Maritime Mode of Production
Raiding and Trading in Seafaring Chiefdoms

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As exemplified by Viking and Bronze Age societies in northern Europe, we model the political dynamics of raiding, trading, and slaving as a maritime mode of production. It includes political strategies to control trade by owning boats and financing excursions, thus permitting chiefs to channel wealth flows and establish decentralized, expansive political networks. Such political institutions often form at the edges of world systems, where chieftains support mobile warriors who were instrumental in seizing and protecting wealth. Particular properties of the maritime mode of production as relevant to Scandinavia are the fusion of agropastoral and maritime modes of production. To exemplify these two sectors, we use the Thy and Tanum cases in which we have been involved in long-term archaeological research. The historic Viking society provides specificity to model the ancestral political society of Bronze Age Scandinavia. Our model helps understand an alternative path to institutional formation in decentralized chiefdoms with low population densities, mobile warriors, and long-distance trading and raiding in valuables, weapons, and slaves.

Using the Bronze Age and Viking Age of Scandinavia, we seek to model decentralized complexity in low-density, chieftdom-like societies that emerged by processes of both historical continuity and independent change. Over the years, scholars (Nerman 1954; Tallgren 1916) have proposed analogies between Scandinavian Viking Age and Bronze Age societies, although others have argued that such comparisons are simplistic (Ling 2014:20; Ojala 2017). Reappraisals now suggest structural continuities across regional, decentralized networks of chiefly power (Kristiansen 2016; Melheim, Glørstad, and Tsigaridas Glørstad 2016; Rowlands and Ling 2016). To understand these cases, we consider them as particular histories illustrative of general political processes identified with chieftainship.

The Bronze Age economy marked, we argue, the onset of a macroregional division of labor integrated by entrepreneurial agents across Europe. Political systems that flourished after 1700 BC (Vandkilde 2014) demanded support of specialized warriors and traders, as well as investments in boats for maritime trade for special products (Earle et al. 2015). Two sectors in the emergent Scandinavian political economy were the land-based agropastoral sector and sea-based boat-voyaging sector (fig. 1). To participate in expanding international trade, Scandinavian groups apparently depended on both, but, because of social and environmental differences, some regions specialized in one or the other. The result was a regional division of labor, a process understandable by the rule of comparative advantage (Ricardo 1817 [1811]), applicable generally to the Eurasian Bronze Age (Earle et al. 2015; Ling, Cornell, and Kristiansen 2017; Rowlands and Ling 2013). For example, coastal Sweden and Norway had access to timber, which was already scarce in some of the most deforested and populated agropastoral regions, such as in the northwestern Jutland (Andersen 1999; Odgård 1994). The latter region had a clear comparative advantage in terms of agropastoral production, which in turn led to an accumulation of wealth and power reflected in metal (Kristiansen 1978). Thus, the comparative advantage of different regions created opportunities for transregional confederates of trade and control over prestige goods, and all this transformed the societies into expansive political machines (Beaujard 2015; Earle et al. 2015; Kradin 2008; Kristiansen 1998; Rowlands and Ling 2013). Our thesis is that development of seaworthy boats and the means to finance them allowed Scandinavian chieftains to channel flows of wealth to create class-based warrior societies.

To illustrate such decentralized maritime confederacies bridging complementary economies, we focus on the maritime action among northwest Jutland (Thy), west Sweden (Tanum), and southwest Norway (Rogaland) (figs. 2, 3). We focus especially on the archaeological evidence from Thy in the Limfjord area of Jutland, Denmark, as exemplifying the land-based sector (Bech, Eriksen, and Kristiansen 2018) and the rich rock-art area of Tanum in Bohuslän (Ling 2014), Sweden, as exemplifying the maritime sector (fig. 4). Important for our case, archaeological evidence of interaction exists that links these rather remote areas; however, our model of Bronze Age transregional interaction could pair other similar regions in Scandi-
navia that share similar economic conditions as Thy and Rogaland in southwestern Norway. These are singularities (Neitzel and Earle 2014), patterns of distinctiveness that stand out in comparison with other Bronze Age regions and that demand explanations that may link to their complementary economic roles. Before discussion of the case materials, some theoretical aspects regarding chiefly social formations need background discussion.

Theory on Decentralized Chiefdoms

Chiefdoms (aka intermediate-scale political societies) were the first truly political societies, meaning simply that they maintained institutions of effective power extending outside intimate kin-based communities (Earle 2017a). Chiefs assembled chieftaincy networks that organized regional polities in the low thousands. They often formed confederacies consisting of “genealogically related and unrelated chiefdoms which were unified through coercion or common agreement” (Gibson 2011:217). Celtic Iron Age Ireland; archaic Greece, Korea, and Iran; and ethnographic cases from the Pacific provide examples. Confederacies are often considered as hierarchical formations of decentralized complexity (Grinin and Korotayev 2011; Kradin 2008, 2015). Such confederacies linked up polities with distinct interests and relationships.

In terms of Adam T. Smith (2015), chieftaincies were political machines capable of institutionalized power with rules of sovereignty. Power was never absolute but was always contested (Levi 1988), and top-down perspectives had to incorporate both intense competition between different social groups and emergent regional conditions that encouraged local groups to form relationships of cooperation and exchange (Blanton and Fargher 2008). Often, bottom-up processes resulted in intercommunity interactions involving marriages, alliances, friendships, trading partnerships, frequent visiting, and ceremonial engagement, and such relational webs can provide opportunities for elite control. At the heart is the dialectics between competition and collaboration and between “small” and “big” government.

Research on chiefdoms demonstrates great variability in political formations (Drennan and Peterson 2012; Earle 1991, 1997, 2002; Feinman and Neitzel 1984; Redmond 1998) that are ideal for comparative studies of political strategies both within and between major cultural traditions (Neitzel and Earle 2014). Such political formations relied variably on three elemental powers (economy, warrior might, and religious ideology; Earle 1997; cf. Mann 1986). Economic power is an ability to demand, give, or deny necessary and desired goods, including tribute, food,
housing, and wealth (prestige goods and weapons). Warrior power is an ability to coerce by force or threat of force. And ideological power is an ability to present religiously sanctioned narratives for rules of sovereignty. Which is the most important source of power? Chiefs mixed and matched to create many alternative political formations in stateless societies, but all sources of power are realized by resources mobilized through the political economy and invested in control mechanisms (Earle 1997).

In this paper, we model power and political dynamics within decentralized maritime chiefdoms exemplified by Viking and Bronze Age societies of northern Europe. We call our model the maritime mode of production. Corresponding to expanding international trade in metals, textiles, slaves, and exotics, Bronze Age warriors achieved a dominant, partly independent position in society that allowed formation of extensive chiefdoms and chiefly confederacies; at the same time, such warrior fraternities were always disruptive, fragmenting these institutional relationships (Kristiansen 2018; Vandkilde 2018). Our theoretical model incorporates both centripetal and centrifugal forces that connect to larger social formations and world systems in Eurasia and Africa from the Bronze Age onward (Kristiansen, Lindkvist, and Myrdal 2018; Vandkilde 2016).

To study different regional pathways to power, we use Marxist notions of “modes of production” (economic formations) to model how resource flows were channeled to finance political centrality and inequality (Marx 1953). Particular ways in which power strategies combined are seen as creating distinctive modes. Here integrated concepts of production/appropriation, distribution/exchange, and consumption provide analytical tools to define economic formations. Modes of production are thus defined by hegemonic formations that are reproduced often in articulation with world systems (Ling, Cornell, and Kristiansen 2017).

To understand the maritime mode of production, we start with Marx and Engel’s underspecified notion of a Germanic mode of production (Engels 1972; Marx 1953). In line with European thinking at the time, the democratic Germanic mode of production of northern Europe was seen in contrast to totalitarian Asiatic modes of production.

In the Germanic mode of production, the political economy is decentralized, based on free farmers organized fitfully by chieftains for defense and dispute settlements. It was agrarian based. Gilman (1995) summarizes the Germanic mode of production as consisting of autonomous households forming independent production units (Marx 1953:79), coalitions of households into tribal assemblies, and hereditary leadership based on military and judicial activities. The Scandinavian longhouse tradition (Artursson 2009) probably well represents such a model archaeologically. We prefer to replace the Germanic mode of production terminology with the neutral, generalized concept of decentralized complexity that existed with prestige goods.
economies (Kristiansen 2015) and had elements recently discussed as anarchistic (Angelbeck and Grier 2012).

We believe the emerging maritime economy in Bronze Age Scandinavia had strong roots in agricultural production but with new maritime, warrior, and trading dynamics that appear to have generated an expansive political economy. Any Bronze Age specialist knows that the evidence for such a model is imperfect, and so the reader should insert the appropriate modifiers, including “probably,” “apparently,” and “logically.” What we present here is a model for testing and refinement. As for any archaeological synthesis, it cannot be stated as facts. Although the maritime mode of production was founded on decentralized social settings, social stratification and political control emerged based on control over distant trading and raiding opportunities. Display of prestige goods formed an integral part of competition for power and prestige, and procuring such goods from a distance became the object of trading and raiding parties with potentials for conquest and colonization. To the degree that chiefs could control the procurement, distribution, and consumption of valuables, they could dominate new political systems, to some degree.

To understand the organizing principles of the maritime mode of production, our analysis of Scandinavian Bronze and Viking Ages proposes linkages between society’s economy, power, and institutional structure vertically (complexity) and horizontally (networks). This political economy approach iden-
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es social groups and their associations with contrasting in-
terests in a class-like system. Fundamental to our thinking were
potentials to control resource fl
ows (Earle and Spriggs 2015). Control, we argue, depended on creating property rights such as
boats and productive land, a warrior aristocracy to protect them,
and a specialized priesthood to legitimize them. Societies orga-
nized around warrior aristocracies have been labeled as “military
democracies” (Engels 1972), but they can be seen comparatively
as “decentralized complexity” based on free farmers/nomads of
autonomous households who formed an elite stratum control-
ling commoners, labor, and slaves through warrior might (Cobb
1993; Kradin 2008; Kristiansen 2013, fig. 13.7).

Viking and Bronze Age Societies
We argue here for long-term continuity in the Scandinavian
sequence from the middle Neolithic to the Viking Age. Under-
standing this continuity is important to see the sequential for-
mulation of historical conditions basic to the maritime mode of
production, but, given space limitations of journal articles, this
sequence is presented here only briefly. The Single Grave culture
(2800–2400 BC), a middle Neolithic society related to Corded
Ware culture elsewhere, dominated much of southern Scandi-
navia. It was apparently a pastoral society, as documented by its
rapid clearance of forests—probably for pasture—and by its
ephemeral settlement finds. As is common for pastoralist so-
cieties (Irons 2003; Salzman 2004; Sweet 1965a), males were
probably warriors responsible to protect and raid for movable
wealth in animals; their burials distinctively included battle-
axes. Female burials included local amber jewelry. During the
subsequent late Neolithic Dagger Period (2400–1700 BC), Bell
Beaker people colonized along the waterways of Europe to form
broad trading networks (Fitzpatrick 2011; Vandkilde 2014), and
they settled in Jutland and crossed by boat into southwest Nor-
way (Østmo 2012; Prescott 2009). Their settlements were more
permanent, with houses scattered across the landscape, suggest-
tive of small independent agropastoral farmers. Additionally,
they were traders, moving flint and amber (Østmo 2012). A
specific dagger form of Jutland flint is found widely distributed,
and amber became an export (Apel 2001). Like the antecedent
Single Grave culture, the Bell Beaker people were characterized
by warrior equipment including now flint daggers and arrow-
heads found in individual male burials. The Bronze Age (1700–
500 BC) was a direct development from the Dagger Period, but
with additions of elaborate metal weapons, jewelry, and tools of
everyday life. All bronze and other metals were imported from
the south. At this time, some social stratification emerged.
During the Iron Age (500 BC to 700 AD), locally available iron

Figure 4. Rock art from Tanum showing boats and warriors from the Bronze Age. An effective boat technology allowed Scandinavian
chieftains to concentrate the flow of wealth and to create class-based warrior societies as illustrated in the rock art. After Milstreu and
Prøhl (1999); source: SHFA. A color version of this figure is available online.
replaced bronze for many weapons and tools; Scandinavia’s connections to a world economy were severed; and, for a time, social stratification collapsed and populations clustered into defensive villages. Raiding continued, but it was rather local in nature. Later during the Roman and “migration” phases, external raiding and colonization rebuilt international connections and social stratification, as described vividly in the Anglo-Saxon classic Beowulf (Heaney 2000). It was followed by the Viking Age (700–1000 AD), a reestablishment of many of the Bronze Age social patterns and eventually the formation of the Danish State. Thus, Bronze Age and Iron Age/Viking Age trajectories exhibit a recurring rise and decline of social complexity (Kristiansen 2016). Periods of international trade and raiding witness the reformation of warrior elites and increasing social complexity, while periods without international trade seem more localized and egalitarian. A deep history approach based on structural correspondence between the Bronze and Viking Ages shows how their social trajectories unfolded similarly (Kristiansen 2016; Rowlands and Ling 2016), as exemplified in the chart below:

<table>
<thead>
<tr>
<th>Early Bronze Age (1500–1100 BC)</th>
<th>Viking Age (700–1000 AD)</th>
</tr>
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<tbody>
<tr>
<td>Mound burials numerous</td>
<td>Mound burials for the elite</td>
</tr>
<tr>
<td>The largest Bronze Age (BA) mounds are few in number and are of similar size as elite mounds in the Viking Age (VA).</td>
<td></td>
</tr>
<tr>
<td>Rock art and ship setting burials</td>
<td>Ship setting burials Seafaring is a dominant motif in both periods.</td>
</tr>
<tr>
<td>Individual farmsteads</td>
<td>Individual farmsteads and villages The largest BA farms are the same size as the largest royal farms in the VA, and considerable variation existed in farm sizes during both periods.</td>
</tr>
<tr>
<td>Ritualized meeting places</td>
<td>Commercial meeting places International trade and exchange dominated both periods.</td>
</tr>
<tr>
<td>Strong warrior ethos</td>
<td>Strong warrior ethos Elaborate chiefly swords and functional warrior swords are found in both periods’ burials.</td>
</tr>
<tr>
<td>Use of symbolic decoration</td>
<td>Use of symbolic decoration Decorative style with cosmological meaning marked status distinctions in both periods.</td>
</tr>
<tr>
<td>Hoarding of metal valuables</td>
<td>Hoarding of metal valuables The tradition of hoarding metal valuables flourished in both periods.</td>
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These notable material similarities speak to fundamental structural correspondences. The farm and the boat were primary in each period. Some elements, like the use of barrows and ship settings, were part of old ritual traditions, still visible in the landscape. Among major differences, in the Bronze Age, bronze was obtained from distant trading and was used for weapons, finery, and working tools, but in the Viking Age, locally available iron served for weapons and other things. Imported metals (bronze, silver, and gold), however, continued to mark status and to store value. Boat technology continued to be essential to trading and raiding, but with Viking Age sails and improved framing (Bill 2008: Fallgren 2008). Overall commercialization increased with market-like places beginning to emerge. Decentralized complexity in both periods was evident, but Vikings moved toward a state-like society.

To construct our model of the maritime mode of production, we begin with a summary of the Viking Age, which has rich historical sources well researched by others. Then, for the Bronze Age, we look at the archaeological evidence for Thy and Tanum, where we have personally conducted research. We take these two regions as representing rather distinctive economic opportunities, each creating local chiefly polities that were linked, we believe, into decentralized confederacies that benefited the political aspirations of both and resulted in an exceptional concentration of wealth in Thy during the Early Bronze Age.

**Viking Age**

Farmhouses and boats constituted two basal units of Viking society. Each appears to constitute independent agents in a segmental system combining or dividing according to each unit’s interests. Although inherently decentralized, regionally stratified chieftainships emerged with an aristocracy, free farmers and warriors, commoners, and slaves. Exemplifying the maritime mode of production for Scandinavia, alternative forces of decentralization and hierarchy were established by surplus production, support of voyaging, and channeled flows of wealth.

Farms were primary productive units, as originally postulated for the Germanic mode of production (Jakobsson 1992:105; Marx 1953). Each Viking Age farm owned its own land, and farmsteads were stable over long periods, suggesting established inheritance (Androuschchuk 2009; Fallgren 2008:67). Bolender (2007) compares this pattern to “house societies,” meaning that the household retained relative subsistence autonomy and inherited rights to land, as documented by long-term occupation in the same locations and the burial of ancestors on the land, and some level of social stratification emerged. During both phases, the ranges of house sizes (5–50 m length; 2–10 m width) materialized social hierarchy between the landless in hovels, free farmers in moderate houses, and chieftains dwelling in large halls (Fallgren 2008:67). Chieftains owned large farms with fertile lands and more slaves that together could produce surpluses that attracted warriors. Extra cereals and animals on large and productive farms supported labor and fashioned dependency networks using the bilateral Viking structure.

While many agrarian societies have unilateral (patrilineal or matrilineal) kinship structures that defined clans or lineages responsible for mutual defense of corporate land, Vikings were famously bilateral, acknowledging both father’s and mother’s lines (Jakobsson 1992; Odner 1973). By creating a person-focused kin network, bilateral organization maximized potential kin relations and facilitated recruitment for undertakings such as work parties, guilds, and boat crews. Anyone could become a kinsman, either real or fictive, needing only lures of gifts and support to bind them to the farm (Odner 1973). Such
open networks of kin relationship were the basis for Viking political organization. People became affiliated with aggressive leaders, not with corporate groups, as chiefs used surplus in wealth to bind people to local and regional political machines.

Boats were the second organizing feature of Viking society. Viking Age ships were “not only a political space but also an economic one” (Price 2016:169). Probably introduced by Viking colonizers, a bilateral structure organized crewing of Faroe Island fishing boats (Jakobsson 1992:103). Formed by free farmers' social positions as maritime warriors, boat units shaped unifying and demanding elements, as free farmers organized boat guilds to build and man boats. Like farmsteads, boats were structural segments, forming according to common interest. Boat groups held bilateral and fictive-kin relationships: “the relations between male members were regulated as if they were family; members identified each other in terms of fathers, brothers and sons” (Varenius 1998:141). A masculine, martial ethos was expressed on runic stones, referring to naval "brothers" who had died in combat and to naval officers of Rāf power, as expressed in runic stones and ship-shaped graves. (Jakobsson 1992:81). The boat was a metaphor for Viking Age power, as expressed in runic stones and ship-shaped graves. Raffield, Price, and Collard (2017; cf. Barrett 2008) argue that Viking Age war bands were partly caused by social inequality and by polygyny and concubinage leading to “a pool of unmarried men motivated to engage in risky behaviors that had the potential to increase their wealth and status, and therefore their probability of entering the marriage market” (Raffield, Price, and Collard 2017:1).

Boat crews were largely self-organizing based on common self-interest. Free farmer families produced surplus in sons (Kristinsson 2010, 2012). Because younger sons could not inherit the farm, they sought opportunities elsewhere for livelihood, organizing crews for trade and plunder. They operated much like pirates (Price 2016:169). Financed by parents, brothers, and relatives to “go Viking” meant to join the seasonal raids, hoping to return wealthy or to lose one’s life in the effort. Voyaging, their stories, and booty materialized personal valor. Many rune stones testify to such expeditions, especially from central Sweden (Jakobsson 1992). Entrepreneurial war bands were seasonal, and for the rest of the year, youths lived within their kin, for whom they worked (Kristiansen 2018). A valorous sojourner might be asked to join a wealthy family as warrior, increasing opportunities to augment wealth, buy a farm, and marry. How could this bottom-up process of self-improvement, however, become centrally controlled?

Agricultural surpluses of chiefly farms financed maritime ventures and thus channeled foreign flows of metals and slaves. Bilateral kinship recruited specialty craft guilds (including boat-builders), work parties (for felling and trees), and personnel to crew boats. Although it is possible, and probably likely, that others could build and man boat crews, the logistical difficulties offered a selective advantage to chieflains to finance boatbuilding and voyaging. As boat owners, they would thus have received the most returns from a successful voyage, amassing wealth as political currency. Both early Arab, Frankish, and English sources picture Vikings as raiders enticed by precious metals, with silver foremost (Sindbaek 2008, 2011). About 800,000 silver coins have been found in Scandinavia, which includes “more Viking Age coins from Germany and England than ever have been found in respective countries” (Gullbekk 2008:164). This wealth was gifted to attract allies and to display personal status, but also to attract warriors and to finance boatbuilding and distant travels (Gullbekk 2008:164; Sindbaek 2011). Toward the end of the Viking Age, monarchs mobilized fleets and armies to expand their kingdoms by conquest and colonization, ruling, for a time, parts of Scandinavia, England, Ireland, France, and beyond. Recruitment for armies took on new, larger proportions, and male warriors in several cemeteries have strontium isotopes showing foreign origins (Price et al. 2011). Seeking service with the highest or most promising bidder, warrior/mercenaries created a diaspora, reflecting political and demographic pressures (Jesch 2015; Price 2015; Price and Gestsdóttir 2006).

To explain the political economy of Viking Age society, we outline the formation of Viking war bands, the līd, a retinue of maritime warriors (Lund 1996; Raffield et al. 2016; Varenius 1998). Although skeptical about projecting historical patterns backward in time (Lönnroth 1963:103; Varenius 1998:36), many scholars discussed Viking Age war bands as renewing ancient forms of maritime organization (Jakobsson 1992; Price 2016; Raffield et al. 2016; Varenius 1998:36). Most scholars argue that households were basic Viking Age units for the maritime war bands (Jakobsson 1992; Lönnroth 1963:103; Sindbaek 2011; Varenius 1998:36). They included maritime specialists and warriors, organized by social standing and residential place (Jakobsson 1992; Varenius 1998:36). Runic stones suggest that navigating officers were elite personages and free farmers constituted crew (Jakobsson 1992; Varenius 1998).

From the Scandinavian maritime sector derived forest timber, labor, and woodworking expertise needed to construct and man boats. Experimental archaeology has shown that building a 30 meter long ship may have taken as much as 40,000 working hours. . . . Assuming a 12 hour working day . . . to build such a ship one should command the surplus production of 100 persons for one year. Taking it to sea for four months meant that 70 men were taken away from production and had to be fed. . . . this would require one year’s surplus from 460 producers. (Bill 2008:170)

Boatbuilding was complicated, involving collective labor and logistics to exploit remote woodland appropriate for boats as well as wool and tar for sails (Ravn 2016). Finance for boatbuilding likely came especially from chiefs, who then owned the boats.

To realize groups for boatbuilding and for long-distance raiding and trading, labor had to be transferred from fieldwork to voyaging. As described by historical documents, slaves apparently filled farm labor gaps. Unfree labor (with different names) provided heavy fieldwork, herding cattle, household chores, and farm management (Brink 2008:55). With unfree labor working farms, free-farmer warriors could participate in voyaging to raise their social standing and capital. Although
Scandinavian slaves did not occur in large numbers on ordinary farms (Brink 2008:54), chiefly farms possessed more.

As significant Viking Age trade commodities, slaves were sought by Vikings both to bring them home and to trade them internationally. Wherever Vikings moved in Western Europe and the Baltic or Slavic regions, they captured slaves (Brink 2008:50). Rather large numbers were seized in Western Europe, for example, for ransoms or to be sold (Brink 2008:54). Vikings traded slaves against gold, silver, bronze, and other precious commodities, as described in Old Norse sources concerning the trading centers of Birka and Hedeby (Brink 2008). Price (2016) succinctly captures these relations: “raiding is slaving is trading” (170).

Because chieftains owned many boats, flows of slaves, metals, and weapons were channeled through their hands. Weapons and other valuables marked status, armed warriors, and provided working tools for boat and house construction. Chieftains distributed gifts to establish fealty and alliances. Kings, aristocrats, and chieftains maintained specialists for precious metals, textiles, and other status objects. Ultimately specialty manufacture occurred in kings’ towns, but local chieftains always supported craft production, showing that the political economy was decentralized (Ljungkvist 2008:190).

Iron swords were typical Viking Age weapons; double-edged swords “measuring about 90 cm in length were by far the most common” (Oakeshott and Peirce 2002; Pedersen 2008:204). Most swords were locally cast, but elaborate swords, as well as other extraordinary artifacts, were foreign. In form, shape, and functionality, Scandinavians copied enemies’ swords (Oakeshott and Peirce 2002) because of the desirability to fight with equivalent weaponry (Jakobsson 1992). Viking swords were highly influenced by Frankish, Anglo-Saxon, Irish, and Russian forms, suggesting that conflict, not peaceful trade, characterized Scandinavian movements in Viking Age and earlier Bronze Age sojourns (Kristiansen and Larsson 2005).

In sum, Viking Age terrestrial and maritime sectors held distinct, complementary potentials and skills to form a dynamic, integrated macroregional economy in Scandinavia. In the land-based sector, all farms used slaves to provide labor. Larger and more productive chiefly farms could accumulate additional slave labor to produce surpluses to support warriors, craftsmen, and ritual specialists and fund construction and manning of boats and crews. Providing seafaring and woodworking skills, the maritime sector produced and manned boats, but especially chiefly farms provided their financing. Based on sectoral complementarity, raiding and trading expeditions amassed wealth that chieftains distributed to fashion chieftaincies and confederacies. This maritime mode of production apparently had ancestral roots in the Bronze Age.

Scandinavian Early Bronze Age Societies and Regional Confederacies: A Maritime Triangle between Northwest Jutland (Thy), West Sweden (Tanum), and Southwest Norway (Rogaland)

During the Early Bronze Age through Eurasia, emerging long-distance trade created a new world order as communities became dependent on supplies of metal from distant places, not unlike today’s reliance on oil and gas. With international interdependency, the Bronze Age marks a significant economic revolution, as transformational as the Neolithic revolution (Kristiansen 2015; Kristiansen and Larsson 2005; Vandkilde 2016). It was supported by a universal rise of populations throughout Europe, which increased by more than 50% between 2000 BC and 1500 BC, amounting to 13–14 million by 1500 BC (Müller 2013: figs. 8, 10). Located to Europe’s far north, Scandinavia might seem to have been a frontier zone in Bronze Age times. Nothing could be farther from the truth: between 1500 and 1100 BC, a remarkable society developed there, with metal wealth, large chiefly farms, and impressive burial landscapes. Critical for this expansion was, we believe, local improvements in seaworthy boats linked to surplus-producing farms that financed a network of economic facilitators (traders) and predators (raiders). Although the extent of social integration during the Bronze Age was extensive, ranging from Norway, across Jutland and the Danish islands, and into the Baltic and Germanic coasts, we have chosen the three regions Thy, Rogaland, and Tanum to exemplify the complementarity of Scandinavian regions for Bronze Age maritime confederacies. These connections, however, had more ancient roots beginning with the expansion of Bell Beaker people (2300–1900 BC), which was followed by a second expansion period of the fully developed Nordic Bronze Age of Periods II–III (1500–1100 BC). The evidence can by summarized as follows:

Bell Beaker period. With expanding trade across Europe and new maritime technologies, Bell Beaker people apparently searched out and transported copper and high-quality flint from 2400 to 1900 BC (Fitzpatrick 2011; Østmo 2012; Vandkilde 2014). In northwestern Jutland, they found good sources of amber and flint and started a nearly industrial production and export of high-quality flint daggers to the rest of Scandinavia based on systematic mining of good flint sources in Thy (Vandkilde 2014). Eighty-one flint daggers have been found in various sources (hoards, graves, and stray finds) in Tanum; these flint daggers were, for the most part, produced and imported from Thy, and in Rogaland, southwestern Norway, we find a similar picture (Apel 2001; Østmo 2012). It corresponds to the beginning of deforestation and the expansion of a pastoral economy in both regions, in part based on migrations from Jutland (Prescott 2009). The qualitative step that triggered the expansion of a Bronze Age maritime economy was, we believe, chieftains’ ability to control trade in flint daggers and early metal by financing maritime forces of production and transport.

Nordic Early Bronze Age period. The second expansion period falls between 1500 and 1100 BC and represents our case study. A major clearance of remaining forest took place in Thy after 1500 BC (Andersen 1999). Access to good timber was now scarce, but there was still an overall need for timber for boats and longhouses in the densely settled Thy (fig. 5). By now, population figures were close to or even exceeding carrying capacity, especially after 1300 BC, with absolute population numbers comparable to those from the preindustrial period in Thy, 1800 AD (Kristiansen 2017). Such demographic surplus would be sent...
off to less dense landscapes in southwestern Norway, as evidenced in similar burials and bronze objects in both regions (Hornstrup 2013). Also, Tanum in Bohuslän, west Sweden, could have received surplus population from Thy; in both Tanum and Rogaland, this is followed by increasing deforestation of the landscape (Ekman 2004; Prøsch-Danielsen and Simonsen 2000). Based on this, we believe that coastal Bohuslän in western Sweden and similar northern areas in southwestern Norway, with rich forests and maritime skills, developed reciprocal confederacies with agriculturally rich zones including Thy,

Figure 5. Local settlement pattern in Thy, Denmark (after Holst et al. 2013). Squares = settlements; dots = barrows; dashed lines = hypothetical infield-outfield boundaries.
especially after 1500 BC, which is supported by a number of additional factors.

Thy occupied a favorable maritime position that probably served as a transit zone (bottleneck) for metals coming from Atlantic networks. Lead isotope analysis carried out on metals from Tanum, Rogaland, and Thy indicates that most of the metal dated to 1500–1100 BC derived from the same sources in Europe and that most of this copper was transmitted to Scandinavia via an Atlantic trade network (Ling and Stos-Gale 2015; Ling and Uhnér 2015; Ling et al. 2014; Melheim et al. 2018). With regard to Thy’s maritime position and the metal wealth in this region, it is logical to assume that the metal was transferred via Thy to northern Bohuslän and to southwestern Norway (figs. 3, 4).

This maritime trade in metal was supported by a system of sea currents that connects the British Isles with western Scandinavia (Earle et al. 2015; Turrell 1992; see also figs. 3, 4). The Jutish sea currents connect Jutland, in turn, with west Sweden and southeast Norway, and up to the modern age, fishermen have used them to save time and effort (Hasslöf 1970; Turrell 1992). Seafaring Bronze Age mariners would undoubtedly have benefited from these currents as well. Maritime groups from Thy could have organized interregional trade expeditions, starting and more or less ending at Jutland, with the use of these currents. More intriguingly, the size of this system correlates with the size of the classical Kula ring (Malinowski 2010 [1922]).

Rock art manifests maritime trade between the coastal regions connected to the sea currents (fig. 4). Several scholars have argued that the ship iconography represented in rock art in Bohuslän and Rogaland must be seen in light of the maritime connections with Jutland (Kaul 1998; Kristiansen 2004; Ling 2014; Pettersson 1982). In fact, there are plenty of rock art scenes depicting bronze weapons that have not been recorded in burials among coastal settlements in Bohuslän and Rogaland, while such weapons have been found in large numbers in burials in Jutland.

The rock art area of northern Bohuslän with thousands of ship depictions and access to timber was a focal area for the organization of maritime activities, including shipbuilding, as we shall discuss below. This could have been one of the regions that provided Thy with boats, when their forests were depleted by 1300 BC. In fact, the first historical evidence from the twelfth century AD shows that northern Bohuslän traded timber and boats against agropastoral products with Jutland (Hasslöf 1949). Moreover, during historical times, the Danish naval fleet was constructed using timber from northern Bohuslän (see Hasslöf 1949, 1970).

We can thus conclude that during the period 1500–1100 BC there developed increasingly close ties among the maritime triangle of Thy, Tanum, and Rogaland and that they served complementary economic functions to each other. This was based on landholding chieftains’ ability to control trade in metal, by financing maritime forces of productions. We shall therefore, in the following, probe more deeply into the organization of these two economic systems: the land-based sector of Jutland in Thy and the maritime-based sector in Bouslän, Tanum.

Land-Based Sector of Jutland: Thy

Ancestral to Nordic Bronze Age society in Jutland, a Single Grave pastoral society (2800–2400 BC) occupied Thy. It was distinguished by individual burials that include male interments with battle-axes. Pollen diagrams show rapid forest clearance to create pasture land (Andersen 1995, 1999; Odgård 1994), although settlements were ephemeral. Bell Beaker populations then settled in Thy after 2400 BC (Earle et al. 1998; Prieto-Martínez 2008, 2012). Continuing the warrior ethos, every house had at least one dagger, and individual male burials held especially fine examples. Farm-like settlements emerged (Earle et al. 1998). The fusion of these societies, both with pronounced warrior ethos, underpinned the emergent Bronze Age society for which warriors served as agents in warfare and trade. Reflecting an expanding pastoral economy, a second land clearance took place in Thy after 1500 BC, and construction of the barrows followed. After 1300 BC the last forests disappeared, probably necessitating northern wood importation to build boats and chiefly halls (fig. 5). This depletion corresponded with peak metal consumption, barrow construction, and settlement density in Thy (Kristiansen 2017).

From 1500 to 1100 BC, an Early Bronze Age political hierarchy emerged in the productive landscape of Thy (fig. 5) with its many farms and rich burials (Bech, Eriksen, and Kristiansen 2018). Household density was 1 per km² and locally higher (Bec and Mikkelsen 1999; Earle and Kolb 2010). With a household consisting of eight to 10 extended family members and perhaps three to five slaves, population density of 12 per km² seems reasonable (Holst et al. 2013).

The Early Bronze Age was the period of marked wealth and social distinctiveness, as documented by hierarchical sizes of households and burial monuments. Central to each farm was a three-aisle residence. Most were about 18 m long with wattle-and-daub walls; some were smaller. A few, like Legård’s chieftain halls, were over 30 m long and constructed of massive roof-supporting posts and plank walls, probably decorated elaborately with carving, as is known for Viking halls (Bec and Eriksen, and Kristiansen 2018). On low hills above the farms are several thousand barrows—graves of chieftains, warriors, and free farmers; most were 2–3 m tall and 15–20 m in diameter, while a few large barrows were above 5 m tall. Building large halls and prominent burial monuments required substantial labor, and we believe that successful farms became seats for chieftains managing production of surpluses. By provisioning animals and grain for specialty labor and feasts, a chieftain farm could have crafted a microregional dependency of farms with supporting warriors and could have financed boatbuilding and expeditions.

The singularity in metal richness in Bronze Age Thy is shown by its quantities of bronze objects. Figure 6 documents increases in numbers of swords from Periods II (1500–1300 BC)
to III (1300–1100 BC). Period III richness is dramatic: both flange-hilted (warrior) swords and full-hilted (chiefly) swords increased. In Thy, every free farmer seems to have been armed with a sword. There also were other bronze weapons, sickles, and ornaments from burials and hoards. Thy then was one of the richest regions in Scandinavia and all of Europe (Kristiansen 1978). The key question is how the people of Thy could have accumulated such large quantities of imported metal on the fringe of Europe. What was their comparative advantage in trade? We propose that they controlled the distribution of metal to southwestern Scandinavia via Bohuslän and Rogaland. We shall therefore look more closely into the role of Bohuslän in this maritime system.

**Maritime Sector of Bohuslän: Tanum**

Documenting a long-term maritime adaptation in Bohuslän, the earliest Mesolithic settlements and later Neolithic settlements and megalithic graves were oriented toward the sea (Sjögren 2003). Early diets combined both maritime and terrestrial sources (Ling 2014; Sjögren 2003), and farmstead and burial locations in the Dagger period and Early Bronze Age document a mixed maritime and land-based economy. Fishing and farming are a deep northern Bohuslän tradition, as manifested in rock art. The coastal population, often called fisher-farmers historically, combined these two subsistence components. Bohuslän also was one of Scandinavia’s foremost boatbuilding centers.
The Tanum Case

Tanum is singularly distinctive for the highest concentration of Bronze Age rock art in Europe. About 70% of the rock art was located near the sea, which in the Bronze Age was a large, shallow bay (fig. 8). Nearly 2,000 boat images have been documented there. Tanum encompasses about 150 km², with granite ridges and hills framing the landscape of open plains and narrow valleys and passages. From about 1800 to 1100 BC, parts of western coastal Sweden and coastal Norway became deforested (Ekman 2004; Prøsch-Danielsen and Simonsen 2000), and, because population densities were comparatively low then, clearing may well document timber harvest for boatbuilding and perhaps export. Deforested early in the Bronze Age, lowlands of Tanum likely served for agropastoralism; however, higher ground in its eastern parts remained forested (Ling 2014; Svedhage 1997). During the Bronze Age, we suggest that perhaps fewer than one household per 2 km² existed here, with a tentative population density of less than 4–6 per km² (fig. 8). Even if an agropastoral economy were its foundation, marine resources doubtless played an important role, as evidenced from boats and fishing scenes on the rock art (Ling 2014). Based on historical parallels, the people of the Tanum area could easily have held knowledge for boatbuilding and voyaging and could have provided wood in trade.

We propose that boatbuilding became part of the regional economy. A well-preserved boat from Hjortspring, Denmark, illustrates the labor and material investment in Bronze Age boatbuilding. This boat, which dates to around 375 BC, had a remarkably similar design to the Bronze Age rock art boat images from Tanum, suggesting continuous boatbuilding traditions in Scandinavia from the Early Bronze Age to the pre-Roman Iron Age (Crumlin-Pedersen 2003; Kaul 1998, 2003; Østmo 2012). Further supporting boatbuilding continuity, a plank-built boat from Haugvik in Norway has recently been dated by radiocarbon determination to the end of the Late Bronze Age (Østmo 2012; Sylvester 2006). Experimental Hjortspring replicas record high labor and timber requirements for Tanum-like boats. Such a boat would have required about 6,500 man-hours to build (Valbjørn 2003:235). These war canoes were similar to Solomon Islands war canoes, which we describe below as requiring years in construction (Clausen 1993). Considering ethnographic parallels, the spatial distribution of Tanum rock art appears to document a ritual chain of boatbuilding: on high ground where trees were cut for the craft; adjacent to settlements where crafts were roughed out; and most commonly near the shore for launching,
embarkation, and return. Financed by chiefs, as in the Oceanic cases, boats would likely have been their property.

Although Bronze Age Scandinavian boat remains are still absent, abundant Bronze Age ship images in Tanum undoubtedly represent local practice for producing and manning boats, which could have become a specialized activity in the macroregional division of labor (Ling 2014). Given the open location and low technologies in production of art panels, Scandinavian elites/chiefs would not have monopolized this medium. Rather, the art probably represented individual agency by the maritime population as they strove for success on risky, long-distance expeditions (Ling 2014). By creating and displaying rock art, individuals could have recorded their actions, communicated their ideals, and proclaimed their positions in society (fig. 4). Having provided an outline of the geographical organization of maritime confederacies during the Early Bronze

Figure 8. Map of the decentralized Bronze Age society in the coastal region of Tanum, west Sweden. Illustrated by different Bronze Age remains and showing a shoreline about 15 m higher than the present. Gray dots = figurative rock art sites; white dots = cup mark sites; black dots = cairns; large light-gray triangles = settlement finds (carbon dates, ceramics, or other features) dated to the Bronze Age; small triangles = indicative settlement sites from the Bronze Age; large circles/dots = bronze items; diamonds = flint daggers; white flashes = flint sickles. After Ling (2014). A color version of this figure is available online.
Age, 1500–1100 BC, and their internal organization in Thy and Bohuslän, we will now describe four basic elements of this maritime mode of production.

The Four Elements of the Bronze Age Maritime Mode of Production Model

The Scandinavian Bronze Age maritime mode of production model has four elements: crew sizes, surplus production, metal wealth, and exports of amber and slaves.

**Crew Size**

Ethnographic and historical data (Johnson 2007; Varenius 1998) suggest that households were the basic structural unit for Bronze Age maritime war bands. As depicted on the Tanum rock art, ships typically had crews of six to 13 (Ling 2014); in other maritime chiefdoms, single households typically provided one crew member (Clausen 1993; Johnson 2007). Tanum could thus have provided perhaps 30–50 maritime warriors, enough for three to four standard boats; however, the largest ships, as represented in the rock art, had crews of 60–100 (Ling 2014), with defined status positions, including elevated or enlarged war canoes (fig. 9). These are the ships, probably accompanied by smaller boats, that would have been central to long-distance trading and raiding sojourns for metals, textiles, and slaves, and, we argue, such ships would have been the outcome of transregional confederacies as between Tanum and Thy. At least some of the boats from Tanum were probably constructed, owned, and partly manned by wealthy chiefs from agropastoral regions such as Thy. For instance, the Hassing district in Thy, with about 250 farms, could thus have provided 93 crew members (Holst et al. 2013), enough for a lead vessel, as seen on the rock art.

**Surplus Production**

If local Tanum people were involved in the building and manning of boats, then we must consider their compensation. Cross-culturally, feasts are sponsored by leaders to reward work parties involved in such activities (Hayden 2014). Although some Tanum farmers probably constructed boats on their own initiative, constraints on labor and finance, especially for larger boats, would have limited their options. As a result, chiefs could have been the primary sponsors and thus could have received trading prizes disproportionately. The potential of Thy to produce sizable surpluses of animals and grains would have provided the means to support boat construction and crewing and could explain the wealth concentrated in Thy. Chieftains could have provided special foods (like meat) and drink for the feasts. Also important would likely have been gifts such as cattle hides and flint from Thy. At this time, its farms intensified cattle production probably to export cattle hides and meat (Earle 2002), and specialty flint production sites were also present (Apel 2001). Thy’s comparative advantage for these exports would likely have been to northern areas like Tanum, with less productive pasture land; Tanum also lacked the high-quality flint sources that were available in Thy. No such comparative advantage for Thy existed southward toward Germany, where a cattle complex was likely to have been equally productive to Thy’s, and available metal would have undercut the value of traded flint.

**Metal Wealth**

The importance of metal wealth for the Scandinavian Early Bronze Age political economy cannot be overemphasized. It provided weapons for an emerging warrior class, elaborate personal equipment of male and female chiefs and warriors (Kristiansen and Larsson 2005), and many tools for woodworking and

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**Figure 9.** Crewed rock art ships from Tanum, Early Bronze Age (top) and Late Bronze Age (bottom). Documentation by T. Högberg and G. Tanums Milstreu; Hällristningsmuseum Underslös; source: SHFA.
other tasks. The magnitude of Bronze Age metal trade was quite extraordinary as seen in rates of metal consumption. All metals were imported from long distance, with at least two major Bronze Age systems of metal flow, each with rather distinct bottlenecks that would have served for emergent social hierarchies (Earle et al. 2015). As documented by its extraordinary richness, Thy’s dominance of Early Bronze Age metal consumption suggests its central role in expanding chieftaincies.

How large were stocks of bronze in Denmark during the Bronze Age, and how fast was the rate of replacement? Recent analysis of Big Data (White 2009) from the Bronze Age (Holst et al. 2013) allows us to determine large bronze stocks in daily use during 1500–1100 BC. If, as a conservative estimate, half of Denmark (22,000 km²) were settled at 1 farm per km², and each farm had at least two working axes of 500 g (the most important tool for daily purposes), the farms required a stock of 22 metric tons of bronze. Because axes would have been worn by daily use and resharpening, as documented by use-wear analysis, they were, conservatively, reduced annually by 5% (25 g per farm) suggesting a replacement rate for Denmark of 1 ton per year. Add to this the considerable consumption of bronze sickles, weapons, and ornaments for use, replacements, burials, and hoards. Between 10,000 and 20,000 swords alone were deposited during Periods II–III (Bunnefeld and Schwenzer 2011; Kristiansen and Suchowska-Ducke 2015). From these rough extrapolations, we estimate that annual imports of metal must have been very high, at least from 1500 BC, and would have demanded regular, well-organized annual procurement.

Additionally, textile imports, whether finished or semifinished, were needed. In northern Europe at this time, no evidence yet exists for large-scale textile production (Bergerbrant 2007; Prescott and Melheim 2017), and at least 80% of analyzed wool fragments were imported from outside Denmark (Frei et al. 2017). Again, such imports must have been substantial and costly. Considering the estimate of Denmark’s population (220,000) at this time, thousands of pieces of cloth would likely have been imported annually from the south. How was trade in metal and textiles organized to make Thy, and ultimately Denmark, so rich?

Exports of Amber and Slaves

To compensate for high volumes of metal and other goods imported into southern Scandinavia required a significant competitive advantage for equivalently highly valued and high-volume exports from Scandinavia. What products could possibly have supported such substantial imports? Amber is the traditional answer, and the richness of amber sources in Jutland would seem to match the concentrated wealth in metal. Although in low amounts, amber is distributed broadly in rich Bronze Age burials and loose finds throughout Europe and the Mycenaean world. Amber is of Baltic origin (Harding 1990), most probably from the coast of Jutland and a few other “amber coasts” such as Simris in eastern Scania, where famous burials held local and foreign motifs engraved on stone slabs (Goldhahn 2013; Kristiansen and Larsson 2005).

Amber was highly valued in the south, probably close to gold as in Roman times, and would therefore have served as an important commodity. However, quantities of metal and woolen textiles, as just outlined, would demand a rather extraordinary export in amber. Recent research in Thy recovered raw amber collected for export, but in the Early Bronze Age only in small amounts (Earle 2018). In Periods II–III, when the region abounded in rich metal finds, only one small bag with 69 pieces of raw amber was recovered from a warrior’s house; all other finds, including large chiefly halls, had only a few scattered pieces. We therefore conclude that, although amber was an important Scandinavian export, this alone would not suffice to compensate for high-volume imports.

What comparative advantage in Scandinavia could have allowed for such rich accumulations of metal that would have built the decentralized complexity of chieftaincies? Here the advantage appears to have been in warrior might and maritime capability, both an outcome of metal trade and macroregional integration. The warrior-maritime specialty would have created a fearsome trading-raiding package. We propose that slaves, along with amber, were Scandinavia’s primary exports in the emerging world system to meet labor shortages created by new regional specializations throughout Europe (fig. 10).

But could slaves have been a key Scandinavian export? As a bulk commodity of high value, slaves would have been desired by Bronze Age communities in Scandinavia as well as farther away in urban palace societies of the eastern Mediterranean and elsewhere. Blonde northern slaves are shown in Etruscan wall paintings (Briggs-Nash 2006), representing perhaps a continuing practice already established in the Early Bronze Age. As described comparatively for Viking, Haida, and Philippine maritime societies, wealth in captive human bodies could have derived from local interchiefdom wars and from raids into coastal and riverine settlements along voyaging routes. The importance of slaves in the Viking case provides the likely homology. When individuals from a defeated population were not killed, “they had forfeited their right to be free” (Brink 2008:50).

Slaves would have been captured by warrior/traders plying the coasts of Scandinavia, northern Germany, the Baltic, and elsewhere. Coastal populations would have been vulnerable to fast-acting raiders as described by Viking era documents. We acknowledge that this scenario is speculative, but some suggestive data support it. Possible evidence for slaves in the Bronze Age includes the following examples. Nonformalized burials of those sacrificed or killed for other reasons occur in Early Bronze Age and Middle Bronze Age central European settlements (Knipper et al. 2014; Kristiansen and Larsson 2005). From the Unetice culture in Poland, a possible male slave from Scandinavia suffered a particularly bad diet before being killed (Pokutta 2013:chap. 6.3). From the island of Thanet off the southeastern point of England, where a Late Bronze Age settlement is interpreted as a trading place, with findings of metal ingots and Baltic amber, stratigraphy and oxygen isotope signatures in human bone
document that, together with local people, some individuals have Scandinavian signatures and others have west Mediterranean signatures (McKinley, Schuster, and Millard 2013). Dating to Late Bronze Age, a female with a clear Scandinavian signature was buried together with others in a pit inside a large ring ditch enclosure (McKinley, Schuster, and Millard 2013:159). Some scholars argue that various burial findings in southern Scandinavia suggest Bronze Age era slaves. Barrows were only for the top segment of free farmers, around 20% of the population, whereas commoners and possibly slaves were sometimes buried in simple flat and gallery graves (Bergerbrant et al. 2017). Possible evidence of a Bronze Age slave raid in Sund, Norway, dated to 1400 BC, includes the finds of a brutal massacre of 22 individuals, most belonging to children, all buried in a mass grave (Fyllingen 2003). Parallels to the above mentioned finds in Thanet could be drawn. Additionally, some Bronze Age farmsteads may have been structured to house slaves (Mikkelsen 2013:62). Tracing back to the late Neolithic, these structures contained segregated sections perhaps for “a family of slaves or non-free workers” (Mikkelsen 2013:62). Especially considering the importance of slaves as commodities in Viking society, future research should systematically investigate the Bronze Age role of slaves. Finally, several Scandinavian rock art panels show lines of people, sometimes linked together, suggesting captured slaves (fig. 11).

Maritime Mode of Production Summarized

For the Viking and Bronze Ages, the maritime mode of production becomes a model of how warrior aristocracies were able with rich farms and superior boats to expand trading, raiding, and colonization. A linkage was established with the division of power and labor between Denmark as a center of agropastoral surplus production and wealth accumulation, west Sweden and Norway with access to boat timber and maritime specialists, and Europe with both a demand and a source for slaves. With new mobility, raiding and slaving by aggressive warriors of the sea would have given them comparative advantages with respect to the emerging world economy. They could seize and trade slaves to the British Isles, central Europe, and possibly the Mediterranean and in return amass considerable wealth and power. As exemplified by the maritime mode of production, the political economy of maritime chiefdoms can be expected to contain the following elements:
1. Low-density populations interconnected by exchanges of wealth
2. Warriors able to raid, trade, protect, and intimidate
3. Agricultural sector with productive lands and autonomous households owned by free farmers and chieftains
4. Slaves as an exchange commodity and as labor to expand surplus production
5. Maritime sector with timber and specialized knowledge of boats
6. Ownership of boats by chiefs who supported their construction
7. Entrepreneurial voyage overseen by chiefly captains
8. Raiding along voyaging routes for slaves and other valuables
9. Transfer of metals and slaves to chieftains who owned boats and financed voyages
10. Gift exchanges by chieftains to establish networks of power and alliance

In the maritime mode of production as developed for Scandinavia, the three sources of power appear intertwined to fashion chieftaincies and confederacies. Positive growth cycles included agricultural intensification, expanding maritime raiding-trading voyaging, wealth accumulation and distribution, and the formation of dynamic networks of power over extensive regions. Foundational was economic power exercised through ownership of large farms and boats and sponsorship of maritime ventures. Warrior power was instrumental to protect and extend chiefly lands and wealth movement and to seize slaves. Economic surpluses, which were invested in weapons and boats, allowed chiefs to fix warriors to chiefly interests, as these warriors also pursued their personal social advancement. And then there was ideological power, which gave meaning and legitimacy to chieftains and warrior service. With economic surpluses, chiefs supported feasts and religious specialists in ceremonies to mitigate risks of distant voyaging and warfare. Objects and actions took on special value by the ritual contexts in which they served.

In world historical terms, structural similarities existed in Europe during the Bronze Age and Viking Age. Our Bronze Age maritime mode of production for Scandinavia relies on the historical specificity of the Vikings. For each of these specific
phases, a new maritime technology changed the rules of the game, allowing Scandinavian sailors, warriors, and chiefs to dominate to some measure flows of weapons, slaves, and status objects. Importantly, most Viking raiding was on a small scale and was maritime and seasonal in character. Slaves were one of the most important commodities in the Viking trade (Brink 2008), and we argue that the same was true in the Bronze Age. Locally, they supported a political economy where warrior farmers were on the move, requiring labor at home that was managed by empowered warrior wives. But slaves could also be sold for metal to distant markets in centers of civilization.

Viking raids and their Bronze Age equivalents were most efficiently accomplished by the mobility gained by human-powered (oared or paddled) boats, not too big that they could travel independent of winds and move silently in and out of coastal settlements. Viking Age chieftains and their followers appeared and disappeared, raiding and trading as they saw advantages. They could establish colonies and trading hubs, drive fear into competitors, and negotiate political and economic relationships. All markets would be opened to them, or consequences followed. Parallel processes, but on a smaller scale, appear to have taken place in Bronze Age Scandinavia. New maritime skills driven by northern chieftains would fundamentally change world interactions, providing slaves and probably warrior service for metal and other wealth from the Atlantic façade, into the Baltic Sea and Russian rivers, up the Elbe and Oder Rivers into Europe, and perhaps even to the Mediterranean.

**Maritime Mode of Production in Comparative Perspective**

The maritime mode of production as described for Scandinavia can be compared with other decentralized, maritime chiefdoms (cf. Bjerck 2009). Although chiefdoms are thought to develop in high-density situations, this is not always the case. When it was possible to control flows of wealth, chiefdoms could emerge at very low densities by binding together polities by gift networks of alliance and dependency. Such maritime chiefdoms used "exclusionary" strategies to distinguish status (Blanton et al. 1996), and warriors provided the means to protect and raid wealth. Slaves from raiding provided labor and exchange value.

Examples of maritime chiefdoms include societies on the islands of Southeast Asia, the Pacific, and the western coast of North America. Illustrating maritime chiefdoms on the edge of a world system, Junker (1999) describes Philippine societies that depended on trading and slavery during the late prehistoric and early historic periods. She emphasizes the low population densities throughout Southeast Asia (5.5 per km²) and the fundamental segmental structure of societies. "The Philippine archipelago became the easternmost edge of a vast network of Chinese, Southeast Asian, Indian, and Arab traders that circulated porcelains, silks, glass beads, and other luxury goods throughout the South China Sea and through the Malaccan Straits into the Indian Ocean as early as the beginning of the first millennium A.D." (Junker 1999:3). Philippine chiefdoms were not traders. Rather, they controlled exchange by creating entrepôts, channeling export products, administering international trade to extract wealth, and raiding for slaves. Essential ingredients to Junker’s model were the warrior nature of society able to obtain and maintain distant relationships, disrupt competitors, seize and trade slaves, guarantee the peace of market transfers, and mobilize exports. Chiefdoms supported a warrior class armed with specialized weapons obtained internationally and repurposed locally. Acquired in raids, slaves provided obligated labor, which was relatively scarce under conditions of low population densities and limited circumscription. Slave labor built and farmed pockets of intensive irrigated rice fields that supported chiefly warriors and elites and urban port settlements. Female slaves were prestige objects involved in political exchanges to negotiate confederacies (Junker 2018). Obtaining and protecting trade networks into Philippine interior areas channeled specialized forest products, desired in Chinese markets, through chiefly hands. In the Philippine case, as exemplifying fully developed world systems, traders were international agents who acted independently of chiefs, who taxed commerce and monopolized distributions of foreign commodities.

Commonly, as in the Scandinavian examples, chiefs control trade by owning boats and supporting warriors to protect them. Providing bottlenecks in wealth flows, ownership of boats allowed for mobile and low-cost trading and raiding. In certain Pacific cases, isolated from the world systems, chiefdoms were based on large seaworthy canoes. A good example was the powerful maritime chiefdom located in the Roviana Lagoon in the Solomon archipelago, southeast of New Guinea. Amazing early European explorers, the region’s famous war canoes (tomoko) were large plank-built vessels with high prows; they were among the finest maritime technology ever seen in the Pacific and were remarkably similar to the Hjortspring boat (Clausen 1993). Elaborate prows, although not on the Hjortspring boat, were represented on Tanum rock art. The tomoko took 3–4 years to build, involving several stages, each marked by rituals to manage high-risk, open-sea voyaging (Clausen 1993). These canoes could hold 30–60 ferocious warriors who traveled fast, often covering 200 km of open ocean. The social organization of Roviana was a hereditary chiefdom with pronounced ranking, and chiefly power relied on organizing maritime headhunting expeditions (Walter and Sheppard 2006:145). Chiefs displayed heads at forts and shrines to call on their powerful ancestors and to demonstrate power (Walter and Sheppard 2006). Headhunting expeditions also procured tradable wealth in slaves, who, among other things, manufactured shell valuables.

Located north of the Solomon Islands, Trobriand chiefdoms participated historically in the Kula Ring trade of valuables (Malinowski 2010 [1922]). Trade involved sea voyages of relatively high risk. Every step in the manufacture of canoes and voyaging involved ritual and magic as an interwoven praxis across the landscapes: (1) cutting down trees on high ground; (2) basic fashioning of the canoe by craftsmen at villages; (3) finishing work at the shore; and (4) the canoe’s launching. Chiefs mobilized food surpluses to support rituals at each step. Fi-
nancing boatbuilding and voyaging, chiefs were the canoe owners, and Kula valuables passed only through their hands.

Removed from the world system, in the central Pacific more complex chiefdoms and state-like polities developed based on trade and conquest. During the second millennium AD, for example, Tonga lords conquered 169 islands in their archipelago and extended hegemony over Samoa and Fiji (Clark, Burley, and Murray 2008). Large, seagoing canoes allowed rapid movement over great distances, carrying commodities and specialized warriors for surprise attacks. Slaves constituted a major part of the economy. The resulting extensive Tonga polities had profound state-like stratification: “The paramount Tu’i Tonga (Lord of Tonga) . . ., along with other senior lineages, were buried in massive stone-faced tombs known as langi, meaning sky or heaven” (Clark, Burley, and Murray 2008:1).

Smaller-scale maritime chiefdoms developed along North America’s Northwest Coast. For example, the Haida First Nation were famous for seamanship, long-distance trade, their advanced canoes, and devastating slave raids (Donald 1997). Large, seagoing canoes crafted from gigantic red cedars could hold crews of 15–20 paddling warriors and crossed open waters greater than 1,000 km. The Haida were considered the “Indian Vikings of the Northwest Coast” (Jenness 1934:2). Raids captured slaves who served the chiefs in political exchanges and ceremonial events (Donald 1997). Polities were stratified, with chiefs and noble warriors at the top of a social ladder, with slaves at the bottom. Long-distance sea ventures were driven by slaving but also the search for valuables including coppers and Chilkat blankets. In fact, it is hard to find a better cross-cultural analogy than the Haida for Bronze Age Scandinavia in terms of copper and textiles (Donald 1997). As another example of maritime chiefdoms, see the Chumash of southern California (Arnold 1995, 2001; Gamble 2008). With particularities of the maritime mode of production, such chiefdoms depended on ownership of boats (or harbors); control at distances of trade and slaving; specialized warriors, often with distinctive equipment; and stratified (exclusionary) polities.

The maritime mode of production is apparently part of a larger set of decentralized chiefdoms that depended on control over raiding and trading in precious commodities including slaves. On the peripheries of ancient civilizations, decentralized trading chiefdoms developed among the pastoral societies of the Eurasian steppe and beyond (Honeychurch 2014; Kradin 2008), Arabia (Sweet 1965a), and North Africa (Sáenz 1991). With the same entrepreneurial spirit, traders and raiders obtained wealth and personal status. Chiefs held advantages by ownership of horses and camels, the ships of the desert wastes, and by control over oases that permitted some control of trade that channeled wealth and thus of social status.

This model of decentralized, pastoral chiefdoms provides an understanding of chiefly confederacies across central Asia during the Bronze and Iron Ages, as they sought to control flows of metals, silks, other textiles, slaves, and additional items desired by agrarian states. Steppe chiefdoms were warrior aristocracies, forming after 2000 BC with the spread of chariot warfare (Kohl 2007; Koryakova and Epimakhov 2007; Kristiansen and Larsson 2005). The lightweight, two-wheeled chariot drawn by two horses revolutionized warfare and created a warrior class as they spread from the Urals west and east across the steppe from Mesopotamia and the Aegean to Iran and Pakistan and into China. After 1000 BC, steppe societies became mounted nomads and more mobile both as military and political forces that extended hegemony across vast regions through confederacies that would periodically develop into empires (Honeychurch 2014; Kradin 2008, 2015). Kradin discusses the origin and maintenance of power by nomadic rulers who controlled gift exchanges between independent pastoral warriors. With aspiring chiefs, nomads organized into large raiding parties that eventually formed conquest armies. Large pastoral polities were decentralized, without bureaucratic structures but always based on interpersonal relationships. Reminiscent of the maritime chiefdoms, pastoral societies retained a dialectic between autonomy and hierarchy, decentralization and central authority. A remarkably similar model can be constructed for the Comanche “empire” during the eighteenth and nineteenth centuries across America’s prairies, where, to build expansionist polities, chiefs managed horse nomadism and warrior control of trade by protection and intimidation (Hämäläinen 2008).

Conclusions

Our article emphasizes some critical points: At relatively low densities, chiefdom did develop despite the fact that control was always problematic because segmental polities could easily dissolve into the interests of separate households spread across vast landscapes. The independence of individual households and their distinct interests was critical. To make up for such centripetal social forces, slavery became critical for labor, linked to a warrior class dependent on rapid movement across the landscape.

The maritime mode of production, as illustrated with two Scandinavian regions, apparently created highly dynamic chiefly confederacies under conditions of low population density and high mobility for warriors and traders. The key ingredient for Scandinavia included independent household economies; a warrior ethos; effective maritime technology; international trade in wealth; slaves used for menial work, exchanges, and commodities; and an unstable social hierarchy based on flows of wealth.

The maritime mode of production for Scandinavia is a historically specific model, but it helps understand similar low-density, decentralized societies that represent a distinct pathway for social evolution (Kristiansen 2015). In Blanton’s terms, the maritime mode of production relied on network (exclusionary) strategies for political centralization. These strategies have been based on different bottlenecks to material flows, different articulations with world economies, and different technologies of warfare and domination. Such specificities created variations in decentralized complexity linked to particular structural relationships in their political economies, but the underlying processes of control and aggrandizement seem remarkably similar.
We emphasize the roles of model building, specific prehistories of development, and then a comparative study of social evolution within and between world regions (Neitzel and Earle 2014). This is both the potential for and the true meaning of archaeology as a social science. Matthew Spriggs (2008) has emphasized that cross-cultural comparisons of human societies have been fatally flawed by a lack of understanding of the prehistories of ethnographic cases used anthropologically. Prehistory and early history offer diachronic data to evaluate alternative trajectories of social evolution. One of archaeology’s central missions can be to comparatively investigate processes of change—top-down, bottom up, and laterally between interlocked social systems.

**Comments**

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Ling and his coauthors make effective use of a paper by Matthew Spriggs (2008), who advocates the comparative study of different archaeological sequences. That is why they place an emphasis on two periods in northern Europe: the Early Bronze Age and the Viking Age. They locate these detailed examples in a wider discussion of “decentralized chiefdoms,” and only toward the close of their study do they draw on ethnographic examples.

Their basic case is well made and, as they say, they are not the first researchers to compare the Bronze Age in northern Europe with developments in the same area during the later first millennium AD. In both periods people could exploit the same resources and travel by the same routes. More important are the structural similarities the authors detect in the archaeology of these phases, for these can be identified in the ethnoarchaeology of other parts of the world. Some elements in their model can be documented by archaeology, but others remain largely hypothetical. In particular, that applies to slave raiding during the Bronze Age, which is postulated by analogy with Viking sources. There is considerable evidence of violence in prehistoric Europe, but no particular peak during the period is considered here. The few examples quoted in the text have a wide distribution over time and space. They claim that their figure 11 shows “a possible slave train,” but there are similar processions in Scandinavian rock art that show armed men and people with special headresses. There are striking numerical patterns in the organization of these scenes (Coles 2003).

To what extent do the authors envisage a direct connection between the two periods? It is well known that Viking cemeteries include the sites of older monuments (Pedersen 2006), but how direct was the reference to a distant past? Most authorities would accept that earlier practices lapsed during the pre-Roman and Roman Iron Ages, but that would not explain why such specific features as the construction of ship settings or the hoarding of metalwork are found in the Bronze Age and the Viking period. There have been claims that certain elements in Old Norse religion originated in the second millennium BC (Andrén 2014). Might there have been other connections? Ling and his colleagues emphasize the importance of the Hjortspring boat that dates from the fourth century BC, but they do not discuss the evidence from other war booty deposits that include military equipment and abandoned boats. This practice extended as late as AD 600 (Pauli Jensen 2009). Does it provide a link between the case studies presented here? And, if not, how was it distinct?

Their case studies operate at different chronological and geographical scales. The account of maritime societies in the Viking world draws on evidence extending from northern Germany to the Faroe Islands, while the examples taken from the second millennium BC focus on three comparatively small regions in Denmark, Sweden, and Norway. The discussion is even more specific. While the authors draw on their own fieldwork in Thy and Tanum, the Norwegian example hardly features in the argument. Other regions are omitted. During the Early Bronze Age many of the elements considered in this paper are shared between the Atlantic and Baltic coasts of Scandinavia, but they are not mentioned.

The authors illustrate their theme by the relationship between Tanum and Thy. It is important to see it in a longer chronological perspective. It is true that images of ships were created on the west coast of Sweden while enormous houses and burial mounds were being built in Jutland, but this convergence was not to last. After 1100 BC, mortuary rituals in Jutland were less elaborate and settlements contained smaller structures, yet it was in the Late Bronze Age that even more seagoing vessels were depicted in the rock art on the Atlantic coast. At Tanum this practice continued until the Iron Age, and in Rogaland, too, it went on into the first millennium BC (Nordenborg Myhr 2004). It follows that the close relationship between Tanum and Thy represents only one stage in a lengthy and more varied history. That is not to reject the argument put forward by Ling and his colleagues, but it needs to be pursued in a wider setting.

One further question must be asked. This paper postulates a direct connection between sea travel, the introduction of metals, and the taking of slaves. At the same time, drawings of ships on rock outcrops and bronze artifacts illustrate a distinctive solar cosmology. During the day the sun is drawn across the sky by a horse, and it returns beneath the ocean carried on a boat (Kaul 1998). How is this related to the evidence considered here? One response might be that the scheme is a feature of the Late Bronze Age and dates from a time when maritime chiefdoms were in decline, but this symbolic system was already present during the previous period (Kristiansen and Larsson 2005:194–198). How can the two interpretations be combined?

The authors remark that in presenting this intriguing hypothesis they were aware of the word limit for a journal article, so that some material could not be included. Their account is selective, and in the future it might be worth developing these ideas in greater detail and exploring their application to a longer sequence and a larger area. It would make a fascinating book.
It is refreshing to find new concepts introduced that have broad explanatory implications and bring together disparate observations in a new light. This is what "Maritime Mode of Production" by Ling, Earle, and Kristiansen has done for me. The initial maritime mode of production model of the Scandinavian Bronze Age may not come as too much of a surprise given the historically established Viking patterns, although it is nice to see how all the parts fit together at an earlier time. What I found particularly interesting (besides connecting the causal links) was the extension of the same basic characteristics and causality to an entirely different sphere, namely, pastoral nomadic chiefdoms. Both the maritime mode of production and pastoral chiefdoms exhibited low population densities that were organized on the basis of transport aids (boats and horses) that made high levels of mobility and regional integration possible. In both cases, the existence of unusually valuable items (wealth) in the form of metals or other prestige objects is what made raiding and trading profitable and attractive. I suspect that, like the Scandinavian case, the pastoral base produced surpluses for freeholders and especially for chiefs (see Fratkin and Roth 1990; Starr 1987). In both cases, individuals with enough surpluses used them to underwrite the adventurous procurement of wealth by highy mobile groups of warriors. Chiefs controlled the construction of boats and the largest herds of horses and hence could attract many warriors. In both cases, long-distance forays were undertaken for trading and raiding by groups of warriors. And in the absence of warrior-lords at home, slaves filled important roles for labor needs. In both cases, warrior roles were important social components resulting in a very competitive and fluid social organization verging on free-for-all trading and raiding for whoever could acquire weapons and the means of transport and could convince others to follow.

I suspect that the maritime mode of production model would be even more applicable to camel pastoralists and caravan organizers, especially given the felicitous term for camels: "ships of the desert." Substantial outlays were necessary to underwrite caravans for trading, and raiding was endemic (Sweet 1965b). Even farther afield, the authors note that the same model can be applied to simple chiefdoms like those in Polynesia. Major parts of the model are certainly apt on Futuna, with which I am most familiar (Hayden and Villeneuve 2010) and which exhibits the same hierarchal independence of constituent groups united in very fluid alliances under an overarching chief, all held together by feasting, trade in prestige items, and warfare.

The authors make a very convincing case for the causality involved in the maritime mode of production. The authors make much of raiding, but I would like to see more attention devoted to the contacts for trading that sea voyagers must have had as exemplified by the brief mention of Thanet Island. Not all of the metal consumed in the Scandinavian Bronze Age could have come from raiding. There must have been regular and reliable friendly ports where ships could have acquired food, water, and supplies and could make repairs. Where were these allied ports located? Did all mariners use the same localities or were there different allied ports used by different chiefs? How were these alliances maintained? (By simple payments or trade pacts? By intermarrying? By initiations and memberships in ritual organizations? Some other means?) I suspect that a stronger role may have been played by ritual organizations in creating and maintaining these ports-of-call alliances, and hence in making long-distance sea voyages viable enterprises. The existence of such ritual organizations may explain much of the elaborate ritual and rock art surrounding the use of boats.

In regard to the organization of trade, I would expand the list of items that could have been produced in Scandinavia for trade or exchange to include furs and hides, livestock, smoked meats or sausages, cheeses, wool/textiles, special breeds of dogs, and fish or marine mammal oils. The authors’ estimates of labor needed to construct boats are extremely useful, but I would also devote more attention to the work required to produce the fabrics used for sails, which was perhaps of comparable importance. One other item that requires more clarification is whether the maritime mode of production and its related confederacies really only emerged in the Bronze Age in Scandinavia or whether the maritime mode of production was initially established in the Neolithic. Even the authors reported that there were long-term continuities from the middle Neolithic to the Viking Age. The Neolithic symbolic and architectural similarities among the Scottish Orkneys, the Boyne River complexes in Ireland, and the Morbihan region in Brittany (France) all indicate substantial maritime connections between elites in these areas during the Neolithic. Chiefs dominated at least some of these centers, and weaponry was strongly represented in the art of these areas as well. Could they not have already been raiding and trading? What was the source of Neolithic wealth (cattle, grain, flint, amber, slaves)? How could the boats needed to maintain these contacts have been written if not by means similar to those proposed for the Bronze Age?

In sum, congratulations to this trio for a stimulating contribution to understanding what was happening in the Scandinavian Bronze Age and other places in the world.
In recent years, new explanatory light has been cast over the emergence of the European Bronze Age, due to the possibilities of analyzing ancient DNA. These analyses clearly show the influx of new groups of people during the prelude of the Bronze Age in central and northern Europe, a migration that fits well with the explanation of some key changes in terms of ideology and religion, as well as the establishment of new contact routes (Allentoft et al. 2015; Haak et al. 2015; Kristiansen 2015).

The results also support the perception of continuity in the southern Scandinavia area from the Bronze Age onward. It means that comparisons over time—historical analogies between different archaeological periods—have become more relevant. This is an important starting point for the paper “Maritime Mode of Production: Raiding and Trading in Seafaring Chiefdoms,” by Johan Ling, Timothy Earl, and Kristian Kristiansen. The authors argue that the more well-known Viking Age maritime contacts can be a good analogy to the Bronze Age. Both periods are highlighted as distinct maritime economies, with similar contact systems and also similar ideology and social structure.

In the paper, the authors take a holistic approach. With broad brushes, they paint a very convincing picture of how the Bronze Age’s contacts were established and maintained in southern Scandinavia, as well as how different geographical areas may have interacted and complemented each other. Important factors are differences in terms of population density, as well as resource-related conditions, between areas such as Thy in Jutland and Tanum in Bohuslän. A particularly interesting aspect thus highlighted is cooperation on resource utilization. For instance, Tanum and its hinterland is a reasonable area for the production of high-quality timber for, in particular, boat construction.

Something that is highlighted as particularly important is slave trade, an aspect that has been overlooked in Bronze Age research. For this scenario, the authors seek support in research into the plundering and trade of the Viking era. For some years now, slave trade has been emphasized strongly by researchers analyzing Viking society and economics (e.g., Brink 2008, 2012). Possibly, therefore, a warning finger may be raised just because research into slavery has become a very attentive topic. There is always a risk in research that one is convinced by arguments just because they are already in strong circulation. But it should be emphasized that the paper includes some very good arguments for the presented scenario. And the fact that slavery and slave trade is a “trendy” subject in Viking research right now is not in itself an argument against similar interpretation of the Bronze Age trade.

Another important trading good mentioned in the article is amber, a product that is often emphasized. But amber is unlikely to have been the only attractive export product from the north, nor the most significant. It is in this context that slave trade appears as a reasonable complement, linked to a maritime economy where war and looting have been an important ingredient.

However, there are other options that might be interesting to discuss as well. A sought-after Scandinavian product, at least during later periods, is leather goods. This applies to hides not only from wild animals but also from domesticated animals. In both cases, Scandinavia could deliver high-quality products, and in a quantity far beyond the local need. In the Roman Iron Age, such exports have been highlighted in earlier research and linked to a documented Roman import, with the army as main consumer (Hagberg 1967). The origin of the goods in Scandinavia is not proven but is a hypothesis based on a chain of indicia. Export of such products over the Baltic Sea during the Medieval period and later is well documented. I have previously suggested that such export from Scandinavia indeed has a very long continuity, going back to the Bronze Age (e.g., Kalif 2001, 2008).

Can a similar scenario as with the Roman army be considered also for Bronze Age Europe? Given the militarization that appears in several areas of the continent in the period 1500–1100 BC, with signs of war and professional forces (e.g., Jantzen et al. 2011; Kristiansen and Suchowska-Ducke 2015), this could be reasonable.

The trade of leather and skins during Roman times coincides with the more well-known trade routes for amber. This trade route or, rather, routes, which ran from the southern Baltic coast down to the Roman border, was referred to as “the Amber Route.” Even during Roman times, however, it is less likely that only amber was transported this way. The reason for the name is mainly because amber was a prestigious product, but not necessarily the most economically significant. One can compare with the name “the Silk route” for the trade routes through central Asia, where silk certainly was an important commodity but was far from the only one.

My suggestions here do not contradict the importance of slave trade, but leather goods may also have been important products. During the Bronze Age, at least parts of southern Scandinavia were highly suitable for livestock farming. This, along with access to large forests and wilderness in the north, makes it possible to have a very rich hinterland for hunting and thus also to access fur and hides from sought-after wildlife.

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A traditional fault line separates text-free and text-aided archaeology. They can be virtually two disciplines. Text-aided archaeology is sometimes subsumed into history and other text-based subjects. As presented in the article, the maritime mode of production potentially bridges this gap in two ways. First, a more sophisticated use of prehistoric archaeological evidence builds confidence for inferences about social organization and economy. Second, the article’s principal method is what might be termed a “vertical ethnographic analogy” (VEA). Some examples of the maritime mode of production are drawn from documented but unrelated cultures far from Scandinavia—in the Solomon Islands, Tonga, the Philippines, and the Pacific coast of North America. But the primary focus is on one region at horizons roughly 2,000 years apart: the Nordic Bronze Age and the Viking Age. Therefore, the variables of geography and environment hold constant, which might otherwise raise issues
of comparability. The VEA also reduces disparities of expertise that could invalidate explanations reliant on analogies of cultures outside the researchers’ usual areas.

In presenting a model using a period known through written evidence to illuminate aspects of European prehistory, the article is not isolated at this time. Advances in the last few years have brought fresh impetus to the goal of combining archaeology, historical linguistics, and archaeogenetics to reach a fuller understanding of later prehistory. The most dramatic breakthrough has been genome-wide sequencing of ancient DNA (aDNA). Independent research showing reassuring agreement through has been genome-wide sequencing of ancient DNA (aDNA). Independent research showing reassuring agreement under has been genome-wide sequencing of ancient DNA (aDNA). Independent research showing reassuring agreement

Both sample sets included northern Europe. Two mass migration events were found that transformed most of postglacial Europe. From about 10,000 BP, early farmers spread west and north from Anatolia, eventually replacing most of the pre-Neolithic hunter-gatherer ancestry. Then, during the third millennium BCE, heavy gene flow, probably male biased, spread from the Pontic-Caspiian steppe region. This second migration transformed gene pools as far east as the Siberian Altai, as well as central and northern Europe. As we now know (Cassidy et al. 2016; Olalde et al. 2018), this discontinuity between the first farmers and Bronze Age groups of ultimate steppe background occurred in Ireland and Britain during the Beaker period (2400–1900 BCE). Unexpected findings included the rapid expansion of the R1b and R1a Y chromosomes at the Neolithic to Bronze Age transition, in western Europe and eastern Europe/western Asia, respectively. It had previously been thought that a more ancient migration was involved, such as postglacial repopulation.

The strength of the influx from the steppe in the third millennium affects historical linguistics. Previously, a widely, but not universally, accepted case saw the spread of Indo-European from the steppe at this time (Anthony 2007; Mallory 1989). As migration came to figure less in archaeological explanation, a view took hold that population replacement could only explain the spread of Indo-European had it been the language of the first farmers (Renfrew 1998–1987)). The possibility that Indo-European from the steppe about 5,000 years ago had dominated largely by numerical strength had come to seem unlikely until aDNA revealed the massive expansion of the steppe component. Subsequently, a numerically small but exceptionally influential elite was no longer needed to explain the spread of Indo-European across wide swaths of Eurasia. Established ideas are also unsettled by the high degree of genetic continuity in northern Europe from the Early Bronze Age until today. The ancient genomes have not indicated a third great prehistoric migration in the Iron Age, the stage when it had usually been supposed that Celtic came to Britain and Ireland.

Where does the archaeogenetic revolution leave the maritime mode of production’s modeling of the Nordic Bronze Age with reference to the Viking Age? As well as constraining the variables of geography and environment, we now know of substantial genetic continuity from the Nordic Bronze Age to the Viking Age. As to language, it had previously seemed possible, but unprovable, that Bronze Age Scandinavia had spoken an Indo-European language and that this had evolved in situ into Proto-Germanic and then Old Norse. This is now the best working hypothesis and will gain strength if accumulating data confirm recently revealed patterns.

Most of the key attributes of the maritime mode of production figure in written accounts of Viking-period chieftains and warriors, maritime exploration, colonization, slavery, raiding, and trading. There are traces of all of these at this period in the archaeological record. The associated language, Old Norse, is fully attested and understood. Therefore, we know the Old Norse words for these institutions, the etymologies of the words, and how they were used in texts.

Even before the archaeogenetic revolution, it had been possible to use etymology and linguistic reconstruction to explore the prehistoric Proto-Indo-European- or Proto-Germanic-speaking worlds. But we could not be certain where and when these reconstructed languages were spoken. Ancient DNA cannot answer these questions directly, but it narrows the possibilities. Therefore, using the maritime mode of production to illuminate the Nordic Bronze Age by comparison with the Viking Age appears to be a valid and meaningful approach, a tool we can expect to use with increasing sophistication and confidence.

There are also differences between the ages to consider. Even if the language of the Nordic Bronze Age is likely to be the direct ancestor Old Norse, it changed greatly over 2,000 years, as had its linguistic neighborhood between Bronze Age and early medieval Europe. For several centuries following the movements off the steppes, a high degree of mutual intelligibility naturally persisted between the far-flung Indo-European dialects. The Nordic Bronze Age maritime chieftains traded, raiding, and took captives within an extensive lingua franca. In the Viking Age, Old Norse, Romance, Slavic, Baltic, Old Irish, and Old Breton were all Indo-European but no longer mutually intelligible.

In the Bronze Age, bronze was essential as the material of tools and weapons as well as ornaments. This required regular long-distance exchange because tin and copper were not plentiful in all regions, and notably not in Scandinavia. The bronze to iron transition coincided with the breakup of the Indo-European lingua franca(s) and the Bronze Age world system. If the bronze to iron transition proved fatal to the maritime mode of production, how did it reemerge after a long hiatus within a linguistically fragmented Europe with what was basically still Iron Age technology?

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Ling, Earle, and Kristiansen discuss a model of the formation of complex societies with low population density. Here, the network strategy leads to the formation of decentralized complex polities.
The Vikings used maritime operations and trade to receive prestige goods and other resources. The booty has strengthened the military alliances while gifts and exchanges have combined the isolated groups into heterarchical polities. It differs from the classical pathway to complexity when population growth leads to scalar stresses and the necessity to regulate internal conflicts for maintaining the internal structure (Carneiro 1970). Before us, there is another, new variant of multilinear pathway to complex societies and state (Chacon and Mendoza 2017; Grinin et al. 2004; Haas 2001; etc.).

It is interesting that Ling, Earle, and Kristiansen attempt to describe this variant using a novel definition—the maritime mode of production. They attain attention again to a problem of mode of production. At present, it becomes a trend in the contemporary archaeology of complexity (Earle and Spriggs 2015; Rosenswieg and Cunningham 2017b). In the historical process, other modes of production based on external resources have also existed. The idea by Catherine Coquery-Vidrovitch (1966) of the African mode of production was the first. This mode of production was based on the monopoly of chiefs exchanging elephant ivory, jewels, and other major assets for bijouterie, guns, and gunpowder supplied to the Dark Continent by white tradesmen. The trade monopoly of chiefs was the base of their power.

Another example is the confederations or empires of pastoral nomads. Pastoral economy and low density of population do not assume the need to develop any legitimated hierarchy among nomads. Therefore, the state organization has not been intrinsically necessary for nomads (Kradin, Bondarenko, and Barfield 2003). Among the nomads, the ownership of livestock is characteristic, and this is the cause of the appearance of inequality and statuses. However, property in land continues to be common, and the economic relations among the cattle farmers interlace tightly with the institutes of kinship. It is no mere chance that French anthropologists have proposed the concept of the nomadic mode of production in order to distinguish the pastoral groups of Africa and the Middle East from agrarian settled societies (Bonte 1990). The political integration of nomads was necessary for attacks against settled agrarian societies or for trade with them. The steppe chiefs and khans had no internal economic resources. Their power has depended on external resources—robberies, trade, and redistribution of booty and gifts. This distinguished the nomadic polities from the agrarian states.

The degree of centralization among nomads is in direct proportion to the extent of the neighboring agricultural societies. From the viewpoint of world system analysis, nomads have always occupied a place of semiperiphery. In each local regional zone, the political structure of the nomadic semiperiphery was in direct proportion to the size of the core of the world system. That is the reason why, in order to trade with oases or attack them, the nomads of North Africa and the Middle East united into complex chiefdoms, and nomads of the Eastern European steppes living on the margins of the Byzantium or Slavic early states established "quasi-imperial" confederations. In Inner Asia, for example, the nomadic empire became a general mode of adaptation (Kradin 2014). For this reason, at the beginning of the 1990s, I called the pattern of pastoral nomads the xenocratic mode of production (Kradin 1995).

The maritime mode of production could be created not only at the homeland but also on alien territory. A case in point is an origin of the early state in the Rus’ (Russia). The Vikings controlled the trade routes between the Baltic and the Black Seas on the territory of East Slavs. In the descriptions of Arabic scholars (Ahmad ibn Rustah, Ahmad ibn Fadlan), Rus’ are warriors and tradesmen who navigated on long boats. By the way, the etymology of this word is connected with Finnish ruotsi (oarsmen) and Estonian rootslane Swedes (Melnikova and Petruxhin 1990–1991). The Slavs are the local population of Eastern Europe that was engaged in arable farming, cattle breeding, and beekeeping. The Rus’ (Vikings) entered into alliances with the Slavic agrarian population and established fortress settlements and centers of exchange and handicraft. Step by step, the heterarchical complex polities were established and, in them, the military groups of Vikings and chiefs played an important role. This was reflected in the legend of the Viking invasion of Novgorod in 862 and later the occupation of Kiev. Present-day scholars show a discrepancy between archaeological finds of the ninth century and historical texts that were written later on, in the twelfth century (Makarov 2012). Nevertheless, the presence of Vikings is doubtless from the tenth century onward, according to archaeological data, and it can be said that the maritime mode of production asserted the controlling influence on establishing the early state in Russia.

In conclusion, it should be pointed out that Ling, Earle, and Kristiansen have offered the fresh idea that provides better insight into the formation of complexity in Scandinavia and other oceanic and coastal societies as well as confirms the multiline trajectories of the origin of states. It is also important to understand what place is occupied by these polities (semiperiphery, periphery) in the communication networks of the preindustrial world systems.

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**Do We Need Another Mode of Production?**

With this article, Ling, Earle, and Kristiansen contribute to a long-lasting tradition in historical materialism studies of socio-evolutionary model building and classification. In a comparison of Bronze and Viking Age societies in Scandinavia, they launch a particular form of production coined "the maritime mode," thus adding "maritimeness" to the Germanic mode of production. While this model is considered relevant globally (for chiefdoms...
at the edges of world systems), the main aim of the article seems to be to characterize Bronze Age chiefdoms in southern Scandinavia, seen through the lens of Viking societies in the same region.

Classic ethnographic studies from the Pacific contributed strongly to shaping previous representations of Bronze Age chiefdoms in Scandinavia. A new model building on archaeological comparison is indeed welcome. The model combines several interpretational and theoretical strands that have been at the core of Bronze Age research during the past 5–15 years: the maritime focus, the Viking analogy, decentralized complexity, and comparative advantage. The approach is top-down, generic—and sometimes eclectic when it comes to the presented evidence.

While a comparison of Bronze and Viking Age societies is nothing new, the theory of slavery presented in this text is an original and bold contribution. While Bronze Age slavery seems logical both from an archaeological and a socioevolutionary perspective, the authors run the risk of swapping one monocausal explanation (amber exportation) with another (slave exportation). I am not convinced why slaves, or amber, would be the only goods from Scandinavia that entered Eurasian trading systems.

An asymmetrical relationship between different parts of Scandinavia is inherently assumed and governs the authors’ approach. Behind lurks a traditional concept of centers and peripheries (cf. Nordenborg Myhre 2004). Agency seems to be first and foremost in the hands of Thy farmers. Thy chiefs held slaves to keep up agricultural production and to be able to fund and man ships to go raiding and trading for slaves, while at the same time surplus population from Thy was sent out to colonize less populated areas on the Scandinavian Peninsula. Hereby, the Scandinavian Bronze Age is condensed into and presented as the equivalent of one small area in northern Jutland.

The historical and natural differences between areas within Scandinavia—making them productively different in a comparative advantage perspective—is blurred and presented instead through a static center-periphery approach. Strangely, the boat-builders and skilled navigators on the Scandinavian Peninsula, as exemplified through the Bohuslän/Tanum and Rogaland cases, are cast as background actors. The authors still need to convince me that “boats from Tanum were likely financed, owned, and partly manned by wealthy chiefs from agropastoral regions such as Thy.” While there is mainly circumstantial evidence, the maritime evidence of boats, and the interaction triangle Thy-Tanum and Thy-Rogaland, is a lack of understanding of the prehistories of the ethnographic cases used anthropologically. By creating a model on the basis of biased interpretations of the archaeological record, the authors run the risk of making the same mistake.

Despite these critical points, my answer to the opening question is confirmative: yes, we need another mode of production. The maritime mode of production represents a far better and more complex model of Bronze Age chiefdoms in Scandinavia than any previous model. I am also convinced that a fusion of agricultural and maritime forces of production was particularly forceful under certain historical circumstances, like in the Bronze and Viking Ages.

We are left with the unresolved problem of what happened between these two grand eras—regress, status quo, or slow evolution? The highlights used by the authors to underscore long-term continuity from the Corded Ware into the Viking Age seem to include all three possibilities. It would be interesting also to see the interaction triangle Thy-Rogaland—Tanum further developed. Currently, it seems to allow mainly for contacts between Thy—Tanum and Thy—Rogaland, and the Rogaland case is quite ad hoc and not well integrated with the rest.

Ling, Earle, and Kristiansen’s article is certainly a good read; it is clever, persuasive, and provocative. It should be read, however, with the authors’ cautionary tale about inserting modifiers at the fore of attention.

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Toward a Realistic Understanding of the Bronze Age

Given the available space, I will focus on the Nordic Bronze Age. Rich data, evolving methods, and conceptual rejuvenation of continental perspectives, politics, conflict, and society, and an appreciation of the diversity and scale of the Bronze Age economy characterize emerging research. Ling, Earle, and Kristiansen aim to pull this body of knowledge together and compara-
tively interpret it. Factors like the Bell Beaker culture’s expansion, maritime capacity, trade, slavery, and warriors are essential analytical components, recasting the scale and structure of Bronze Age economy, networks, and society.

The complexity and scale of the Bronze Age economy in northern Europe is often underestimated and commonly is described in terms of agropastoral subsistence. Long-distance "exchange" is commonly described as the circulation of a limited number of prestige goods: metal and amber in the full-fledged Bronze Age, flint in the Late Neolithic. This leaves a discrepancy in trade volumes—a massive 2000-year trade deficit. Wilderness products like pelts and furs are commonly inferred to be goods entering networks from the north. There is extensive upland activity in the Late Neolithic and the Bronze Age, and evidence of species prized for their hides, furs, and antlers are found at the production end. However, few traces have turned up at the market end. Ling, Earle, and Kristiansen bring timber boats and slaves and hides and cereal into the equation, and they expand the scale of the Bronze Age economy in terms of goods and trade. There were conceivably a host of products traded in intricate local to continental networks, so should the Bronze Age economy be viewed as more diversified and complex?

Cereal and cattle production took place even in marginal environments throughout Scandinavia; is it reasonable that grain and hides were distance-traded in bulk? Evidence of production of wool textiles is scarce in southern Scandinavia, but wool fibers from the Scandinavian Peninsula are potentially a commodity. Wool production can explain the upland expansion in the Late Neolithic and the Bronze Age. Is large-scale timber production for overseas markets feasible in the Bronze Age? Floating timber down a river is very different from transporting it across the sea, and Late Neolithic and Bronze Age deforestation is better correlated with the intensification of agropastoralism and increase in farms than lumber export. Forced labor and trade in slaves were almost certainly a part of the Bronze Age economy, but is a slave market on the scale suggested in the article likely? Though there is significant evidence of violence in the Bronze Age, how does systematic, long-term slave raiding fit with expanding agropastoral settlement throughout Scandinavia? Despite all the advantages of maritime raiding, is it enough to make slave raiding a predictable mode of production and pillar of trade? The logical argument for slavery is stronger than the evidence—the rock art is ambiguous, and if the mass grave at Sund is a slaying raid, why kill the children? Though I agree that slavery was probably part of the Bronze Age society, the structure and scale remain unclear. Whether dealing with wilderness products, slaves, timber, wool, dried fish, grain, or cattle hides, problems remaining in that circumstantial argument are blunt, evidence is weak, and comparisons need explication.

The article emphasizes maritime raiding, which was undoubtedly important. Another structural impetus for violence is found in the pastoral sector. Access to pastoral resources was virtually a zero-sum game in terms of labor and pastures already in the Late Neolithic. To expand pastures, competitors had to be driven away. Cattle, sheep, and goats were conceivably highly valuable as capital, and raiding can immediately increase this capital. The thousands of bifacial points found along the coastal heathlands and in the mountains are conceivably linked to feuding over pastures and raiding of herds, as well as hunting—or attacking wealthy centers?

This leads to an uneasiness concerning the term “maritime mode of production.” Again, sea travel, “bottlenecks,” and large boats (whether building, manning, and navigating boats or gaining access to ports, e.g., Kvalo 2007) are essential in understanding the Late Neolithic and Bronze Age history (Austvoll 2017; Prescott, Eriksen, and Austvoll, forthcoming). Along Scandinavia’s coasts, the correlation between agricultural potential, bottlenecks, and strategic positioning between resource areas is pivotal to explaining centers of power. However, the farms, upland shielings, production sites, and hunting camps attest to a multidimensional economy and society. The use of the maritime mode of production, and connotations inherent to the term, seem inaccurate. Like the traditional emphasis on agriculture that undercommunicated maritime and nonagrarian factors, maritime mode of production bifurcates a composite totality of a decentralized complex Late Neolithic/Bronze Age and understates a multifaceted society and economy.

Comparing the Bronze Age with the Viking Age (and other societies) is valid and serves heuristic and rhetorical purposes. The Late Neolithic through the Bronze Age also represents the institutional continuum leading up to the contemporary world. From the interpretative perspective of understanding the structure and history of the Bronze Age, it might be productive to emphasize differences.

Highlighting the Bell Beaker culture (BBC) as the catalyst of the Late Neolithic is warranted. The BBC affected Jutland’s Corded Ware (CW), but it also had direct impact on areas along the western Scandinavian coast inhabited by hunter-gatherers, where evidence of the CW remains elusive. The dating of the Mjeltehaugen grave chamber, with its enormous mound and slabs decorated with a dagger, geometric textile motifs, and Late Neolithic boats has been termed an “enigma.” However, Mjeltehaugen should be compared to BBC monuments in Iberia and western-central Europe (Prescott, Eriksen, and Austvoll, forthcoming; Sand-Eriksen 2017) and is an elite expression in the early Late Neolithic. Mjeltehaugen and other finds (Melheim 2012; Prescott and Glørstad 2015) represent the events that sparked the Nordic Late Neolithic. Given an emphasis on maritime capacity, the terrestrial CW does not seem to have a dynamic role in the final transformation of third millennium Scandinavia. However, the article’s reference to a “fusion” between the Single Grave culture and the BBC underlines a key task: unraveling the pivotal events around 2400 BC and the different historical trajectories in encounters between the CW and BBC.

There is a need for further adjustments, balancing, and clarification, but Ling, Earle, and Kristiansen explicate the scope of Bronze Age society and economy, advocate maritime capacities
and raiding, and through comparative perspective, contribute to lifting the Bronze Age out of the sociohistorical backwaters where it sometimes is stranded.

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Modeling Prehistory: Some Comments on Maritime Modes of Production and the Comparative Analysis of Past Societies

In their article, Johan Ling, Timothy Earl, and Kristian Kristiansen explore sociopolitical and economic structures among Scandinavian societies during the Bronze Age. The authors apply the Marxist concept of modes of production, arguing that regional specialization in the production of certain trade goods, as well as participation in seaborne raiding and slaving, led to the establishment of a maritime mode of production on the northern periphery of Bronze Age Europe. They argue that this brought Scandinavia into long-distance trading networks, facilitating the development of political complexity and social evolution. This hypothesis is reinforced with a comparative study of social, economic, and political structures in Viking Age Scandinavia.

These arguments are novel and interesting, and they demonstrate the potential for comparative work to offer new insights into the structural organization of prehistoric societies. While I read the article, however, some thoughts came to mind concerning the overarching methodological approach employed throughout this study, particularly with regard to the discussion of modes of production within the context of prehistoric Scandinavia and the comparative analysis of Bronze and Viking Age societies. I will do my best to express these thoughts in a constructive way, with the aim of stimulating discussion, but I should emphasize that I claim no specialist knowledge of the Bronze Age; my comments will instead derive from my own research on Viking Age societies.

The authors’ study rests on a theoretical framework provided by the Marxist concept of modes of production, its links to the establishment of comparative advantage, and how this in turn facilitates the development of political complexity and social inequality. It is argued that, during the Bronze Age, this mode of production was based on maritime travel, trade, and warfare, which facilitated the development of regional chiefdoms and confederacies of rulers.

While the attempt to conduct an economically driven study of Bronze Age society is well-taken, I worry that the application of this model, which is heavily laden with Marxist political overtones, may in fact skew the reality of the prehistoric past. Without due caution, applying such a model runs the risk of introducing a reductionist perspective, which in this case could lead to deeply complex societies being presented as simple cogs within a south Scandinavian “machine” of production and exchange. Of course, there is little reason to doubt that Bronze Age societies were engaging in long-distance trade—this is shown by the published research that the authors cite (e.g., Frei et al. 2017; Ling et al. 2014). However, we must carefully consider the extent to which hypotheses can be drawn from these results. To take a single example, can the claim really be made for a massive trade in wool and/or textiles in Thry based on a single study that found that over 75% of 42 wool samples from Bronze Age Denmark were of nonlocal origin (Frei et al. 2017:648)? Can this be reasonably taken to imply, as the authors suggest, that a substantial proportion of the population of what is now Denmark (an estimated 220,000 people) relied almost exclusively on foreign imports of wool and/or textiles? Given the current state of knowledge, I feel it would be more productive to first attempt to understand this purported textile trade rather than force it into an overarching economic model for social development. While the authors acknowledge that their hypotheses require refinement, perhaps some arguments could have been made with a little more caution.

The need for caution is also evident in relation to the comparative analysis of Scandinavian societies. In outlining the case for a maritime mode of production in Bronze Age Scandinavia, the authors construct a comparative model that draws heavily on analogies with Viking Age societies. This builds on an earlier study by Kristiansen (2016) that argued for significant structural continuity between the two periods. It is important, however, not to prioritize the search for diachronic continuity over the consideration of historical context. Otherwise, in the case of the Viking Age, there is a risk of glossing over more than 300 years of social and political development, and with that, numerous examples of potential comparative discontinuity with the Bronze Age. Our knowledge of Scandinavian political geographies, for example, especially during the early Viking Age, is uncertain. It has been argued that a consolidated Danish kingdom existed as early as the eighth century (e.g., Näsman 2000), and whether or not this was the case, it is likely that substantive and politically complex regional polities had been established on a scale that exceeded those of the Bronze Age. The authors similarly present the earliest Viking raiding parties as being driven by the same goals as the large, itinerant fleets of the late ninth century (which did not represent the coordinated forces of any particular Scandinavian kingdom), when in reality these were very different forces operating in markedly different contexts (McLeod 2014; Price 2016; Raffield 2016). The organizational complexity of these latter fleets, which were influential political entities in themselves, was likely far beyond that of any Bronze Age raiding force discussed thus far in the archaeological literature. Other factors that might have been considered include potential disparities in ideology and ritual practice and the divergent roles that these would have played in underpinning social and political structures in each period. While our knowledge of prehistoric ritual practices and beliefs is far from complete, these deserve consideration as an important factor in the for-
mation and maintenance of political and martial power (see, among others, Price and Mortimer 2014; Sundqvist 2002, 2012), and similarity between the Bronze and Viking Ages cannot be presumed. Perhaps, in this case, a consideration of the potential discontinuities between the two periods might have facilitated a more detailed discussion of how the proposed model of a maritime mode of production might have manifested at different times and in different places.

These potential issues notwithstanding, I found this to be a thought-provoking and insightful article that raises interesting points for further consideration. I would welcome discussion of the theoretical and comparative approaches employed here and how the arguments posited in the study might be further tested. A consideration of how diachronic analyses of prehistoric Scandinavia could be strengthened as part of future research would also be well received.

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I am in full sympathy with the approach being developed here, and I only offer two comments for the authors’ consideration.

The first concerns the name of the proposed maritime mode of production, which I do not feel is an appropriate one. It implies there is only one maritime-based mode of production, whereas several different maritime modes have existed or could be logically derived that do not require slaves as major trade items or slave raiding as a major technology of acquisition of resources. The maritime Lapita expansion in the western Pacific previously treated in Current Anthropology by Earle and Spriggs (2015), itself a facies and extension of the Island Southeast Asian Neolithic, has no evidence of slave raiding or a trade in slaves. Yet it was a maritime network covering many thousands of kilometers of ocean and many hundreds of islands in what Gosden and Pavlides (1994:168) called a “supercommunity.” It represented a rather different “maritime” mode of production.

Toward the end of the paper the authors draw explicit parallels between their maritime mode of production and other examples of decentralized trading chieflaincies among pasto-ral societies of the Eurasian Steppes, Arabia North Africa, and the Comanche “empire” in North America. These are characterized as having “warrior aristocracies.” Explicit mention is made of the advantages of possession of horses, chariots, and camels, “the ships of the desert wastes,” as the authors call them. If horses and camels are truly the equivalent on land of the boats that feature in their own case study, then there is nothing specifically maritime at all about the maritime mode of production.

The point about using mode of production as a conceptual device is surely that it must have some application beyond any individual “historically specific model,” as they describe their case study. If such application is indeed the intention of the authors, then a general label would be more serviceable; something like “mobile predatory mode of production” might perhaps better capture the general idea that they are seeking?

Paul Spencer (2014:49–50) has discussed a predatory mode of production among Maasai and related groups in East Africa, involving cattle rather than slave raiding, which particularly came to the fore during times of famine, epidemic, or territorial expansion and involved the young men of the group as a (generally very temporary) warrior aristocracy. The addition of “mobile” to such a concept stresses the necessary technologies of boats, horses, chariots, or camels as allowing a major spatial extension in the reach of the economic system.

My only other comment would be that it might be useful to insert a further concept into the discussion in addition to that of “prestige goods.” It is the idea of “prestige practices,” which I have defined as “involving the activation of often-esoteric knowledge systems above and beyond the pragmatic skills used in the production of material items, transportation or other communally-recognised activities and/or performances, the practice of which enhances the prestige of the specialist” (cf. Spriggs 2016:107–111).

I feel that we have a too monolithic idea of the nature and distribution of power in chiefdoms; the open and competitive nature of power seen for the Lapita situation by Earle and Spriggs (2015) may well be the norm. “Chief” is only one high-status role among many that might exist at any one time, although more constantly on show in a community. In relation to the discussion in this paper, we need to ask about the role and status of boatbuilders and navigators, long-distance traders, warrior tacticians or warriors in general, priests and bone-setters, bronzesmiths and prospectors, architects/builders of great halls, and so on. We thus insert prestige practices and the practitioners of them into a discourse that is usually focused specifically on chiefly power. By doing this we not only potentially bring in “bottom-up” alternatives to “top-down” forms of power (cf. Angelbeck and Grier 2012) but also broaden the discussion of the nature of devolved power more generally.

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The article is fresh and valuable input to discussions of the societal makeup of the Nordic Bronze Age. It rethinks Marxist concepts and historicities, while the Viking Age provides data to model a maritime mode of production based on waterborne trading and raiding. With its footing in Ricardo’s “comparative advantage” (1817 [1811]), Mann’s power sources (1986), and
the ethnography of political economy, this hybridizing contribution will appeal to Nordic Bronze Age scholarship and beyond. Strong points are slaves as key commodity, the resolution of the conventional war-peace divide, the anthropological underpinning of the argument, the dynamism between landed and maritime production/property, and the effort made to show that hierarchies can arise among low-density populations. The following remarks stem from my own research.

From Bell Beaker hubs ca. 2500–2100 BCE to west Scandinavian Nordic Bronze Age confederacies ca. 1500–750 BCE. The article describes this long span in terms of a continuum between two maritime-led expansions, both of which inhabited metallurgical knowledge. What is, however, truly remarkable is the wide time gap between them, with de facto little metal. This hiatus left the triangle of northwest Jutland-Rogaland-Bohuslän outside the emerging Nordic Bronze Age, with little evidence of engagement in the metal venture as it evolved in central-eastern Denmark and Scania with thresholds ca. 2100 BCE and again 1600 BCE (in alignment with much of the Bronze Age hyperregion in Afro-Eurasia). Thy and the central Limfjord region with their modest-sized sunken-floor houses contrast with the east, where metal axes were in great demand due to the timber-demanding big houses (Vandkilde 2017a). Metallurgy apparently fell out of use in the west after the Bell Beakers and was not reintroduced until ca. 1500 BCE, with concrete evidence in the Kluborg sunken-floor house (Simonsen 2017) and in the suddenly numerous metal-rich mound burials.

The Nordic Bronze Age of the west then took a path different from the leading east of the earliest Nordic Bronze Age. This invites questions of the underlying logic and reasons for such differences as well as their longer-term consequences. An ethnically heterogeneous landscape rooted in Scandinavia’s complex later middle Neolithic, hence different varieties of tribal formations, may form part of the answer.

Can the maritime mode of production template contain, and throw new light on, historical change and social-structural variation in Scandinavia? At stake is its wider applicability when confronted with archaeological data from the remarkable Nordic Bronze Age containing several thresholds of change and regional variations. The article generalizes long time spans into one single model, but it could have explained the degree to which sociocultural change impacted the maritime mode of production in the focus region of Thy-Rogaland-Bohuslän. The Urnfield-inspired late Nordic Bronze Age commenced toward the end of the thirteenth century BCE as a major watershed (Kristiansen 1998): Did this push the maritime mode of production in the direction of more or less hierarchy?

Across a wider geography, one may ask whether different production modes coexisted while networking with each other through trade, alliance, and raiding. South of the maritime mode of production in Thy, western Jutland may exemplify a persistent pastoral mode of production from the Corded Ware into the Nordic Bronze Age. Segmentary tribes ought here to be addressed as a social solution also perfected to the extreme decentralization of low-density dispersed populations. Semi-nally, Sahlins (1961:326) explained this form of society in terms of “predatory expansion” because of the innate warfare expediting strong confederacies akin to Clastres’s warrior societies (1994), the military democracy earlier coined by Morgan and Engels (1972), and also bearing resemblance to the article’s maritime mode of production. This makes me interject that it is perhaps not necessary to subscribe rigidly to the chiefdom model when interpreting the societies of the Corded Ware, Bell Beakers, or the Bronze Age. Temporary elevation of tribal segments to form a political superstructure is known to occur in times of stress and crisis (Sahlins 1968:51). The article’s expression “chiefdom-like” would align with a more volatile order. The maritime mode of production nonetheless maintains that hierarchy was consistently present in the low density–populated Nordic Bronze Age building on landed/maritime property and the comparative advantages obtained through bronze and linked goods. These advantages must at times have been subject to intense competition and thence been difficult to maintain. Clearly, different social groups existed, more or less privileged, and with slaves at the bottom rung, as the authors contend, but why not with room for social climbing or descent when success failed? As far as I can judge, the data do not contradict a measure of social mobility through self-made enterprises.

Warfare was an arena where individual ambition could contest fraternity order and potentially threaten hierarchies at home. At sea, fame, prestige, and companionship evolved around the leader as captain and provider of booty (Van de Noort 2011: 233–235). If the war chief proved unpopular or unable to deliver, he was degraded or even killed: this basic principle of “military democracy” or “first among equals” existed in many contexts from Homer’s epic about the Trojan War and Tacitus’s accounts of the Germanic tribes to early Danish kingship. In the Viking Age, with its lords and retainers, the warrior fraternity at sea demonstrated loyalty to the group as much as to the war chief; that is, social boundaries were traversed to bind the group (Raffeld et al. 2016:42). In the Aegean final Bronze Age and Iron Age, as, furthermore, Homer sustains, fragile hierarchies existed with a pregnant, though rather unofficial, economy and sociality of raiding. Mediterranean early histories unfolded in a seascape offering good analogues to the Nordic Bronze Age (cf. Bevan 2010; Broodbank 2013). Hence, I am inclined to understand Nordic Bronze Age social hierarchies as usually unstable, with dynastic exceptions primarily in the ninth and eighth centuries BCE.

How similar was the Bronze Age to the Viking Age? A final remark concerns the comparative potential of the Viking Age to improve understanding of the Nordic Bronze Age. I find the endeavor undertaken fruitful and inspiring. However, the Nordic Bronze Age formed part of a huge realm glued by bronze as a crucial resource well outside the controlling grip of ancient hubs and civilizations (Vandkilde 2016, 2017b), indeed an “economic revolution as transformational as the Neolithic revolution.” The historical uniqueness of the Bronze Age may hint at substantial differences between the two epochs, which need more research.
Reply

Maritime Mode of Production: An Engagement with Comments

We are pleased by the thoughtful comments by a remarkable assembly of scholars. We take to heart Richard Bradley’s comment that our article is selective in both scope and comparisons, and its subject would demand a book to cover the complexity of the European Bronze Age. We respond to the commentary positively, as we agree with many of their points and believe that they show how modeling the maritime mode of production provides the foundation for future research. Our esteemed commenters roughly fall into two groups—those primarily focused on comparative studies of complexity and those focused on the European sequence, which is our archaeological and historic case. Those comments that relate to theoretical questions consider various comparative issues, but not least the nature of a maritime mode of production, a formulation that we ourselves had long discussed before deciding on the term “maritime.” The other group of comments relates much more to the archaeology of the Bronze Age and, finally, about critical concerns about the comparison between the Scandinavian Bronze and Viking Ages. These two interrelated topics help organize here our engagement with the commentary.

Situating Modes of Production in Relationship to Materialist Theory in Contemporary Archaeology

What is the role of comparative studies in contemporary archaeological research? Although many archaeologists naturally are committed first and foremost to constructing accurate and detailed prehistories of specific places and times, we argue strongly for the importance of archaeology as the means to compare long-term sequences to investigate common processes in societal change. Thus, archaeology can contribute meaningfully to a historical science of societal change.

In terms of a comparative study of prehistory, we draw attention to the insightful comments of Brian Hayden, Nikolay Kradin, and Matthew Spriggs. They discuss our central point, that low-density complexity can develop in several economic and social contexts involving the trading-raiding complex that create bottlenecks to channel resource flows resulting in differential power. Importantly, the nature of such bottlenecks need not be strictly economic in nature but can involve political control of ritual organizations (Hayden) or prestige practices (Spriggs). The ceremonies that realize social institutions have strong material requirements involving mobilization of social labor and channeling special objects, often of foreign origins (Earle 2017b). These commentators highlight Kristiansen’s (1998, figs. 17, 18) more general point that decentralized complexity is typically a macroregional pathway in social evolution that must be considered separately from the more standard examples of local control exercised in high-density societies. Their discussions highlight the usefulness of identifying specific economic relationships across historically independent cases that result in similarities and difference in long-term sociopolitical change. Several European prehistorians also point to the importance of our comparisons (and others) to offer useful understanding of the European sequence.

As Bradley links to Spriggs (2008), John Koch describes “vertical ethnographic analogy” as a useful means for comparative research. Spriggs describes typical ethnographic studies, which are often used as analogies, to be inadequate, because they describe single points in time, often without considering the impacts of long-term colonial engagements and other evolutionary trajectories. When most ethnographic descriptions were being produced, British social anthropologists argued that traditional people were “without histories” and so had to be studied only as operating in the ethnographic present (see Radcliffe-Brown 1952). Spriggs believes that such synchronic cases provide poor comparisons because they do not consider the historical processes resulting in the specific conditions being observed. Rather, he argues that what is needed for each ethnographic case is a consideration of their historical record, as archaeology can provide. As Koch correctly realizes, that is just what we are trying to do by using the historical homology of the Scandinavian Vikings to understand a long-term record of social continuity and change. We appreciate comments by Anders Kaliff and John Koch on the importance of the ancient DNA revolution in archaeology, which supports our argument for long-term continuity documented by population continuity from the middle Neolithic migrations through the Scandinavian Bronze and Viking Ages. We support Spriggs’s objective to create long-term ethnographic-historical-archaeological cases that serve comparatively to investigate evolutionary processes. In this regard, we advocate the use of modes of production, a controversial idea to several commentators.

We define a mode of production as the totality of production and reproduction within a historically contingent social formation, such as the Nordic Bronze Age or Viking Age. However, the concept of modes of production has never been static. Following Marx, Patterson uses the railroad metaphor to emphasize the ever-changing functions of production in a society: “Modes of production are manifest in social formations—i.e., societies and cultures in the process of becoming and dissolving” (Patterson 2014:41). While a social formation is historically defined in time and space, a mode of production is the relational, material concept that can be employed to characterize historically different social formations. Wolf’s tributary mode of production, for example, is such a generalized concept that can be applied to various historical cases (Wolf 1982). To us, modes of production should never be as a new typology; rather, they represent specific dynamic relationships grounded in material processes that resulted in a range of political outcomes. They are our strategy to apply a political economy approach to prehistory (Earle 2017b; Earle and Spriggs 2015).

Why have modes of production declined in analytical use, and why are they now being revived in archaeology (Rosenswig...
and Cunningham 2017a)? From the beginning, Marx and Engels conceived modes of production as closely related to historical stages, which they termed Asiatic, Germanic, Feudal, and Capitalist, based upon fragmentary archaeological and historical evidence available at the time. With the revival of evolutionary thinking during the 1950s and ’60s, the Marx/Engels stages were redefined, creating static ethnographic-based series of social types, such as the band, tribe, chiefdom, and state, which represented increasing social complexity (Service 1971). Using only ethnographic cases without detailed archaeological sequences to understand them, such typological formulations could be no more than pseudohistory.

During the second half of the twentieth century, the coming of age of archaeology as a rigorous, science-based discipline has led to fundamental revisions in evolutionary thinking, increasingly looking at long-term sequences of change to understand alternative evolutionary pathways and generally rejecting the use of social typologies. In Friedman and Rowlands’s (1978) seminal paper on epigenetic models, they introduce “systems of social reproduction.” Perhaps their most important contribution, as relevant to our work, their consideration of societies involved in interregional relations dependent on external resources involving long-distance trade, colonization, and center-periphery structures (Friedman and Rowlands 1978, fig. 6). This was soon applied to European and Eurasian prehistory (Kradin, Bondarenko, and Barfield 2003; Kristiansen 1998), where Earle’s concepts of “wealth” and “stable” finance (Earle 1997), as well as “corporate” and “network” strategies (Blanton et al. 1996), helped characterize evolutionary trajectories within contrasting systems of social reproduction (Kristiansen 1998, figs. 17, 18). These new processual concepts largely replaced modes of production and similar evolutionary typologies. What is clear to us now, however, is that modes of production, stripped of their typological chains, comfortably coexist within these new concepts and provide the basis of comparison for archaeological sequences. For example, the linkage of different modes of production enabled the formation of world systems, where wealth and stable finance and corporate and network strategies were the foundations of linked political economies that undergirded the macroregional systems. Here, we do not discuss the wider application of world systems models to later history (see Chase-Dunn and Hall 1997; Frank and Gills 1993).

We now consider comments on the maritime mode of production specifically. Although developed to model the dynamic political economy relationships of Scandinavia, we believe that the general materialist relationships apply with significant variability to a wide range of cases; most commenters, with specific reservations, agree with us. Helle Vandkilde asks whether we should consider the social formation represented by “segmentary tribes” as a more general social formation of high decentralization. We agree that segmentary tribes characterize conditions of fission and fusion in many warrior-based pastoral societies. Such a formulation probably characterized middle Neolithic Corded Ware populations and continued as a key element of Scandanavian society, especially where pastoralism dominated (see Christopher Prescott). The maritime mode of production, as we understand it, however, includes the significant addition of long-distance raiding and trading that results in the uneven emergence of social stratification. Matthew Spriggs suggests, rather, the use of the predatory mode of production, which would subsume both maritime and pastoral modes. Although we strongly agree that pastoral and maritime economies have similar political structures, we decided to keep them separate for analytical purposes. These closely linked modes of production exemplify conditions whereby social inequality emerges among political decentralization because of bottlenecks in the trading-raiding complex.

Benjamin Raffield is worried that an over-reliance on a strong Marxist (materialist) model may “skew the reality of the prehistoric past.” Of course, a materialist perspective is only part of the picture, but it is a very important part that has emerged with better archaeological documentation of some fundamental economic changes. The accumulation of new evidence for the volume of Bronze Age trade has led us toward the formulation of the maritime mode of production, not the other way around. Our understanding of a new maritime economic sector has emerged during the last 10–15 years along with an increasing knowledge of long-distance trade in metals (Earle et al. 2015; Kristiansen 2016; Kristiansen and Suchowska-Ducke 2015; Ling, Cornell, and Kristiansen 2017; Ling et al. 2014; Rowlands and Ling 2013; Vandkilde 2016) and, more recently, woolen textiles (Bergenbrant 2007; Frei et al. 2017). The project on woolen textiles, which demonstrated foreign origins, includes 42 samples from burials spread across Denmark; it can be considered representative of general Bronze Age burial ritual using imported textiles. The maritime sector involved in this trade apparently enabled the colonization of the coastal zones of central and even northern Scandinavia, as well as the active expansion of trade routes toward the south. In this, we came to see many parallels to the Viking Age, if on a smaller geographical scale. We wish to stress that the Bronze Age maritime sector differed fundamentally from the Neolithic, as a response to Hayden’s question, by being able to carry rather large quantities of trade goods. It was the integration between a land-based and sea-based economy that made us coin the concept of a maritime mode of production.

But do we need another mode of production? Lene Melheim asks this rhetorical, and yet important, question. Hayden, Kradin, and Spriggs support our argument for the structural similarities between pastoral and maritime modes of production. Should we then generalize the concept by merging them into a decentralized mode of production or, rather, maintain them as different? We prefer to consider them separately: one is land based and the other is sea based in terms of the dynamics of control. An original pastoral economy of the Early Bronze Age was extended with an emerging maritime economy, however, controlled and financed by the land-based economy. It is this integration of two political economies, yet in our view dominated by the land-based economy, that provided the maritime mode of production with its
specificity, which can be generalized to other historical trajectories around the world. We predict that the maritime economy could become semiautonomous and challenge the land-based economy, but in our case, it remained under its control. Others may propose that the maritime sector would be able to create seaborne chiefdoms (Ling 2014; Wehlin 2013) that were able to profit from their activities (see Junker 2018). Where does this leave the Lapita expansion, as asked by Matthew Spriggs, or the Neolithic seaborne expansions of megalithic cosmologies? We believe these were primarily colonizing ventures with a mode of production probably involving extensive resistance to central control, as Spriggs and Furholt are now documenting. But we may be wrong, and reframing the maritime mode of production is always to be considered. We are pleased that Melheim answers yes to her question. We see it not as a type but as a variable set of relationships, which should help in comparative studies of social evolution.

And finally, what is the appropriate role of modeling, as we use with the maritime mode of production, to guide archaeological research? Benjamin Rafffield argues for the necessity of “due caution,” and Richard Bradley notes that some elements of our model, such as the role of slaving, remain “largely hypothetical.” We agree, but we want to emphasize the importance of modeling in research. This article should be understood not as a synthesis of historical knowledge but as a materialist model designed from available evidence to encourage research directions creating better knowledge by testing the model. We suggested that woolen textiles may well have been an important trade item, but Rafffield responds, “Given the current state of knowledge, I feel it would be more productive to first attempt to understand this purported textile trade rather than force it into an overarching economic model for social development.” This statement, we believe, misconstrued the role of model building in archaeology, which is to construct logically consistent relationships based on existing theory and evidence that build expectations requiring testing with new archaeological research. Until woolens are suggested as a major trade item, attempts to document their production and trade are unlikely to draw attention in such research. Did slaving provide the trade product that would be sufficient to concentrate metal wealth in Scandinavia? Based on both historical comparisons to the Viking economy and comparison to other maritime chiefdoms, slaving seems logically important. Now we must develop the archaeological research to test the proposition, and the ancient DNA revolution will provide the best means to do so. Several argue that other items of trade, rather than slaves, amber, and woolens, must be considered; Anders Kaliff, for example, discusses the possible importance of the leather trade. We do not discount the possible importance of other items, but we do not now see an argument for their comparative advantage in Scandinavia that would make them good candidates as the means to compensate for the high volume of imported metal riches. Research focused on leather, like on textiles and slaves, would certainly settle this point.

Interpreting the Bronze to Viking Ages as a Chronological Case of Social Evolution

Here we address more concrete comments about the archaeological data supporting our interpretation. Not least is the question of slave trade, raised in several comments, and the role of the sun cult mentioned by Richard Bradley. These comments and others must be resolved by future research.

Lene Melheim questions the passive role we apparently assign to the people of Tanum as mere providers of timber and boats to aggressive Thy elites. Her point reflects a more general interest in prehistory to broaden agency to non-elite sectors of the population, a position that we encourage. If the maritime-linked Tanum groups had specialized and necessary skills, should not they also be able to have direct political agency? Here, perhaps, we are under too strong an influence of the rather remarkable differences in metal wealth accumulated in Danish burials, especially in Thy, but being rare in burials in Bohuslän and Tanum. However, the Bohuslän rock carvings demonstrate the existence of metal in their lives. How can we explain this apparent contradiction in the evidence?

Helle Vandkilde makes a number of important observations and raises some good questions. How homogenous was the Nordic Bronze Age society, and can we expect the rise and fall of different regimes and the coexistence of different modes of production, say, between a western, more pastoral economy and an eastern, more agrarian economy, rooted in differences back into the later Neolithic? Thomas B. Larsson (1986) was among the first to point out the potential different economic and political strategies between different regions in southern Scandinavia, pointing to areas of less metal consumption, but otherwise with both barrows and farms of traditional south Scandinavia types. Our proposal is that from around 1500 BC, an overarching new political economy was able to integrate and unify these economic differences, in which some degree of agency would have existed in each sector. It may be true that the pastoral mode of production dominated in areas in central Jutland without direct access to the sea, and the maritime mode of production only came to its full potential in coastal regions that were able to monopolize and integrate the two economies through warrior might and tribute. The system was, in all probability, quite unstable, due to competition and reliance on international trade, as well as control of tribute and surplus production needed to finance trade expeditions.

Finally, we discuss the nature of deep historical structures that we propose underlie the similarities between the Bronze and Viking Ages in Scandinavia and how they relate to our comparative examples. John Koch raises the crucial question, “If the bronze to iron transition proved fatal to the maritime mode of production, how did it reemerge after a long hiatus within a linguistically fragmented Europe with what was basically still Iron Age technology?” The same question is raised by Lene Melheim: “We are left with the unresolved problem of what happened between these two grand eras—regress, status
The purpose of formulating the maritime mode of production is to define institutional, material relationships that open up, and do not restrict, new research directions to resolve the hypotheses that the model generates.

—Johan Ling, Timothy Earle, and Kristian Kristiansen

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