus* based on its supposed inability to explain change (e.g., King 2000) ignore Bourdieu's later identification of 'symbolic struggles and specific knowledge' whose negotiation changes the social structure (1988, p. 21). Thus, the *habitus* enshrines the power of 'world making', and crucially to change the world means to change the ways of 'world making' (1988, p. 22). Each of the forms of objects that remained central to the Trypillia Big Other for two millennia were contributing to daily lifeways on every Trypillia site. We have seen how the house framed daily practices and materialised

hitherto invisible social relations. We have also noted the repetitive practices in which standardised figurines participated, as well as the influence of the form of pottery on appropriate and inappropriate behaviour. The participation of houses, figurines and pottery contributed reflexively to a widespread *habitus*, which formed the basis for shared meaning of cultural practices in different communities.

One important element of the *habitus* was the spatial order produced as communities settled on the land and created their own settlements. This move from space to place has been much discussed in the social sciences, with a consensus around the dialectical relationship between the physical embodiment and the meaning of the built environment (Tuan 1977; Chapman 1988a; Tilley 1994; Ingold 2009; Hillier 2014). It will be claimed here that megasites became a monumental part of the *habitus* of Trypillia people (Buchanan, Section 4.3). This new kind of *habitus* was based upon non-competitive interactions between different small sites in one single large site.

These four elements of shared cultural practice – settlement layout, inter-regional exchange, the symbolic order of the Big Other and the daily practice-based engagements with the *habitus* in significant places – were closely intertwined and hence could create a strong framework for people from different communities developing relations with each other. Yet this convergence of shared frameworks of meaning did not necessarily create the possibility of imagining such vast communities as the megasites: it was a necessary but insufficient cause of megasite emergence. For this, we turn to the second question – the changes in the pre-megasite world which may have generated the imagined communities.

As we have noted (see above, pp. 25–26), the standard response to the changes leading to the emergence of megasites targets increasing levels of internal and/or external conflict, migration and population pressure (Diachenko & Menotti 2017). However, there is little supporting evidence for any of these variables making a difference, with the increased levels of these factors being particularly unsubstantiated. An alternative approach is to consider the social and settlement changes in the early Trypillia Phase. There was a long-term increase in the clustering of small Trypillia sites from Phase BI onwards (Nebbia, Section 3.4), leading to pressure on agro-pastoral resources. One response was more intensive exchange within a site cluster to provide buffering; the other was the formalisation of nucleation on single, larger sites. This led to the consolidation of assembly places in Phase BI, which, by extension from Kruts' (1989) model for Taljanki, constituted kin-based aggregations of up to 40 smaller social units, each corresponding to the population of typical sites of up to 10ha. Social gatherings of local, regional and inter-regional scale for the purposes of trade, exchange, exogamous marriages, ceremonies, feasts, celebrations, burials and conflict resolution became an important part of the Trypillia calendar – a notion supported by the overall material integrity of the Cucuteni-Trypillia network over a vast area. Those exchanges performed at a regional level as temporary gatherings at special places gradually offered the

possibility of conceiving of regular formal meetings at a place with accumulated ancestral place-value but on an even greater scale than before. Thus, there were two parts of a vision of the new site type: assembly and settlement. Formal assemblies could take place in the open central space of the megasite plan, while large numbers of people could settle in the dwelling zone outside the inner open area. The inner open area was a powerful residual reminder of the function of such places that fed into the symbolic order of Trypillian communities.

Moving beyond the possibility of imagining this community to its actual creation leads us to the site itself and the (dis)advantages of its actual dwelling within the local and regional network (Fig. 2.2). An early advantage in the early months and years of a megasite was the huge prestige attached to a person's association with the megasite because of its centrality. The centrality of megasites in local and regional networks was formed not in the traditional core-periphery sense but as places fostering different opportunities for ceremonial, political and exchange interactions. Such a network differed from the frequently reproduced link between urban centres and their hinterland in that sites did not need to be in the immediate vicinity of a megasite – in fact, we postulate that such a distance may span a 100km radius (see Chapter 3.4). What is important here is not the *spatial* but the *social* proximity of smaller settlements.

Another advantage of the megasite was the heterogeneity that was built into the site. In a discussion informed by social anthropology, Hahn (2016, p. 176) maintains that urbanization created "the capability to practice the characteristics of heterogeneity as everyday life". This may have occurred in two ways: first, the *heterogeneity of practices*, whereby urban occupants and visitors would experience some practices similar to those on small sites (for megasites, house-burning and pit-digging), but would be unfamiliar with other practices which were an urban prerogative (e.g,, regional assemblies and ceremonies or long-distance trade and exchange activities); and, secondly, the *heterogeneity of identities* – the cross-cutting and complementary identities of members of various corporate groups, different genders and forms of personhood (Gaydarska 2019), households and Neighbourhoods, which were often in tension with the overarching urban identity of the imagined community. This rather different vision for the *habitus* in urban places meant an advantageous fluidity of practice and identity for all those coming to the megasite, offering a greater potential for meetings, exchanges and ceremonies than was available in the home community. But these advantages were not to the detriment of losing contacts with the home community: instead, the mobility offered by megasites allowed continuing contact with one's roots as well as expansion into new networks. The long-assumed permanent occupation of megasites is in need of much more supporting evidence; if that is not forthcoming, seasonality and mobility can finally take centre stage (cf. Tkachuk 2010–11).

The early years of a megasite may not necessarily have introduced major social change at once, although there was an obvious difference between the identities of small, autonomous, local communities and the few places which hosted formal assemblies for groups of such small settlements. These two identities were in tension all year long at the meeting-place but became particularly potent at the time of the assembly. In the early years, the megasite identity may have been weak, lacking as it was the formal mechanisms of ritual, ceremonial and feasting practice that consolidated such an identity. But the advantages of developing an overarching identity to the success of the megasite meetings may have produced a response in the creation of new ceremonies, depositional opportunities or feasting events that reflexively strengthened the megasite identity. This emergent process would have lasted over years, if not decades, and if successful would have created an attractive identity for the 'imagined community' that lay at the heart of the megasite.

The greatest disadvantage to living in such massive communities as megasites was undoubtedly the potential for scalar stress (Johnson 1982), which could drive constituent groups apart and cause the failure of the entire settlement. However, there were several mitigating factors which reduced this risk. We suggest that Kruts' (1989) kin-based aggregation could manage scalar stress by allowing the operation of everyday activities, including disputes (Johnson 1982), at smaller operational units such as the Quarters (see Chapter 4.2) or even smaller units such as Neighbourhoods. These emergent social practices were congruent with the notion of egalitarian, self-governing and heterarchical forms of society, rather than hierarchical forms. It was in the interests of small cooperative groups to control status competition at incipient cites (Jennings & Earle 2016) – an idea supported by the current lack of evidence for materialized hierarchy at megasites. We concur with Ur's (2014) suggestion that the household was a key metaphor in the social organization of incipient urban societies and his conclusion that scalar transformation at such sites was not a mere sum of its constituents. A further mitigating factor of scalar stress was the low residential density of below 10 houses per ha found at all Trypillia megasites. In addition to the well-argued global advantages of low-density occupation (Fletcher 2012), the immediate benefits of such habitation should be emphasised, e.g., the creation of social space comparable to that found in megasite visitors' home communities, with room for gardens, smallholdings and animal keeping. Lastly, the short times of such assemblies allowed deferral of tensions until the end of the season.

If scalar stress constituted the principal threat to megasite survival, the opposite problem was how to continue to integrate such large numbers of residents and visitors. We should not forget the unprecedented size of Trypillia megasites – never seen before in Eurasian prehistory. What were the integrative principles and practices that produced the megasites and what held these disparate Neighbourhoods and Quarters together? The straightforward answer is the same four inter-related elements which helped to create the possibility of the megasites: large-scale site planning,

inter-regional networks, the 'Trypillia Big Other' and everyday social practices. The construction of a megasite can be viewed as an expression of cohesion, co-operation, obligation and inter-relationship within a larger community than an immediate kinship group. Perhaps the most critical element of the four was the Trypillia Big Other, which integrated communities through an already closely linked suite of material practices centred on the house (Fig. 1.8), the figurine (Fig. 1.4) and pottery (Fig. 1.3).

The predominant and preferred study unit in Trypillian archaeology is the burnt house, referred to as '*ploshchadka*' in the Russian and Ukrainian literature. This term is very revealing, as it is explicitly linked to the physical remains with no mention of the sociability implied by words like 'house' or 'dwelling'. People are conspicuously missing from the discussion of house-building and -burning, while house assemblages are taken literally with little appreciation of taphonomy and site-formation processes (Müller et al. 2017). It is our aim here to bring *the members of the house* back to the fore.

The production of an individual house can be viewed as a symbolic fusion of the different elements that made up the Trypillia landscape. Creation and fusion was achieved through combining clay from the earth with straw from the steppe or as a by-product of agriculture, wood from the forest and reeds and water from the rivers and lakes. For Bailey (2000 p. 268), the building of houses established otherwise invisible sets of social relations as explicit and materialised, as well as increasingly durable and in many cases permanent. The personality of each house would have emerged out of the combination of persons living there – the persons who were at the same time developing their own forms of personhood according to household and wider, corporate principles. The ways in which these principles of personhood were worked out in daily practice were strongly grounded in Trypillia household practices and relationships, only some of which required materialisation. It was largely out of the household setting that gendered (in)dividuals emerged through reiterated practices of cultural transmission. Bradley (2005, p. 120) maintains that "In prehistory, ritual gave domestic life its force and domestic life in turn provided a frame of reference for public events". This was equally true of figurines as it was of houses.

Figurines are traditionally viewed as sacred objects or deities. The concept of the Big Other advocated here is much more flexible and encompassing, allowing for symbolic renderings to be linked to all aspect of social life, not exclusively to cult and religion. The importance of figurines to the Trypillia world is shown by their ubiquity on sites, with ca. 10,000 known examples of anthropomorphic figurines (Ţerna 2017). Their frequent fragmentation (often over 90% of figurines on a site were deposited as broken) stimulated the enchainment of persons as well as households to each other (Chapman & Gaydarska 2007, 2015). Their flexibility of design made figurines an ideal constituent of the Big Other, with designs ranging from highly stylised to realistic 'portrait heads' (Fig. 2.3). The latter showed how

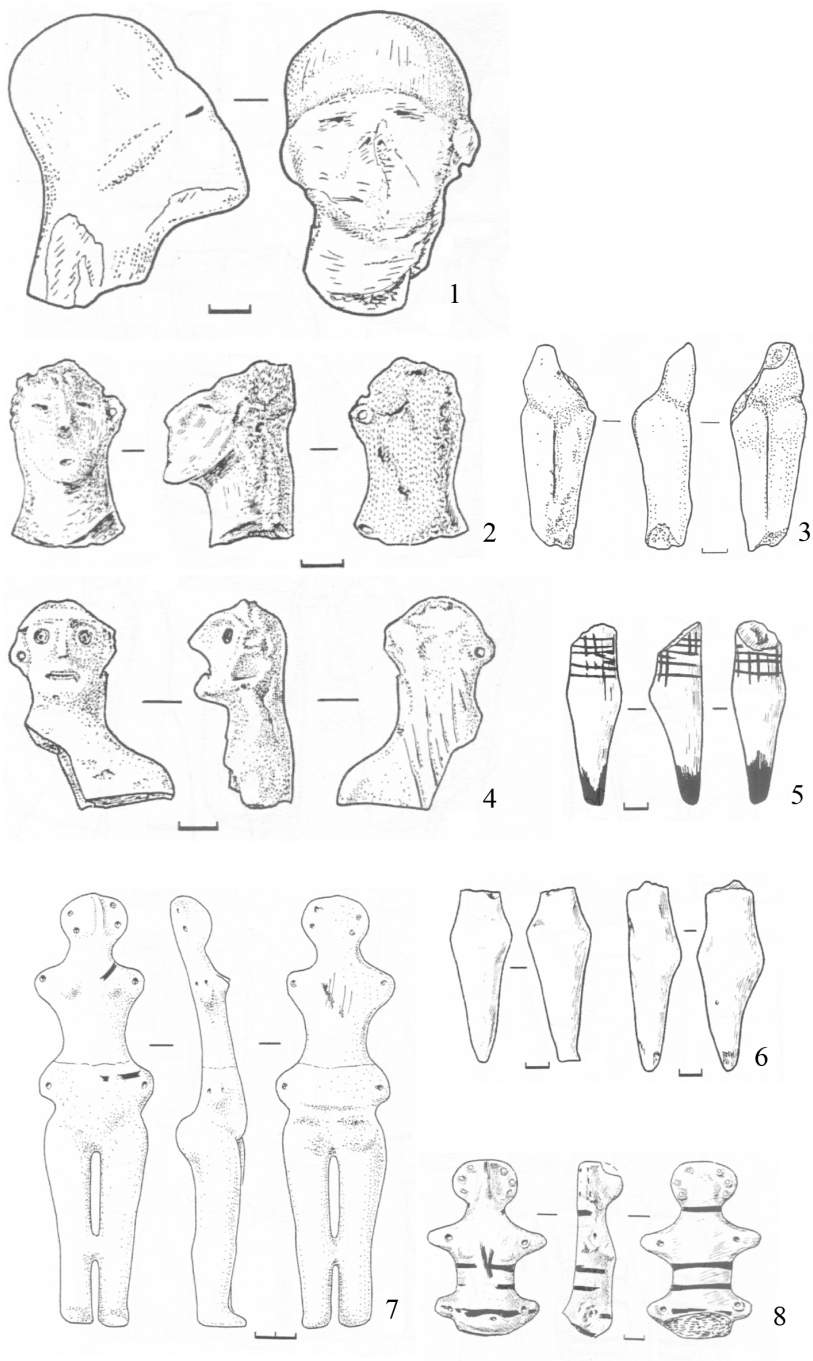

Figure 2.3: Realistic and stylised figurines (by B. Gaydarska).

Trypillia personhood was sometimes materialised through individual features, while the former is reminiscent of Orphanidis' theory of repetition (2010, p. 109), in which people used figurines to mediate community agreement on critical concepts of being or one's position in a social group. In this sense, figurines were material codes with which people re-shaped reality (Kokkinidou & Nikolaidou 2010, p. 76).

Last but not least is the pottery, which fulfils the two basic features associated with the Big Other – a long-running significance in daily practices and the potential for variability which allows a great diversity of people to continue using ceramics. A key role in these new social environments were the **things** that came to dominate daily life – expressive things made of a huge variety of materials, in a vast range of shapes and sizes, and with an almost unlimited durability (Bailey 2000, p. 270). These things were dominated by pottery, which became a key element in the 'container revolution' (Gamble 2007), leading to new opportunities for food storage and allocation and creating a range of appropriate practices which formed part of the *habitus*. Techniques for making new things such as pottery added to the expanding rules of social tradition (Childe 1949). The widespread distribution of the means of aesthetic production of pottery (Fig. 2.4) resulting from its predominantly household production created a strongly enchained system of social relations between consumers and producers, because they were often members of the same household (Wengrow 2001). Dramatic changes in the gendered structure of household work would have followed changes in pottery production into separate workshops within the settlement (e.g., Trypillia sites such as Varvareuvka XII: Ellis 1984) and/or by the introduction of pottery kilns on Trypillia megasites (Korvin-Piotrovskiy et al. 2016).

We have seen that all the objects which materialised the Big Other were central to daily Trypillia social practice, exhibiting the most significant visual effects on everyday performance. The long-term structuring effects of houses extended beyond the control of movement within the megasite to the creation of the households that produced and deposited the pottery and the figurines. The imagining of megasites in the mid-5th millennium BC would have been impossible without the existence of the shared meanings of the house, the figurine and the pottery that linked so many communities. What megasite households did with their houses, figurines and pottery made a further, enormous contribution to the perpetuation of megasites as successful examples of the biggest sites in 5th–4th millennia BC Eurasia.

Figure 2.4: The Scânteia vessel with multiple symmetries (source: Monah D & M 1997, Fig. 46).

Table 2.1: Summary of Project activities.

Number of units	Activity Unit
6	Years of fieldwork and excavation
1	Geographic zone (Northern tributaries of Southern Bug)
14	Field activities
7	Field seasons
137	Participants
286	Ha of geophysical investigation
1,445	No. of houses identified
850*	No. of Pits identified
24	No. of Assembly Houses identified
160	No. of geophysical anomalies cored
10 (2,619m^2)	Area excavations (area excavated)
88 (225m^2)	Test pit excavations (area excavated)
86 / 25	AMS dates / radiocarbon dates
6	Units tested with soil micro-morphology
25	On-site soil investigations
39	Transect soil cores
233	Ha surveyed with intensive systematic fieldwalking
178 (574)	Sq km of linear valley walked by extensive survey (ha fieldwalked)
4	No. of sites with intra-site gridded collection
34	Surface concentrations documented
800	Burial mounds registered
5	Sediment cores collected
1	Full multi-proxy analysis of sediment core
15	Units investigated in megasite hinterland
2	No. of experimental houses built
1	No. of experimental houses burnt
1	No. of excavations of burnt house remains
2	No. of building experiments, Durham
37,000*	No. of sherds excavated
21,300 (504 kg.)	No. (Weight) of sherds fully studied
6,316	No. of animal bones excavated
150	No. of chipped stone studied
85*	No. of ground stone tools
291 (143)	No. of Special Finds (figurines)
5,248	No. of Digital Images in ADS Project Archive
394	No. of Documents in ADS Project Archive

Key: * – estimated value

John Chapman & Bisserka Gaydarska

2.2 Changing Perspectives – Stable Research Questions

This project has been the first multi-disciplinary investigation of megasites ever conducted[21]. We sought to deliver field data and interpretation on a scale never attempted on megasites, whose very size makes them extraordinarily difficult to investigate. At the outset, we defined eight major research questions for project investigation. Despite the changes in research perspectives outlined in Chapter 1 ('A Project biography'), the research questions have, for the most part, remained stable, largely because they constitute the most basic research questions to be asked of a Trypillia megasite. The Project's wide-ranging research activities have been summarised above (Table 2.1) to allow the reader to relate them to the research questions which we now discuss. It should be recalled that the number of visual images and documents presented on the ADS Project Archive represents but a small fraction of the total available images and documents.

Question 1: What was the settlement plan at the Nebelivka megasite?

At the outset of the Project, no complete plan of a megasite had yet been produced using modern geophysical methods. The derivation of a complete settlement plan of Nebelivka through large-scale geophysical prospection of the 238ha site would allow the identification of a wider range of anomalies than had previously been recorded, a detailed spatial analysis of the settlement plan as well as insights into small-scale variations in plan at various spatial scales (see Chapter 4.2).

Methods for Question 1

– Data collection

Measurements of vertical geomagnetic field gradient were determined using Bartington Grad 601-2 dual sensor fluxgate gradiometers. A zig-zag traverse scheme was employed and data were logged in 30m grid units. The sample interval was 0.25m and the traverse interval was 1m, thus providing 3,600 sample measurements per 30m grid. Approximately 3,600 grids were surveyed at Nebelivka, providing almost 13 million geomagnetic data points. The complete data archive is held at Durham University.

– Data processing

Geoplot v.3 software was used to process the geophysical data and to produce continuous tone greyscale images. The basic processing functions applied to the geomagnetic data typically included clip, zero mean traverse, de-stagger and interpolate (typically to 0.25m × 0.25m intervals). The principal data processing issue

21 The multi-disciplinary projects at Majdanetske, Taljanki, Dobrovodi and Apolianka began in 2011 (Rassmann et al. 2014).

was the suppression of the strong magnetic signal from the underlying Ukrainian 'granite shield' by the use of a high pass filter with Gaussian weighting.

– Notes on structural features

There are two types of rectilinear geophysical anomaly that have been interpreted as 'houses': intense anomalies (e.g., -30 to +80nT), considered to be burnt houses, and weak anomalies (e.g., +1 to +6nT), considered to be unburnt houses.[22] A third category comprises anomalies which are considered likely to reflect houses, but which are amorphous to varying degrees, and either weak or strong or a combination of both. Using criteria of size, orientation of anomaly, strength of anomaly and location, none of the geomagnetic anomalies at Nebelivka is entirely consistent with what would be expected of a kiln anomaly.

– Testing the geophysical results

Several field tests were performed to check the accuracy of the geophysical results. The first took place in 2009, when the first intra-site gridded collection on a Trypillia megasite was carried out over a 15-hectare area in the South-West corner of Nebelivka. A total of 138 30 × 30m grid squares (12.5ha) was surveyed, using the same grid as the geophysical survey of the same area. The collection was a timed pick-up of surface material, overwhelmingly burnt daub and potsherds, with thirty person-minutes allowed per square. A total of 32 grid squares was not surveyed due to time constraints, and priority was given to those squares which included magnetic anomalies on the geophysical survey. Additionally, four squares have missing data for at least one class of find. Consideration was given to cultural and natural transforms affecting the field data, as well as surface visibility. The results were compared with the distribution of house-shaped magnetic anomalies, with a good correlation between surface daub concentrations and house-shaped anomalies (see Chapter 3.2.2).

The second test of the geophysical results involved soil coring, performed on a limited scale in 2009 and much more extensively in 2012. In 2009, daub was retrieved from the two cores placed over house-shaped anomalies, while dark, organic-rich soil was found in the cores placed over pit-shaped anomalies. In 2012, all of the 91 cores placed over house-sized anomalies yielded daub which was later scrutinised for charred botanical remains. The last coring was conducted at two places over a linear anomaly interpreted as the perimeter ditch; in both cases, deep ditch-fill was recovered in the cores. Full-scale excavations of burnt houses, adjacent pits and ditches in 2012–2014 showed good correlations between the size of the anomalies and the eventual size of the excavated features. Finally, all of the 88 house-shaped anomalies which were investigated by test pitting showed burnt or unburnt house remains. The results of the testing of the geophysical data showed a remarkably high accuracy in the identification of magnetic anomalies at Nebelivka (see Chapter 4.2).

22 Pichartz et al. (2019) use inverted soil magnetization mapping to demonstrate that "house masses … are basically daub masses".

– Analysis of the plan

The limitation on analyses of the Nebelivka plan is our initial assumption that not all houses were built and settled coevally. This limits the numbers of useful analyses; for example, in the publication of Ohlrau's (2015) Masters dissertation, all eleven of the excellent analyses of Majdanetske were based upon the assumption of coeval occupation of all houses.

Comparative spatial analyses of the location and composition of Neighbourhoods and Quarters have been complemented by the comparative analysis of Assembly Houses. An analysis of house sizes by Neighbourhood, by Quarter and for the whole site has been conducted, together with a GINI Coefficient analysis of house sizes by Quarter (see Chapter 4.3.1). An extensive Visibility Graphic Analysis (VGA) has been conducted for ten Quarters using 10 different kinds of analysis (see Chapter 4.3.2). In addition, VGA of the three stages of each of two Models (the Distributed Governance Model and the Assembly Model) has been completed for six Quarters. The selection of 10 Quarters from the original 14 provides a sound sample of the spatial variability found across the megasite. The parameters of the Pilgrimage Model were developed too late to allow extensive VGA analysis; the application of the diachronic analysis of the two Models to only six Quarters was predicated upon the high probability of redundant results from extending the analysis to four more Quarters.

Question 2: What was the internal chronology of the Nebelivka layout? What was the chronological place of Nebelivka relative to other megasites?

The production of an internal chronological sequence for Nebelivka was vital, since is is difficult to gain a full understanding of megasites without an estimate of the number of **coevally** occupied houses. The central methodological issue is how to place what turned out to be 1,445 structures on the megasite into a chronological sequence. Four key questions were posed about the chronology of Nebelivka: (1) How long was the occupation of an individual segment of the inner or outer circuit?; (2) Were adjacent houses and segments constructed, occupied, and destroyed sequentially or coevally?; (3) How many segments/groups were constructed, occupied, and destroyed coevally across the whole site?; and (4) How do the radial streets inside the circuits relate chronologically to the circuits? Following on from the internal chronology of Nebelivka was the question of placing Nebelivka in a secure chronological relationship to other neighbouring megasites, such as Taljanki and Majdanetske, as well as to the sediments of the multi-proxy Nebelivka P1 core, with its own age-depth model.

Methods for Question 2

Initial dates were obtained from the structures excavated in 2009. The majority of dates were obtained following a sampling strategy based on the geophysical plan of the site. The aim was to sample different sectors of the site, including the inner and outer circuits of houses and the inner radial streets. The sampling strategy followed the highly organized spatial arrangement of houses. We aimed to sample houses from an inner circuit segment, from an outer circuit segment and from each of two groups inside the circuit to address the question of contemporaneity of houses within these

groups, the duration of use of a segment/group, and whether the construction dates were spatially structured.

The first method for obtaining datable samples was the auger coring of *ploschadki* to obtain daub samples from which charred plant remains could be extracted for dating. However, the daub firing temperature was so high that the charred cereals were destroyed; 130 cores from 91 houses yielded just one charred grain. Instead, a programme of test pit excavation was undertaken to recover stratigraphically reliable bone samples from houses. Bone samples were screened for collagen preservation using overnight acid demineralisation of a chip of bone, and only those yielding visible collagen were considered for submission to the Oxford Radiocarbon Accelerator Unit. A grant-in-kind from the National Radiocarbon Facility funded 80 dates. A sub-set of samples was divided and parts sent to the Poznań Laboratory as well as to Oxford for the measurement of inter-laboratory consistency. The final set of dates was measured at higher precision in an attempt to overcome the problem of the wiggle in the radiocarbon calibration curve at ca. 4000–3700 BC. Attempts were also made to model the duration of individual houses.

Question 3: What was the distribution of Trypillia, as well as earlier and later, sites in the Nebelivka hinterland and micro-region?

We needed to understand the settlement pattern in the Nebelivka hinterland (5km radius) and its micro-region (25km radius), since many urban studies had posited an inter-dependent relationship between an urban centre and small sites close to the the centre (Adams 1965). It was also important to investigate off-site discard in the hinterland to identify the incidence of manuring scatters as a mark of agricultural intensification. Wider investigations of the settlement pattern would shed light on Linda Ellis' (1984) contention of a three-level settlement hierarchy in the Uman region. A diachronic perspective for both areas would set Trypillia settlement in a longer time-frame, helping us to understand continuities or otherwise in settlement location and thus providing ideas for establishing the reasons for the location of Nebelivka.

Methods for Question 3

Two methods never previously used in Trypillia research were utilised to recover settlement information: remote sensing and intensive, systematic fieldwalking. The free availability of CORONA satellite images over a wide area enabled coverage of the Nebelivka micro-region and beyond (see below, Question 4). The high commercial costs of WorldView2 satellite images limited coverage to a 25km block around the megasite. The results of each set of images were compared to assess their respective merits in a heavily cultivated, residual forest-steppe environment.

Intensive, systematic fieldwalking was conducted using two sampling strategies: (a) coverage of all parts of the landscape in a 50% sample of all fields within a 5km radius of Nebelivka; and (b) judgmental sampling along streams within a 25km radius. The first technique was applied to fields in 2009, with GPS recording of every surface object found during a 20m-wide spacing transect. This labour-intensive data recording was abandoned in 2012 and 2013 for a recording of single finds ('off-

site') by 20m × 50m transect, with greater attention given to surface scatters ('sites'). The restriction of all scatters to a zone close to existing streams led to a judgmental coverage of such zones in 2014 (see Chapter 3.4).

A third more intensive method was used to investigate the alleged sizes of Trypillia settlements, which were suspected of being over-estimates of the actual site sizes. This method involved collecting surface sherds and daub along a transect from the centre of a site to well beyond the limits as judged by aerial photography or geophysical survey. In this way, a better size estimate of four Trypillia sites was achieved (see Fig. 3.16).

Question 4: How did megasites relate to their wider settlement context?

The huge area of the Cucuteni-Trypillia group (up to 250,000km^2) meant that no single region had been subject to intensive, systematic fieldwalking. The data on site location and size was regionally variable, yet this data set was important for placing Nebelivka and its micro-region in a wider regional settlement network of interaction and mobility covering the whole of the Trypillia area. The well-known concentration of megasites in the Southern Bug-Dnieper Interfluve raised the question of environmental differences between this region and other Trypillia areas, while a regional investigation of site sizes would be a second test of Ellis' hierarchical settlement model. Finally, if Trypillia megasites exerted influence over smaller sites, how far did this influence extend and were there regularities between megasites?

Methods for Question 4

Remote sensing was also applied on this wider spatial scale but with limited success. The main method was a source-critical analysis of the site database included in the *Encyclopaedia of Trypillia Civilization* (Videiko 2004), with its synthesis of information for all known sites, using a gazetteer with site phasing and general co-ordinates ("the site lies 6km NE of the village of XXX"). This critical filtering of the Encyclopaedia's database led to a much smaller set of sites with reliable locational and size data. Marco Nebbia's engagement with exploratory spatial data analysis led to a comparison of location and environmental parameters of megasites with smaller sites to assess environmental influence on megasite location and the use of Incremental Global Moran's I index and Anselin's Local Moran's I Index to investigate site hierarchy and the scale of megasite influence (see Chapter 3.3).

Question 5: How can we best characterise the Nebelivka landscape? What was the human impact of the megasite on the surrounding landscape?

The vegetation history of the semi-arid forest-steppe landscape of Southern Ukraine has not received widespread attention, mainly because of the scarcity of long-term peat deposits outside of the principal Ukrainian valleys (e.g., the Dnieper, the Southern Bug and the Dniester: Kremenetski 1995, 2003). Our challenge was to locate coring sites which could be chronologically related to the Nebelivka megasite, so as to place the site in the context of its long-term vegetation history, as well as to make a detailed assessment of the human impacts caused by megasite dwelling. A

second approach concerned the information on the local, site environment provided by the molluscan remains found in all excavation units.

Methods for Question 5

The discovery of a Ukrainian Government database of peat-extraction sites revealed the existence of two peat-filled depressions within 50km of Nebelivka. A preliminary investigation of these sites in 2009 and 2012 yielded one potentially valuable core for regional vegetational history at Onopriivka but this site was too far from Nebelivka to provide any idea of human impacts. A survey of the stream valleys around the megasite revealed three coring alluvial sites which were tested in 2012, using the particular expertise of Dr. Bruce Albert, who had been working on small alluvial basins for a decade. The only core to sample a palaeo-ecological archive coeval with the megasite occupation was the 6m Core P1, 250m from the NE edge of the megasite.

The archive sampled by Core P1 was subjected to multi-proxy analysis, including Loss on Ignition analysis, particle size analysis, pollen and non-pollen palynomorph analysis, microcharcoal counting and sedimentological analysis. Bayesian modelling of 11 AMS dates provided an age-depth model. The results proved an important catalyst for the Project's re-conceptualisation of the nature of a megasite (see Chapter 4.1.1).

The Project's flotation programme of a sample of every context in the four excavation units yielded a varied suite of remains, including lithic chips and pottery fragments. The sizeable molluscan assemblage studied by Dan Miller (see Chapter 4.1.2) showed that the majority of molluscan species was characteristic of steppic rather than wooded environments, whether deriving from test pit samples below or above the living floors, the soils buried under the sole barrow constructed on the megasite area and the soil pits designed to provide a long-term soil sequence. The only limitations to the molluscan analysis concerned the lack of AMS dates attributed to most of the samples; this was particularly important in the attempt to reconstruct the environment of the Nebelivka promontory before the occupation of the megasite (see Chapter 4.1.2).

Question 6: How can we reach a better understanding of house architecture and finds assemblages at Nebelivka?

One of the key strategies for the investigation of megasites was the Ukrainian predilection for the excavation of complete burnt houses. It was anticipated that this strategy would be pursued at Nebelivka, as it was in two cases – Houses A9 & B17. The Project Biography (see above, p. 12ff) alluded to the two key decisions of excavating the Mega-structure and conducting extensive test pitting for AMS samples, which led to the recovery of far greater quantities of Trypillia pottery and Special Finds than we had anticipated at the start of the Project. These decisions led to changing Research Question 6 from a better understanding of 'house architecture' to 'house architecture *and finds*'. This positive development necessitated the integration of our thinking on houses and other features (pits, Assembly Houses) with our approaches to their

contents, especially through questions of taphonomy. Three issues of house practice were of particular relevance to the interpretation of household pottery assemblages: whether a house was one-storey or two-storey; whether the finds in a burnt house were a reflection of the residents' living assemblage or a staged, placed deposit constituting a 'household death assemblage', comparable to offerings in a grave; and how the houses were actually burnt down. In taphonomic discussions, the three basic terms introduced by Schiffer (1976) were extended by Kuna's (2015, Fig. 22.1) elaboration of three more categories of refuse:

- primary refuse – the remains of artifacts left at the locus of activity where artifacts were produced or used (Schiffer 1976, p. 30)
- secondary refuse – damaged or destroyed artifacts intentionally moved to refuse areas (Schiffer 1976, p. 129)
- *de facto* refuse – discarded refuse that is still usable (Schiffer 1976, p. 33)
- tertiary refuse – artifacts that had found their way into their place of deposition not in the form of individual, damaged artifacts but together with the material of the layer in which they were originally deposited as refuse (Kuna 2015, p. 281)
- internal residue – material that has accumulated in the cultural level during the existence of a given activity area (Kuna 2015, p. 281)
- external residue – the remants of preceding, unrelated components or phases of the site (Kuna 2015, p. 281).

These additional terms do much to offer precision in the way that artifact deposition can be described.

The artifacts found at Nebelivka were so numerous and so diverse that they offered many opportunities for investigation – in terms of intra-site distribution, formal variability and differences in association and context. A final class of biological finds (or ecofacts) comprised the animal bones and macro-botanical remains discarded as food waste. The faunal remains were studied to answer three questions: (a) what was the relative contribution of hunted vs. herded animals at Nebelivka, and how does this fit into wider trends noted for the Trypillia period?; (b) are there any detectable differences in animal use (or at least bone deposition) between areas of the site and/or between different context types (e.g., houses and their associated pits)?; and (c) what was the nature of bone deposition in the Mega-structure?

Methods for Question 6 (houses)

Four methods were adopted to improve our understanding of Trypillia houses – excavation, soil micromorphological analysis, the analysis of building materials and an experimental programme.

In line with the expansion of types of magnetic anomalies found in the geophysical investigations, it was decided to excavate at least one complete example of each of the units – a *house*, an *Assembly House* and a *pit* – in addition to the large number of *test pits* in which we targetted a small sample (3–5%) of a burnt or unburnt house or an Assembly House (1–2%). A major goal of this strategy was to make comparative

analyses of the pottery, animal bones and Special Finds discovered in each of the four excavation units in order to gain a deeper understanding of the contexts of deposition of the portable finds.

While total excavation of Trypillia burnt houses has been *the* standard field method for Ukrainian specialists, it was clear that the utility of this method for a four-year Project on a site with 1,445 houses was not cost-effective[23]. Instead, we decided upon the use of test pits – a strategy that was far less common in Ukraine. An initial test pit size of 5m × 1m was abandoned because of high labour costs. Instead, in the course of 2013, test pits of 2m × 1m were used to recover animal bone samples for AMS dating; if none was discovered, the test pit was extended to 3m × 1m and, in a few cases, 4m × 1m. While it is conceded that a 3–5% sample of a house could hardly be considered to be a representative sample of that house's material assemblage, the excavation of over 80 test pits across all main elements of the Nebelivka plan (outer and inner circuits, inner radial streets and Squares) gave a good sample of the total range of material culture used across the site, as well as an unparalleled set of snapshots into household architecture, both building and burning, across the whole site. What the test pit approach lost in depth, it gained in breadth. It has now been recognised as a indispensible method by the Ukrainian-German project at Majdanetske (Müller et al. 2017) (see Chapter 4.6.1).

The soil micromorphological study was based upon a total of 22 undisturbed block samples and associated bulk samples collected from nine separate contexts at Nebelivka. In order to retrieve archaeological information and evidence of past formation processes from the soil archive, block samples were made into thin sections for soil micromorphological analysis (impregnated and cut at the UCL Institute of Archaeology; crafted into polished thin sections by Spectrum Petrographics Inc.). Bulk samples were employed for the measurement of different physical and chemical parameters (pH, organic matter, carbonates, and magnetic susceptibility). Among the questions we hoped to answer were: i) What microscopic indicators of human activity could be detected using soil micromorphological analysis? ii) How were the different occupation deposits formed? iii) What factors affected archaeological preservation – including of charcoal and bone – within these deposits? Overall, the study of these research materials illuminated important differences between the different contexts sampled (see individual excavation unit reports in Chapter 4: barrows – 4.5.2; test pits – 4.6.1; pit, Sondazh 1 – 4.6.2; House B17 – 4.7.3).

Dr. Natalia Shevchenko's programme of analysis of building remains focussed on the daub remains from the Mega-structure, for which she carried out detailed laboratory tests designed to shed light on three areas of research interest: (1) the establishment of the technical – typological characteristics of the samples, including

23 And also time-consuming: according to our estimates, the excavation of two complete houses per annum would take until 2743 to complete!

their physical-chemical properties, their composition, their structure, their context and their recipes; (2) the determination of the function of the different building materials; and (3) the classification of building materials based on point (1).

A combination of macro- and micro-level methods was used, including morphological analyses, qualitative analyses (composition), quantitative analyses (ratios between different elements in clay mixture), metric analysis (fractions of content, thickness of layers of building material) and textural-structural analyses. The most characteristic samples were selected for further laboratory analysis, including stereo-microscopic investigation and the making of thin-sections for polarising microscopy to recover more specific information on mineral contents, structural traits, ratios of elements in the clay mixture and mineral temper. Micro-probe analysis was used for the clay minerals in some of the samples, while polished sections (Russian: *Anschliff*) were studied in reflected side light to gain further stratigraphic information (see Chapter 4.9).

The least precise method of visual inspection of daub fragments during excavation was also an important aspect of the recording protocols, which involved characterisation of the daub on plans and sections in one of three ways: (1) destruction daub – daub produced by the burning of a structure at low to medium temperatures (this was by far the commonest type of daub); (2) vitrified daub – daub produced by high-temperature firing of a structure; and (3) construction daub – daub forming an interior feature of a building, usually a platform, a podium, a hearth or a bin (for an example, see Fig. 4.40).

Experimental house-building and -burning has been part and parcel of Cucuteni-Trypillia archaeological methodology, but there have been ambiguous results, especially over two important questions: the construction of 1- or 2-storey houses; and the way in which houses were actually burnt down. An experimental programme of building, burning and excavation of the burnt remains was designed in order to seek answers to these questions (see Chapter 4.4) and to provide the Project with insights into house-burning taphonomy.

Two small-scale experiments in the Durham University Botanic Gardens woods were carried out to investigate (a) Korvin-Piotrovskiy's hypothesis of 'construction burning' (Korvin-Piotrovskiy & Shatilo 2008; Korvin-Piotrovskiy et al. 2012) and (b) ways of producing the cracked daub surface effect found during excavation of fired clay platforms.

The main experimental effort was devoted to the construction, burning and excavation of two timber-framed, wattle-and-daub-walled 'Trypillia' houses with a footprint of 4 × 3m in the centre of Nebelivka village. The construction team took initial advice from Dr. Videiko on Trypillia construction methods, although the use of modern tools and the delivery of building materials to the building site failed to match Neolithic practice. Mr. Johnston's detailed recording of the construction process and estimates of building resource required formed the basis of his Durham University B.Sc. undergraduate dissertation (Johnston, S., n.d.).

The burning of only one of the two experimental houses (the two-storey house) was carried out at the time of the Kirovograd-Nebelivka International Conference (May 2015), thus vitiating the possibility of a comparative burning experiment. The entire burning procedure was carefully recorded through photography and a timed diary of burning stages, starting with the filling of the house with 30m^3 of firewood the day before the firing and concluding with the collapse of all but one of the house walls six hours after ignition.

There was one aim for the Project team's final fieldwork season (2017): the geophysical investigation and excavation of the experimental burnt house remains of 2015. A Kyiv colleague, Dr. Kseniya Bondar, tested two methods: a cesium magnetometer test of the house mound, using a PKM-1M (Geologorazvedka, Russia) instrument, and a ground-penetrating radar test of the same, with a VIY-2-300 (Transient technologies LLC, Ukraine) instrument. The Nebelivka villagers had solicitously covered the remains of the experimental burnt house with earth to form a low mound. The mound was divided into quadants and two quadrants were excavated – the West Quadrant and the North Quadrant. Hand excavation produced a mass of structural detail, much of which was recorded by photography and some of which was plotted by photogrammetry[24].

Methods for Question 6 (finds)

The analysis of artifacts was conducted in a variety of methods, depending upon the material and the excavation unit(s). The largest finds assemblage – the pottery – was studied in terms of its production, fragmentation and discard taphonomy before a series of 13 analyses investigated a range of questions, from basic statistics on sherd number, weight and mean weight to the fabrics chosen for specific vessel shapes. Most of these analyses compared the samples from each of the four main excavation units. There was also a comparative analysis of the Nebelivka pottery with other megasites (Taljanki and Majdanetske) as well as with the Kaniv group in the Dnieper valley (see Chapter 5.1).

Detailed reports were made on many of the Special Finds (especially the lithics and worked bone), including their placing in a broader comparative perspective (see Chapter 5.2). The group of miniature vessels from the Mega-structure received special attention because of its unique character, with lipid analysis of their contents and isotopic analysis of the graphitic decoration and washes on some vessels (see Chapter 5.2.3). Another form of analysis made use of the large numbers of Test Pits, which produced spatial data on Special Finds, as well as pottery decorative motifs, from all over the megasite.

The Project's flotation programme began in 2009 with the use of bucket flotation, continued with the use of a Legge Mark IV flotation tank in 2012 and resumed with

24 There is a plan for a short fieldwork season in the future to collect soil micromorphological samples from the burnt remains of the experimental house.

bucket flotation in the 2013 and 2014 seasons (see above, p. 52). The programme produced a small macro-botanical sample studied by Dr. Galyna Pashkevych with the help of a x25 microscope (see Chapter 5.4). Flotation also produced many small faunal remains from the majority of excavation units, with this difference in retrieval methods integrated into the overall faunal report. A feature of the faunal report concerned David Orton's elegant solutions to the problem posed by the contribution of several faunal analysts. The lowest common denominator approach focussed on broad questions of subsistence, set in the wider context of Trypillia economy, with particular attention to differences in faunal composition between different features and feature types, and especially to understanding the nature of bone deposition in the Mega-structure (see Chapter 5.3).

Question 7: What were the main characteristics of the origins, development and decline of the Nebelivka megasite?

Much of the earlier part of this Chapter concerns a theoretical critique of earlier approaches to the origins and development of the megasites (see Section 2.1). The alternatives to the maximalist view have been the development of three interpretative models of the foundation, growth and decline of Nebelivka – the Assembly Model, the Distributed Governance Model and the Pilgrimage Model.

Methods for Question 7

The coincidence of the occupation of Nebelivka with a wiggle on the radiocarbon calibration curve meant that we have been unable to provide a tight internal chronology for the megasite. This has led to the alternative approach of modelling of the megasite development. Each of the three models grew out of Project fieldwork results, while at the same time being rooted in recent general discussions of aspects of human interaction and agglomeration. The Assembly Model has been presented in a thematic *World Archaeology* issue debating 'Temporary places, gatherings and assemblies' (Nebbia et al. 2018). The Distributed Governance Model comes out of discussions of heterarchical power relations, as widely discussed in the volume 'Power from below' (Gaydarska, submitted), and inspired by the distant links between sites in the Latin American model of *altepetl* (Hirth 2008). The Pilgrimage Model (Chapman & Gaydarska 2019) draws on recent discussions of assemblies, as well as considerations of pilgrimage in mostly historical contexts (e.g., the Durham Lumbini Project) but also picks up on Loveday's (2015) formulation of the characteristics of prehistoric pilgrimages.

Each model has the initial goal of matching the number of houses built and houses burnt to the known footprint of the Nebelivka site, as well as its estimated duration of more than 150 years or five 30-year generations, and the absence of major human impacts as recorded in the Nebelivka P1 core. All models use a generational framework to calculate the number of houses standing, the number of new houses built, the number of houses burnt and thus the number of houses standing at the end of the generation. Only in the Pilgrimage Model is particular attention paid to the initial two-year period of intensive construction. Falsification of the model comes

when the projected house statistics fail to meet the Nebelivka footprint (as happened with one rejected version of the Assembly Model) (see Chapter 6.1).

Question 8: How do the Trypillia megasites fit into an account of comparative urbanism at the global scale?

In Section 2.1, we introduced the comparative study of urban origins elsewhere in the world and critiqued the over-reliance on check-lists in the usual comparative studies. The first approach concerns the relational approach to cities, which has been proposed by Gaydarska (2016, 2017). Here, the main point is the difference between a claimed urban site and other, smaller and preceding or coeval sites in the vicinity. While in the classic high-density urban sites with well-developed hinterlands, the relationship between the core site and the peripheral settlements can be characterised in hierarchical terms, this may not be the case with big, anomalous sites. The relational approach is at the cutting edge of urban research.

Our early comparative studies of the megasites showed that megasites were very different from the classic, high-density urban agglomerations which dominate the urban narrative (e.g., Uruk, Babylon, Rome, Byzantium). This was hardly a revelation but what was interesting was that, around this time, other anomalous sites akin to the megasites were becoming the focus of attention (Fletcher 2012; Fletcher & Kim, submitted). This disparate collection of sites, initially termed 'Anomalous Great Sites', had little in common but their extreme size and low-density nature, exactly two defining features of the Trypillia sites. The only useful comparative exercise involving the megasites has therefore been a comparison with other low-density sites.

Methods for Question 8

The first step in finding the place of Nebelivka, and Trypillia megasites more generally, within the global development of settlement forms was to establish whether or not Trypillia megasites could be classified as 'urban' in a relational sense. This meant the development of a relational framework for the study of megasites so as to provide an archaeological equivalent of 'measurement' as suggested by Cartwright and Runhardt (2014) for the social sciences. Their approach to measurement in social science has three interlinked components - characterization, representation and procedures. 'Characterization' involves defining the quantity or category that is to be measured using four principles: it needs to be useful for the purposes of the enquiry, it is socially constructed, it does not have rigid boundaries but it is also not too general. 'Representation' is the way the category/quantity is represented, with procedures to describe what needs to be done to measure the category/quantity successfully. They both can be expressed either in absolute numbers or as measurements according to scale. The application of this approach in archaeology is of course, not straightforward and needs adjustment. Thus, the characterization of the category '*urban*' in the Trypillian context is not just a word or a phrase but a range of locally specific and interlinked factors.

The second step is the investigation of the similarities and differences between the Trypillia megasites and the other 'Anomalous Great Sites'. A structural comparison

between these sites identified seven overlapping characteristics, suggesting that such sites are structurally less random as may look at first sight. A proposal is made that all members of this category of sites should be called 'megasites'.

2.2.1 Summary and Assessment

By the end of the Project, the approaches and methods in use had moved a long way beyond those envisaged in the Project application. Many initial methods worked well without any change (e.g., the geophysical investigations). The application of one fieldwalking sampling strategy was changed as an outcome of early results: in the intensive, systematic fieldwalking programme, overall landscape coverage shifted to a focus on the stream valleys where a high proportion of sites was located. Other methods worked well after minor changes made to adapt the method to Trypillia circumstances (e.g., the Mont Beuvray pottery processing system, with its use of the sherd as the basic unit of analysis, was adapted to the vagaries of Trypillia fine and coarse wares). Yet other methods of which we had high hopes worked less well and were abandoned (e.g., the use of CORONA satellite imagery proved unsuited to heavily cultivated post-Soviet landscapes, and was replaced by another satellite package). The method which had seemingly offered great potential for obtaining samples for AMS dating from hundreds of burnt houses (viz., daub coring and the retrieval of well-preserved charred cereal grains) failed because the grains were burnt out in the high-temperature house fires or destroyed by pedogenic processes; this method was replaced by the test pitting approach, which reduced the number of houses under investigation and therefore the number of samples recovered for AMS dating. Despite the widespread use of flotation, poor recovery of charred botanical remains continued to limit our understanding of Trypillia agriculture, leading to the question of whether the finding of so few cereal remains was indicative of the nature of Trypillia crop processing and discard practices rather than the failure of the flotation method[25]. Our understanding of the excavated remains of burnt houses was so limited that it could only be mitigated by the innovation of an experimental programme – the biggest methodological change introduced in the middle of the Project.

We are sure that these successes, adaptations and failures are typical of any large-scale Project. But the challenges of the failure of a method with which we had started with great confidence proved to instigate some of the most valuable methods by the end of the Project. In the next three chapters, we present the principal results of the application of these methods.

25 One approach not tested at Nebelivka has been utilised at Majdanetske: phytolith analysis has provided valuable details of crop-processing and the use of cereal by-products, although no information was gained on the scale of arable intensity (Kirleis & Dal Corso 2016, pp. 201–204).