A SHELL-MIDDEN ON THE ISLAND OF SANGNODAEDO; A NEOLITHIC SITE OFF THE SOUTHERN COAST OF KOREA

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BACKGROUND

Over a thousand islands lie in the Pacific Ocean off the southern coast of Korea. Sangnodaedo is one of them. Many shell-midden sites occur in this area (Fig.1); Tongsamdong was one of the early finds, whereas Yokchido and Yondaedo have been more recently excavated. Sangnodaedo was excavated in 1978, and some behavioral and environmental studies have been added since the report was published (Sohn 1982).

The site of Sangnodaedo was discovered after most of the area had been disturbed by a mandarin orange orchard. Only a fringing area 10 x 10 meters square was undisturbed and available for excavation. The study of Sangnodaedo was therefore handicapped by pre-excavation limitations, making impossible an intensive study of questions such as population size, area of habitation, shellfish consumption rates and so forth.

The site is located 5 meters above present sea level on a gentle slope facing southwards. Sangnodaedo and Hanodaedo are a pair of islands which were originally connected together by sunken reefs to the west and which enclose an inland sea. Folklore refers to this sea as half fish and half water, indicating the abundant food resources in ancient times.

From the excavation it can be concluded that the staples in diet were shellfish, fish and some sea and land animals. Land mammals include boar, deer, fox, and dog; sea animals consisted of balena, sea lion, seal, Canadian otter, and turtle. Forty-nine species of shellfish, readily available throughout the year, provided the major fresh food resource. Shellfish were harvested continuously from lower layer VIII to upper layer II. Among them were oyster, *Turbo* and mussel, which continue to be dietary staples of the coastal peoples of Korea even today. Fish caught belonged to species in the Dasyatidae, Labridae, Serranidae, Sparidae, and Sphoerodidae families. Bird bones belong to the genera *Haliaetus, Pelagicus, Corvus, Phalacocorax* and the family Procellaridae.

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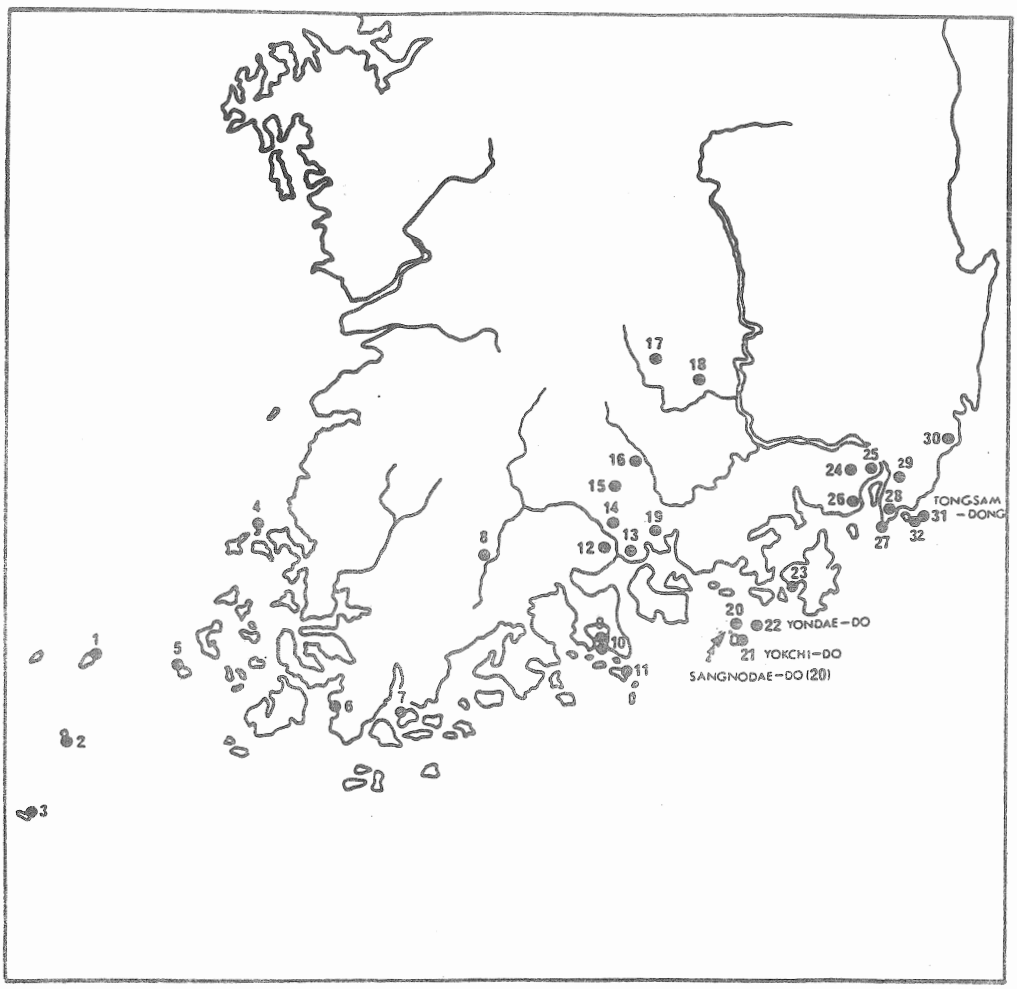

FIGURE 1: NEOLITHIC SITES IN THE SOUTHERN COASTAL AREA OF KOREA

ARTEFACTS

Fishing was conducted with fishhooks made of bone and shell, and probably with fish nets, although we did not find sinkers of any kind. Various flake tools with sharp edges were utilized as butchering and cutting tools, and the serrated obsidian tools and larger felsite and porphyritic tools were probably used for hunting and butchering purposes. Cutmarks on the animal bones have been analyzed (Choi 1988), suggesting that bone, leather and tendons were separated with skill. Carcasses were dissected efficiently and coherently.

Among the flaked stone tools there are retouched scrapers, endscrapers, cutting tools, points, arrowheads, denticulates, and gravers (Fig.2). Many of these, such as a nosed

endscraper, have Upper Paleolithic traits. There are also some Mesolithic tool types. The lowermost layer X is attributed to the early Holocene period because of its Upper Paleolithic and Mesolithic tool characteristics and its lack of ceramics. In general the microlithic and Upper Paleolithic traditions are stronger in the lower layers V-IX. Ground stone tools and well-made obsidian tools occur in the upper layers II-IV. A chipped stone hoe, believed to be a farming tool, was found in layer II. This may correlate with the decorative designs, believed to represent rain symbols, which occur on the pottery in the same layer (Fig.3). Together these phenomena may indicate the development of incipient agriculture. Other stone tools include saddle querns for grinding acorns and grains, and mortars and pestles for cracking shells. The mortars contain residues of shell powder and fragments (Fig.4). They are found in layer V of the early Neolithic period, radiocarbon dated to 6430±80 B.P.

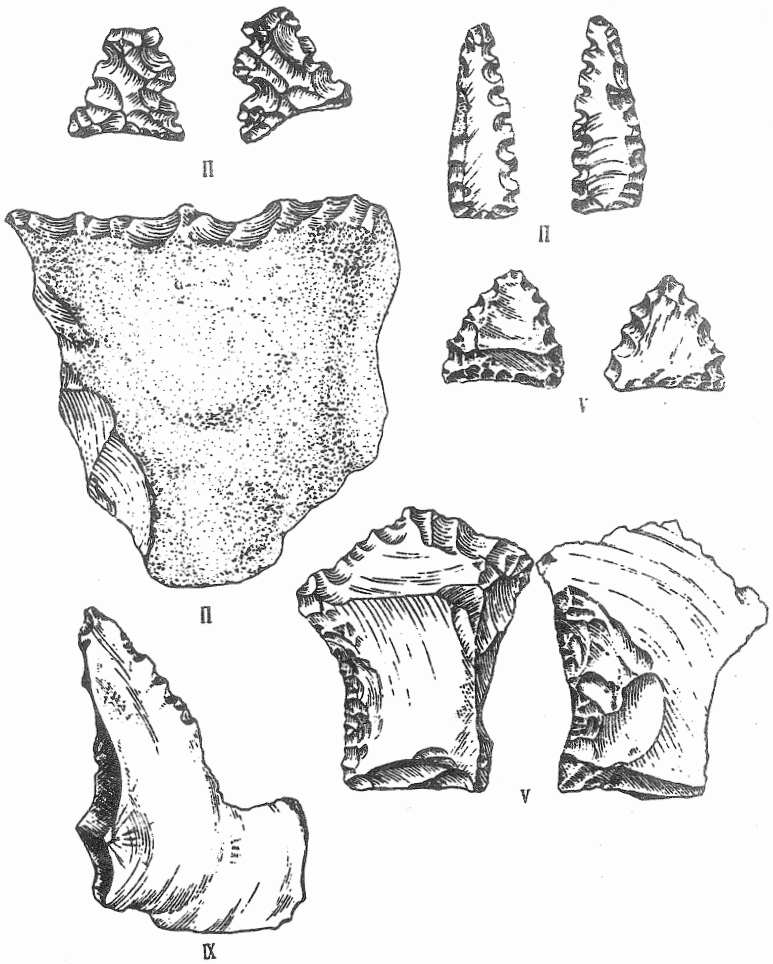

FIGURE 2: RETOUCHED STONE TOOLS FROM SANGNODAEDO

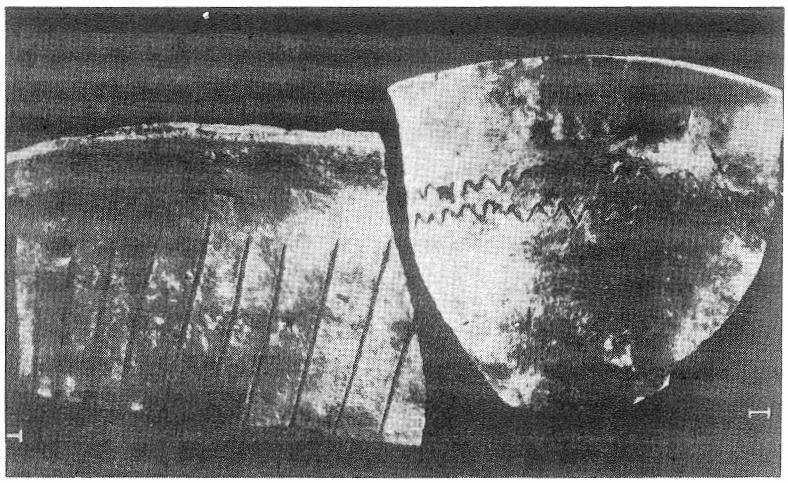

FIGURE 3: SHERDS WITH INCISED PATTERNS BELIEVED TO REPRESENT RAIN, FROM SANGNODAEDO

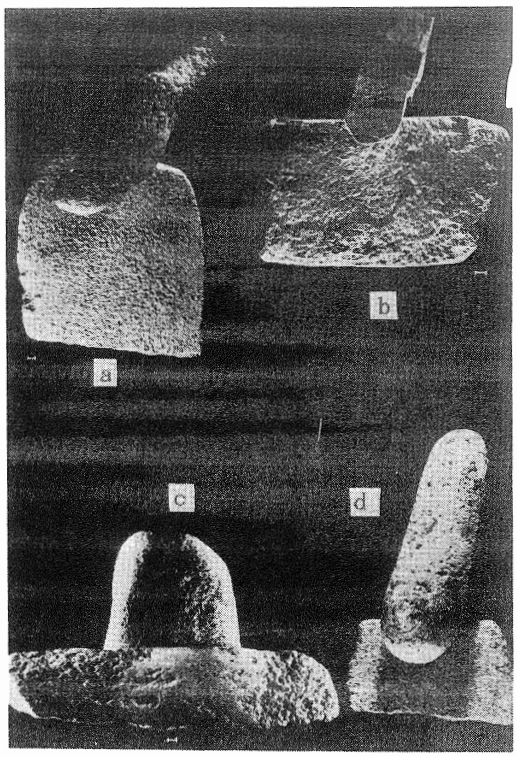

FIGURE 4: SADDLE QUERN (A), MORTARS AND PESTLES FROM SANGNODAEDO

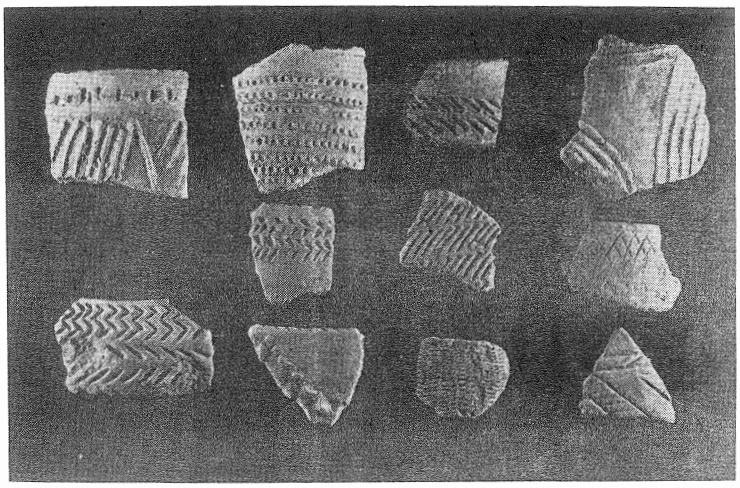

FIGURE 5: SHERDS WITH APPLIQUÉ DECORATION FROM THE LOWER LAYERS OF SANGNODAEDO

Potsherds are quite numerous in the midden and gradual changes in surface decoration occur from the lower to the upper layers. In the lower layers appliqué designs are observed (Fig.5). Incised designs in the middle layers resemble those of the Pusan period of the Tongsamdong site excavated by Sample in 1964 (Sample 1974). Slanting and parallel incisions occur in the upper layers. It is interesting to note that flat-based pottery occurs with round-bottomed in both the lower and upper layers, contradicting the prevailing notion of a transition from round to flat bottoms in Korean prehistory.

The bone industry was also highly developed. From deer bone, boar tusk and shell they carved fishhooks with single as well as multiple barbs, which enabled them to harvest large fish. This fishhook tradition is known to have been developed in the Soviet Maritime province and Kyushu in Japan, as well as along the southern coast of Korea. Drills, cutting implements, needles, scrapers, spatulas, paddles, measuring scales and design markers for pottery were also made from bone (Fig.6). These bone items were unearthed from the upper layers and belong to a time when agricultural activities had begun and the pottery decoration had shifted to symbols of rain, seeds, and furrows. Maritime designs such as herringbones, fish scales, and fish nets also occurred at this time.

We have also been able to study the delineation of flower petals on Sangnodaedo pottery, together with methods of perforating shells and making shell bracelets during the fully developed Neolithic stage (Chang 1988).

ANALYTICAL STUDIES

X-ray diffraction and petrological analysis indicate that most temper materials are pieces of volcanic rock of insular and probably local origin. X-ray diffraction shows that firing

The only clue to the identity of the early inhabitants in the lowermost layer is a single left molar tooth. SEM examination shows traces of mixed dietary striations suggesting consumption of more meat than vegetables, as vertical striations dominate over slanting and horizontal ones. The tooth is attributed to a male of 45 years of age according to its tooth-canal X-ray shadows (Sohn 1982).

DATING AND ENVIRONMENTAL CHANGE

One radiocarbon date of 6430±180 B.P. comes from layer V. This date correlates with those from Tongsamdong. The lower layers are assumed to date probably between 7,000 and 10,000 B.P. The preceramic lowermost layer contains small chips and tools with Upper Palaeolithic traits. In the lower layers, pottery with appliqué and fishery-related designs and the paucity of ground stone tools and bone tools suggest a pre-farming stage. The upper layers contain farming-related pottery designs and an increase in bone tools in addition to finely worked ground stone tools.

Past climatic conditions can be reconstructed in terms of sea level changes with the aid of submerged layers, and variations of temperature derived from the growth rates of oysters and other shells. In the upper layer III sediments small shells with marine silt are observed, whereas larger oysters were found in the lower layers. It is presumed that a rise of temperature took place during the climatic optimum around 5,000 years B.P. and that maximum elevations of sea level occurred between 3,000 and 4,000 B.P. Similar environmental conditions also occurred at Yondaedo shell-midden site.

There are more than 32 Neolithic sites along the southern coast of Korea and excavations are in progress at several at present. Many more data useful for environmental reconstructions will be available in the near future. In conclusion, further studies will provide the answers to such questions as:

1. Was settlement on the islands seasonal or permanent?
2. Did groups of people move in response to sea level changes and could a self-sufficient economy be maintained on these small islands?
3. To what degree was the population of Sangnodaedo dependent on agriculture? Agriculture was probably minimal because space for planting is rather limited, but further analyses of prehistoric dietary intake need to be carried out.

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