7 Discussion and conclusion

Having discussed four aspects of the Jomon culture (subsistence, settlement, mortuary/ceremonial practices, and crafts/exchange), the next step is to present a model of long-term change in Jomon cultural complexity. Traditionally, Japanese archaeologists have approached this issue under the direct or indirect influence of classical Marxist theories (see chapter 4). For example, scholars such as Ken Amakasu (1986) and Isamu Okamoto (1975; 1986) have identified the Jomon period as an egalitarian society that preceded a class society. These scholars interpreted the prosperity of the Jomon culture as the result of the growth of "forces of production" caused by population increases. They also regarded the transition to the following Yayoi period as the inevitable consequence of the contradiction encompassed in the non-food-producing economy, in which the growth of the "forces of production" eventually exceeded the reproduction rate of the natural environment (Amakasu 1986: 8). Thus, long-term changes from the Incipient through to the Middle Jomon periods were interpreted as progressive, with an increasing degree of sedentism. These scholars also suggested that a decrease in the number of sites from the Middle to the Late/Final Jomon was a result of the imbalance between the growth of "forces of production" and the limitations of the environment.

Amakasu also saw the nature of Jomon economy as primarily self-sufficient, with the exchange of exotic items reflecting the existence of a small surplus. Other scholars, such as Kiyotari Tsuboi (1962), who did not explicitly adopt a Marxist approach, also saw the Jomon people as sedentary and egalitarian. The fact that most Japanese scholars viewed the Jomon as a Neolithic culture also contributed to the conventional picture of an affluent and sedentary hunter-gatherer society.

Aspects of the Jomon culture reviewed in the previous chapters, however, indicate that regional and temporal variability in Jomon subsistence, settlement, and social complexity was more diverse than has been previously assumed. For example, the assumption of Jomon sedentism during and after the Early Jomon period needs to be reappraised, as does

the assumption of Jomon egalitarianism. Most of all, the discrepancy between the long-term change in organizational complexity in subsistence and settlement, which reached its maximum extent in the Middle Jomon in eastern Japan, and the seemingly progressive development in social complexity, which culminated in the Final Jomon, requires further explanation.

A number of questions can be raised concerning these two seemingly contradictory patterns. Why did the decline in organizational complexity in subsistence and settlement occur at the end of the Middle Jomon, and not before or after then, even if one accepts the classical Marxist theory of the limitations of a non-food-producing economy? Why did the Jomon as a complex hunter-gatherer culture eventually follow a different pathway from other well-known examples of complex hunter-gatherers, such as those in California and the Northwest Coast of North America, in which increasing complexity in subsistence–settlement and social inequality went essentially hand in hand (Koyama and Thomas 1981)? To answer these questions, conditions, causes, and consequences of long-term changes through the Jomon period need to be identified.

In this concluding chapter, I present a preliminary model of long-term change in Jomon subsistence, settlement, and society. The collector–forager model introduced in chapter 1 provides the basic guideline in the following discussion: the model is used as the framework within which to sort various types of data from each of the six Jomon subperiods.

It should be noted that Binford (1978; 1980; 1982) originally developed the collector–forager model to explain synchronic diversity in subsistence–settlement systems, not to deal with diachronic changes (for more discussion on this issue, see Fitzhugh and Habu 2002b; Habu and Fitzhugh 2002). In particular, the primary focus of Binford's 1980 article was on examining system variability under different natural environments. Using ethnographic examples (Murdock 1967), the latter half of the article attempted to find correlations between effective temperature (ET; measured by both the total amount and yearly distribution of solar radiation characteristic of a given place) and subsistence–settlement type. The results of his analysis indicate a strong correlation between ET and subsistence–settlement type; hunter-gatherers in the high ET areas (those who live in an equatorial or semitropical environment) tend to be mobile foragers, whereas many hunter-gatherer groups in the areas of lower ET are closer to the collector end of the continuum. An exception to this rule would be hunter-gatherers in some fully Arctic settings (e.g., Canadian Arctic Inuit), where the percentage of mobile groups is significantly higher than that in a temperate or boreal environment. Binford (1980: 17) suggests that many of these examples can be identified as what he calls *serial specialists* or *serial foragers*, who are primarily relying on foraging strategies (i.e., characterized by low logistical mobility), but who change their primary target resources seasonally.

The fact that the primary focus of the original model was on synchronic dynamics, however, does not deny the applicability of the model to the examination of long-term changes. As case studies in the Fitzhugh and Habu (2002a) volume indicate, the model can be operationalized in various ways to provide explanations for long-term system change. Long-term changes in the types of available resources and their spatial distribution would result in changes in subsistence–settlement systems. In addition, various nonenvironmental factors could also be causes or conditions of long-term hunter-gatherer system change. These include (1) technological developments, (2) an increase or decrease in population density or pressure, (3) the adoption of plant cultivation and other types of environmental management, (4) trade/exchange of critical resources, and (5) changes in social relations, including the development of social alliances or warfare.

In the following, I outline major changes in archaeological data in each of the six Jomon subperiods, and explain these changes in the context of the collector–forager model. The effects of long-term environmental fluctuations, including the warming trends from the Late Pleistocene to Mid-Holocene, on Jomon subsistence, settlement, and society are discussed in the context of the model. I also argue that the model can help explain the cultural development from the Incipient to Early Jomon by reference to the concept of serial foraging. Interpretations of the changes in the latter half of the Jomon period seem to demand the active incorporation of factors other than subsistence and settlement, some of which are listed above. Accordingly, the effects of these factors on the overall systems are also considered in the following discussion.

Development of Jomon cultural complexity

From Late Palaeolithic to Incipient Jomon: emergence of Jomon foragers

The transition from the Palaeolithic to the Jomon period has generally been discussed in the context of rapidly changing climate in the terminal Pleistocene (Harunari 1998; Ikawa-Smith 2000; Tsutsumi 1998). Scholars have suggested that changes in flora and resulting changes in fauna triggered a series of reorganizations of people's subsistence strategies (e.g., Inada 1986; I. Okamoto 1986; Tsuji 1997b). In particular, a significant decrease in and eventual extinction of large terrestrial

mammals, such as Naumann's elephant (*Palaeoloxodon naumanni*), Yabe's giant deer (*Sinomegaceros yabei*), and bison (*Bison priscus*), after 17,000 bp (ca. 20,000 cal BP) seem to have played a critical role in these subsistence reorganizations (Inada 1986). It is possible that changes in fauna during this period were also accelerated by overkills. Many scholars suggest that the disappearance of large terrestrial mammals resulted in a shift in hunting targets from large to middle-sized terrestrial mammals, namely to sika deer (*Cervus nippon*) and wild boar (*Sus scrofa*).

Because the presence of middle-sized deer (both sika deer and its ancestor *Cervus praenipponic*) on the Japanese archipelago goes back as far as 40,000 bp (Inada 1986), Harunari (1998) questions whether Late Palaeolithic people were really large mammal hunters. However, the presence of middle-sized terrestrial animals itself does not automatically disqualify the hypothesis of Late Palaeolithic people being large-mammal hunters. What matters is the relative ranking of these resources among all the available resources on the basis of both economic (i.e., labor investment vs. return) and social/ideological criteria. In other words, even if middle-sized deer were relatively abundant throughout the Late Palaeolithic period, it is likely that their overall dietary importance increased significantly as the number and kinds of large terrestrial mammals decreased.

A series of changes in lithic assemblages in the terminal Palaeolithic through to the beginning of the Incipient Jomon period seems to have corresponded to the shift in prey species and resulting changes in hunting methods. According to Inada (1986; 2001), hunting tools in the transition from the Late Palaeolithic to the Jomon period went through the following five sequential stages in terms of characteristic tools: (1) small bifacial points (approximately 5 centimeters in length or smaller) and so-called knife-shaped tools (also likely to have been used as projectile points), (2) composite tools made of microblades, (3) Mikoshiba projectile points (large bifaces), (4) tanged bifacial points, and (5) arrowheads. As discussed in chapter 2, at the Odai Yamamoto I site, lithics of the third stage are associated with radiocarbon dates of ca. 13,800–12,700 bp (ca. 16,500–15,100 cal BP) along with plain pottery, thus making this third stage the beginning of the Jomon period. Tanged bifacial points that characterize the fourth stage are typically associated with sites of the linear-relief pottery phase, such as Kamikuroiwa (12,165 ± 320 bp; I-944) (1σ: 15,350–13,450 cal BP) and Tazawa. However, regional variability is also noticeable. Namely, in Kyushu and Hokkaido, microblades remained in use later than in the other areas. For example, linear-relief pottery from Fukui Cave (12,700 ± 500 bp; GaK-950) (1σ: 15,850–14,250 cal BP) is associated with microblades, thus suggesting that the use of microblades was later in this region.

Given these contexts, the transition from the Late Palaeolithic to the Jomon period should be seen as part of these continuous changes, rather than as an epoch-making event. It should also be noted that the use of arrowheads did not become prevalent until the fifth stage, which corresponds to the latter half of the Incipient Jomon period. However, if the two triangular points recovered from the Odai Yamamoto I site (fig. 2.2; lower) were in fact used as arrowheads (see chapter 2), then the bow-and-arrow technology was either invented during or before the third stage, or introduced from continental Asia together with pottery production. Shiraishi (2000) also reports the presence of arrowheads associated with plain pottery at the Yoshioka site complex in Kanagawa Prefecture.

It is likely that the subsistence strategy of this transitional period was primarily that of the forager end of the collector–forager continuum. The majority of the sites associated with plain pottery and linear-relief pottery in Honshu and Shikoku (in terms of lithics, the Mikoshiba phase to the tanged bifacial point phase) are either open sites or cave sites, associated with no, or very few, features, suggesting relatively mobile settlement systems. Evidence for plant food collecting and processing is also relatively scarce, although some scholars (e.g., Inada 2001; Miyashita 1980) believe that the appearance of pottery on the Japanese archipelago was closely related to an increase in the reliance on plant food. In any case, the amount of plain or linear-relief pottery in these sites is usually relatively small.

Other scholars suggest that changes in subsistence strategies during this transitional period may have included the utilization of marine and/or freshwater fish. According to Hiroyuki Sato (1992), for example, some of the terminal Palaeolithic sites such as Araya (Niigata Prefecture), which are associated with microblades and so-called Araya-style burins, represent resource extraction locations for exploiting anadromous fish. This is because these sites tend to be located near large rivers, and the lithic assemblages share similarities with Early Neolithic fishing sites in northeast Asia. Recovery of salmon remains from the Maedakochi site (Incipient Jomon) indicates that at least some Incipient Jomon groups were fishing salmon (Matsui 1995; K. Imamura 1996). However, the scarcity of faunal remains from other sites in the Late Palaeolithic/Incipient Jomon periods makes the evaluation of the importance of fishing during this transitional period difficult.

Unlike Incipient Jomon data in Honshu and Shikoku, data from Incipient Jomon sites in southern Kyushu and Tanegashima (an island south of Kyushu) show clearer evidence of plant food use. At the Yokoi Takenoyama site in Kagoshima Prefecture, which is associated with plain pottery and microblades (i.e., the beginning of the Incipient Jomon

period), grinding stones and possible stone mortars have been reported together with a small number of arrowheads (Kagoshima-shi Kyoiku Iinkai 1990). At the Sojiyama site in Kagoshima Prefecture (middle Incipient Jomon), two pit-dwellings, one fire pit with a ventilation shaft (see chapter 3), and several hearths were identified (Kagoshima-shi Kyoiku Iinkai 1992). Lithic assemblages from Sojiyama and several other contemporaneous sites, such as Kakoinohara in Kagoshima (Kaseda-shi Kyoiku Iinkai 1998) and Okunonita in Tanegashima (Nishino'omote-shi Kyoiku Iinkai 1995), show not only an increase in plant food processing tools such as grinding stones, but also marked diversity (Miyata 2000). This may suggest possible differentiation in site function and occupational seasonality, perhaps related to the earlier emergence there of a collector type of subsistence–settlement system than in the rest of the Japanese archipelago. Miyata (2000) suggests repeated use of these three sites (Sojiyama, Kakoinohara, and Okunonita), a characteristic that also fits into the picture of a collector system.

Initial Jomon: expansion of target resources

With the exception of southern Kyushu, where an emergent type of collector system may be detected among some Incipient Jomon sites, residentially mobile forager systems seem to have characterized the Incipient Jomon culture of the rest of the Japanese archipelago. For most Incipient Jomon sites, evidence for the systematic exploitation of clumped resources is scarce, and only a small number of pit-dwellings have been reported.

These characteristics began to change during the Initial Jomon period (ca. 9500–6000 bp, or 11,000–6900 cal BP). One of the new developments during this period is the appearance of shell-middens. A good example is the Natsushima shell-midden in Kanagawa Prefecture (Sugihara and Serizawa 1957) dated to the Yoriito-mon phase (the first phase of the Initial Jomon period) through to the end of the Initial Jomon. An oyster shell collected from the bottom layer of the shell-midden (associated with Yoriito-mon-style pottery) is dated to 9450 ± 400 bp (M-769) (1σ: 10,850–9550 cal BP). Located on the Miura peninsula of the western Tokyo Bay area, the shell layer measured as much as 1.5 meters in thickness, and consisted primarily of oyster (*Crassostrea gigas*) and granular ark shell (*Tegillarca granosa*). Faunal remains reported from the site include both fish, such as tuna (*Thunnus thynnus*), mullet (*Mugil cephalus*), black porgy (*Acanthopagrus schlegeli*), sea bass (*Lateolabrax japonicus*), and flathead (*Platycephalus indicus*) (K. Imamura 1996), and terrestrial mammals, such as wild boar, raccoon dog, and hare. Hunting tools (e.g., arrowheads), fishing tools (e.g., bone fishhooks and needles), and plant food processing tools (e.g., pebble tools, grinding stones, and stone mortars) have also been reported. These lines of evidence indicate the rapid expansion of target resources toward so-called *r*-selected species (smaller mammals, plants, fish, and shellfish).

The radiocarbon date for the Natsushima shell-midden places the Jomon as one of the earliest examples of prehistoric hunter-gatherers who systematically exploited marine resources. Clear evidence of maritime adaptation in the Early Holocene from the other parts of the Pacific Rim region include On Your Knees Cave (ca. 10,000 cal BP) of Prince of Wales Island in southeastern Alaska, the Anangula site (ca. 8500 cal BP) in the Aleutian Islands, and the Hidden Falls site (ca. 8200 cal BP) (Fitzhugh 2002). However, unlike these examples, where the residents seem to have been heavily reliant on marine resources, the contribution of marine food to the Initial Jomon diet in Honshu seem to have been significantly less. This is because the number of shell-middens is relatively small in comparison to the number of inland settlements and open sites. With the possible exception of Late Jomon shell-midden sites in the eastern Tokyo Bay area (see pp. 238–239), there is little evidence elsewhere in Honshu that marine resources were the staple food of the Jomon people. Thus, characterizing the Honshu Jomon people as maritime foragers is inadequate in most instances (see also chapter 3).

Despite the signs of the increasing exploitation of *r*-selected species, I suggest that the majority of Initial Jomon people in Honshu remained residentially mobile foragers. The majority of settlements during this period are small, associated with only three to five pit-dwellings (I. Okamoto 1975). Most Initial Jomon sites are located on narrow ridges on hills, not suitable for constructing larger villages. Lack of storage pits indicates that food storage was not yet an important component of Incipient Jomon subsistence strategies.

In many regards, Initial Jomon people seem to have resembled what Binford (1980) referred to as "serial specialists," or "serial foragers." Like typical foragers, serial foragers are characterized by high residential mobility, low logistical mobility, and lack of storage. However, unlike typical foragers, who are adapted to spatially and seasonally homogeneous environments, serial specialists occur in environments where seasonal variability of critical resources is quite large. Binford (1980: 17) states that serial specialists "execute residential mobility so as to position the group with respect to particular food species that are temporally phased in their availability through a seasonal cycle." Although most of the ethnographically known serial foragers are located in cold climates (Binford 1980: 16), some early exploiters of *r*-selected species in temperate zones may also have adopted similar strategies.

The expansion of target resources is likely to have been caused or conditioned by multiple factors. Initial Jomon sites are generally associated with a much larger amount of pottery than Incipient Jomon sites. This seems to indicate that the ability to process and cook efficiently *r*-selected species (namely plant food and shellfish) resulted in heavier reliance on these types of food. Also, the continuing warming trend resulted in the expansion of various kinds of oak trees in central/western Honshu (including the Kanto region), Shikoku, and Kyushu (Tsuji 1997b). The warming trend also resulted in higher sea levels, which must have significantly affected the quality and quantity of available seafood.

While most of the Initial Jomon settlements in Honshu are relatively small, some examples in Hokkaido from the same period have different characteristics. For example, at the Nakano B site in Hakodate, Hokkaido, 546 Initial Jomon pit-dwellings have been reported (Izumita 1996). Many of the dwellings overlap one another, suggesting repeated occupations of the place. A large number of burial pits and flask-shaped storage pits, both of which are considered to be markers of sedentary collectors, were also discovered. The site is associated with more than 20,000 stone net sinkers, suggesting the possibility that intensive fishing was the subsistence basis of the site residents.

In southern Kyushu, where a collector type of system may have developed as early as the Incipient Jomon period (see pp. 247–248), a continuing pattern of unique developments can be observed. At the early Initial Jomon Uenohara no. 4 site (Kagoshima Prefecture), forty-six pit-dwellings, fifteen fire-pits with ventilation shafts, and other features were recovered. The site was covered by the volcanic ash layer dated to ca. 9500 bp (ca. 11,000 cal BP).

The early development of organizational complexity in subsistence and settlement seems to have formed the foundation for the development of sophisticated ceremonial practices. By the latter half of the Initial Jomon period, clay figurines, pulley-shaped clay and stone ear spools, jars with necks, and other seemingly ceremonial artifacts and features appeared in this region. The Uenohara no. 3 site provides a good example of an artifact assemblage from this period (Kagoshima-ken Kyoiku Iinkai 1997). Some Japanese archaeologists equate the level of sophistication of ceremonial artifacts evidenced at Uenohara no. 3 with that of the Late Jomon in Kanto and Tohoku. This unique development, however, was subsequently terminated by a volcanic eruption of the Kikai Caldera (a submarine volcano located south of Yakushima Island) dated to approximately 6400 bp (ca. 7300 cal BP) (Shinto 1997).

Early Jomon: development of collector systems and organizational complexity in subsistence and settlement

The emergence of serial foraging strategies during the Initial Jomon period opened the pathway to the development of more logistically organized systems. Unlike typical foragers, who tend to be more generalists (see chapter 3: p. 63), serial foragers are specialists who focus on the bulk exploitation of a limited number of critical resources. Without systematic food storage, however, the Initial Jomon system remained residentially mobile.

The development of storage techniques at the beginning of the Early Jomon period seems to have triggered the development of less residentially mobile systems in various parts of the Japanese archipelago. As discussed in chapter 3, excavations of storage pits are primarily from the Early Jomon and subsequent periods, with the exception of southern Kyushu. Together with the appearance of storage pits, other characteristics that are typical of collecting systems are commonly reported from Early Jomon sites. These characteristics include the presence of large settlements and the functional differentiation of sites. Some of the large settlements are associated with cemeteries and/or large ceremonial stone features, even though they were not necessarily contemporaneous (see chapter 5). Also, the number of ceremonial or religious artifacts, such as clay and stone figurines, talc earrings and beads, shows an increase over time.

Of these, the common presence of large settlements is diagnostic of the Early Jomon culture throughout eastern Japan. A number of settlements associated with dozens of pit-dwellings are reported from the beginning of the Early Jomon period on. Some of these settlement sites are characterized by a circular or horseshoe-shaped configuration of pit-dwellings such as those of the Nanbori site (see chapter 4). Other settlements show more clustered or linear configurations (e.g., Okada 2003).

Because many of these pit-dwellings are overlapping, it is clear that not all of them were simultaneously occupied. Examination of the pottery associated with them also confirms this interpretation. Based on these observations, Tatsuo Kobayashi (1986) suggests that the maximum number of simultaneously occupied dwellings must have been only five or six. Some of the Early Jomon villages, such as the Early Jomon component of the Sannai Maruyama site (see chapter 5), may have been larger. Regardless of the number of simultaneously occupied pit-dwellings, most of these large settlement sites seem to have been repeatedly occupied; a trait that is characteristic of collectors because of the necessity to exploit efficiently spatially and seasonally clumped resources.

Results of Case Study 1 presented in chapter 4 indicate that at least some Early Jomon systems associated with large settlements were those of seasonally sedentary collectors, not fully sedentary ones. The results also show the relatively fluid nature of these systems, including the possible presence of forager systems at the end of the Early Jomon. They indicate that organizational complexity in Jomon subsistence and settlement neither evolved from simple to complex, nor was it universal.

Despite the fluid nature of subsistence–settlement systems, the implication of the common appearance of collector systems during the Early Jomon period seems quite profound. In particular, the fact that various new developments in both mortuary/ceremonial practices and crafts/exchange systems occurred for the first time during this period indicate emergent social complexity (not necessarily hierarchical, but with more differentiation between individuals as well as between settlements) in accordance with the development of collector systems (for details, see chapters 5 and 6).

The shift toward the collector type of system is particularly noticeable in eastern Japan, notably in the Chubu, Kanto, and Tohoku regions. In western Japan, discoveries of large settlements from this period are less common. Population estimates by Koyama (1984) also suggest only a small increase in western regions (see chapter 2). Given these lines of evidence, it is likely that western Japan in general was associated with less specialized systems (i.e., closer to foragers) than those in the Chubu, Kanto, and Tohoku regions.

Middle Jomon: intensification of plant use, and its collapse

The Middle Jomon period, especially that of the Chubu, Kanto, and Tohoku regions, is known for its relative abundance of large settlements, heavily decorated pottery (see chapter 6), and ceremonial artifacts such as clay figurines and stone rods (see chapter 5). High site density and ample evidence for long-distance trade of exotic materials, such as jade (see chapter 6), also characterize this period. An abundance of so-called chipped stone axes in the southwestern Kanto and Chubu Mountain regions has also been noted by many archaeologists. As discussed in chapters 3 and 4, several scholars (e.g., Fujimori 1950) have suggested that these chipped stone axes were used as hoes for plant cultivation, while others believe their abundance reflects the practice of intensive plant root collecting (see also Habu 2001). In either case, a high level of subsistence intensification and specialization on particular types of plant food can be assumed. Fujimori (1950) also noted that, in the Chubu Mountain region, hunting tools such as arrowheads are extremely scarce during the Middle Jomon period. This also supports the hypothesis of a high level of plant food specialization. In short, Middle Jomon people in these regions seem to have been on the collector end of the forager–collector continuum.

Because of the large size of many settlements and the rich material culture, the development in the Chubu and Kanto regions described above has attracted many researchers' attention. As a result, the system associated with chipped stone axes is frequently regarded as the most representative case of Middle Jomon prosperity. This development of a so-called "Middle Jomon type" of system has been attributed to the progressive development of the Jomon culture in general, or the development of the "forces of production" in particular when discussed within the framework of classical Marxism. However, results from Case Study 1 in chapter 4 indicate that the development of this new system in the Chubu Mountain region may have been originally triggered by a system change in the Kanto region. Thus, the importance of historically unique situations, in this case a shift from collecting to foraging systems in one region and the resulting population movement to a neighboring region, needs to be seriously considered to understand the change from the Early to Middle Jomon in these regions (see chapter 4).

As discussed in chapter 3, Keiji Imamura (1996) notes that the northeastern Kanto region is characterized by an abundance of storage pits. He suggests that this reflects a heavy reliance on nuts. If this was the case, it implies the presence of another highly specialized collector system. An abundance of storage pits is also noticeable in some Middle Jomon sites in Tohoku, although their regional distribution patterns have yet to be analyzed.

In the northern Tohoku region, extremely large settlements appeared in the latter half of the Middle Jomon period, notably during the Upper Ento-d, -e, Enokibayashi, and Saibana phases. These include the Sannai Maruyama site (see Case Study 2 in chapter 4) and the Tominosawa site (Aomori-ken Maizo Bunkazai Chosa Center 1989; 1991a; 1991b; 1991c; 1992a; 1992b). While the function and occupational seasonality of these sites need to be further investigated (see chapter 4), there is little doubt that they were associated with a high level of organizational complexity in subsistence and settlement.

The cause for this development is currently unidentified. However, it is worth noting that, in Aomori Prefecture, the preceding subphases (Upper-Ento-a to -c phases in the beginning of the Middle Jomon) are characterized by a significant decline in the number of sites. This may imply the existence of a forager system prior to the development of a complex collector system, a situation that resembles the case in the Kanto

and Chubu regions (see Case Study 1 of chapter 4). Given this situation, an examination of system dynamics at the interregional scale, including the possibility of population movement from one region to another, is required.

Although the Middle Jomon culture is characterized by the presence of a large number of ceremonial artifacts and features, evidence for vertical social inequality is scarce. As Oki Nakamura's (2000) work (see chapter 5) indicates, Middle Jomon graves are not much different from those in the previous period in terms of variability in grave goods. Nevertheless, a significant increase in certain types of ceremonial artifacts and long-distance exchange from the Early to the Middle Jomon can be observed (see chapters 5 and 6). This seems to indicate that, despite the lack of clear evidence of vertical social differentiation, Middle Jomon society as a whole was much more complex than Early Jomon society, if we follow the wider definition of social complexity outlined in chapter 1.

At the end of the Middle Jomon period, the prosperity of these systems reached an abrupt end throughout the Chubu, Kanto, and Tohoku regions. On the basis of his analysis of the number of excavated pit-dwellings, Keiji Imamura (1996: 156) indicates that populations in the Kanto and Chubu regions increased by as much as 50 to 150 times and then went down close to the original level within 600 to 700 years. Although no similar statistics are available from the Tohoku region, a rapid disappearance of most large settlements in the end of the Middle Jomon is reported by both Okada (2003) and Kodama (2003).

It is also worth noting that, according to Keiji Imamura (1996: 93), 70 percent of all excavated pit-dwellings in the Chubu and Kanto regions belong to the Middle Jomon period, and 50 percent of all excavated pit-dwellings in these districts belong to the latter half of the Middle Jomon. This clearly demonstrates the unusual nature of the subsistence–settlement systems of this period in these regions, which may lie outside the range of hunting-gathering practice. In this regard, reexamination of the Middle Jomon "plant cultivation hypothesis" (e.g., Fujimori 1950), as well as the possibility of environmental management (see, e.g., Y. Sato et al. 2003), will be critical.

The mechanism of this sudden decline of the highly specialized systems has yet to be investigated. In the past, many Japanese archaeologists have attributed this dramatic change in the Chubu, Kanto, and Tohoku regions to the cooling climate at the end of the Middle Jomon (e.g., Okada 2003; Kodama 2003; Yasuda 1995). While the wide occurrence of this phenomenon makes this hypothesis seemingly convincing, no scholars have attempted to explain *how* the cooling climate actually caused the rapid change of these systems. The relative scarcity of reliable radiocarbon dates from the Middle Jomon period, with the exception of those from the Sannai Maruyama site (see chapter 4), also makes the evaluation of the cooling climate hypothesis difficult. Other scholars interpret this change as a result of epidemics, but no archaeological evidence to support this hypothesis is currently available.

As an alternative hypothesis, I suggest the possibility that the extremely specialized subsistence strategies associated with these systems were capable of supporting much larger populations, but at the same time were more susceptible to minor environmental fluctuations or other external disruptions. In other words, Middle Jomon people in these regions may have gone too far toward specialization.

Although the majority of large Middle Jomon settlements are associated with evidence of intensive plant food exploitation, shell-midden sites in the east Tokyo Bay area are exceptions. As discussed in chapter 3, in this area, ring- or horseshoe-shaped shell-middens associated with a large number of pit-dwellings began to be constructed during this period. Whether this implies a heavy reliance on marine food or simply reflects seasonally intensive exploitation of marine food remains to be further investigated (see chapter 3).

The rapid development and disappearance of extremely specialized systems can be observed only in eastern Japan. Change from the Early to Middle Jomon in western Japan seems to have been more gradual, and not necessarily directional. Population estimates by Koyama (1984) show only minor increases, if not decreases, in Kinki, Chugoku, Shikoku, and Kyushu (see chapter 2). Overall, Middle Jomon hunter-gatherers in western Japan seem to have remained further from the collector end of the forager–collector continuum than their counterparts in eastern Japan.

Late Jomon: further development of social complexity

The shift from the Middle to Late Jomon period in the Tohoku, Kanto, and Chubu regions is generally characterized by decreasing organizational complexity in subsistence and settlement, but increasing social complexity. The number of extremely large settlements dated to the Late Jomon is much smaller than that of the Middle Jomon. A significant decrease in site density is also apparent (Koyama 1984). However, this does not imply that the people in these regions were on the forager end of the forager–collector scale. In most cases, subsistence–settlement systems in these regions can be understood within the range of collector systems. In the Kanto and Chubu regions, the level of organizational complexity in subsistence and settlement, which is reflected in site

density and site size variability, seems to be roughly equivalent to that of the Early Jomon (with the exception of the east Tokyo Bay area; see below). In Tohoku, the average size of settlements seems smaller than in the Early Jomon. The development of ceremonial sites away from settlements in this region (Kodama 2003) may be related to this small settlement size.

An indication of the emergence of hereditary social stratification can be seen in child burials. As suggested by Oki Nakamura (2000), an increase in the relative occurrences of child burials with grave goods can be observed in eastern Japan (see table 5.5). This trend started in the Late Jomon period, and continued through to the Final Jomon period.

In terms of possible archaeological correlates of social complexity, there are three major lines of evidence. First, there was an increase in the number and kinds of ceremonial artifacts and features (see table 5.3). In particular, there was a sudden increase in large stone circles at the beginning of the Late Jomon in northern Tohoku and Hokkaido. Second, long-distance movement of items obtained from restricted sources, including asphalt and salt, becomes more conspicuous. Third, specialized production of finely made pottery, lacquerware, and other perishable artifacts seems to have occurred during and after the Late Jomon. As discussed in chapters 5 and 6, these three lines are all possible pathways toward vertical social hierarchy.

To identify which factor or factors were utilized by emergent elites to establish their position and power, it is necessary to determine the chronological order of the occurrence of these events in each region. While such data are not presented in this book, fine-grained excavation reports of Jomon sites would allow us to compile a database of this kind. It is quite possible that emergent leaders in different regions adopted different strategies to obtain their power.

Despite a slight increase in the number and percentage of child burials with grave goods, the degree of vertical social differentiation during the Late Jomon seems to have been relatively small. Evidence for hereditary social stratification other than from child burials is limited, and differences in grave goods between adult burials are not significant. Elaboration of burial customs seems to be more closely related to the development of communal burials (e.g., *kanjo dori*) rather than vertical differentiation between individuals.

I suggest that the development of vertical differentiation was limited by the reduced organizational complexity in subsistence and settlement. Because continuity in ceremonial practices can be observed from the Middle to Late Jomon (Kodama 2003; Okada 2003), the seed for the development of Late Jomon social complexity must have been sown

during the Middle Jomon period. Complex site structure and the construction of large monuments observed among large Middle Jomon sites, such as those at Sannai Maruyama, indicate that Middle Jomon society was highly complex. However, because evidence for vertical stratification from the Middle Jomon is virtually absent, it is more likely that the nature of this social complexity was based more on horizontal differentiation. For the construction of large monuments, the presence of leaders must have been critical, but their positions may not have been hereditary.

I also hypothesize that the disappearance of highly specialized collector systems at the end of the Middle Jomon period triggered the emergence of vertical differentiation in the following Late Jomon period. Under the rapid collapse of the existing system, the role of group leaders must have become more important, thus providing the opportunity for the existing horizontal differentiation to become more vertical. However, with the decline of intensive subsistence strategies, the amount of surplus available to be manipulated by the leaders may have been relatively small. While monument construction and elaborate ceremonial practice, long-distance trade, and craft specialization could be used to manipulate power, ultimately the elites had to have access to a food surplus. Individuals working as monument builders, traders, or craft specialists would have needed to be fed. Elaboration of trade networks and craft specialization may have supplemented the subsistence base, but not to the point of establishing complex political organizations.

Although most parts of eastern Japan experienced a significant decline in the number and size of sites from the Middle to Late Jomon, the east Tokyo Bay area was an exception. Large shell-middens associated with many pit-dwellings, such as Kasori and Kainohana in Chiba Prefecture, were present from the Middle through to the Late Jomon periods. Because of their high density, Horikoshi (1972: 22) suggests that the territory of each settlement associated with a shell-midden was possibly only 2–3 kilometers in radius. This is extremely small when compared to the average size of hunter-gatherer territory suggested by Vita-Finzi and Higgs (1970) (i.e., approximately 10 kilometers in radius). If this was the case, and if these sites indeed represent residential bases, it is possible that overcrowding in this region resulted in the restriction of the occupants' residential mobility (cf. Rosenberg 1998). Alternatively, it is also possible that the apparent overcrowding may simply reflect the repeated use of these sites as special-purpose camps for the seasonally intensive exploitation of marine food.

Unlike in eastern Japan, data from western Japan (the Kinki, Chugoku, Shikoku, and Kyushu regions) indicate that site density increased steadily from the Middle to Late Jomon (see table 2.5). Although the density is

much lower than in eastern Japan, no decrease in site size and site density is observed. This may imply that, because subsistence–settlement systems in western Japan were less specialized, they were not as vulnerable to environmental fluctuations and other risks as the systems in eastern Japan. It is also worth noting that influences from continental Asia began to be noticed on various aspects of material culture, including pottery production technology (see chapter 5). In sum, the diverging paths between eastern and western Japan, the former continuing to follow its unique development of Jomon social complexity, and the latter gradually accepting external influences, began to be apparent during this period.

Final Jomon: the transition to Yayoi

By the Final Jomon period, continuing influences from the Mumun culture (ca. 3300–1300 cal BP) of the Korean peninsula began to alter various aspects of the Jomon culture in western Japan. Material culture, including stylistic characteristics of pottery, shows strong influences from the Mumun culture. In the latter half of the Final Jomon period, rice paddy fields and dolmens (megalithic tombs), both of which are hallmarks of the Mumun culture, appeared in northern Kyushu.

Whether this transitional phase in northern Kyushu should be regarded as the terminal phase of the Jomon period or should be classified as the Initial Yayoi period has been a topic of debate. Traditionally, it has been classified as the latter half of the Final Jomon period. However, scholars such as Sahara (1987) argue that, because evidence of rice cultivation has been found, the cultures of northern Kyushu in this phase should be labeled as belonging to the Initial Yayoi period (note this chronological division is applied only to northern Kyushu).

In traditional chronologies, this transitional phase was dated to ca. 500–300 bp, and these dates were roughly equated with the calendrical dates 500–300 BC. The rest of the Yayoi period has been divided into three subperiods: Early (ca. 300–100 BC), Middle (ca. 100 BC–AD 100), and Late (ca. AD 100–300). Because the Yayoi culture spread from northern Kyushu to the east, the Early Yayoi period is present only in western Japan. As a result, the end of the Final Jomon period in eastern Japan is estimated to have been approximately 100 BC. However, if, as Harunari et al. (2003) suggest, the beginning of the transitional period in northern Kyushu goes back as early as 1000–900 BC, then absolute dates for the Final Jomon and the Yayoi periods need to be substantially modified.

The cause of the shift from hunting-gathering to a food-producing economy at the end of the Final Jomon warrants further discussion. While diffusion may describe what happened during this transition, it does not explain *why* the change occurred. Looking at the population estimates by Koyama (1984), the estimates for western Japan show a slight decrease (4,400 to 2,100 in Kinki, 2,400 to 2,000 in Chugoku, 2,700 to 500 in Shikoku, and 10,100 to 6,300 in Kyushu). This may reflect a system change in these regions, which may have triggered the adoption of new cultural elements from the continent. Systematic analyses of regional settlement patterns are required to investigate the issue further.

The number of immigrants who came to the Japanese archipelago from the Korean peninsula is another topic of debate. Scholars such as Hanihara (1987) and Hudson (1999) indicate that the transition to the Yayoi period entailed a large-scale migration from the Korean peninsula. While the dual structure model for the population history of the Japanese (see chapter 2) is generally well accepted, the actual number of immigrants at the transition from Jomon to Yayoi is still hotly debated. If in fact a large-scale migration occurred, then the reason why a large number of the Mumun people moved into the Japanese archipelago needs to be investigated. In this regard, external conditions may be as important as internal changes in order to explain this major shift (see also Habu 2002b).

In eastern Japan, archaeological data that would allow us to infer Final Jomon subsistence–settlement systems are relatively scarce. In the Kanto and Chubu regions, the number of sites and site density show a dramatic decrease. Koyama's (1984) population estimates for the Kanto region decreased from 51,600 (Late Jomon) to 7,700 (Final Jomon). For the Chubu region, the decrease is from 22,000 to 6,000 (see chapter 2; table 2.5). Furthermore, most of these sites are not associated with any pit-dwellings or other residential features, making any kind of analysis on settlement systems difficult. In the Tohoku region, the decrease in the number of sites is not as dramatic (from 43,800 to 39,500) as in Kanto and Chubu, but the recovery of large settlements is still uncommon. Many of the well-known Final Jomon sites are either ceremonial sites or waterlogged sites associated with artifact concentrations (possibly also ceremonial).

Compared to the extreme scarcity of subsistence and settlement data, recoveries of ceremonial sites are more commonly reported. Examples of these sites include the Teraji site (Niigata Prefecture), the Kinsei site (Yamanashi Prefecture), and the Yaze site (Gunma Prefecture) (see chapter 6). Recovery of waterlogged sites associated with a large number of pottery and ceremonial artifacts is also common, particularly from the Tohoku region. These sites include the Korekawa Nakai site (Aomori Prefecture), the Kamegaoka site (Aomori Prefecture), and the Kunenbashi site (Iwate Prefecture) (see chapter 5).

It should be noted that many scholars have pointed out a strong continuity in pottery decoration in eastern Japan from the terminal Final Jomon to Yayoi. Thus, the rapid decline in the number of sites in eastern Japan does not imply that people in this region eventually died out.

Three possible hypotheses can be suggested to explain the small number of sites and low estimated population for the Final Jomon period. First, it is possible that Final Jomon people were not living in pit-dwellings but constructed non-semisubterranean structures that are difficult to identify archaeologically (e.g., tents or surface dwellings with no post-molds). However, while this would explain the scarcity of pit-dwellings, it would not explain the scarcity of sites.

Second, the location of Final Jomon sites may be very different from the other Jomon sites, making the recovery rates of Final Jomon sites much lower. The lowland areas and hills of the Japanese archipelago have been relatively thoroughly surveyed as a result of large-scale land development since the 1960s, but the recovery rate of sites in mountainous areas is much lower. It should also be kept in mind that the site recovery rates vary between regions. Thus, the numbers of sites in relatively underdeveloped areas, such as the Tohoku region, may be significantly underestimated.

Third, the duration of the Final Jomon period in eastern Japan may have been shorter than is currently assumed. Conventional chronology places the Final Jomon from ca. 3000 to 2100 bp, which calibrates to ca. 3300–2100 cal BP. However, reliable radiocarbon dates from the terminal Late Jomon through to the Final Jomon are scarce. If the duration of the Final Jomon period was shorter than the traditional estimate, then the population estimates for each region would be larger.

For the moment, we know relatively little about the Final Jomon subsistence–settlement system in eastern Japan. The fact that very few large sites associated with pit-dwellings have been reported seems to support the possibility of residentially mobile foragers. On the other hand, it should be noted that the production of lacquerware and other lacquered artifacts would require a certain level of sedentism, the necessity to stay in one place for at least several months. Because Final Jomon culture in the Tohoku region is characterized by the presence of exquisitely made lacquerware (i.e., lacquered wood containers), lacquered baskets, and lacquered pottery, it is likely that at least some groups in this region maintained seasonally, if not fully, sedentary lifeways.

Hypothetically speaking, several factors may have caused these changes. The cooling climate in the first millennium BC in the northern hemisphere has been noted by several scholars (Endo 1999; see also Karabanov et al. 2000). Such a change may have caused a decrease in one or more critical resources that formed part of the Late Jomon subsistence base. As discussed in Case Study 1 in chapter 4, a minor change in environmental conditions could lead to a major system change. It is also very likely that external influences from continental Asia affected these regions. Unlike in western Japan, where strong influences from the continent can be observed on various aspects of material culture, clear evidence of direct influence is scarce in eastern Japan. But it is quite possible that the growing cultural differences between the east and the west triggered a major system reorganization in these regions.

Concluding remarks

As discussed above, long-term changes in the Jomon culture can be explained as the accumulation of numerous changes at both the local and regional levels. These changes were caused or conditioned by multiple factors. Some can be explained by either environmental changes or technological developments. Other changes seem have been more closely related to social and ideological factors, including rituals, craft specialization, and long-distance trade. The constellation of these numerous changes over the 10,000-year span of the Jomon culture resulted in the unique historical trajectory of this prehistoric hunter-gatherer culture. As a whole, the historical trajectory proposed here does not fit into the conventional picture of unilinear evolution. The mechanism of each change, however, can be adequately explained by using ecological or social models that assume the validity of general laws.

The degree of residential mobility/sedentism is the key that links subsistence and settlement practices with the social practices of the Jomon people. As many ecological models suggest, the degree of residential mobility is inseparably tied to environmental conditions and resulting subsistence strategies. At the same time, the degree to which the Jomon people moved their residential bases would have significantly affected both their cultural landscapes and annual/long-term cycles of their social life. Thus, understanding the degree of residential mobility is a first step toward understanding the Jomon society as a whole.

The model presented in this chapter still has many missing parts. Through a series of case studies, similar to those presented in chapter 4, these gaps can be filled in. And the extremely rich Jomon database allows us to conduct numerous new projects on the Jomon, both at the macro scale (e.g., regional settlement pattern analysis) and the micro scale (e.g., household archaeology).

Throughout this book, I have attempted to show the range of temporal and spatial variability within the Jomon culture, and to explain the reasons for and implications of the variability. Although the archaeological

data examined here are coming from the Japanese archipelago, methodological and theoretical issues discussed in this book can be shared by archaeologists working elsewhere in the world. In this regard, I hope that the publication of this book will help enhance active interactions between Japanese archaeology and world archaeology, especially in the field of hunter-gatherer archaeology.

References

Abe, Chiharu. 2000. Jomon jidai no asphalt riyo [Use of asphalt during the Jomon period]. *Shiroi Kuni no Uta [Essays on Northern Land]* 524: 22–25 (in Japanese).

Abe, Gihei. 1983. Haiseki [Ceremonial features with stone arrangements]. In *Jomon Bunka no Kenkyu IX: Jomon-jin no Seishin Bunka [Studies of the Jomon Culture*, vol. IX: *Mortuary and Ceremonial Practices]*, ed. Shinpei Kato, Tatsuo Kobayashi, and Tsuyoshi Fujimoto, pp. 32–45. Tokyo: Yuzankaku (in Japanese).

Abe, Yoshiro. 2000. Jomon jidai no seigyo to Nakazato kaizuka no keisei [Jomon subsistence and the accumulation of the Nakazato shell-midden]. In *Nakazato Kaizuka [The Nakazato Shell-Midden]*, ed. Kita-ku Kyoiku Iinkai [Board of Education of Kita Ward], pp. 243–259. Tokyo: Kita-ku Kyoiku Iinkai (in Japanese).

Abiko, Shoji. 1978. Jomon shiki doki no keishiki to hennen [Jomon pottery typology and chronology]. In *Nihon Kokogaku o Manabu I: Nihon Kokogaku no Kiso [Studying Japanese Archaeology*, vol. I: *Foundations of Japanese Archaeology]*, ed. Hatsushige Otsuka, Mitsunori Tozawa, and Makoto Sahara, pp. 170–188. Tokyo: Yuzankaku (in Japanese).

1982. Asphalt. In *Jomon Bunka no Kenkyu VIII: Shakai, Bunka [Studies of the Jomon Culture*, vol. VIII: *Society and Culture]*, ed. Shinpei Kato, Tatsuo Kobayashi, and Tsuyoshi Fujimoto, pp. 205–222. Tokyo: Yuzankaku (in Japanese).

1985. Asphalt no ryutsu to Tohoku no chiiki-ken [Regional interactive spheres and the circulation of asphalt in the Tohoku region]. *Kikan Kokogaku [Archaeology Quarterly]* 12: 43–46 (in Japanese).

Adams, Robert McCormick. 1965. *Land behind Baghdad: A History of Settlement on the Diyala Plains*. Chicago: University of Chicago Press.

Aida, Kaoru, and Satoshi Koike. 1986. Dai II bunka-so [The second cultural layer]. In *Tsukimino Iseki-gun Kamino Iseki Dai Ichi Chiten [Location 1 of the Kamino Site of the Tsukimino Site Complex]*. Yamato: Yamato-shi Kyoiku Iinkai [Board of Education of Yamato City] (in Japanese).

Aikens, C. M. 1981. The last 10,000 years in Japan and eastern North America: parallels in environment, economic adaptation, growth of social complexity, and the adoption of agriculture. In *Affluent Foragers: Pacific Coasts East and West*, ed. Shuzo Koyama and David H. Thomas, pp. 261–273. Senri Ethnological Studies, No. 9. Osaka: National Museum of Ethnology.