The Indo-Europeanization of Europé.

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Background: The decline of the Neolithic: the collapse of ‘proto-urban’ mega sites in southeast Europe and the Iberian peninsula.
The decline of the Neolithic: the collapse of settlements/populations in temperate Europe from late 4\textsuperscript{th} millennium into early 3\textsuperscript{rd} millennium BC: Based on C14 frequencies, also documented for western Europe in Shennan et al. 2013.

WHY? Internal or external causes?

**Regions in northern Europe**

**Kujavia in Poland**
The earliest documentation of plague originating in the Eurasian steppe before 3000 BC provides a new driver of major demographic changes.
A expansive social formation emerged during late 4th millennium BC north of the Caucasus. It was based on a new mobile pastoral economy, wagons, cattle and horses. Innovations of the 4th millennium BC
1st transformation and expansion of innovations, and possibly Anatolian and PIE during the 4th millennium BC

• New genetic evidence from Caucasus and Anatolia has made it clear that Anatolian Bronze Age individuals, among them also some from a Hittite settlement, harbored no steppe DNA. Instead they show admixture from Caucasian. As a Chalcolithic individual showed the same admixture we may assume that this admixture event or series of migratory events took place most likely during the 4th millennium BC.

• Anatolian names occur in te and later Hittite languages must therefore have reached Anatolia no later than the 4th millennium BC, at a time when Caucasus acted as a civilisational bridge between north and south east and west.
Early contacts between Mesopotamian/Uruk metal prospecting colonists/traders and steppe societies in the Caucasus in the 4th millennium BC expanded metalworking and trade into the steppe.
The Maikop culture prospered from this Mesopotamian venture for metal, and soon expanded into the steppe, where it became the Kurgan or Yamna culture.
More and more prehistoric mines, copper and gold, are being recorded and excavated in the Caucasus to support its bridging role between Mesopotamia/Anatolia and the steppe during this period.
A recently published Maikop tumulus used stelae and decorated stone slabs for the construction of the chamber, a tradition (stelae) to be found later also in the steppe. These stelae had apparently been reused from older burials, as a demonstration of power.
I propose that new institutions were borrowed as well from Mesopotamia linked to rank, property/trade, but influences went both ways. Here a bull nose ring from the steppe applied by goddess Ishtar in Mesopotamia.
Genetically the Majkop Culture differs from the steppe, but when it moves into the steppe it admixes genetically and culturally and inspire the formation of the Yamnay Culture, which in turn lead to the Corded Ware Culture. We encounter already the dominant R1 male lineage in the steppe, that should continue into Europé. A general decline in male lines occur at the same time.
Here Klady/Majkop and Bernberg, Germany, recurved bow, large scale movements linked to warfare

Klady, steppe Maykop

Bernberg, Germany
Early expansion of PIE speaking populations and their influence areas around 3000 BC. This could be the Italic-Celtic branching out into east-central Europe, before Corded Ware.
Material culture (left) of the Yamna populations, and their new institutional package (right) of an expansionist social formation.
Model of the new social formation of the early 3rd millennium BC, which colonized the steppe and soon expanded westwards, due to expanding herds and populations.
Who were they: tall and healthy due to mobile lifestyle and change of diet to meat and milk products. Yamnay were the first to develop lactose tolerance. Also a gene for tallness.
We generated genome-wide data from 89 Europeans who lived between 4000–3000 years ago by matching ancient DNA extracts from a target set of 394,007 single-nucleotide polymorphisms (SNPs) (79% capture), 304,32 of which are autosome SNPs that have also been genotyped using the Illumina Human Origins array by 2.33 million SNPs from 201 populations. This reduces the amount of sequencing required to obtain genome-wide data by a proportion of 45.4% and a maximum of 24.2% (Supplementary Data 5). This storage allows us to report genome-wide data on more than twice the number of ancient Eurasians as has been possible in the entire previous literature (Extended Data Table 4).

We used this technology to study population transformations in Europe. We began by preparing 121 DNA extracts from 130 farmers in central Europe, testing them by high-throughput sequencing and identifying 45 independent genetic sources through ancient DNA analysis (Supplementary Information section 1, Supplementary Data 5). We restricted our analyses to farmer populations that share mitochrondrial haplogroups with modern Europeans, to avoid potential contamination from non-human DNA (Extended Data Table 4).
The new pastoral economy expanded rapidly around 3000 BCE, and 2850 it penetrated temperate northern Europé. It was supported by a period of wet climate good for grass production. Pre-proto Germanic?
From left to right we show how the genetic composition of Europeans has changed from Hunter-Gatherers to Antolian farmers to Yamnaya steppe pastoralists between 6000 – 2000 BC. Compared to modern populations above
European hunter-gatherers
The Anatolian migration
The Steppe migration

Impact on modern Europeans

Family barrows of the Single Grave Culture in northwestern Europe, and a typical open barrow landscape from Jutland around 1900 AD. 30,000 barrows were constructed 2800-2400 BC. It was a massive immigration.
Pollen diagram from northwestern Jutland that shows the dramatic and sudden forest clearance by the Single Grave Culture in order to create grazing lands for their large herds. The migrations tried to establish a steppe environment.
The early Corded Ware invaders inmarried with local women, but hostilities were frequent as in Eulau in central Germany, where several families had been killed brutally. Similar masscares of Globular Amphora Culture families are also know from Poland, at the time of Corded Ware expansion.

Tensions between the new invaders and existing groups resulted in violence, here a family of parents and two children

Strontium values for all buried victims in Eulau, showing non-local females as wives of local Corded Ware males
Formation of Corded Ware from Yamnaya: model of social/cultural processes, including formation of Pre-Proto-Germanic through exogamy. 90% of early phase CW burials in Jutland are male burials.

• Foreign women are potters and start to transform Yamnaya and later CW material culture in wood and other organic materials into pottery.
The impact of male burials on the construction of Corded Ware identity: Reconstructing networks of information in the 3rd millennium BC

Quentin Bourgeois*, Erik Kroon, PlosOne
Strikingly different patterns of similarity between male and female burials, male burials showing similarities over vast distances, female burials showing more local variability, the impact of exogamy? And male similarity a result of fosterage and strong patrilineal warrior ethos? Would explain dominance of a single male line
Recent work on Neolithic substratum languages show they were non IE. Terms for crops were borrowed in early IE languages, through exogamy with Neolithic women.
The migrations from Yamnay and the steppe brought different PIE dialects to Europé. Represented also by two different male lineages, R1a and R1b

• North of the Carpathians R1a male lineages expanded and turned into the Corded Ware Culture, which would later develop into the Germanic languages

• From the Yamnay migration into Hungary the R1b male lineages spread westwards and adopted the Bell Beaker package, but within genetic admixture. Borugh Italo-Celtic.
Continued westward migrations: The Bell Beaker expansion

- By the middle of the third millennium BC a second wave of migrations of early metallurgists, bowmen and sailors swept into central and western Europe from the Iberian peninsula and from Corded Ware
- Recent aDNA evidence now conclusively document that north European Bell Beakers were a continuation of the Yamnaya/Corded Ware expansion. They migrated to the UK and soon achieved the same dominance as Corded Ware on the continent
- No significant migration out of Iberia, at least not genetically traceable
- Applied the same decentralized social organisation as CW groups

From around 2570 to 2000 BC, Bell Beaker pottery became widespread across western and central Europe, before it disappeared between 2200 and 1800 BC. The forces that propelled its expansion are a matter of long-standing debate, and there is support for both cultural-diffusion and migration having a role in this process. We present genomewide data from 610 Southills, Cooper Age and Bronze Age Europeans, including 236 individuals associated with the Bell Beaker–complex artefacts. We detected limited genetic affinity between Beaker–complex-associated individuals from Iberia and central Europe, and thus exclude migration as an important mechanism of spread between these two regions. However, migration had a key role in the further dissemination of the Bell Beaker complex. We document this phenomenon most clearly in Britain, where the spread of the Beaker complex introduced high levels of steppe–related ancestry and was associated with the replacement of approximately 90% of Britain’s gene pool within a few hundred years, continuing the east–west expansion that had brought steppe–related ancestry into central and northern Europe over the previous centuries.
International collaboration to document the Bell Beaker phenomenon. A completion of the westward migrations from the steppe, but also a cultural transmission without genetic transmission from Iberia.

- Share of steppe aDNA (black)
The beakers were used to drink beer, as already the Corded Ware beakers, and are similar across vast regions.
A now classic article by Price et al. from 2004 of 82 Bell Beaker individuals from central Europe for the first time documented widespread migration among Bell Beaker communities, but not their origin.

Table 4. Distribution of migrant individuals by age group.

<table>
<thead>
<tr>
<th>Age group</th>
<th>Number</th>
<th>Migrants</th>
<th>%</th>
</tr>
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<tbody>
<tr>
<td>Adult</td>
<td>52</td>
<td>30</td>
<td>57.7</td>
</tr>
<tr>
<td>Juvenile</td>
<td>6</td>
<td>3</td>
<td>50</td>
</tr>
<tr>
<td>Child</td>
<td>13</td>
<td>8</td>
<td>61.5</td>
</tr>
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Table 5. Distribution of migrant individuals by sex.

<table>
<thead>
<tr>
<th>Sex</th>
<th>Number</th>
<th>Migrants</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>38</td>
<td>20</td>
<td>52.6</td>
</tr>
<tr>
<td>Female</td>
<td>22</td>
<td>12</td>
<td>60</td>
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Burials with tools for metalwork show the importance of early metalworking and mining, such as Ross Island in Ireland. Bell Beaker people started the Bronze Age in Europe.
The famous Amesbury archer and his companions near Stonehenge exemplify the early migrants in England, originating in south Germany.
Early Bell Beaker mining at Ross Island, Ireland
BELL BEAKERS tomorrow...

Atlantic Facade

1.7 Maritime beakers from Portugal (on the left), Galicia (in the middle), and Brittany (on the right).

Drawings and photo from Leisner & Leisner (1996), Salanova (2000a), Prüito Martínez & Salanova 2011

Drenth & Salanova 2012

Figure 9: The distribution of bell beakers (probably) associated with sites across Europe after Drenth & Salanova 2012. Figure 9, right: Close-up of some sites including the three bell beakers discovered in Italy (Archaeological Park of the Etruscan cities of Vetulonia and Populonia).
Bell Beaker groups migrated along the Atlantic seaboard, but also into Central northwestern Europe, where they met Corded Ware groups that stopped their expansion and took over the Bell Beaker package before migrating to England.

- Reconstruction drawing of early plank built boats from England around 2000 BC
The western expansion of supposed PIE speaking Yamna groups into the Carpathians and their influence areas, versus supposed Bell Beaker groups of supposed proto-Celtic speaking/Latin speaking populations. Corresponds with gene flow of 1rb male lines from the steppe to England.
INDO-EUROPEANISATION OF A CONTINENT
Models of proto-Celtic language dispersals

Archaeological model, Celtic as a fusion of languages

Linguistic model, cannot be supported, unless we accept that Celtic as we know it resulted from a second migration from France to Ireland/England (Arras Culture etc.) and Iberia.
Celtic place names are clearly western, and far removed from the original languages of contact. Return migrations to Iberia from the north.
The Bronze Age model for the spread of Celtic along the Atlantic façade.
The three models: one for each millennium BCE that contributed to formation and distribution Celtic languages

• 3rd millennium Beaker migrations to UK and north Iberia spread proto italo/celtic
• 2 millennium Bronze Age Atlantic trade systems spread languages of proto-Celtic south but interacted with proto-Germanic speaking population to the north
• 1st millennium: La Tene migrations from Gaul/Belgium to UK spread a Gaulish version of Celtic to Ireland/UK

• Thus, this later spread came to dominate. It explains why insular Celtic has virtually no connections to the maritime world.