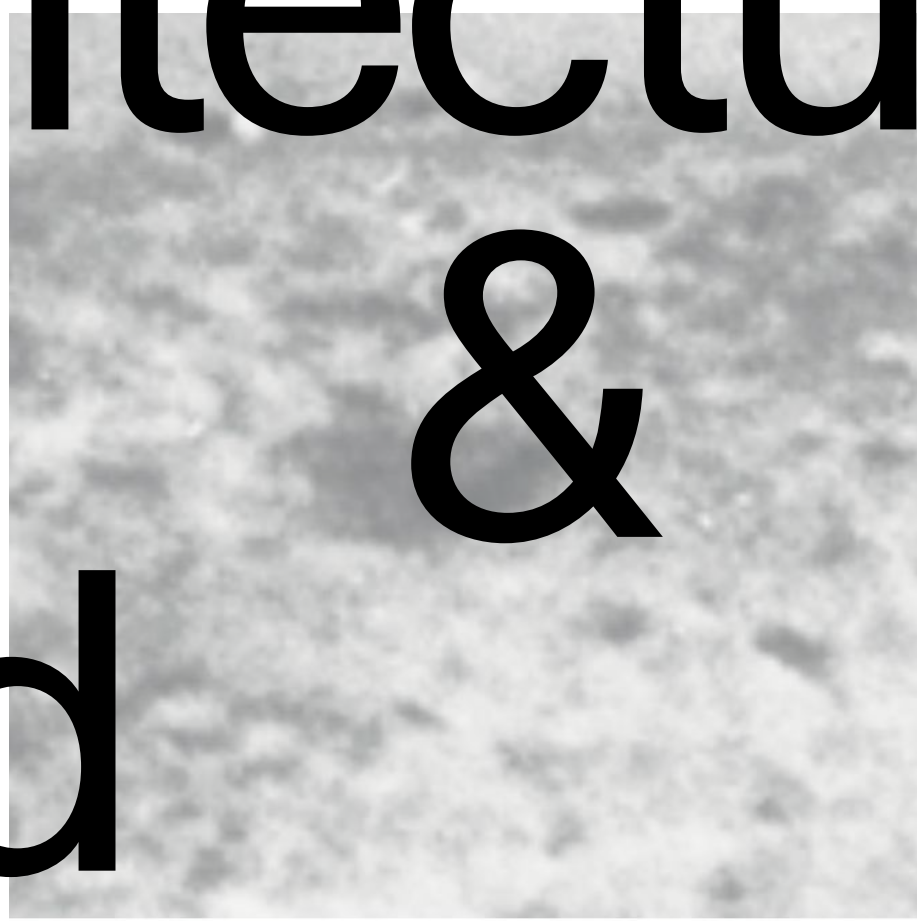
The Nebelivka Hypothesis

Forensic Architecture



&

David Wengrow

The Nebelivka Hypothesis

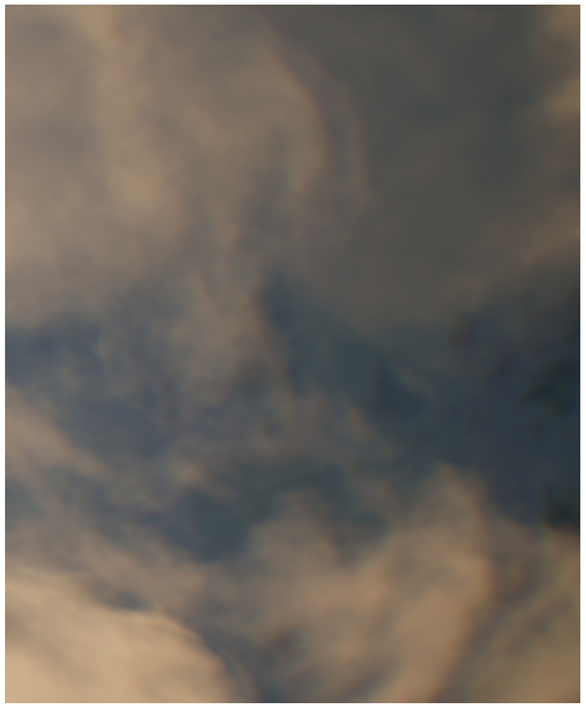
00:00:10

The book you are reading accompanies the video produced by Forensic Architecture and David Wengrow for the 18th International Architecture Exhibition of La Biennale di Venezia.
It presents a transcript of the voiceover...0

0
...together with a collection of short entries (in the form of footnotes) that complement and expand upon this main text by presenting the research, debates, methodologies, visual materials and tools that have informed and guided the making of the video.

In presenting these resources to the public we wish not only to acknowledge the generous contribution of Bisserka Gaydarska, and John Chapman, who have actively collaborated with their enormous expertise and generosity in the development of the project, but also to invite the readers into the work of the many archaeologists, soil scientists, paleobotanists, architects, etc. whose work forms the basis of the exhibition.

This publication is an invitation to re-think the future of the 'city' together with them and their ideas.



00:00:17

00:00:31

‘As they did without monarchy and slavery, so they also got on without the stock exchange, the advertisement, the secret police, and the bomb. Yet I repeat that these were not simple folk, not dulcet shepherds, noble savages, bland utopians. They were not less complex than us. The trouble is that we have a bad habit, encouraged by pedants and sophisticates, of considering happiness as something rather stupid. Only pain is intellectual, only evil interesting . . . Omelas sounds in my words like a city in a fairy tale, long ago and far away, once upon a time. Perhaps it would be best if you imagined it as your own fancy bids, assuming it will rise to the occasion, for certainly I cannot suit you all.’

Ursula Le Guin, *The Ones Who Walk Away From Omelas*

00:00:37

The Nebelivka Hypothesis

A revolution is taking place in our understanding of cities, arising from the laboratory of the past. Using an array of new techniques, archaeologists are discovering traces of urban landscapes that, until now, have been entirely lost to human memory. Such evidence is not ‘unearthed’ from the ground. It is interior to the soil and inseparable from it.

Between the southern Bug and Dnieper rivers of central Ukraine, less than a metre below agricultural fields, geophysical surveys reveal the unsuspected legacy of 6,000-year-old settlements, similar in scale to the early cities of Mesopotamia. But these early Ukrainian cities are centre-less. Or rather, they are organised as concentric rings of domestic buildings, around a mysterious open space. No trace is found of temples, palaces, administration, rich burials, nor any other signs of centralised control or social stratification.

What’s more, studies of the ancient environment around these huge sites reveal a surprisingly light ecological footprint. It has even been argued that their foundation triggered the formation of chornozem, among the richest soils in the world. The famous black earths of the Ukrainian forest-steppe may turn out to be anthrosols: human-produced soil, confronting us with a system of urban life that enhances the vitality of its own environment. If so, then we must also confront a tragic historical irony.

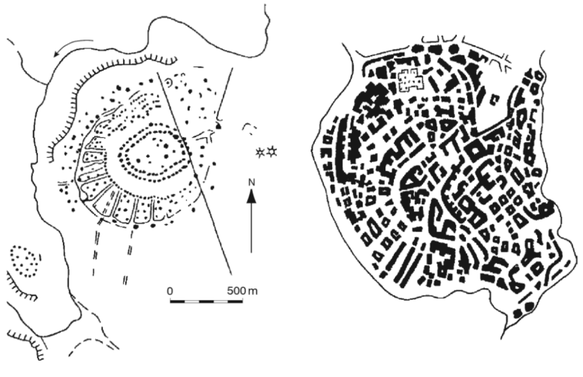
Since Greeks first settled on the northern shores of the Black Sea, the yield of chornozem attracted waves of colonisers and feudal empires. In the last century, policies of forced collectivisation under Soviet rule produced famine from abundance, while for the Nazis this was *Lebensraum*: a quest for life-space that turned it to bloodlands. Could these dark earths - the target of so many violent appropriations - have originated thousands of years ago, as an effect of human social experiments undertaken millennia before the dawn of the Anthropocene?

If these ancient Ukrainian sites are indeed to be considered cities, then our very concept of ‘the city’ and its ‘territory’ as rooted in a history of extraction, predation, and hierarchy must also change.

This is what we call ‘The Nebelivka Hypothesis’.

00:00:43

In 1964 a Soviet air force pilot named Konstantin Shyshkin[1] flew over central Ukraine's Kirovograd Oblast and noticed faint topographical irregularities peering through the clouds.[2]



1
'The discovery of Trypillia protocities began with major Shyshkin Konstantin Valentinovich, a military topographer, a specialist in the field of decoding aerial photographs.[1.1] Studying images of different regions of Ukraine, he found in the Cherkasy region traces of huge settlements unknown to archaeologists.
(...) It was hard to believe, and indeed, the scientific community was sceptical of Shishkin's first reports in the late 1960s'.

He identified a total of around 250 sites through aerial photography, although only a few of these were of urban scale. Shyshkin first published maps and plans of Trypillian Culture sites in 1973. Verification of a selection of these settlements was performed through field-walking, undertaken by Shyshkin and Stefanovych at the end of the 1960s.

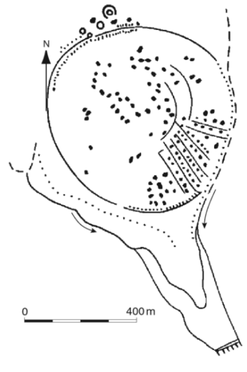
In 1985, Shyshkin published settlement plans of twenty-seven sites, including (but not limited to) Tallianki, Maidanets'ke, Dobrovody, Nebelivka, Glybochok, Yatranivka, Volodymyrivka, and Kosenivka.

Shyshkin, V. 1973. Z Praktiki Deshifruvannya Aero-Fotoznimkiv U Arheologichnih Tsiliyah. *Arheologiya 10*: 32–41.

Shyshkin, V. 1985. Planuvannya Tripilskih Poselen Za Danimi Aerofotoziomki. *Arheologiya 52*: 72–77.

1.1
Beginning in 1920, in the aftermath of the First World War, pioneers such as the British military pilot and archaeologist O.G.S.Crawford (1886-1957) used Royal Air Force photographs and new aerial surveys to map the distribution of 'shadow sites' across England's Salisbury Plain, raising finances to secure the land around Stonehenge for the National Trust.

An intellectual Marxist, and founder of the scholarly journal 'Antiquity', Crawford also photographed English churches and advertising hoardings as testimony to a society based on religion and capitalism, which he felt would soon, inevitably disappear in favour of a more rational and equitable way of life.



Remote operation of the kite camera, 191?. Wellcome Images reference: L0021185.

From left to right:

Cucuteni-Trypillia large site in Moldove (aerial photographs), after K. Shyshkin and V. Bichaev. Stolniceni-I; Brynzeni VIII; Sofia V; [J. Muller, K. Rassmann & M. Videiko (ed.).*Trypillia Mega-Site and European Prehistory 4100-3400 BCE*]

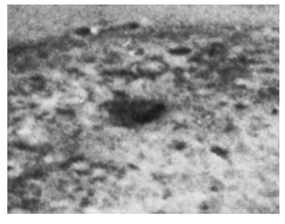
2
The Bavarian Squadron 304 (*Königlich Bayerisches Fliegerbataillon 304*), together with five other German squadrons (about eighty-five aircraft in total), was part of the expeditionary force of imperial Germany that flew in support of the Ottoman military at the end of WWI. These were the early days of aerial reconnaissance. The Bavarian aviators of Squadron 304 joined the retreat of the Ottoman military. Understanding they were fighting a lost war, the pilots also took to systematically photographing archaeological and religious sites with no strategic importance.

Sites included Christian churches in Jerusalem, Bethlehem, and Nazareth, as well as older ruins in Jericho, Caesarea, Acre, and the Dead Sea. The sorties were also part of the Heritage Commando (*Denkmalschutz-commando*), which undertook numerous scientific surveys of ancient monuments.

The organisation was led by Theodor Wiegand, who employed specially equipped kites to obtain aerial photographs. These images became important tools of aerial archaeology, particularly reconstructing the topographic features of many places in Lebanon, Syria, Israel, and the Palestinian territories that have since been built over.

From the top:

Tal al-Shari'a (Negev desert), Bavarian Squadron 304, 24 August 1918. The image contains traces of abandoned Ottoman trenches and fortifications. Marked within the white frames (nos. 1–6) and reproduced in the enlargements are possible traces of Bedouin settlements consistent with Bedouin land use at the threshold of the desert; zoom in of no. 1; zoom in of no. 2 [E. Weizman. *Ground Truth-Reading Aerial Images of the Naqab from the Ground Up*]



Weizman, Eyal. 2020. Ground Truth-Reading Aerial Images of the Naqab from the Ground Up. *Jerusalem Quarterly 81*: 37-51.

Source: USGS (1982)

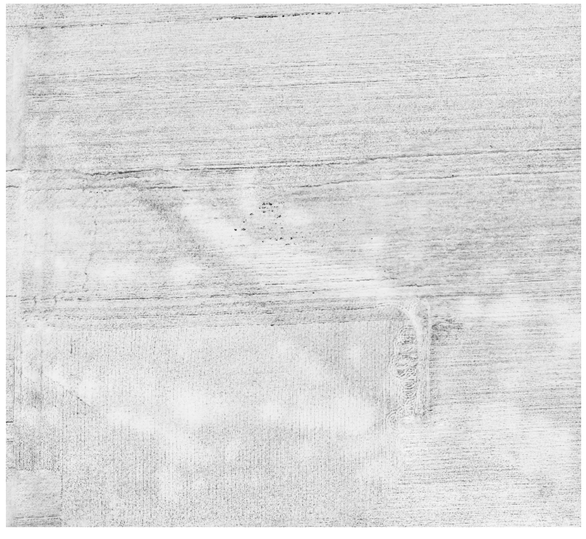
00:00:49

3
Aerial Archaeology involves interpreting and analyzing photographic and other types of images to comprehend archaeological features, sites, and landscapes. It serves a broad range of purposes, such as discovering new sites, recording and determining excavation locations, mapping and monitoring sites, etc. The analysis of aerial images is the only feasible method to study vast or inaccessible areas.

1. Sites that can be seen from the air are usually classified into two main categories. Those that are still more or less cut into the soil or rise above it (preserved banks and ditches, tumuli, ancient roads, field systems, stone quarries, etc.). They can be in most cases seen by their light-and-shadow contrast, that is why they are called ‘shadow marked’ sites.[3.1]

2. Sites that have been levelled completely (mostly) by agriculture. They are still leaving traces at the surface, which are only visible under certain conditions. According to these traces, they can show up (among others) as ‘soil-marked’,[3.2] ‘crop-marked’,[3.3] and ‘snow-marked’ sites.[3.4]

On a shallow hilltop, low light appeared to stretch the skin of the earth almost to the point of transparency. [3]



Photogrammetry of the site of Nebelivka showing snow mark (January 2021) (by The Center for Spatial Technologies).

3.1
From an aerial view, shadow marks can be seen more or less easily depending on a number of factors, including preserved height, weather conditions, color and vegetation cover above the objects in question, time, date, flying height, angle of view and direction of flight.

For instance, flat sites are better apprehended during early morning or late evening, when the low, slanted sunlight hitting discreet archaeological features projects distinct shadows onto the surrounding earth. From above, shadows can be observed that might otherwise be obscured by the objects producing them.

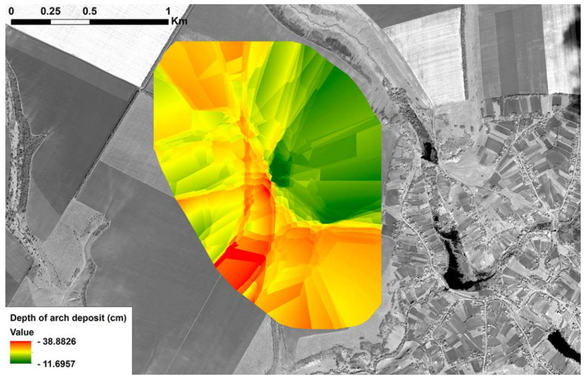
3.2
Soil marks become visible when the presence of archaeological features, such as a ditch or a pit, disturb the local soil profile. Often, the increased humus components, differences in the grain sizes, and better water storage capacity of the refilled material make it appear darker than the undisturbed soil. This difference can be easily observed from an elevated viewpoint.

The opposite is true when it comes to buried walls: the diminished water retention capacity of the compacted stones and mortar produces drier soil along these structural lines that yield brighter patches on the surface of the earth, visible to a trained eye. Additionally, stones and mortar are unearthed and expose to the daylight by ploughing, which all together makes buried walls look brighter than the surrounding area.

Soil marks are most often recorded during spring or autumn, after the land has been ploughed.

3.3
Crop marks (or vegetation marks) are perceptible when buried archaeological features affect the rate of growth of the crops planted in the soil above them.
Ditches or pits previously dug into the subsoil can provide greater depth for plant life to take root and thrive, and as a result yield visibly enhanced growth in those crops immediately above.

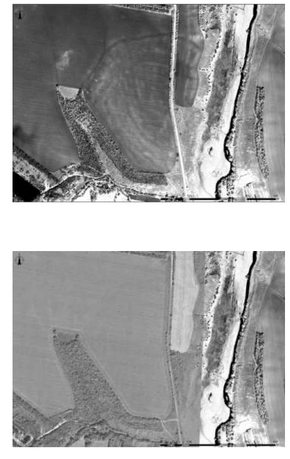
Conversely, growth can be inhibited by the presence of structures like buried wall foundations or compacted surfaces such as floors or Roman roads. From above, the patterns created can be observed in the form of visible differences in crop colour and height during various phases in the growing season.



Shallow depth of the top of the anthropogenic deposit on the North-Eastern part of Nebelivka, allowing a better visibility of the anomalies compared to the rest of the site (by M. Nebbia). [B. Gaydarska (ed.). *Early Urbanism in Europe*]

3.4
Such differences in soil quality, depth, and density also manifest distinctively at the end of the winter season with an effect known as snow marks, or frost marks.
Refilled ditches or trenches retain warmth and cold differently from buried walls and other such structures. These differentials can be observed during just a few particular hours within the thawing of a light snow cover or freezing of hoar frost .

Adapted from:
Universität Wien. How Do Archaeological Sites Show?. https://luftbildarchiv.univie.ac.at/aerial-archaeology/introduction-to-aerial-archaeology/visibility-marks/, accessed April 2, 2023



Two views of the Trypillia site of Perehonivka (BII): clearly visible in crop-free field conditions (upper) and totally invisible when the field is cultivated (lower): WorldView-2 panchromatic images (0.46m resolution), acquired on April 2008 (upper) and September 2011 (lower). [B. Gaydarska (ed.). *Early Urbanism in Europe*]

Source: Bing Satellite Imagery (2022)

00:02:25

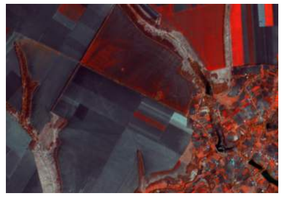
4
A false-colour composite of three Sentinel-2 bands reveals some pertinent properties of the site's vegetation and soil.[4.1]

Chlorophyll present in the plants reflects near-infrared wavelengths (shown in green pixels), while soil moisture responds particularly well to short-wave infrared radiation (SWIR), represented by the intensity of orange-brown hues. The darker the pixel (namely, the more SWIR is absorbed), the more saturated the soil is likely to be.

Our interpretation of the image indicates higher levels of moisture in the soil in the western part of the plot. This coincides with the location of the first plants of the season to germinate on site.

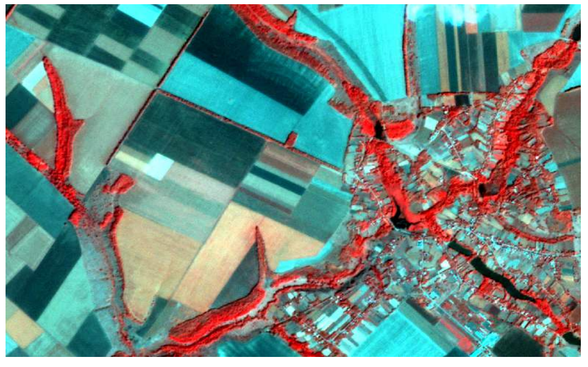
Curiously, these early plants seem to diligently follow the radial arrangement of the archaeological site buried in the soil beneath.

These growth patterns substantiate Doneus' aforementioned theories on the impact of archaeological ruins on soil moisture, temperature, and depth, such that plant life responds directly to these shifts.



Various false-colour band combinations using the Planetscope 8-band product. © 2020 Planet Labs PBC

In the autumn, when crops are harvested, the contours of a vast forgotten place are revealed in the earth.[4]
In winter, warmth stored within the subterranean ruins causes snow cover to thaw unevenly, yielding a ghostly image on the ground.



Near infrared and Green I band combination. © 2020 Planet Labs PBC

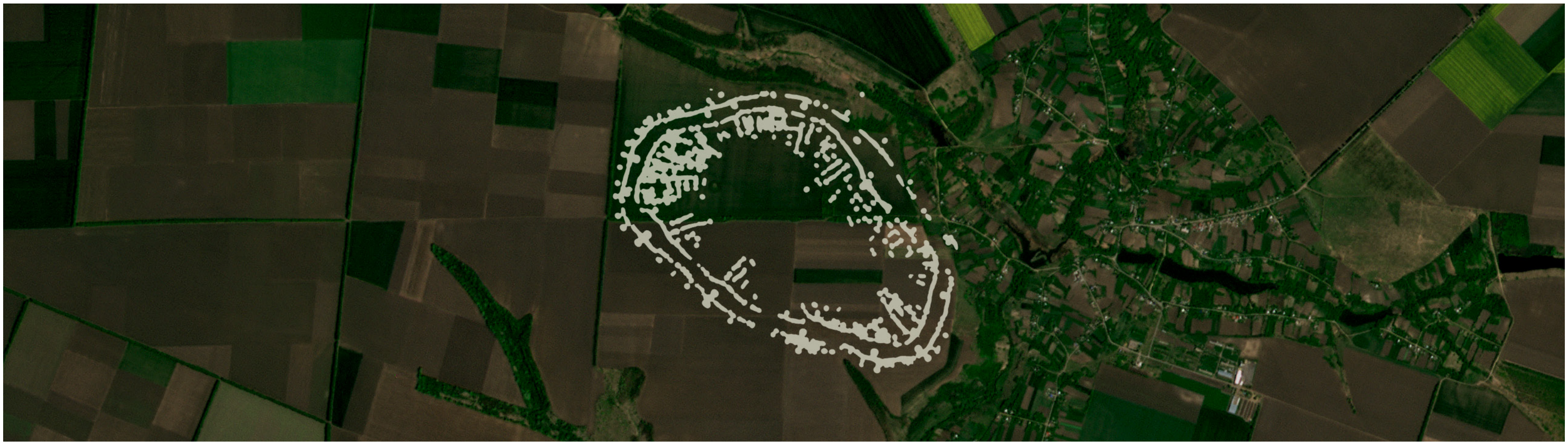
Each April, crops rise early in the very same places, making visible the outlines of an ancient city with a photosynthetic signature that sensors aboard satellites-orbiting in outer space-can read.

4.1
The Copernicus Sentinel-2 is a mission operated by the European Space Agency (ESA). It is comprised of two polar-orbiting twin satellites (S2A and S2B), which complete a full rotation of the Earth every ten days. Their travel path is situated over a grid of so-called granules, dividing the Earth's surface into nearly sixty thousand unique tiles. The satellites are equipped with a high-resolution MultiSpectral Instrument (MSI) that captures image data within particular wavelength ranges of the electromagnetic spectrum.

Every spectral band represents one specific wavelength of the electromagnetic spectrum. These discrete bands - be they visible red, green, blue, or infrared, shortwave infrared, or the 'coastal aerosol' band - are recorded in a single grayscale mode; once combined, they result in a three-channel image (Red, Green and Blue-RGB).

Assigning, for example, the near-infrared band to the red channel will reveal to us the near-infrared waves reflected by vegetation, yielding a result that, while abstract, is legible to the human eye.

The aim of the Copernicus-Sentinel2 mission is to monitor variability in land surface conditions, over large areas (290 km swath width) and at a high revisit time (5 days time).



Source: Bing Satellite Imagery (2022)

00:03:35

5
In a famous and profoundly influential essay for Town Planning Review, published in 1950, the Australian prehistorian Gordon V. Childe defined the Urban Revolution - alongside the earlier Neolithic and the later Industrial Revolutions - as a key threshold in human social development.

He took ancient Uruk, together with archaeological evidence from the Nile Valley, the Indus Basin, and the Maya lowlands, as the empirical basis of his theory that even the earliest cities in the world could be clearly distinguished from villages based on ten criteria, as follows:

1. scale and density of population;

2. the presence of full-time specialists such as artisans, priests, officials, and merchants who lived off agricultural surplus produced by the mass of peasants;

3. surplus in the form of taxes paid to kings and gods, who resided in palaces and temples where - for the first time in history - capital accumulated in large concentrations;

4. this concentration was symbolised by the appearance of the first truly monumental architecture, pyramids and ziggurats, dominating the city, with their attached workshops and granaries;

5. the emergence of a ruling class, made possible by such arrangements;

6. the invention of abstract recording systems - including writing and mathematical notation - as managerial tools, necessary for administering large surpluses and complex labour regimes;

7. the growth of a scribal class, which developed astronomy and arithmetic;

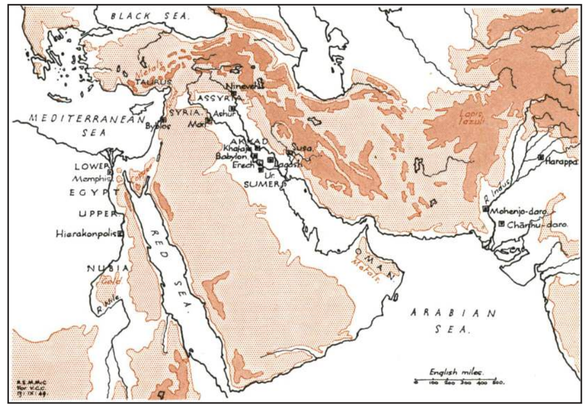
8. full-time artists and architects, liberated from food-producing activities, and therefore able to pursue and refine their crafts;

9. the growth of foreign trade;

10. the birth of 'a State organization', which incorporated people on the basis of residence rather than kinship.[5.1]

Childe, Vere Gordon. 1950. The Urban Revolution. *Town Planning Review 21*: 3-17.

The prehistoric city lies close to the contemporary village of Nebelivka. But its original name, and the language in which it was spoken, are lost to time.



First Centres of Urban Civilization in the Old Worl [G. Childe. *The Urban Revolution*]

The discovery of this site sparked a fierce debate about the nature of urban life, its origins and its possibilities.[5]

5.1
For a long time, the archaeological evidence - from Egypt, Mesopotamia, Mesoamerica, China, the Andes, and elsewhere - seemed to bear out Childe's theory. In those same areas where crops and animals were first domesticated, cities and centralised states seemed invariably to also emerge, inviting speculation that the former led naturally to the latter.

Invent agriculture - or so the thinking of the time went - and you set yourself on a course that will eventually lead to the Pyramids of Giza, Ashurbanipal's chariots, Aztec priests performing human sacrifices, Confucian bureaucracy, or Inca sun-kings. Before long, all manner of other scholars - social scientists, evolutionary psychologists, and historians of architecture - were speculating that the relationship between City and State could be rooted in universal factors of human cognition and factors of scale.

Combined with theories developed in other fields such as anthropology, industrial psychology, and primatology, this gave rise to paradigms such as 'scalar stress', 'energised crowding', and 'Dunbar's Number'. Using different idioms, their originators claimed remarkably similar things, such as:

'(...) increase in the number of information sources contained within an integrated system increases the probability of either system collapse or the development of hierarchical organisation.'

Johnson, Gregory. 1982. Organisational structure and scalar stress. In *Theory and explanation in archaeology*, edited by C. Renfrew, M. J. Rowlands and B. Abbott Seagraves, pp. 389-421. Academic Press.

'Behind every enormous city of this sort, at least in the pre-industrial era, there lies a vast, centralised State. Without its ruler, the city is bound to wither and collapse.'

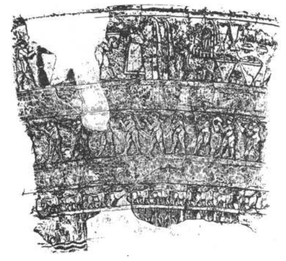
Kostof, Spiro. 1991. What is a City?. In *The City Shaped: Urban Patterns and Meanings Through History, S. Kostof and T. Richard. Thames & Hudson.*

'(...)with more people to coordinate, hierarchical structures are required. There must be chiefs to direct, and a police force to ensure that social rules are adhered to.'

Dunbar, Robin. 1996. *Grooming, Gossip, and the Evolution of Language.* Harvard University Press, London.

Archaeologists in the 1980s and '90s began to adopt these paradigms, and a consensus appeared to be forming across disciplines: the origins of the City and the origins of the State were much the same thing, or at least closely related phenomena.

Then everything began to change...



Relief carving on a stone vase from Uruk (Warka) in southern Iraq, c. 3200 BC. [G. Childe. *The Urban Revolution*]

Nebelivka

Nebelivka

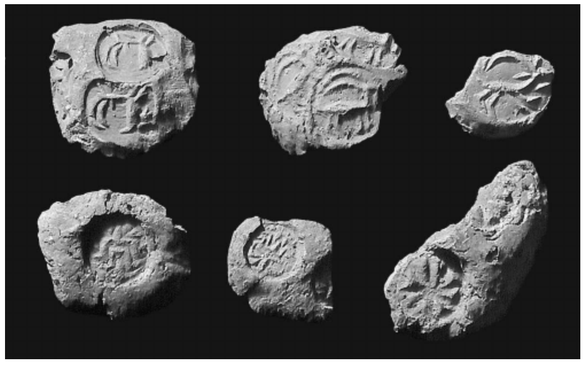
Uruk

Uruk

Source: Bing Satellite Imagery (2022)

00:03:17

Ancient Nebelivka covers an area roughly as great as its contemporary in the fourth millennium BC – the site of Uruk[6] in southern Iraq – commonly believed to be the world's first city.



6
Ancient Uruk, identified with the archaeological mound of Warka, lies today in the central desert of southern Iraq. Archaeologists recognise it as the world's earliest city, dating back to 3500 BC.
At that time Uruk bordered on rich marshlands, adding fish, birds, and other wetland resources to the yield of its irrigated fields and flocks.

Cuneiform script - the earliest known writing system - was developed here, initially for purposes of administration in the city's temples, which were also factories, where agricultural products were transformed by a dependent workforce into finished goods.[6.1]
A large female workforce was engaged in the manufacture of textiles. Other workers processed wheat and dairy into packaged food and drinks. The drab, standardised containers for these goods littered the site, and also travelled beyond it through trade and colonisation, as far as the foothills of the Taurus and Zagros Mountains.

Beyond the temple-factories, almost nothing is known of residential arrangements in the early city of Uruk, which covered an area of 250 hectares, roughly the same size as Nebelivka.

This is because excavations focused on its acropolis, known as Eanna, the House of the goddess Inanna, with its grand monumental buildings and plazas, raised high on stone foundations.

In later times, Uruk was famed as the home of legendary king Gilgamesh, and played host to a long succession of royal dynasties. But evidence of kingship is scarce for the first 1,000 years of its existence.

Assyriologists suggest Uruk may originally have been governed as a democracy of sorts. In later times, even during periods when powerful kings held sway, popular assemblies retained important decision-making powers in Uruk, and in other cities throughout Ancient Mesopotamia: the lands between the Tigris and Euphrates.

Barjamovic, Gojko. 2004. Civic institutions and self-government in southern Mesopotamia in the mid-first millennium BC. In *Assyria and Beyond: Studies Presented to M. T. Larsen*, edited by J. G. Dercksen, pp. 47-98. NINO, Leiden/ Istanbul.

Fleming, Daniel. E. 2009. Democracy's Ancient Ancestors: Mari and Early Collective Governance. Cambridge University Press: Cambridge.

Liverani, Mario (ed. and transl. Z. Bahrani and M. Van De Mieroop). 1998. *Uruk. The First City*. Equinox: Sheffield.

Previous page:

Selection of clay sealings with stamp-seal impressions found in the buildings of the Burnt Village at Tell Sabi Abyad, ca. 6000 BC. The largest sealing on the left is 7.7 cm long and 6.6 cm wide. [Peter M. M. G. Akkermans. *Tell Sabi Abyad, or the Ruins of the White Boy. A Short History of Research into the Late Neolithic of Northern Syria*]

Cuneiform tablet: administrative account with entries concerning malt and barley groats (MET, 1988.433.3)

But unlike Uruk, Nebelivka presents no trace of temples, palaces or central administration.

6.1
Contrary to Gordon Childe's expectations, we also know now that techniques of specialised administration first originated not in cities but in tiny villages scattered across the grasslands of Syria and northern Iraq.

In the 1980s, excavations by Dutch and Syrian researchers at the site of Tell Sabi Abyad, in the Balikh river valley near the modern town of Raqqa, revealed something astonishing: a late Neolithic village, just a single hectare in size and home to perhaps a few hundred people at most, with mud-brick architecture and other clay artefacts preserved to an exceptional degree by a fire that had engulfed the site more than 8,000 years prior.

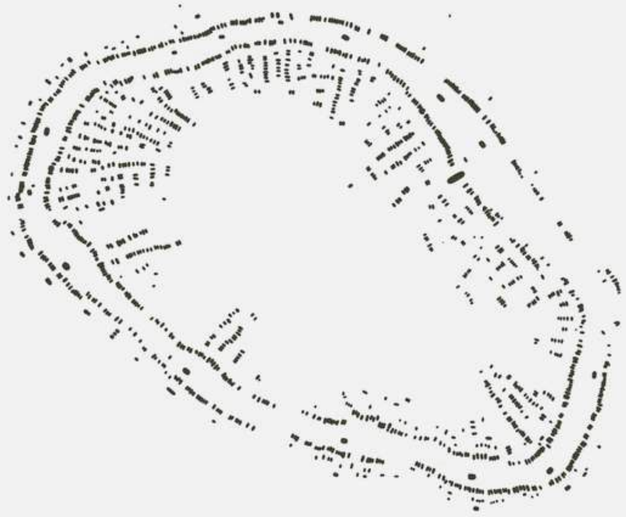
What the excavators discovered among the remains of this burned village is confirmation that more than 2,000 years before the appearance of cities, small-scale communities in the Middle East were already developing central storage facilities, including granaries and warehouses, and more remarkably, administrative devices of some complexity to keep track of their contents.

These devices included clay numerical tokens and stamps used to mark the earthen stoppers of vessels.
Perhaps most astonishing, the stoppers themselves, once removed from the vessels, were kept and archived in a special building - an office or bureau of sorts - near the centre of the village.

There is no consensus as to why such 'village bureaucracies' arose or how exactly they functioned, but at the very least, their existence refutes the notion that specialised administration originated as a response to the growth of cities.

What's more, these early agricultural villages - some hundreds of which have been investigated across the lands of northern Iraq, Syria, and southern Turkey - show few signs of social stratification, or the existence of a governing class.

Akkermans, Peter M. M. G. and Mark Verhoeven. 1995. An image of complexity: the burnt village at Late Neolithic Sabi Abyad, Syria. *American Journal of Archaeology 99 (1)*: 5–32.



00:03:58

Can Nebelivka also be called a city?[7]

7
Rethinking and rewriting the concept of the city is now becoming unavoidable, for reasons of evidence that go far beyond The Nebelivka Hypothesis. Much has changed since the days of Gordon Childe, especially in the last few decades, but theory has yet to catch up with data. We now have evidence for early cities in different parts of the world that simply don't conform to his criteria, or even depart from them almost entirely.

At the same time we also now have evidence for the origins of bureaucracy and highly specialised crafts in tiny village societies, long before the appearance of cities; and for the existence of truly monumental architecture among hunter-gatherer societies, even before the advent of agriculture.

The anomalies keep accumulating, and it seems a paradigm shift is now inevitable, with ramifications for urban design and architectural theory, as well as history and archaeology. Let us consider just a few examples.[7.1]

7.1
Modern archaeology shows that cities already existed on the lower reaches of the Yellow River more than a thousand years before China's Shang Dynasty.

On the other side of the Pacific, along Peru's Rio Supe, population centres with monumental architecture have now been documented more than four millennia before the Inca Empire.

Remote sensing (using LiDAR - Light Detection and Ranging technology) reveals similar findings from the Maya lowlands, where ceremonial centres of truly enormous size - so far, presenting no evidence of monarchy or stratification - can now be traced back as far as 1000 BC, long before the rise of Classic Maya kings and dynasties.

In South Asia, around 4,500 years ago, cities are documented at Harappa and Mohenjo-daro in the Indus Valley, but after more than a century of sustained investigation, these huge settlements still yield no clear traces of dynastic authority or ruling elites: no royal tombs or aggrandising monuments; while on the other hand, it is clear that much of their population lived in high quality housing, with excellent sanitation.

There are also examples of ancient cities that began as highly centralised and hierarchical affairs, but then reversed this trajectory.

For example, in the Valley of Mexico, around 250 AD, the city of Teotihuacan, with a population of roughly 100,000 people, turned its back on pyramid-temples and human sacrifices, and reconstructed itself as a vast collection of comfortable villas, housing most of the city's population.

Archaeologists at first thought these apartment buildings must be palaces, until they realised that almost everyone in the city was living in 'palatial' circumstances with spacious patios, sub-floor drainage, and walls covered with gorgeous murals.

None of these societies were perfectly egalitarian. But we might recall that fifth century BC Athens - which we look to as the birthplace of democracy - was itself a militaristic society, founded on chattel slavery and the systematic oppression of women.

Contemporary archaeology shows that the ecology of early cities was also far more diverse, and less centralised than once believed.

Small-scale gardening and animal keeping were often central to urban economies, as were the resources of rivers and seas, and indeed the ongoing hunting and collecting of wild seasonal foods in forests or in marshes, depending on where in the world one happened to be.

What we are gradually learning about our species' first city-dwellers is that they did not always leave a harsh footprint on the environment, or on each other.[7.2]

Blanton, Richard and Lane Fargher. 2008. *Collective Action in the Formation of Pre-Modern States*. Springer: New York.

Inomata, Takeshi et al. 2020. Monumental architecture at Aguada Fénix and the rise of Maya civilization. *Nature 582*: 530–533.

Pournelle, Jennifer. 2003. *Marshland of Cities: Deltaic Landscapes and the Evolution of Mesopotamian Civilization*. University of California: San Diego.

Underhill, Anne P. et al. 2008. Changes in regional settlement patterns and the development of complex societies in southeastern Shandong, China. *Journal of Anthropological Archaeology 27 (1)*: 1–29.

7.2
To complicate matters further, we now also have an extensive record of monumental construction in many parts of the world, which not only predates the appearance of cities, but agriculture itself.

Hunter-gatherer architecture of truly impressive scale is now documented on every continent, from the massive storehouses of Sannai Maruyama in Jomon-period Japan - which long predate the inception of rice farming - to the so-called 'Giant's Churches' (*Jätinkirkko*) of the Bothnian Sea, between Sweden and Finland: great stone ramparts, some up to 195 feet long, raised up in their tens by coastal foragers between 3000 and 2000 BC. 11,000 years ago, hunter-foragers in what is now eastern Turkey built the enormous stone temples of Gobekli Tepe and Karahan Tepe, with their multi-tonne monoliths and grand stone sculptures of wild and fearsome animals.

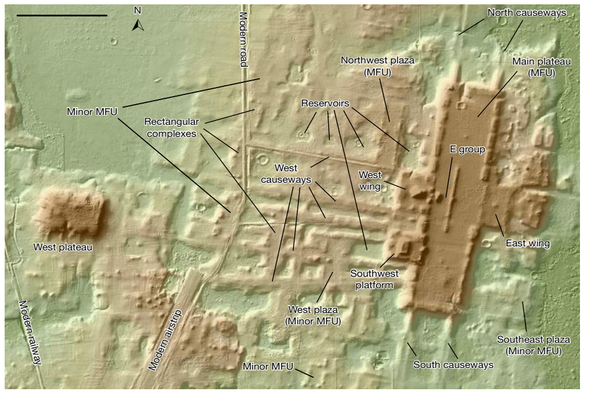
In North America, researchers are beginning to talk of a once unsuspected era of prehistoric 'monuments without kings.' On the shores of the Atlantic and around the Gulf of Mexico are found great tectonic accumulations of shell, ranging from small rings to massive U-shaped 'amphitheatres' like those of St. Johns River Valley in Northeast Florida.

Careful investigation showed that these were not natural features, but rather built spaces where hunter-gatherer publics once assembled in the thousands. Across the continent, along the shores of British Columbia, underwater archaeology is producing evidence of settlements and fortifications of striking magnitude, dating back as far as 2000 BC.

Further discussion in:
Graeber, David and David Wengrow. 2021. *The Dawn of Everything: A New History of Humanity*. Farrar, Straus, and Giroux: New York.

Many object to this idea, as it would require us to rewrite the whole concept of the city.
They want to call it something else: a 'mega-site', an 'overgrown village', a 'central place'. Nebelivka, they say, is not a city.

High-resolution LIDAR images of Aguada Fénix and La Carmelita [Inomata et al. *Monumental architecture at Aguada Fénix and the rise of Maya civilization*]



00:04:19

Eleven of these enormous sites were gradually discovered within surprisingly easy reach of each other.[8]

Map of Cucuteni-Trypillia distribution (by M. Nebbia) [B. Gaydarska (ed.), *Early Urbanism in Europe The Trypillia Megasites of the Ukrainian Forest-Steppe*]

8
The Cucuteni–Trypillia culture, is a Neolithic–Chalcolithic archaeological culture of Eastern Europe. It extended from the Carpathian Mountains to modern-day Moldova, covering substantial parts of western Ukraine and northeastern Romania. The time-place distribution of the Cucuteni–Trypillia groups – over two millennia (5000-2800 ca. BC) – makes them one of the largest and most long-lasting groups in Neolithic and Copper Age Europe.[8.1]

Three key points stand out from the long history of the Cucuteni–Trypillia studies:

1. the utter predominance of the domestic domain over the mortuary sector. Not only were extramural cemeteries absent, but there were hardly any intramural burials or fragmentary bone deposits in the hundreds of excavated settlements. The absence of human bone remains has been linked to both the ubiquity of figurines and house-burning.

2. the closely related near-absence of the materialisation of hierarchies in either group. One of the most notable aspects of this culture was the periodic destruction of settlements, with each single-habitation site having a lifetime of roughly 60 to 80 years. The purpose of burning these settlements is a subject of debate among scholars; some of the settlements were reconstructed several times on top of earlier habitational levels, preserving the shape and the orientation of the older buildings.

3. the differential development of massive sites (the so-called 'megasites'). Indeed, the Trypillia megasites stand out from the rest of Eastern, South-East and Central European Neolithic and Chalcolithic settlements, which were normally limited in size to 10 hectares, whatever the settlement form – tells, open sites, or enclosed sites.

Gaydarska, Bisserka and John Chapman. 2020. Introduction to the Trypillia Group. In *Early Urbanism in Europe: The Trypillia Megasites of the Ukrainian Forest-Steppe*, edited by Bisserka Gaydarska, pp. 1-8. de Gruyter: Berlin.

8.1
The inhabitants of Nebelivka practised cereal agriculture and stock raising, alongside a wide range of other pursuits. But as we have noted, in other parts of the world, large-scale settlement of various kinds often precedes the appearance of farming.

Among the most striking examples is the enormous site of Poverty Point, in modern-day Louisiana, where archaeologists have investigated the remains of massive earthworks erected by Indigenous peoples around 1600 BC. To create these mounds and make them resilient in swampy environments required not just the mobilisation and coordination of massive amounts of labour, but also extraordinary skills of engineering, reflected in the careful sourcing and interlacing of different soils, gravels, and sediments.

Colour symbolism appears to have been an important factor in the selection of soils for mound-construction, leading one archaeologist to describe the builders of Poverty Point as 'DaVincis of dirt'.

Unable to acknowledge the sophistication of Native American peoples, the first European travellers and colonists of these lands entertained strange and fanciful theories about such ancient sites as these: were they perhaps the dwellings of an ancient race of giants, or the lost tribes of Israel, or survivors of the legendary city of Atlantis?

Seen from the air, Poverty Point's standing remains look like some gargantuan amphitheatre; a place of crowds and power, worthy of any great agrarian civilisation. Nearly a million cubic metres of soil were moved to create its ceremonial infrastructure, which was most likely oriented to the skies, since some of its mounds form enormous figures of birds.

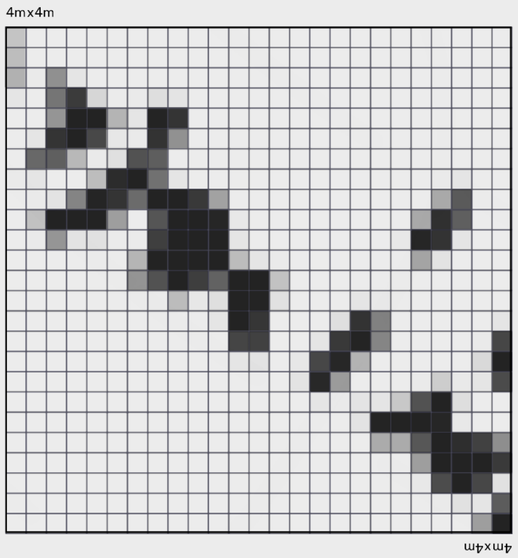
But the people of Poverty Point weren't farmers. Nor did they use writing. They were hunters, fishers and foragers, exploiting a superabundance of wild resources (fish, deer, nuts, waterfowl) in the lower reaches of the Mississippi.

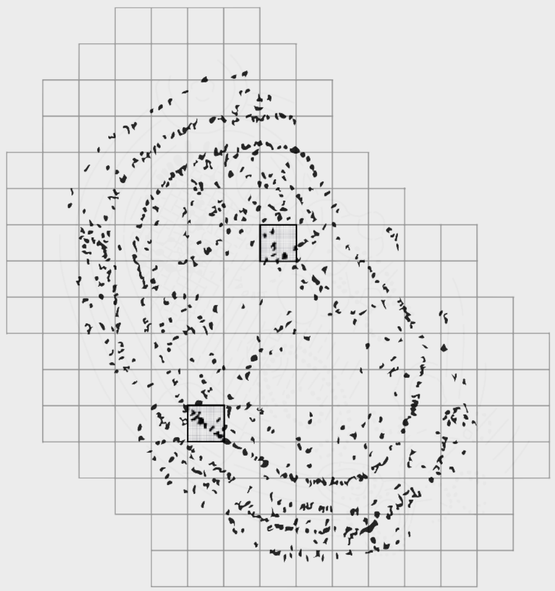
The monumental precinct of Poverty Point once extended over 200 hectares. To place this in perspective, the first Eurasian cities – such as Uruk in southern Iraq, or Harappa in the Punjab – began as settlements of roughly 200 hectares in total. That is roughly the size of Nebelivka as well. Which is to say that the entire layout of these early Eurasian cities could fit within the ceremonial precinct of Poverty Point.

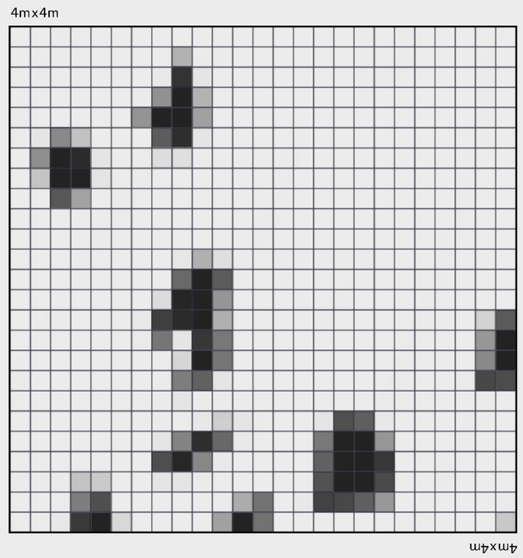
Sherwood, Sarah and Tristam Kidder. 2010 The DaVincis of dirt: Geoarchaeological perspectives on Native American mound building in the Mississippi River basin. *Journal of Anthropological Archaeology 30*: 69-87.

United States Army Corps of Engineers, retouched aerial image of Povert Point, 1938. [J. Gibson. *The Ancient Mounds of Poverty Point*]

In its day, ancient Nebelivka and her sister sites on the Ukrainian steppe were among the largest human settlements on Earth.







00:05:13

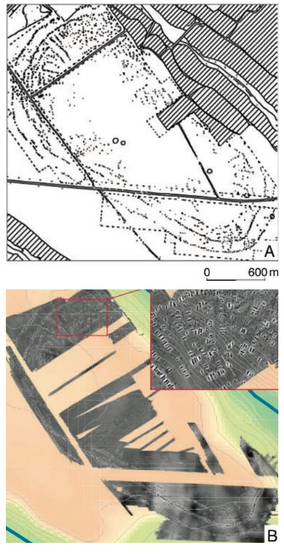
9
Valery Dudkin (1943-2011) was a distinguished authority in geophysics and archaeology.

Using geomagnetic surveys, Dudkin conducted more than 40 architectural plan reconstructions for ancient settlements in Ukraine and Moldova. Among these were the exceptional Trypilian protocities Maidanets'ke, Yatranivka, and Glybochok.

In 1971, Dudkin began his geomagnetic survey of Maidanets'ke, utilizing M-23 and M-27 magnetometers following a 4 × 4 m grid. While Dudkin's survey of this site generally corroborated the data provided by the aerial photography of Shyshkin, it yielded further interesting details and methodological possibilities.

For the first time it became possible to determine the number of houses at a Trypillian cultural site without excavations, and therefore create detailed reconstructions while conserving time and resources.

The surveys soon became standard practice to supplement archaeological excavation, together with a range of non-extractive techniques, including archaeozoological studies, archaeobotanical studies, and Carbon-14 dates.



Tallianky (Cherkasy Oblast). (A) Geomagnetic map of Dudkin's 1983–1985 survey (Koshelev, 2004: 305). (B) Overview of the 2011–2012 geomagnetic survey. [J. Müller, K. Rassmann and M. Videiko (ed.). *Trypillia Mega-Sites and European Prehistory 4100-3400 BCE*]

Müller, Johannes, K. Rassmann and M. Videiko (ed.). 2016. *Trypillia Mega-Sites and European Prehistory 4100-3400 BCE*. Routledge.

In 1971, the Ukrainian archaeologist Valery Dudkin[9] decided to peer deeper into the earth near the modern Ukrainian villages of Maidanets'ke and Talianky, where aerial reconnaissance[10] suggested the presence of similar anomalies.
A specialist in the field of geophysics, Dudkin used a machine originally designed to search through post-war landscapes for magnetic traces of unexploded ordnance.

Peering gently into the ground, the M-24 magnetometer offered a reading in 4×4 m resolution: too coarse to capture architectural details, it revealed the general pattern of a settlement – huge circumferences, resembling earthworks.

10
Another technological advancement - the passage from aerial photography to satellite imagery - today offers an increased level of detail in the analysis of archaeological sites and features, depending on factors such as their size and shape, location, state of preservation, and the contrast with the surrounding land cover. The spatial and spectral resolution of the image, as well as the time of acquisition and the specific satellite sensors used, can also influence legibility.

Beginning in 1959 and continuing until 1972, the CORONA programme was the first American satellite initiative designed for photographic surveillance of the Soviet Union, People's Republic of China, and other key areas.

Research over a span of 15 years demonstrated the potential of such imagery in arid and semi-arid regions, with CORONA images proving particularly useful in exploring Near Eastern archaeology, where the images reveal the remains of flat sites, tells, and route ways.

Similarly, DigitalGlobe26, a commercial Earth observation satellite company, launched WorldView-2 in October 2009, which provides panchromatic imagery at a resolution of 0.46m and 8-band multispectral imagery at a resolution of 1.85m.

The multispectral dataset enables several image processing and feature enhancements, with a focus on vegetation growth and soil moisture content as key factors in detecting buried archaeological remains.

Nebbia, Marco. 2020. Remote Sensing. In *Early Urbanism in Europe - The Trypillia Megasites of the Ukrainian Forest-Steppe*, edited by Bisserka Gaydarska, pp. 61-75. de Gruyter: Berlin.

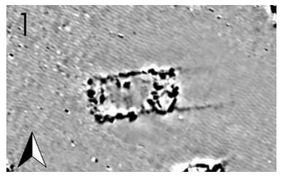
In 2011, an international team of archaeologists visited Nebelivka with a new generation of earth prospecting technologies.

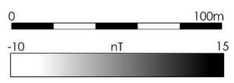
They placed a grid of 30 × 30 m over the site.

A magnetometer transmits pulses into the ground at regular intervals to detect minute differences in soil densities and levels of magnetism.

Each pixel covers an area of 1/2 × 1/4 m.

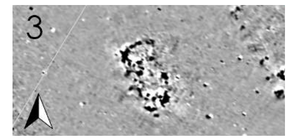
1,445 repetitive signatures of this kind came into focus.



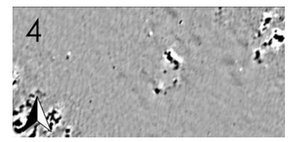


Assembly Houses 1–5, Nebelivka (by J. Watson) [B. Gaydarska (ed.). *Early Urbanism in Europe - The Trypillia Megasites of the Ukrainian Forest-Steppe*]

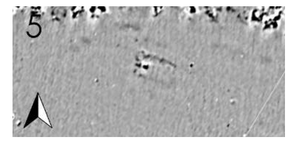
Ground truthing confirmed that these were the faint and garbled remains of prehistoric houses, of roughly similar size, around 60 sqm, each over 5,000 years old.



The houses were arranged in neighbourhoods, forming groups or clusters that radiated towards the empty centre.

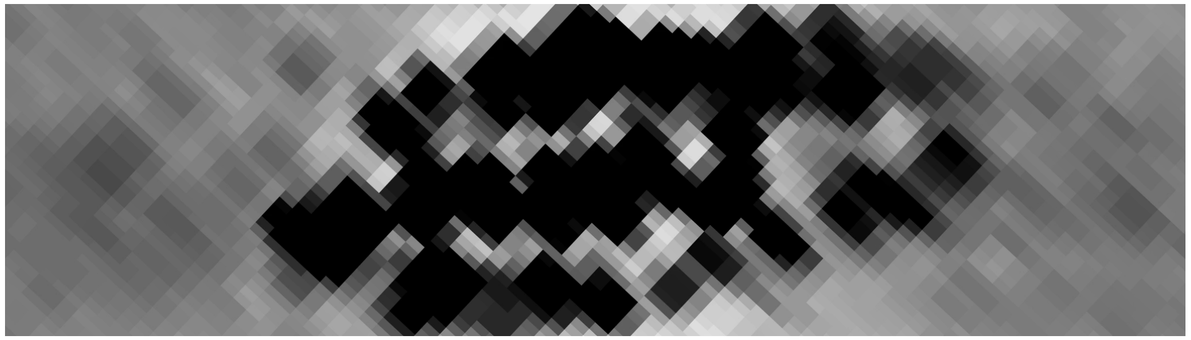


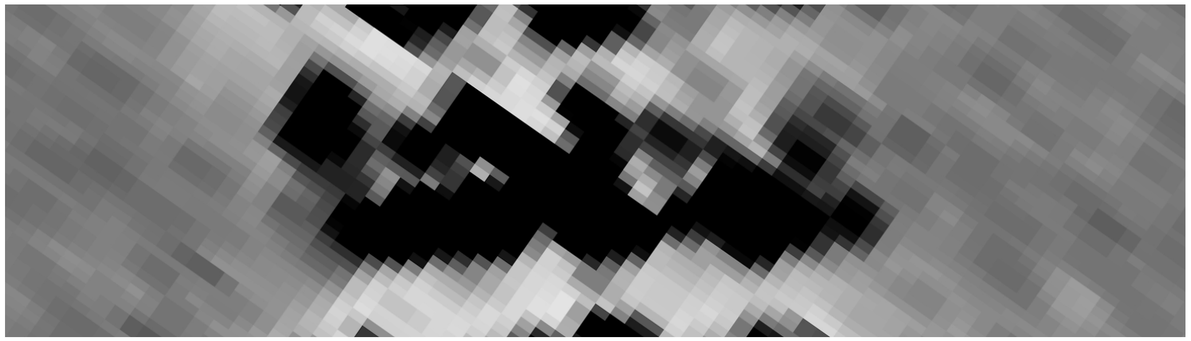
These neighborhoods converged into larger agglomerations, which archaeologists identified as distinct residential quarters.

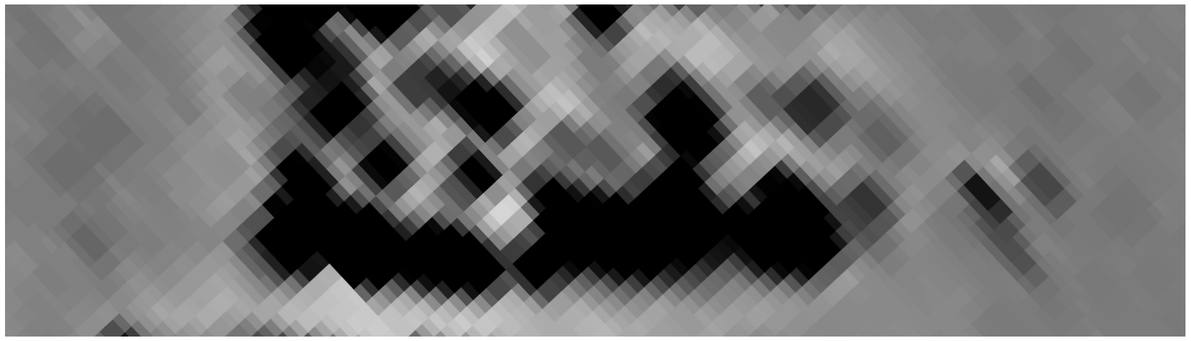


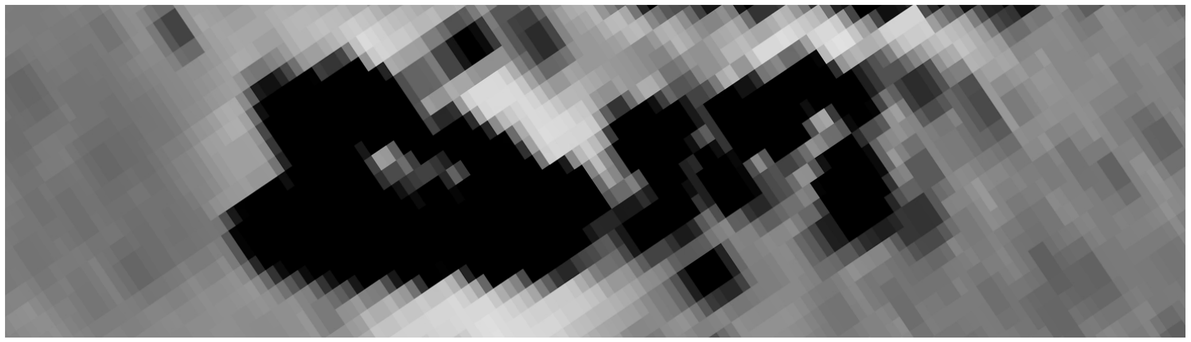
Each quarter was arranged around at least one larger building.

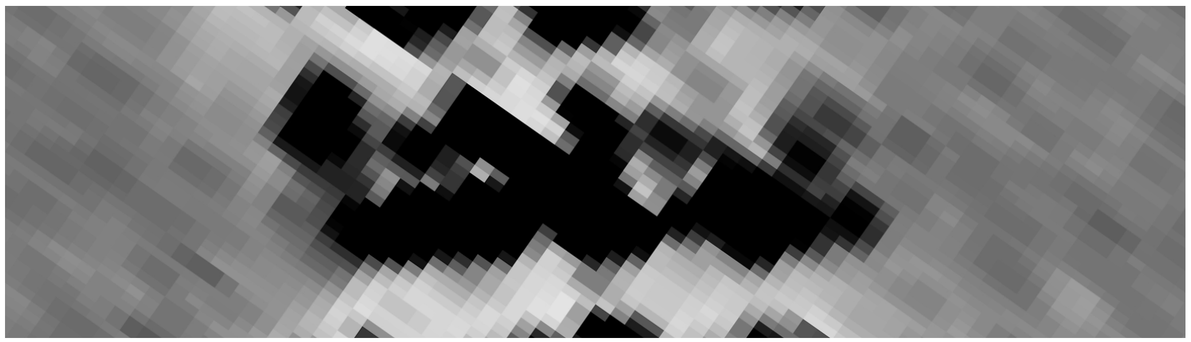
29.31	-9.48	-22.46	-15.91	17.83	46.08	31.71	3.82	-16.73	-33.15	-45.46	-47.72	-29.23	-3.42	20.88	36.81	31.85	21.91	21.09	18.7	3.43	-10.85	-10.14	-4.51	-1.08	3.25	11.91	17.83	12.5	4.28	-0.21	-3.07	-5.14	-5.62	-2.98	-0.17	-0.16	-0.94	-1.07
26.95	-11.63	-27.59	-22.58	16.57	48.1	23.91	-11.21	-18.68	-21.62	-40.21	-47.67	-11.77	30.47	47.11	46.53	24.97	4.52	10.27	16.28	-3.52	-23.82	-20.46	-10.61	-7.39	-2.42	13.37	25.66	18.47	6.17	-0.08	-3.49	-4.97	-4.68	-2.03	0.41	-0.11	-1.4	-1.79
25.21	-12.71	-21.01	-10.56	21.3	42.92	14.34	-20.32	-19.57	-14.96	-35.93	-47.59	-11.04	34.2	56.29	55.66	15.61	-15.64	18.9	52.84	19.21	-23.58	-24.52	-13.36	-10.97	-6.71	9.75	23.66	19.38	9.15	1.34	-4.06	-5.02	-4.07	-2.83	-2.2	-3.71	-4.99	-3.53
24.77	-11.49	-13.36	-0.76	16.78	24.54	-0.1	-27.45	-28.36	-25.75	-40.96	-47.55	-15.41	25.2	51.57	55.64	12.63	-22.25	13.99	52.75	27.38	-10.17	-17.52	-14.5	-12.85	-8.55	2.79	12.41	10.82	5.08	-0.31	-4.4	-5.07	-4.3	-3.23	-2.85	-4.8	-6.25	-4
26.29	-6.92	-4.44	8.33	13.34	9.13	-12.78	-35.28	-42.32	-33.83	0.74	32.59	29.47	22.21	40.88	50.51	9.82	-23.74	12.18	52.67	36.81	5.74	-10.86	-19.85	-21.72	-18.22	-8.8	0.24	2.3	0.65	-3.79	-7.61	-6.69	-4.79	-5.2	-5.66	-4.14	-2.32	-1.63
28.18	-1.34	6.76	20.91	14.24	-2.29	-26.18	-39.24	-16.27	16.76	40.46	52.42	41.62	28.59	34.75	36.41	6.26	-17.71	6.09	35.86	34.63	20.23	0.8	-15.24	-16.17	-11.29	-6.57	-2.93	-2.4	-3.99	-7.97	-10.92	-8.58	-5.58	-6.3	-7.05	-4.29	-1.15	-0.36
26.69	-2.23	11.98	29.99	15.88	-10.2	-38.97	-47.14	2.91	57.24	64.37	52.46	36.5	23.45	24.81	24.93	6.93	-12.3	-18.03	-12.24	11.51	29.62	14.05	-6.62	-6.93	-1.91	-2.36	-4.17	-4.93	-5.71	-7.38	-8.7	-8.24	-7.7	-8.83	-9.47	-7.28	-4.42	-2.56
20.86	-5.5	10.8	28.7	9.24	-21.24	-46.67	-49.74	2.38	57.45	64.52	52.82	39.1	26.12	19.38	13.75	5.38	-8.28	-35.35	-47.13	-4.22	38.09	23.48	-1.62	2.02	10.02	2.54	-7.24	-8.78	-7.82	-8.02	-8.35	-8.17	-8.31	-9.69	-11.08	-11.4	-10.32	-6.6
19.64	-0.57	6.36	13.53	-4.55	-29.44	-49.88	-49.25	3.3	57.94	66.1	53.44	31.96	11.61	5.08	3.4	1.41	-6.95	-34.66	-46.63	3.71	51.95	31.32	2.16	18.93	40.35	30.54	11.52	-2.14	-10.9	-11.06	-8.58	-8.32	-8.93	-9.83	-11	-12.72	-12.63	-7.25
7.23	1.03	3.26	3.82	-7.38	-24.06	-45.77	-48.68	3.34	58.49	67.47	54.1	27.05	3.19	3.74	8.72	1.51	-12.86	-36.89	-43.78	5.91	52.28	31.9	4	22.98	45.13	31.01	7.92	-4.08	-10.19	-10.77	-9.49	-9.61	-10.65	-12.93	-14.56	-13.34	-10.36	-5.61
1.37	6.79	6.31	0.75	-11.42	-27.03	-46.92	-48.17	3.99	58.97	68.76	54.68	21.78	-6.16	-0.3	13.8	16.78	7.65	-25.52	-43.44	4.97	52.39	30.12	-2.68	5.57	20.69	15.19	3.62	-4.95	-10.73	-11.35	-10.53	-11.41	-12.4	-12.28	-10.86	-7.08	-3.29	-1.88
-2.56	2.96	2.17	-4.61	-20.16	-37.4	-52.12	-47.53	5.45	59.57	68.83	55.34	26.37	-0.24	-4.16	5.86	31.14	44.69	9.28	-20.4	15.64	52.47	26.12	-9.5	-7.93	3.25	4.6	1.32	-5.95	-12.43	-12.26	-10.58	-11.81	-12.73	-10.29	-6.91	-4.33	-2.39	-1.44
-1.64	-0.86	-5.63	-14.77	-29.51	-42.65	-47.24	-37.26	1.98	43.2	61.73	56.11	9	-35.54	-31.68	-5.87	30.74	54.94	32.65	9.3	31.74	52.6	24.16	-9.47	-8.61	0.99	0.51	-3.72	-9.24	-13.45	-12.35	-10.38	-11.72	-12.42	-8.28	-3.71	-2.82	-2.94	-2.08
-1.51	-3.57	-12.14	-23.61	-36.72	-42.08	-25.65	-3.38	11.28	25.94	49.67	56.88	11.8	-34.94	-34.81	-11.7	26.55	56.43	47.15	28.53	25.82	23.69	9.6	-3.59	-2.92	0.55	-2.36	-6.11	-6.07	-5.93	-9.08	-12.26	-12.61	-10.28	-3.52	2.01	-0.32	-4.07	-3.62
-0.46	-4.86	-14.32	-26.1	-39.99	-41.68	-8.73	25.06	25.03	21.8	45.46	57.39	12.22	-34.6	-29.91	-5.58	20.14	39.39	39.15	26.85	2.47	-15.63	-4.23	11.89	10.87	3.66	-3.6	-8.93	-8.21	-7.22	-11.91	-15.93	-13	-6.36	3.47	10.08	4.76	-2.45	-2.52
1.09	-7.38	-16.81	-27.22	-40.44	-41.25	-6.17	28.38	24.19	17.13	42.91	57.85	11.72	-34.26	-19.57	10.12	19.87	20.49	15.87	4.72	-18.22	-31.7	-8.06	18.6	15.87	5.36	3.16	1.88	-4.08	-10.84	-15.71	-17.14	-11.61	-3.02	6.73	13.27	10.14	4.71	3.1
-2.81	-9.97	-21.12	-32.78	-43.05	-40.71	-5.99	26.45	19.02	8.3	30.35	44.01	2.34	-33.79	-0.25	42.04	39.01	20.86	7.18	-7.94	-30.85	-41.41	-11.9	19.56	16.12	0.99	-10.81	-18.68	-18.06	-15.91	-19.09	-20.43	-12.02	-1.16	6.49	11.57	13.13	11.61	5.75
-5.42	-10.07	-22.94	-36.52	-45.12	-40.22	-4.14	29.09	22.65	9.03	17.5	20.88	-11.82	-33.3	10.49	60.37	62.35	43.03	14.67	-14.31	-34.94	-40.72	-15.8	9.1	2.53	-12.65	-19.6	-21.8	-18.34	-15.33	-20.17	-22.85	-12.17	1.31	8.93	13.42	15.5	14.38	7.72

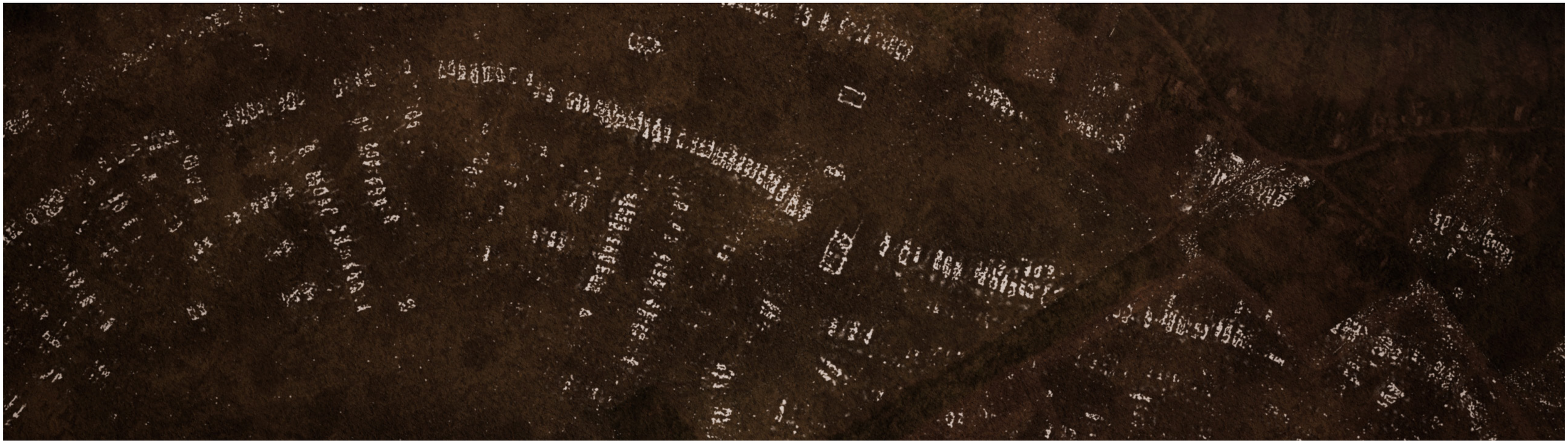










00:09:26

12
How did the earliest cities spring to life in various parts of the world?

There is no single story or explanation. The population of Teotihuacan, for example, appears to have swelled due to an influx of displaced people fleeing volcanic eruptions and other natural disasters around the Valley of Mexico. Still, there are some wider patterns to be observed.

Across many parts of Eurasia, and a few parts of the Americas, the appearance of cities follows a global restructuring of the world's ecosystems, which began around 7,000 years ago. Flood regimes in the Earth's major river systems became more regular, creating the wide and fertile alluvial plains of the Yellow River, the Indus, the Euphrates, and others that served as incubators of the first cities.

In parallel, the melting of polar glaciers slowed to a point that allowed sea levels across the world to stabilise. Where great rivers met open waters, deltas formed: the fans we see today at the head of the Mississippi, the Nile, or the Tigris. Such deltaic environments were major attractors for human populations, combining fertile soils with rich wetlands and aquatic resources.

Often, the earliest phases of urban occupation lie buried under deep deposits of silt, and when the picture comes into focus we see a marsh metropolis fully formed, or more often, a network of such centres.[12.1]

What distinguishes these first cities from earlier settlements, apart from their sheer scale, is their civic identity. Even without written evidence, which is usually lacking, this is clearly detected in the coordinated arrangement of built environments according to a harmonious pattern or unified scheme, which may or may not be organised around a high centre.

Defined in such terms, the city makes itself known to human history - whether at Mohenjo-daro in Pakistan, or Taosi in China - as a boldly self-conscious creation, planned at the municipal level.

D. Wengrow. 2018. The origins of civic life - a global perspective. *Origini XLII(2)*: 25-44. (in honour of Robert McCormick Adams)

But there was nothing in these larger buildings to suggest the presence of an elite or ruling class. No tools of bureaucracy. No signs of special wealth or privilege.[12] The archaeologists speculated that these larger buildings were assembly places for periodic, public gatherings.

12.1
In environmental terms, Nebelivka and her sister sites are outliers among early Eurasian cities, establishing themselves on an ecotone between the forest and the steppe, rather than in the floodplain of a mighty river.

But just like early cities elsewhere, they were the physical realisation of extended communities that already existed - in distributed form - long before their constituent units coalesced into urban centres.

We are, in fact, able to trace their originators to a distant origin on the lower reaches of the Danube, from whence they migrated through the Carpathian Mountains, leaving behind them a trail of villages and artefacts that reflect a coherent 'design for life' - particular ways of building houses, making and decorating pottery, tools, and female figurines - that archaeologists call the Cucuteni-Trypillia culture.

The prehistorian Marija Gimbutas considered this cultural area to be a part of 'Old Europe', a lost civilisation in which men and women were equally valued, and conflict over resources was limited. In Gimbutas' view, 'Old Europe' came to end when the grasslands north of the Black Sea were overrun by nomadic cattle-keepers - and later horse-riders - whose burial mounds (known as *kurgan*) still rise above the black soils today, casting shadows across the steppe.

When opened by modern archaeologists or looters, these great earthen mounds were found to be awash with golden treasure, just as described by the ancient Greek writer Herodotus and the mediaeval traveller Ibn Fadlan, in their vivid accounts of 'barbarian steppe kingdoms'.

Today, such treasures command eye-watering prices at auction, and occupy pride of place in the galleries of the world's major art museums, as well as the national museums of Sofia, Tbilisi, and Kyïv.

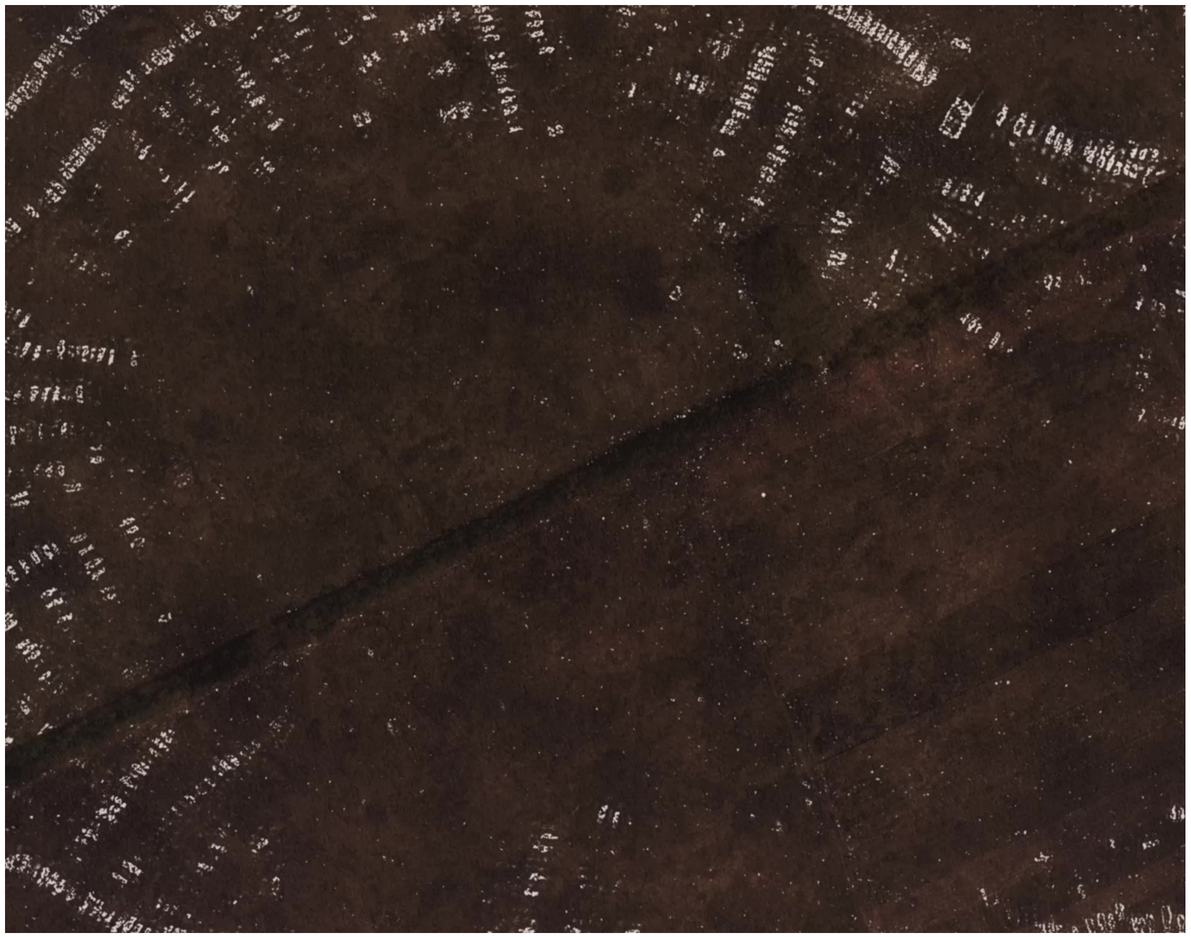
It was only in the 1970s, when Shyshkin made his discoveries from the air, that researchers even began to suspect the presence of a lost urban tradition, lying buried deep below the remains of these warrior tombs that, for so long, had defined and dominated this region's prehistory.

D. Anthony and J. Chi (ed.). 2010. *The Lost World of Old Europe: The Danube Valley, 5000-3500 BC*. Princeton University Press: Princeton

M. Gimbutas. 1982. *The Goddesses and Gods of Old Europe*. Thames and Hudson: London

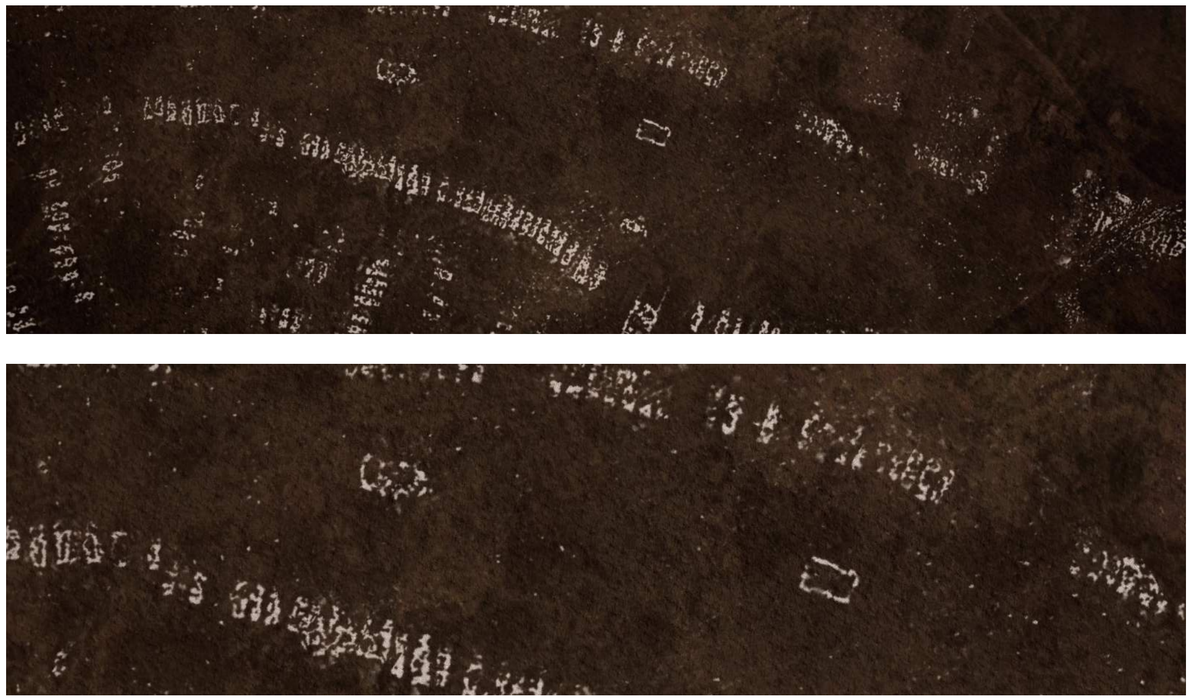
From these traces in the earth, they reconstruct a coherent pattern of civic life, in which the quarters emerge as self-governing districts.

Kurgan in Ukrainian landscape in the grass steppe zone, surrounded by arable fields. [I. Moysiyenko, M. Zachwatowicz, B. Sudnik-Wójcikowska and E. Jabłońska. *Kurgans help to protect endangered steppe species in the Pontic grass steppe zone, Ukraine*]



An unusually large structure was found, but - when excavated - gave no indications of housing a religious or political elite.

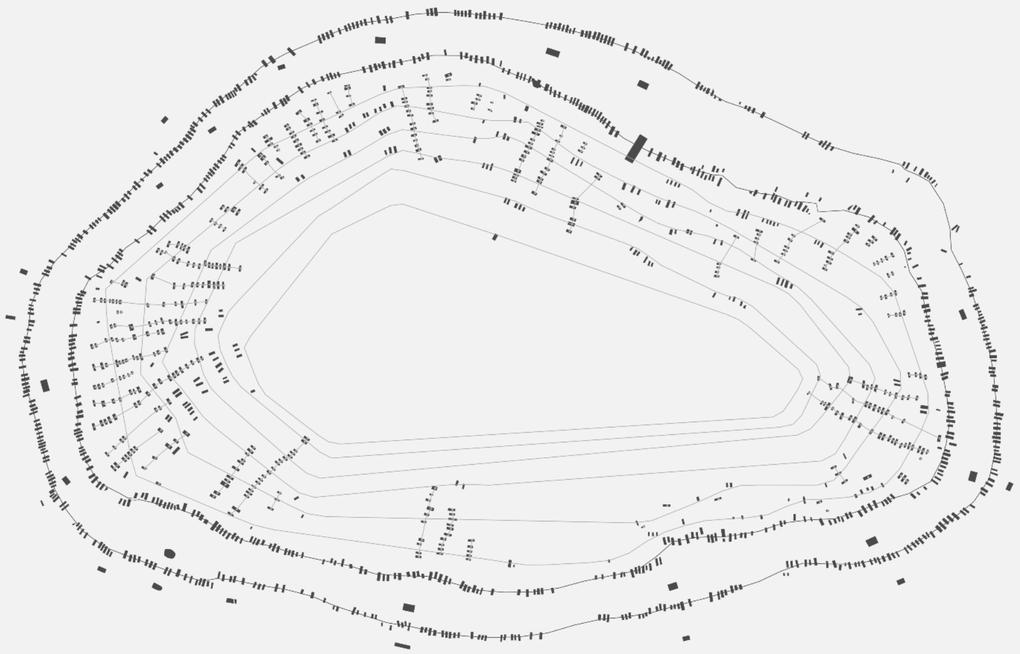
We are told that a city needs hierarchical form and structure.



No less important than what was found, is what was not.

Extensive survey of the center of the city found no evidence of palaces, central storage, administration, rich burials, nor any other signs of top-down control.

And for this reason Nebelivka is not a city.



00:11:13

Magnetic readings of the site revealed a circular logic,[13] with two main circumferences of houses. Twenty-three assembly houses are distributed around them.
Inside the circuit, a series of neighbourhoods radiate towards a mysterious empty center.

13
'The first impression of these sites is one of rigid uniformity, a closed circuit of social interaction, but closer study reveals constant deviation from the norm.

(...) Individual households would sometimes opt to cluster together in groups of between three and ten families. Ditches or pits marked their boundaries.

At some sites these groups coalesce into neighbourhoods, radiating out from the centre to the perimeter of the city, and even forming larger residential districts or quarters.

Each had access to at least one assembly house, a structure larger than an ordinary dwelling where a wider sector of the population might gather periodically for activities we can only guess at (political meetings? legal proceedings? seasonal festivities?).

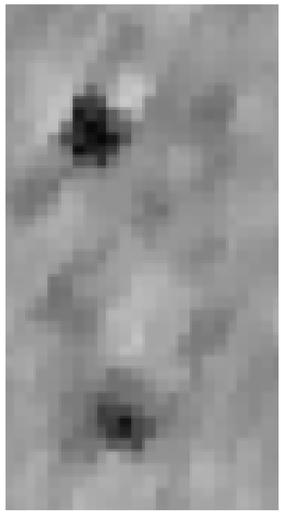
Careful analysis by archaeologists shows how the apparent uniformity of the Ukrainian mega-sites arose from the bottom up, through processes of local decision-making.

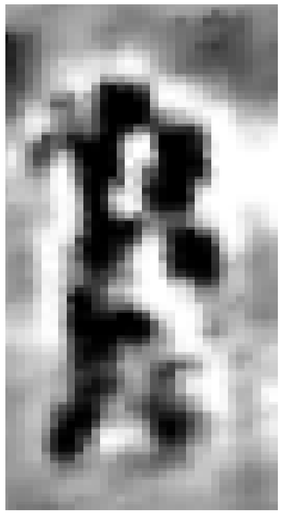
This would have to mean that members of individual households - or at least, their neighbourhood representatives - shared a conceptual framework for the settlement as a whole.
We can also safely infer that this framework was based on the image of a circle and its properties of transformation.'

Graeber, David and David Wengrow. 2021. *The Dawn of Everything: A New History of Humanity.* Farrar, Straus, and Giroux: New York.

Details from Nebelivka's geomagnetic plan comparing the geomagnetic reading of an unburned structure (left) with a burned one (right) [B. Gaydarska (ed.). *Early Urbanism in Europe - The Trypillia Megasites of the Ukrainian Forest-Steppe*]

Some of the houses were deliberately burnt, reduced to compressed platforms of incinerated wattle-and-daub.[14]





14
Burned houses are consistently found by archaeologists in Neolithic and Copper Age settlements, not just in Ukraine, but more widely in Eastern Europe and the Balkan region. How to explain this widespread practice?

There is no firm consensus, but archaeologists generally reject the notion that the fires were caused by arson (there is little circumstantial evidence for warfare or inter-personal conflict in most cases).

For a variety of reasons, they also largely reject the notion that the burning was accidental. In most documented cases, there is little evidence for the simultaneous burning of multiple structures, as when fire spreads out of control, and it is not typical to come across remains of animals or people trapped in the blaze; but perhaps most important is the thoroughness of the burning.

Experimental studies show it is difficult to achieve the high levels of incineration of wattle-and-daub structures found on archaeological sites. It requires large quantities of fuel and deliberate, coordinated effort to maintain such high temperatures.

Lastly, there is the fact that, in a considerable number of cases, large assemblages of portable objects were found - carefully arranged so that they burned along with the house-floors. These various factors lead experts to conclude that we are in the presence of some form of 'domicide', the socially sanctioned ending or even 'killing' of a physical building, perhaps associated with its ritual purification and partial recycling of its parts, upon the death of a significant member of the household.

Chapman, John. 1999. Deliberate house-burning in the prehistory of central and eastern Europe. In *Glyfer och arkeologiska rum : En vänbok till Jarl Nordbladh*, pp. 113-116. University of Göteborg Press: Göteborg.

Johnson, Stuart et al. 2018. The Experimental Building, Burning and Excavation of a Two-Storey Trypillia House. In *Materiality and Identity in Pre- and Proto-historic Europe*, edited by Senica Ţurcanu and Constantin-Emil Ursu, pp. 397-434. Karl A. Romstorfer: Suceava.

Stevanović, Maria. 1997. Production of architecture in the age of clay. *Journal of Anthropological Archaeology 16*: 334–95.

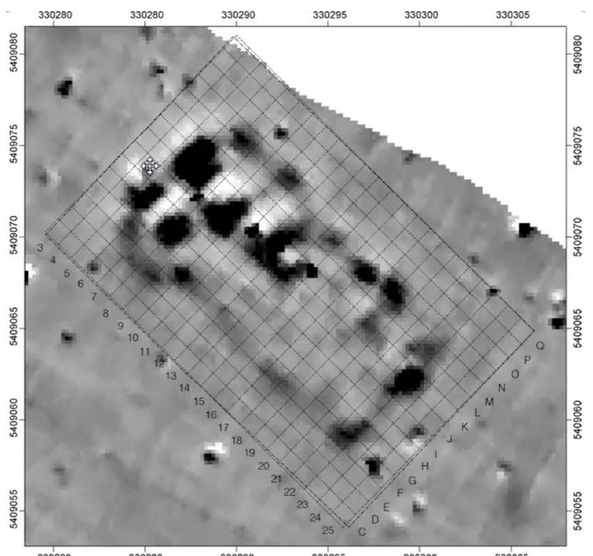
Tringham, Ruth. 2005. Weaving house life and death into places: a blueprint for a hypermedia narrative. In *(Un)Settling the Neolithic*, edited by D. Bailey et al., pp. 98-111. Oxbow Books: Oxford.

This invites us to introduce uncertainty into the modelling of Nebelivka's past.

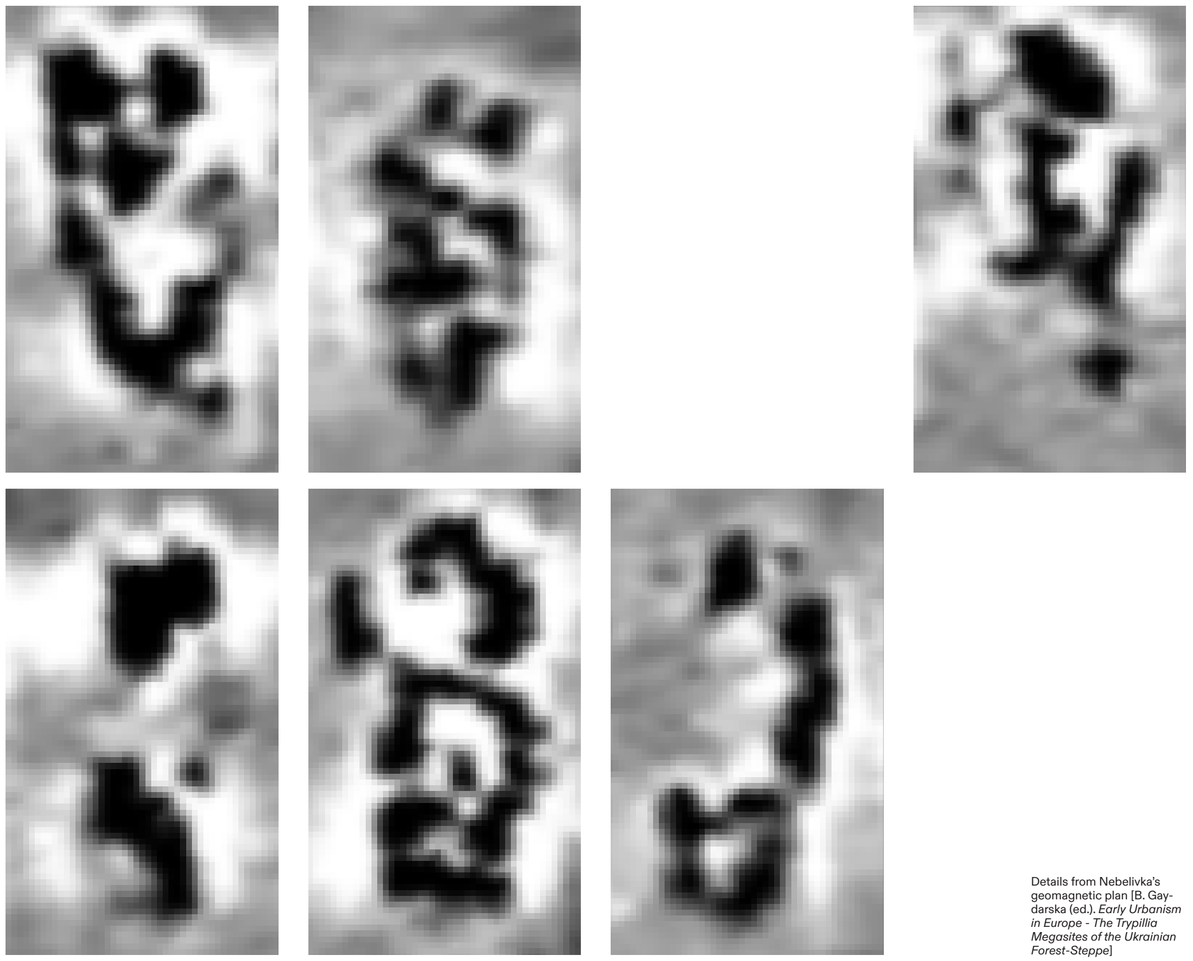
The result is a system for modelling indeterminacies in the data, and the possibilities they introduce.

We developed an algorithm to simulate the city's patterns of use, growth, and decline.

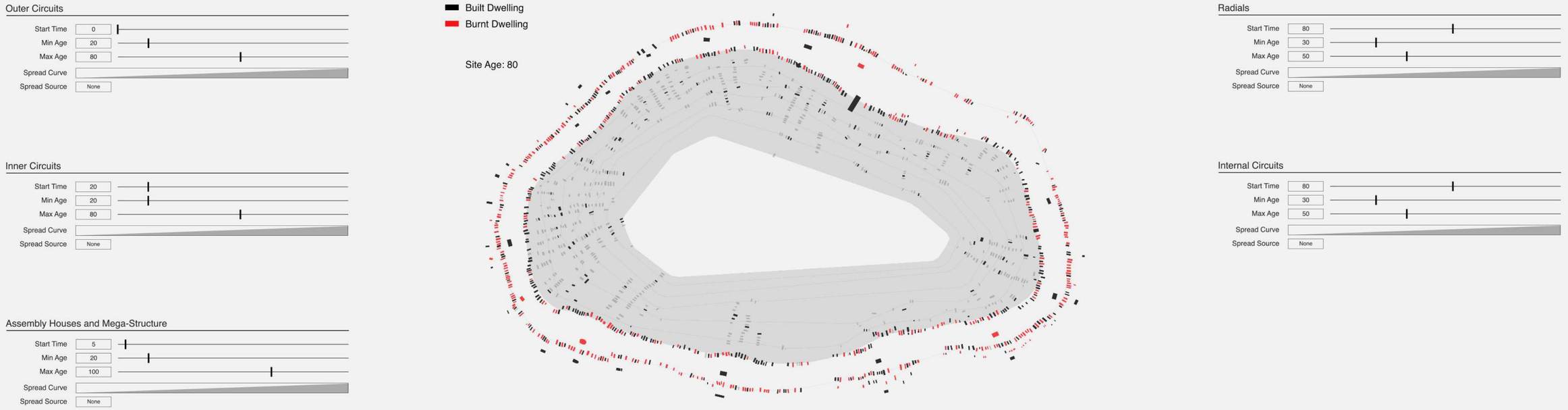
A spectrum of possible transformations - spanning a range of 200 years - reveals itself through the data.



Details from Nebelivka's geomagnetic plan [B. Gaydarska (ed.). *Early Urbanism in Europe - The Trypillia Megasites of the Ukrainian Forest-Steppe*]



Details from Nebelivka's geomagnetic plan [B. Gaydarska (ed.). *Early Urbanism in Europe - The Trypillia Megasites of the Ukrainian Forest-Steppe*]



00:12:00

15
Our basic idea is to follow the ethos of the ancient site-builders, showing how processes of social learning and reasoning are captured in the act of making images and models; in particular, how parametric modelling techniques arising from the study of architecture can enhance the process of archaeological interpretation and vice versa.

It is worth recalling here the obvious point that prehistoric archaeology is the art and science of interpreting evidence without verbal or written testimony. Evidence refers to material culture, in this case both the soil and the artefacts; but evidence without testimony is always under-determined.

Or, as the brilliant archaeological theorist David Clarke put it in the 1970s:

'Archaeology in essence then is the discipline with the theory and practise for the recovery of unobservable hominid behaviour patterns from indirect traces in bad samples.'

Such fragile traces open up possibilities and constrain them, and there is always a multiplicity of these possibilities extending between data points.

But without due care, the traces themselves can be obliterated by top-heavy theoretical constructs and free-wheeling speculation.

Archaeologists often treat indeterminacy as a caveat to interpretation, or as an invitation to patch over gaps and silences in the evidence with totalising theories of social or scalar change.

The approach we take is different. It seeks to generate insights into past social life, by simultaneously respecting and exploring the indeterminacies of the data, and the multiple possibilities they contain.[15.1]

Initially the External and Internal Circuits were built. The organizational logic shifts when the buildings forming the inner circuits are burned, in red, and the new buildings inhabiting the inner settlement are laid out as radials. [15]

15.1
To embrace and simulate multiple possibilities in the life, growth, and decline of Nebelivka, we developed an agent-based model using Houdini FX, a procedural generation software commonly employed for the creation of 3D animation and visual effects.

An agent-based model is a computational model that simulates the behaviour and interactions of autonomous agents to study complex systems. By constructing and applying such a model to Nebelivka's development, we were able to simulate the possible distribution and spread of buildings – with attention to the changing status of individual dwellings, burned and unburned – through a set of parameters that considered the spatial organisation suggested by the geomagnetic survey of the site, the lifespan of the buildings, and their uses.

In this way, the model becomes a machine for modelling the indeterminacies of the available datasets, together with the possibilities introduced by a number of different survey techniques such as radiocarbon dating, pollen analysis, geomagnetic, etc.

Through the model, we simulate a wide array of (possible) urban forms and modes of organisation. Speculating within the constraints and possibilities of a single data-set, a multiplicity of possible urban worlds can be shown to co-exist at the very same site.

Of course, only a few of the paths rendered will have been taken, but given the right circumstances each of them could present itself to conscious historical actors as a viable alternative, in the remote past.

At present, the space opened up by this catalogue of possibilities suggests the need to move beyond condescending notions of primitive or vernacular architecture as being non-discursive or 'symbolic' of a static worldview, or of merely adapting to its environment.[15.2]

15.2
The first simulation exposes a structural transition from circumferential to radial logics, representing alternate modes of co-existence and social organisation.

While in the former model, dwellings and communal spaces were built with an inward movement departing from their outer layers, the latter model suggests a sequence of destruction and reconstruction that follows a clockwise trajectory.

Some of the starting variables of this simulation are based on the 'Pilgrimage Model', theorised by John Chapman and Bisserka Gaydarska. The organisational logic shifts when most of the buildings forming the two external circuits are burned, highlighted in red, and the new buildings built along the inner settlement are laid out as radials.

According to Chapman and Gaydarska's model, each year an average of 10 buildings would have been built in close proximity to the most recently burned dwellings.

The burned distribution is based on the houses' lifespan: 30-70 years for the circuit; 30-50 years for the radials.

Clarke, David. 1973. Archaeology: the loss of innocence. *Antiquity 47(185):* 6-18.

00:12:19

16
At Nebelivka, as elsewhere, the record of objects rendered from soils and clays offers vivid glimpses into the less tangible aspects of this community's existence.

The ritual life of Nebelivka's inhabitants seems to have been mostly focused on, and contained within, the domestic realm. Its main material components could be procured from within the regional economy of the steppe-forest zone, including the earths and pigments used to make figurines and food vessels.

Anthropomorphic clay figurines, found in many dwellings, represent the self-contained social world of the household, replete with miniature representations of furniture and feasting equipment. In Mesopotamia, the growth of cities is associated with increasing standardisation and uniformity in everyday material culture, such as ceramic vessels used to prepare and serve meals.

Nebelivka and its sister sites in Ukraine do not follow this pattern. There is an aesthetic richness and individuality to everyday objects, which endures despite the growing scale and density of human cohabitation.[16.1]

It suggests constant innovation and playfulness within the rules of commensality - each household to some extent inventing its own rituals and cuisine.

Chapman, John. 2010. Houses, Households, Villages, and Proto-Cities in Southeastern Europe. In *The Lost World of Old Europe: the Danube Valley 5000–3500 BC*, edited by David Anthony, pp. 74-89. Princeton University Press: Princeton/Oxford.

Bailey, Douglas W.. 2010. The Figurines of Old Europe. In *The Lost World of Old Europe: the Danube Valley 5000–3500 BC*, edited by David Anthony, pp. 112-127. Princeton University Press: Princeton/Oxford.

Lazarovici, Cornelia-Magda. 2010. Cucuteni Ceramics: Technology, Typology, Evolution, and Aesthetics. In *The Lost World of Old Europe: the Danube Valley 5000–3500 BC*, edited by David Anthony, pp. 128-161. Princeton University Press: Princeton/Oxford.

16.1
Writing in 1923 for the *Cambridge Ancient History,* J.L. Myres attributed the 'gulf which separates the study of the Old Stone Age from that of the New' to the appearance of a 'more varied and far more expressive source of archaeological knowledge than stone, bone or antler.'

This new source of information was earth or clay and, according to Myres, there are special reasons for its 'eloquence':

'First, clay is eminently plastic; unlike stone, wood or fibre, it has no 'grain' or texture of its own; it is therefore fictile, and can be modelled into any form characteristic of the natural "grain" or texture of any other material; all objects of pottery are therefore literally figments of the potter's will, fictions (to vary the phrase) of his memory and imagination. "Hath not the potter power over the clay?"

Decorated anthropomorphic figurines from Pit, SF 28 + 43: back, and front, Nebelivka (by K. Harding). [B. Gaydarska (ed.). *Early Urbanism in Europe The Trypillia Megasites of the Ukrainian Forest-Steppe*]

But the potter, and still more those people who will use his pots, are creatures of habit.'

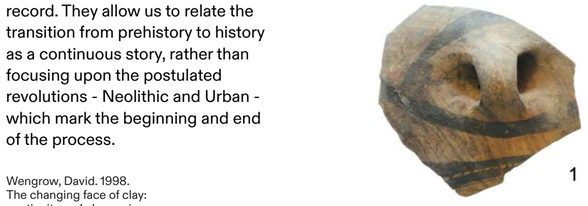
The growth of the archaeological record since Myres' day has greatly enlarged the scope of his initial insight. Shaped into figurines and tokens by the first horticultural communities of the Fertile Crescent, clay and soil were soon put to use in the manufacture of fired and decorated vessels.

Clay later became the material upon which seals and written signs, the tools of urban administration, were impressed, and its plastic and thermal qualities provided the moulds which made possible the casting of sophisticated metal artefacts through the lost-wax technique.

A primary construction material from the inception of farming onwards, clay (in combination with earth) also played an integral part in the development of architectural forms which, through symbolic elaboration, acted as frameworks for the formation of corporate groups and the negotiation of social roles.

More than any other surviving medium of human expression, these earth substances now serve to bridge the gap between late Stone Age prehistory and the first written documents in the archaeological record. They allow us to relate the transition from prehistory to history as a continuous story, rather than focusing upon the postulated revolutions - Neolithic and Urban - which mark the beginning and end of the process.

Wengrow, David. 1998. The changing face of clay: continuity and change in the transition from village to urban life in the Near East. *Antiquity 72*: 783-785.


1


1


2


2


3 4


5

0 10cm

0 10cm

The inhabitants of Nebelivka left us no written testimony.
Only traces in the soil, and the durable artefacts they fashioned from local clays. Pots, figurines, and model houses painted with vivid designs.[16]

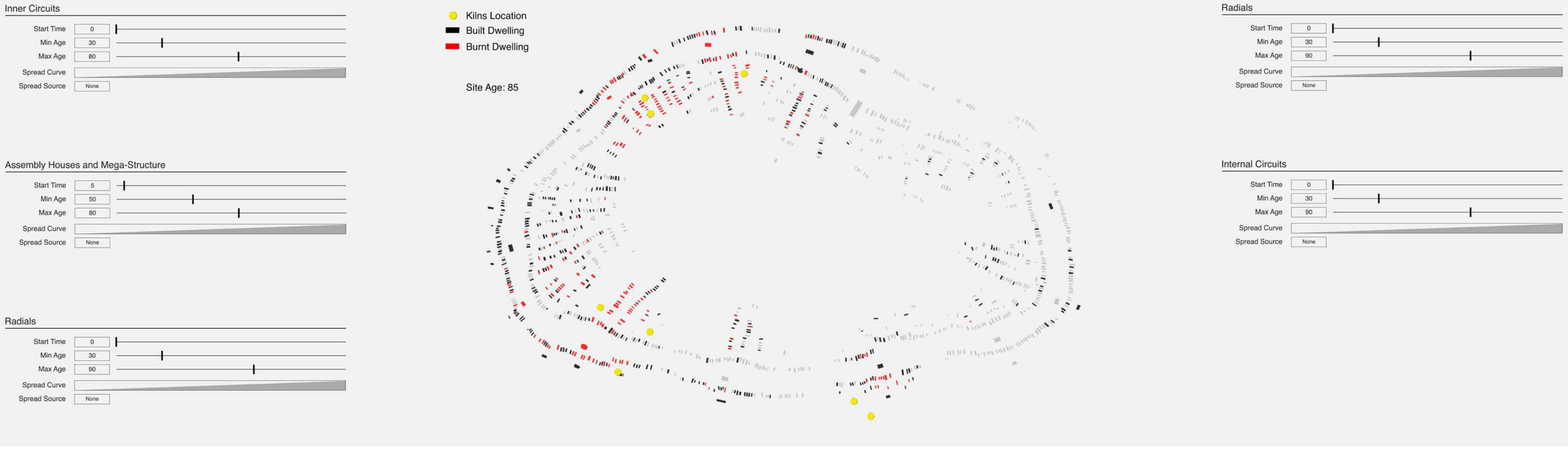

6

Left column:

Taphonomy: (1) burnt sherd, Test Pit 20/1; (2) burnt sherd, Test Pit 33/1;

Right column:

Pottery production: (1) handle pushed in, interior, Test Pit 24/3; (2) handle pushed in, exterior, with potting lines, Test Pit 24/3; (3) sherd with grit temper, Mega-structure Context 35; (4) sherd with possible wheel-marks, Mega-structure, TsT 8958, Context 3; (5) sherd with grooved decoration, House A9; (6) base with mat impression, Mega-structure TsT 1905, Context 151; [*Bisserka Gaydarska (ed.). Early Urbanism in Europe - The Trypillia Megasites of the Ukrainian Forest-Steppe*]



00:12:57

A second simulation takes into account nine pottery kilns, as possible starting points for the city's growth.[17]

17
'(...) An egalitarian ethos was fundamental to many of the Balkan Neolithic and Copper Age groups from which the Cucuteni-Trypillia group emerged (...) and such a strong principle would have guided many of the Trypillia social practices. The founding group obviously held an important position, (...) but if members of the founding group decided to extend their kinship authority or ritual primacy into a more general social dominance, one would have expected strong resistance against such an inegalitarian policy (...).
In a similar way, it is unlikely that households with members showing signs of distinction, whether as particularly skilled flint knappers, carpenters or figurine-makers, would have desired, let alone achieved, the structural prominence of their household on a permanent basis.

(...) In the megasites of Tallianki and Maydanets, the transformation of pottery production from a largely or wholly household affair, as in Nebelivka, into a system of dispersed, kiln-based production created the first serious caesura in the communal mode of production.

Importantly, the new system changed the basis of the relationship between Households, Neighbourhoods and Quarters, with specialized workshop production underpinned by groups of skilled potters, who fostered communal co-operation with individual households and Neighbourhoods.

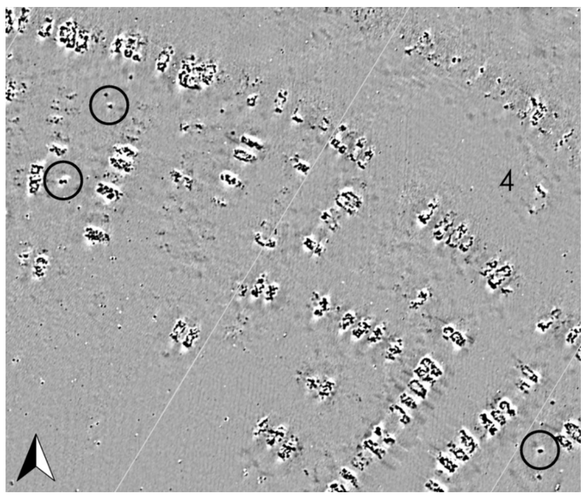
Thus, a specialized production practice combining the labour of many persons was itself integrated into pottery production – one of the key aspects of Trypillia lifeways.

The fact that pottery kilns were widely dispersed across two megasites suggests the importance of the Quarter as a heterarchical organisational and decision-making unit, in contradistinction to a centralised model of a single, specialised pottery-producing Quarter organised at site level in a hierarchical manner. [17.1]

(...) This result indicates that, for the fourth millennium BC on the forest steppe of Ukraine, there was a class of sites which was so different from typical small settlements that it merits the title of 'city'.

The claim is that Trypillia megasites exhibited the same order of qualitative and quantitative differences from the typical small Trypillia settlement as the city of Uruk did from small tells in the Fertile Crescent, or Roman London from the villas of South-East England.'

Gaydarska, Bisserka & John Chapman. 2020. Low-Density Urbanism - a Global Approach. In *Early Urbanism in Europe - The Trypillia Megasites of the Ukrainian Forest-Steppe*, edited by Bisserka Gaydarska, pp. 482-498. de Gruyter: Berlin.



Previous page:

General view of Industrial feature, Nebelivka (by M. Videiko). [B. Gaydarska (ed.). Early Urbanism in Europe The Trypillia Megasites of the Ukrainian Forest-Steppe]

Left:

strong anomalies possibly representing 'kilns', Nebelivka (by J. Watson). [B. Gaydarska (ed.). Early Urbanism in Europe The Trypillia Megasites of the Ukrainian Forest-Steppe]

17.1
The resulting mode of organisation is driven by the location of nine potential kilns or communal cooking features.

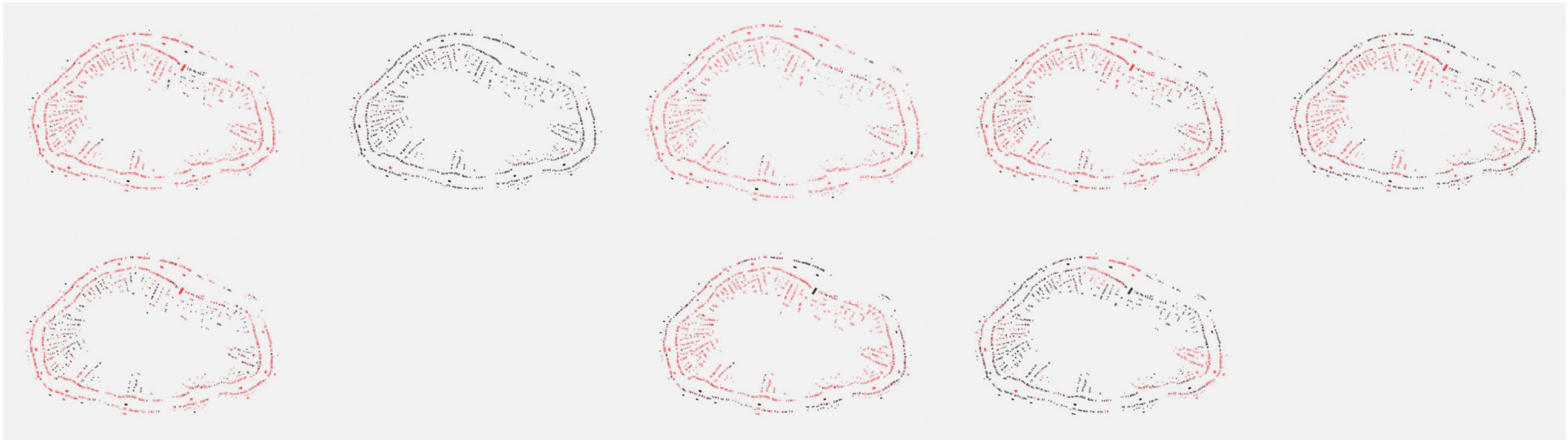
The location of the kilns within each of the established 'quarters' has been identified using the available geomagnetic data. Interestingly, AMS radiocarbon dating reveals the first four quarters in the region to develop settlements, and within three of those four quarters there is evidence of pottery production.

Did these kilns play a role in the cultural and structural shift that took place during Trypillian BI/BII?

This second simulation shows a potential standard distribution of dwellings radiating out from the kilns' locations within each quarter.

According to this model, each quarter is guided by a circumreferential logic that develops from the establishment of a main Assembly house. The site will grow according to the new logic over a period of approximately 200 years.

Looking once again to Chapman and Gaydarska's model, each year an average of 10 buildings will be built in close proximity to the most recently burned dwellings.



00:13:06

18
Can urban form be indexical for certain kinds of society? Archaeology, like forensic architecture, is based on a reverse architectural reading. It asks what modes of occupation, class and hierarchy can we deduce from architectural form. Found partial ruins are read for their intended use.

But for this to be simple, architectural form must be a mirror of the social relations it contains and enables. There must be a single and unique relation between architectural form and social function (captured perhaps by the modernist 'form follows function'). Our speculative interpretation insists, however, that the relation between form and function could be multiple, that different forms can achieve the same function, and that social relation can transcend architectural shape. We have, after all, seen embassies and palaces used as communes, and other such examples where architecture designed for one purpose offers the possibility for a wide variety of other uses according to people's needs and desires.

In architectural historiography, the vernacular form is associated with a naturalised form. It is presented as anonymous, spontaneous, and unreflective, a determined interaction between particular

Modelling the data allows us to extend our vision beyond static notions of primitive architecture: as representation, or adaptation...[18]

environmental conditions and particular social forms. Architecture is perfectly suited to its environment because it is determined by it. The vernacular form is associated with pre-modern Indigenous cultures (in time) or pre-Western sometime pre-historical cultures (in space). In contradistinction, Western, Modern architecture is presented as the activity of individual deliberative subjects free to decide and imagine.

In 'Architecture without Architects', Bernard Rudofsky, who is most closely associated with the popularisation of Vernacularism, writes that vernacular architecture is a 'communal architecture—architecture produced not by specialists but by the spontaneous and continuing activity of whole people with a common heritage, acting within a community of experience.'

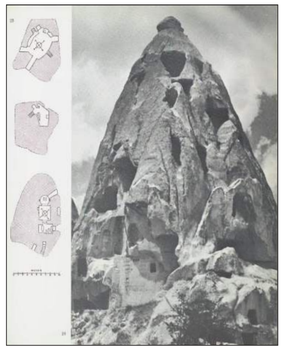
His intention was to emphasise the communal enterprise at the heart of this architecture rather than the work of individual architects. However, Vernacularism easily drifts to environmental determinism with its racist conceptions of Indigenous societies as being somehow closer to Nature than Culture. Its perfect adaptability to an environment is presented as something achieved through a process of naturalised social evolution, in which a sequence of random mutations results in gradual change.

Our study of possible actions by the community of ancient Nebelivka emphasises decision. These architects transformed, destroyed and abandoned existing urban and social orders, demonstrating an avowedly self-conscious deliberation process and negotiation of design decision. This has a lesson to teach us about architecture, which could be defined of as 'the freedom to create or transform social relationships'.

Rudofsky, Bernard. 1964. *Architecture without Architects, an introduction to nonpedigreed architecture*. The Museum of Modern Art: New York.

Graeber, David & David Wengrow. 2022. *The Dawn of Everything, a new history of humanity*. Penguin Random House: London

...and reveals the outlines of a social process: a collective imagining and reshaping of human relationships; a multiplicity of possible urban worlds and ways of inhabiting them.

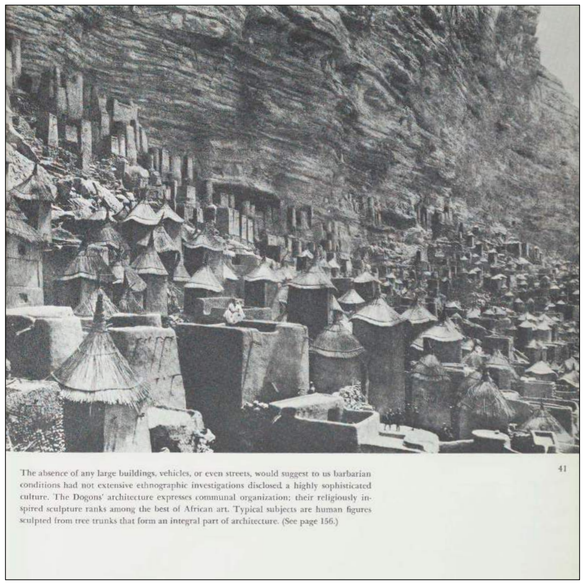


Previous page:

cover of Bernard Rudofsky's 'Architecture without Architects'.

Left:

'(...) a close-up of one of the Goreme cones sculpted by nature. They range from the size of a tent to that of a minor skyscraper with as many as sixteen floors'. Plans of the apartment inhabited by Simeon the Stylite (in the fifth century A.D.) are shown at right. The lowest floor contained his oratory. Above it were his living quarters with a fireplace and furniture made from stone.
[B. Rudofsky. *Architecture without Architects*]

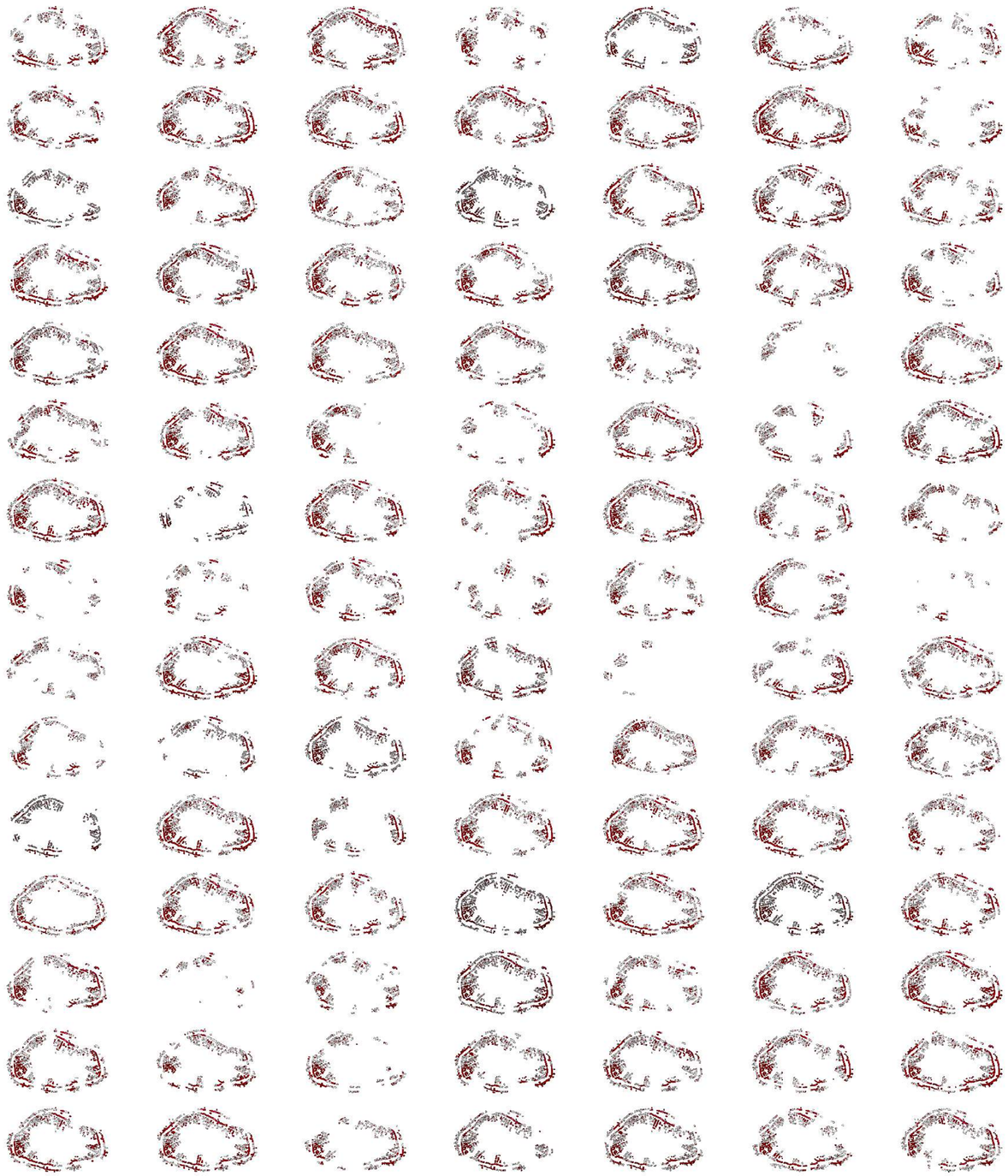


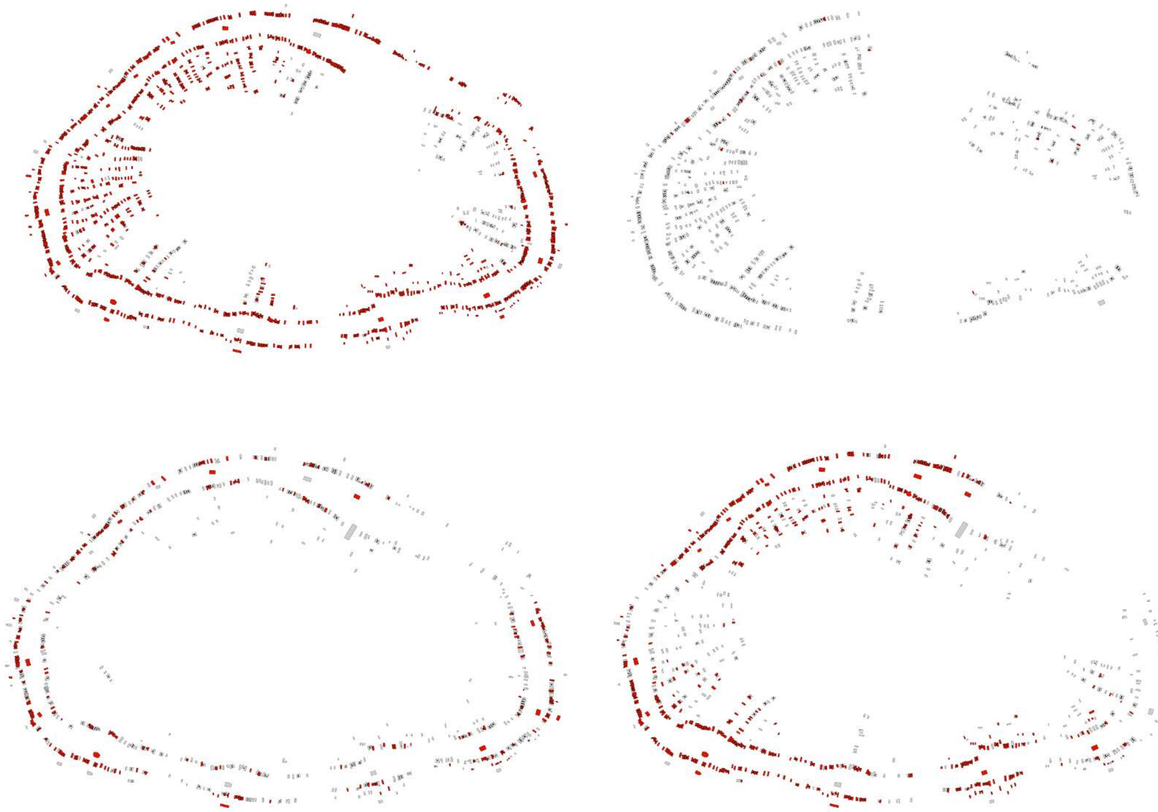
The absence of any large buildings, vehicles, or even streets, would suggest to us barbarian conditions had not extensive ethnographic investigations disclosed a highly sophisticated culture. The Dogons' architecture expresses communal organization; their religiously inspired sculpture ranks among the best of African art. Typical subjects are human figures sculpted from tree trunks that form an integral part of architecture. (See page 156.)

41

'The absence of any large buildings, vehicles, or even streets, would suggest to us barbarian conditions had not extensive ethnographic investigations disclosed a highly sophisticated culture. The Dogon's architecture expresses communal organization; their religiously inspired sculpture ranks among the best of African art. Typical subjects are human figures sculpted from tree trunks that form an integral part of architecture'.
[B. Rudofsky. *Architecture without Architects*]

Only a few of the pathways you are seeing will ever have been followed, but all were available to the ancient residents of Nebelivka.





Still, we are told that a city needs hierarchical form and structure.

And for this reason Nebelivka is not a city.

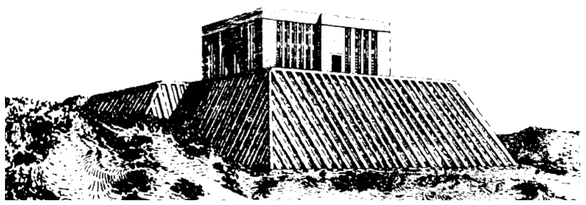
Growth simulation based on Bing Satellite Imagery (2022)

00:14:06

19
By reversing the figure/ground relation of traditional archaeology and museum display, we also wish to consider what can be learnt, when the logic of 'unearthing' - the extraction, cleansing, and purification of objects from the earth - shifts towards a much gentler practice, attuned to the texture and materiality of the earth itself as a primary medium and locus of investigation.

In this 'non-museum', or 'anti-museum', no objects are displayed. Instead, the densities and textures of the viscous black soils take centre-stage. As María Puig de la Bellacasa writes: *'soil shifts from container of worlds to a world in itself . . opening into perception a whole world of invisible labours that are more than human.'*

Reconstruction of the White Temple, standing on an artificial platform at Erech [G. Childe, The Urban Revolution]



This also presents a paradox. For archaeologists, she suggests, what enters the category of 'evidence' has traditionally focussed on material residues of one sort of another that resist decomposition through decay, whereas soil is the very result of such decay. For that reason, soil has often been relegated to the status of a 'container of this evidence - a more or less irrelevant background', its importance reduced to 'how its quality will guarantee better or worse conservation.'

But these insights, perhaps, relate more closely to museum display and the presentation of the past as cultural heritage, than to the practice of archaeology itself, which has long been attentive to the study of soil as a form of evidence in its own right, even developing the sub-field known as Geoarchaeology for this purpose.[19.1]

Puig de la Bellacasa, María. 2014. Encountering bioinfrastructure: ecological struggles and the sciences of soil. Social Epistemology 28(1): 26-40.

19.1
'Geoarchaeology is a multi-proxy approach where geographical and geoscientific concepts and methods are applied to Prehistory, Archaeology and History.[19.2]

However, to elucidate environmental contextual issues, geoarchaeologists must be more than casual practitioners of applied science. Indeed, if archaeological excavation emerged in the Eighteenth century with a systematic analysis of the material excavated - notably in Herculaneum (Italy) - stratigraphic excavation that applied environmental evolution data for the first time ever did not become established until the end of the nineteenth century.

Finally, to better understand environmental changes, particularly throughout the historical period, geomorphological research became an essential preliminary to the study of all archaeological sites in the 1980s.'

Ghilardi, Matthieu and Stéphane Desruelles. 2008. Geoarchaeology: where human, social and earth sciences meet with technology. *Surveys and Perspectives Integrating Environment and Society 1(2)*: 1-9.

19.2
British archaeologist Mortimer Wheeler coined the phrase 'excavation is merely methodological destruction', by which he meant the destruction of archaeological evidence, even as it is extracted from the ground. The soil, in this view, is a natural matrix that preserves delicate cultural remains of the past, and once removed from the soil, this work of preservation must be continued by other cultural and often labour-intensive means.

But this ontological separation between natural and cultural processes is far from universal.[19.3]

Other systems of knowledge regard the soil as a source of life and fertility, not just for organic beings, but also for artefacts such as pottery, which is considered to be 'grown' rather than 'manufactured', extending the life-giving properties of the soil into new social domains.

In other cases, artefacts based on soil were routinely recycled back into the earth, to enhance its fertility. Such ideas and practices are not always wedded to an agenda of environmental conservation. At times, they have also served the logic of capitalist production and extraction.

Perhaps the most striking, in terms of the scale of the operations, was the relatively recent profession of the *sebakheen* in Egypt: men employed by land companies to mine and harvest mud-bricks in their thousands from the walls of ancient monuments, dating back to the time of the Pharaohs.

The organic temper in these bricks made them rich in nitrogen - an excellent source of fertiliser. For centuries, ancient structures were thus recycled and their components used to enrich fields adjacent to the floodplain of the Nile, until the practice was finally regulated and then mostly outlawed, in the interests of conserving the ancient monuments.

In its heyday, between the 1830s and 1930s, the *sebakh* industry was not confined to the extraction of mud-bricks, but to any form of decomposed organic debris: a natural form of composting, which was ubiquitous on archaeological sites.

Bailey, Donald M. 1999. Sebakh, sherds, and survey. *The Journal of Egyptian Archaeology 85*: 211-218.

Coupaye, Ludovic. 2013. *Growing Artefacts, Displaying Relationships: Yams, Art, and Technology amongst the Nyamikum Abelam of Papua New Guinea*. Berghahn: London.

Wheeler, Mortimer. 1954. *Archaeology from the Earth*. Clarendon Press: Oxford.

19.3
As in the case of Nebelivka, new understandings of early urban landscapes have emerged as a consequence of new 'ways of seeing' (to quote the English critic, John Berger).

These ways of seeing are generated by new analytical sensibilities, including the use of decommissioned Corona satellite imagery from the Cold War, LiDAR remote sensing from airborne drones to scan through foliage to the underlying topography, and microscopic studies of earth composition below the surface of the ground.

All these new methods of investigating the human past have two things in common: they are invisible to the naked eye, making them different from the traditional study of artefacts and landscapes, and they share a focus on the archival properties of soil and sediment, breaking down the distinction between 'natural' and 'cultural' processes of change, so the soil becomes an artefact and the artefact becomes an extension of the soil.

This shift of perspective opens up new vectors of comparison between the long-term development of cities in different parts of the world, such as southern Africa, Amazonia, Yucatan, China, and South-East Asia. In each case the shift from large-scale excavation and physical survey to the imaging and analysis of soils reveals dramatic evidence of urban landscapes, lurking unsuspected beneath the cover of forests and grasslands.

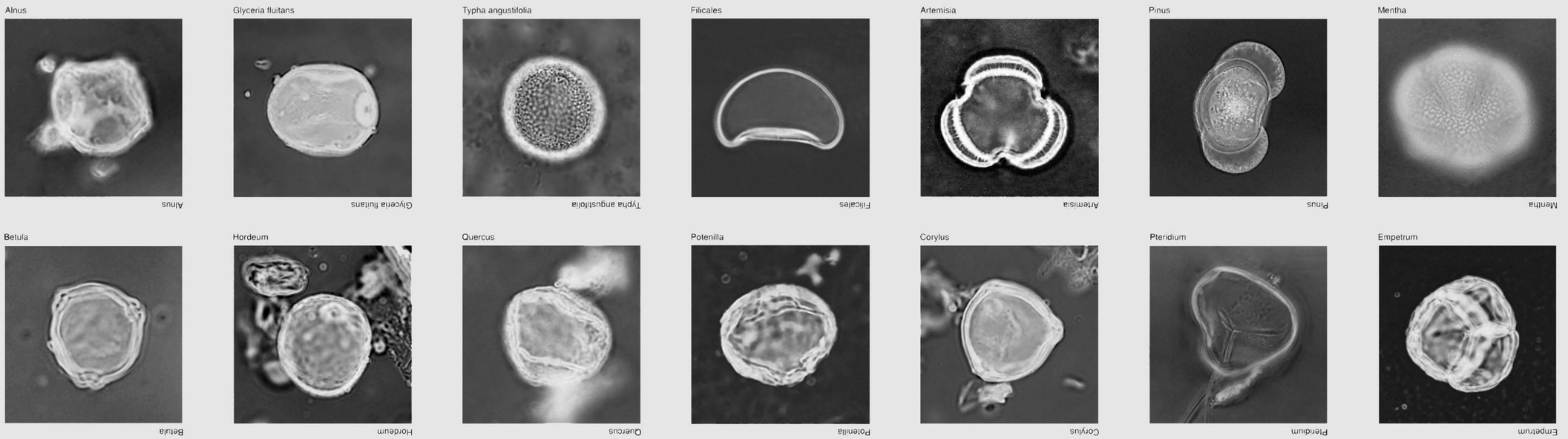
Whether from outer space, or up in the sky, or down the lens of a petrographic microscope, all these new methods have another thing in common: they are much less invasive than traditional approaches to urban archaeology.

Nevertheless, it does not escape our notice that they follow a consistent trend in archaeological field practice, which over the past two centuries has always mirrored evolving practices of State warfare and military organisation in its execution: from digging orthogonal trenches to field survey to aerial photography to geophysics, spy satellites, drones, and the refinement of chemical and biological techniques.

Could we see the soil of Nebelivka not just as a medium in which objects are found, but an archive of information in its own right?[19]

Menze, B.H., J.A. Ur and A.G. Sherratt. 2006. Detection of Ancient Settlement Mounds: Archaeological Survey Based on the SRTM Terrain Model. *Photogrammetric Engineering & Remote Sensing 72*: 321-327.

Prümers, H. et al. 2022. Lidar reveals pre-Hispanic low-density urbanism in the Bolivian Amazon. *Nature 606*: 325–328.



00:14:37

Soil was analysed for traces of ancient pollen, which tell us about past uses of the land: they revealed a light ecological footprint. Was Nebelivka a seasonal gathering place, a site of pilgrimage, or a durable settlement, whose inhabitants found ways to live gently on the land?[20]

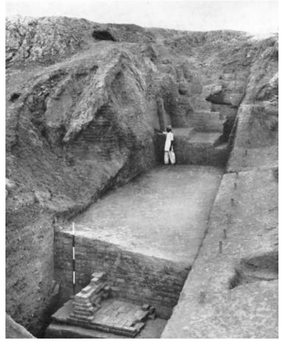
20
Here we might pause to reflect on the technical procedures and methods of field investigation that provided the data for Gordon Childe's *Urban Revolution*.[20.1] In particular, we might pay attention to the industrial scale of digging, well illustrated by a photograph of the site of Harappa in Pakistan under excavation, from Childe's original article in the *Town Planning Review*.

Earth removal on such scales precluded the careful investigation of soft building materials - such as unbaked mudbrick - and indeed, often involved the wholesale destruction of more ephemeral layers of architecture, to produce images of settlement forms that were, to a large degree, new creations, compressing multiple historical phases into flat ground plans.

It is worth repeating that we still know almost nothing about the layout of residential areas in the earliest phase of Uruk, because of the excavators' almost exclusive focus on monumental structures atop its acropolis. Such plans were then raised into three-dimensions through the kind of axonometric reconstructions that are ubiquitous in publications of the time, as in this third example, again from Childe.

In the felicitous terms of James C. Scott's *Seeing Like a State*, this style of urban archaeology made 'legible' or even in some cases created powerful images of State surveillance and control, testifying to a causal link between the growth of cities and the growth of stratification: a co-genesis of the 'City' and the 'State'.[19.1]

Nissen, H. 2002. Uruk: key site of the period and key site of the problem. In *Artefacts of Complexity: Tracking the Uruk in the Near East*, edited by N. Postgate. British School of Archaeology in Iraq: 1–16.



Section of the Ramparts round the Citadel of Harappa [Gordon Childe, The Urban Revolution]

20.1
Even within the histories of individual urban sites, we may now need to take account of multiple urban revolutions, evidence of which can be detected in the archaeological record, albeit often at very crude scales of analysis. Here we follow not Childe, but Leo Tolstoy's definition of a revolution as a 'change that occurs in a people's relation to Power'.

One example comes from the pre-Shang city of Taosi, in China's Jinnan Basin, where a highly stratified city with rigid segregation between commoner and elite quarters was replaced - around 2000 BC - by far more egalitarian arrangements, overriding the spatial distinctions of the earlier era. Such transformations are often disguised by the 'flat' presentation of urban ground plans in archaeological publications, which compress centuries of urban history into static images that disguise the dynamic processes behind a city's formation and transformation.[20.2]

Perhaps the most startling example of 'camouflage' is the standard ground-plan of Teotihuacan, in the Valley of Mexico, where the great Pyramids of the Sun and the Moon and the Temple of the Feathered Serpent are all presented as part of a single 'snapshot' with the hundreds of apartment blocks and residential neighbourhoods that surround them, despite that fact that these structures were built in different phases, extending over a period of some six centuries. In that time, the construction of monumental pyramids ceased, the Temple was closed off and vandalised, and large-scale construction came to focus on the provision of high quality accommodation for the city's multi-ethnic population.

René Millon - the archaeologist responsible for producing the first detailed map of Teotihuacan - described these phases as an extraordinary project of public housing, laid out on an orthogonal grid that covers the city from end to end. At what pace this transformation occurred cannot yet be clearly established. But the chronologically collapsed ground-plan reproduced in most publications is certainly a mirage, folding centuries of urban history into a single map. We are presented with an artificially static image of hierarchy, like something from More's *Utopia* or Campanella's *City of the Sun*, whereas in fact the record suggests something more akin to an urban revolution in Tolstoy's terms.

Millon, R. 1970. Teotihuacan: completion of map of giant ancient city in the Valley of Mexico. Science 170: 1077–82.

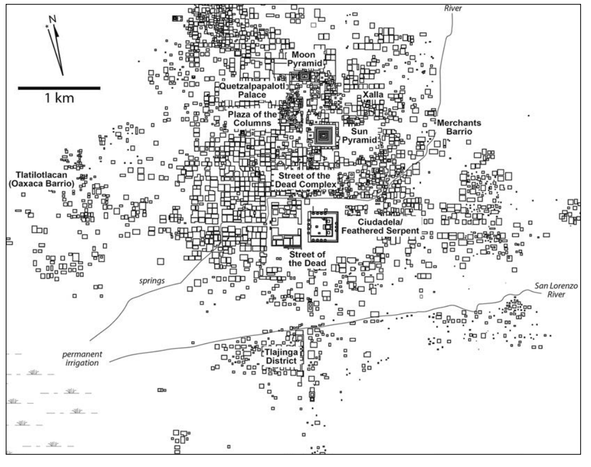
Cowgill, G.L. 2015. Ancient Teotihuacan-Early Urbanism in Central Mexico. Cambridge University Press: Cambridge.

Carballo, D. M. et al. 2019. New research at Teotihuacan's Tlajinga district 2012–2015. *Ancient Mesoamerica 30*: 95-113.

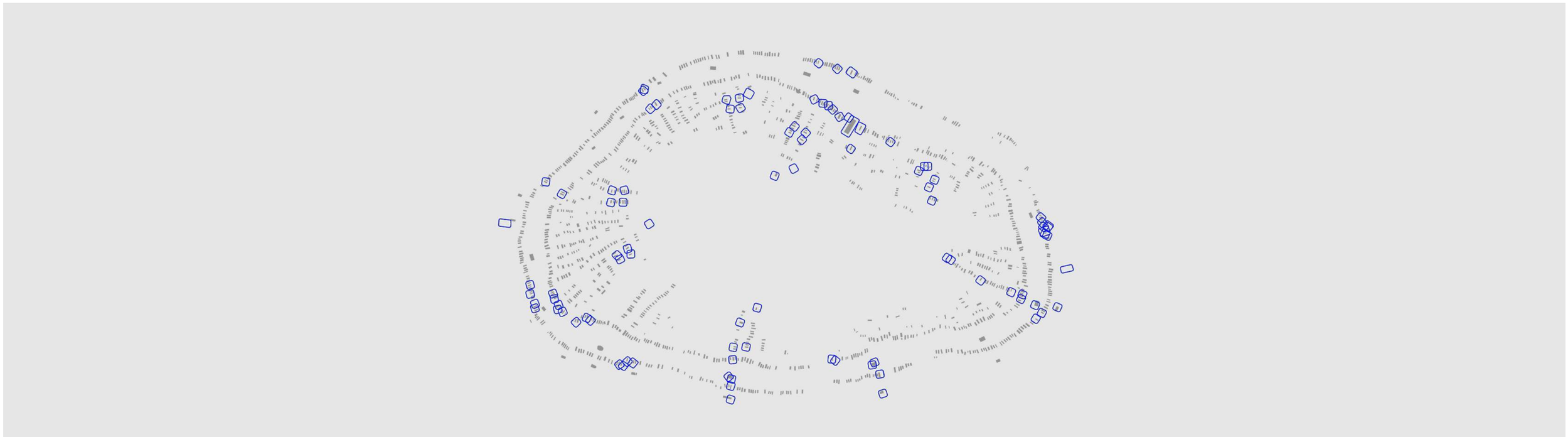
20.2
Archaeologists are currently experimenting with different models for the habitation of Ukraine's megasites. There are the 'minimalists' and the 'maximalists'. The minimalists, whose work is based at Nebelivka, envisage either a small permanent population of a few thousand people occupying 400 houses, or a seasonal flux of population as groups move in and out of the site, perhaps for major annual festivals at times of abundance, or following a more protracted pilgrimage calendar.

The maximalists, working at Maydanets and Tallianki, favour contemporaneous occupation of most or all the houses, with populations ranging between 10,000 to 45,000 people at any one time. Minimalist models are based on the assumption that large, dense populations are incompatible with a light environmental footprint, as documented by palaeo-ecological studies of the forest-steppe region.

Maximalist models stress the robust timber-frame architecture of the settlements, as well as elements of large-scale infrastructure, and the prevailing agricultural regime. But perhaps there are other possibilities, altogether?



Chronologically 'flat' ground-plan of Teotihuacan in the Valley of Mexico, spanning centuries of architectural and social transformation (courtesy of David Carballo) [D. Carballo, Power, Politics, and Governance at Teotihuacan]



00:14:27

Previous page:

Gaydarksa, Bisserka, John Chapman, and Marco Nebbia. 2019. Trypillia megasites in context: independent urban development in Chalcolithic Eastern Europe. Cambridge *Journal of Archaeology 30(1)*: 97-121.

Müller, Johannes et al. 2016. Chronology and Demography: How Many People Lived in a Mega-Site?. In *Trypillia Mega-Sites and European Prehistory 4100-3400 BCE*, edited by Johannes Müller, Knut Rassmann and Mykhailo Videiko. Routledge: London / New York.

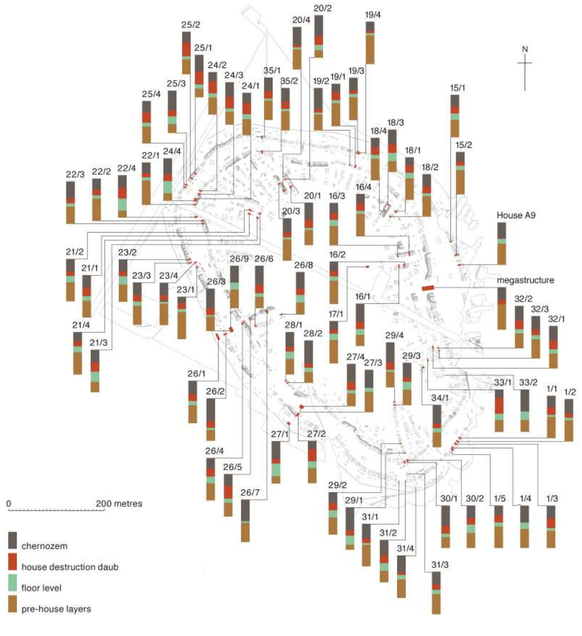
Nebbia, Marco et al. 2018. The making of Chalcolithic assembly places: Trypillia megasites as materialised consensus among equal strangers?' *World Archaeology 50*: 41–61.

Rassmann, Knut et al. 2014. High precision Tripolye settlement plans, demographic estimations, and settlement organisation. *Journal of Neolithic Archaeology*: 96-134.

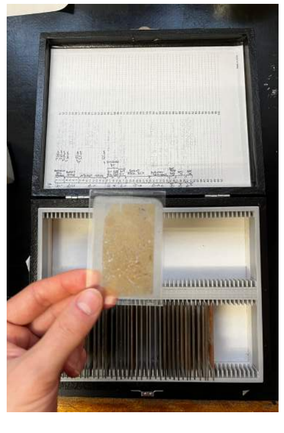
21
Urban archaeology began in the former European colonies, as a simultaneous process of discovery and destruction, carried out on an industrial scale. The unearthing of monumental structures in Mesopotamia, Egypt, and Pakistan laid grounds for a teleology of the State, discarding the complex palimpsest of simpler structures rendered in soft mud-brick that represented the most common urban activity of previous ages, and producing a singular image of hierarchy: the Urban Revolution as the birth of the State, enshrined as World Heritage. Against archaeology's tendency for 'unearthing' manifested in invasive large-scale excavations and involving the extraction, cleansing, and purification of objects from the earth, a gentler sensibility deeply attuned to the texture and materiality of the earth itself as a primary medium and locus of investigation has been emerging in recent decades.
In it, the earth is not only seen as a 'matrix within which the great majority of archaeological materials are found but, increasingly... [as an] archive of archaeological and environmental data' in its own right. This approach involves slow and careful field-walking, remote sensing, geophysics, and the careful scientific sampling of soils and deposits for micro-evidence of past human activity including charcoal, ash, bones, pottery, plaster, lithics, phytoliths, slag, etc. The geoarchaeology of anthropogenic soils and sediments focuses on their composition, and the material effects of human agency over centuries and millennia.[22.1]

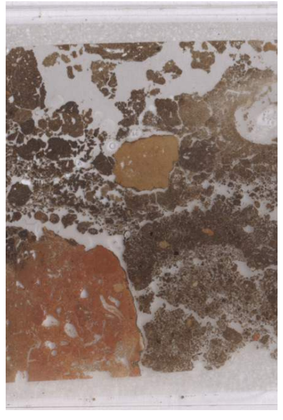
Arroyo-Kalin, Manuel. 2014. Anthropogenic Sediments and Soils: Geoarchaeology. In Encyclopedia of Global Archaeology, edited by Claire Smith, pp. 279-284. Springer.

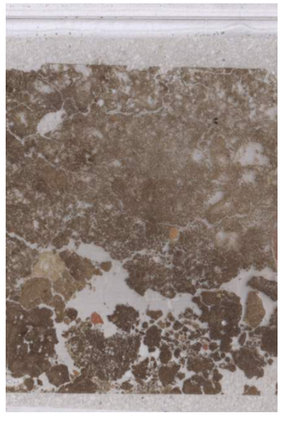
Close to a hundred test pits were dug around the perimeter of the site.[21]

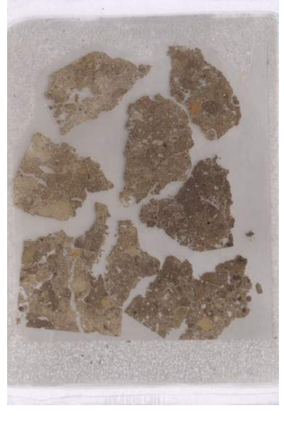


Using microscopic data extracted from these pits, we reconstructed digital soil covering Nebelivka, modeling the interaction between human and non-human forces.









Left:

collection of soil samples from Nebelivka's horizons. (courtesy of by Manuel Arroyo-Kalin)

Right:

microscopic images of soil samples (courtesy of by Manuel Arroyo-Kalin)

00:15:10

Vegetation cover: today these fields are most often used to cultivate sunflowers for the production of oil.
As we scan through the soil we see their roots.
We then enter the layer of Chornozem,[22] black soil, rich in micro-sediments, phosphorus and ammonia;

22
A chernic horizon (from Russian *chorniy*, black) is a relatively thick, well-structured, very dark-coloured surface horizon, with a high base saturation, a high animal activity and a moderate to high content of organic matter.

A chernic horizon is a surface horizon consisting of *mineral material* and has:

1. ≥ 50% (by volume, weighted average, related to the whole soil) fine earth and does not consist of mulmic material;

2. single or in combination, in ≥ 90% (by volume):
a. granularstructure; or
b. subangular blocky structure with an average aggregate size of ≤ 2 cm; or
c. cloddy structure or other structural elements created by agricultural practices;

3. ≥ 1% soil organic carbon; and

4. one of the following:
a. in ≥ 90% of the exposed area of the entire horizon or of the subhorizons below any plough layer, a Munsell colour value of ≤ 3 moist, and ≤ 5 dry, and a chroma of ≤ 2 moist; or
b. all of the following:
i. ≥ 15 and < 40% calcium carbonate equivalent; and

ii ≥ 90% of the exposed area of the entire horizon or of the subhorizons below any plough layer, a Munsell colour value of ≤ 3 and a chroma of ≤ 2, both moist; and

iii. ≥ 1.5% soil organic carbon; or
c. all of the following:
i. ≥ 40% calcium carbonate equivalent and/or a texture class of loamy sand or coarser; and

ii. ≥ 90% of the exposed area of the entire horizon or of the subhorizons below any plough layer, a Munsell colour value of ≤ 5 and a chroma of ≤ 2, both moist; and

iii. ≥ 2.5% soil organic carbon; and

5. if a layer is present that corresponds to the parent material of the chernic horizon and that has a Munsell colour value of ≤ 4, moist, ≥ 1% (absolute) more soil organic carbon than this layer; and

6. a base saturation (by 1 MNH_4OAc, pH 7) of ≥ 50%; and

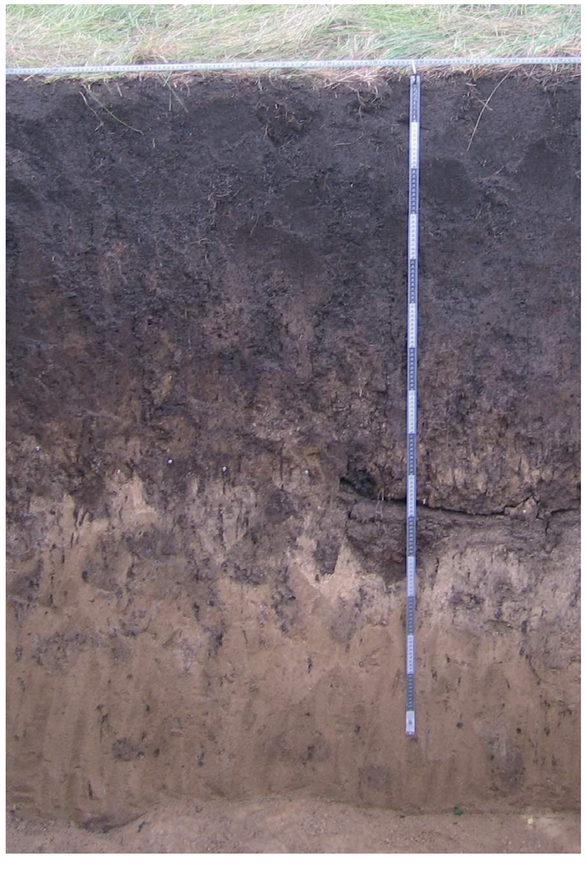
7. a thickness of ≥ 30 cm.
A chernic horizon may easily be identified by its blackish colour, caused by the accumulation of organic matter, its well-developed granular or subangular blocky structure, an indication of high base saturation (e.g. pHwater > 6), and its thickness.

The Chornozem of Ukraine is one of the most fertile soils in the world.

The chernic horizon is a special case of the mollic horizon with a higher content of soil organic carbon, a lower chroma, generally better developed soil structure, a minimum content of fine earth and a greater minimum thickness.

The upper limit of the content of soil organic carbon is 20%, which is the lower limit for organic material.

IUSS Working Group WRB. 2022. *World Reference Base for Soil Resources. International soil classification system for naming soils and creating legends for soil maps. 4th edition.* International Union of Soil Sciences (IUSS): Vienna



Chornozem with a high biological activity marked by the vermic qualifier. Southern Russia, the region of Kursk. (Photo by B. Vysloužilová). [B. Strouhalová - Vysloužilová, D. Ertlen. *Chernozem. From concept to classification: a review*]

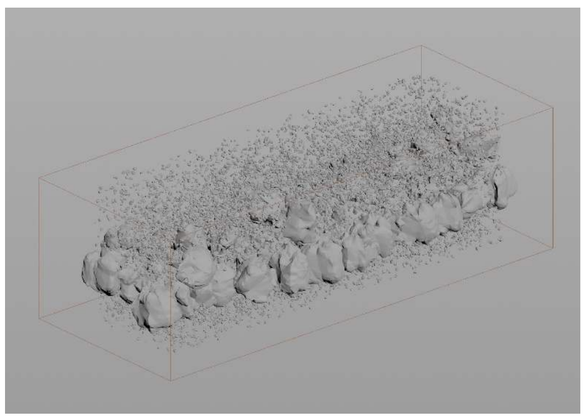
As our scan descends 25 cm below the surface, fragments of structural materials appear: hardened adobe and clay.

75 cm below the surface, traces of charcoal become visible between shards of pottery and daub.

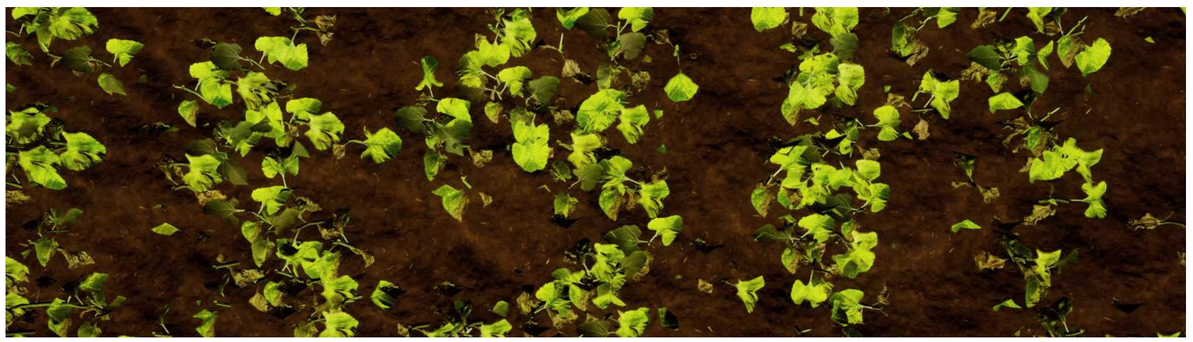
Their accumulation produces a pavement of burnt matter. As we go beyond the main level of prehistoric habitation, loess deposits become more common, revealing the burrows of anecic earthworms.

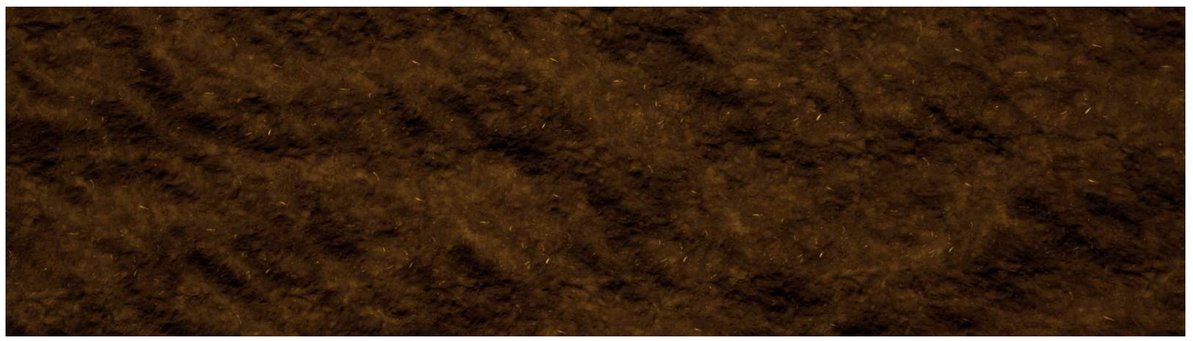
We scan back up through the earth: in red, you see the vertical movement of the worms.

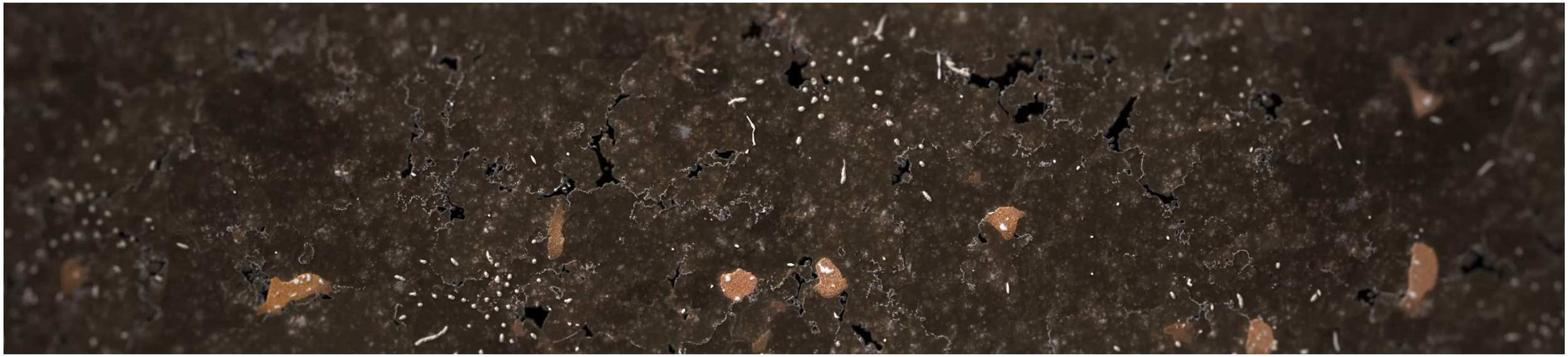
They carry soil between horizons, along with tiny fragments of pottery rich in calcium carbonate, quartz, and charcoal.

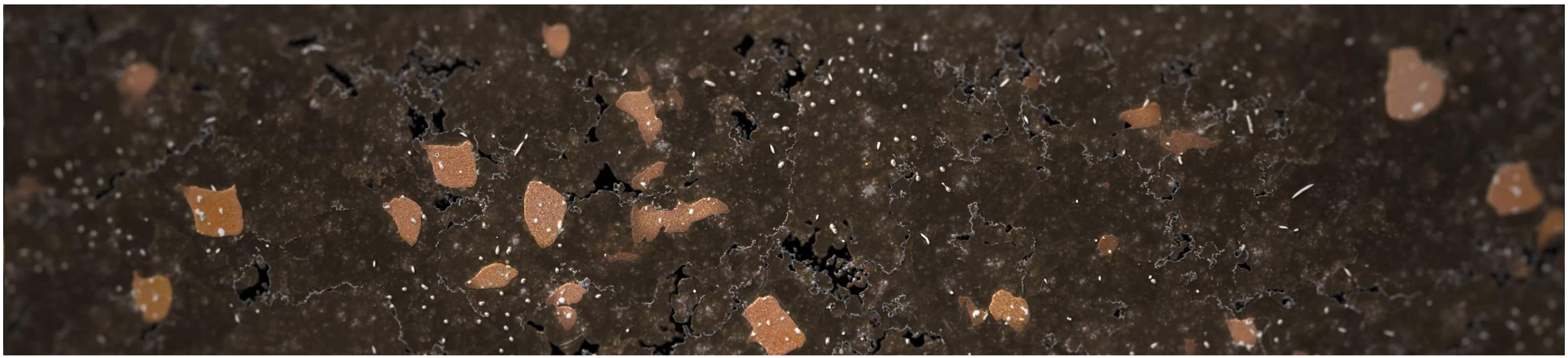


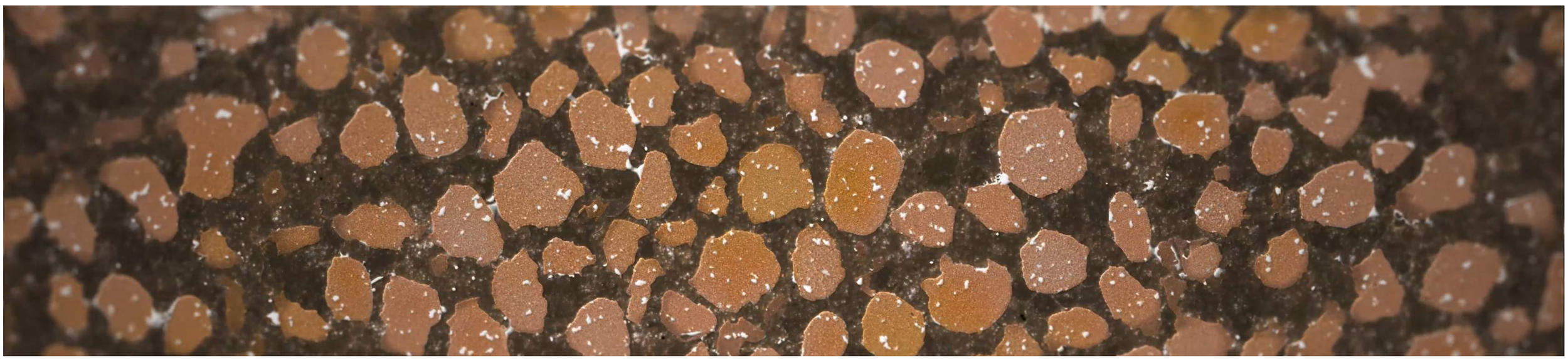
Slowly, Chornozem forms through the mixing of sediments.

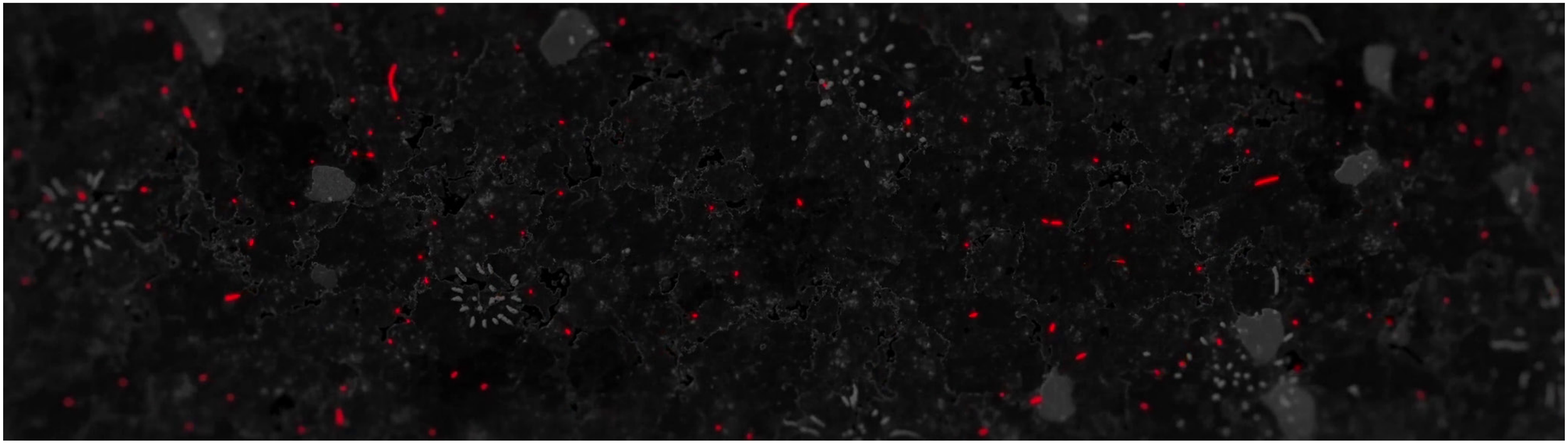












00:17:05

23
Eurasian *chornozem* is, in fact, distributed from the Southern Urals to Ukraine, as well as in parts of Moldavia and the Danube basin.

In the late nineteenth century, a geographer called Vassilij V. Dokuchaev coined the term *chernozem* (or *chornozem* in Ukrainian) along with a series of other Russian terms now commonly used in international soil science, such as *podsol* and *solonets*. Often regarded as the 'father of soil science', Dokuchaev defined Russian chornozem as a steppe soil forming naturally under dry continental climatic conditions, with bioturbation (soil-mixing by small animals) as a stimulus. This definition was then extended to black soils in other parts of Eastern and Central Europe.

Modern studies, however, have complicated this definition, and there is currently no consensus in the published literature as to the formation process of chornozems in these regions. The spatial distribution of chornozems in central Europe does not correlate in any direct or consistent way with topographic relief, hydrology, or climate conditions, leading some scientists to posit anthropogenic influence as a contributing factor in their formation.

These include the archaeologist Janusz Kruk, who conducted pioneering surveys of prehistoric human settlement patterns in southern Poland in the 1970s. Kruk found no palaeo-environmental evidence for the existence of chornozems in pre- or early Neolithic times (down to c. 4500 BC), and dated their appearance to a later phase of agricultural settlement (c. 4000 - 3300 BC), associated with more intensive farming and widespread deforestation.

Kruk was the first to link the two phenomena, suggesting that chornozem formation had an anthropogenic cause. More specifically, the patchy distribution of chornozem and its proximity to the remains of early farming settlements led some to conclude that it was a relic of Neolithic agriculture, stimulated by the use of fire to clear forest vegetation, as well as other interventions in the landscape.

Other studies cast doubt on this reconstruction, while offering no alternative explanation for the uneven distribution of chornozem.[23.1]

In Ukraine, geophysical and geochemical analysis of soils and sediments at the gigantic prehistoric site of Maydanets, a sister-site of Nebelivka, revealed that chornozem formation was hardly present before

Scientists debate the nature of the process. Some claim it is largely natural, and merely accelerated by human activity.[23]

the establishment of a massive Trypillian settlement, but accelerated after its establishment.

The study concluded that chornozem formation in this area was a result of anecic earthworm casting, fostered by the practice of prehistoric agriculture, resulting over time in the creation of black soils. If true, then this stands for a far grander claim: that the famous chornozem of Ukraine is, at least partly, an archaeological artefact; a result of prehistoric cities interacting with the land.

Here as elsewhere, however, the hypothesis remains controversial.

Dreibrodt, Stefan et al. 2022. Earthworms, Darwin and prehistoric agriculture-Chernozem genesis reconsidered. *Geoderma 409*.

Eckmeier, Eileen et al. 2017. Pedogenesis of chernozems in Central Europe - a review. *Geoderma 139*: 288-299.

Kruk, Janusz. 1980. *The Neolithic Settlement of Southern Poland*. Polish Academy of Sciences. BAR: Oxford

Lorz, Carsten and Thomas Saile. 2011. Anthropogenic pedogenesis of chernozems in Germany? – a critical review. *Quaternary International 243(2)*: 273-79.

23.1
Recently, several papers have challenged the role of vegetation cover (forest vs. steppe) in chornozems' formation, a debate that has been central for archaeologists, soil scientists, and palaeobotanists for decades.

Initially, it was assumed that during the Mesolithic, the shift in cultivation systems in favour of the use of fire for forest clearing – the so-called slash-and-burn – was the likely cause for chornozem formation. However, this anthropogenic model that dates back to Childe's hypothesis has been drawn into question by new available datasets and is now considered outdated.

It is now known that fires resulting from spontaneous ignition due to the prevalence of steppe in Central Europe during the Preboreal and Boreal (forest) might have happened at a scale likely to have an impact on processes of soil formation. Therefore, the assumption of human-made fires may not be the only explanation for high concentrations in chornozems.

Lüning and Kalis, for instance, described relatively small, isolated clearance areas, comprising only about 5-6% of the wood-covered loess landscapes. Farmers might have used natural clearings that, despite causing changes in tree composition, have not resulted in widespread deforestation through the man-made cultivation of large open spaces.

Radiocarbon dating confirms that 'the different ages could indicate that chornozems formed over a longer time period than thought before'; in fact, the datasets available suggests that the first farmers who settled in Northern Germany around 7,500 years ago found chornozems at that time.

Although the idea of (semi-) natural chornozem formation has been challenged, based on the observation that (major) parts of Soil Organic Matter (SOM) have properties of Black Carbon, it has been concluded that fire plays a crucial role in the formation of chornozemic soils, as does climate, vegetation, and bioturbation. According to Lorz and Saile, the hypothesis of a predominantly anthropogenic pedogenesis of chornozems in Northern Germany during the Early Neolithic, and earlier periods, must be rejected, confirming *de facto* the theory of natural formation.

The reference to anthropogenic soils in other climatic zones, such as the 'Terra Preta de Índio' and areas with entirely different physical-geographical conditions contributes little to the understanding of chornozem formation in Northern Germany and Eastern Europe.

Chide, Vere Gordon. 1929. The Danube in Prehistory. Clarendon Press: Oxford

Dokuchaev, V. Vasil. 1883. Russkij Cernozem. Sankt Petersburg.

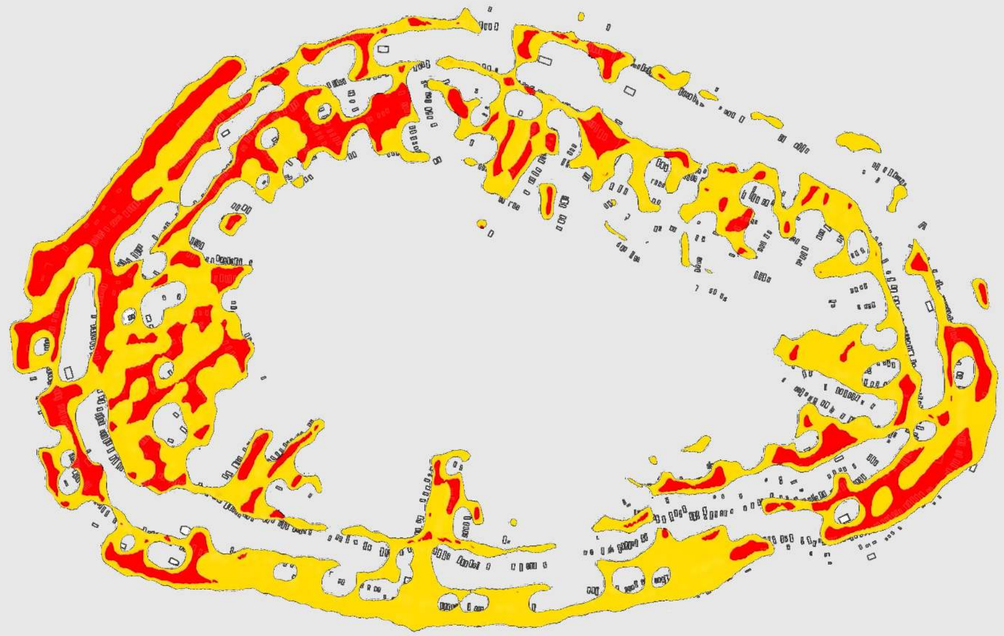
Lorz, Carsten and Thomas Saile. 2011. Anthropogenic pedogenesis of chernozems in Germany? – a critical review. Quaternary International 243(2): 273-79

Lüning, Jens and Arie J. Kalis. 1992. The influence of Early Neolithic settlers on the vegetation of the Lower Rhinelands and the determination of cleared areas based on archaeological and palynological criteria. *Paläoklimaforschung 8*: 41-46.

Schmidt, M.W.I. et al. 1999. Charred organic carbon in German chernozemic soils. European *Journal of Soil Science 50*: 351-365.

Schmidt, M.W.I et al. 2002. Detection of charred organic matter in soils from a Neolithic settlement in Southern Bavaria, Germany. *Geoderma 107*:71-91.

But others argue it was triggered by Neolithic settlers of the land, whose methods of farming stimulated the actions of earthworms.



00:17:12

If so, then the black soils may be considered anthrosols – a human-produced soil.[24] Even, perhaps, an archaeological artefact; an archive of human and natural processes.[25] We reconstructed this process, unfolding over a period of millennia. Chornozem extends in a curious patchwork formation.

24
Potawatomi scientist Robin Wall Kimmerer suggests an alternative understanding of the interaction between humans and soil - not in terms of resource exploitation (a master-servant relation) - but rather as taking place between relatives who engage on reciprocal terms, via the mediation of crops, wild plants, and fungi.

In many forms of Indigenous agriculture, she writes, plants are consciously modified by people to fit the requirements of the soil, as opposed to the globally prevalent situation, where short-term market forces determine what is grown, and the land is shaped to accommodate the needs of mechanised agriculture, regardless of long-term carrying capacity or sustainability.

It is often assumed that the former *ethos* is only suitable for small-scale horticulture, and could never support large populations. But there is a risk of circular argumentation here, since the recent history of Indigenous peoples has been one of catastrophic demographic decline and displacement as a result of European colonisation and genocide, and the replacement of Indigenous forms of cultivation by agro-industrial regimes.

Archaeology offers a way out of this circularity, by revealing a deeper history. In the Amazonian rainforest, for example, it has been possible to demonstrate that the scale of Indigenous land modification before European colonisation was far greater than once supposed, supporting large and densely clustered populations.

As demonstrated in the pioneering work of Wim Sombroek (1934 - 2003) - archaeologist and Secretary General of the International Society of Soil Science from 1978 to 1990 - Indigenous ways of occupying the land induced anthropogenic soil formation on an impressive regional scale.

Modern rainforest agriculture relies on slash-and-burn techniques, labour-intensive methods geared to the extensive cultivation of a small number of crops.

But the more ancient mode, still practised by some Indigenous groups, allows for a far wider range of cultivars, grown in doorstep gardens or small forest clearings close to settlements.

Such ancient plant nurseries rested on special soils (or, more strictly, 'anthrosols'), which are locally called *terra preta*[24.1] (black earth) and *terra mulata* (brown earth): dark earths with carrying capacities well in excess of ordinary tropical soils.

The dark earths owe their fertility to absorption of organic by-products such as food residues, excrement, and charcoal from everyday village life (forming *terras pretas*) and/or earlier episodes of localised burning and cultivation (*terras mulatas*).

These Indigenous methods of soil management act as a highly effective form of carbon sequestration, which supported large and dense populations for centuries, even millennia.

Kimmerer, Robin Wall. 2020. *Braiding Sweetgrass: Indigenous Wisdom, Scientific Knowledge and the Teachings of Plants.* Penguin: London.

Woods, William I. et al. 2009. *Amazonian Dark Earths: Wim Sombroek's Vision*. Springer: New York.

24.1
'Until very recently, our understanding of the relationship between nature and society in Amazonia was largely dominated by socio-evolutionist perspectives. Amazonia was depicted as a hostile environment, sparsely occupied by small tribes who were unable to overcome harsh ecological determinants imposed by the forest's incommensurable natural forces, and who were therefore kept permanently locked in primitive stages of technological development and socio-political organisation. Confined by nature, these human collectives were simultaneously placed outside history. Rather than being the masters of their own habitats, forest peoples were thought to have been subjugated by them.

An important factor supporting this perception was the apparent lack of archaeological evidence demonstrating significant transformation of the landscape, chiefly urban complexes.

In the last three decades or so, a series of archaeological findings such as the *geo-glyphs*, the identification of many sites containing *terra preta* – anthropogenic black soil that is rich in carbon compounds and highly fertile – and the incredible urban clusters mapped out by archaeologist Michael J. Heckenberger at the Upper Xingu River Basin, are radically transforming this image, demonstrating that substantial parts of the forest have been modified by continuous human action.

As anthropologist William Balée wrote in a seminal article published in 1989, instead of using the "natural" environment to explain cultural infrastructures in the Amazon, probably the reverse should be more apt.'

Tavares, Paulo. 2014. The Geological Imperative. In Empower! *Essays on the Political Economy of Urban Form*. Ruby Press: Berlin.

25
A team of archaeologists and environmental scientists at the University of Kiel made an extraordinary, some might have made slightly outrageous claim.

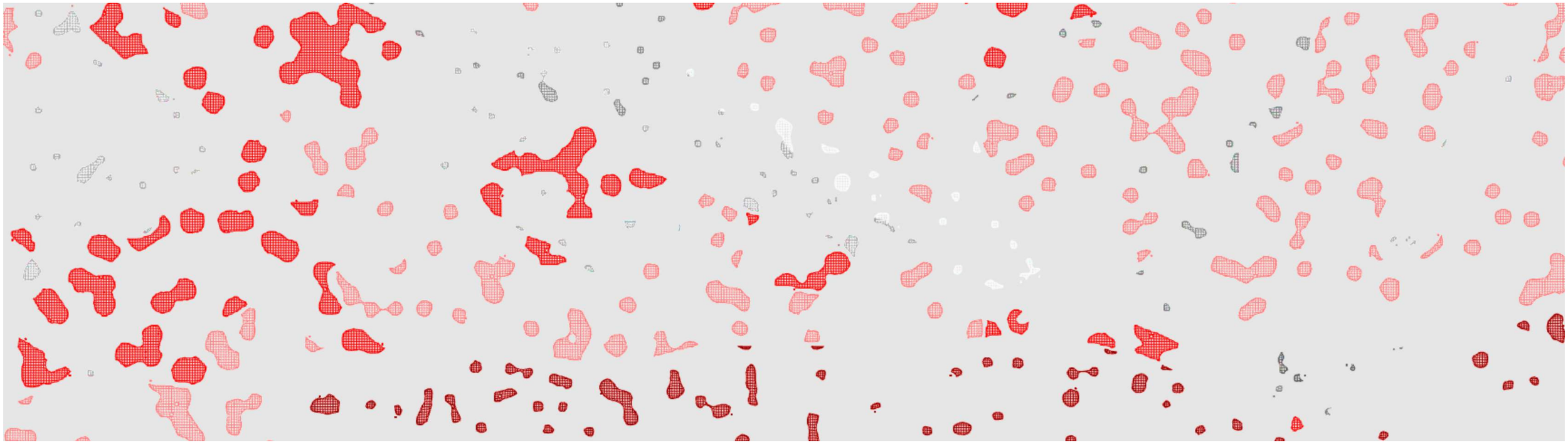
Their counter-intuitive suggestion is that the forms of agriculture practised at these giant sites were not only sustainable, but also enhanced processes of soil formation: in other words, at least some component of the famously rich, local chornozem or 'black soils' are in fact *anthrosols*: a human-produced soil.

Their audacious theory is that the production of this soil was induced through the presence of the Trypillian settlements.

In other words, the existence and subsequent decay of these large-scale settlements unleashed a biological process, which resulted in the creation of black soils.

If true, then this stands for a much grander claim: that the famous chornozem of Ukraine is an archaeological artefact, a result of a city, or cities, interacting with natural processes. This may seem far-fetched, given the extensive and uniform distribution of such soils in the wider region. But let us at least consider some possible implications that would follow, if urban life really did generate geological change on this scale, well before what most in the scientific community consider to be the onset of the Anthropocene.

Dreibrodt, Stefan et al. 2022. Earthworms, Darwin and prehistoric agriculture-Chernozem genesis reconsidered. *Geoderma 409*: 1-14.



00:17:51

26
An anthropogenic origin for the black soils or *chornozem* is an intriguing proposition at many levels. It would mean, for example, that at least some parts of what the ancient Greeks came to regard as the 'barbarian steppe' may in fact be rooted - not just historically, but also ecologically - in a lost urban tradition, already long forgotten by the time of Herodotus.

This spatial reversal of cultural stereotypes - 'civilised' and 'barbarian' - may also be a political and historical reversal of some irony, because the prehistoric cities of Ukraine present traces of a robustly egalitarian form of urban life approximately three millennia earlier than what is traditionally thought of as the birth of democracy in fifth century BC Athens, whose own population was fed with grain imported from the Ukrainian steppe, shipped via an emporium at Olbia on the shores of the Black Sea.

For the people of these lands, over the ages, the rich black soils called chornozem have been both a treasure and a curse. This is among the richest soils in the world, a life-enhancing force, but also an attractor for conquerors and colonisers, from the ancient Greeks through to the present day.

In modern times, such incursions were driven by ideologies of domination rooted in the symbolism of the soil. A cornerstone of such ideologies was the work of German geographer Friedrich Ratzel (1844-1904), whose concept of *Lebensraum* (living space) lent an aura of scientific respectability to the racist and expansionist policies of the Nazis in South West Africa (Namibia) and Eastern Europe, which turned the Ukrainian steppe into 'bloodlands' of ethnic conquest, enslavement, and genocide.

The 1901 essay, where Ratzel first developed this concept, pays close attention to the life and death of soils, 'the changeability of the soil on which life depends by virtue of being bound to it', and to the exhaustion of soils by expanding human populations, which Ratzel saw as a prime mover in the *Kampf ums Dasein* (struggle for life) that in turn conditioned the ongoing struggle of nations (*Völkerkampf*) over territory and space.

Ominously, Ratzel noted that: *'The soil that has the most noticeable impact on the living conditions of old-established species is that which is developed and restructured by culture; before our eyes it creates new living conditions for the immigrants that culture brings. They spread from the old cultivated land into the new ones.'*

Ratzel, Friedrich. 1901. Lebensraum: a biogeographical study. (translated into English by Tul'si (Tuesday) Bhambry) *Journal of Historical Geography 61*: 59-80.

Snyder, Timothy. 2010. *Bloodlands: Europe between Hitler and Stalin*. Vintage: New York

27
'Below the forest, all the way south to the Black Sea and east to Siberia, lies an extremely fertile region known as black soil. The line dividing forest and steppe does not accurately align with the forest soil and black soil but nevertheless loosely corresponds to the political lines: first of medieval battles with the Golden Horde of nomadic people that populated the wide steppes of Eurasia in the thirteenth to fifteenth centuries and dwindled from then on; and secondly coinciding with the tideline of serfdom in Russia.

(...) In the fifteenth to seventeenth centuries, battling with its southern neighbors, the newly conceived state of Russia gave conquered black soil lands to landowners and the status of peasants was permanently fixed as that of serfs, partly to ensure that there was sufficient population to work those lands. The wonderful black soil requiring neither crop rotation nor other soil care became an exclusive site of slavery.

This internal colonization, as Alexander Etkind has called it, is quite in line with external kinds. In Russia it meant that the majority of the peasant population of the north (from Moscow to the White Sea) and of Siberia in the fifteenth to seventeenth centuries were either

Once established, its unrivaled fertility attracted colonisers and empire-builders, from the ancient Greeks, all the way down to the enforced famine of Stalin, the German *Lebensraum*,[26] and the horrors of today.[27]

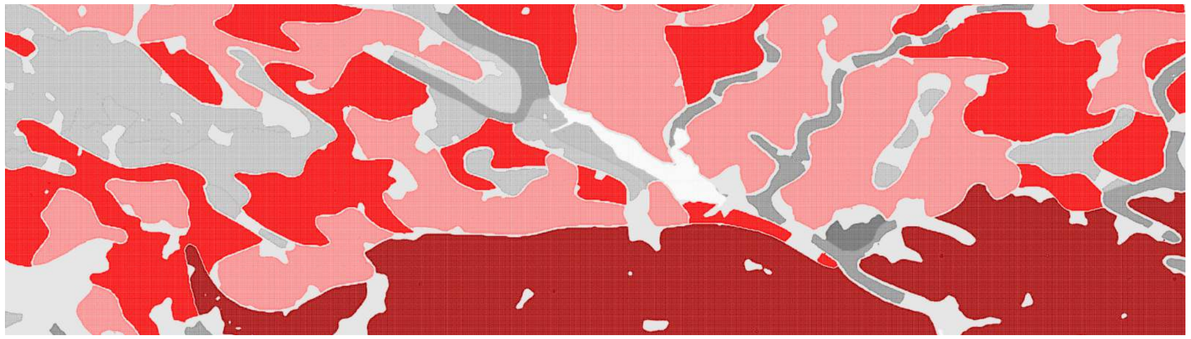
relatively free (state serfs) or had never been enslaved. Juridically, they were called "free countryside dwellers" and were personally free though often linked to their place of abode with a restriction placed on movement.

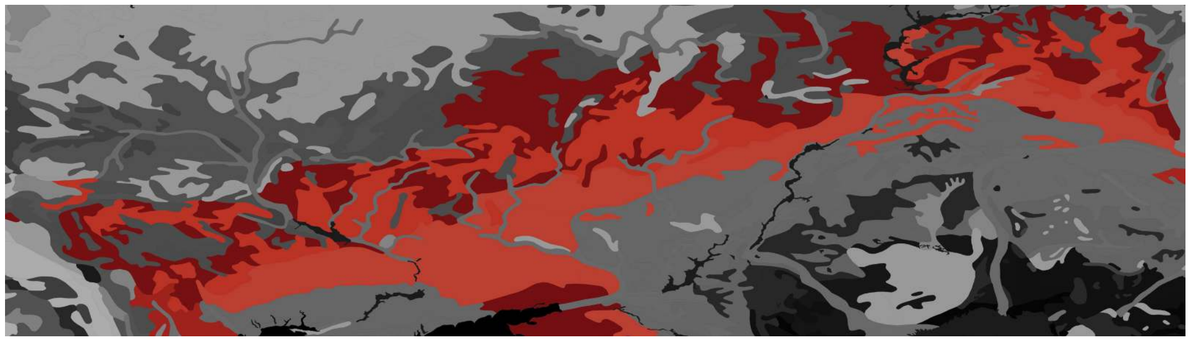
The idea of the forest as coextensive with a free space that contains sources for survival but that does not demand or obligate grueling agrarian work, itself a condition of enslavement, lies here. What constructs this forest is relative scarcity, nonfertility.

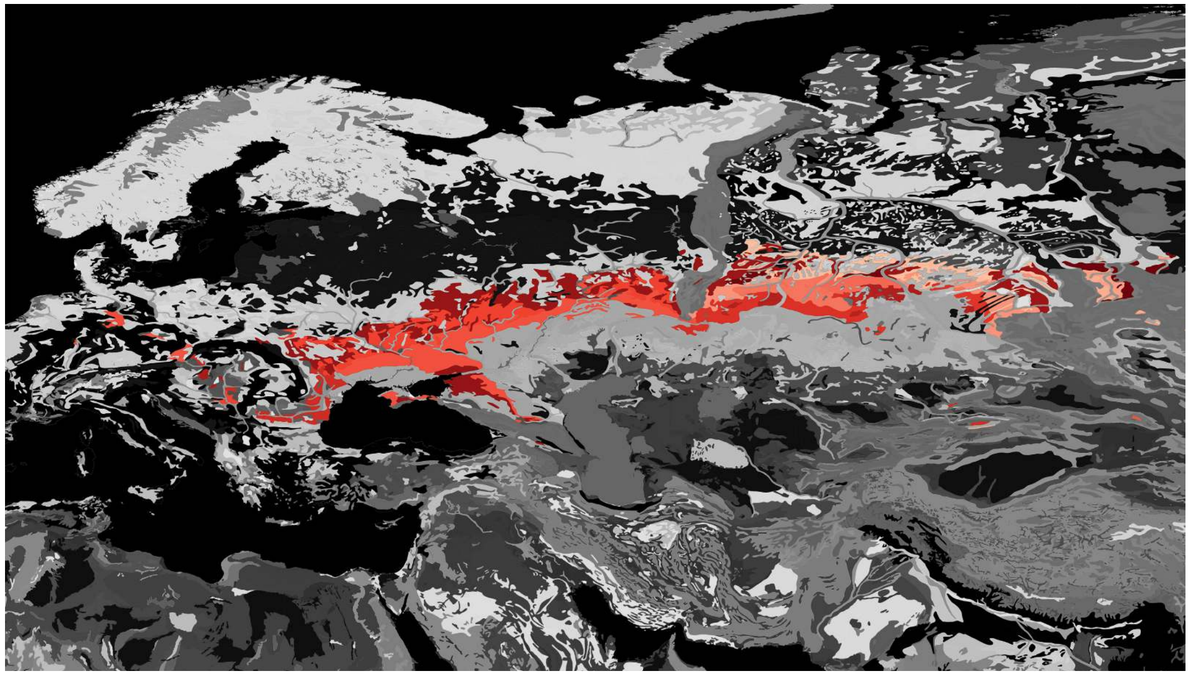
(...) The forest's northern climate and hardship made possible some personal freedom and a certain looseness of fixed gender roles. The freedom to get lost in three or more pines, be eaten by wolves or starve, goes hand in hand with not being a serf, with not being heavily gendered. It is so hard to remain alive that one might as well be a bit free.

There is nothing essentially and a priori good about the forest. The forest was only a site of freedom because the grassy land, and especially the black soil, was the site of serfdom, and cultivation was an instrument of violence. Labor, and more specifically agrarian labor, was considered, in the work of Locke, a tool for the redemption of men. It is by dropping sweat onto the soil that one makes it one's own. Using such Lockean justification of ownership, settler colonialism saw land that was not visibly farmed as appropriate for settlement. (...) If in Russia working the land became the condition of serfdom, in colonies, not working the land in a certain manner became the condition of dispossession. In both cases, the home is negotiated in relation to attraction and repulsion—to cultivation and plants on land.'

Fuller, Matthew and Olga Goriunova. 2019. *Bleak Joys: Aesthetics of Ecology and Impossibility*. University of Minnesota Press: Minneapolis.







Source Data: FAO

Received wisdom positions the State and extractive relationships with the Earth system as irreversible outgrowths of the City.

But the Nebelivka Hypothesis posits that egalitarian societies have existed on an urban scale, and that cities could also enhance the vitality of the land they inhabit.

Could this point our way to an alternative future?

The Anglo-Ukrainian Project 'Early Urbanism in Europe? The case of the Trypillia megasites of Ukraine' arose out of the conundrum over what are currently the largest sites in the fourth millennium BC in Eurasia. These sites are not only more expansive than the urban formations in the Near East that we normally assume to have been the first cities in the history of humankind, but they also precede the latter's appearance.

A partnership was established between the Institute of Archaeology, Kyiv (Dr. Mykhailo Videiko) and Durham University (Professor John Chapman) to seek funds for a multi-disciplinary investigation of a single megasite - Nebelivka, Novoarkhangelsk District, Kirovograd Domain.

The Project received funding for a trial season in 2009 and further major funding for a four-year Project (2012-5).

The Project defined seven objectives for investigation; an additional objective was added during the course of the fieldwork:

1. the derivation of an accurate settlement plan of Nebelivka, using a combination of modern geophysical investigations of the entire site and satellite imagery from the 1960s onwards to reveal changes in site preservation;

2. the production of an internal chronological sequence for Nebelivka: progress in the understanding of a mega-site is impossible without an explicit and realistic estimate of the number of houses under coeval occupation;

3. the setting of Nebelivka in a broader micro-regional settlement context through intensive, systematic field-walking;

4. the placing of the Nebelivka micro-region in a regional settlement context through the analysis of satellite imagery of all Trypillia sites over 10ha in size;

5. the palaeo-environmental assessment of the human impacts of a mega-site by comparison of local alluvial sequences (streambeds) with the overall vegetational history provided by peat-coring in larger basins;

6. the development of an interpretative understanding of the foundation, growth and decline of Nebelivka;

7. the comparative study of the emergence of towns elsewhere in the world in order to locate the Trypillia case in a long-term, global picture of the onset and collapse of regional social complexities;

8. the experimental building and burning of two 2/3 real size Trypillia houses – one single-storey and one two-storey – to investigate the methods of house-building and house-burning and to assess the physical remains of the experimental houses in comparison with excavated house remains.

With the exception of Objective 2, all of these objectives have been fully met.

The Project finds are divided between 'the Fond' of the Institute of Archaeology, Kyiv, and the Historical Museum, Kirovograd.

The original site documentation is in the Archive of the Kyiv Institute of Archaeology.

An (open access) monograph, associated with the archive, is also available:

Gaydarska, Bisserka (ed.). 2020. Early Urbanism in Europe. The Trypillia Megasites of the Ukrainian Forest-Steppe. de Gruyter: Warszawa / Berlin.

Albert, B., J. Innes, K. Kremenetskiy et al. 2019. What was the ecological impact of a Trypillia mega-site occupation?: multi-proxy palaeo-environmental investigations at Nebelivka, Ukraine. *Vegetation History and Archaeobotany, 29*: 15-34.

Chapman, J. 2017. 'The Standard Model, the Maximalists and the Minimalists: New Interpretations of Trypillia', *Journal of World Prehistory, 30 (3)*: 221–37.

Chapman, J., B. Gaydarska and M. Nebbia 2019. 'The origins of Trypillia mega-sites', *Frontiers in Digital Humanities*, section Digital Archaeology: special issue on 'Where Do Cities Come From and Where Are They Going To? Modelling Past and Present Agglomerations to Understand Urban Ways of Life'.

Chapman, J. Videiko, M.Y., Gaydarska, B., Burdo, N. and D. Hale. 2014. 'Architectural differentiation on a Trypillia mega-site: preliminary report on the excavation of a mega-structure at Nebelivka, Ukraine'. J*ournal of Neolithic Archaeology16*: 135-157.

Chapman, J., M. Videiko, D. Hale et al. 2014b. 'The Second Phase of the Trypillia Megasite Methodological Revolution: A New Research Agenda', *European Journal of Archaeology, 17 (3)*: 369–406.

Diachenko, A. and F. Menotti. 2017. Proto-Cities or Non-Proto-Cities? On the Nature of Cucuteni–Trypillia Mega-Sites. *Journal of World Prehistory 30*: 207–219.

Gaydarska, B. 2017. 'Introduction: European prehistory and urban studies. Special Issue on Urbanism', *Journal of World Prehistory, 30 (3)*:177–188.

Gaydarska, B. (ed.) 2020. *Early Urbanism in Europe: The Trypillia mega-sites of the Ukrainian forest-steppe* (Berlin: De Gruyter).

Gaydarska, B., Nebbia, M., and Chapman, J. (2020). Trypillia Megasites in Context: Independent Urban Development in Chalcolithic Eastern Europe. *Cambridge Archaeological Journal, 30(1)*, 97-121.

Johnston, S. Chapman, J., Gaydarska, B., Diachenko, A. Voke, P., Nebbia, M., and V. Litkevych. 2019. The Nebelivka experimental house construction and house-burning, 2014–2015. B*ulgarian e-Journal of Archaeology 1*: 61-90.

Müller, J., J. Czebreszuk and S. Kadrow (Eds.) 2017. Majdanetske 2013. New excavations at a Trypillia Megasite, S*tudien zur Archäologie in Ostmittleuropa Band 16* (Bonn: Rudolf Habelt).

Müller, J., R. Hofmann, R Ohlrau and M. Shatilo 2019. 'The social constitution and political organisation of Tripolye megasites: hierarchy and balance', in H. Meller, D. Gronenborn & R. Risch (Eds.), S*urplus without the state - political forms in Prehistory, 10th Archaeological Conference of Central Germany October 19-21, 2017* (Halle (Saale): Tagungen des Landesmuseums für Vorgeschichte (Halle) 18), pp. 247 - 262.

Müller, J., K. Rassmann and M. Videiko (Eds.) 2016a. Trypillia Megasites and European Prehistory 4100-3400 BCE, *Themes in Contemporary Archaeology Volume 2* (Abingdon: Routledge).

Nebbia, M., B. Gaydarska, A. Millard and J. Chapman 2018. 'The Making of Chalcolithic Assembly Places: Trypillia Megasites as Materialized Consensus among Equal Strangers?', *World Archaeology50 (1)*: 41–61.

Ohlrau, R. (2020) *Maidanets'ke. Development and decline of a Trypillian Mega-site in Central Ukraine*.Leiden: Sidestone.

Videiko, M. (ed.) 2004. *Entsiklopedia Tripil'skoi tsyvilizatsii. Vol. 1* (Kyiv: Ukrpoligrafmedia).

Videiko, M. 2007. 'Contours and Contents of the Ghost: Trypillia Culture Proto-Cities?' *Memoria Antiquitatis, 24*: 251–76.

Videiko, M. 2012. 'Kompleksnoe Izuchenie Krupnykh Poselenij Tripolskoj Kultury 1971–2011', *Stratum Plus, 2*: 225–263.

Videiko, M. 2013. *Kompleksnoe Izuchenie Krupnykh Poselenij Tripolskoj Kultury V – IV Tys Do N.e.* (Saarbrücken: Lambert Academic Publishing).

Wengrow, D. 2015. *Cities before the State in Early Eurasia, The Jack Goody Lecture*, Max Planck Institute for Social Anthropology. Department 'Resilience and Transformation in Eurasia'.

Metadata, logged at the Archaeology Data Service:

J C Chapman, Bisserka Gaydarska, Marco Nebbia, Andrew Millard, Bruce Albert, Duncan Hale, Mark Woolston-Houshold, Stuart Johnston, Edward Caswell, Manuel Arroyo-Kalin, Tuuka Kaikkonen, Joe Roe, Adrian Boyce, Oliver Craig, David C Orton, Kate Hosking, G Rainsford-Betts, James Nottingham, Dan Miller, Sophia Arbeiter, Natalia Shevchenko, Galina Pashkevytch, Vitalii Rud, Mykhailo Videiko, Natalia Burdo, Konstantin Krementski, GEOINFORM Ukrainii (2018) Trypillia mega-sites of the Ukraine [data-set]. York: Archaeology Data Service

CREDITS

David Wengrow
and Eyal Weizman
with Forensic Architecture
and The Nebelivka Project
London, UK

— Eyal Weizman, Haifa, Israel, 1970; Vive e lavora / Lives and works in London, UK and Berlin, Germany
— David Wengrow, UK, 1972; Vive e lavora / Lives and works in London, UK

Collaborazione autoriale
Authorial collaborators
— Forensic Architecture, The Nebelivka Project and The Center for Spatial Technologies

Team
— Forensic Architecture
Davide Piscitelli (Project Coordinator)
Agata Nguyen Chuong (Research)
Natalia Sliwinska (Video Editing)
Mark Nieto (Sound Design)
Sarah Nankivell (Project Support)
Elizabeth Breiner (Project Support)
Andra Pop-Jurj (Project Support)

— Extended Team
Rosie Emery (3D Modelling)
Matteo Zamagni (3D Animation)
Riccardo Badano (Editor)
Ewa Domaradzka (Narrator)
Hanna Rullmann (Graphic Designer)

— The Nebelivka Project
Bisserka Gaydarska
John Chapman
Marco Nebbia
Manuel Arroyo-Kalin
Duncan Hale
James Innes
Bruce Albert
Brian Buchanan
Mikhailo Videiko
Aleksandr Diachenko
Valentin Sobchuk

— The Center for Spatial Technologies
Maksym Rokmaniko
Andrew Onyshchenko
Daryna Vilkhova
Mykola Holovko
Natasha Pereverzina

— Extended Team
Sergey Revenko
Oleksiy Makulskiy

— External collaborator
Kris Lockyear (University College London)
Nicholas Donald (Goldsmiths)
Mr. Bobko (Mayor of Nebelivka)

Con il supporto aggiuntivo di
With the additional support of
— The Richard and Peggy Greenfield Foundation

Thank you to: Adrian Lahoud, Anselm Franke, Christina Varvia, Eduardo Neves, Erhard Schüttpelz, Ines Weizman, Mike Rowlands, Paulo Tavares, Susan Schuppli and Yijie Zhuang,

Venice Biennale 2023 -

18th

International Architecture Exhibition