MARITIME ENCOUNTERS 1

PRESENTING COUNTERPOINTS TO THE DOMINANT TERRESTRIAL NARRATIVE OF EUROPEAN PREHISTORY (ed. J. T. Koch, M. Fauvelle, J. Ling. B. Cunliffe) is the first in the multi-author series Maritime Encounters, outputs of the major six-year (2022–28) international research initiative, funded by Riksbankens Jubileumsfond (grant ref. M21–0018). This major new series examines the contribution and significance of maritime transport, movement, and trade in the shaping of Bronze Age communities and social complexity in north-west Europe. Our research programme is based on a maritime perspective, as a counterpoint to prevailing land-based vantages on Europe's prehistory. It includes a far-ranging, research-led reconsideration of the role of mining and source areas of metals and metal exchange networks in the Bronze Age along the seaboard between Iberia, Ireland, Britain, and Scandinavia, and models a maritime mode of production.

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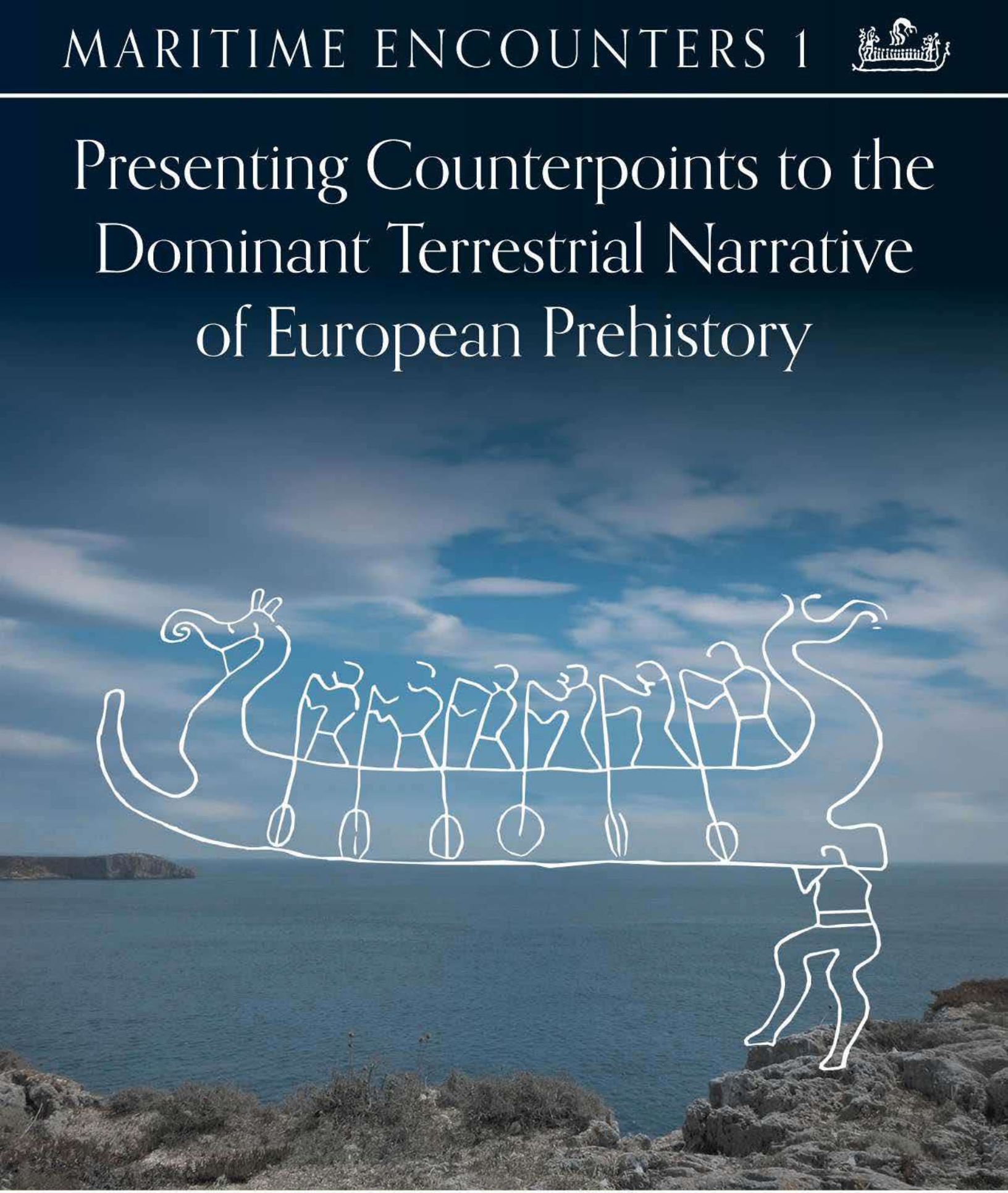
MARITIME ENCOUNTERS 1

Presenting Counterpoints to the Dominant Terrestrial Narrative of European Prehistory



Edited by John T. Koch, Mikael Fauvelle, Barry Cunliffe and Johan Ling

MARITIME ENCOUNTERS I

PRESENTING COUNTERPOINTS TO THE DOMINANT TERRESTRIAL NARRATIVE OF EUROPEAN PREHISTORY

Edited by

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Convergence *in situ*: the formation of the Indo-European branches and the Bronze–Iron transition

John T. Koch

The archaeogenetic support for the steppe hypothesis of the Indo-European homeland leads to re-assessments of unresolved issues of historical linguistic theory. This study argues that the shorter time depth of the Steppe Hypothesis and what we now know about the relatively rapid and massive spread of steppe ancestry is more consistent with a 'convergence in situ *' model for the formation of Indo-European branches. In this theory, the primary process is that of a geographically over-extended dialect continuum of shallow differentiation in which the branches formed amongst adjacent dialects within emerging socio-cultural networks during the Bronze Age. The separated branches then decisively crystalized during the Bronze–Iron transition.*

Introduction

Particularly if we accept some version of the Steppe Hypothesis, as now supported by ancient DNA evidence (Allentoft et al. 2015; Haak et al. 2015; Anthony & Brown 2017; Reich 2018; this volume Chapter 10), the formation of the Indo-European branches will be seen as the result of processes that ran their course largely during the Bronze Age. Despite the archaeogenetic breakthroughs and ongoing advances in our understanding of the archaeological record of western Eurasia in later prehistory, mapping onto archaeological cultures of the 'proto-branches' intermediate between Proto-Indo-European and the attested languages – i.e., Proto-Greek, Proto-Celtic, Proto-Germanic, and so on – remains a formidable challenge. In large part this continuing uncertainty is due to a fundamental fact, i.e., the independence of the transmission of genes and languages. It is most often the case that a first language is transmitted from parent to child – thus genes and language together. But there is no biological imperative for this. Not infrequently, individuals or whole groups will find it advantageous to learn a second language and then pass this on to their children as a first language (cf. Koch & Fernández Palacios 2019). When this happens, the result will be genetically unrelated populations speaking the same language and closely related populations speaking different languages.

This chapter deals with a different, purely linguistic, problem that further complicates efforts to track the formation of the Indo-European branches through the Bronze Age archaeological record. There is reason to see a significant disparity between the proto-branches as reconstructed by the unalloyed historical-comparative method over the past two centuries and real languages spoken by real populations pinpointable at specific times and places in later prehistory. In other words, although Proto-Celtic, etc., can stand as invaluable tools for working out sound laws and their order, as well as indicating degrees of relatedness between attested languages, the unattested nodal points on the Indo-European family tree might be better understood as abstractions at a significant remove from the real languages spoken by real Bronze Age people.

The dilemma of Celtic origins

As an editor of these collected research papers, I note the good fortune that they include a thought piece by the lead author of a recent archaeogenetic study (Patterson et al. 2022; this volume Chapter 10) that stands out as a milestone towards a better understanding of Europe's Atlantic façade during the Bronze Age. Patterson's contribution here frames the linguistic dilemma clearly: Celtic first

arrived in the British Isles 1) either with the migration of ~1300–800 BC that brought about 50% shift in the genetic makeup of southern Britain or 2) with the entry of Beaker groups ~2450–2000 BC to Britain and Ireland, bringing up to a 90% shift when contrasted with the Neolithic genomes of the Atlantic Archipelago (Olalde et al. 2019; cf. Cassidy et al. 2016). So, broadly speaking, that would be either about 3000 or about 4000 years ago. Patterson views the later, Middle/Late Bronze Age scenario as more probable though allows that the earlier Beaker scenario cannot be ruled out.

Generally, I agree that the problem can be narrowed down in this way based on what we know so far. The fact that the data indicates a very different genetic profile in Britain and Ireland during the Neolithic – one not agreeing closely with any early Indo-European-speaking regions – together with the comparative stability and isolation of the British population in the Iron Age, ~800 BC–AD 43, makes it unlikely that Celtic or the speech forms that became Celtic arrived before ~2450 BC or after ~800 BC.

Although the archaeogenetic evidence changes forever how this problem must be considered, it is ultimately a linguistic, rather than a genetic, question. When we think about 'Celtic' in this context, this means a reconstructed language situated in the gap between Proto-Indo-European and the several attested Celtic languages. So how we think Celtic and the other Indo-European branches formed in that gap is crucial if the specialists are not to talk past one another. If migrants into Britain about 4000 years ago spoke an early Indo-European language (or languages) and those who followed about 3000 years ago did likewise, to what extent must these have been – or even could they have been – different languages? That is both a theoretical question for linguists but first and foremost it must be seen as a practical matter in the lives of Bronze Age people. If the descendants of Britain's Beaker folk could speak to the Continental incomers of the Middle to Late Bronze Age using the first languages of both groups, do we possibly have a non-dilemma?

The Indo-European dark ages

The well attested Indo-European branches are usually reckoned as numbering ten. These are, in approximate order of their appearance in writing: Anatolian, Indo-Iranian, Greek, Celtic, Italic, Germanic, Armenian, Tocharian, Balto-Slavic, Albanian. Possible higher order unities, Italo-Celtic and Greco-Armenian, remain uncertain and controversial (Watkins 1966; Cowgill 1970; Ringe et al. 2002; Clackson & Horrocks 2007; Kortlandt 2007; Weiss 2012; Schrijver 2016). Meagrely attested languages like Thracian possibly reflect additional branches, while others may have died out leaving no records at all. Higher unities of some sort – such as the early grouping of Indo-European that became Indo-Iranian, Balto-Slavic, and Germanic (proposed in Ringe et al. 2002) – remain even less certain.

As mentioned in both Patterson's contribution and my own other paper here (Chapter 11), it remains paradoxically true that the where, when, and archaeological context of post-Anatolian Proto-Indo-European (aka, Nuclear [Proto-] Indo-European: NIE) in deeper prehistory is less mysterious than are the circumstances of many of the nodal points further down on the Indo-European family tree, even though these stand closer to the horizon of written records. Thus, the four-way correlation of post-Anatolian Indo-European ≅ the Yamnaya Cultures ≅ the Pontic-Caspian steppe ≅ the steppe genetic component is now much more firmly established than, for example, Proto-Celtic for which there is, at present, no agreed-upon archaeological culture, homeland, or genetic profile.

This problem of the Indo-European dark ages pre-dates the archaeogenetic revolution (Mallory 1996). But the sequencing of ancient genomes has, if anything, intensified the disparity between the relative certainty over the homeland of post-Anatolian Indo-European and some of its later prehistoric offspring. This is because it appears virtually impossible that the proto-branches interacted as first encounters of groups that were very different genetically, groups that had previously been long isolated from one another. The latter is what had happened when European hunter-gatherers first came into contact with farmers migrating from Anatolia or then when those early European farmers (EEF) encountered pastoralists spreading from the steppe. With populations so distinct and long isolated, we can easily minimize so far as to virtually exclude the possibility that they spoke the same language, dialects of the same language, or closely related languages.

For the central questions dealt with in Patterson et al. (2022), relating to the rise of EEF ancestry in southern Britain ~1300–800 BC and the inverse shift in south-west Europe during the same period, the possibility that all the groups involved spoke early Indo-European languages cannot be excluded. In fact, that seems more likely than not. And 'early' in this context must be understood also to mean 'still very similar'. Population movements in Bronze Age Europe more often involved contact between groups both of whom had blends of high levels of steppe and EEF ancestry. In southern Britain and the Iberian Peninsula, both the incoming and longer-established populations had mixed steppe and EEF ancestry, their proportions shifting towards convergence during the Middle/Late Bronze Age. And at this period, we are not so far removed in time – and by implication linguistic evolution – from Proto-Indo-European itself. Therefore, we cannot so easily exclude the possibility that such Bronze Age peoples in contact spoke the same language or early Indo-European languages that were still similar enough to retain a significant degree of mutual intelligibility.

Reconstructed proto-languages and the historical-comparative method

The basic historical linguistic approach to the various prehistoric, hence reconstructed, nodes on the Indo-European family tree is to conceive of each as undifferentiated into early, middle, and late stages, and likewise lacking dialects, registers, or specialist word sets. It is as if every competent adult speaker of the language possessed exactly the same sound system, grammar, and lexicon. When scrutinizing these issues in finer detail, most linguists will of course modify or abandon such assumptions. With living languages and fully attested languages of the past – if their speakers are sufficiently numerous, occupy a sufficiently large territory, and their society has more than minimal complexity – there will be regional dialects, registers appropriate to not universally inclusive social domains, and vocabulary known only to occupational specialists (cf. Robb 1993).

The reconstruction of Proto-Celtic, Proto-Germanic, Proto-Greek, and so on with single invariable sound systems, grammars, and lexicons is an artefact of the historical-comparative method. The core idea is to reconstruct the latest common ancestor of the attested languages within the family. For example, numerous cognate words occur across the attested Celtic languages and from these one reconstructs their Proto-Celtic ancestors, reversing all the sound laws in their consistent regularity. For example, Old Irish *cenn*, Old Welsh and Old Breton *pen(n)*, Gaulish *penno-* (in names), all meaning 'head', derive from Proto-Celtic **k^{w}ennom* 'head'. This is algebraic. We solve for a single X, not X, X′, and X″. And solving for a single X over the hundreds of comparable items shared across the attested Celtic languages, or cognate languages within any other family, then accumulates into something approaching fully reconstructed languages – Proto-Celtic in this example – but lacking dialects, registers, and jargons to convey specialist knowhow. So some adjustment of the basic method is necessary to bring the reconstructions into line with linguistic reality. Such an adjustment will be analogous to the calibration required to bring raw radiocarbon dates, as achieved by the primary technique, closer to chronological accuracy.

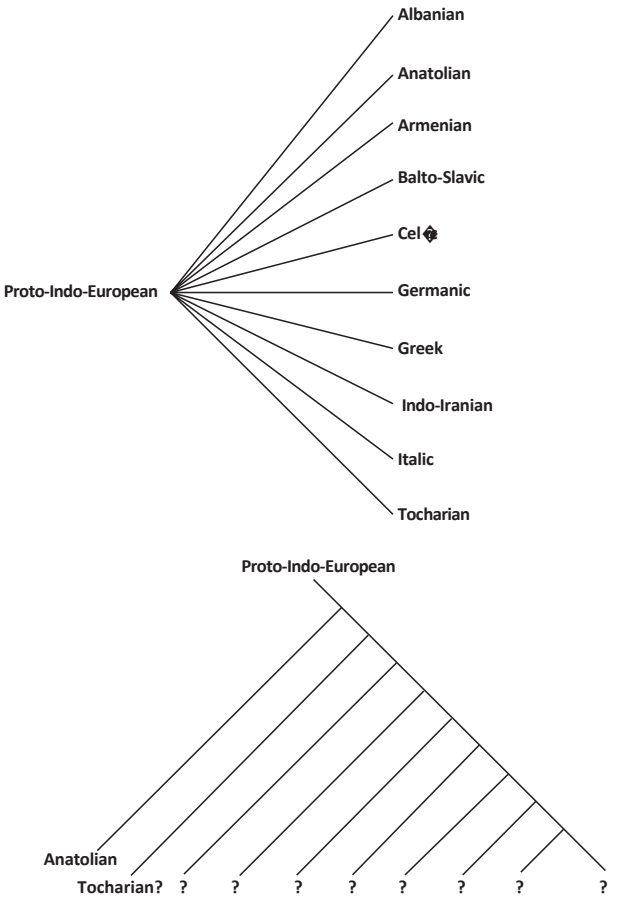

Figure 12.1. 'Bad trees': attempting to explain the Indo-European branches using a traditional family-tree model can lead to either the very implausible primary split into ten or so primary branches or series of binary splits, which, after Anatolian and possibly Tocharian, become very difficult to put conclusively into order, as well as compressing into a plausible absolute chronology and archaeological context between post-Anatolian Indo-European (≅ Yamnaya) and the attested languages (J. T. Koch).

Convergence *in situ* (CIS)

At least some of this discrepancy is overcome if we adopt the different concept of the formation of the Indo-European branches proposed by Garrett (1999; 2006). As acknowledged, that proposal was to a significant degree inspired by the earlier work of another Berkeley linguist, which attempted to explain her observations: 'The striking feature of the IE family tree is the early, almost simultaneous spread of many branches from a single root' (Nichols 1998, 256) and that Indo-European 'has the greatest number of primary branches of any known genetic grouping of comparable age', which is 'the hallmark of a language family that enters a spread zone as an undifferentiated single language and diversifies while spreading' (Nichols 1997, 138; cf. Garrett 1999, 148). This interpretation can be understood as based on an analysis like Dyen's: 'As traditionally conceived, the Indo-European daughter languages (Proto-Germanic, Proto-Greek, etc.) and Proto-Indo-European constitute a simple family-tree' (Dyen 1956, 612–13). In other words, the family tree does not have an agreed superstructure of higher order binary branchings, like that proposed by Ringe et al. (1998; 2002), but rather ten or more primary branches (Fig. 12.1).[1]

Garrett's case was worked out mainly on the example of Greek, though he extended conclusions to the branched structure of the entire family, notably touching on Celtic. Ringe et al. (2002, 108) acknowledge the proposal as

demanding consideration, though running generally counter to their premises. I picked up the idea, focusing on Celtic (Koch 2013). Though 'Garrett's theory' would be an accurate label for this proposal, 'convergence *in situ*' is less opaque, so CIS for short. Its gist is that a not yet much diversified proto-language spread widely and relatively rapidly to form a dialect continuum of shallow differentiation. Dialects in contact then continued to share innovations while not yet greatly evolved from the proto-language in linguistic domains including phonology and morphology. In effect, 'language boundaries' had not yet sharpened as barriers between contiguous dialects (on the language boundary concept, cf. Dyen 1956, 612). The continuum then fragmented, as new socio-cultural areas arose so that subsets of dialects within these distinct areas converged to crystallize as branches. Emerging language-based group identities played a role in this transformation, as for example, the opposition of *Ἕλληνες* to *Βάρβαροι* amongst the Iron Age Greeks (Nichols 1998, 240).

The pattern of the branches cannot be assumed to continue the first-order genetic relationships between the dialects of the initial post-spread continuum. In Garrett's words,

> ... the familiar branches arose not by the differentiation of earlier higher-order subgroups – from 'Italo-Celtic' to Italic and Celtic, and so on – but by convergence among neighbouring dialects in a continuum. Dialect continua are typical in shallow-time-depth language families … Convergence, together with loss of intermediate dialects in the prehistoric continuum, has created the historical mirage of a branchy IE family with its many distinctive subgroups. (Garrett 2006, 139)
>
> … the loss or 'pruning' of intermediate dialects, together with convergence *in situ* among the dialects that were to become Greek, Italic, Celtic, and so on, have in tandem created the appearance of a tree with discrete branches. But the true historical filiation of the IE family is unknown, and it may be unknowable. (Garrett 2006, 143)
>
> … It follows that Proto-Greek – or if this did not exist, IE speech that was to become Greek – was linguistically closer to IE than has been supposed. I suggest more generally that we should contemplate models of IE phylogeny that assign a greater role in the formation of IE branches to convergence *in situ*. (Garrett 2006, 147)

In some key respects, CIS had been anticipated by Nichols, in countering what she sees as a widely held assumption that

> PIE was spoken in some locale and spread out widely only after its break-up. (Nichols 1998, 223)
>
> … However, a minimally differentiated Common IE spread, diverging into daughter branches only after and as a result of the spread. (Nichols 1998, 256)

As a matter of time depth and homeland, CIS as formulated by Garrett then myself has been consistent with the Steppe Hypothesis of Indo-European dispersal (e.g., Anthony & Ringe 2015).[2] However, the idea that Indo-European arrived as Proto-Indo-European in the lands where the Celtic languages were later attested, and that it evolved into Celtic *in situ* there, was a feature of the Anatolian Hypothesis as set out by Renfrew, who 'would prefer to see the development of the Celtic languages, in the sense that they are Celtic as distinct from generalized Indo-European, as taking place essentially in those areas where their speech is later attested' (1987, 245; 1999; cf. Garrett 1999, 155; Renfrew 2013). But Renfrew's model involved a greater time depth, with Proto-Indo-European reaching the Atlantic façade with the first farmers, so reaching Britain and Ireland ~4000 BC (Renfrew 2000).

The archaeogenetic evidence has been widely claimed as confirming the Steppe Hypothesis, or some version of it, and so the later chronology for the Indo-European dispersal (e.g., Allentoft et al. 2015; Haak et al. 2015). This data would therefore falsify the phylogenetic approaches claimed to confirm the deep chronology of the Anatolian chronology (Gray & Atkinson 2003; Pagel &Meade 2006; Bouckaert et al. 2012; 2013; Heggarty et al. 2023). This approach has been forcefully criticized (Pereltsvaig & Lewis 2015) or, adopting different principles, has led to a chronology consistent with the Steppe Hypothesis (Chang et al. 2015). Certainly many, possibly most, historical linguists remain sceptical about methods attempting to reach absolute dates on the supposition that core vocabulary is lost at a regular rate. On the other hand, this phylogenetic research may provide useful pointers for relative chronology. Even so, with the small numbers of lexical items used, a few revised etymologies or old loanwords mistaken for inheritances can drastically shift results.

To update the Steppe Hypothesis so as to line up with the facts as known, as I now write, it is best to specify that the relevant proto-language is post-Anatolian Indo-European, also known as Nuclear Indo-European (NIE). There is recent doubt that linguistic-archaeological-genetic-geographic correspondence PIE ≅ Yamnaya ≅ steppe cluster ≅ Pontic-Caspian steppe includes the subfamily to which Hittite belongs (Lazaridis 2018; Reich 2018; Lazaridis et al. 2022; 2024), using the symbol ≅ to mean 'usually corresponds to, more or less equals'.

The reason for returning to the CIS idea now is that, since its earlier outings, advances have been made in three areas that harmonize well with it:

1. the 'archaeogenetic revolution' (note especially Allentoft et al. 2015; Haak et al. 2015; Olalde et al. 2019; Patterson et al. 2022);
2. archaeological science revealing large scale long distance movement of metals in the Bronze Age (especially Ling et al. 2014; 2019; Nørgaard et al. 2019; 2021; Williams & Le Carlier de Veslud 2019; Berger et al. 2022; Williams 2023; cf. Radivojević et al. 2018);

3. the Celto-Germanic vocabulary as studied in Koch (2020; 2024) and Chapter 11 in this book.

It may now be possible to develop the CIS idea further to better account for a range of linguistic and non-linguistic processes in Bronze Age western Eurasia.

Mycenaean and Proto-Greek

As mentioned, Garrett's CIS proposal relied mainly on the example of Greek. It may be useful to recap in brief some of his main points. Greek is fortuitous as being well attested in several Iron Age dialects, which had been objects of intense philological study for over a century when the work of Alice Kober, Michael Ventris, and John Chadwick led to the discovery that the texts of ~1400–1200 BC in the Linear B syllabary were written in a language identifiable as Greek. Therefore, a Proto-Greek had already been reconstructed in detail before this decipherment, as the latest common ancestor of the attested dialects of the archaic and classical periods. That detailed reconstruction could then be compared with the 'honest to God' Bronze Age Greek of deciphered Linear B. And they were not identical. There were two general, and deeply significant, disparities between the reconstruction and the reality.

1. Mycenaean was not Proto-Greek or Common Greek – i.e., an undifferentiated common ancestor of all the attested dialects – but was already a dialect, showing innovations that never occurred in West Greek dialects, so effectively a Pre-Arcado-Cypriot. For example, **-ti* of Indo-European active primary verbal endings had become *-si* in Mycenaean, as in *ehensi* 'they are', a change found also in the Iron Age dialects Attic-Ionic and East Aeolic, as well as Arcado-Cypriot, but preserved in West Greek *'εντί* (Garrett 2006, 139).
2. Sound changes and morphological innovations from Proto-Indo-European that are found in all the Iron Age Greek dialects – and thus reconstructable for their latest common ancestor – had not yet occurred in Mycenaean. For example, Mycenaean appears to have preserved seven of the eight inflected cases of the Proto-Indo-European noun, whereas the Iron Age dialects had shared innovations reducing these to a system of five. Mycenaean preserved the labiovelars $*k^w$, $*g^w$, $*k^{wh}$ of Proto-Indo-European, but these have been shifted to labials in all Archaic and Classical Greek. Mycenaean also preserves Proto-Indo-European **y* and **w* in most positions (Garrett 2006, 140).

In other words, the Mycenaean situation was very unlike what had been supposed for a reconstructed Proto-Greek as a node on the Indo-European family tree. The attested Late Bronze Age language was, on the one hand, significantly closer to Proto-Indo-European than the Proto-Greek produced by the historical-comparative method applied to the Greek dialects, but, on the other, also closer to the dialectal situation of the Iron Age than had been supposed before the decipherment. Therefore, there never was a fully developed uniform Greek branch. As a matter of its general character, Mycenaean had become Greek in its vocabulary, name stock, and derivational patterns, but remained closer to post-Anatolian Indo-European in key aspects of its phonology and morphology. That means that, as Garrett claims, Proto-Greek *per se* never existed; it was a mirage, an artefact of a powerful but imperfect method. However, to throw such Neo-Grammarian reconstructions aside as altogether valueless would be a step back, as they have achieved – and continue to achieve – so much for our understanding of old texts and linguistic relationships. Rather, the reconstructions remain invaluable as pointers or approximations, two-dimensional models to render multi-dimensional realities, analogous to statistical medians and means that are sometimes useful but can also mislead in over-simplifying more complex realities.

Application to Celtic and Germanic

If we assume that the Celtic and Germanic branches emerged in ways similar to those observed in Greek, that leads to general expectations. These include the following.

- The full gamut of Proto-Indo-European to Proto-Celtic sound changes (e.g., the weakening and loss of **p*) and those of Proto-Germanic (e.g., Grimm's law (Fulk 2018, 102–12)) would not have been complete before the Bronze–Iron transition. As the Germanic sound law known as Verner's law (Fulk 2018, 107–12) acts on the output of Grimm's law and is also dependent on the Proto-Indo-European, rather than Proto-Germanic, position of the accent, it is most likely that both the Pre-Germanic and Pre-Celtic dialects of the Bronze Age retained the Proto-Indo-European position of the accent. That inference also suggests that mutual intelligibility remained at a relatively high level (cf. Koch 2022). Effectively, the dialects that were to become Celtic and those that were to become Germanic were still dialects of a single post-Anatolian Indo-European language.
- The common Celto-Germanic vocabulary – the 175 words discussed in Koch (2020) and Chapter 11 here – implies that these Pre-Celtic and Pre-Germanic dialects were also sharing significantly in the formation of the lexicons and name stock that were to be characteristic of both branches. In this respect they were comparable to Mycenaean Greek, but in the north-west the two pre-branches were developing together within a common or overlapping socio-cultural space.
- On the other hand, Pre-Celtic and Pre-Germanic would neither one nor together have been a single unified

dialect, or even two single undiversified dialects. Some of the variant innovations that are recognized as defining characteristics of individual attested languages and subgroupings – e.g., Brythonic or North Germanic – would already have been appearing in some of the Bronze Age dialects, although the processes defining Proto-Celtic and Proto-Germanic were not yet complete. In other words, as Mycenaean was already distinct from West Greek, it is possible that there were Pre-Celtic dialects that already showed some Pre-Goidelic, Pre-Gaulish, or Pre-Celtiberian innovations.

- As we have no evidence for a language-based Greek identity – *Ἕλληνες* versus *Βάρβαροι* – in Mycenaean, it is also likely that speakers of dialects that later became Celtic and Germanic did not have distinct language-based identities in the Bronze Age. The Celto-Germanic word **alyo-morg-* 'foreigner' can be seen from its etymology, 'one from another country, one from beyond the border', to be territorially based, rather than language based.
- There is inadequate comparative evidence to show that there had been a language-based Indo-European group identity prior to the formation of the branches. Had there been one, cognate versions of the same group name would be expected across several branches. And to imagine that such an identity existed in the absence of adequate supporting evidence could of course favour ideologies that are dangerous as well as baseless.

Some potential advances

CIS offers a potentially better framework than the traditional Indo-European family tree model for interpreting new evidence turned up over the past decade in the following fields. An integral subcomponent of CIS is that post-Anatolian Indo-European, when as yet minimally diversified, spread rapidly over a wide territory. This premise is strongly consistent with the subsequently discovered aDNA evidence for the rapid and wide expansion about 5000 years ago of a distinctive and not widely diversified genetic population hailing from the Yamnaya cultures of the Pontic-Caspian steppe (Allentoft et al. 2015; Haak et al. 2015). As with Nichols's proposal (1998) quoted above, the break-up NIE into its branches did not precede the expansion but followed it.

After Anatolian, some linguists argue for a family-tree model in which Tocharian was the second to branch off in a binary split from residual undifferentiated Indo-European ancestral to the other branches (e.g., Ringe et al. 2002). The idea that the Afanasievo culture of the Siberian Altai and Minusinsk Basin ~3100–2500 BC represents speakers of an early Indo-European ancestral to Tocharian pre-dates the archaeogenetic revolution (Mallory & Mair 2000; Anthony 2007). It remains consistent with subsequent aDNA data, which have revealed 20 Afanasievo individuals nearly indistinguishable genetically from Yamnaya genomes (Allentoft et al. 2015; Damgaard et al. 2018; Narasimhan 2019).

Following the principles of CIS, many characteristics of the reconstructed proto-branches would have spread secondarily between contiguous dialects in an early Indo-European continuum (Fig. 12.2). In contrast, the movement which gave rise to the Afanasievo community from Yamnaya migrants was a true migration, as opposed to an expansion or territorial reshaping, in that it came into an area geographically detached from its homeland. In contrast, the other post-Anatolian Indo-European dialects remained contiguous within a territory that had widely expanded but were not broken up geographically. Therefore, Afanasievo as the best current hypothesis for a primary pre-Tocharian cultural context – unlike the settings of the other incipient branches – was not in a position to share subsequent innovations from cognate dialects in the continuum. The ability of the contiguous dialects ancestral to the other branches to continue to share innovations later will, through the historical-comparative method, have created an illusion that they were still members of an undifferentiated proto-language at a stage when they were differentiated but in continued contact.

If we continue to use a traditional family tree model together with the assumption that each prehistoric nodal point represents an undiversified proto-language, each of these will imply a discrete homeland, as well as an absolute chronological extent of some centuries. So, for example, Proto-Celtic could hardly have arisen then broken up a mere few years either side of 1000 BC. If a Proto-Italo-Celtic node is incorporated into the model that will also have had a homeland and a period of some centuries before it broke up – and similarly any higher unity, such as the theoretical undiversified proto-language left to the other side after the Tocharian branch split off.

If these nodal proto-languages are all invested with reality in time and space, an archaeological footprint, and so on, then it becomes concerning that archaeogenetics narrows the available time. By favouring a version of the Steppe Hypothesis over the Anatolian Hypothesis, archaeogenetics has now placed post-Anatolian Indo-European at its later possible date ~3000 BC. By showing the British population was relatively stable and isolated during the Iron Age (~800 BC–AD 43), archaeogenetics now shifts the arrival of Celtic from its traditional Iron Age date to the Middle to Late Bronze (~1300–800 BC) or the Beaker Period (~2450–2000 BC). Any later theoretical unities like Goidelic-Gallo-Brythonic (aka, 'Gallo-Insular': McCone 1996; 2008) could be situated in the (earlier) Iron Age but might fit more neatly in the Late Bronze Age, when archaeology and archaeogenetics show the relevant regions were in close contact. In other words, the time available for the successive splits between undiversified proto-languages has tightened, perhaps uncomfortably so, in the light of genomic evidence.

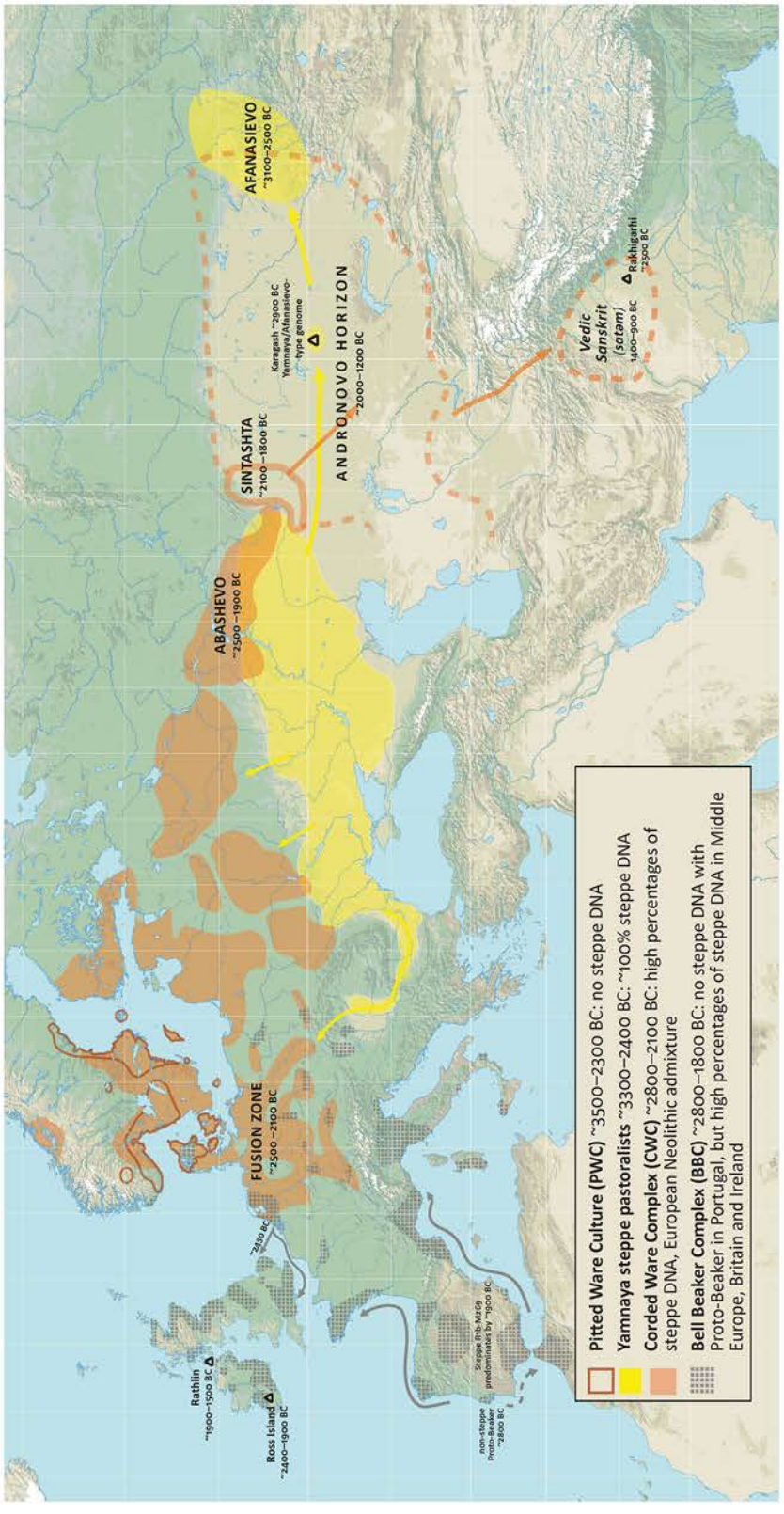

Figure 12.2. Western Eurasia in the 3rd and 2nd millennia BC and the spread of the steppe component related to archaeological cultures (J. T. Koch).

On the other hand, with CIS, we expect a state in the Bronze Age background of Celtic and Germanic like that directly observable with Mycenaean Greek. The dialects ancestral to these branches would still have been close to NIE in their morphology and phonology – so that many of the NIE to Proto-Celtic and Proto-Germanic changes had not yet taken place – but already dialectal, such as, hypothetically speaking, pre-Goidelic, and characteristically Celtic and Germanic in their vocabulary and name stock. In other words, a range of states and processes traditionally viewed as a sequence of discrete stages were more probably in progress contemporaneously. Proto-Celtic and Proto-Germanic *per se* would be – if not out and out mirages – theoretical abstractions lacking corresponding realities in time and space. Many of the phonological innovations defining these branches would have arisen through convergence between dialects within congealed socio-cultural areas after the Bronze–Iron transition.

If Mycenaean Greek is both already a Greek dialect (pre-Arcado-Cypriot) but effectively not yet even Greek, rather a pre-Greek Indo-European, then it would be possible for pre-Goidelic and pre-Gallo-Brythonic dialects to exist at a stage before the full range of Proto-Indo-European to Proto-Celtic innovations had spread across the dialects, in other words, before Celtic as such existed.

In Garrett's presentation, the chronology is absolute, emphasizing the fundamental difference between the Greek found in records of the 2nd millennium BC to those of the 1st, extrapolating from there an absolute chronology of the formation of other Indo-European branches.[3] However, if we bring the archaeological evidence into it and more specifically the recent discoveries about the long distance trade in copper and tin, it is then clear that the more important factor is what happened between the Mycenaean period and the Greek Dark Age, rather than the absolute dates when these events and processes occurred, thus the Bronze–Iron transition.

It is not hard to imagine why this socio-cultural and economic transformation would coincide with linguistic transformation of a continuum of NIE dialects into the separated branches. During the Bronze Age, control of a hub or bottleneck in the long distance exchange of metal was a key to power. Over the course of the Bronze Age – as metal use increased greatly in volume and high-tin bronze became the standard material for weapons, tools, and ornaments across western Eurasia (Pare 2000; Koch 2013) – the pivotal factor of dominance of metal trade over long distances rose in importance (Ling & Koch 2018; Koch & Ling 2023) (Fig. 12.3).

During this period, there would have been distinct advantages for elite groups to reject linguistic innovations that were not shared by other NIE-speaking groups with whom they maintained valuable links in the metal trade. Within the framework of the Maritime Mode of Production model (Ling et al. 2018), the ability to communicate with the terminus points of the long distance exchange networks would have provided distinct advantages to the trader-raiders and their chieftain organizers at the system's core. For example, seafarers bringing copper from Cwmystwyth, Great Orme, or south-western Iberia or tin from Cornwall to bulk consumers in Scandinavia would have found the ability to communicate along all nodal points of the network useful if not essential. A dialect continuum of NIE could function as the system's *lingua franca*.

As well as the trader-raiders and their chiefs, other key groups might have moved long distances and found NIE dialects advantageous. For example, it is likely that high status exogamous marriages cemented trading relationships within the metal exchange networks. High status fosterage and hostage exchange are also likely to have been aspects of the system. Celtic and Germanic share a word for 'hostage', derived from **gheisslo-*.

At the low end of the social pyramid, it is also likely that the intensification of land use (Cunliffe 2013) and rise of the Maritime Mode of Production (Ling et al. 2018) in the Middle to Late Bronze Age brought with them a significant factor of captive farm labour traded as a commodity along with metals. Here again, there is an Italo-Celto-Germanic word for this institution **kapto-* 'captive, (bound) slave', as well as a Celto-Germanic word for its antithesis **priyo-* 'free' < NIE 'beloved'. While these unfortunates would have lacked the social power to replace the language of their captors and overlords, they might have influenced it in the direction of preserving a pre-branch Indo-European, i.e., one lacking sharply crystallized language boundaries across a network within which numerous captives were transported.

When iron became the standard material of weapons and tools, the balance shifted. A world language was no longer an economic necessity or a valued prerequisite for warlike elite groups. Conversely, there might now be new advantages – for the cohesion of groups and their wholehearted aggressive competition towards foreign adversaries – to share a language uniquely only across a smaller region within which other innovative earmarks of social and cultural identity were also shared.

If we recognize the key milestone in the formation of the Indo-European branches as the Bronze–Iron transition rather than an absolute date towards the end of the 2nd millennium BC, that leads to the expectation that branches might have emerged from NIE at different dates in different regions because the transition occurred at different dates there (Fig. 12.4). The Bronze Age world system gradually shrank. During the sub-Mycenaean Dark Age of ~1150–850 BC, the Late Bronze cultures of the Atlantic façade, Central Europe, and the Nordic region were nearing their apogees. This time disparity may explain, at least in part, why there is the sizable store of 175 Celto-Germanic words and names, which pre-date the main NIE >Proto-Celtic and Proto-Germanic

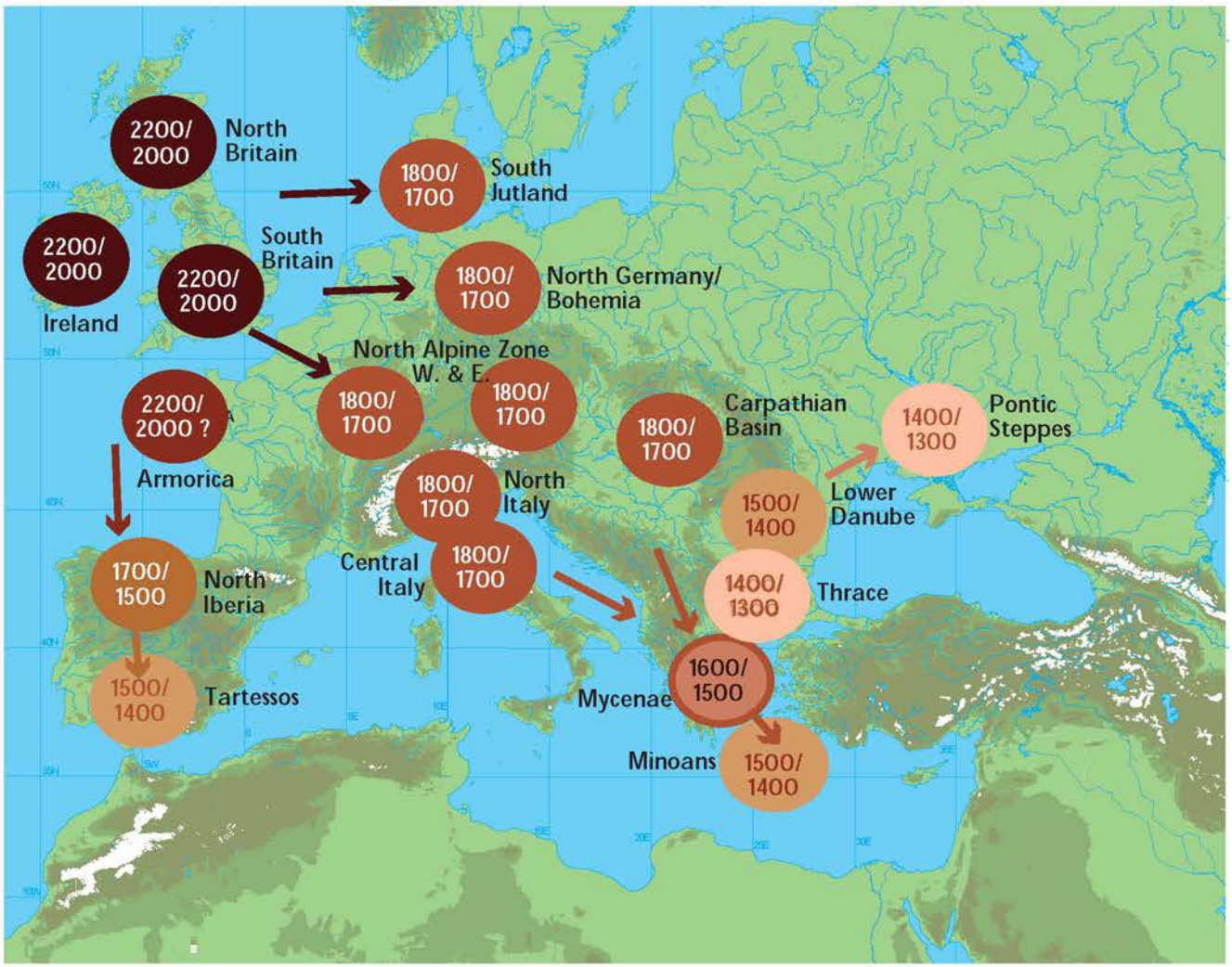

Figure 12.3. Approximate dates for the adoption of high-tin bronze as the standard material for tools, weapons, and ornaments (based on Pare 2000; cf. Koch 2013).

sound changes, but these words are not more widely shared with other Indo-European languages, even those of Europe. If we suppose that the branches emerged from NIE at the Bronze-Iron Transition, that happened two or three centuries earlier for the Aegean than for Britain and Gaul, with a still longer gap before the end of the Nordic Bronze Age.

As covered in Koch (2020) and discussed here in Chapter 11, the Celto-Germanic vocabulary arose at a linguistic stage preceding the emergence of the Proto-Germanic, in other words, the emergence of the Germanic branch from late NIE. Particularly representative of this state of affairs is the Germanic consonant shift. The CG corpus comprises entirely a majority of words that clearly had been part of Pre-Germanic before the operation of Grimm's law together with a sizable minority of words that lack the consonants to show whether or not they predate Grimm's law.

Similarly, most attestations of CG words in Celtic show that the items had been in Pre-Celtic NIE before most of the Proto-Indo-European to Proto-Celtic sound laws had occurred. For example, the iconically Celtic weakening and loss of **p* occurred after the formation of the CG vocabulary:

- **pinn-* 'extremities of a living thing' > Old Irish *inn*, *ind* 'tip, point, edge, extremities of the body, tongue, point of a weapon, treetop, hilltop'; Old Norse *fina* 'fin, chaff, husk', Old English *finn*;
- **pleid-* 'strive, succeed' > Middle Welsh *llwyδaw* 'to succeed, flourish, prevail, promote'; Old English *flītan* 'to exert oneself', Old High German *flīzan* 'attempt, try hard';
- **plōro-* 'floor' > Old Irish *lár* 'ground, surface, middle', Middle Welsh *llawr* 'floor, deck, ground, platform', Breton *leur*; Old Norse *flór* 'floor of cowstall', Old English *flōr*;

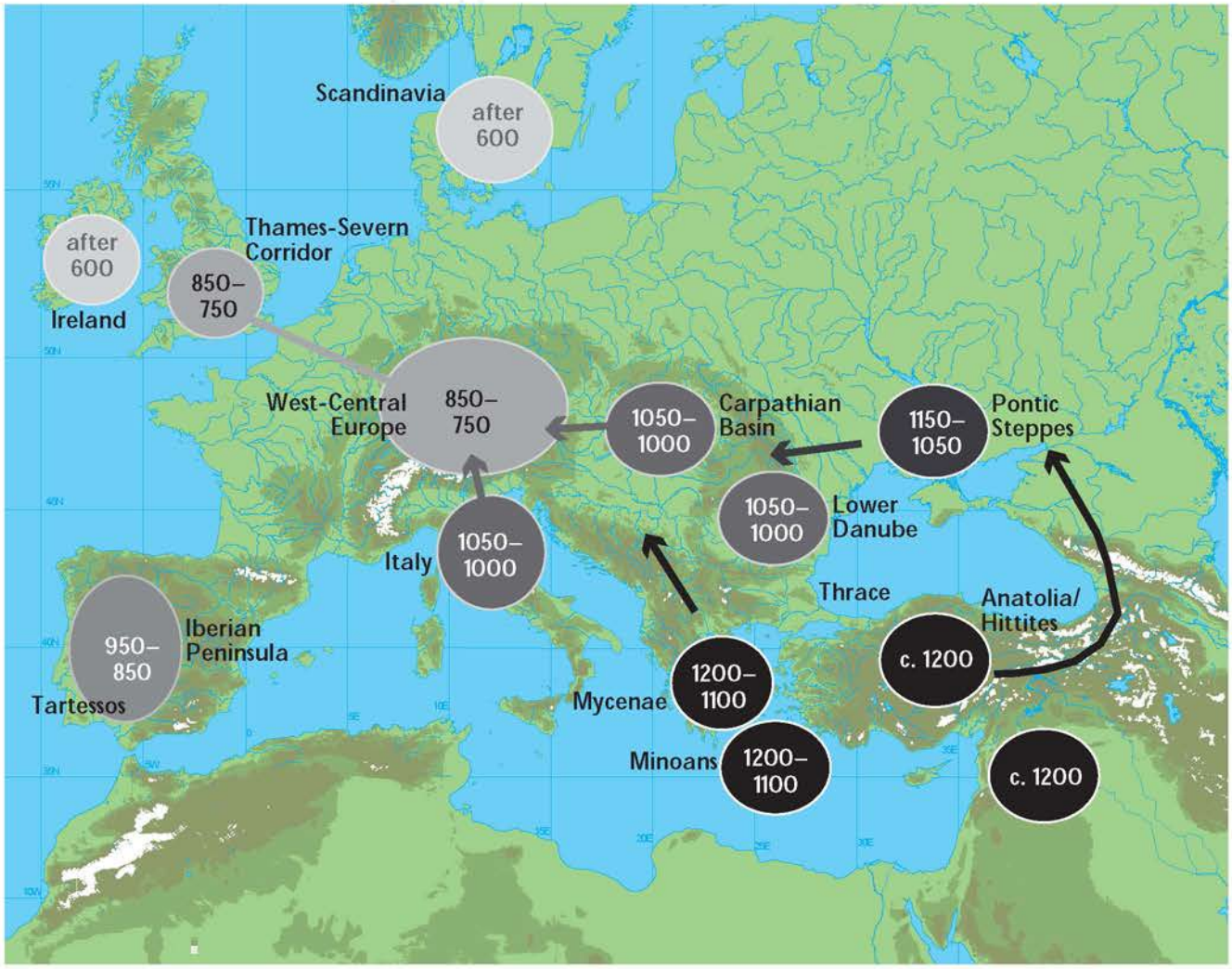

Figure 12.4. Approximate dates for the replacement of bronze by iron in different regions of Europe as the standard material for tools and weapons (cf. Burgess & O'Connor 2008; Koch 2013).

- **pluk-* 'boatload (of people, domestic animals, inanimate items of value)' > Gaulish *luxtos* 'load of pottery from an industrial kiln for despatch', Old Irish *lucht* 'class of people, occupants, category, boat's crew, followers, contents, ship's cargo', Old Welsh *luidt*, Middle Welsh *llwyth* 'tribe, lineage, kinship group, faction, clan, occupants, inhabitants, (full) load, ship's cargo'; Old Norse *flokkr* 'troop, host, flock', cf. Middle Dutch *vluycken* 'to transport over water';
- **poiko-* 'foe' > Old Irish *oech* 'enemy'; Old English *fáh* 'foe';
- **pot(a)mo-* 'thread, fathom' > Old Welsh *etem* 'thread', Scottish Gaelic *aitheamh* 'fathom'; Old Norse *faðmr*, Old English *fæðm* 'embracing arms, spreading arms to full extent, fathom, bosom';
- **priyānt-* 'relative, friend' > Old Breton name element *Riant-*, Welsh *rhiant* 'parent'; Gothic *frijonds* 'friend', Old Norse *frændi*, *frjándi* 'relative, friend', Old English *frēond* 'friend, loved one, relative', Old High German *friunt* 'friend, loved one';
- **priyo-*, **priyā-* 'free' > Old Breton *rid* 'free', Middle Welsh *ryδ* 'free, not in slavery, having civil and legal rights, not oppressed, not imprisoned, unrestricted, loose, gratis, lawful, generous'; Gothic *freis*, Old English *frēo*, Old High German *frī* 'free'.

The Celto-Germanic words reflect a period when dialects ancestral to Celtic and Germanic (etc.) were (a) in continued close contact, (b) at a stage analogous to Mycenaean in the formation of Post-Proto-Indo-European vocabulary and name stock, (c) thus in effect forming a common socio-cultural area speaking a chain of post-Anatolian Indo-European dialects.

From the previous points we come to the question of whether the attested Celtic languages of Ireland and Britain can more plausibly be traced back to the ~90% genetic

shift associated with the Beaker Period (~2450–2000 BC) (Olalde et al. 2019) or the ~50% shift that affected southern Britain in the Middle to Late Bronze Age (~1300–800 BC) (Patterson et al. 2022).

If we extrapolate from the Greek analogy, it follows that prior to the Bronze–Iron transition (~800 BC in Britain, Gaul, and Central Europe) many of the sound laws defining Celtic as a separate Indo-European branch had yet to occur or were not yet complete. The fact that Iberia underwent the transition about a century earlier (Burgess & O'Connor 2008) may be correlated with the differentness and conservatism of Hispano-Celtic, as contrasted with the innovations shared among Goidelic, Brythonic, and Gaulish, notably the un-inflected direct relative particle **i̯ o* (Koch 2016). Before the transition, there had been no sharply defined language boundaries between contiguous dialects of NIE and no sharply defined and opposed language-based group identities between contiguous Indo-European dialects analogous to the Iron Age Greek opposition of *Ἕλληνες* vs. *Βάρβαροι* (cf. Nichols 1998, 240). Note that at this later stage there was no sense, or even awareness in such terms, that groups speaking non-Greek Indo-European languages were any less *Βάρβαροι* than were speakers of non-Indo-European languages.

It is worth noting in this connection that Celtic and Germanic share and inherited word **alyo-morgi-* 'foreigner, person from across a national border'. The attestations are Ancient Nordic **aljamarkiz** (Kårstad cliff inscription, Sogn og Fjordane, Norway post-~AD 400: Antonsen 1975, §40), cf. Gothic *alja-* 'other, foreign', Old English *ele-*, Old Saxon and Old High German *eli-*; Gothic *marka* 'boundary, district, march', Old Norse *mǫrk* 'woods', Old English *mearc* 'boundary, border, march', Old High German *marca*, *marcha*; Gaulish group name *Allobroges*, singular ALLOBROX, ALLOBROXVS (Delamarre 2007, 18), Middle Welsh *allfro* '(hostile) foreigners' collective; cf. Old Irish *aile*, Middle Welsh *eil* 'other, second', Gaulish *broga* and Brythonic *bro* 'country, district', Old Irish *mruig* 'inhabited or cultivated land'.

It is not clear whether the Iron Age speakers of the Celtic branch shared – opposed to **allo-mrog-* 'foreigner' < 'one from across the frontier' – a word for themselves. *Κελτοί* was used by Herodotus ~450 BC for people near both the source of the Danube and beyond the Pillars of Hercules neighbouring the *Κυνητες* in the Algarve (Koch 2014); so the group name clearly existed and was widely used by the middle of the Iron Age. As McCone (2008) has shown *Κελτοί* was in origin not a Greek or Latin name, but a Celtic one. There is no evidence to show that the Iron Age speakers of Goidelic and Brythonic identified with this group name. But it is not safe to take that negative detail as proving that they did not. As the evidence is so slight and indirect, we cannot be certain what the prehistoric inhabitants Britain and Ireland *did not* call themselves. Furthermore, as pointed out in earlier work (Koch 2003), the use of *Gallia Celtica* for the largest part of Roman Gaul for 100 years prior to the Claudian invasion of Britain would have been a good reason for the Romans to avoid re-applying the same term confusingly to the new province and its inhabitants, whatever the Britons themselves thought 'Celt' did and did not mean.

Another way in which the Greek analogy is relevant to Celtic and other research questions of Maritime Encounters is in highlighting a situation in which the sea, such as the Aegean, rather than becoming a linguistic boundary when speakers of Indo-European crossed it, became the core of a socio-cultural area around which an Indo-European branch formed. We therefore should not automatically assume that the Channel, Irish Sea, or Baltic would at all periods have formed linguistic barriers as opposed to connective corridors. Compare Needham's (2009) concept of the Bronze Age 'maritory' around the Channel and southern North Sea (Fig. 12.5). The role of a sea in linguistic geography can change over time. For example, in the earlier 2nd millennium BC, an early Mycenaean Greek was probably already established on the mainland and separated by the Aegean from Crete, where a non-Greek, probably non-Indo-European Minoan language was spoken. But then in the Iron Age the Greek-speaking world was unified around the Aegean. Similarly, during the periods (~2450–2000 BC and ~1300–800 BC) when the high incidence of genetic outliers indicate that many people were crossing the sea from the Continent to Britain (Patterson et al. 2022), the sea might have functioned as the unifying core of a common socio-cultural area and dialect continuum. At the periods (~2000–1300 BC and ~800 BC–AD 43) during which a low occurrence of genetic outliers indicates Britain's relative stability and isolation (Patterson et al. 2022), it possible that the sea then functioned more as a socio-cultural and linguistic barrier. It is likely during these lulls fewer people were involved in seafaring or were reliant on activities for which seafaring was essential.

In their influential study, which sought to identify higher order relationships for a tree model of Indo-European, Ringe et al. (2002) recognized an anomalous position of Germanic. Their proposed explanation was that the Indo-European ancestral to Germanic formed at an early stage a close sister with that ancestral to Balto-Slavic and Indo-Iranian, suggestive of a dialect chain. Somewhat later, but still within the prehistoric period, Pre-Germanic re-oriented westwards towards the Indo-European ancestral to Celtic and Italic. In a previous paper (Koch 2020), I propose that this explanation of Germanic's background can be reconciled with a range of newer evidence. The archaeology for the spread of Indo-European, now in the light of archaeogenetic evidence, is consistent with an interpretation in which the Pre-Germanic/Pre-Balto-Slavic/Pre-Indo-Iranian chain corresponds broadly to the Corded Ware Cultures (CWC) of north-eastern Europe. The re-orientation westward of the Pre-Germanic

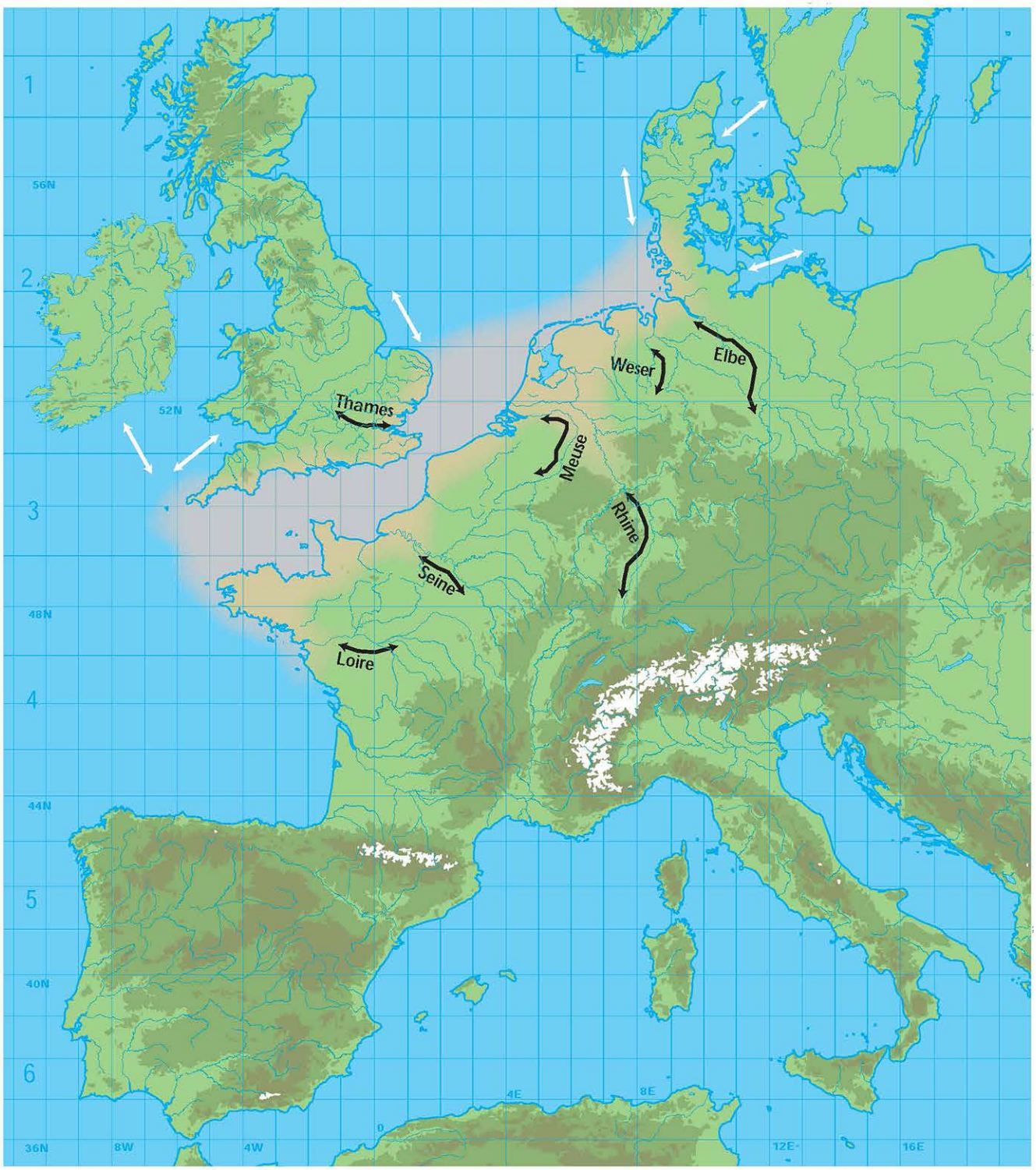

Figure 12.5. Narrow seas as a cultural link rather than a barrier: Needham's (2009) Channel/southern North Sea 'maritory' and its extensions up navigable rivers (J. T. Koch).

end of this chain can be seen as corresponding broadly the penetration into north-central Europe by Beaker groups from the mid-3rd millennium BC followed by the metal trade between northern European and the Atlantic façade now known to have intensified during the Bronze Age. The formation of the Celto-Germanic vocabulary can also be seen as fitting within this model, following the interleaving of Beaker and CWC in north-central Europe and before

separation of the Proto-Celtic and Proto-Germanic branches from the late NIE continuum at the Bronze–Iron transition.

Not unlike the Indo-European macrofamily, the higher order subdivisions within Celtic are notoriously hard to arrange into a family tree model. With a succession of homogeneous proto-languages undergoing binary splits, as traditionally conceived, the mutually exclusive concepts of a genetic Gallo-Brythonic vs. a genetic Insular Celtic – ancestral to Goidelic and Brythonic, but not Gaulish – remains unresolved (Koch 1992; Matasović 2008; Lambert 2010).[4]

With CIS, the shared innovations defining Insular Celtic versus those defining Gallo-Brythonic can be seen as arising within overlapping socio-cultural areas linking dialects across a continuum. In neither case would there have been a unified and homogeneous proto-language. The population entering southern Britain from across the Channel ~1300–800 BC might have brought with them linguistic innovations included amongst the defining earmarks of Proto-Celtic or a Proto-Gallo-Brythonic. But, as undiversified proto-languages, neither of these actually existed in a particular region at a specific time. Rather, they are constructs that usefully explain the systematic relationships between attested languages and between the dialects in contact ancestral to them.

Summary and concluding thoughts

Natural human language is enormously diverse, varying from community to community and one generation to the next, ultimately down to the level of the idiolect of the individual, which itself evolves over the course of a lifetime. Against this background, even the most useful models for the reconstruction of unattested languages will involve abstractions and over-simplifications. With this in mind, the CIS model shows stronger explanatory power than the traditional family tree model for the formation of the Indo-European branches. Holding this view does not require disposing of the concepts of Proto-Celtic, Proto-Germanic, etc., as devoid of utility, but it will transform how we think of them. They will no longer be understood as homogeneous languages reconstructable as the latest common ancestor of their attested descendants, these being the outcome of clean splits from a higher order homogeneous proto-languages, reconstructed by the same methods applied to a wider range of more distantly related attested languages. Rather than that, Proto-Celtic, Proto-Germanic, and so on are to be understood as the outcome of a series of innovations shared among related, but already differentiated, dialects within a subset of a dialect continuum that came into intensified contact in an emerging socio-cultural area. The intensification of long distance trade in copper – and then tin, after the standardization of high-tin bronze – had the effect of prolonging a stage comparable to that observable in Mycenaean Greek amongst the other Indo-European dialects of Bronze Age Europe. In other words, these dialects remained closer to Post-Anatolian Indo-European (NIE) in their phonology than is found in the proto-languages reconstructed from evidence attested from the Iron Age and later. The Celto-Germanic vocabulary reflects a stage before the branches had fully separated, as signalled by such sound changes as the weakening and loss of **p* in Celtic and Grimm's law in Germanic. The Bronze–Iron transition is not co-incidentally co-eval with the emergence of the branches, but was causal, leading to the breakup of large, diverse, and more porous socio-cultural areas, in which long distance journeys were essential and prestigious, to become smaller more ethnically differentiated ones.

The dilemma of when Celtic, or the language ancestral to it, entered the Atlantic archipelago is recast in this light. Neither the Indo-European which was probably brought to Britain and Ireland with the Beaker package or that coming to southern Britain in the Middle to Late Bronze Age would have belonged to any fully developed branch. Even at the later horizon, Celtic *per se* had not yet come into being and the languages involved were in key respects closer to NIE than to the latest reconstructable common ancestor of the attested Celtic languages. The NIE continuum was yet to fragment and the well-defined language boundaries had not yet arisen to restrain later innovations spreading across the boundaries of the crystallizing branches.

We return finally to the evidence and inferences of Patterson et al. (2022). With a traditional family-tree concept of the Indo-European branches, it would be a reasonable supposition that an undiversified Proto-Celtic – i.e., the latest reconstructable common ancestor of all the attested Celtic languages, having undergone the full gamut of linguistic changes shared by these – would have existed at about 1300–800 BC. Therefore, the migrations passing through Kent into the rest of southern Britain would be a good fit as the vector introducing this Proto-Celtic to the Atlantic Archipelago. The Beaker-package users entering ~2450–2000 BC might seem too early to be speakers of this fully formed Celtic branch. On the other hand, the Middle/Late Bronze Age migration might seem too early for the introduction of some post-Proto-Celtic unity, such as Proto-Gallo-Brythonic or Proto-Insular Celtic. But if it was simply a fully formed, but undiversified Celtic that arrived then, that leaves the problem of how Celtic arrived in north Britain and Ireland, where its supposed speakers with their elevated EEF ancestry did not go.

On the other hand, if we consider the CIS model, that will imply that, in the Middle to Late Bronze Age, the dialects that were to become Celtic were then still closer to post-Anatolian Indo-European, comparable in this way to Mycenaean. Many of the innovations defining the emergence of the Celtic branch would belong to the Bronze–Iron transition, in the same way as the Mycenaean to Proto-Greek shared innovations occurred in the parallel stage of the

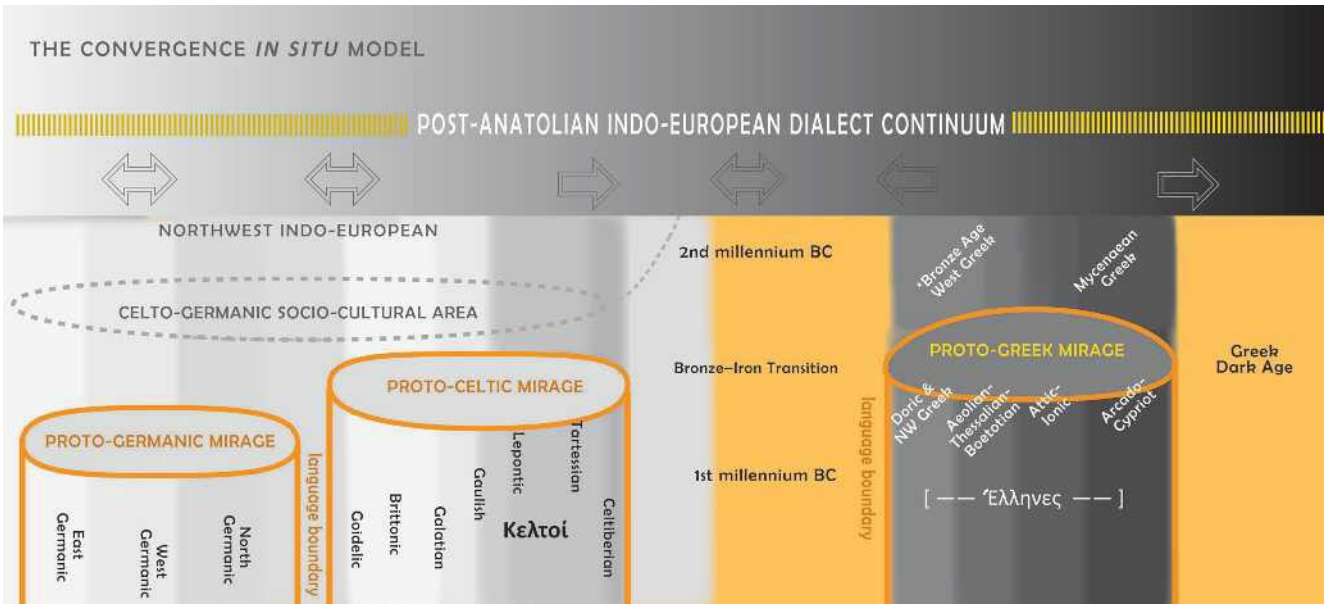

Figure 12.6. This model illustrates the 'convergence in situ *' concept as applied to Greek by Garrett (1999; 2006) and to Celtic by Koch (2013) and now to the Celto-Germanic phenomena.*

Greek Dark Age (Fig. 12.6). Therefore, within this model, the language of the Beaker users who drastically changed the culture and genetic makeup of Britain and Ireland and that of the newcomers to southern Britain in the Middle/Late Bronze Age were both probably (later) NIE and neither yet fully Celtic.

In short the progression was:

- first, the rapid and wide expansion of a minimally diversified post-Anatolian Indo-European,
- leading to the formation of dialect continuum across western Eurasia,
- and then the full formation of the proto-branches forestalled (for Proto-Greek, Proto-Italic, Proto-Celtic, and Proto-Germanic, at least) until the Bronze–Iron transition.

Notes

1 Dyen (1956) favoured Indo-Hittite, anticipating the Indo-Anatolian model coming back into currency today (Lazaridis et al. 2022). In this family tree, Proto-Indo-European figures as a sister of Anatolian with Proto-Indo-Anatolian as their common ancestor.

2 It should be noted that the papers of Nichols cited here advocated a view, since abandoned, of an Indo-European homeland in western central Asia, east of the Caspian Sea.

3 '… early IE language spread was thus a two-phase process. In the first phase, local IE dialects acquired their specific lexical, derivational, and onomastic features; in the second phase, late in the second millennium in some cases, changes that gave dialect areas their characteristic phonology and morphology swept across those areas.' (Garrett 2006, 143)

4 If genetic Insular Celtic is indeed a mirage as proposed by Lambert (2010), one is reminded of Nichol's thoughts regarding the appearance of a close unity between Baltic and Slavic: 'The morphosyntactic and lexical conservatism of Balto-Slavic, together with some secondary areal accommodation in northeastern Europe that has increased the superficial resemblances between Lithuanian and Russian, the most studied Baltic and Slavic languages, create the impression of strong similarity between the two branches' (Nichols 1998, 246).

References

Allentoft, M. E., M. Sikora, K.-G. Sjögren, K.-G. Sjörgen, S. Rasmussen, M. Rasmussen… K. Kristiansen & E. Willerslev 2015 'Population Genomics of Bronze Age Eurasia', *Nature* 522, 167–72 https://doi.org/10.1038/nature14507.

Anthony, D. W. 2007 *The Horse, the Wheel, and Language: How Bronze-Age Riders from the Eurasian Steppes Shaped the Modern World*. Princeton NJ, Princeton University Press.

Anthony, D. W. & D. Ringe 2015 'The Indo-European Homeland from Linguistic and Archaeological Perspectives', *Annual Review of Linguistics* 1, 199–219 https://doi.org/10.1146/annurev-linguist-030514-124812.

Anthony, D. W. & D. R. Brown 2017 'Molecular Archaeology and Indo-European Linguistics: Impressions from New Data', *Usque as radices: Indo-European studies in honour of Birgit Anette Olsen*, eds B. S. S. Hansen, A. Hyllested, A. R. Jørgensen, G. Kroonen, J. H. Larsson, B. N. Whitehead, T. Olander & T. M. Søborg, 25–54. Copenhagen, Copenhagen Studies in Indo-European 8.

Antonsen, E. H. 1975 *A Concise Grammar of the Older Runic Inscriptions*. Tübingen, Max Niemeyer.

Berger, D., Q. Wang, G. Brügmann, N. Lockhoff, B. W. Roberts & E. Pernicka 2022 'The Salcombe Metal Cargoes: New Light on the Provenance and Circulation of Tin and Copper in Later Bronze Age Europe Provided by Trace Elements and Isotopes', *Journal of Archaeological Science* 138 (5) 1–26

Bouckaert, R., P. Lemey, M. Dunn, S. J. Greenhill, A. V. Alekseyenko, A. J. Drummond, R. D. Gray, M. A. Suchard & Q. D. Atkinson 2012 'Mapping the Origins and Expansion of the Indo-European Language Family', *Science* 337, 957–60 http://dx.doi.org/10.1126/science.1219669.

Bouckaert, R., P. Lemey, M. Dunn, S.J. Greenhill, A. V. Alekseyenko, A. J. Drummond, R. D. Gray, M. A. Suchard & Q. D. Atkinson 2013 'Correction to: Mapping the Origins and Expansion of the Indo-European Language Family', *Science* 342, 1446 http://dx.doi.org/10.1126/science.342.6165.1446-a.

Burgess, C. & B. O'Connor 2008 'Iberia, the Atlantic Bronze Age and the Mediterranean', *Contacto cultural entre el Mediterráneo y el Atlántico (siglos XII–VIII ANE), La precolonización a debate*, eds S. Celestino, N. Rafel & X-L. Armada, 41–58. Madrid, Escuela Española de Historia y Arqueología en Roma-CSIC Serie Arqueológica 11.

Cassidy, L. M., R. Martiniano, E. M. Murphy, M. D. Teasdale, J. Mallory, Barrie Hartwell & D. G. Bradley 2016 'Neolithic and Bronze Age Migration to Ireland and Establishment of the Insular Atlantic Genome', *Proceedings of the National Academy of Science* 113 (2), 368–73.

Chang, W., C. Cathcart, D. Hall & A. Garrett 2015 'Ancestry-Constrained Phylogenetic Analysis Supports the Indo-European Steppe Hypothesis', *Language* 91 (1), 194–244.

Clackson, J. & G. Horrocks 2007 *The Blackwell History of the Latin Language*. Malden & Oxford, Blackwell.

Cowgill, W. 1970 'Italic and Celtic Superlatives and the Dialects of Indo-European', *Indo-European and Indo-Europeans*, eds G. Cardona, H. M. Hoenigwald & A. Senn, 113–53. Philadelphia PA, University of Pennsylvania Press.

Cunliffe, B. 2013 *Britain Begins*. Oxford, Oxford University Press.

Damgaard, P. de Barros, R. Martiniano, J. Kamm, J. V. Moreno-Mayer, M. Peyrot, G. Barjamovic, … R. Durbin & E. Willerslev 2018 'The First Horse Herders and the Impact of Early Bronze Age Steppe Expansions into Asia', *Science* 360. https://doi.org/10.1126/science.aar7711

Delamarre, X. 2007 *Nomina celtica antiqua selecta inscriptionum (Noms de personnes celtques dans l'épigraphie classique)*. Paris, Errance.

Dyen, I. 1956 'Language Distribution and Migration Theory', *Language* 32 (4), 611–26.

Fulk, R.D. 2018 *A Comparative Grammar of the Early Germanic Languages*. Amsterdam/Philadelphia, John Benjamins Publishing Company.

Garrett, A. 1999 'A New Model of Indo-European Subgrouping and Dispersal', *Proceedings of the Twenty-Fifth Annual Meeting of the Berkeley Linguistics Society, February 12–15, 1999*, eds S. S. Chang, L. Liaw & J. Ruppenhofer, 146–56. Berkeley CA, Berkeley Linguistics Society.

Garrett, A. 2006 'Convergence in the Formation of Indo-European Subgroups: Phylogeny and Chronology', *Phylogenetic Methods and the Prehistory of Languages*, eds P. Forster & C. Renfrew, 139–51. Cambridge McDonald Institute Monograph.

Gray, R. D. & Q. Atkinson 2003 'Language-Tree Divergence Times Support the Anatolian Theory of Indo-European Origin', *Nature* 426, 435–3. http://dx.doi.org/10.1038/nature02029.

Haak, W., I. Lazaridis, N. Patterson, N. Rohland, S. Mallick, B. Llamas, … K. Werner Alt & D. Reich 2015 'Massive Migration from the Steppe was a Source for Indo-European Languages in Europe', *Nature* 522, 207–11 https://doi.org/10.1038/nature14317.

Heggarty, P., C. Anderson, M. Scarborough, B. King, R. Bouckaert, W. Haak, … Kühnert & R. D. Gray 2023 'Language Trees with Sampled Ancestors Support a Hybrid Model for the Origin of Indo-European Languages', *Science* 381, 414 https://doi.org/10.1126/science.abg0818.

Koch, J. T. 1992 'Gallo-Brittonic vs. Insular Celtic: The Interrelationships of the Celtic Languages Reconsidered', *Bretagne et pays celtiques – langues, histoire, civilisation: Mélanges offerts à la mémoire de Léon Fleuriot*, eds G. Le Menn & J.-Y. Le Moing, 471–95. Saint-Brieuc and Rennes, Skol/Presses Universitaires de Rennes.

Koch, J. T. 2003 'Celts, Britons, and Gaels – Names, Peoples, and Identities', *Transactions of the Honourable Society of Cymmrodorion* 2002, NS 9, 41–56.

Koch, J. T. 2013 'Out of the Flow and Ebb of the European Bronze Age: Heroes, Tartessos, and Celtic', *Celtic from the West 2: Rethinking the Bronze Age and the Arrival of Indo-European in Atlantic Europe*, eds J. T. Koch & B. Cunliffe, 101–46. Oxford, Celtic Studies Publication 16.

Koch, J. T. 2014 'Once again, Herodotus, the Κελτοί, the source of the Danube, and the Pillars of Hercules', *Celtic Art in Europe: Making Connections. Essays in Honour of Vincent Megaw on his 80th Birthday*, eds C. Gosden, S. Crawford & K. Ulmschneider, 6–18. Oxford, Oxbow Books.

Koch, J. T. 2016 'Phoenicians in the West and Break-up of the Atlantic Bronze Age', *Celtic from the West 3. Atlantic Europe in the Metal Ages. Questions of Shared Language*, eds J. T. Koch, B. Cunliffe, C. D. Gibson & K. Cleary, 431–76. Oxford, Celtic Studies Publication 19.

Koch, J. T. 2020 *Celto-Germanic: Later Prehistory and Post-Proto-Indo-European Vocabulary in the North and West*, Aberystwyth, Centre for Advanced Welsh and Celtic Studies. https://www.wales.ac.uk/sites/uw/files/2024-11/Celto-Germanic2020.pdf

Koch, J. T. 2022 'The Neo-Celtic Verbal Complex and Earlier Accentual Patterns', *Studia Celtica* 56, 29–62.

Koch, J. T. 2024 'Celto-Germanic and North-West Indo-European Vocabulary Resonances in Myth and Rock Art Iconography', *Indo-European Interfaces: Integrating Linguistics, Mythology and Archaeology*, eds J. Larsson, T. Olander & A. R. Jørgensen, 195–216. Stockholm, University of Stockholm Press.

Koch, J. T. with F. Fernández Palacios 2019 'A Case of Identity Theft? Archaeogenetics, Beaker People, and Celtic Origins', *Exploring Celtic Origins: New Ways Forward in Archaeology, Linguistics, and Genetics*, eds B. Cunliffe & J. T. Koch, 38–79. Oxford, Celtic Studies Publications 22.

Koch, J. T. & J. Ling 2023 '"From the Ends of the Earth": A Cross-Disciplinary Approach to Long-Distance contact in Bronze Age Atlantic Europe', *The Indo-European Puzzle Revisited: Integrating Archaeology, Genetics, and Linguistics*, eds K. Kristiansen, G. Kroonen & E. Willerslev, 157–71. Cambridge, Cambridge University Press.

Kortlandt, F. H. H. 2007 *Italo-Celtic Origins and Prehistoric Development of the Irish Language*. Amsterdam, Leiden Studies in Indo-European 14.

Lambert, P.-Y. 2010 'Le mirage des celtisants du XXe siècle: l'unité celtique insulaire' Unpublished paper read at the conference 'La langue bretonnes des origines – Les origines de la bretonne', Université Rennes 2, 29–30 April 2010.

Lazaridis, I. 2018 'The Evolutionary History of Human Populations in Europe', *Current Opinion in Genetics & Development* 53, 21–7.

Lazaridis, I., S. Alpaslan-Roodenberg, A. Acar, A. Agelarakis, L. Aghirkyan, U. Akyüz, … R. Pinhasi & D. Reich 2022 'The Genetic History of the Southern Arc: A Bridge Between West Asia and Europe', *Science* 377, eabm4247 2022. https://doi.org/: 10.1126/science.abm4247

Lazaridis, I., N. Patterson, D. Anthony, L. Vyazov, L., R. Fournier, H. Ringbauer … R. Pinhasi & D. Reich 2024 'The Genetic Origin of the Indo-Europeans', *bioRxiv preprint* https://doi.org/10.1101/2024.04.17.589597.

Ling, J. & J. T. Koch 2018 'A Sea Beyond Europe to the North and West', *Giving the Past a Future. Essays in Archaeology and Rock Art Studies in Honour of Dr. Phil. h.c. Gerhard Milstreu*, eds J. Dodd & E. Meijer, 96–111. Oxford, Archaeopress.

Ling, J., T. Earle & K. Kristiansen 2018 'Maritime Mode of Production. Raiding and Trading in Seafaring Chiefdoms', *Current Anthropology* 59 (5), 488–524.

Ling, J., Z. Stos-Gale, L. Grandin, K. Billström, E. Hjärthner-Holdar & P.-O. Persson 2014 'Moving Metals II. Provenancing Scandinavian Bronze Age Artefacts by Lead Isotope and Elemental Analyses', *Journal of Archaeological Science* 41 (1), 106–12.

Ling, J., E. Hjärthner-Holdar, L. Grandin, Z. Stos-Gale, K. Kristiansen, A. L. Melheim, G. Artioli, I. Angelini, R. Krause & C. Canovaro 2019 'Moving Metals IV. Swords, Metal Sources and Trade Networks in Bronze Age Europe', *Journal of Archaeological Science: Reports* 26, 101837 https://doi.org/10.1016/j.jasrep.2019.05.002..

Mallory, J. P. 1996 'The Indo-European Homeland Problem: a Matter of Time', *The Indo-Europeanization of Northern Europe: Papers*, eds K. Jones-Bley & M. E. Huld, 1–22. Washington DC, Institute for the Study of Man.

Mallory, J. P. & V. H. Mair 2000 *The Tarim Mummies: Ancient China and the Mystery of the Earliest Peoples from the West*. London, Thames & Hudson.

Matasović, R. 2008 'Insular Celtic as a Language Area', *The Celtic Languages in Contact*, ed. H. L. C. Tristram, 93–112. Potsdam, Potsdam University Press.

McCone, K. R. 1996 *Towards a Relative Chronology of Ancient and Medieval Celtic Sound Change*. Maynooth, Maynooth Studies in Celtic Linguistics I.

McCone, K. R. 2008 *The Celtic Question: Modern Constructs and Ancient Realities*, Myles Dillon Memorial Lecture. Dublin, Dublin Institute for Advanced Studies.

Narasimhan, V. M., N. Patterson, P. Moorjani, N. Rohland, R. Bernardos, S. Malliick, … R. Pinhasi & D. Reich 2019 'The Genomic Formation of South and Central Asia', *Science* 365, eaat7487 https://doi.org/:10.1126/science.aat748

Needham, S. P. 2009 'Encompassing the Sea: "Maritories" and Bronze Age Maritime Interaction', *Bronze Age Connections: Cultural Contact in Prehistoric Europe*, ed. P. Clark, 12–37. Oxford, Oxbow Books.

Nichols, J. 1997 'The Epicentre of the Indo-European Linguistic Spread', *Archaeology and Language I: Theoretical and Methodological Orientations*, eds R. Blench & M. Spriggs, 122–48. London, Routledge.

Nichols, J. 1998 'The Eurasian Spread Zone and the Indo-European Dispersal', *Archaeology and Language II: Archaeological Data and Linguistic Hypotheses*, eds R. Blench & M. Spriggs, 220–66. London, Routledge.

Nørgaard, H. W., E. Pernicka, & H. Vandkilde 2019 'On the Trail of Scandinavia's Early Metallurgy. Provenance, Transfer and Mixing', *PloS One* 14 (7), e0219574 https://doi.org/10.1371/journal.pone.0219574.

Nørgaard, H. W., E. Pernicka & H. Vandkilde 2021 'Shifting Networks and Mixing Metals: Changing Metal Trade Routes to Scandinavia Correlate with Neolithic and Bronze Age Transformations', *PloS One* 16(6), e0252376 https://doi.org/10.1371/journal.pone.0252376.

Olalde, I., S. Brace, M. Allentoft, I. Armit, K. Kristiensen, T. Booth, … C. Lalueza-Fox & D. Reich 2018 'The Beaker Phenomenon and the Genomic Transformation of Northwest Europe', *Nature* 555 (7697), 190–5 https://doi.org/10.1038/nature2573

Pagel, M. & A. Meade 2006 'Estimating Rates of Lexical Replacement on Phylogenetic Trees of Languages', *Phylogenetic Methods and the Prehistory of Languages*, eds P. Forster & C. Renfrew, 173–82. Cambridge, McDonald Institute for Archaeological Research.

Pare, C. F. E. 2000 'Bronze and the Bronze Age', *Metals Make the World Go Round: Supply and Circulation of Metals in Bronze Age Europe*, ed. C. F. E. Pare, 1–37. Oxford, Oxbow Books.

Patterson, N., M. Isakov, T. Booth, L. Büster, C.-E. Fischer, I. Olalde, … I. Armit & D. Reich 2022 'Large-scale Migration into Britain During the Middle to Late Bronze Age', *Nature* 601, 588–94 https://doi.org/10.1038/s41586-021-04287-4.

Pereltsvaig, A. & M. W. Lewis 2015 *The Indo-European Controversy: Facts and Fallacies in Historical Linguistics*. Cambridge, Cambridge University Press.

Radivojević, M., B. W. Roberts, E. Pernicka, Z. Stos-Gale, M. Martinón-Torres, T. Rehren, P. Bray, D. Brandherm, J. Ling, J. Mei, H. Vandkilde, K. Kristiansen, S. Shennan & C. Broodbank, 2018 'The Provenance, Use, and Circulation of Metals in the European Bronze Age: The State of Debate' *Journal of Archaeological Research* 27 (2), 131–85 https://doi.org/10.1007/s10814-018-9123-9.

Reich, D. 2018 *Who We Are and How We Got There*. Oxford, Oxford University Press.

Renfrew, A. C. 1987 *Archaeology and Language: The Puzzle of Indo-European Origins*. London, Cape.

Renfrew, A. C. 1999 'Time Depth, Convergence Theory, and Innovation in Proto-Indo-European: "Old Europe" as a PIE Linguistic Area', *Journal of Indo-European Studies* 27, 257–93.

Renfrew, C. 2000 '10,000 or 5000 Years Ago? – Questions of Time Depth', *Time Depth in Historical Linguistics*, eds C. Renfrew, A. McMahon & L. Trask Vol. 2, 413–39. Cambridge, McDonald Institute for Archaeological Research.

Renfrew, A. C. 2013 'Early Celtic in the West: The Indo-European Context', *Celtic from the West 2: Rethinking the Bronze Age and*

the Arrival of Indo-European in Atlantic Europe eds J. T. Koch & B. Cunliffe, 207–17. Oxford, Celtic Studies Publication 16.

Ringe, D., T. Warnow & A. Taylor 2002 'Indo-European and Computational Cladistics', *Transactions of the Philological Society* 100 (1), 59–129.

Ringe, D., T. Warnow, A. Taylor, A. Michailov & L. Levinson 1998 'Computational Cladistics and the Position of Tocharian', *The Bronze Age and Early Iron Age Peoples of Eastern Central Asia*, ed. V. Mair, 391–414. Washington DC, Institute for the Study of Man.

Robb, J. 1993 'A Social Prehistory of European Languages', *Antiquity* 67, 747–60.

Schrijver, P. 2016 'Sound Change: The Italo-Celtic Linguistic Unity, and the Italian Homeland of Celtic', *Celtic from the West 3. Atlantic Europe in the Metal Ages. Questions of shared language*, eds J. T. Koch, B. Cunliffe, C. D. Gibson & K. Cleary, 489–502.Oxford, Celtic Studies Publication 19.

Watkins, C. W. 1966 'Italo-Celtic Rrevisited', *Ancient Indo-European dialects*, eds H. Birnbaum & J. Puhvel, 29–50. Berkeley & Los Angeles CA, California University Press.

Weiss, M. 2012 'Italo-Celtica: Linguistic and Cultural Points of Contact Between Italic and Celtic', *Proceedings of the 23rd Annual UCLA Indo-European Conference*, eds S. W. Williams, A. & C. Le Carlier de Veslud 2019 'Boom and bust in Bronze Age Britain: major copper production from the Great Orme mine and European trade, c. 1600–1400 BC', *Antiquity* 93 (371), 1178–96.

Williams, R. A. 2023 *Boom and Boost in Bronze Age Britain: the Great Orme Copper Mine and European Trade*. Oxford, Archaeopress.