

CHANGE AND STABILITY IN THE DIETARY SYSTEM OF PREHISTORIC O-LUAN-PI INHABITANTS IN SOUTHERN TAIWAN

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ABSTRACT

This research investigates change and stability in the dietary system of a prehistoric coastal population at O-luan-pi on the southern tip of Taiwan. The study highlights the interrelationships between human subsistence and environmental opportunities within a local system. As part of the general dietary reconstruction of this population, the temporal variability in O-luan-pi prehistoric subsistence systems is considered and two patterns of subsistence change are evaluated. The first examines whether natural resource consumption decreased through time; while the second investigates whether marine resource exploitation increased through time.

The excavation of the coastal site of O-luan-pi II in 1993 has documented a continuous sequence of occupation beginning with an initial settlement around 4000 BP and continuing until 2500 BP. Quantitative analyses of the faunal remains and artefacts provide new comparative data for studying the relationship between long-term changes in subsistence, technology and environment.

Faunal analyses indicate that subsistence strategies of the initial settlement utilized more available animal species, including shellfish, turtles, marine fish and terrestrial mammals, than later occupation periods. Faunal remains indicate that food from natural sources, primarily marine fish and shellfish, were the primary resources of the O-luan-pi inhabitants between 4000 and 2500 BP. Comparatively, all natural animal food resources decreased in the last occupation period. In addition, the diversity measurement indicates a fairly low degree of variation in their food resource exploitation. These changes are viewed as the result of a greater reliance on intensified agricultural production.

Fishing gear analyses suggest that prehistoric O-luan-pi II settlers developed very effective fishing strategies. Through time, increased offshore fish remains suggest a refined fishing strategy and an intensification of fishing

subsistence activity. Overall, the evidence suggests that the major subsistence pattern of O-luan-pi inhabitants was a dual exploitation of agricultural-marine resources that varied with the development of the community.

This research investigates change and stability in the dietary system of a prehistoric coastal population in southern Taiwan. The study focuses on the interrelationships of human subsistence needs and available natural resources within this local environmental system. Insights into the relationship between resources extracted from the marine ecosystem and terrestrial ones may provide essential information for reconstructing the settlement and subsistence patterns of the prehistoric O-luan-pi people, and of prehistoric coastal economies in general.

The goal of this research is to provide a general reconstruction of the dietary system of the O-luan-pi people as well as look at some indications of prehistoric coastal adaptations in southern Taiwan by referring to the modern environmental situation and to archaeological studies. Consequently, the primary questions considered are: What were resources used by prehistoric O-luan-pi inhabitants? Were these resources available seasonally or year-round? How did they schedule their utilization of resources? And did these inhabitants change their food sources through time?

THEORETICAL APPROACH

The general model focused on in this study stems from the concept of local environmental adaptation, which is based on how settlers carried out subsistence strategies for obtaining daily food resources (Yen 1973; Kirch 1984; Rolett 1998; Allen 1992). It is proposed that when the prehistoric O-luan-pi II settlers initially occupied this area, they relied on a wide variety of natural resources to meet their basic

3. appropriate time for consumption of available resources, and
 4. types of tools related to subsistence.
- These focal points also serve as the guides for data collection and material analyses.

RESULTS

Although the six carbon-14 dates (Table 1, Figure 3) measured for this study did not provide a well-defined chronological division between the two phases, they did document the long span of years between 4000 and 2500 BP that these deposits represent. On the basis of cultural context and breaks in natural deposition (Figure 4), four strata of occupation were defined for the site and used in the analysis. According to Li's definition (Li 1981; Li *et al.* 1983, 1985), the time period represented in O-luan-pi II is equivalent to that in the nearby site of Ken-ting and to his O-luan-pi Prehistoric Cultural Phases III and IV. The Ken-ting Cultural Phase can be traced back to about 4500-4000 years ago, with archaeological remains characterized by fine red-marked pottery. O-luan-pi Prehistoric Cultural Phase III can be dated to 3500 BP and is characterized by painted pottery. Cultural Phase IV, characterised by plain ware, can be dated to about 2500 BP.

Unfortunately, no agricultural food resources or pollen were recovered at O-luan-pi II. However, shellfish, marine turtle, terrestrial mammals such as deer, *muntjac* and wild boar, and marine fish subsistence resources were recovered in large numbers. In total, 36 families and 68 species of shell (total weight 511,216 g) were unearthed in the 1993 excavation. In addition, seven families of terrestrial mammals (total bone 45,479 g), sea turtle (14,557 g), and 15 families of marine fish (93,507 g) were found in O-luan-pi II. In order to discover more information about changes in O-luan-pi animal food resource exploitation patterns through time, the overall faunal assemblage was pulled together and diversity was further evaluated (Figure 5). This provides us with a clear picture of the wild natural food resources consumed by prehistoric O-luan-pi people.

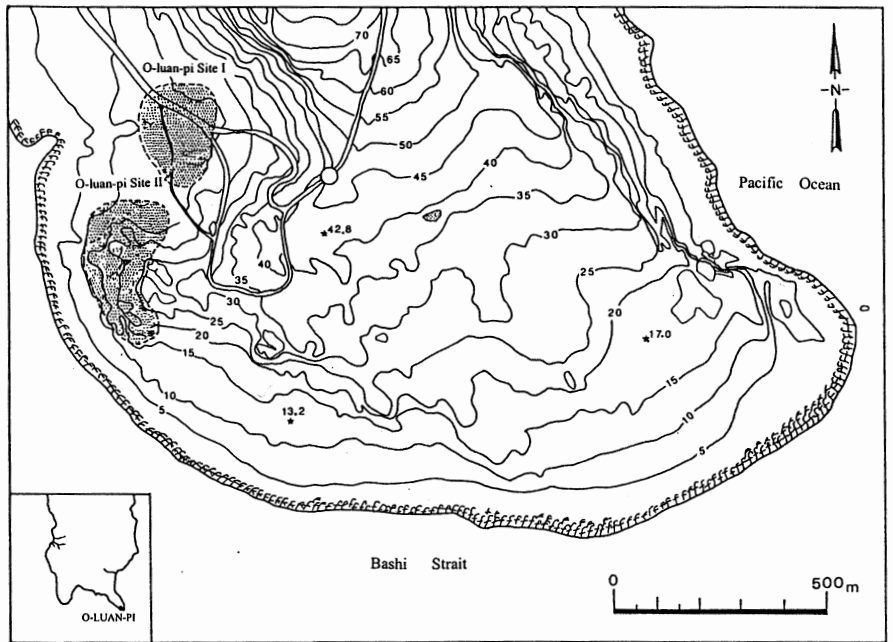


Figure 2: Location of O-luan-pi site I and O-luan-pi Site II.

Table 1: O-luan-pi II radiocarbon age-determination

Lab. No.	Provenience	C14 Age BP	Conventional C14 Age BP	Calibrated*
Beta-66266	Ap5D165	3340 ± 90	3340 ± 90	1795-1420 BC
Beta-66267	Ap7L7	2990 ± 60	2990 ± 60	910-735 BC
Beta-66268	Ap7L16	3180 ± 70	3180 ± 70	1210-830 BC
Beta-100988	Ap5L5	3310 ± 60	3720 ± 70	1865-1500 BC
Beta-100989	Ap5L9	3100 ± 70	3510 ± 70	1590-1275 BC
Beta-100990	Ap5L11	3150 ± 70	3560 ± 70	1670-1310 BC

Date range at two sigma

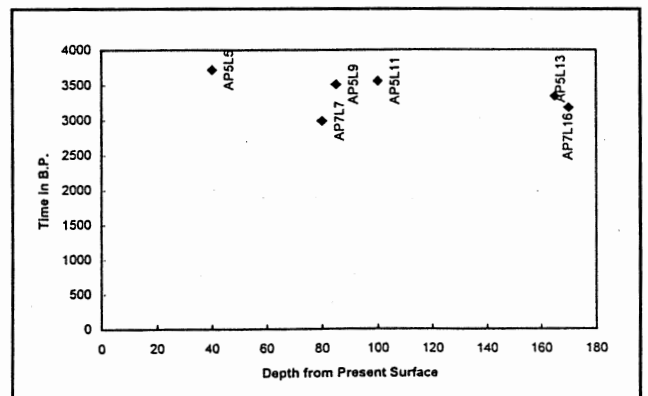


Figure 3: Plot of Radiocarbon Age Determinations from the O-luan-pi Site II.

a growing population during this phase of occupation. People at this time exploited common and stable species as their primary food resource, such as the turban shell. In historic times turban shells continue to be a productive species along the Hengchun Peninsula coastal zone. Thus, it is not surprising that prehistoric inhabitants relied heavily on this species. But, a dramatic decrease in shell consumption appeared in the final stage of O-luan-pi II. One possible explanation is that the population declined as people were forced to leave the area, possibly because the previous population had overexploited this and other species.

Despite substantial changes in the utilization of terrestrial mammals during the O-luan-pi II occupation, deer, wild boar and *muntjac* remained the three most consistently hunted large mammals. But, each of these animals was consumed in different proportions during each of the four occupation strata. Deer, the largest in size, were less important in the beginning and became most significant in Stratum 4. Wild boar, the medium-sized animal, exhibited a fairly constant ranking through time. Comparatively, the *muntjac* was always the least important of these three animals. The most striking feature is that terrestrial animals were most significant in the final occupation period, while marine food sources declined in importance.

I believe the O-luan-pi II subsistence pattern to be similar to the situation in the southwestern United States studied by Speth and Scott (1985, 1989). As the horticultural village became larger and cultivated food products came to play a more significant role in the diet, so the proportion of large mammals taken, such as deer, increased. This is because garden work and other activities around the village consumed a great deal of time and people had to restrict their long-distance hunting trips. Therefore, once a hunting event was undertaken, they focused heavily on species that yielded a greater return.

Marine remains suggest a different exploitation strategy to terrestrial mammals. The different types of fishhook and net sinker, as well as the fish remains, illustrate that the people were efficiently exploiting their marine environment. Although a reduced consumption of fish occurred in the final occupation period, the offshore exploitation of sailfish played an increasingly significant role through time.

Over time, the O-luan-pi II inhabitants changed their preferences from shark to sailfish. In the initial settlement, people mostly focused on inshore fishing. Because of the shark's large size it must have been a prized catch, perhaps caught mostly inshore when searching for food close to the

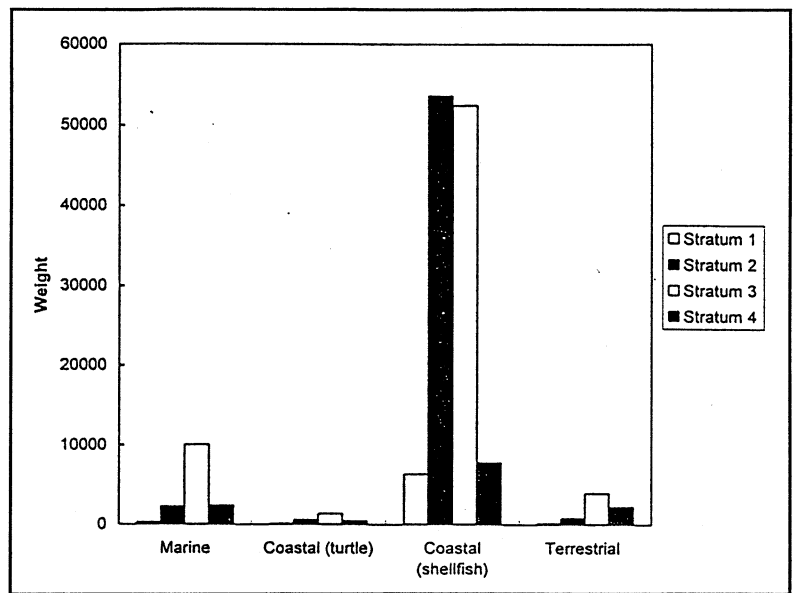


Figure 5. Comparison of marine, coastal and terrestrial remains at O-luan-pi II (by weight in grams)

coast. By the time of Stratum 3, with its rapidly growing population, offshore fishing techniques had become better developed. In Stratum 4, specialized fishing exploitation was well established. As I have suggested, the prehistoric inhabitants of O-luan-pi had by the final stratum established a well-adapted marine fishing subsistence exploitation strategy that paralleled the presumed development of their agricultural activities. Thus, the outcome of these changes over time appears to have been a dual exploitation of agricultural and marine resources as the O-luan-pi major subsistence pattern.

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