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国立民族学博物館学術情報リポジトリ National Museum of Ethnology

SES no.009; Introduction

メタデータ	言語: eng 出版者: 公開日: 2009-04-28 キーワード (Ja): キーワード (En): 作成者: 小山, 修三, Thomas, David Hurst メールアドレス: 所属:
URL	https://doi.org/10.15021/00003390

Introduction

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The Third Taniguchi Symposium was organized primarily to compare the foraging economies of prehistoric Japan and California, two areas with rather similar natural environmental characteristics: size and geographic shape, warm temperate climates, relatively complex topographies with a great altitudinal range, mature and widespread forests, and abundant freshwater flowing towards extended and highly indented coastlines. For the most part, Japan and California present generally benign biological and physical environments, well-endowed with natural resources capable of supporting populations of foragers in conditions of relative affluence. Such conditions contrast with those that confront present-day hunters and gatherers, who survive in the Arctic tundra, deserts, or tropical rain forests, zones that appear (to outside observers, at least) as remarkably harsh environments.

Aboriginal life and economies of prehistoric California foragers have been well-documented by numerous ethnographers. Complex societies developed relying on the exploitation of abundant acorns, salmon, and game (principally deer); and the human population densities were relative high, by foraging standards.

The foraging stage in Japan, however, was superceded long ago by other economic forms, and can be extrapolated today only from the archaeological evidence. The final stage of the Japanese foraging system is known as the Jomon period, characterized classically by the manufacture of elaborate pottery. The Jomon period lasted for many millennia, from the end of the Pleistocene until about 2000 B.P. Jomon culture began to flourish some 6000 years B.P., as indicated by a major increase in the number of archaeological sites. This evidence implies the existence of large, well-planned, sedentary settlements which reached their apogee in the Middle Jomon phase, some 4000 years B.P. The Jomon period is generally described in five phases, temporal units based on a pottery chronology devised by Yamanouchi [1937]. The simple chronology has been accepted by most Japanese archaeologists, and the continuing development of pottery typology was rapidly subsumed within it. During the past forty years, a massive, complex, but still incomplete Jomon chronology has emerged for the main regions of Japan. English usage for the five phases varies considerably, and in this volume we use the popular sequence of Initial, Early, Middle, Late, and Final Jomon. We also employ a new "Incipient" stage (preceding the Initial), proposed by Yamanouchi [1964] to describe the pottery culture that retains a strong Paleolithic tradition.

Are these temporal units valid against absolute dating, and if so, how old are they? The first Jomon radiocarbon date— 9450 ± 400 B.P., from the Natsujima shellmound (Initial Jomon, Kanagawa Prefecture)—seemed to embarrass many archaeologists, since it implied that Japan had the world's oldest pottery tradition. This notion completely contradicted the traditional belief that all local culture diffused to Japan from the Asian mainland. Somewhat later, an even more surprising date— $12,700 \pm 500$ B.P., from Fukui Cave (Incipient Jomon, Nagasaki Prefecture)—led to further skepticism regarding the validity of radiocarbon dating.

But as the number of radiocarbon samples increased, a consistent pattern emerged that confirmed the overall validity of the chronological sequence, despite some discrepancies in both local sequences and inter-regional relationships. When the approximately 150 available samples are grouped by phase, most fall within the following approximate groupings: 12,000 B.P. (Incipient), 8000 B.P. (Initial), 5000 B.P. (Early), 4000 B.P. (Middle), 3000 B.P. (Late). Koyama [1978] has computed a large population size for the Middle Jomon (about 260,000 persons, i.e., comparable to that of nineteenth century California), and several areas had extremely high densities of 3.0 persons/km². Interestingly, the Jomon staple resources (acorns, roots, fish [salmon and marine species], and game [deer and wild boar]) are almost identical with those of aboriginal California. This comparison of societies in these two areas raises interesting issues, particularly since the abundant ethnographic material from California apparently helps to reconstruct many aspects of the long extinct Jomon culture.

The later history of foraging societies in Japan and California followed diverging paths. The cultivation of paddy rice spread to Japan from southern China some 2000 years ago, and apparently the transition from a foraging to an agricultural economy was smooth and rapid. As a consequence of these economic changes the population of the Japanese archipelago increased greatly; many small states emerged and became gradually unified by the fourth century A.D. Despite a dearth of empirical evidence, it has been argued that agriculture must have been practiced in Japan prior to the Jomon Period for such an efficient transition to rice cultivation to have taken place.

In contrast, California remained at the foraging stage until European contact. This does not imply, however, that the Californian aborigines could not have become agriculturalists, since it is evident that some agricultural traits did enter California. Agriculture conceivably could have been more widely and more completely adopted, and why the early inhabitants chose not to do so remains to be explained.

What factors gave rise to such different economics in societies living under similar environmental conditions and exploiting similar suites of natural resources? That is, when, how, and under what circumstances does the transition take place from foraging to agriculture? This process is fundamentally related to those whereby hunters and gatherers become affluent. Yet it is impossible to develop a general model of these processes based on a comparison of limited areas like California and Japan. Thus this symposium attempted to view the problem within the wider

regional contexts of the North Pacific coasts of both Asia and North America, involving many and varied ethnographic and archaeological data. By viewing these data in terms of their complex inter-regional relationships, we hoped to illuminate aspects of the processes involved in economic transition.

A staggering quantity of information, especially archaeological data, exists on the origins and diffusion of agriculture for the main cultural centers: China, India, Southwest Asia, Mesoamerica, and the Central Andes. Unfortunately, the interstitial, or minor areas, have been little studied.

Thus we saw in this symposium an opportunity also to examine processes of transition. By focussing on and comparing the problems raised by societies on the east and the west coasts of the Pacific Basin, and by combining the use of both archaeological and ethnographic data, we attempted to develop a perspective on the transition of foraging societies within the environmental and natural resource context of benign, warm temperate regions.

Papers from the Third Taniguchi Conference begin with the keynote address delivered by Professor Komei Sasaki. In his remarks, Sasaki raises a question which came up repeatedly in the various sessions, and also in the papers published here: by what measure do we determine that one society is more "affluent" than another? Population density is one such traditional measure, and such efforts can be directly traced from the work of A. L. Kroeber through several participants in this symposium, especially Baumhoff, Koyama, and Thomas. Professor Sasaki also raises a second issue which echoed throughout the Taniguchi Symposium, namely, the mechanism by which societies change from foraging to agricultural economies. Sasaki suggests that shifting cultivation was an important transitional step in the adoption of paddy rice cultivation, a point developed elsewhere in this volume by Kotani.

The first set of symposium papers deals with foragers of the eastern Pacific Coast, and the initial paper, by David Hurst Thomas, specifically addresses the nature of the less affluent societies by developing three case studies from the Great Basin of the American West. By conventional standards, the Great Basin Shoshoneans are not affluent at all. In fact, cultural evolutionists have traditionally regarded the Great Basin Shoshoneans as among the most primitive cultures known to anthropology. This notion is supported by the relatively low population density figures for the ethnographic Great Basin; in many cases, there was not even one person per 65 km². And yet, in other parts of the Great Basin, the aboriginal population density approached one person per 2 km². Explaining the diversity within a relatively circumscribed set of environmental conditions forms the basis of Thomas' paper.

After considering the basic ecological and sociocultural data for the foragers of the Kawich Mountains, the Reese River Valley, and the Owens Valley, Thomas scales these societies according to Lewis Binford's [1980] forager—collector continuum. The Kawich Mountain Shoshone are clearly foragers; the Owens Valley Paiute are clearly collectors; the Reese River Valley Shoshone are both. This diversity can be accounted for by analyzing the various strategies which are used to exploit

the differing combinations of microenvironments available to each group. In turn, traditional social and political institutions have developed in response to those varying subsistence strategies. In these three case studies, at least, one can see in operation the processes of microevolutionary change, and the decision-making strategies which foster such changes.

Randall F. Schalk then examines some very similar relations, but on the more complex, more "affluent" end of the spectrum, analyzing that textbook example of complex foragers, the Indians of the Northwest Coast. Schalk argues that one useful measure of "affluence" is the degree of separation in time and space between resource procurement and resource consumption. Schalk first distinguishes between marine and terrestrial productivity in Northwest Coast environments. Terrestrial environments are considerably more productive in the south, but the temperature and precipitation gradients conspire to decrease terrestrial productivity as one moves northward. The marine environment lacks the distinction between north and south. Because of this, foragers operating at the northern latitudes are considerably more dependent on marine resources, resources which are highly clumped in this spatial and temporal distribution. Using the available ethnographic information, Schalk demonstrates that the size of the home range, the degree of logistic mobility, and group size all tend to increase in proportion to the clumping of the resource patches. He further argues that because of this increase in marine dependence, the more northerly groups are required to manage and manipulate more complex resource-consumer relationships. It is this dependence on marine resources which accounts for the relatively complex social organization of the more northerly groups. Schalk concludes that the high dependence on stored food resources accounts for the high degree of organizational complexity in this area. That complexity cannot be ascribed solely, or even directly, to mere population density or to raw abundance of food.

The final paper concentrating on foragers of the eastern Pacific slope is by M. A. Baumhoff, who examines the notion of carrying capacity among hunter-gatherers. Earlier, Baumhoff [1963] concluded that the aboriginal population of the North Coast Range of California had existed in Malthusian equilibrium with its environment. In the present paper, Baumhoff develops his argument in more detail, looking at the ultimate carrying capacity of the area in terms of acorn procurement and processing. By quantifying the available ecological figures for acorn density and productivity, Baumhoff concludes that the figures for possible population are about 65 times as large as the actual aboriginal population of the area; that is, the native Californians were by no means making complete use of the available acorn crop. But the aboriginal levels of population density may still have been at carrying capacity because these levels had adjusted to the minimum yield rather than the average yield per year.

Baumhoff also examines the extremely close relationship between area population densities and the density of the oak woodland forest, interpreting these figures to indicate that the people had indeed reached the local environmental carrying

capacity. The paper then examines some implications of the prehistoric data relative to the relationship between carrying capacity and population pressure.

Part II of this volume describes the Hida Project which has been undertaken by a number of investigators affiliated with the National Museum of Ethnology. The Hida Project is, in the broad sense, an attempt to provide the mid-range theoretical background necessary for understanding the now-extinct Jomon lifeway.

The term "mid-range theory" is relatively new in archaeology (see Binford [1977, 1981] for a general discussion), but the concept has been with us for a long time. The need for mid-range theory has arisen because the "facts" of archaeology are simply incapable of speaking for themselves. Archaeologists must necessarily employ bridging arguments ("mid-range theory") to breathe behavioral life into the objects of the past, which have actually existed in two discrete contexts [Thomas 1979: 422]. The artifacts, features, and residues that the archaeologist excavates were once related to an ongoing behavioral system. While these artifacts were being manufactured and used, they existed in a *systemic* context, but by the time they reached the hands of the archaeologists, the objects had ceased to participate in the behavioral system, passing instead into an *archaeological* context. In order to *bridge the gap* between the behavioral and the archaeological contexts, archaeologists need to derive a body of what is now called mid-range theory.

The Hida Project is a practical exercise in mid-range theory. The problem arose when Koyama [1978] attempted to estimate prehistoric Jomon population levels by examining the nature of food resources available to Jomon people at various times. But quantification of the levels of productivity of these sources remains only approximate and relative. Under ideal conditions, the techniques of *experimental archaeology* could be employed to provide data on productivity, yield, harvest time, and so on; but the intense industrialization and environmental modification in contemporary Japan makes such studies extremely difficult. In order to overcome this difficulty, the Hida Project has attempted to reconstruct one pre-industrial ecosystem in the central mountain area of Japan. If the probable levels of productivity can be quantified under such circumstances, it should be possible to project these results to the Jomon period.

The Hida Project relies in large measure on the *Hidagofudoki*, "A New Geographical Description and Local History of Hida". This document, compiled in 1873, provides an unusual summary of pre-industrial productivity in Hida, a rugged mountain environment located in the Chubu area of central Honshu. Rice production in this area was severely restricted by topographic and climatic conditions, and the nineteenth century residents of Hida subsisted largely on slash-and-burn cultivation, gathering of wild plant foods, fishing in the rivers, and hunting in the uplands.

The *Hidagofudoki* includes input-output data from 415 villages, tabulating more than 400 discrete economic products. After this formidable body of data was converted into a computer-readable format at the National Museum of Ethnology, it was

possible to determine the relationship between population size and primary subsistence items for the region.

The paper by Shuzo Koyama presents a detailed analysis of data contained in the *Hidagofudoki*. Using computer-generated graphics and concomitant statistical analysis, Koyama determined the productivity of major pre-agricultural resources, including chestnut, buckeye, acorns, root crops, fish, and game animals. These interpretations provide unique insights into the absolute quantities of non-agricultural foodstuffs available in the Hida upland ecosystem.

Koyama attempts to reconstruct population size and subsistence activities during the Jomon period (prior to the introduction of rice agriculture). Archaeological remains in the Hida region are especially common during the Middle Jomon period (about 2500 B.C.), with lower population densities during earlier and later subperiods of the Jomon. Population levels in the Hida area are relatively well-known for the last 250 years, and Koyama uses these figures to project an estimated population of about 2000 people in this area for the Final Jomon period. Working back in time, Koyama also examined a relationship between Jomon sites and the productivity of wild food resources cited in the *Hidagofudoki*.

These unusual figures for pre-agricultural productivity have been supplemented by Toshio Matsuyama's detailed technological study, prepared as another facet of the Hida project. Matsuyama provides an empirical synthesis of methods for processing acorns and buckeye. Citing detailed studies on over forty contemporary traditional Japanese villages, Matsuyama concludes that whereas heating processes are characteristic for the temperate deciduous forest belt of Japan, a water-leaching technology is more typical of the evergreen forest belt. Matsuyama also provides detailed information on the social and technical aspects of acorn and buckeye gathering in both traditional and contemporary Japan.

The final contribution from the Hida project is a consideration of the distribution of riverine fish resources, also based on data from the *Hidagofudoki*. In this paper, Tomoya Akimichi examines the ecological distribution of fish resources during the preindustrial period, relating biomass to elevation. Akimichi also computes the potential productivity from each river system, and develops a model which describes human exploitation of river fish resources for the Hida district. A comparison of the nineteenth century records in the *Hidagofudoki* with more recent fishery records demonstrates a major change in the distribution of riverine resources over the last century; clearly the contemporary distributions would be misleading when reconstructing prehistoric patterns of exploitation.

Taken together, the contributions from the Hida project provide an unusually comprehensive body of data which can be applied as mid-range theory for reconstruction of environmental parameters and prehistoric subsistence practices in the area. Using the high quality data from the *Hidagofudoki* as a baseline, it is also possible for Koyama and his collaborators to gauge the ecological and cultural impact of the introduction of various modes of agriculture into prehistoric Japan.

The third, and most lengthy part of this volume, contains papers dealing with

the foragers and farmers of the western Pacific. The first paper, by Jesus Peralta, parallels that by Thomas, presenting ethnographic data for three Philippine societies to illustrate the microevolutionary process. But whereas Thomas held the level of technology constant and examines micro-environmental variation, Peralta holds environment relatively constant, focussing instead on the effects of differing levels of technology. Peralta's first case, the Manobo Tasaday of Mindanao, were first reported in June 1971. The group was composed of only 27 individuals and foraged in a primary forest environment. The Tasaday economy had only minimal effects on the animal and plant populations, at least until the introduction of metal into their culture. The Tasaday apparently spent an average of only three hours a day in subsistence-related activities, primarily living off plant resources. Hunting was of minimal importance and one male Tasaday admitted that the largest animal that he had ever hunted was a giant frog.

Peralta's second case is the Tau't Batu of Palawan, first reported in 1978. The Tau't Batu are slash-and-burn cultivators, exploiting secondary forest. Their subsistence is based in large measure on a seasonal combination of foraging and agriculture. The agricultural phase is spent in the open field during the first half of the year. The hunting-gathering stage takes them to the cave region in the latter part of the year, during the height of the rainy season. Peralta describes the technologies of both slash-and-burn cultivation and hunting in some detail, concluding that risk is relatively spread out, allowing for backup alternative strategies in the case of crop failure.

Peralta's final case is the I'wak, a group of about 2000 individuals living in scattered enclaves on the island of Luzon. The I'wak employ a monocropping strategy based on taro, exploiting a secondary forest thinned with grassland. Foraging and hunting constitute a minimal contribution to the I'wak subsistence, a situation which Peralta attributes to the degraded nature of the environment. The I'wak subsistence pattern is tenuous, owing to a combination of socioeconomic, environmental, and external factors.

Although these three societies do not, in any sense, represent a prehistoric developmental sequence, they do suggest the nature of alternative exploitation strategies in the Philippines. The Tasaday subsist in a primary forest environment, relying almost exclusively on a plant diet. The Tau't Batu employ a mixed hunting and slash-and-burn cultivation strategy, living in a karstic topography dominated by second growth vegetation. Although rice is the major prestige crop, the scheduling conflicts with the environmental adaptation of the Tau't Batu, and creates problems with both seasonality and maintaining a transhumant pattern. The most tenuous of the adaptations is that of the I'wak, who maintain a more intensive approach to cultivation. The I'wak create a severe environmental impact, putting their technoeological base in a precarious position. The specter of crop failure requires the I'wak to participate in a market economy, thereby linking them to external factors of the urban labor market. In this case, the agricultural strategy places severe strains on both the society employing it, and the environment supporting it.

K. C. Chang presents new empirical evidence regarding the nature of the earliest farmers along the Pacific coastal area of China. Chang, following Carl Sauer, suggests that such early agricultural experimentation occurred not in marginal, hard-pressed areas, but rather in an area of "affluent foragers". The evidence from Taiwan firmly establishes the presence of grain agriculture (by the Lungshanoid cultures) as early as 2500 B.C. Looking at the cultural antecedent to Lungshanoid (the Dapenkeng culture), Chang also sees a horticultural component. Apparently, this early subsistence activity centered around aquatic animals. Chang also reviews the evidence for upper Paleolithic adaptations along the southeastern coast of China and in Taiwan. Although the Taiwanese evidence is sketchy, it is clear that there was indeed a paleolithic occupation of the island, but little is known about the subsistence and settlement patterns of such people.

The next paper, by Akifumi Oikawa and Shuzo Koyama, describes the Jomon shellmound Database. This project is a large-scale effort to place the burgeoning Jomon site data into a form satisfactory for archaeological research. The Jomon Database Project began with data compiled previously by Nakao Sakazume; the relatively small sample of sites included in this study (between two and three thousand Jomon shellmounds), provided a useful pilot project for preliminary stages of computer coding. At present, the Jomon Database is intended for exclusive use by Japanese researchers, but a generalized coding scheme is being planned so that the information can be shared with concerned researchers around the world.

Using the preliminary Database (termed the *Sakazume File*), Oikawa and Koyama tabulate the frequency of Jomon shellmounds by region and by temporal period. Not surprisingly, the densest concentration occurred in the eastern half of Honshu, in the Tohoku and Kanto regions. The relatively high frequency of shellmounds in this area during the Late Jomon phase is followed by a drastic decrease in numbers of sites during the Final Jomon Phase. This suggests significant destruction of the marine habitat during the Final Jomon period, and a corresponding collapse in Jomon population density. The authors go so far as to suggest that this major catastrophe is comparable to decimation of the American Indian population during the early half of the nineteenth century. This suggestion provides a provocative direction for future study, particularly utilizing the growing sample of Jomon skeletal material.

Yoshinobu Kotani then considers the evidence for plant cultivation by Jomon peoples. After a detailed review of previous evidence—specifically a critique of the traditional Jomon farming hypothesis—he presents an up-to-date summary of direct evidence suggesting the presence of cultivated plant remains in Jomon contexts. Although the quantity of cultivated plants is still rather small (and largely restricted to western Japan) it seems clear that a number of plants other than wet rice were cultivated during the Jomon period, specifically gourd or cucurbit, pea and bean, barley and buckwheat. These dry-land crops were, according to Kotani, probably introduced prior to wet rice agriculture, but this mode is distinguished from more conventional slash-and-burn agriculture, for which evidence is lacking at present.

Middle Jomon sites have not yielded evidence of crop farming, and Kotani

cautions against the assumption that Middle Jomon people were farmers. Evidence of root crops in Jomon contexts is likewise lacking, and the so-called "luciphyllous forest hypothesis" is not supported by the data. It can, however, be stated that cucurbits, red beans, and peas were the earliest crops under cultivation, and that barley and dry-land rice appeared in Late Jomon context. Wet rice was introduced during the Final Jomon period. In other words, the present evidence indicates that the basic Japanese agricultural pattern took three or four thousand years to become fully established after the initial appearance of domesticates, a rather long process compared to Mesoamerica and elsewhere.

The final paper in Part III, by Takeru Akazawa, also analyzes the maritime ecological adaptation of Jomon Japan, and the impact of agricultural innovation. His paper begins by presenting a territorial model of Jomon shell midden sites in an attempt to reconstruct the local prehistoric maritime ecosystem. The paper then examines the adaptive significance of key Jomon sites in eastern Japan. Akazawa discusses the spread of wet rice cultivation throughout the Japanese archipelago, emphasizing the different pathways and variable speeds with which the Jomon people reacted to the introduction of settled village agriculture. Agreeing with Sasaki, Koyama, and Kotani, Akazawa points out the importance of local ecological adaptation in conditioning the acceptance or rejection of new modes of agricultural productivity. Considering the common argument that fishing societies constituted a transitional stage between hunting-gathering *per se*, and agriculture, Akazawa suggests that maritime adaptations may have caused eastern Japan to resist, rather than readily accept, the new agricultural lifeway.

Part IV contains two papers that attempt to summarize and synthesize the parallels evident between affluent foragers of the east and west Pacific areas. The first paper, by C. Melvin Aikens, addresses the relationship between agricultural expansion and societal complexity, through a comparative analysis of Japan and eastern North America, two regions which lie near the margins of the great nuclear areas of China and Mexico, respectively. Aikens argues explicitly that it is increasing societal complexity which creates a demand for agricultural expansion and for control of the food supply; the ecological response to this increasingly complex social organization is, under certain conditions, the development of an agricultural economy. Aikens further argues that the Japanese and eastern North American data conform to a two-stage process. Exotic (i.e., non-native) cultigens initially diffused gradually into each area, with little initial effect on relatively affluent hunter-gatherer populations. Sometime later, in some cases *much* later, these cultigens were incorporated in a process of significant sociopolitical evolution. This, in turn, resulted in their taking on a key role as an economic base for the elaborating social structure.

Aikens argues that during postglacial times, Japanese and eastern North American environments were generally similar to environments recorded during historic times in each region. Even more important, woodland environments of both Japan and eastern North America were fundamentally similar to each other in terms of flora, fauna, and general species distribution within major lifezones. Similarly,

relying heavily on Caldwell's concept of "primary forest efficiency", Aikens attempts to demonstrate that the adaptations of the Japanese Jomon and the Archaic groups of eastern North America were fundamentally similar, as were the artifacts manufactured to sustain that adaptation. The obvious addition of ceramics to the Jomon cultural inventory is not considered by Aikens to be a significant difference between the two areas. Although the evidence is far from satisfying, Aikens points out the probable existence of limited cultivation during the Middle Jomon period, as well as cultigens such as sunflower and marsh elder found in American Archaic period sites.

In other words, Aikens argues that both Japanese and North American societies were "clearly preadapted" to make use of imported cultigens—rice in Japan and the Mexican domesticates by eastern Archaic peoples. By Middle Jomon and late Archaic times, a settled existence and significant degree of societal centralization had already taken place. This included, among other things, the development of elite groups which assumed at least some managerial functions. All of this, according to Aikens, was accomplished on the basis of native forest economics. Only with the radical social growth during the Yayoi and Kofun periods in Japan, and during Middle Woodland through Mississippian times in eastern North America, does one see the florescence of agriculture. Aikens argues that it was this increasingly organized political situation that "pulled along" the expansion of agricultural economics.

The final paper in the volume, by Mark N. Cohen, further elaborates the thesis that population growth, rather than technological advance, accounts for much of the change seen in the prehistoric record. Focusing on the foragers of the eastern and western shores of the Pacific Ocean, Cohen contends that the archaeological records of California and Japan reflect not so much a common "affluence" as a common vulnerability owing to the relatively crowded world in which they lived. After a brief review of his general model [COHEN 1977], the author evaluates the parallel sequences from California and Japan to determine the relative role of population pressure in each sequence.

Cohen encounters a certain amount of difficulty with the Jomon sequence. Koyama's [1978] figures indicate a decline in population during Late Jomon, and the introduction of wet rice cultivation during the Final Jomon and subsequent Yayoi periods. Akazawa has suggested that agriculture was introduced during a period of relatively low population density, in contrast to Cohen's argument that such technological innovations should occur only during periods of population stress. But if population indeed declined during the Late and Final Jomon, coinciding with a period of displacement of productive forest zones (as suggested by Koyama), then the diffusion of wet rice agriculture could indeed have occurred during a period of population pressure.

Another source of conflicting evidence is the preliminary Harris' lines studies, which suggest increasingly good health through the California sequence [MCHENRY 1968]. McHenry has suggested that the increasingly better health resulted from an improvement of the economy, and an adoption of acorn processing which provided a buffer against periodic deprivation. Cohen correctly stresses difficulties with using

Harris' lines as a single indicator, citing the more reliable multiple-index studies from Illinois. McHenry's evidence could also indicate a redistributive shift within an already crowded environment, since his evidence does not come from the early hunting-oriented populations of California.

We feel that the Third Taniguchi Symposium has contributed significantly to the study of Jomon archaeology, which only recently has begun to escape the narrow mold of ceramic typological studies. Previously, the prehistory of Japan has been viewed as a limited, simplistic linear evolution from foraging to agriculture, the transition having been brought about by the diffusion of techniques and technology from the Asian mainland. By contrast, most of the papers in this symposium adopted an ecological, demographic, and socio-economic approach to demonstrate the complex and multi-dimensional aspects of the Jomon transition. Two aspects of agricultural origins dominated the discussions, namely the nature of Middle Jomon agriculture, and the transition from the Jomon Period to the Yayoi Period. Traditionally, three keywords have characterized hypotheses on the origins of agriculture: environment (cf. Childe), culture (cf. Braidwood), and population (cf. Binford). Our discussions also focussed on these factors, not as isolated, but rather as complex, interacting factors.

The previous evidence for Middle Jomon agriculture, specifically the Jomon farming hypothesis, was reviewed and critically examined by Kotani. Whereas such plant remains appear by at least 6000 B.P., 3000–4000 years were required for the basic patterns of Japanese agriculture to become fully established. Kotani's claim is elaborated and supported by Aiken's comparative analysis of Japan and eastern North America. Aikens suggests that the resource-abundant environments of both Japanese and eastern North American forests supported a stable foraging society, the complexity of which increased under resource affluent conditions. Social complexity, he contends, creates a demand for the expansion of agriculture and for a control of food supplies. Evidence to substantiate this contention is abundant for the Jomon Period. Jomon agriculture played a fundamental role in pre-adapting Jomon people to accept the highly systematized techniques demanded by flooded field rice cultivation. The radical social growth in the succeeding Yayoi and Kofun periods was supported by agriculture, but the increasingly organized political structure both stimulated and guided the expansion of the agricultural economy.

Contradictory opinions emerged concerning the Final Jomon phase, another important topic of this symposium. Cohen used a population pressure model, for example, to postulate that technological innovations, such as wet rice cultivation in Japan, occurred as a result of population stress. This contrasts to Akazawa's contention that rice farming was introduced to western Japan when population density was low. However, Oikawa and Koyama suggest that a drastic population decline in eastern Japan might have occurred because of the displacement of both productive forest zones and marine environments. Then the diffusion of wet rice agriculture could have occurred during a period of population pressure. These opinions also differ from those of Aikens, who presumes a smooth, linear socio-economic development

from Jomon to succeeding periods. We avoid any definite conclusions for such a complex topic, preferring to await more explicit and creative perspectives that might emerge in the future.

Although this symposium has not solved many problems, the discussions certainly raised many significant issues and provided stimulating new data for the study of foraging societies. One such contribution is the quantitative approach to measuring the resources of an area, a new and growing dimension in the study of archaeology. The measurement relates directly to the population and carrying capacity of foraging societies. Baumhoff, for instance, focusses on the acorn, a dietary staple for the Californian aborigines; he calculates the density and yields of present-day oaks. Similar measurements were made by Koyama, Matsuyama, and Akimichi, who attempted to estimate the quantity of available food resources from historical documents for the Hida area of central Japan. Carrying capacity estimates are of world-wide importance because such values are critical to determining prehistoric population levels. These figures can, in turn, be used in conjunction with the theoretical and mathematically-oriented models considered by Thomas, Cohen, and Schalk, among others.

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