

## Towards a prehistory of the Great Divergence: the Bronze Age roots of Japan's premodern economy

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**ABSTRACT** – *This essay argues that the primary socio-economic formations of premodern Japan were formed in the Bronze Age via processes of ancient globalization across Eurasia. Multi-crop cereal agriculture combining rice, millet, wheat and barley with a minor contribution from domesticated animals spread from Bronze Age Korea to Japan at the beginning of the 1<sup>st</sup> millennium BC. This agricultural system gradually expanded through the archipelago while engendering new economic niches centred on trade, raiding and specialized fishing. From the 5<sup>th</sup> century AD the horse became widely used for warfare, transport and overseas trade. While alluvial rice farming provided staple finance for the early state, it is argued here that the concept of the 'maritime mode of production' better explains economic processes in the nonstate spaces of Japan until the early 17<sup>th</sup> century. Despite this diversity in socio-economic formations, the post-Bronze Age globalization of food in Japan appears to have been delayed compared to many other regions of Eurasia and to have been less impacted by elite consumption. Further research is required to confirm this suggestion, and the essay outlines several areas where archaeological research could contribute to debates over the 'Great Divergence' and the economic development of the modern world.*

**KEY WORDS** – *agriculture; globalisation; mode of production; Great Divergence; Bronze Age; Japan*

### **K prazgodovini velikega razhajanja: izvor japonske predmoderne ekonomije v bronasti dobi**

**IZVLEČEK** – *V prispevku razpravljamo o tem, da so se prvotne družbeno-ekonomske oblike predmoderne Japonske oblikovale v času bronaste dobe, in sicer s procesi starodobne globalizacije v Evraziji. Poljedelstvo s številnimi vrstami žit, ki vključujejo riž, proso, pšenico in ječmen, in z manjšim deležem udomačenih živali se je širilo iz bronastodobne Koreje na Japonsko na začetku 1. tisočletja pr. n. št. Takšen poljedelski sistem se je postopoma širil čez celotno otočje, kar je povzročilo nove ekonomske niše, osredotočene na trgovanje, roparske napade in specializiran ribolov. Od 5. stoletja n. št. se je razširila uporaba konjev pri vojskovanju, transportu in čezmorskem trgovanju. Medtem ko je pridelava riža na naplavinah nudila stabilno financiranje za prve države, v članku razpravljamo o tem, da lahko ekonomske procese za območja na Japonskem, ki so bila izven teh držav, do začetka 17. stoletja bolje razložimo s konceptom 'morskega načina proizvodnje'. Kljub takšni raznolikosti v družbeno-ekonomskih oblikah se zdi, da se je po-bronastodobna globalizacija v prehrani na Japonskem v primerjavi z drugimi regijami v Evraziji zgodila z zamikom in je bila pod manjšim vplivom porabe elit. To bo treba potrditi z dodatnimi raziskavami, na kar opozorimo tudi v prispevku in okvirno predstavimo, na kakšen način bi lahko arheološke raziskave prispevale k razpravam o 'velikem razhajanju' in ekonomskemu razvoju modernega sveta.*

**KLJUČNE BESEDE** – *poljedelstvo; globalizacija; način proizvodnje; veliko razhajanje; bronasta doba; Japonska*

## Introduction

The premodern economy of the Japanese archipelago has received considerable attention from economic historians who have attempted to explain why Japan was the first Asian country to industrialize. Many such historians have concluded that premodern Japan was characterized by relatively high living standards and economic growth until the so-called 'Great Divergence' of the early modern era (Hanley 1983; Pomeranz 2000). Recently, Jean-Pascal Bassino *et al.* (2019) found that even during the 19<sup>th</sup> century living standards and productivity in Japan remained high as compared to the rest of Asia. Despite its unquestioned importance in understanding the origins of industrialization, however, comparative research on premodern Japanese economic history has tended to emphasize shared similarities with Europe, such as markets, institutions, and the rise of capitalism. This research also relies heavily on documentary records produced by state bureaucracies. As a result, *differences* in premodern socio-economic formations between Japan and the rest of Eurasia – especially those formations which receive little attention in state records and are primarily known from archaeology – remain less well understood. Historians of Japan have long used archaeological findings in their work (*e.g.*, Farris 1998; Wakita 2001). However, recent years have seen significant changes in our understanding of many aspects of the archaeology of early Japan, and these changes necessitate a re-evaluation of several aspects of economic history.

This essay argues that feudal or peasant modes of production were not the only game in town in premodern Japan. In a preliminary attempt to develop a 'prehistory' of the Great Divergence, I discuss the roots and evolution of socio-economic formations in Japan from *c.* 900 BC to AD 1640 from a primarily archaeological perspective using Scott's (2017) ideas about post-Bronze Age resistance to alluvial states and Johan Ling *et al.*'s (2018) concept of the 'maritime mode of production'. The essay summarises current understandings of the relevant issues but also identifies areas where future research is required.

## Bronze Age agriculture

The Neolithic Jōmon cultures of the Japanese Islands had combined hunter-gathering with the management and cultivation of several native plants, including adzuki (*Vigna angularis* var. *angularis*), soy-

beans (*Glycine max*) and barnyard millet (*Echinochloa esculenta*) (Nakayama 2010; Crawford 2011; Obata 2016). Millet farming reached southern Korea from northeast China by around 3500 BC (Lee 2011; 2017). Jōmon populations must have been aware of this, because one of the earliest Korean sites with evidence of millet is Tongsamdong, a site on the south coast of the peninsula long-known for remains relating to Neolithic interaction between Korea and Japan (Sample 1974; Bausch 2017). However, the Neolithic millet agriculture found on the Korean peninsula was not adopted in Japan, and it was not until the beginning of the 1<sup>st</sup> millennium BC when a new complex of mixed cereal agriculture spread from Bronze Age Korea to Kyushu, giving rise to the cultures of the Yayoi period (*c.* 900 BC – AD 250). This agricultural complex included rice (*Oryza sativa*), both broomcorn (*Panicum miliaceum*) and foxtail (*Setaria italica*) millet as well as wheat (*Triticum aestivum*) and barley (*Hordeum vulgare*) (Nakayama 2010; Nasu, Momohara 2016).

The first millennium BC agricultural expansion to Japan built on preceding Neolithic networks across the Korea Strait (Bausch 2017), but involved new Bronze Age globalizations. While it was earlier assumed that agriculture reached Japan from the Yangzi basin of southern China (*e.g.*, Egami 1964), in fact it was a combination of southern and northern Chinese farming systems, as well as West Asian crops (notably wheat and barley), which spread to the Japanese Islands (Stevens, Fuller 2017). The mixed nature of Japanese agriculture is clear even from mythological texts produced by the Yamato state. The *Nihon Shoki* (AD 720) describes how Uke-mochi no kami, the goddess of food, transmitted a range of important foodstuffs after her death: "*On the crown of her head there had been produced the ox and the horse; on the top of her forehead there had been produced millet; over her eyebrows there had been produced the silkworm; within her eyes there had been produced panic [broomcorn millet]; in her belly there had been produced rice; in her genitals there had been produced wheat, large beans and small beans.*" (Aston 1972.I. 32–33).

Moreover, the Yamato state issued a number of official directives between 715 and 840 encouraging the cultivation of crops other than rice (Tab. 1).

Despite this, there is still a pervasive emphasis on rice in many archaeological writings on Japan, ultimately reflecting the way the ancient state used rice to define Japanese ethnic identity (Batten 2003).

Shin'ichiro Fujio (2013) defined the Yayoi as a culture which selected irrigated paddy-field rice cultivation as its basis of production *and* which engaged in 'Yayoi rituals' to maintain that production base. This interpretation leads Fujio to conclude that less than half of the Japanese archipelago fits his own definition. Although he presents this as a critique of a simplistic association between rice and the Yayoi, Fujio is unable to develop an alternative framework which takes full account of social and economic diversity in Bronze Age Japan, leading him to follow Tsuyoshi Fujimoto (1988) in positing the existence of 'blurred' or 'fuzzy' cultural zones surrounding the Yayoi. Areas of ancient Japan *with* wet rice cultivation are assumed to be the norm and are termed the 'central culture' zone by both Fujimoto (1988) and Fujio (2013).

The spread of agriculture from north Kyushu across the Japanese archipelago was not especially rapid. Some readers will note that this statement contradicts my earlier evaluations of a fast expansion (Hudson 1990; 1999), and a short explanation is in order. Firstly, recent radiocarbon dating puts the beginning of the Yayoi period some five centuries earlier than previously assumed (Fujio 2011). According to current chronologies, therefore, the Yayoi period lasts some 1200 years, a time span which is almost as long as the 1500 years of the following Kofun through early modern eras (Kawamura 2018). Latest estimates plot the spread of Yayoi *culture* as follows: north Kyushu by the end of the 10<sup>th</sup> century BC, Shikoku and the central Inland Sea in the 8<sup>th</sup> century, the Kinai (Osaka-Kyoto) region in the 7<sup>th</sup>, the Tōkai and Hokuriku in the 6<sup>th</sup>, and the Chōbu, Kantō and southern Tōhoku in the 3<sup>rd</sup> century BC (Segawa 2017:19). Rice paddy fields were constructed in Aomori in the northern Tōhoku in the 4<sup>th</sup> century BC but rice growing in this region was quickly abandoned, only to return centuries later. Agriculture did not reach the Ryukyu Islands in the south until the 10<sup>th</sup> century AD (Takamiya et al. 2016). In Hokkaido, barley is known from sites of the Iron Age Okhotsk culture (Leipe et al. 2017). In the 9<sup>th</sup> century, the cultivation of barley, wheat and broomcorn and foxtail millet has been confirmed from the Sapporo area (Crawford, Yoshizaki 1986). The medieval period saw a further expansion of crops from

Year	Decree
715	Each adult male shall additionally sow barley and millet
722	For warding off famine, plant late-ripening millet, buckwheat, barley and wheat
723	Sow and harvest barley and wheat
766	Plant barley and wheat
767	Expand the cultivation of mulberry
820	Plant barley and wheat
839	Sow buckwheat and millet
840	Cultivate dry fields. For support in bad years, plant two kinds of millet ( <i>kibi</i> [broomcorn] and <i>takakibi</i> [sorghum]), barnyard grass, barley, large and small beans, and even sesame

**Tab. 1. "Measures for the Increased Production of Miscellaneous Grains" issued by the Japanese state 715–840 (adapted from Kimura 2018).**

Honshu into Hokkaido (Yamamoto 1996), but a full-scale transition to agriculture across Hokkaido did not occur until the settler colonial period of the late 19<sup>th</sup> century. In some regions of Japan, agriculture seems to have spread as a package with the Bronze Age Yayoi culture. In other areas it is possible that local hunter-gatherers took up farming themselves (Fujio 2011), although the evidence for the latter is largely circumstantial.

The speed of agricultural colonization is, of course, relative. Compared to Japan, for example, the spread of farming across Britain and Ireland seems to have been extremely fast (Bocquet-Appel et al. 2012; Shennan 2018), perhaps taking only some 300 radiocarbon years (Whittle et al. 2011) despite a larger surface area (*c.* 312 773km<sup>2</sup> for Britain and Ireland compared to *c.* 283 542km<sup>2</sup> for Honshu, Kyushu and Shikoku). On the ground, settlement by farmers would have depended on local geographic conditions and, in the case of Japan, the actual areas suitable for early farming would have been extremely limited due to the mountainous topography. It has been suggested that the rapid Neolithic colonization of Britain was aided by a series of separate migrations from the continent (Whittle et al. 2011). Such a scenario also seems likely for Yayoi Japan, although further research is required on specific routes. Another point is that the speed of an initial agricultural colonization needs to be balanced against evidence for later abandonment and re-introductions. In Britain, it has been proposed that cereal farming was abandoned in many areas after five centuries, only to be re-introduced in the Bronze Age (Stevens, Fuller 2012). With the exception of the northern Tōhoku region mentioned above, this possibility has yet to be seriously considered by Japanese archaeologists, who define Yayoi farming on

the basis of its irreversibility (Fujio 2013). As compared to Neolithic Britain, however, the late arrival of farming in Japan probably gave it greater flexibility and resilience (cf. Fuller, Lucas 2017).

Domesticated animals played a relatively minor part in the initial Bronze Age expansion of agriculture to Japan. The pig was the main such animal associated with the introduction of cereal agriculture in the Yayoi period, but the status of pigs in Bronze Age Japan has been controversial (Hongo 2017). Some pigs were probably introduced from Korea at this time, but extensive inter-breeding with wild boar probably occurred. Pigs are also known in the Iron Age Okhotsk culture in Hokkaido (Hudson 2004). Domesticated chickens first appear in the Middle Yayoi (c. 400 BC–AD 100), but are rare until the Middle Ages. In Yayoi Japan, only some 13 chicken bones (NISP) have been discovered from seven sites (Eda 2018). Chickens are archaeologically more common by the early modern Tokugawa period and comprise 22% of avifauna excavated from Tokugawa sites (Niimi 2008). However, this figure is significantly lower than at European sites from the same time period (Tab. 2).

Horses were introduced to Japan in the late 4<sup>th</sup> or 5<sup>th</sup> centuries (Sasaki 2018). Cattle bones also appear from the 5<sup>th</sup> century, becoming more widespread from the 6<sup>th</sup> (Hongo 2017). According to the *Nihon Shoki*, an envoy from the Korean state of Paekche presented a camel, a donkey and two goats to the Japanese court in 599. Another camel was given by the state of Koguryō in 618, but none of these animals became common in Japan until much later, and camels were never integrated into the Japanese landscape. Goats were, however, common in Okinawa

and the islands of northwest Kyushu from the medieval period (Thiede 1998; Toizumi 2018).

Archaeological evidence is crucial to understanding the role of domesticated animals in ancient Japan, since historical texts sometimes borrow Chinese expressions about animals. An entry in the *Nihon Shoki*, for example, describes a prosperous nation as one where “a measure of rice was sold for one piece of silver, and horses and kine covered the moors”, but the translator of this text takes “the whole passage to be a flight of the author’s fancy, stimulated by his recollections of Chinese literature” (Aston 1972.I.391). One example where texts and archaeology match well is the domestic cat. Cats are first mentioned in the diary of the late 9<sup>th</sup>-century emperor Uda, and the first archaeological evidence for this animal in Japan dates to the 10<sup>th</sup> century at the Kannonji site in Tokushima (Yamane 2008). Cats were initially associated with the aristocracy, and from the Kamakura period (1185–1333) were used by shrines and temples to keep rats from damaging sutras and other documents (Yamane 2008.86).

A scarcity of domesticated animals has been proposed as a distinctive feature of the premodern Japanese economy, most vociferously by the environmental archaeologist Yoshinori Yasuda (2006). While Yasuda’s writings have been widely critiqued for their nationalistic interpretations of the Japanese past (Reitan 2017), there is a need for further empirical research on at least five issues to determine just how distinctive patterns of domesticated animal usage in premodern Japan really were: (1) historical differences between domesticated animal utilization in Japan and neighbouring areas such as Ko-

Site/location	Period	% <i>G. gallus domesticus</i>	Chicken sample size (NISP)	Source
Japan	Tokugawa (1603–1868)	22.1	1605	Niimi 2008
Savvatiev Monastery, Tver oblast, Russia	14–16 <sup>th</sup> centuries	46.66	7	Zinoviev 2019
Gdansk, Poland	16–18 <sup>th</sup> centuries	45	190	Makowiecki, Gotfredsen 2002
Middle Volga, Russia (3 sites)	16–17 <sup>th</sup> centuries	50.97	236	Galimova et al. 2013
St. Anne’s Square, Belfast, N. Ireland	17 <sup>th</sup> -early 20 <sup>th</sup> centuries	56.25	18	Fothergill 2017
Santa Clara-a-Velha Convent, Coimbra, Portugal	17 <sup>th</sup> century	>63	1462	Moreno-Garcia, Detry 2010
Stafford Castle, UK	19 <sup>th</sup> century	70.77	491	Thomas 2011

**Tab. 2. Percentage of *Gallus domesticus* as a total of all avian fauna from early modern Japan and Europe. Unidentified avian fauna were removed from the totals before calculating the percentages.**



rea; (2) actual numbers of domesticated animals in Japan; (3) the extent to which wild animals and birds were eaten as an alternative to domesticates; (4) the role of commercialization and capitalism in promoting meat consumption; and (5) the influence of elite political controls over diet. All of these issues require evidence from zooarchaeology, which sometimes does not match that from the historical record (Albarella 1999).

From the Neolithic period, domesticated animals were widely adopted across Eurasia but actual patterns of utilization were variable and were influenced by regional ecological and historical conditions (Manning et al. 2013; Balasse et al. 2017; Zeder 2017). The animals that were domesticated in West Asia in the 8<sup>th</sup> millennium BC spread to Europe north of the Mediterranean through a series of cultural and biological adaptations including dairying and an increased reliance on cattle at the expense of ovicaprids (Ethier et al. 2017). Pigs were also domesticated in China but spread more slowly to Northeast Asia, including Korea, the Russian Far East and Japan (Kuzmin 1997). Some Japanese historians such as Nakazawa (2009) see a major difference between domestic animal exploitation in Japan and that in China and Korea, yet Korea remains poorly understood in this respect. European historians tend to emphasize low levels of domestic animal usage across East Asia as a whole. Eric Jones (2003) argued that the European accumulation of capital in the form of livestock was one cause of what he called *The European Miracle*. Kenneth Pomeranz (2000, 32–35) claims that the scarcity of domestic animals in many parts of Asia had little effect on economic development, but further research is needed to support this argument for the ancient and medieval periods.

The consumption of animals in premodern Japan must be understood in relation to questions of political control by the emperor and social elites, as well as complex histories of social taboos. It has been argued that at least until the 9<sup>th</sup> century – when Buddhist ideas gained greater influence amongst the aristocracy – abstinence from killing animals and eating meat served as a type of magico-ritual means of avoiding disasters (Harada 1993; Nakazawa 2009). Prohibitions against the use of certain resources were also a way by which elites could control their subjects. The late 13<sup>th</sup> century Azuma Kagami contains prohibitions against burning moorland to hunt animals and against using oil cakes to poison rivers to catch fish (Taniguchi 2014). Various social

taboos were also associated with fish. According to the mid-18<sup>th</sup> century *Efu fūzokushi*, “tuna, sweet potato, pumpkin, and such are exceedingly low class foods, and even commoners are ashamed to eat them openly” (Sakurai 2017, 680).

The presence of good pastureland in many areas of eastern Japan meant that horses were more commonly raised there than in the west of the country. This difference extended to animals used in agricultural work, with cattle being more common in most of western Japan, whereas horses were more frequently used in east Japan as well as in southern Kyushu and southern Shikoku (Kōno 2009). In the ancient period, horses were raised on official government ranches, but also in nonstate spaces by groups such as the Emishi of the northern Tōhoku (Matsumoto 2018).

### **The barbarian niche and the maritime mode of production**

Even in Europe, premodern history has for the most part adopted a land-based perspective (Rüdiger 2017) and – notwithstanding the influential critiques of Amino (2012) and others – this remains true for Japan. In this context, the term ‘land-based’ may be less useful than the concept of ‘nonstate spaces’ developed by James Scott (2009; 2017). Although the term ‘feudalism’ is rarely used in more recent Japanese historiography, there is still an assumption that the economy centred around aristocratic landlords who obtained a surplus from dependent peasants. Chris Wickham (2005, 304), an historian of medieval Europe, has proposed a ‘peasant mode of production’ for “societies in which peasants are mostly independent producers, and the local rich and powerful are dominant only over a minority of the peasantry, or are partly direct producers themselves”. However, this concept seems difficult to apply to Japan. In an alternative approach, which would appear to be more relevant to the Japanese context, Ling et al. (2018) have proposed a ‘maritime mode of production’ which combined agricultural production with new maritime, warrior and trading dynamics. Although Ling and colleagues illustrate this model with Bronze and Viking Age examples from Scandinavia, they suggest that the maritime mode of production was more widespread, and briefly note comparative examples from Island Southeast Asia, Oceania, and the Northwest Coast of North America.

As in Europe, land-based power in Japan has often been contrasted with the opposing, ‘dangerous’ world

of pirates and others who attempted to live in non-state spaces. In a much-cited work, Shōsuke Murai (1993) saw medieval pirate/traders as 'marginal men'. This framework derives in part from the 'agrarian fundamentalism' of Confucian thought, which was perhaps less strict in Japan than in Korea or China (Amino 2012), yet I believe this opposition between the land and the sea in Japanese history to be over-stated. Ling *et al.*'s (2018) maritime mode of production emphasizes that maritime raiding and trading could incorporate an agricultural sector owned by free farmers and chieftains.

New maritime adaptations had to some extent developed in Japan from the Late Jōmon period, before farming had been introduced from Korea, with a new emphasis on offshore resources such as tuna, marlin and sharks (Toizumi 2008). However, the arrival of agriculture and immigrant populations in the Yayoi transformed post-Jōmon economies in the archipelago, opening up new opportunities which – following the logic of Scott (2017) – might be termed the 'barbarian niche' (Hudson *in press*). In Hokkaido, Epi-Jōmon groups focused on sea bottom fish, especially Pleuronectinae and Japanese halibut (*Paralichthys olivaceus*), as well as swordfish (Segawa 2017). All of these were difficult and dangerous species to fish, and it can be assumed that opportunities for trade were a major stimulus. From Hokkaido down to Kyushu, abalone also became a very common trade item, a pattern that continued into the Tokugawa period. The long-distance connections between maritime-oriented populations along the coast of the Sea of Japan is shown by various categories of archaeological evidence including shell beads and rock art (Hudson, Barnes 1991; Segawa 2017). Certain Japanese rock and tomb art motifs from this period mirror Indo-European mythological themes connected to ships, horses and the sun (Segawa 2017; *cf.* Kristiansen 2012), and it has yet to be explained how such influences might have reached the archipelago.

The post-Jōmon 'barbarian niche' did not only involve maritime resources. As noted above, horses were also important in many 'peripheral' (meaning peripheral to the Yamato state) regions of Japan. The early 8<sup>th</sup> century gazetteer, the *Hizen no Kuni Fudoki*, mentions that maritime-based peoples in the Gotō Islands of Nagasaki raised horses and cattle (Aoki 1997.265). Mountain bandits were also common in many areas of the archipelago. But it was the sea-based 'pirates' and traders who developed enormous power across Japan and into the broader

East Asia region (Amino 2012; Carré 2017; Oxenboell 2005; *in press*; Shapinsky 2009; 2014; Smits 2018). Medieval Japan can be characterized by processes of political decentralization and economic commercialization (Yamamura 1990), yet the pirates served to promote 'connectivity' (Horden, Purcell 2000) across the region. Forest products, including furs and timber, were important items of commerce with China and Korea, as were slaves (Nelson 2004; Totman 2014; von Verschuer 2006). Archaeology is crucial to our understanding of this trade. A recently published example is Deryugin's (2018) suggestion that petroleum for lighting was traded from northern Japan to the state of Parhae in northern Korea and the Russian Far East. As early as 668, the *Nihon Shoki* mentions that "the province of Koshi [the modern Hokuriku region] presented to the Emperor burning earth and burning water", items that are assumed to be coal and petroleum (Aston 1972.II.289).

Of course, the sea also supported state power in early Japan, but its role in this respect seems to have undergone significant changes over time. Guillaume Carré (2017) argues that "the Yamato court was not particularly interested in the sea" between the 8<sup>th</sup> and 12<sup>th</sup> centuries, although he notes that internal seaways were used to collect taxes. In earlier centuries, however, the sea had been important as a route to attempted territorial expansion through frequent attacks on the Korean peninsula, as described in the *Nihon Shoki*. The historian Gari Ledyard (1975) even called the early Japanese state the 'Thalassocracy of Wa', although he never published a full argument in support of this concept.

### **Food globalization and the economy of premodern Japan**

#### ***Background remarks***

The long-distance exchange of ancient foods has become an important topic of research in recent archaeology (Boivin 2017; Boivin *et al.* 2012; Liu, Jones 2014). Research on the ancient globalization of food can provide new perspectives on the question of wealth disparities across Eurasia. Many early travellers from Europe remarked that Asian societies were characterized by profligate aristocracies who exploited poor peasants (Jones 2003.5). Further research is needed on how the Japanese Islands articulated with premodern processes of globalization, but it seems hard to avoid the impression that those processes were often quite delayed with respect to the rest of Eurasia. Even rice, that most symbolic of

crops in Japan, reached the archipelago very late. By comparison, imported rice has been found at a number of Roman sites in Europe from at least the 1<sup>st</sup> century AD (Reed, Leleković 2019), a date that is not significantly different from many parts of eastern Japan. The slow rate of the globalization of food in early Japan appears to mirror that of other technologies, such as wheeled transport. The oldest wooden wheel in Europe, from the Ljubljana marshes, dates to around 3150 BC. Very sophisticated woodworking technologies were found in Neolithic and Bronze Age Japan, but the wheel and wheeled transport were probably not introduced until the middle of the 1<sup>st</sup> millennium AD. Chariots were never used in Japan, and the emperor and aristocracy do not seem to have used wheeled transport for political display until as late as the 10<sup>th</sup> century (Nakazawa 2009.6).

Several new crops and varieties did have a major economic impact in premodern Japan. Champa rice (*Oryza sativa indica* var. *spontanea* or *perennis*), introduced from south China sometime between 1100 and 1300, not only produced higher yields but was also more resistant to disease, drought and flooding (Farris 2006.132). Champa rice also became popular, because its taste made it less attractive to aristocratic tax demands (Totman 2014.126). The introduction of the pumpkin and sweet potato shows the importance of contact with the European trading nations in the late 16<sup>th</sup> and early 17<sup>th</sup> centuries, a time of considerable agricultural change in parts of Europe (Grau-Sologestoa, Albarella 2019). Some plants did not take off widely upon their first arrival in Japan. Cotton is said to have first been introduced to Japan in 799 by a man from Southeast Asia. In the following year, the court ordered cotton to be grown in several provinces but this was not followed, and cotton was not widely grown until it was re-introduced from Korea in the 15<sup>th</sup> century (von Verschuer 2016.26). DNA evidence suggests that melons (*Cucumis melo* L.), which appear to have first reached Japan at the end of the 1<sup>st</sup> millennium BC, were re-introduced on several occasions thereafter, but underwent intensified artificial selection for desired traits after around AD 1000 (Tanaka et al. 2016).

One explanation for the apparently slow rate of food globalization in Japan may relate to different attitudes and ideologies of state control. Von Verschuer (2016) notes that until the 17<sup>th</sup> century the Japanese government hardly ever provided peasants with technical assistance or manuals on agricultural im-

provement, even though the large Chinese literature on such matters was known in Japan. Von Verschuer's (2016.13) suggested explanation that "*the Japanese mentality put zeal before technical ability*" begs the question of why the ancient and medieval state in Japan was so weak in that respect. A hypothesis for future consideration is that – from the perspective of food globalization – Japanese elites had a relatively low influence over the introduction and spread of new food items. Testing this hypothesis would provide new perspectives on the role of the profligate consumption by Asian elites proposed by Jones (2003) and others.

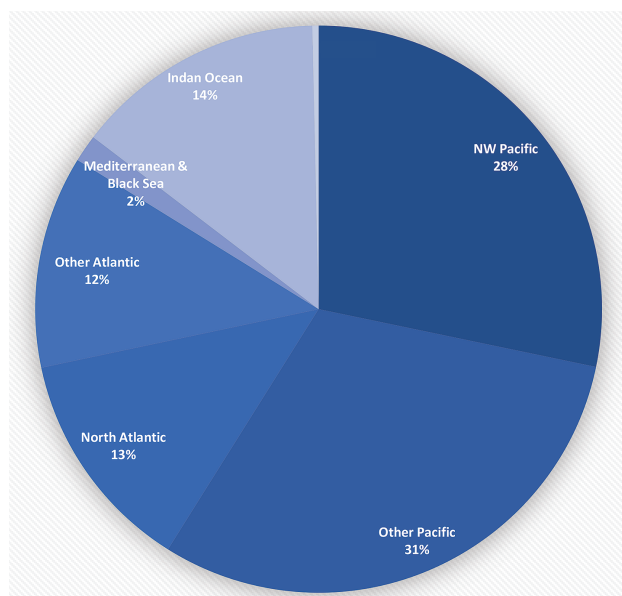
### ***The role of commercial fisheries***

The globalization of food does not just involve the transfer of exotic items, but the whole process by which new foodstuffs are incorporated into the broader social and economic structures of a particular culture. This process may have important knock-on effects on social change beyond food. As an example, in this section I briefly consider fish and fisheries.

Japanese elites enjoyed an extensive culture of banquets. The abbot of the Chōrakuji temple in modern Gunma is said to have attended more than 100 such banquets in 1565 alone (von Verschuer 2017). Following Buddhist precepts some of these meals were vegetarian, but Japanese elites were also major consumers of seafood in feasts and banquets. Zooarchaeological analyses from the residence of the Ōuchi family in Yamaguchi has shown that around AD 1500, as well as ducks, pheasants, sparrows, rabbits, otters, martens and badgers, a huge variety of marine and river resources was consumed, including scorpion fish (Scorpaenidae), Asian sea bass (*Lateolabrax* sp.), Carangidae mackerels, sweetfish (*Plecoglossus altivelis*), sharks, rays (Myliobatiformes), pike congers (Muraenesocidae), Serranidae sea basses and groupers, grunts (Haemulidae), surfperch (Embiotocidae), salmonids, tuna and bonito (Scombridae), sardines, carp, abalone, horned turban shell (*Turbo cornutus*) and the Asian rapa whelk (*Rapana venosa*) (Kitajima 2014). Elite sites of the early modern Tokugawa period are also marked by a large diversity of marine remains. For example, the Ministry of Post and Telecommunications Iikura Annex site in Tokyo, the location of Tokugawa daimyo residences of the Yonezawa and Usuki domains, produced 25 types of fish and 18 types of shellfish (Sakurai 2017).

The medieval expansion of offshore fishing has been seen as one important factor in the economic





**Fig. 1. Global marine fisheries capture in 2016 (based on data in FAO 2018).**

rise of Europe (Jones 2003.75). In Asia, by contrast, Jones (2003.167–168) argues that the available fisheries were much less rich: “Asians were simply not provided with as good marine fishing-grounds as the North Sea and the far side of the Atlantic offered to Europeans.” Japan is noted as an exception to this generalization, but Jones provides no discussion of the historical role of fisheries in Japan. Based on contemporary data from the Food and Agriculture Organization of the United Nations, fisheries in the northwest Pacific accounted for 29% of global marine capture in 2016; the north Atlantic by contrast comprised only 13% (Fig. 1). Although Japan is most conveniently located to access northwest Pacific fisheries, access from China and Korea would also have been possible had such an economy developed in those countries.

Archaeology has played an important role in understanding the historical commercialization of fishing (Pitcher, Lam 2015). Zooarchaeological evidence shows a rapid increase in offshore catches of herring and cod in northwest Europe after around AD 1000 (Barrett et al. 2004; Galloway 2017). Long-term trends in fisheries in Japan are quantitatively less well understood, but a broad outline is known from the work of Toizumi (2008) and others (Fig. 2). What stands out from these trends is the great variety of fishing adaptations found in Japan over time. Some of this variation no doubt reflects environmental factors and, from the medieval period, it is possible to identify the growing commercialization of fisheries, yet the overall diversity is still high.

In Europe, herring from Britain were being traded to France and Germany by at least the 12<sup>th</sup> century AD (Barrett 2018.130). The increasing commercialization of fisheries in Europe probably derived from a range of factors, including Christian fasting regulations, population growth and urbanism, and declining freshwater fish resources (Hoffmann 1996; 2002; Barrett et al. 2004). It is presently unclear to what extent similar factors affected fisheries in Japan. Various social taboos surrounding the killing and eating of animals in Japan might be assumed to have encouraged fish consumption, but this relationship needs to be investigated using long-term zooarchaeological sequences. Jun'ya Sakurai (2017.680) claims that the fish most preferred by the Japanese during the medieval period was carp, whereas red

<b>Jōmon</b>
<ul style="list-style-type: none"> <li>• Pottery used to process marine foods</li> <li>• Salmon exploitation</li> <li>• Large shell mounds with inshore (e.g., <i>Acanthopagrus schlegelii</i> &amp; <i>Lateolabrax japonicus</i>) and offshore (e.g., <i>Katsuwonus pelamis</i>) fish in addition to shellfish</li> <li>• Freshwater species exploited, especially in western Japan</li> </ul>
<b>Yayoi</b>
<ul style="list-style-type: none"> <li>• Big decline in shell mounds</li> <li>• 'Jomon type' offshore fishing continues in NW Kyushu, Hokkaido and along Pacific coast of Tohoku</li> <li>• Carp raised in rice paddy fields</li> </ul>
<b>Kofun-Heian</b>
<ul style="list-style-type: none"> <li>• Specialist processing of <i>K. pelamis</i>, abalone and other resources used for tax payments</li> <li>• Small-scale shell middens in Kanto region</li> <li>• Large <i>Corbicula sp.</i> midden at Kaminagahama (Shimane)</li> </ul>
<b>Medieval</b>
<ul style="list-style-type: none"> <li>• Tuna, <i>Scomberomorus niphonius</i>, <i>Coryphaena hippurus</i> and <i>Pagrus major</i> common at Kamakura and other urban sites</li> <li>• Blood clam (<i>Anadara broughtonii</i>) middens around Osaka Bay suggest new netting techniques</li> <li>• Growing commercialisation, salmon trade in Hokkaido</li> </ul>
<b>Early Modern</b>
<ul style="list-style-type: none"> <li>• Heavy exploitation of Tokyo Bay to feed Edo</li> <li>• Dominance of <i>Pagrus major</i> in Kanto follows medieval trend, but matched by increased variety of exploited fish</li> <li>• Decline in <i>Meretrix lusoria</i> and increase in <i>Venerupis philippinarum</i> and <i>Macra chinensis</i> possibly linked with urban pollution</li> <li>• Dried herring imported from Hokkaido as fertiliser</li> </ul>

**Fig. 2. Major trends in Japanese fisheries exploitation from the Jōmon to early modern periods. Based on Toizumi (2008), Habu et al. (2011), Hudson (1994), Nakajima et al. (2010), Ōnishi (2014), and other sources.**

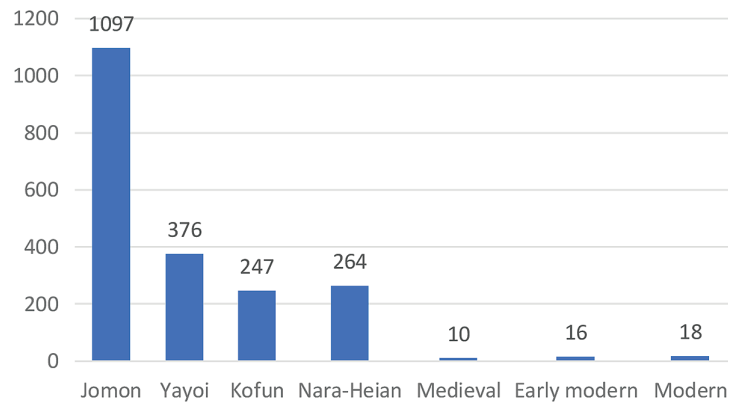


sea bream (*Pagrus major*) became the most popular fish in the early modern era. This shift might reflect medieval over-exploitation of freshwater fish, but the Japanese fisheries record is characterized by high regional and chronological diversity and more research is needed. By the early modern Tokugawa period, however, it is known from the historical record that various fishery conservation methods had already been introduced (Takahashi 2009), presumably as a result of over-fishing in earlier times.

Figure 3 shows a decline in the number of shell middens in Japan from the Bronze Age Yayoi period. Figures for the Jōmon to Kofun periods are taken from Nakao Sakazume (1959). As noted by Junko Habu *et al.* (2011), based on more recent data actual shell midden numbers are likely to be higher, but the overall trend shown here can be assumed to reflect long-term changes in the use of marine resources. An important caveat, however, is that many Jōmon shell mounds are located on higher ground and have been less disturbed by modern coastal development.

## Conclusions

The field of Japanese history is entering an exciting new phase wherein interdisciplinary and revisionist approaches are beginning to transform traditional understandings. Recent books by Takuro Segawa (2017) and Gregor Smits (2018) can be cited as examples of this trend. This exploratory essay has



**Fig. 3. Number of shell middens in Honshu, Shikoku and Kyushu from the Jōmon to modern periods. Data from Sakatsume (1959) and Kenmotsu (2014).**

argued that Bronze Age globalization established mixed cereal farming in the Japanese Islands and also stimulated the formation of new, ‘post-Jōmon’ economies filling what I have called the ‘barbarian niche’. Continuing globalization over the historic period was important, but further research is needed to explore the role of elite consumption in that process. A discussion of historic transformations in Japanese fisheries was used to illustrate this problem.

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## References

- Albarella U. 1999. ‘The mystery of husbandry’: medieval animals and the problem of integrating historical and archaeological evidence. *Antiquity* 73: 867–875.
- Amino Y. 2012. *Rethinking Japanese History*. Center for Japanese Studies, University of Michigan. Ann Arbor.
- Aoki M. Y. 1997. *Records of Wind and Earth: A Translation of Fudoki with Introduction and Commentaries*. Association for Asian Studies. Ann Arbor.
- Aston W. G. 1972. *Nihongi: Chronicles of Japan from the Earliest Times to AD 697*. Tuttle. Rutland VT and Tokyo.
- Balasse M., Tresset A., Bălăşescu A., Blaise E., Tornero C., Gandois H., Fiorillo D., Nyerges É. Á., Fremondeau D., Banffy E., and Ivanova M. 2017. Sheep birth distribution in past herds: a review for prehistoric Europe (6<sup>th</sup> to 3<sup>rd</sup> millennia BC). *Animal* 11(12): 2229–2236. <https://doi.org/10.1017/S1751731117001045>
- Barrett J. H. 2018. Medieval fishing and fish trade. In C. M. Gerrard, A. Gutiérrez (eds.), *The Oxford Handbook of Later Medieval Archaeology in Britain*. Oxford University Press. Oxford: 128–140.
- Barrett J. H., Locker A. M., and Roberts C. M. 2004. The origins of intensive marine fishing in medieval Europe:

- the English evidence. *Proceedings of the Royal Society B* 271: 2417–2421. <https://doi.org/10.1098/rspb.2004.2885>
- Bassino J-P., Broadberry S., Fukao K., Gupta B., and Takashima M. 2019. Japan and the great divergence, 730–1874. *Explorations in Economic History* 72: 1–22. <https://doi.org/10.1016/j.eeh.2018.11.005>
- Batten B. L. 2003. *To the Ends of Japan: Premodern Frontiers, Boundaries, and Interactions*. University of Hawai'i Press. Honolulu.
- Bausch I. R. 2017. Prehistoric networks across the Korea strait (5000–1000 BCE): 'Early globalization' during the Jomon period in northwest Kyushu? In T. Hodos (ed.), *The Routledge Handbook of Archaeology and Globalization*. Routledge. London: 413–437.
- Bocquet-Appel J.-P., Naji S., Vander Linden M., and Koslowski J. 2012. Understanding the rates of expansion of the farming system in Europe. *Journal of Archaeological Science* 39(2): 531–546. <https://doi.org/10.1016/j.jas.2011.10.010>
- Boivin N. 2017. Proto-globalisation and biotic exchange in the Old World. In N. Boivin, R. Crassard, and M. Petraglia (eds.), *Human Dispersal and Species Movement: From Prehistory to the Present*. Cambridge University Press. Cambridge: 349–408.
- Boivin N., Fuller D. Q., and Crowther A. 2012. Old World globalization and the Columbian exchange: comparison and contrast. *World Archaeology* 44: 452–469. <https://doi.org/10.1080/00438243.2012.729404>
- Carré G. 2017. Féodalités maritimes: le Japon médiéval et la mer (XIe–VIIe siècles). In M. Balard (ed.), *The Sea in History: The Medieval World*. Boydell Press. Woodbridge: 867–890.
- Crawford G. W. 2011. Advances in understanding early agriculture in Japan. *Current Anthropology* 52 (Supplement 4): S331–S345. <https://www.journals.uchicago.edu/doi/abs/10.1086/658369>
- Crawford G. W., Yoshizaki M. 1986. Ainu ancestors and prehistoric Asian agriculture. *Journal of Archaeological Science* 14: 201–213. [https://doi.org/10.1016/0305-4403\(87\)90007-0](https://doi.org/10.1016/0305-4403(87)90007-0)
- Deryugin V. A. 2018. Japan as a possible supplier of oil to the mainland in early Middle Ages. *Multidisciplinary Studies in Archaeology* 2: 65–70.
- Eda M. 2018. Yayoi jidai no niwatori saikō. *Kikan Kōkōgaku* 144: 43–46. (in Japanese)
- Egami N. 1964. The formation of the people and the origin of the state in Japan. *Memoirs of the Tōyō Bunko* 23: 35–70.
- Ethier J., Bánffy E., Vuković J., Leshtakov K., Bacvarov K., Roffet-Salque M., Evershed R. P., and Ivanova M. 2017. Earliest expansion of animal husbandry beyond the Mediterranean zone in the sixth millennium BC. *Nature Scientific Reports* 7: 7146. <https://doi.org/10.1038/s41598-017-07427-x>
- Farris W. W. 1998. *Sacred Texts and Buried Treasures: Issues in the Historical Archaeology of Ancient Japan*. University of Hawai'i Press. Honolulu.
2006. *Japan's Medieval Population: Famine, Fertility, and Warfare in a Transformative Age*. University of Hawai'i Press. Honolulu.
- FAO 2018. The State of World Fisheries and Aquaculture 2018: Meeting the Sustainable Development Goals. FAO. Rome.
- Fothergill B. T. 2017. Urban animals: human-poultry relationships in later post-medieval Belfast. *International Journal of Historical Archaeology* 21: 107–133. <https://doi.org/10.1007/s10761-016-0331-z>
- Fujimoto T. 1988. *Mō futatsu no Nihon bunka*. Tokyo University Press. Tokyo. (in Japanese)
- Fujio S. 2011. 'Shin' Yayoi jidai: 500nen hayakatta suiden inasaku. Yoshikawa Kōbunkan. Tokyo. (in Japanese)
2013. The frame of the Yayoi culture: is wet rice cultivation with irrigation system an indicator of the Yayoi culture? *Bulletin of the National Museum of Japanese History* 178: 85–120. (in Japanese with English summary).
- Fuller D. Q., Lucas L. 2017. Adapting crops, landscapes, and food choices: patterns in the dispersal of domesticated plants across Eurasia. In N. Boivin, R. Crassard, and M. Petraglia (eds.), *Human Dispersal and Species Movement: From Prehistory to the Present*. Cambridge University Press. Cambridge: 304–331.
- Galimova D. N., Askeyev I. V. and Askeyev O. V. 2014. Bird remains from 5<sup>th</sup>–17<sup>th</sup> century AD archaeological sites in the Middle Volga region of Russia. *International Journal of Osteoarchaeology* 24: 347–357. <https://doi.org/10.1002/oa.2385>
- Galloway J. A. 2017. Fishing in medieval England. In M. Balard (ed.), *The Sea in History: The Medieval World*. Boydell Press. Woodbridge: 629–641.

- Grau-Sologestoa I, Albarella U. 2019. The 'long' sixteenth century: a key period of animal husbandry change in England. *Archaeological and Anthropological Sciences* 11 (6): 2781–2803.  
<https://doi.org/10.1007/s12520-018-0723-6>
- Habu J, Matsui A, Yamamoto N, and Kanno T. 2011. Shell midden archaeology in Japan: aquatic food acquisition and long-term change in the Jomon culture. *Quaternary International* 239: 19–27.  
<https://doi.org/10.1016/j.quaint.2011.03.014>
- Hanley S. B. 1983. A high standard of living in nineteenth-century Japan: fact or fantasy? *Journal of Economic History* 43: 183–192.
- Harada N. 1993. *Rekishi no naka no kome to niku: tabemono to tennō, sabetsu*. Heibonsha. Tokyo. (in Japanese)
- Hoffmann R. C. 1996. Economic development and aquatic eco-systems in medieval Europe. *American Historical Review* 101: 631–669. DOI: 10.1086/ahr/101.3.631
2002. Carp, cods and connections: new fisheries in the medieval European economy and environment. In M. J. Henninger-Voss (ed.), *Animals in Human Histories: The Mirror of Nature and Culture*. University of Rochester Press. Rochester NY: 3–55.
- Hongo H. 2017. Introduction of domestic animals to the Japanese archipelago. In U. Albarella (ed.), *The Oxford Handbook of Zooarchaeology*. Oxford University Press. Oxford: 333–350.
- Horden P., Purcell N. 2000. *The Corrupting Sea: A Study of Mediterranean History*. Blackwell. Oxford.
- Hudson M. J. 1990. From Toro to Yoshinogari: Changing perspectives on Yayoi period archeology. In G. L. Barnes (ed.), *Hoabinhian, Jomon, Yayoi, Early Korean States: Bibliographic Reviews of Far Eastern Archaeology 1990*. Oxbow. Oxford: 63–111.
1994. Constructing Japan: Diversity and unification, 400 BC to AD 1600. In G. Burenhult (ed.), *The Illustrated History of Humankind, Vol. 4*. Harper Collins. New York: 122–141.
1999. *Ruins of Identity: Ethnogenesis in the Japanese Islands*. University of Hawai'i Press. Honolulu.
2004. The perverse realities of change: world system incorporation and the Okhotsk culture of Hokkaido. *Journal of Anthropological Archaeology* 23: 290–308.  
<https://doi.org/10.1016/j.jaa.2004.05.002>
- in press. Language dispersals and the 'secondary peoples' revolution': a historical anthropology of the Trans-  
 eurAsian unity. In M. Robbeets, N. Hübler, and A. Savel'yev (eds.), *The Oxford Guide to the Transeurasian Languages*. Oxford University Press. Oxford.
- Hudson M. J., Barnes G. L. 1991. Yoshinogari: A Yayoi settlement in northern Kyushu. *Monumenta Nipponica* 46: 211–235.
- Jones E. L. 2003. *The European Miracle: Environments, Economies and Geopolitics in the History of Europe and Asia*. Third edition. Cambridge University Press. Cambridge.
- Kawamura Y. 2018. Yayoi period on the Japanese archipelago. *Kōkogaku Kenkyū* 65(3): 61–80. (in Japanese with English summary)
- Kenmotsu T. 2014. Rekishi jidai no kaizuka. *Kikan Kōkogaku* 128: 17–19. (in Japanese)
- Kimura S. 2018. Agricultural expansion and irrigation in the early medieval age. In J. R. Goodwin, J. R. Piggott (eds.), *Land, Power, and the Sacred: The Estate System in Medieval Japan*. University of Hawai'i Press. Honolulu: 143–163.
- Kitajima D. 2014. Chūsei saidai no en o saigen suru. *Kikan Kōkogaku* 128: 77–79. (in Japanese)
- Kōno M. 2009. Nōkō to ushiuma. In K. Nakazawa (ed.), *Hito to dōbutsu no Nihonshi 2: rekishi no naka no dōbutsutachi*. Yoshikawa Kōbunkan. Tokyo: 96–126. (in Japanese)
- Kristiansen K. 2012. Rock art and religion: The sun journey in Indo-European mythology and Bronze Age rock art. *Adoranten* 2012: 69–86.
- Kuzmin Y. 1997. Vertebrate animal remains from prehistoric and medieval settlements in Primorye (Russian Far East). *International Journal of Osteoarchaeology* 7: 172–180.
- Ledyard G. 1975. Galloping along with the horseriders: looking for the founders of Japan. *Journal of Japanese Studies* 1: 217–245.
- Lee G.-A. 2011. The transition from foraging to farming in prehistoric Korea. *Current Anthropology* 52: S307–S329.  
<https://www.journals.uchicago.edu/doi/abs/10.1086/658488>
2017. The spread of domesticated plant resources in prehistoric northeast Asia. In T. Hodos (ed.), *The Routledge Handbook of Archaeology and Globalization*. Routledge. London: 394–412.
- Leipe C., Sergusheva E. A., Müller S., Spengler R. N., Goslar T., Kato H., Wagner M., Weber A., and Tarasov P. 2017.



- Barley (*Hordeum vulgare*) in the Okhotsk culture (5<sup>th</sup>–10<sup>th</sup> century AD) of northern Japan and the role of cultivated plants in hunter-gatherer economies. *PLoS ONE* 12(3): e0174397. <https://doi.org/10.1371/journal.pone.0174397>
- Ling J., Earle T., and Kristiansen K. 2018. Maritime mode of production: raiding and trading in seafaring chiefdoms. *Current Anthropology* 59(5): 488–524. <https://www.journals.uchicago.edu/doi/abs/10.1086/699613>
- Liu X., Jones M. K. 2014. Food globalisation in prehistory: top down or bottom up? *Antiquity* 88: 956–963. <https://doi.org/10.1017/S0003598X00050912>
- Makowiecki D., Gotfredsen A. B. 2002. Bird remains of medieval and post-medieval coastal sites at the southern Baltic Sea, Poland. *Acta Zoologica Cracoviensia* 45: 65–84.
- Manning K., Downey S. S., Colledge S., Conolly J., Stopp B., Dobney K., and Shennan S. 2013. The origins and spread of stock-keeping: the role of cultural and environmental influences on early Neolithic animal exploitation in Europe. *Antiquity* 87: 1046–1059. <https://doi.org/10.1017/S0003598X00049851>
- Matsumoto T. 2018. *Tsurareta Emishi*. Dōseisha. Tokyo.
- Moreno-Garcia M., Detry C. 2010. The dietary role of hens, chickens and eggs among a 17<sup>th</sup>-century monastic order: the Clarisse of Santa Clara-a-Velha, Coimbra (Portugal). In W. Prummel, J. Zeiler, and D. Brinkhuizen (eds.), *Birds in Archaeology*. Barkuis, Groningen University Library. Groningen: 45–55.
- Murai S. 1993. *Chūsei Wajinden*. Iwanami. Tokyo. (in Japanese)
- Nakajima T., Nakajima M., and Yamazaki T. 2010. Evidence for fish cultivation during the Yayoi period in western Japan. *International Journal of Osteoarchaeology* 20: 127–134. <https://doi.org/10.1002/oa.1005>
- Nakayama S. 2010. *Shokubutsu kōkogaku to Nihon no nōkō no kigen*. Dōseisha. Tokyo. (in Japanese)
- Nakazawa K. 2009. Rekishi no naka no dōbutsutachi. In K. Nakazawa (ed.), *Hito to dōbutsu no Nihonshi 2: rekishi no naka no dōbutsutachi*. Yoshikawa Kōbunkan. Tokyo: 1–14. (in Japanese)
- Nasu H., Momohara A. 2016. The beginnings of rice and millet agriculture in prehistoric Japan. *Quaternary International* 397: 504–512. <https://doi.org/10.1016/j.quaint.2015.06.043>
- Nelson T. 2004. Slavery in medieval Japan. *Monumenta Nipponica* 59: 463–492.
- Niimi M. 2008. Tori to Nihonjin. In T. Nishimoto (ed.), *Hito to dōbutsu no Nihonshi 1: dōbutsu no kōkogaku*. Yoshikawa Kōbunkan. Tokyo: 226–252. (in Japanese)
- Obata H. 2016. *Tane o maku Jōmonjin*. Yoshikawa Kōbunkan. Tokyo. (in Japanese)
- Ōnishi H. 2014. The formation of the Ainu cultural landscape: landscape shift in a hunter-gatherer society in the northern part of the Japanese archipelago. *Journal of World Prehistory* 27: 277–293. <https://doi.org/10.1007/s10963-014-9080-2>
- Oxenboell M. 2005. Images of akutō. *Monumenta Nipponica* 60: 235–262.
- in press. Bandits and peasants in medieval Japan. In R. W. Kaeuper, H. Zurndorfer (eds.), *The Cambridge World History of Violence. Volume 2: AD 500–1500*. Cambridge University Press. Cambridge.
- Pitcher T. J., Lam M. E. 2015. Fish commoditization and the historical origins of catching fish for profit. *Maritime Studies* 14: 2. <https://doi.org/10.1186/s40152-014-0014-5>
- Pomeranz K. 2000. *The Great Divergence: China, Europe, and the Making of the Modern World Economy*. Princeton University Press. Princeton.
- Reed K., Leleković T. 2019. First evidence of rice (*Oryza cf. sativa* L.) and black pepper (*Piper nigrum*) in Roman Musra, Croatia. *Archaeological and Anthropological Sciences* 11: 271–278. <https://doi.org/10.1007/s12520-017-0545-y>
- Reitan R. 2017. Ecology and Japanese history: reactionary environmentalism's troubled relationship with the past. *The Asia Pacific Journal: Japan Focus* 15: article 5007.
- Rüdiger J. 2017. Medieval maritime polities: some considerations. In M. Balard (ed.), *The Sea in History: The Medieval World*. Boydell Press. Woodbridge: 34–44.
- Sakazume N. 1959. *Nihon kaizuka chimeihyō*. Tokyo. Doyōkai. (in Japanese)
- Sakurai J. 2017. Archaeology of early-modern Japan: food, rituals, and taboos. In J. Habu, P. V. Lape, and J. W. Olsen (eds.), *Handbook of East and Southeast Asian Archaeology*. Springer. New York: 677–694. [https://doi.org/10.1007/978-1-4939-6521-2\\_39](https://doi.org/10.1007/978-1-4939-6521-2_39)
- Sample L. 1974. Tongsamdong: a contribution to Korean Neolithic culture history. *Arctic Anthropology* 11: 1–125.

- Sasaki K. 2018. Adoption of the practice of horse-riding in Kofun period Japan: with special reference to the case of the central highlands of Japan. *Japanese Journal of Archaeology* 6: 23–53.
- Scott J. C. 2009. *The Art of Not Being Governed: An Anarchist History of Upland Southeast Asia*. Yale University Press. New Haven.
2017. *Against the Grain: A Deep History of the Earliest States*. Yale University Press. New Haven.
- Segawa T. 2017. *Jōmon no shisō*. Kōdansha. Tokyo. (in Japanese)
- Shapinsky P. D. 2009. Predators, protectors, and purveyors: pirates and commerce in late medieval Japan. *Monumenta Nipponica* 64: 273–313.
2014. *Lords of the Sea: Pirates, Violence, and Commerce in Late Medieval Japan*. Center for Japanese Studies. University of Michigan. Ann Arbor.
- Shennan S. 2018. *The First Farmers of Europe: An Evolutionary Perspective*. Cambridge University Press. Cambridge.
- Smits G. 2018. *Maritime Ryukyū, 1050–1650*. University of Hawai'i Press. Honolulu.
- Stevens C. J., Fuller D. Q. 2012. Did Neolithic farming fail? The case for a Bronze Age agricultural revolution in the British Isles. *Antiquity* 86: 707–722. <https://doi.org/10.1017/S0003598X00047864>
2017. The spread of agriculture in eastern Asia: archaeological bases for hypothetical farmer/language dispersals. *Language Dynamics and Change* 7: 152–186. <https://doi.org/10.1163/22105832-00702001>
- Takahashi Y. 2009. Kinsei gyogyō o tōshite mita seigyō to gyokairui. In K. Nakazawa (ed.), *Hito to dōbutsu no Nihonshi 2: rekishi no naka no dōbutsutachi*. Yoshikawa Kōbunkan. Tokyo: 164–187. (in Japanese)
- Takamiya H., Hudson M., Yonenobu H., Kurozumi T., and Toizumi T. 2016. An extraordinary case in human history: prehistoric hunter-gatherer adaptation to the islands of the central Ryukyus (Okinawa and Amami archipelagos), Japan. *Holocene* 26: 408–422. <https://doi.org/10.1177/0959683615609752>
- Tanaka K., Stevens C. J., Iwasaki S., Akashi Y., Yamamoto E., Dung T. P., Nishida H., Fuller D. Q., and Kato K. 2016. Seed size and chloroplast DNA of modern and ancient seeds explain the establishment of Japanese cultivated melon (*Cucumis melo* L.) by introduction and selection. *Genetic Resources and Crop Evolution* 63: 1237–1254. <https://doi.org/10.1007/s10722-015-0314-7>
- Taniguchi S. 2014. Azuma Kagami ni kisareta suisan shigen o saguru. *Kikan Kōkōgaku* 128: 89–92. (in Japanese)
- Thiede U. 1998. *Auf Haustierspuren zu den Ursprüngen der Japaner: Vor- und frühgeschichtliche Haustierhaltung in Japan*. Iudicium. Munich.
- Thomas R. 2011. The 19<sup>th</sup>-century animal bones from Stafford Castle. In *Faunal Remains from Stafford Castle Excavations 1978–1998*: <https://doi.org/10.5284/1000401>
- Toizumi T. 2008. Gyorō katsudō no henshen. In T. Nishimoto (ed.), *Hito to dōbutsu no Nihonshi 1: dōbutsu no kōkōgaku*. Yoshikawa Kōbunkan. Tokyo: 119–146. (in Japanese)
2018. Okinawa no jūnikushoku. *Kikan Kōkōgaku* 144: 63–64. (in Japanese)
- Totman C. 2014. *Japan: An Environmental History*. IB Tauris. London.
- von Verschuer C. 2006. *Across the Perilous Sea: Japanese Trade with China and Korea from the Seventh to Sixteenth Centuries*. Cornell University Press. Ithaca.
2016. *Rice, Agriculture, and the Food Supply in Pre-modern Japan*. Routledge. Abingdon.
2017. Illustrated debate over wine and rice (Shuhanron emaki): dining and socializing in late Muromachi Japan. *Monumenta Nipponica* 72: 189–222.
- Wakita H. 2001. La conjonction de l'approche par les textes et de l'archéologie en histoire du Moyen Âge japonais. *Bulletin de l'École française d'Extrême-Orient* 88: 340–344.
- Whittle A. W. R., Healy F. M. A., and Bayliss A. 2011. *Gathering Time: Dating the Early Neolithic Enclosures of Southern Britain and Ireland*. Oxbow. Oxford.
- Wickham C. 2005. *Framing the Early Middle Ages: Europe and the Mediterranean, 400–800*. Oxford University Press. Oxford.
- Yamamoto T. (ed.) 1996. *Kinsei Ezochi nōsakumotsu nenpyō*. Hokkaido University Press. Sapporo. (in Japanese)
- Yamamura K. 1990. The growth of commerce in medieval Japan. In K. Yamamura (ed.), *The Cambridge History of Japan, Vol. 3: Medieval Japan*. Cambridge University Press. Cambridge: 344–395.

Yamane Y. 2008. Neko. In T. Nishimoto (ed.), *Hito to dōbutsu no Nihonshi 1: dōbutsu no kōkogaku*. Yoshikawa Kōbunkan. Tokyo: 86–90. (in Japanese)

Yasuda Y. 2006. Sustainability as viewed from an ethos of rice cultivating and fishing. In UNESCO (eds.), *Cultural Diversity and Transversal Values: East-West Dialogue on Spiritual and Secular Dynamics*. UNESCO. Paris: 106–110.

Zeder M. A. 2017. Out of the Fertile Crescent: the dispersal of domestic livestock through Europe and Africa. In N.

Boivin, R. Crassard, and M. Petraglia (eds.), *Human Dispersal and Species Movement: From Prehistory to the Present*. Cambridge University Press. Cambridge: 261–303. <https://doi.org/10.1017/9781316686942.012>

Zinoviev A. V. 2019. Black woodpecker (*Dryocopus martius* L.) in the archaeozoological context of the Savvatiev Pustyn', a medieval rural Russian monastery. *International Journal of Osteoarchaeology* 29(2): 356–360. <https://doi.org/10.1002/oa.2741>

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