

BAKS

PAPERS OF THE  
BRITISH ASSOCIATION FOR KOREAN STUDIES

木風亦不抗有灼其華者實其實

動也灼職

根深之木風亦不抗有灼其華者實其實

動也灼職

略切華盛貌華俗作花

實許雲切實之盛也

**Papers of the  
British Association for Korean Studies**

**Volume 5**

**KOREAN MATERIAL CULTURE**

**edited by**

**Gina L. Barnes**

**and**

**Beth McKillop**

**Papers of the  
British Association for Korean Studies**

Series Editor: KEITH HOWARD

The editorial office of the *Papers of the British Association for Korean Studies* is at the Centre for Korean Studies, School of Oriental and African Studies, Thornhaugh Street, Russell Square, London WC1H 0XG, UK.

Publication of the *Papers of the British Association for Korean Studies* is made possible with financial support from the Korea Research Foundation. Institutions and individuals wishing to subscribe or purchase back issues should write to the editorial office for current rates.

Unlike in previous BAKS Papers volumes, Korean and Japanese names in this issue appear in original order with surname given first; when the full name appears, the surname is presented in small capitals wherever possible.

Contributor's Notes:

Articles for future volumes of *Papers* should be submitted in both hard and soft copy wherever possible. State format and word processing package used on your disc. Manuscripts should be typed, double-spaced throughout, on one side of the paper only, with ample margins and sequential page numbers. Articles should be written in English. Although we have no strict rules about length, authors should remember that most papers are derived from conference presentations.

References should be clearly cited in the text and set out in full at the end. Footnotes should be indicated in the text with a raised number. For style, follow the pattern of articles in this volume.

Standard romanization systems for Asian languages should be adopted: McCune-Reischauer for Korean, *pinyin* for Chinese, and Hepburn for Japanese. Use diacriticals for Korean and Japanese. Enclose separate character glossaries where necessary, preferably in a camera-ready form. Do not insert characters in the main body of your text. Proper names should follow preferred spellings only when affixed to an article or book written in English; in such cases, McCune-Reischauer romanizations should be appended in square brackets, or non-standard given in parentheses. Names should be given without hyphens—for example, Kim Hyenam. In references romanize Asian titles in the above systems and give, where appropriate, a translation (use square brackets if the translation is not printed in the original). Use standard translations whenever available.

Copyright © 1994 by the British Association for Korean Studies.

## Contents

<b>Keith Howard</b> The Korean kayagŭm: the making of a zither	1
<b>KIKUCHI Yuko</b> Yanagi Sōetsu and Korean crafts within the Mingei movement	23
<b>Nigel Wood</b> Technological parallels between Chinese Yue wares and Korean celadons	39
<b>LEE In-sook</b> Ancient glass trade in Korea	65
<b>Lisa Bailey</b> Crowning glory: headdresses of the Three Kingdoms period	83
<b>Gina L. Barnes</b> Discoveries of iron armour on the Korean Peninsula	105
<b>CHOO Youn-sik</b> Objects, sinkers, nets, behaviour and subsistence: the use of culturally specific and relational analogies in archaeological reasoning	131

## Editors' Preface

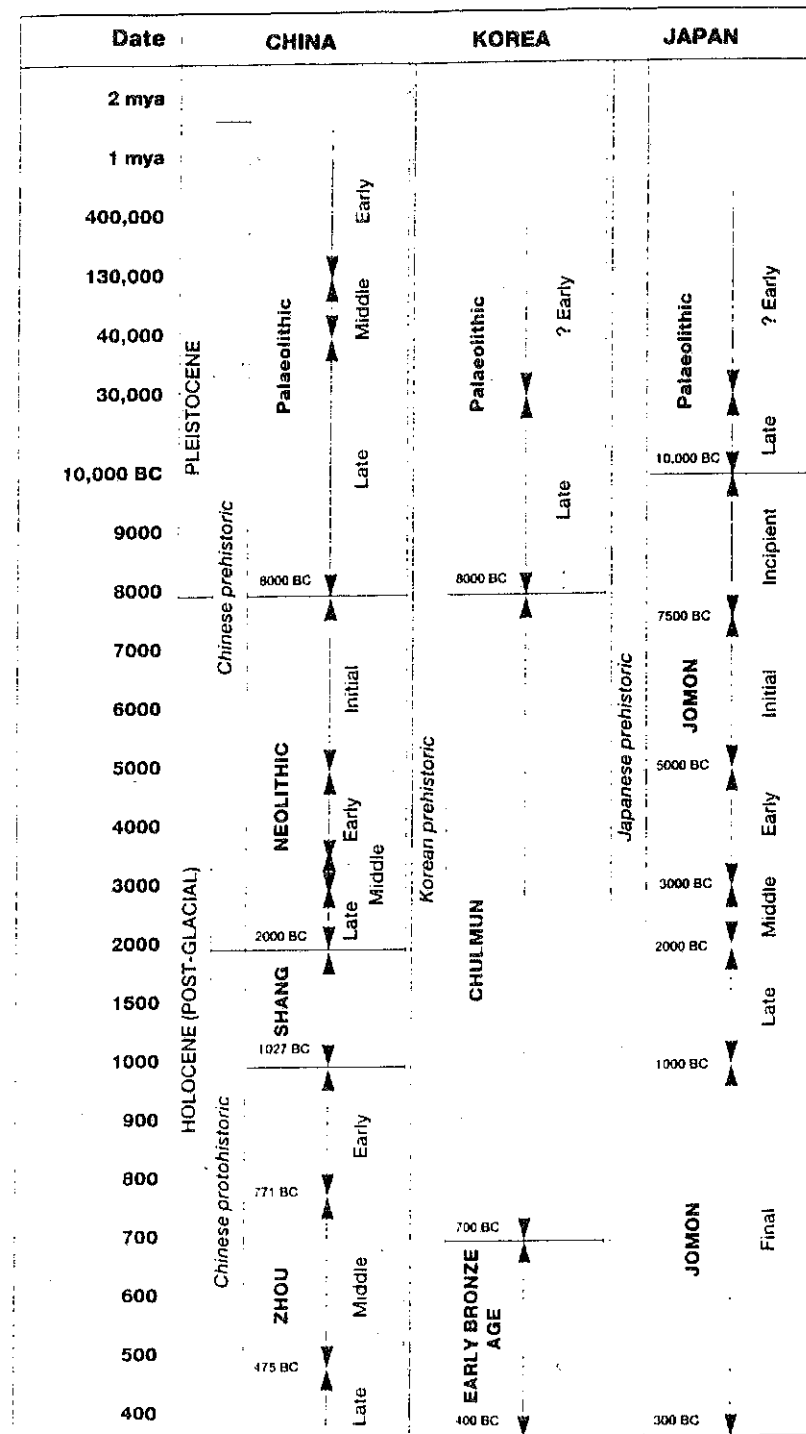
The first BAKS Workshop, on "Korean Material Culture", was held on February 13, 1993, at the Victoria & Albert Museum in London. Hosted by Beth McKillop, this event was also publicised as a V&A Study Day and opened to the general public. Five of the papers included in this volume (by Howard, Kikuchi, Wood, Bailey and Barnes) were presented at this Workshop; an additional presentation by Liz Wilkinson on "Birds, bats and butterflies: symbolism in the decorative arts of the Chosŏn period" is being published elsewhere. A further paper by CHOO Youn-sik was given at the BAKS Conference in 1991 in condensed form; it was decided to publish his entire work here in order to demonstrate modern thinking in archaeology in terms of how to interpret the material culture of people no longer living. Finally, the paper by LEE In-sook was accepted from outside BAKS to be included here in line with the series policy of providing a forum for all worthy scholarship on Korea, not just that generated by BAKS activities.

The papers here represent diverse approaches to Korean material culture: the art historical, the archaeological, the sociological, and the technological. Readers, therefore, may well find themselves faced with successively different principles of analysis or frameworks of thinking as derived from these different disciplines. All authors, however, use analogy in their arguments, even if just with their own experiences and knowledge, in order to make sense of what they are investigating. The paper by Choo, therefore, should perhaps have been presented first, since it demonstrates analogical thought processes by which we judge the material culture of different times and peoples. The process of interpretation is the foremost component in these articles; it is one task of the reader to evaluate whether the reasoning processes of these authors are successful or not.

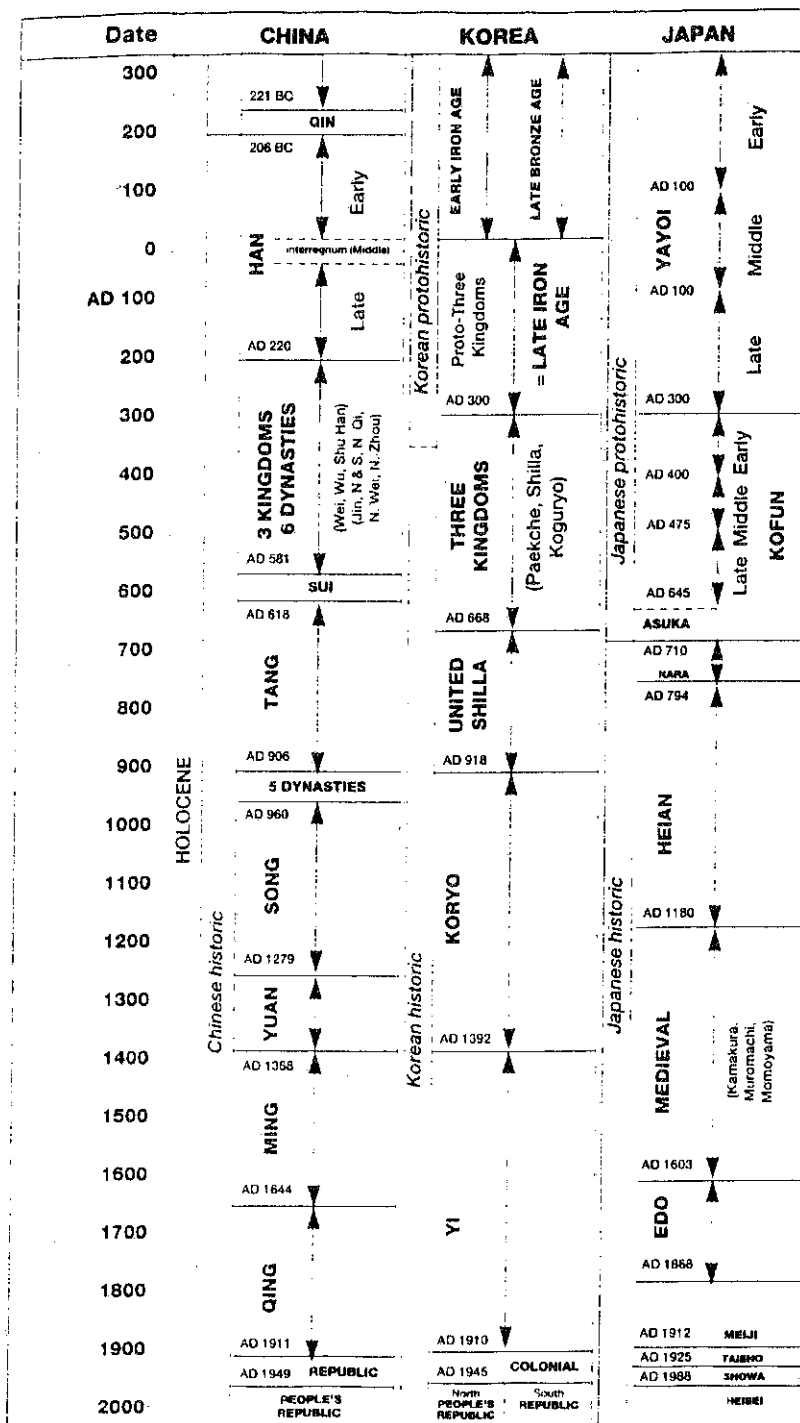
Contrary to many studies of material culture throughout the ages, these papers are presented in reverse chronological order. Howard deals with modern Korea and his actual fieldwork experiences with instrument-makers. Kikuchi takes her topic from the early 20th century, at a time when Japanese-Korean relations were particularly difficult. Wood focusses on the medieval ceramic industries of China and Korea, beginning with a recapitulation of Chinese ceramic technology from protohistoric times. Lee's subject spans the first eight centuries AD or so, and her analysis touches on the complex trade relations of Korea's Proto-Three Kingdoms and Three Kingdoms societies with the outside world. Bailey focusses more closely on the latter period and the debt of Korean crown forms to Eurasian prototypes. Barnes takes her topic from the period of early state relations between the Korean Peninsula and the Japanese Islands *circa* the 4-5th centuries AD. Choo completes the cycle by examining materials of the 1st millennium BC in contrast with ethnographical data from modern Korea.

It is clear that the Korean Peninsula at no time stood in isolation from the peoples and developments surrounding it. The following charts are provided to aid in understanding these myriad and exciting social relationships that have shaped peninsular culture through the ages.

Gina Barnes  
Beth McKillop  
17 December 1994







# The Korean *kayagŭm*: the making of a zither

Keith Howard

In February 1971, KIM Kwangju (1906-1984) was nominated by the *Munhwajae iwŏn* (Cultural Asset Committee) a *poyuja* (holder) of *Muhyŏng munhwajae* (Intangible Cultural Asset) No. 42. This was in recognition of his skill in making traditional string instruments such as the *kayagŭm*.<sup>1</sup> The *kayagŭm* is a 12-string half-tube zither which organologists, following the Hornbostel and Sachs system, might label as 312.22.5.<sup>2</sup> As part of a fading Korean heritage, the importance of instrument making had been recognized almost a decade earlier by the journalist, YE Yonghae. Ye described a second maker, the then 68-year-old KANG Sanggi (Ye 1963: 19):

...traditional Korean instruments incorporate the ancient philosophy of 'heaven and earth, male and female, four seasons, five lines'. Master artisans must be in the stage of nothingness, completely integrated into nature. It is said that the perfect instrument maker's search after the perfect sound is likened to a saint's search after perfect righteousness.<sup>3</sup>

<sup>1</sup> The incoming regime of PARK Chung Hee [PAK Chŏnghŭi] laid the foundations for a state preservation system back in 1962, and the first Intangible Cultural Assets were nominated in 1964. By the end of 1991, 98 Assets had been nominated in the fields of performance, plays, rituals, and crafts. At this time 5 had no living holders. There were 186 holders in total, each receiving a stipend equivalent to roughly half the average Korean full-time wage. *Munhwajae kwalliguk* 1992 gives the most recent published information; for general background, see Howard 1990 and forthcoming.

<sup>2</sup> This classification system dates from 1914. The standard English translation is by Baines and Wachsmann.

<sup>3</sup> Paraphrased and corrected from the English translation; pages 207-11 in Ye's book contain the Korean article about Kang. Ye was a journalist at the *Han'guk ilbo* in 1963. During the previous four years he had published a column with the title *In'gan munhwajae*. He scoured the Korean countryside looking for craftsmen and performers who knew the dying traditions. Ye's concern over the lack of government support (1963: 9-11, 14, 17, 20 etc.) came as the government established the preservation system. And such was his influence that not only were many of those he discovered appointed as "holders" (*poyuja*), but his name for master craftsmen and performers, *In'gan munhwajae* (Human Cultural Asset), has moved into everyday speech.

Both Kim and Kang have now died. Kim trained KO Hünggon (b. 1951) who, in turn, was appointed a *poyuja hubo* (future holder) in 1990, some six years after Kim's death. By the time of writing—January 1994—Ko has not yet been appointed a holder. This conforms with the current Korean common perception that the full title, with its attendant national recognition, is not given to people under 50 years old.<sup>4</sup>

Kang's apprentice, Yi Yöngsu (b. 1929), was appointed a *poyuja* for the same craft in 1991 (Figure 1). Yi has carefully nurtured his reputation as a skilful craftsman, for more than a decade making the string instruments favoured by many musicians at the *Kungnip kugagwöŋ* (Korean Traditional Performing Arts Centre). In the early 1980s, he also rented out several rooms above his workshop as studios to *kömun'go* and *haegüm* teachers.<sup>5</sup>

Ko and Yi strive to build authentic instruments. They consider themselves inheritors of an unbroken tradition stretching back into a legendary past. According to Ko:

I build instruments just like in the past. I study the old ways of doing things and scour the country to find proper materials. Korean string instruments have a particular tone colour, a specific smell (*hyang*). Today, we can once more use really old production methods because we have found ancient instruments and old records detailing how the instruments were played. We know how instruments were made back in Silla times [traditional dates, 57 BC - AD 935]; we know how instruments were made in the Chosön dynasty [1392-1910]. Today, we also work with musicians who can trace their lineages back many generations, and they tell us if our instruments match their knowledge of ancient times.

Over the last 30 years, there have been many efforts to modernize traditional instruments (*chönt'ong akki*). But Koreans now want to preserve the old. Performers see little need to change anything. We have cleaned up and improved the sounds that instruments make; we have smartened the look of the instruments. But the right way forward is to preserve traditional forms to keep instruments just as they were in the past.

Both Yi and Ko sell instruments to performers. Ko claims a clientele which is 80% professional musicians, university students, and private devotees. The string instruments both make capture the Korean sound world, a world which—when compared with Western music—exhibits less focus on steady, clear pitches, and more timbral blurring. In 1990, both charged around 900,000 *wön* (£750) for a

<sup>4</sup> Ko lives and works in what was KIM Kwangju's studio near Tongdaemun (Chongno-gu, Söngindong 57-43). The instruments he makes are *kayagüm*, *kömun'go* (6-string half-tube zither with frets; H/S 312.22.6), *haegüm* (2-string fiddle; H/S 321.313.71), and *ajaeng* (7- or 8-string bowed half-tube zither; H/S 312.22.7). I interviewed him in 1990 but have met him several times since 1984.

<sup>5</sup> Yi has a house, with craft shop underneath and studios above, in Hannamdong (Yongsan-ku, Hannam 2-dong 789-7). I first met him in 1982, when I bought a *haegüm* and court *kayagüm* from him, and I returned to discuss instrument manufacturing processes with him in 1985 and 1987.



Figure 1 Yi Yöngsu, an Intangible Cultural Asset, making kayagüm bridges in his workshop.

medium quality *kayagŭm*. Ko builds copies of Silla-period instruments to order, complete with gold-leaf inlay, for 1,500,000 *wŏn* (£1,250) or more, and Yi charges similar prices for his prized court instruments. A few of Kim's instruments were still for sale in 1990, but they were priced at around £2,000. To Ko, this was a realistic price:

It's not a matter of expense for the sake of expense. Kim's *kayagŭm* were made at least a decade ago, with wood of such a high quality as you cannot find anymore. Kim has died, so few of his instruments remain; he cannot build any more. He stored wood for 10 years before using it, so now his instruments are basically 20 years old or more. They were built entirely by hand. They took much time. Even in the 1970s they cost a lot. Now, although what anybody buying an instrument pays for is the sound, in Kim's case you also pay more because we think it worthwhile to preserve his craftsmanship.

The construction of the *kayagŭm* seems to have changed little in 1,500 years, although recent developments have led to what Koreans both North and South describe as *kaeryang akki* ('improved' instruments).

### The construction of traditional instruments

The *kayagŭm* resembles the Chinese *zheng*, the Mongolian *yatga*, the Japanese *koto*, and the Vietnamese *dan tranh*. Curiously, the *zheng* decreased in prominence in court ensembles from the Ming dynasty onwards (Liang 1984: 893), just as the *kayagŭm* was withdrawn from the Chosŏn ritual tradition. In contrast, the *koto* was almost exclusively a court instrument in *gagaku* ensembles until Kenjun (1547-1636) and YATSUHASHI Kengyō (1614-1685) adopted it to provide song accompaniments (Kaufmann 1976: 100; Kishibe 1982: 55-56). The *yatga*, although it had since the 14th century possessed 13 strings in contrast to the 12 of the *kayagŭm*, was revived in the 1920s on the basis of Korean instruments.<sup>6</sup>

In Korea, two distinct versions of the *kayagŭm* survive. The larger, associated with court and literati ensembles, is known as the *pŏpkŭm*, *p'ungnyu kayagŭm* or *chŏngak kayagŭm* (*pŏp* = law; *p'ungnyu* = 'elegant music'; *chŏngak* = 'upright' or 'correct' music). It has a body made from a single piece of paulownia wood (*odong namu*). A slightly convex front is fashioned by planing, with a soundbox hollowed out through a large rectangular opening at the back. Old wood is preferred, taken

<sup>6</sup> Below I mention *se* and *zhu* zithers. The bamboo element, also present in the character for *zheng*, suggests common roots, and we can trace *zheng* back to Qin times (897-221 BC). A second element in the character, 'quarrel,' introduces a legend about how two brothers quarrelled over an instrument and split it in two, one with 12 strings and another with 13. The brothers were sisters according to Adriaansz (1973), and one emigrated to Korea with the 12-string instrument. A similar legend is present in Vietnam. In China, both 12- and 13-string *zheng* have been used. The *koto* typically has 13 strings, the *kayagŭm* 12. An epic story in Mongolia tells how Queen Agai Shabdai played, with understandable difficulty, an instrument with 8,000 strings. Connections do appear to suggest intercultural exchange. See van Gulik 1951: 13; Crossley-Holland 1959: 238; TRAN Van Khe 1967: 85-6; Adriaansz 1973; Liang 1984: 893; Nixon 1984: 884; Howard 1988: 169-70.

from high, rocky areas such as Sŏrak, Chiri and Songni mountains. Similar wood can be found in cold mountainous areas in Japan, but Korean makers prefer Korean wood, stating that this alone produces the right sound. Little suitable wood, however, remains in a countryside ravaged by war and the many decades during which poverty forced many to scavenge for firewood. Wood from the core of a trunk is considered best, cut vertically or at a slight angle through the centre. The softness of such wood is said to generate a round, slightly damped sound in a finished instrument. Craftsmen will sort through several dozen pieces of wood before choosing one they consider suitable for an instrument.

Wound silk strings, bought in country markets in spring and autumn, are still used. These are held by pegs (*tolgwae*) above a fixed hardwood bridge (*hyŏnch'im*) near the top of the instrument; they then pass over movable bridges, typically made from jujube or cherry wood, that define the sounding length. Bridges are known by their shape as *anjok* or 'wild geese feet' (*kirogi pal*) and come in sets, kept together by a thread decorated with a *maedŭp* tassel (*su*). Performers change both bridges and strings every two or three years. The strings are tied in coils at the lower end of the soundboard. The coils are held behind loops at the top end of blue, brown or red cords (*pudŭl*). The cords, in turn, are secured by passing round and through a sandalwood extension to the body described as 'ram's horns' (*yangidu*). There is no knot to hold tension in the strings. Rather, the cords are doubled back on themselves and, for reasons of aesthetics, bundled together in a decorative figure '8'.

The second instrument, now called the *sanjo kayagŭm* after a popular folk genre of the same name, has a similar but smaller body with sides and back of a harder wood such as chestnut. Makers buy hardwood direct from merchants. Since the construction alleviates any need for hollowing out a soundbox, the backpiece typically has three soundholes—a new moon (*ch'osaeng tal*) above the Sino-Korean character for happiness (*hŭi*) given as a decorated oblong hole, and the full moon (*porŭm tal*). Some older instruments have inscriptions. Ivory or plastic strips cover joints, and an elaborate inlay of wood or bone fills the area above the strings. Only an echo of ram's horns remains, again carved from a separate piece of hardwood.

The *sanjo kayagŭm* is assumed to have developed in the 19th century to facilitate the rapid flurries required by folk musicians (LEE Hye-Ku 1976: 19; Rockwell 1974: 35). We know that the repertory of *sanjo* (lit. 'scattered melodies') was first introduced by KIM Ch'angjo (1865-1918)<sup>7</sup> in the 1880s. The smaller *kayagŭm* may, however, have existed earlier, not least since it is more portable than the large instrument and would consequently have been useful for travelling musicians. Also, models for its construction (with separate sides and back) had existed for centuries in *kŏmun'go* and *ajaeng* zithers in Korea and in the similar zithers of neighbouring states.

<sup>7</sup> Other dates are also given for Kim in texts. Many Koreans are taught that Kim invented the genre of *sanjo*, but it is surely more appropriate to consider that he merely introduced a solo piece outside shaman ritual or entertainment ensembles. See Howard 1990.

## The historical record

Three pottery artefacts provide early information about the *kayagŭm* and its predecessors (Figure 2). The first, a tall jar known as the *changgyŏngho*, was excavated in 1974 at Kyŏngju, the old capital of the southeastern Silla kingdom. This has been dated by Koreans to the reign of Mich'u (262-84) (e.g. Kwŏn 1985: 92), but Pratt (1987: 237-8) believes a later date more appropriate. The jar has a neck which incorporates human figures and animals; a pregnant woman plays the zither. A second jar also shows a woman playing, now alongside a dancing man in a state of obvious sexual arousal. Koreans make the inference from these two artefacts that the vessels and/or the zither were used in some sort of fertility rite. With the benefit of contemporary morality, the argument is taken one stage further: the instrument, it is said, was more likely used by commoners than in court rituals. This, however, is not supported by our knowledge of musical praxis, nor would it match the history of the *koto* in Japan. The third artefact is a headless clay figure illustrated in a book by the musicologist Yi Hyegu (1957: 367). All three have two characteristics common to today's *kayagŭm*: they lack frets and have distinct 'ram's horns.' Two have six strings, compared with the contemporary twelve, but the crude execution surely warns us not to take the depictions as particularly faithful reproductions.

The ram's horns and lack of frets suggest an instrument distinct from potential Chinese archetypes such as the *qin*, and similar—but not identical—to the *zheng*. Indeed, Koreans cite the Chinese Chen Suo's 3rd century *Sanguozhi* as proof that they used a "se (Kor: *sŭl*) that was not a *zhu*<sup>8</sup> (Kor: *ch'uk*)" (e.g. Kwŏn 1985: 92). Further, the instrument is quite distinct from the *kŏmun'go* half-tube zither and the now-defunct *ohyŏn*, a 5 string vertical lute. Both of these have frets. They are depicted in northern Koguryŏ tomb paintings from the 4th century onwards (e.g. Anak Tomb #3, Tomb of the Dancers at Tongguo, and Changchuan Tomb #1).<sup>9</sup>

The written record offers less clarity than we might wish. The *Samguk sagi* (History of the Three Kingdoms), compiled by KIM Pushik in the 12th century, records that in Silla during Naehae's reign (196-230) the musician Mulgyeja played and composed music for a *kŭm* zither, while two centuries later Paekkyŏl, a teacher during King Chabi's reign (458-79) used a *kŭm* to imitate the sound of milling (Kwŏn 48; Yi 1986: 701-2). Koreans, largely on the basis of the comment that "*kŭm* in Korean means *ko*" in the 1527 *Hunmong chahoe*, a textbook for Chinese character learning, suggest *kŭm* denotes an indigenous instrument. *Kŭm* appears to be a loan word appropriated to write the purely Korean *ko* before the introduction

<sup>8</sup> Koreans describe the *zhu/ch'uk* as a 13-string zither similar in construction to the *qin* (Kor: *kŭm*) (e.g., Chang 1984: 745).

<sup>9</sup> See Song 1991 for illustrations of these tomb paintings. Song applies considerable detective skills in an attempt to trace the development of Koguryŏ instruments. Song 1986 offers the most complete historical picture for the *kŏmun'go* that has been published in English to date.

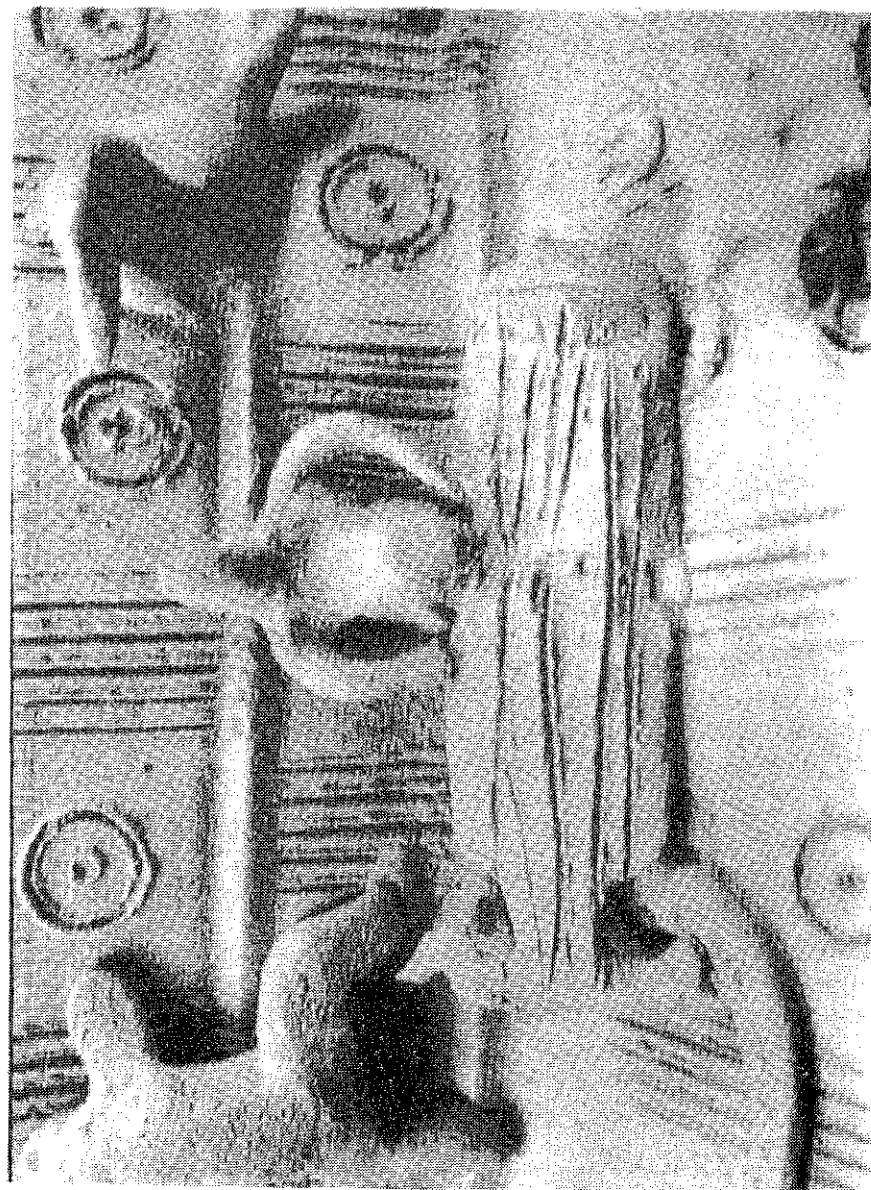


Figure 2 Detail from a stoneware jar, 5-6th century, showing an early *kayagŭm*.

of a Korean alphabet. The scholar CHANG Sahun thus refers to the “*kogŭm*” (1984: 95, 1969: 77). We should not overlook the fact that the Chinese character appropriated denotes the Chinese 7-string zither *qin*. Nonetheless, logic seems to suggest Chang is correct, not least since the *ko-* in the Japanese *koto* may be related. Four Silla zithers, known as *Shiragi koto*, survive at the 8th-century Shōsōin repository in Nara. These again have no frets, but they do have distinct ram’s horns cut from a separate piece of wood. All four have 12 strings, the pattern retained in contemporary instruments. Although the *Akhak kwebōm* (Guide to the Study of Music) of 1493 states that the body, right to the horns, should be made from a single piece of wood (YI Hyegu 1979, 2: 136-41), contemporary instruments match the Shōsōin examples and tend to have separate horns made from red sandalwood.

There is a legend about the invention of the *kayagŭm* known to virtually all Koreans today. This is recorded in *kwŏn* 32 of the *Samguk sagi*. It offers a rational explanation for the name, as a zither (*kŭm/-gŭm*) from the Kaya federation,<sup>10</sup> but leaves several questions unanswered. Here I cite the legend as it is translated into Korean by YI Pyŏngdo (1986: 503-5); the original is repeated in a number of musicological essays (e.g. Kwŏn 1985: 93, fn. 114). The legend tells how King Kashil, ruler of Kaya, heard a Chinese *zheng* and commented that since countries do not share languages they should not have the same music. U Rŭk, a musician from Sŏngyŏl prefecture, was ordered to compose music for a new instrument. He did so, according to KIM Tonguk’s *Kaya munhwa* (1966, cited in Kwŏn 1985: 93), giving names based on places in Kaya to many of his 12 pieces: *Hagarado*, *Sanggarado*, *Pogi*, *Talgi*, *Samul*, *Mulhye*, *Hagimul*, *Sajagi*, *Kŏyŏl*, *Sap’alhye*, *Isa*, *Sanggimul*. The music does not survive, but the titles suggest the appropriation of local folk songs. In 551 U Rŭk fled with his student YI Mun (the composer of three pieces named after rats, crows, and quails) to Silla, where King Chinhŭng (r. 540-76) allowed him to settle in Kugwŏn (now Ch’ungju in North Ch’ungch’ŏng province). A year later Pŏpchi, Kyego and Mandŏk were sent to learn his music. They considered it unrefined, so they reconstructed the twelve melodies as five new works for the Silla court. This was probably designed to distance the music from its roots, for we hear how “treacherous” officials argued against Chinhŭng that music from an overrun federation should not be preserved. U Rŭk’s anger at the revisions turned to tears of joy when he heard the new pieces performed.

There are three problems with this legend. First, the story of the *kayagŭm* being a court instrument seems, perhaps superficially, to conflict with the ‘rustic’ way the instrument is depicted on two of the pottery artefacts. Second, complex instruments are typically given high value in pre-industrial societies. It seems unlikely that U Rŭk would have found an easy way to flee to a rival kingdom with what we must

<sup>10</sup> LEE Ki-baik talks about two federations, Pon Kaya and Tae Kaya; Pon Kaya fell to Shilla in 532 and Tae Kaya in 562 (Lee 1984: 41). Many Japanese sources have claimed Kaya was merely a Japanese colony, but excavated artefacts suggest it had far more in common with its neighbouring Korean states, Paekche and Shilla.

assume was a prized *kayagŭm*. Third, Kashil is not mentioned in any other historical document.<sup>11</sup>

The five revised pieces became part of the *Samhyŏn samjuk* ensemble of three strings (*kayagŭm*, *kŏmun’go*, *pip’a* [lute]) and three bamboo flutes (*taegŭm* [big], *chunggŭm* [medium], and *sogŭm* [small]) in Silla. They survived until King Sŏngjong’s reign (r. 1469-94) (Chang 1969: 79-80). The fortunes of the *kayagŭm* then became inexorably bound to the state adoption of Confucianism. Court music was codified, separating Chinese imports—as esteemed repertoires—from indigenous music. The *kayagŭm* was associated with the local, possibly because its name indicated a Korean origin. Thus, in the *Akhak kwebōm*, it is discussed after other zithers, implying a lower ranking. From then onwards it occupied a position of constantly shifting importance. It was dropped from state rituals in 1593 and thereafter moved in and out of ensembles. While many score books remain for the literati-favoured *kŏmun’go*, few survive for the *kayagŭm*. Indeed, the earliest *kayagŭm* score, the 1786 *Choljang mannok*, has yet to be fully deciphered.<sup>12</sup> Rockwell (1974) states that new names were adopted in attempts to raise its status, first as ‘elegant zither’ (*p’ungnyu kayagŭm*) then as ‘zither of the law’ (*pŏpkŭm*).

A hint of ambivalence remains in the position of the instrument today. Musicians still consider the *kŏmun’go* a man’s instrument but the *kayagŭm* more suitable for women. A genre painting by SHIN Yunbok (1758-?; pen-name Hyewŏn) survives as one of very few depictions of the *kayagŭm*. This work, “Picnic by the lotus pond,” is one of a set of illustrations which challenged the norms of aristocratic lifestyles in the 18th century (Figure 3). In it, a *kisaeng* (entertainment girl) stimulates her clients by playing the instrument.

### Developments in *kayagŭm* today

In South Korea, *kugak* (traditional music) has since the 1960s undergone a revival. Initially government-led, this now reflects the increasing nationalism of urban Koreans. There are now four professional *kugak* orchestras in Seoul and one in each province.<sup>13</sup> A dozen universities teach *kugak*, and the most popular instrument by far is the *kayagŭm*. Regular courses take place at the Korean Traditional Performing

<sup>11</sup> A “Kasul” is mentioned in one Japanese source, who could be the same ruler (Kwŏn 1985: 90).

<sup>12</sup> This score is also known as the *Chorong kayagŭmbo*. The compilation date is given as the 20th year of King Chŏngjo’s reign, that is, 1786. CHANG Sahun has published the most detailed account of the score that I know of, but this is still very incomplete (Chang 1983: 295-300). Chang also provided an introduction to a facsimile of the score published in *Han’guk ūmakhak ch’ongsŏ charyo* 16: 20-3, 151-61 (Kungnip kugagwŏn 1984).

<sup>13</sup> The Seoul orchestras are the Kungnip kugagwŏn (Korean Traditional Performing Arts Centre), KBS, Seoul City, and Chungang. Provincial orchestras started in the mid-1980s as part of central government’s decentralization plan. Cities such as Pusan and Kwangju had for many years before this sponsored their own orchestras, hiring musicians from Seoul to play alongside more local members.





Figure 3 A painting by SHIN Yunbok (1758-?), "Picnic by the Lotus Pond," showing a female entertainer playing the kayagŭm.



Figure 4 Girls learning the 'improved' kayagŭm at the Man'gyŏngdae Children's Palace, P'yŏngyang, DPRK.

Arts Centre and the *Chönsu hoegwan*, while occasional classes are held in private institutes such as *Hansori hoe* and *Hüngsadan*.<sup>14</sup> Consequent to this activity, there is an adequate market for instrument makers.

New diversity has led to changes in training methods. There has been a move away from oral mastery of a limited repertory towards a reliance on scores to enable the student to learn many pieces. Techniques formerly associated solely with court or folk music have merged as musicians are required to learn both traditions. Vibrato, pitch shading, and ornamentation techniques once differed substantially between the two traditions (see Howard 1988: 180-4; Chang 1982). Thus, conservative performers such as KIM Chöngja, a member of the classical *Chöngnong akhoe* ensemble,<sup>15</sup> lament the quality of today's court music (pers. comm., 1991). Others, such as the composer and internationally-known performer HWANG Pyönggi, suggest that few musicians can today play *sanjo* with the depth of emotion—and the control of vibrato—of old performers (pers. comm., 1990).<sup>16</sup>

*Kaeryang* ("improved") *kayagüm* have emerged because of this interface between court and folk (Figure 4). They further accommodate the requirements of a generation of new composers. HWANG Pyöngju, a musician, recently designed and commissioned the production of a 17-string version. In 1991, this new instrument became standard issue at the *KBS Kwanhyön kugaktan*, the Seoul orchestra which gives the greatest number of concerts and has the most varied repertory.<sup>17</sup> Hwang's design increases the 2.5-octave range of traditional instruments to just over 3 octaves (Figure 5). This allows simultaneous coverage of the low court scale (E flat—a flat), the typical *sanjo* range (ca. A flat—e flat<sup>18</sup>), and the higher range ideally needed for *kayagüm pyöngch'ang* (B flat—f<sup>18</sup>).<sup>18</sup> But Hwang has made compromises in terms of structure to amalgamate court and *sanjo* instruments. Although separate, the backpiece of his design is paulownia like the court *kayagüm*, not chestnut. The new instrument is longer than old *sanjo kayagüm* but shorter than court *kayagüm*

<sup>14</sup> 1711 students were enrolled in 12 university Korean traditional music programmes in 1987 (*Han'guk t'onggye yön'gam* 1987). The Korean Traditional Performing Arts Centre (until 1988 glossed in English as the National Classical Music Institute) recently began publishing yearbooks under the title *Kugak yön'gam*. The 1990 volume lists 165 courses for instruments, and its listing of concerts, recordings and lectures runs to 248 pages.

<sup>15</sup> This group issued a four-album set of the chamber suite *Yöngsan hoesang* back in 1981 which remains the standard performance (Söngüm [SEM] SEL-100 122). Kim is a professor of *kayagüm* at Seoul National University.

<sup>16</sup> This is a criticism often levelled at teacher-performers in universities by older musicians who learnt *sanjo* by rote from performers who gave their names to *sanjo* schools. Hwang is a professor of *kayagüm* at Ewha Women's University.

<sup>17</sup> Founded in May 1985, the KBS orchestra now gives around 100 concerts a year divided into TV and radio performances, regular, special, school and touring concerts. From 1985 until 1992 the main conductor was the composer Yi Sanggyu, whose influence has meant that a roughly 50/50 split has been maintained between performances of traditional music and recent compositions.

<sup>18</sup> A genre of singing, in which a singer—typically female—accompanies herself on the *kayagüm*. See Howard and Yang 1990: 75-80.

(150 cm as opposed to 145 cm and 166 cm respectively, as measured by Hwang) (Hwang 1990). The string cords of old versions are replaced by anchoring pegs that better facilitate rapid tuning and the replacement of broken strings. Wound silk has given way to nylon strings which range in thickness from 2.15 mm on string 1 to 0.8 mm on string 17. Nylon is more resilient than silk, but it restricts the potential for vibrato on any given string because it is more resistant to stretching. Further, it significantly changes the sound envelope of notes, for silk struck by a finger exhibits a gradual attack curve in which substantial noise elements feature.

Hwang's design echoes a North Korean development begun by an instrument committee set up in P'yöngyang in the 1960s. The Northern regime was concerned to update traditional instruments in a way which would both make them more popular and allow them to compete more effectively with Western orchestras.<sup>19</sup> The development process, however, took into consideration *zheng* developments in China. A 21-string instrument was the result, with metal tuning pegs and nylon strings. It is played seated on a chair, hence requiring legs to raise the instrument. These are stored inside the instrument at the back, and a box contains the tuning pegs at the bottom front. The soundboard is comparable in length to *sanjo* instruments but is wider. One example, stored at the museum attached to the Isang YUN Music Study Institute (*Yun Isang Ümak Yön'guso*) in P'yöngyang, measures 132.5 cm long, including peg box at the base and the decorated face known as the *chwadan* above the fixed upper bridge. The soundboard is 113.5 cm long, with a maximum width of 33.5 cm. The peg box is 28.8 cm wide and 11.5 cm long. Curiously, the stylized *hüi* 'happiness' character remains as a hole carved into the backpiece.

The new instrument keeps the old range but fills in missing diatonic pitches, allowing for the introduction of harmonic and heterophonic structures unknown in the tradition. New compositions such as *Pom* (Spring) and *Pada üi sori* (Song of the Sea) include chordal structures based on Western triads; they are played in both solo and ensemble versions (Figure 6). Melodies focus on fixed, steady pitches which, as noted above, are more a feature of the Western than of the Korean tradition. Such melodies need less vibrato, and few techniques are concerned with changing pitch during the duration of a tone. Yet vibrato (*nonghyön*) has been retained. So has an ornament traditionally known as *ttüldong*, in which the right index finger first plucks then flicks a given string. However, there is also little use of the traditional glides between tones. And *chönsöng* and *ch'usöng*, two celebrated traditional

<sup>19</sup> State dogma emphasizes *juche* [*chuch'e*], the spirit of self-reliance. This insists that art must be Korean yet should compete with—and be superior to—anything foreign. The retention of a necessary indigenous colour is thus tied to a modernization of instrument construction and timbres that draws on developments in instruments elsewhere. At the same time, the concept of the people (*minjok*) as controllers of the state has given rise to a concept of the popular that devalues instruments and instrumental soundworlds tied to the literati or aristocracy of the past. For a discussion, see Howard 1993.

***Chŏngak kayagŭm***

1. *P'yŏngjo* mode

2. *Kyemyŏnjo* mode

3. *Ujo* mode

***Sanjo kayagŭm***

typical tuning

***Kaeryang kayagŭm***

HWANG Pyŏngju

YI Sŏngch'ŏn  
(for "Pada")  
(actual pitch)

YI Sŏngch'ŏn  
(for "Haebalagi")

standard  
North Korean  
tuning

(actual sound; original written one tone higher)

Figure 5 Various tunings for the kayagŭm.



ornaments in court music which used left-hand fingers below the movable bridges to alter pitches after the initial strike, no longer have any noticeable place. The reduction in pre- and post-tone ornaments, combined with the actual string material (nylon), facilitates greater fluidity in melodic lines. Thus, the overall effect, caused by a combination of instrument construction and playing techniques, is to replace the serenity of a Confucian world with diatonic-oriented virtuosity.

Despite North Korea's Stalinist political philosophy, one version of *sanjo* survives, played on the *kaeryang* instrument. CHÖNG Namhüi, whose *sanjo ryu* (school) tends to be known in South Korea as that of KIM Yundök, settled in P'yöngyang during the Korean war.<sup>20</sup> A measure of the change that has occurred is given by relative durations: whereas *sanjo* pieces can last up to an hour in performance in South Korea, Chöng's surviving student KIM Killan states that his piece lasts only about 10 minutes (pers. comm., 1992).<sup>21</sup>

Back in South Korea, in 1982 the instrument-maker, YI Yöngsu, was commissioned to make a larger *kayagüm* based on the court version. His brief was to provide an instrument which could produce louder sounds than either extant court or *sanjo* versions. This instrument was to be used to accompany opera at the massive National Theatre (*Kungnip kükch'ang*). Yi took his standard instrument and simply increased the size. More significantly, in 1984 the scholar and composer YI Söngch'ön commissioned KO Hünggön to develop two new instruments. One, to serve the needs of the Association for Traditional Music Education (*Kugak Kyoyuk Hakhoe*), was to be a scaled-down version of the *sanjo kayagüm* designed for small children, just as violins are made for children in fractional sizes. Korean craftsmen have for over 30 years built miniature instruments, designed primarily as decorations, but this was to be a real instrument.

The second commission was particularly significant. This was for a 21-string instrument, designed in spring 1984 and first shown to the public in February 1985. It evolved from the experiments of Yi and others but was developed specifically to increase *kayagüm* range. It was, then, distinct from North Korean and Chinese developments, where the overall range has hardly altered. In this new design, three strings were to be tuned lower than those of the 12-string instrument, and six higher, giving a four-octave range. The composer CHÖNG Hoegap had once commented that the traditional *kayagüm* range (of two octaves and a fifth) was too narrow to provide a suitable Korean counterpart to Western instruments such as the piano. YI Söngch'ön would have felt this acutely, since he began as a student of Western

<sup>20</sup> Kim (1916-1978) learnt from Chöng in 1947-8. Kim's student, YI Yönghüi, who worked with him from 1959 until his death, was in 1991 appointed *poyuja* for the *sanjo* Intangible Cultural Asset in the South.

<sup>21</sup> I have not heard a recording of the piece. HWANG Pyönggi was given a tape by KIM Killan in 1990, but to my knowledge this has never been made public in Seoul. I visited P'yöngyang in 1991 and was told there was a tape recording of Chöng's performance but that it was locked away in a cupboard for which my hosts had lost their key.



Figure 6 A performance of *kayagüm pyöngch'ang* on *sanjo kayagüm* in Seoul, ROK.

composition under Chŏng, and his best-known work for *kayagŭm*, *Norit'ŏ* ("The Playground"; 1966), was first written as a piano suite in 1965. The adaptation of *Norit'ŏ* for *kayagŭm* required considerable down-scaling and was criticised for requiring playing techniques outside the traditional repertory. To YI Sŏngch'ŏn, the problem of range was exacerbated in traditional orchestras. There, composers were forced to rely on *kŏmun'go* and *ajaeng*, instruments with distinct and different sounds, to provide lower pitches beyond the *kayagŭm* range. This contrasted with the string section of Western orchestras, where four similar instruments blend well. The representative composition for Yi's new instrument is what he published as his 33rd acknowledged piece, *Pada* ("The Sea"). *Pada* was premiered on KBS FM radio in 1986.<sup>22</sup> To Ko:

21-string zithers are now typical of East Asia. The Korean version is not just an invention, because similar things are present elsewhere, but it was needed to allow the *kayagŭm* to cover a wider range. It can now produce as many sounds as Western instruments. It can reach lots of high pitches and all the low pitches. And it is larger, so it can create a louder sound. In other Asian countries, silk strings have been replaced, but this takes away the characteristic tone colour. The Korean colour has to be there, focussed in the centre of a tone.

There remain drawbacks. Because the construction methods developed for old instruments are retained, high and low pitches on the 21-string instrument lack resonance and depth. This has led Yi to experiment with different tunings: two different tuning systems are used in his 1987 composition collection (cf. Figure 4). Again, silk strings tightened in order to produce high pitches are liable to break. Furthermore, performers find it difficult to match melodies in higher registers with the volume produced by strings in the mid-range, or to sustain bass notes sufficiently to underpin a multi-part texture. Nonetheless, the musical press was enthusiastic, with one critic saying that the unveiling of the new instrument was "the greatest musical event since U Rŭk."

This is not where the story ends. HWANG Pyŏngju's account of the development of his *kaeryang kayagŭm* pointedly ignores YI Sŏngch'ŏn's instrument, moving from a consideration of old court and *sanjo* versions, through modern Chinese and Japan instruments, straight to his own development (1990: 33-53). Rather than describe Yi's tuning systems, Hwang details a 21-string Chinese *zheng* tuned to a regular pentatonic (do, re, mi, sol, la) scale (Hwang 1990: 41).

The two instruments commissioned by Yi, however, have been influential. In 1989 a trio was formed by three *kayagŭm* performers, PAK Hyŏnsuk, KIM Haesuk and KIM Illyun. The trio took the small *kayagŭm* as the equivalent of a soprano instrument, the old *sanjo kayagŭm* as an alto, and the large 21-string *kayagŭm* as a

<sup>22</sup> Yi published three pieces for the 21-string instrument in a 1987 collection of compositions: Solo Compositions 32 and 33—*Pada* (The Sea) and *Maipoegi* (Taste)—and Ensemble Composition 12, *Haebaragi* (Sunflower). The first two, along with a fourth composition, *Sanjo 2-chungju* (Sanjo Duet) are recorded on SEL-RO 187 (Seoul, Sung Eum, 1991).



Figure 7 The cover of an album released by PAK Hyŏnsuk, KIM Haesuk and KIM Illyun—the Saeul Kayagŭm Trio—in 1992.

bass. The bass instrument was soon redeveloped back to a large 12-string instrument. All three members teach at Chungang University, where they have been supported by a group of composers—PAEK Taeung (b. 1943), PAK Pŏmhun (b. 1948), YI Pyŏnguk (b. 1951) and KIM Hŭijo (b. 1920). These composers claim to reject the academic approach of those working at Seoul National and Hanyang universities in favour of a more populist style, hence they initially arranged Western music and Korean folk songs for the trio. Soon new pieces emerged, written primarily by this group of composers but also by the Seoul National-based modernist PAEK Pyŏngdong (b. 1936). August 1992 saw the release of the trio's

first disc (Seoul, SKC, SKCD-K-0436),<sup>23</sup> a combination of arrangements, compositions, and Pachelbel's *Canon* (Figure 7). Even in Pachelbel, the old ornaments and melodic style remain: this is Korean music firmly rooted in the tradition.

### Acknowledgments

Credits for Figures 1, 4, 5 to author; Figure 2, National Museum of Korea, Seoul; Figure 3, painting by SHIN Yun-bok, Kansong Art Museum; Figure 6, Korea National Tourism Corporation; Figure 7, Seung Eum Record Company.

### References

- Adriaansz, Willem (1973) *The Kumiuta and Danmono Traditions of Japanese Koto Music*. Berkeley and Los Angeles: University of California Press.
- Chang, Sahun (1969) *Han'guk akki taegwan*. Seoul: Han'guk kugak hakhoe.
- Chang, Sahun (1982) *Hwajönt'aewa hwaryut'ae*. Seoul: Susōwōn.
- Chang, Sahun (1983) *Kugaksaron*. Seoul: Susōwōn.
- Chang, Sahun (1984) *Kugak taesajōn (Dictionary of Korean Music)*. Seoul: Segwang ūmak ch'ulp'ansa.
- Crossley-Holland, P. C. (1959) "Chinese Music." In E. Blom (ed.), *The Grove Dictionary of Music and Musicians* 2: 219-248. London: Macmillan.
- Economic Planning Board (1987) *Han'guk t'onggye yōn'gam (Korea Statistical Yearbook)*. Seoul: Economic Planning Board.
- Gulik, R. H. van (1951) "Brief note on the *cheng*, the Chinese cither." In *Tōyō Ongaku Kenkyū* 9: 10-25.
- Hornbostel, E. M. von and Curt Sachs (1961) "Classification of Musical Instruments." *The Galpin Society Journal* 14: 3-29. Translated by A. Baines and K. P. Wachsmann; original published in 1914.
- Howard, Keith (1988) *Korean Musical Instruments: A Practical Guide*. Seoul: Se-kwang.
- Howard, Keith (1990) *Bands, Songs, and shamanistic Rituals: Folk Music in Korean Society*. Seoul: Korea Branch of the Royal Asiatic Society.
- Howard, Keith (1993) "Where did all the old music go? North Korea's 'improved' instruments." In *Minjok ūmakhak (Journal of the Asian Music Research Institute, Seoul)* 15: 122-151.
- Howard, Keith (forthcoming) *Preserving the Land of Morning Calm*. London: C. Hurst.
- <sup>23</sup> The tracks include five Korean folksong arrangements—the local *Sangju moshimgi norae* arranged by PAEK Taeung, and the more modern, popular *Kyōngbokkung t'aryōng*, *Shin'gosan t'aryōng*, *Toraji t'aryōng* and *Panga t'aryōng* arranged by KIM Hūijo. Paek also contributes two arrangements of European classics, the quasi-popular *Java* and Pachelbel's *Canon*. Three new compositions complete the disc: Paek's *Samul Nori*, Chōn Sunhūi's *Sequence*, and Yi Pyōngguk's *Dialogue*. PAEK Taeung has also, incidentally, experimented with Hwang's 17-string instrument, and recently published his own *Sanjo* (Paek 1992).

- Howard, Keith, and Yang, Chunggang (1990) *The Sounds of Korea*. Seoul: Korean Overseas Information Service.
- Hwang, Pyōngju (1990) "Kayagūm ūi kaeryange kwanhan yōn'gu: 17 chul kayagūmŭl chungshimūro." In *Kugagwōn nonmunjip* 2: 33-55. Seoul: Kungnip kugagwōn.
- Kaufmann, Walter (1976) *Musical References in the Chinese Classics. Detroit Monographs in Musicology* 5. Detroit: Information Co-ordinators.
- Kim, Tonguk (1966) *Kaya munhak*. Seoul: Ch'ōnggu taehakkyo.
- Kishibe, Shigeo (1982) *The Traditional Music of Japan*. Tokyo: The Japan Foundation.
- Kungnip kugagwōn (1984) *Han'guk ūmakhak ch'ongsō charyo* 16. Seoul: Kungnip kugagwōn.
- Kungnip kugagwōn (1991) *Kugak yōn'gam 1990*. Seoul: Kungnip kugagwōn.
- Kwōn, Osōng (1985) "Samguk shidae ijōn ūi aksok" and "Samguk shidae ūi ūmak." In *Han'guk ūmak sa*: 9-100. Seoul: Taehan min'guk yesulwōn.
- Lee, Hye-Ku [see also Yi, Hyegu] (1976) "Introduction to Korean music." In *Korea Journal* 16/12: 4-14.
- Lee, Ki-baik [Yi, Kibaek] (1984) *A New History of Korea*. Translated by Edward W. Wagner with Edward J. Shultz. Seoul: Ilchokak.
- Liang, Ming Yueh (1984) "Zheng." In Stanley Sadie (ed.), *The New Grove Dictionary of Musical Instruments* 3: 893-4. London: Macmillan.
- Munhwajae kwalliguk (1992) *Munhwajae kwalli yōnbo* 5. Seoul: Munhwajae kwalliguk.
- Nixon, Andrea (1984) "Yatga" and "Yatagulig." In Stanley Sadie (ed.), *The New Grove Dictionary of Musical Instruments* 3: 884. London: Macmillan.
- Paek, Taeung (1992) "17-hyōn'gūmŭl wihan jalbūn sanjo [A short sanjo for 17-string zither]." *Chungang ūmak yōn'gu* 3: 67-84.
- Pratt, Keith (1987) *Korean Music. Its History and Its Performance*. Seoul: Chōngūmsa; London: Faber Music.
- Rockwell, Coralie (1974) "Kayagūm: the origin and development of the Korean twelve string zither." In *Transactions of the Korea Branch of the Royal Asiatic Society* 49: 26-47. Seoul: Korea Branch of the Royal Asiatic Society.
- Song, Bang-Song (1986) *The Sanjo Tradition of Korean Kōmun'go Music*. Seoul: Chōngūmsa.
- Song, Bang-Song (1991) "Koguryo instruments in Tomb No. 1 at Ch'ang-ch'uan, Manchuria." In Allan Marett (ed.), *Musica Asiatica* 6: 1-17.
- Tran, Van Khe (1967) *Vietnam*. Paris: Buchet/Chastel.
- Ye, Yonghae (1963) *In'gan munhwajae* [Human Cultural Assets]. Seoul: Ōmun'gak.
- Yi, Hyegu (1957) *Han'guk ūmak yōn'gu* [Studies in Korean Music]. Seoul: Kungmin ūmak yōn'guhoe.
- Yi, Hyegu (1976) *Han'guk ūmak nonch'ong*. Seoul: Sumundang.
- Yi, Hyegu (1979) *Akhak kwebōm. Kojōn kugyōk ch'ongsō*, pp. 199-200. Anntation of original treatise. Seoul: Minjok munhwa ch'ujinhoe.
- Yi, Pyōngdo (transl. into Korean) (1986) *Samguk sagi*. Seoul: Ulliyu munhwasa.
- Yi, Sōngch'ōn (1987) *Pada: Han'guk akkirul wihan ch'angjak kokchip* 3: 21 *Hyōn'gūm*. Seoul: Susōwōn.

## YANAGI Sōetsu and Korean crafts within the *Mingei* movement

Yuko KIKUCHI

This paper elucidates YANAGI Sōetsu's relationship with and views on Korean crafts from a historical perspective, ending with a critical analysis of his position. Firstly, I give a brief background to Yanagi and his involvement with Korea. In the second section, I outline Yanagi's view on Korean crafts, focussing on the ceramics of the Chosŏn period; and thirdly I would like to outline various criticisms and evaluation problems arising from Yanagi's view of Korean crafts.

It is well known that YANAGI Sōetsu (1889-1961) was the theoretical leader of the *Mingei* (Japanese folkcrafts) movement, which started in the 1920s and flourished until Yanagi's death in 1961. Yanagi used Buddhist analogies and terminology to create a theory about what constituted supreme beauty and to set the standard of beauty for *getemono* (common household objects handmade by unknown craftsmen). Yanagi was one of the members of the Shirakaba ('White Birch') group, the school of writers who were all from Gakushūin, the Peers' school, in Tokyo. He also edited *Shirakaba*, a magazine published between 1910-1923, which mainly introduced new Western ideas and fine art and which had a great impact on the intellectuals of the time.

The *Mingei* movement, following Yanagi's aesthetic theory, was developed further by well-known figures such as HAMADA Shōji, KAWAI Kanjirō, TOMIMOTO Kenkichi, Bernard Leach, MUNAKATA Shikō and SERIZAWA Keisuke—craftsmen of the *Mingei* movement who tried to create new "true crafts" following Yanagi's aesthetics. The Mingeikan (Japan Folk-Crafts Museum)<sup>1</sup> established in 1936 in Tokyo is the tangible legacy of the movement in Japan, and overseas, the *Mingei* aesthetic has become widely known through Bernard Leach and his book, *The Unknown Craftsman* (1972). However, the latter only contains points taken from the twenty-two volumes of Yanagi's collected works that Leach

<sup>1</sup> I have followed the English translations officially used by the Mingeikan for 'Mingeikan' and 'Mingei' in this article.

considered significant or was able to understand—given that his knowledge of the Japanese language was limited.

### Yanagi's involvement in Korea

Yanagi's involvement with Korea was extremely significant in the development of the *Mingei* movement. The seeds of his interest were planted by the Asakawa brothers and by his first trip to Korea in 1916. The Asakawa brothers were often overshadowed by Yanagi's fame, but it is very important that their role be recognised. ASAKAWA Noritaka, who had lived in Korea since 1913, conducted some of the first research on Korean ceramics—particularly Chosŏn ceramics—and he was to excavate 700 pottery sites between 1922 and 1946. As an enthusiastic reader of the magazine *Shirakaba*, Asakawa first visited Yanagi in 1914 at Abiko, a suburb of Tokyo, to see the sculptures by Rodin sent to the Shirakaba group as gifts. On that occasion Asakawa gave Yanagi a Chosŏn faceted jar of white porcelain decorated in underglaze blue in the 'autumn grass style'<sup>2</sup>, a design which sparked Yanagi's interest in Korean ceramics. When Yanagi travelled to Korea for the first time in 1916, he stayed with Noritaka's younger brother, ASAKAWA Takumi, himself a pioneer researcher into Korean ceramics and folkcrafts. Yanagi benefitted enormously from the brothers' first-hand knowledge of Korean ceramics and their fluency in the Korean language.

Yanagi's involvement in Korea was a mixture of art and politics. In 1919 he published his first article on Korea, "*Chōsenjin o omou*",<sup>3</sup> on the occasion of the March First movement, the first big protest against Japanese rule since Korea's annexation by Japan in 1910. In his 1920 article, "*Chōsen no tomo ni okuru sho*", he expressed his empathy and affection for Koreans and Korean art. In the same year, his wife Kaneko, a singer specialising in operatic arias, organised four fund-raising concerts in Japan in order to give free concerts in Korea to show sympathy for the suffering of the Koreans. Bernard Leach went with them to Korea where they gave as many as four lectures and seven concerts; it is said that they were enthusiastically welcomed by the people. After the success of this trip, he and the Asakawa brothers developed a plan for a Korean Folkcrafts Museum. In 1921 Yanagi circulated a piece on the establishment of the museum, "*Chōsen minzoku bijutsukan no setsuritsu ni tsuite*", and advertised in *Shirakaba* for funds for the Museum. He made three

<sup>2</sup> Chosŏn blue-and-white porcelain pots were highly valued in Japan; they are decorated with flower and plant designs widely known as the 'autumn grass style' (*akikusade*)—a term which Yanagi coined in his article "*Kōgei bunka*" (Yanagi 1954, 3: 336). IDEKAWA Naoki argued that the kinds of flowers and the plants used for this design need not necessarily be autumn ones because spring and summer plants such as plums, orchids and irises were also seen mixed with the autumn plants. Yanagi, however, deliberately used the term *akikusa* to emphasise the sad feeling and the "beauty of sadness" he perceived to be characteristics of Chosŏn pottery (see Idekawa 1988: 159-62).

<sup>3</sup> Yanagi's works mentioned in the text are listed in alphabetical order, with their English translations and dates of publication, under Yanagi 1981 in the list of references for this article.

trips to Korea that year including those concerning the museum: in January he negotiated with Governor General SAITŌ Makoto for rent-free use of the Kwangp'ung-ru<sup>4</sup> building as the museum; in June with his wife, he organised eight fund-raising concerts and ten lectures; and in July the death of his younger sister, Chieko, who was married to IMAMURA Takeshi—a senior civil servant working for the colonial government in Seoul—caused him to make his third trip to Korea. He also organised the first exhibition of Chosŏn crafts in Japan in May of that year and he, ASAKAWA Takumi, and other friends bought about 600 items for the museum collection. Then in December, he organised an exhibition, "Reproduction of the masterpieces of Western art", in Seoul. In January 1922, he gave lectures and exhibitions on William Blake, introducing Western art to Koreans in order to raise their awareness of their identity as Asians through the appreciation of Western art. On this trip, he also re-negotiated with Governor-General Saitō for the use of a larger building for the museum.

Yanagi's ongoing interest in Korean ceramics took shape in 1921 as his first book on crafts, entitled *Tōjiki no bi*. The ideas in this book contain the essence of his aesthetics, which developed into the *Mingei* theory. In 1922 he summarised his views on Korean art in "*Chōsen no bijutsu*," and in the same period he published several political articles, which will be discussed below. In July 1922, in response to the announcement of the proposed demolition of the Chosŏn-period Kwanghwa-mun (Figure 1), the front gate of the Kyōngbok-kung Palace, and the construction in its



Figure 1 Kwanghwa-mun gate in Seoul, circa 1922.

<sup>4</sup> This building used to exist outside the north gate of the Kyōngbok-kung Palace.



place of a new western-style building as the colonial government office, Yanagi published "*Ushinawaren to suru ichi Chōsen kenchiku no tameni.*" This article is in the style of a lyrical poem personalising *Kwanghwa-mun* by calling it "my dear" (*omae*) and likening its destruction to the murder of a human being. Partly as a result of Yanagi's passionate protest, *Kwanghwa-mun* was eventually saved. Also in 1922, Yanagi published *Chōsen to sono geijutsu*, a compilation of his nine previous articles on Korea with royalties going to the Korean Folkcrafts Museum. An issue of *Shirakaba* featured Chosŏn ceramics as part of Yanagi's efforts to build the reputation of Chosŏn ceramics, which had largely been ignored up to that point.

As the first event under the name of the Korean Folkcrafts museum, Yanagi, the Asakawa brothers and Tomimoto organised an exhibition in Seoul of Chosŏn ceramics, together with their academic research. Up to 1200 people, two thirds of them Korean, visited this exhibition which featured more than 400 items. In 1923 when the Great Kantō Earthquake occurred, a number of Koreans were killed because there were rumours circulated that they were planning to riot. Yanagi expressed his anger in a letter in English to Bernard Leach, saying [sic] "Great massacre of Korean people happened together with the disaster was one of the most ignorant & biggest crimes we have done towards them" (*Zenshū* 21, upper vol.: 617).<sup>5</sup> Then Yanagi gave fund-raising lectures in Seoul for humanitarian aid to the Koreans in Japan. In 1924 the Korean Folkcrafts Museum was officially opened at Chipkyōng-dang in the Kyōngbok-kung Palace. With the opening of the Museum, four concerts were organised by Kaneko. It is said that two exhibitions a year were organised in spring and autumn after the Museum opened, and lecture and concert tours were organised almost every year, including aid concerts in 1925 for Korean flood disaster victims (Takasaki 1979: 84, 1991: 104), until ASAKAWA Takumi's death in 1931.<sup>6</sup>

With the publication in 1928 of *Kōgei no michi*, the bible of *Mingei* theory, Yanagi became more and more involved in Japanese folkcrafts, but still he visited Korea almost every year. 1932 saw the publication of a special issue of *Kōgei* ("Crafts") on Korean ceramics; and the exhibition and sale of several thousand items of contemporary Korean folkcrafts was organised in Tokyo and Kyoto. After the Second World War, and in particular from 1950 on, Yanagi published many articles on various Korean crafts other than pottery—ranging from sculpture, woodwork and metalwork to paintings, etc. As he developed his 'Buddhist aesthetics', he began to

<sup>5</sup> Yanagi's writings are cited in the text as printed in his collected *Zenshū*. This 22-volume series is listed in the references as Yanagi 1981.

<sup>6</sup> After ASAKAWA Takumi's death in 1931, this museum was mostly closed to the public and opened to a few occasional visitors. The key of the museum was kept by ASAKAWA Noritaka, and the museum was maintained by Yanagi's and Asakawa's friends in Seoul. During the Second World War, the collection of the museum was moved to Kunjōngjōn from Chipkyōng-dang, then to Minjok Pangmulgwan (Folklore Museum), and finally the collections were absorbed into the collection in Kungnip Chung'ang Pangmulgwan (National Museum of Korea) after the war (Takasaki 1991: 107).

apply these to Korean crafts, too. By 1940, Yanagi had travelled to Korea twenty-one times. In that year he made his last trip with HAMADA Shōji, KAWAI Kanjiro and SHIKIBA Ryūzaburō, though he continued to organise exhibitions of Korean folkcrafts and to write about Chosŏn ceramics and other crafts until his death in 1961.

### Yanagi's views on Korean crafts

Yanagi's approach to artefacts was generally by "direct insight" (*chokkan*),<sup>7</sup> and he tried to keep the background of the object in mind as he viewed it. His approach was initially derived from the "new mystery" he wrote about in his 1914 letter, "*Abiko kara: tsūshin 1*"; that is, the shape of a pot tells you more than just its shape. In his first systematic book on crafts, *Tōjiki no bi* in 1921, he refined this insight into the idea that "through the beauty of the pot you can understand the mind of the people, the culture of the period, its natural background and the relationship of the people and beauty" (*Zenshū* 12: 4). Yanagi used the term, "beauty of intimacy" (*shitashisa no bi*) for one's first level of analysis of the nature of specific beauty. Later in *Mingei* aesthetics, this beauty was categorised in finer detail as "beauty of tradition, nature, functionality, simplicity, selflessness, plurality, inexpensiveness and health".<sup>8</sup>

Yanagi applied this approach to objects to Korean art and summarised his views in the term, "beauty of sadness" (*hiai no bi*). In Yanagi's first article on Korea, he wrote that the Koreans who had been "violated and bullied" (*shittagerare ijimerareta*) by the Japanese and Chinese invasions needed "sympathy" (*ninjō*) and "love" (*ai*), and this need reveals itself in (*Zenshū* 6: 27):

the beauty of line, which is characteristic of Korean art, and also symbolises the heart starving for love of the Koreans...That beautiful long Korean line expresses exactly their starving hearts. Their grudges, their prayers, their wishes, their tears, all are felt in the flowing line...The Koreans have expressed their 'sad feeling' (*sabishii kimochi*) and their starving for something in this beautiful, appealing, long and curved line.

In this way, through the appreciation of one Korean pot, he developed what has been considered to be empathy for the Korean people and their culture.

The term "beauty of sadness" (*hiai no bi*) appeared for the first time in his article of 1920, "*Chōsen no tomo ni okuru sho*" (*Zenshū* 6: 42-3):

<sup>7</sup> There are several English translations of *chokkan* such as 'intuition' (Yanagi 1954); 'the seeing eye' (Leach 1972), and 'direct perception' (Moeran 1984).

<sup>8</sup> Yanagi's terminology describes elements of ideal beauty in the "true crafts" made by hand by unknown craftsmen without ego, free from the desire to be famous or rich, merely working to earn their daily bread. "True crafts" are made from natural materials using traditional methods: characteristically of simple form strong enough to be functional and of simple design not artistically decorated, which are copied and produced in large quantities, inexpensively. Yanagi describes the combination of all of these elements as "healthy."

The long, harsh and painful history of Korea is expressed in the hidden loneliness and sadness of their art. It always has a sad beauty and loneliness that brings you to tears. When I look at it, I can not control the emotion that fills my heart. Where else can I find such *hiai no bi*?

In his 1922 article on Korean art, "*Chōsen no bijutsu*", Yanagi summarised his view of *hiai no bi* as the supreme beauty of Korean ceramics clearly and simply by comparing the art of three different cultures: the strong shape of Chinese ceramics, created by "the practical and strong Chinese people" (*shina no jissaiteki na kyōkōna minzoku*), the colourful ceramics of the Japanese created by "cheerful Japanese" (*tanoshii nihonjin*) and the sad and lonely line of Korean ceramics created by "lonely Koreans" (*sabishii Chōsen minzoku*). He saw this "Korean line" everywhere in Korea, in architecture, sculpture, paintings, nature, crafts and particularly in ceramics (*Zenshū* 6: 102):

[A liquor bottle] has a long and narrow shape and is not secure in balance, but the desire to express the line is fully satisfied. [Bowls] have small feet and serene lines form the sides. Sometime the foot is cut so that its balance is even less secure. They do not have the shape to sit firmly on the earth. This is the image of Korea, ...reminding us of their suffering and sad experiences.

Technique, firing and designs also reflect the sadness. The inlay method is "passive and quiet with hidden beauty." The reducing fire they use is "smoky fire which they prefer to the bright, strong oxidising fire. They hide their face in the smoke and reveal their weeping souls" (*Zenshū* 6: 103). Popular Koryō designs such as 'willow and ducks' and 'flying cranes and clouds' (Figure 2) are also sad.

There is nothing with such long, thin and beautiful lines as the willow. Under that sad willow, there is a stream of water and floating ducks. The water stream will never remain the same and the ducks can never stay in the same place. This is the very symbol of people living on a peninsula. Where else can you find more sad and beautiful designs...the 'flying cranes and clouds' design represents one or two scattered lonely clouds in the vast air and a couple of cranes without any destination...who fly away somewhere, their sad calls echoing once or twice in the high sky of sunset. They are cranes with long legs and thin feathers. I cannot help thinking about inevitable meanings hidden in those designs. [*Zenshū* 6: 104-5]

In addition to 'lines' as a symbol of sadness, Yanagi pointed out the colour 'white' (Figure 3). The white clothes worn by Koreans—whether male or female, old or young—are ..."mourning dresses. They are a symbol of their sad and humble minds. By wearing white clothes they are eternally in mourning" (*Zenshū* 6: 105). Furthermore, he gave other examples such as the lack of variety in children's toys, the scarcity of flower vases, and "the sadness of the music with its series of long notes which seem to sink and die away" (*Zenshū* 6: 107). He concluded that "Korean life generally lacks cheerfulness" (*Zenshū* 6: 105).



Figure 2 A celadon-glazed porcelain Maebyōng vase with inlaid 'flying cranes and clouds' design. Koryō period, 12th century; height 42 cm

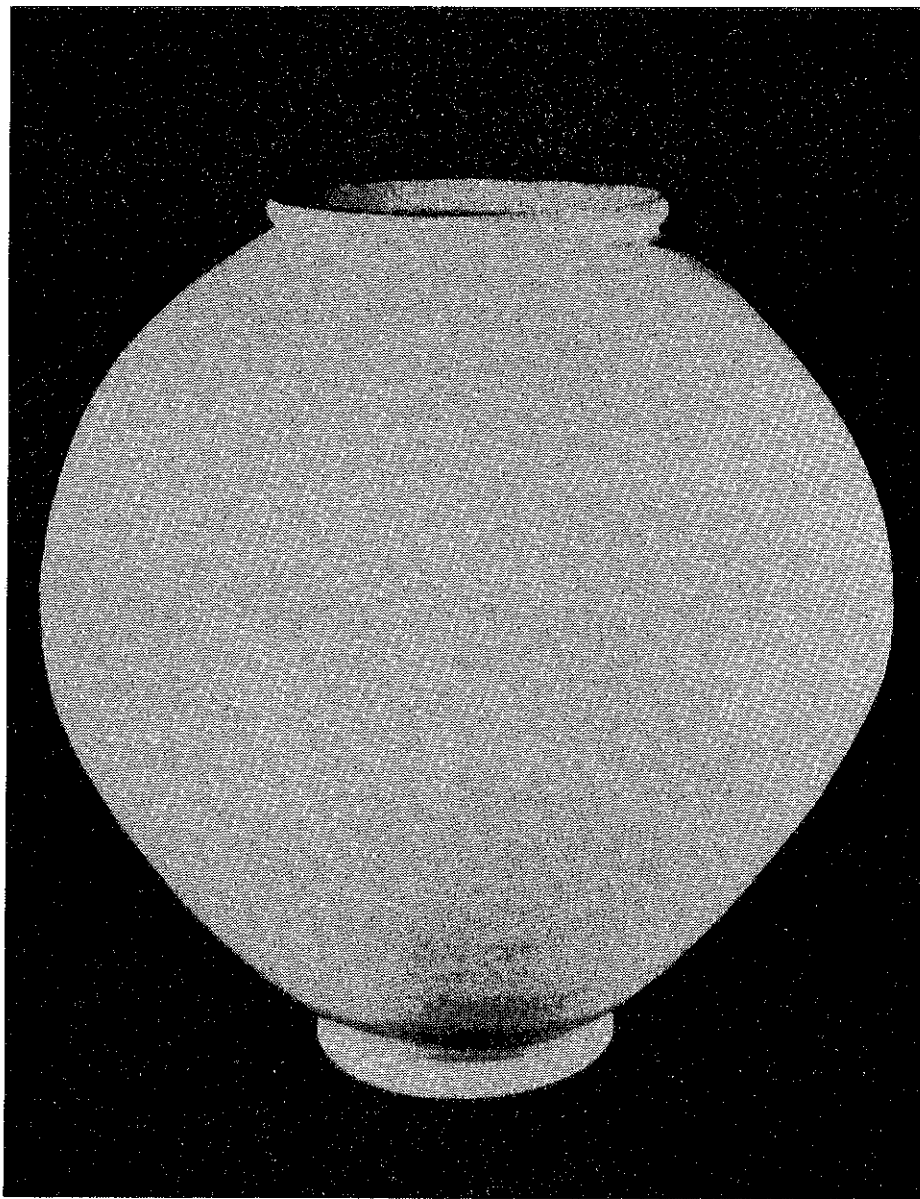


Figure 3 A large white porcelain jar. Chosŏn period, 17th century; height 42.8 cm, rim diameter 19.8 cm

Yanagi had an extremely sentimental and dogmatic idea of *hiai no bi* in Korean art, and this idea continued more or less throughout his writings on Korean crafts until the end. However, there is a noticeable and gradual change in tone to a less sentimental one and a move to other perspectives.

The first noticeable change came in 1922 when Yanagi started to concentrate on reevaluating and restoring the reputation of Chosŏn ceramics. In "*Richō tōjiki no tokushitsu*" and "*Richō yōmanroku*", published in *Shirakaba*, he dealt specifically with the characteristics of Chosŏn and Koryŏ wares rather than the characteristics of Korean ceramics as a whole. His interest in comparing the two wares continued in "*Kōrai to Richō*". He described Koryŏ ware as having "feminine beauty" (*josei no bi*) and Chosŏn ware as having "masculine beauty" (*dansei no bi*) (*Zenshū* 6: 159). Reflecting the changes of social belief in the Chosŏn society from Buddhism to Confucianism, the characteristics of the ceramics also changed from "beauty of delicacy" (*sensai na yūbi*) to "beauty of will" (*ishi no bi*) and from sensitive forms and lines to simple, strong and big shapes (*Zenshū* 6: 158). But Yanagi also added that although Chosŏn ware has strength, it is not the same strength as that of Chinese ceramics. The typical Chosŏn white porcelain jar has

...a wide shoulder which can not be seen in Koryŏ ware but when you look at the way it tapers to the bottom and its small foot, it is a 'sad figure' [*sabishii sugata*] different from the strength and pride of Chinese ceramics....The white colour is also different from the white of Ming Ware. [The Chosŏn whites] are always either pale blue-tinged white, powdery white or dull greyish white. [*Zenshū* 6: 161]

He later concluded that "such warm whites can not be seen anywhere else...and plain white is the ultimate state of beauty" (*Zenshū* 6: 363) However, in these two articles, he no longer strongly emphasises *hiai no bi*. His emphasis has shifted, rather, to "unquestioning trust" (*mushin na shinrai*) in Nature or "the truth hidden between the mind of the craftsman and Nature" (*Zenshū* 6: 165) and "naturalness without 'intention'" (*sakui*) (*Zenshū* 6: 187) as the special character of Chosŏn ware. In the special issue of *Kōgei* on Chosŏn ceramics in 1932, Yanagi's aesthetic of beauty developed terms used for the appreciation of ordinary household crafts—moving from "naturalness" (*shizensa*) to "anonymity" (*mumei*), "functionality" (*jitsuyō*), and "health" (*kenkō*) to explain the essence of Chosŏn ceramics. These elements were summarised again more systematically in "*Richō Tōji no Nanafushigi*" published in 1959.

The second change in Yanagi's writings came after the Second World War, especially from the 1950s onwards in articles such as "*Chōsen jawan*", "*Richō tōji no bi to sono seishitsu*" and "*Richō tōji no nanafushigi*." It was during this period that Yanagi developed his Buddhist aesthetics on crafts inspired by his friend and



teacher, SUZUKI Daisetsu. The Chosŏn tea bowls, such as the one named Ido,<sup>9</sup> which were highly prized by tea masters in Japan as early as the 16th century, were ordinary rice bowls and were considered to have “the truest beauty” (*Zenshū* 6: 519). They were made by unknown craftsman with “no intentional clever thought” (*mushin*) (*Zenshū* 6: 519), relying on “the way of other power” (*tariki*) (*Zenshū* 6: 483). Yanagi concluded that the beauty of Chosŏn ceramics should be called “beauty of unity” (*funibi*) (*Zenshū* 6: 519). In these three articles Yanagi used “naturalness” (*shizensa*) and “freedom” (*jiyūsa*) to describe the image of Chosŏn ceramics; no longer did he use terms such as “sadness” (*hiai*) or “loneliness” (*sabishisa*). He even concluded that the use of white, which he had analysed as the colour of sadness, was a “reasonable solution to avoid complication of the design process for inexpensive ordinary folkcrafts” (*Zenshū* 6: 537).

Yanagi’s central view on Korean crafts—first summarised in the term “beauty of sadness” (*hiai no bi*) as the specific quality of Korean crafts—changed to “beauty of naturalness” (*shizensa no bi*) and then eventually to “beauty of unity” (*funibi*), which he applied to all crafts, not just to Korean ones.

### Criticism and evaluation of Yanagi’s views on Korean art

There has been very little critical evaluation in Japan of Yanagi’s views of Korean folkcrafts, with TAKASAKI Sōji and IDEKAWA Naoki being the only two critics to analyse and criticise Yanagi’s work. The so-called critics of the *Mingei-ha* (the *Mingei* faction)—such as MIZUO Hiroshi, SHIKIBA Ryūzaburō, TONOMURA Kichinosuke, TANAKA Toyotarō—were people who worked with and supported Yanagi in the promotion of the *Mingei* movement, writing numerous, uncritical articles adulating Yanagi and maintaining his high reputation. They praised Yanagi’s criticism of the government as being, for that time, extremely brave, undaunted by the threat of censorship or by the police who monitored his actions. They admired his humanism and the deep insight into Korea that sprang from his sharp “direct insight” (*chokkan*).

In 1961, the year Yanagi died, UBUKATA Naokichi wrote the first article in Japan which evaluated Yanagi’s view on Korea, rating favourably Yanagi’s objection to the assimilation policy and his humanism under the difficult circumstances in Japan and noting that Yanagi’s reputation was higher in Korea than at home. TSURUMI Shunsuke (1976), a leading scholar of intellectual history followed Ubukata’s opinion, and it was not until TAKASAKI Sōji’s article in 1979 that anyone criticised Yanagi’s work from a Korean perspective or pointed out the perception gap between the two countries. IDEKAWA Naoki’s work in 1988 analytically criticised Yanagi’s

<sup>9</sup> There are several opinions about the derivation of the name Ido: 1) Mr. Ido of the Yamato region owned this bowl; 2) Mr. Ido, the governor of Wakasa region, owned the bowl; 3) the name was taken from the shape of the bowl, which is exceptionally deep—as deep as an *ido* (‘well’); 4) from the place name, Ido, in Kyōngsan province, Korea, whence this bowl came.

*Mingei* theory and view of Korea, and he claimed that the beauty of sadness (*hiai no bi*) was totally undertheorised.

In Korea the situation was diametrically different. From 1961 until a peak in the 1970s, there were many articles on Yanagi; of the 16 major articles that I have found, 11 were negative. Critical articles were rather emotional in tone before CH’OE Harim set up in 1974 the first model of criticism which dominated the rest. Back in 1922, PAK Chonghong had criticised Yanagi’s theory of the “beauty of sadness” (*hiai no bi*) as a prejudiced view, and in 1931 KO Yusōp declared it to be “merely poetic” and undertheorised. Three articles (Kye 1961; Kim H. 1961; Anon. 1961) which positively evaluated Yanagi’s involvement with Korea were published the year Yanagi died, and there was another article supporting Yanagi seven years later (Kim U. 1968). But these are exceptions to the mainstream of opinion.

In 1968 KIM Talsu, a Korean living in Japan, initiated the debate about Yanagi’s view of white as the colour of sadness. Kim used historical examples to show that from the Korean perspective, white was the ultimate colour showing humour and dynamism. This argument about the symbolism of colour was continued by KIM Yanggi (1975, 1977a,b,c) and LEE Chinhūi (1978). CH’OE Harim’s seminal work in 1974 established the concept of the “aesthetics of colonialism”; it became a milestone for critics who followed. Although Ch’oe notes that Yanagi passionately impressed the Koreans in the 1920s, he criticised Yanagi’s view as being “a mixture of imperialism, backed by the ‘Cultural Policy’ applied by the colonial government, and sentimental humanism” and a “superficial interpretation of Korean history”; he adds that the beauty of line is a general characteristic of Asia. He called on Koreans to re-examine Korean art history, free of the Japanese view of Korea during the period of Japanese rule (*Ilche sidae*), and other critics followed his lead (LEE Mannyōl 1974; KIM Yunsu 1977; MUN Myōndae 1977). Then in 1989, CHO Sōnmi summarised previous critical analyses of Yanagi’s work, both from the point of view of his contributions and his weaknesses, and raised the key question about how to look at the art of another country.

As TAKASAKI Sōji indicated, there is an obvious perception gap between the two countries. But there is also the difficulty of how to evaluate Yanagi’s work on Korea, given the unusual circumstances of the Japanese occupation. He certainly organised numerous concerts and lectures, both to show friendship and to raise funds for humanitarian aid, to pay for exhibitions of Korean folkcrafts and to build the Korean Folkcrafts Museum to preserve these works. These activities of his were acclaimed by the Koreans in 1920s. He was vehement too, in his denunciation of the immoral and inhuman behaviour of the Japanese towards the Koreans, castigating the brutality of the Japanese government as “shame on shame” (*chijoku no chijoku*) for Japan (*Zenshū* 6: 38).

Yanagi’s political opinions, however, can be clearly seen as ambivalent in his five political articles which appeared in the early 1920s (“*Sekika ni tsuite*”, “*Kenshō shōsetsu boshū ni tsuite*”, “*Hihyō: Arekisandaa Paueru ‘Nihon no Chōsen tōchi*

*seisaku o hyōsu*”, “*Nissen mondai no konnan ni tsuite*”, and “*Chōsen ni okeru kyōiku ni tsuite*”). In these articles he denounced the Japanese government, advocating the abolition of Japanese militarism, the granting of absolute freedom of speech for the Koreans, the provision of higher education in Korea and the implementation of moral human discipline to attain peace. At the same time, he called on the Koreans to undertake self-reflection on their lack of “self-awareness” (*jikaku*) and on the fact that they had not protected their own country, saying, “before dreaming of independence, dream of producing a great man of intellect, a great scientist and a great artist. Reduce the amount of time you complain and increase the time you study. Please do not abandon yourselves to despair” (*Zenshū* 6: 186). Then he concluded that the best solution would be for both countries to compromise. Although he strongly denounced the Japanese government, it seems to me that in reality he was only against military rule, not against liberal rule to ‘civilise’ the Koreans. His limitation is that he did not question the justice or injustice of colonisation itself.

The prejudice of the Japanese, including intellectuals, towards the Korean people, is revealed in the stereotyped view that Koreans were not capable of governing themselves. It also reflects mainstream Western opinion as it was seen in the article by Alexander Powell<sup>10</sup> (1922), justifying power politics as inevitable in order for civilised nations to civilise the primitive ones in the competition for colonies. Although Yanagi had high morals, being a product of the period of modernisation in which Japanese intellectuals suffered from a massive sense of inferiority towards the West, he could not help but follow the Western model. His paternalistic stance also has parallels with the attitudes of Lafcadio Hearn and Bernard Leach, whom he idealised (*Zenshū* 6: 24).

Yanagi himself was in a difficult position. Some of his articles were censored when published, and he was closely followed and watched by the police as a “dangerous person”. Yet at the same time, he sometimes defended the officials of the colonial government. “I know Japanese greedy merchants and arrogant policemen have made the problem more difficult, but the officials in the colonial government do not want violence. There are many intellectuals among them and they are trying to govern justly” (*Zenshū* 6: 228). This attitude was possibly a result of Yanagi’s strong personal and family connections. The Colonial Governor-General SAITŌ Makoto was junior (*kōhai*) to YANAGI Narayoshi, Sōetsu’s father, himself a Navy Rear Admiral and a mathematician; and Saitō also knew Sōetsu’s older brother-in-law, KATŌ Motoshirō, ex-Consulate-General at Inchon during the Japan-Russo War in 1904. He also knew Yanagi’s younger brother-in-law, IMAMURA Takeshi, who was a senior civil servant in the colonial government. Therefore, whether he was aware of it or not, Yanagi may have been used by Saitō as part of his “Cultural Policy” (*bunka seiji*) from 1919 to 1931, which tried to demonstrate a

<sup>10</sup> Alexander Powell (1879-1957) was a political analyst and a political editor specialising in foreign affairs for several newspapers and magazines in the USA and Britain.

general relaxation of controls over Korean people’s cultural and political life so as to change the negative image of the colonial government aggravated by the previous Governor-Generals’ harsh repressive rule.

## Conclusion

Yanagi’s involvement with Korea played a vital part in the development of the *Mingei* movement and its aesthetic, as it was through the process of theorising the beauty of Korean crafts that he acquired an articulate aesthetic language. However Yanagi’s central view on Korean crafts, as summarised in the term, “beauty of sadness” (*hiai no bi*), has been clearly shown to be extremely sentimental and dogmatic in the light of the perception gap revealed between Japan and Korea in the subsequent evaluation of Yanagi’s views on Korean crafts.

Art criticism is a synthetic product of historical, political and cultural factors, and Yanagi’s approach to Korean crafts reveals how strongly he was influenced by the times in which he lived. Although his views shifted slightly in time from *hiai no bi* to more universal values for appreciating crafts, Yanagi’s initial views of Korea were coloured by exoticism under Japanese colonisation, just as European evaluation of the art of Asia, the Near and Middle East and Africa is dazzled by exoticism. Through studying Yanagi’s work one can see both the danger of perceiving the art of another country as distorted by one’s own cultural perspective and the difficulty of building a balanced perception.

Evaluation of Yanagi’s genuine help to Koreans and Korean crafts should remain high and positive as ever, but at the same time, Yanagi’s aesthetic views on Korean crafts and his theory need further re-evaluation: on the Korean side, in the context of factual studies of Korean social and economic history, and on the Japanese side, in the context of Japanese modernisation as Japan encountered the West. In the West, major art books on Korean art, such as that by Gompertz (1964, 1968), should be used with caution because of the undue influence of Yanagi and the *Mingei-ha*.

## Acknowledgments

I would like to express my special thanks to Sue Preston of the University of Sheffield for correcting my English writing and for various other suggestions; to KIM Hyejōng of Tokyo National University of Fine Arts and Music for translation of articles from Korean to Japanese; and to Visiting Professor KIM Yong-suk from Kyōngsang University for romanisation of Korean words.

Credits for the illustrations are due to the Japan Folk-Crafts Museum (Figure 1) and the National Museum of Korea (Figures 2-3).

## References

- Anonymous (1961) "Yanagi Sōetsu ūl saenggak handa" [Thinking of Yanagi Sōetsu]. *Tongil Chosŏn Shinmun* May 13, 1961.
- Cho, Sonmi (1989) "Yanagi Sōetsu ūi Han'guk misulgwan" [Yanagi Sōetsu's views on Korean art]. *Misul sahak* 1: 151-87.
- Ch'oe, Harim (1974) "Haesŏl Yanagi Sōetsu ūi Hanguk misulgwan e taehayŏ" [Introduction: Yanagi Sōetsu's views on Korean art], in *Han'guk kwa kŭ yesul* [Korea and its art] by Yanagi Sōetsu, translated into Korean by LEE Daewŏn. Seoul: Chishik sanopsa.
- Gompertz, G. St. G. M. (1964) *Korean celadon and other wares of the Koryŏ period*. London: Faber and Faber.
- Gompertz, G. St. G. M. (1968) *Korean pottery and porcelain of the Yi period*. London: Faber and Faber.
- Idekawa, Naoki (1988) *Mingei: riron no hōkai to yōshiki no tanjō* [Mingei: collapse of the theory and establishment of the style]. Tokyo: Shinchōsha.
- Kim, Hui-myŏng (1961) "Yanagi Sōetsu sensei to Chōsen no geijutsu" [Dr YANAGI Sōetsu and Korean art]. *Shinwa* 5: 16-7.
- Kim, Talsu (1968) *Chōsen bunka ni tsuite* [Concerning Korean culture]. Iwanami kōza tetsugaku, vol. 13. Tokyo: Iwanami Shoten.
- Kim, Ulhan (1968) "Kōkamon to Yanagi Sōetsu sensei" [Kwanghwamun and Dr. YANAGI Sōetsu]. *Shinwa* 6: 23-7.
- Kim, Yanggi (1975) *Kankoku no ishobotoke* [Korean stone Buddhas]. Kyoto: Tankōsha.
- Kim, Yunsu (1977) "Pundan shidae ūi minjok munhwa" [Folk art of the age of division of the Korean Peninsula]. *Ch'anggan kwa pip'yong* 7: 2-52.
- Kim, Yanggi (1977a) "Han'guk ūi minūn piae ūi mi'inga" [Is Korean art 'beauty of Sadness'?). *Shindonga* 9: 329-35.
- Kim, Yanggi (1977b) "Kankoku bi no shinri" [The truth of Korean beauty], *Asahi Shimbun* (Evening) May 13, 1977.
- Kim, Yanggi (1977c) "Yanagi Sōetsu no 'Kankoku no bi'" [Yanagi Sōetsu's Beauty of Korea]. *Asahi Shimbun* (Evening), January 26, 1977.
- Ko, Yusop (1931) "Kumdong Mirŏk pan'gasang ūi koch'al" [A study of a seated figure of Maitreya]. In *Han'guk misul munhwasa nonch'ong*, by KO Yusop. Seoul: Tong Mun Gwan, 1966.
- Kye, Hongjik (1961) "Yanagi Sōetsu ō to Kankoku" [Mr. Yanagi Sōetsu and Korea]. *Asahi Shinbun* August 28-30, 1961.
- Leach, Bernard (1972) *The unknown craftsman*. Tokyo and New York: Kōdansha International.
- Lee, Chinhui (1978) "Richō no bi to Yanagi Sōetsu" [Beauty of Chosŏn pottery and Yanagi Sōetsu]. *Kikan Sanzenri* 2: 46-59.
- Lee, Mannyŏl (1974) "Sŏp'yŏng: Han'guk kwa kŭ yesul" [Book review: Korea and her art]. *Sukdae Shinbo* September 23, 1974.
- Moeran, Brian (1984) *Lost innocence: folk craft potters of Onta, Japan*. Berkeley: University of California Press.

- Mun, Myōndae (1977) "1930 nyōndae ūi misulhak chinhūng undong" [Art movement in the 1930s]. *Minsoku munhwa yŏn'gu* 12: 147-68.
- Pak, Chonghong (1922) "Chosŏn misul ūi sajŏk koch'al" [A historical study of Korean art]. *Kaebiyŏk* 27: 13-26.
- Powell, Alexander (1922) "Japan's policy in Korea." *US Atlantic Monthly March*, 1922: 395-412.
- Takasaki, Sōji (1979) "Yanagi Sōetsu to Chōsen" [Yanagi Sōetsu and Korea]. *Chōsen shisō* 1: 65-107.
- Takasaki, Sōji (1991) *Chōsen no tsuchi to natta Nihonjin* [A Japanese laid to rest in Korea]. Tokyo: Sōfūkan.
- Tsurumi, Shunsuke (1976) *Yanagi Sōetsu*. Heibonsha sensho 48. Tokyo: Heibonsha.
- Ubukata, Naokichi (1961) "Nihonjin no Chōsenkan: Yanagi Sōetsu o tōshite" [Japanese perception of Korea: through Yanagi Sōetsu]. *Shisō* 448: 1262-73.
- Yanagi, Sōetsu (1954) *Yanagi Sōetsu Senshū* [Selected works of Yanagi Sōetsu] Tokyo: Shunjūsha.
- Yanagi, Sōetsu (1954) "Kōgei bunka" [Craft culture]. In *Selected works of Yanagi Sōetsu* 3: 333-345. Tokyo: Shunjūsha
- Yanagi, Sōetsu (1981) *Yanagi Sōetsu Zenshū* [Collected works of Yanagi Sōetsu]. Vols 1-22, Tokyo: Chikuma Shobō. [Abbreviated in text as *Zenshū*]
- Yanagi's publications mentioned in the text, their original dates of publication and location in his *Zenshū* [Collected Works](1981):**
- "Abiko kara: tsūshin 1" [A report from Abiko 1, 1914]. *Zenshū* 1: 332-9.
- "Chōsen jawan" [Korean tea bowls, 1954]. *Zenshū* 6: 481-91.
- "Chōsenjin o omou" [Sympathy toward the Koreans, 1919]. *Zenshū* 6: 23-32.
- "Chōsen minzoku bijutsukan no setsuritsu ni tsuite" [About the establishment of the Korean Folkcrafts Museum, 1921]. *Zenshū* 6: 79-83.
- "Chōsen ni okeru kyōiku ni tsuite" [About education in Korea, 1923]. *Zenshū* 6: 233-9.
- "Chōsen no bijutsu" [The art of Korea, 1922]. *Zenshū* 6: 89-109.
- "Chōsen no tomo ni okuru sho" [Letter to my Korean friends, 1920]. *Zenshū* 6: 33-51.
- Chōsen to sono geijutsu* (Korea and her art, 1922). *Zenshū* 6: 13-167.
- "Hiyō: Arekisandā Paueru 'Nihon no Chōsen tōchi seisaku o hyōsu'" [Review of Alexander Powell's "Japan's Policy in Korea", 1922]. *Zenshū* 6: 184-6.
- "Kenshō shōsetsu boshū ni tsuite" [Concerning prize award contest of novels, 1921]. *Zenshū* 6: 179-83.
- Kōgei no michi* (The way of crafts, 1927). *Zenshū* 8: 61-282.
- "Kōrai to Richō" [Koryō and Chosŏn, 1942]. *Zenshū* 6: 348-371.
- "Nissen mondai no konnan ni tsuite" [About difficulties of the problems between Japan and Korea, 1923]. *Zenshū* 6: 227-32.
- "Richō tōjiki no tokushitsu" [Characteristics of Chosŏn ceramics, 1922]. *Zenshū* 6: 155-67
- "Richō tōji no bi to sono seishitsu" [Beauty and characteristics of Chosŏn ceramics, 1959]. *Zenshū* 6: 519-29.

"Richō tōji no nanafushigi" [Seven wonders of Chosŏn ceramics, 1959]. *Zenshū* 6: 530-43.

"Richō yōmanroku" [Essay on Chosŏn ceramics, 1922]. *Zenshū* 6: 187-217

"Sekika ni tsuite" [Concerning red radicalisation, 1920]. *Zenshū* 1: 381-7.

"Tōjiki no bi" [Beauty of ceramics, 1921]. *Zenshū* 12: 3-26.

"Ushinaware to suru ichi Chōsen kenchiku no tameni" [For a Chosŏn building on the verge of demolition, 1922]. *Zenshū* 6: 145-54.

## Technological parallels between Chinese Yue wares and Korean celadons

Nigel Wood

The grey-green Yue wares of south China (made from the 4th to the 11th centuries AD) and the bluish-green Koryŏ celadons of south Korea (made from the 11th to the 14th centuries AD) are two of the most distinguished productions in the history of world ceramics. The Yue kilns provided some of the first Chinese stonewares to meet with Imperial approval, as well as establishing a domestic and export industry of unprecedented scale between the 9th and the 11th centuries AD. The development of Korean celadons owed a great deal to the Chinese Yue tradition in terms of forms and manufacturing methods; but Korean potters took the Yue style to new heights through their use of subtle bluish-green celadon glazes plus complex and ambitious designs.

These fine Korean celadon glazes, once described as showing as many colours and qualities as the sea itself, were often used over white and black inlaid patterns. The inlaid style of Korean celadon ware appears to have started production in the mid-12th century and flourished in the later Koryŏ Dynasty (918-1392). A more rustic version of the tradition continued well into the Chosŏn Dynasty (1392-1910), usually employing stamped rather than carved designs.

That significant historical and stylistic parallels exist between Yue wares and Korean celadons (particularly between the 9th to 11th centuries) has long been appreciated by students of Eastern art; but it is only recently that the technological relationships between Chinese Yue wares and Korean celadons have been properly investigated and understood. These new insights have come from four programmes of analytical research: carried out in Korea from 1981 (Lim 1986), at Oxford University from 1982 (Hatcher *et al.* 1985; Tite & Barnes 1992), at the Smithsonian Institution, Washington D.C. from 1986 (Vandiver 1989; Vandiver *et al.* 1989), and at Chung-Ang University in Seoul from 1991 (Choo 1994).

Taken as a whole, this detailed work has shown how closely related Chinese Yue wares and Korean celadons are in their essential body compositions and also in their general production technologies. It has also helped to explain the vital differences

that exist between the glazes used in China and Korea for celadon wares. The present paper is intended as a resumé of this scientific work, beginning with a sketch of the historical and technical backgrounds to the two materials.

### Yue wares

Of the two stoneware traditions (Yue and Koryŏ celadon), Yue ware is by far the older, with its technical roots reaching deep into China's Bronze Age, the Shang Dynasty (16-11th c. BC), making Yue wares direct successors to some of the world's oldest glazed stonewares. In developing and adding to the Yue tradition, Korean celadon potters were building upon an East Asian stoneware technology that—by the 10th century AD—was already at least 2000 years old.

### Yue ware origins

The origin of glazed stoneware in China is a well-researched subject, particularly through the work of Li Jiazhi of the Shanghai Institute of Ceramics. Professor Li has studied the evolution of Chinese stonewares for some 40 years, paying particular attention to the wares of Zhejiang province in southern China, one of the birthplaces of Chinese high-fired ceramics. In recent papers, Li and his colleagues described some examples of southern Neolithic wares, south Chinese unglazed, stamped stonewares, and south Chinese glazed stonewares—which were made from essentially similar raw materials (Li 1986; Li *et al.* 1989; Li *et al.* 1992). Many of these late Neolithic and early Bronze Age ceramics were fired and cooled in reducing atmospheres, which gave a cool greyish cast to the wares. Reduction firing may well have been adopted by Chinese potters to improve the fired strength of their wares through the fluxing effects of ferrous oxide (FeO) above about 900°C—an approach still used in China for the production of grey bricks and roof-tiles.

Following these developments, unglazed grey stoneware became south China's main Bronze Age stoneware type, with some examples showing thin glossy patches where fluxes present in fly-ash (produced by wood-firing) reacted with the clay surface at high temperatures to provide natural glaze effects. From these accidental patchy glazes, it would have been a short step for south Chinese potters to begin applying wood ashes direct to their wares before firing in order to achieve controlled and deliberate ash-glaze coatings (Zhang 1986).

This deliberate application of wood ash glazes occurred quite early in the Shang Dynasty; and a number of early Shang stonewares, beaten with cord-wound paddles and glazed thinly and evenly outside, can be seen in Chinese collections such as that of the Shanghai Museum. Sherds of similar wares have been found at Shang sites at Jiaoshan and Wucheng (Jiangxi province), Yixing (Jiangsu province) and at Jiangshan (Zhejiang province) (Li *et al.* 1992). Even so, despite the potential usefulness of this technology, fully-glazed Shang stonewares seem to have accounted for only a minute fraction of Shang ceramic production (Figure 1).

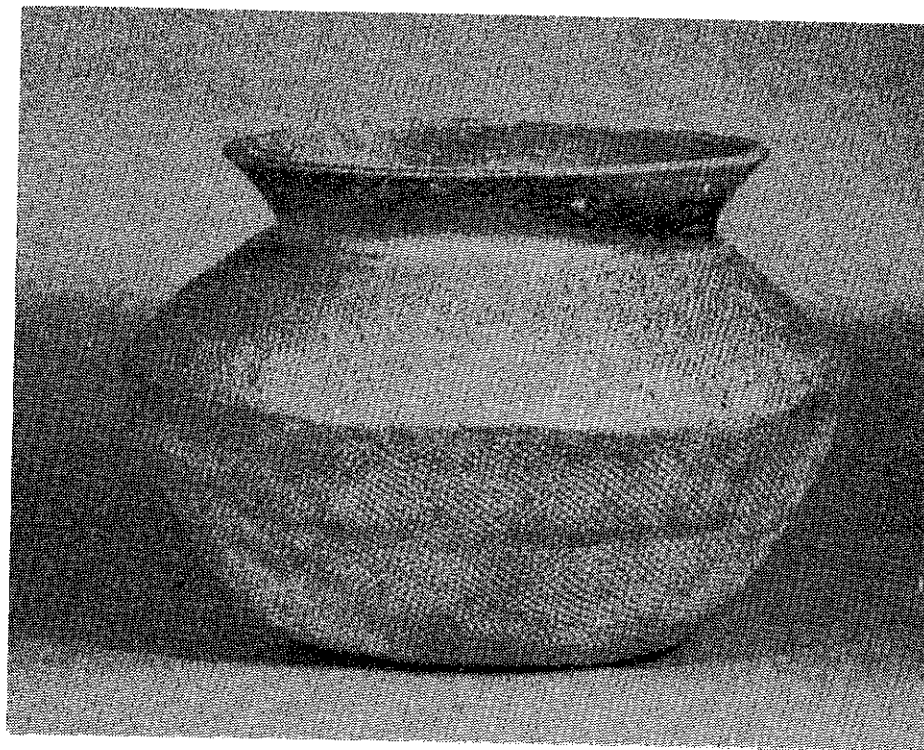


Figure 1 Stoneware jar, coiled and beaten with a textured paddle and bearing a thin olive-green ash-rich stoneware glaze. South China, Shang Dynasty (ca. 1500-1050 BC); diameter 8"

Most Shang glazed stonewares have been found at southern sites, with only some 0.2% of the total having been excavated in north China (Luo *et al.* 1992; Deng and Li 1992). This significant disparity has led to intense debate on the provenance of these northern finds. On good compositional grounds, Luo believes that these early glazed stonewares were actually made in south China and then transported to the developing fortified cities of the Yellow River area. This opinion is based on the existence of a very sharp geological divide that runs just north of the Huai river and which crosses China from west to east (Tregear 1980).

This important natural division is known to geographers as the Nanshan Qinling divide, named after the Nanshan and Qinling hill systems that make up the more westerly reaches of the feature. North of this divide, the main high-firing ceramic raw materials are refractory and rather ancient sedimentary stoneware and porcelain clays which are often associated with north China's coal fields. South of the divide, weathered igneous rocks and the silty downwashes from similar materials provided the main materials for southern stoneware and, much later, for southern porcelain.



North Chinese high-firing materials tend to be rich in true clays (mainly kaolinite) and consequently high in alumina, low in silica and low in potassia. These local northern stonewares were little-used for glazed stoneware production before the late 5th century AD. By contrast, the southern stoneware and porcelain materials consist largely of quartz, micas and some feldspars, with relatively low true-clay contents. As a result of these mineralogical differences, southern materials show high silica, low alumina and high potassia percentages when analysed—exactly opposite the characteristics of their northern counterparts (Guo 1987; Guo *et al.* 1980; Guo & Li 1986; Sundius & Steger 1963).

Although glazed stonewares were a significant south Chinese innovation, they remained rare during the later Bronze Age, when unglazed grey, stamped stonewares continued as the main high-fired products. The few glazed stonewares that have survived from this time include small thrown bowls, jars, dishes and ewers with green and brown ash glazes, made near Tunxi in southern Anhui province in the late Western Zhou period (11th c. BC-770 BC). In the Spring & Autumn period (770-476 BC), fairly large coiled-and-beaten glazed jars with well-fitting covers, and stamped and combed designs, were made at kilns in Zhejiang and Jiangsu provinces (Yang *et al.* 1985). In the Warring States period (475-221 BC), some thinly-glazed thrown vessels, imitating round bronze forms, were made in Zhejiang province—apparently for burial use. These various wares supplied a tenuous continuity for high-fired glazes in south China through a time when unglazed grey wares remained the dominant stoneware type.

Somewhat later, in the Western and Eastern Han Dynasties (206 BC-AD 220), large thrown stoneware jars and covered boxes of a more utilitarian style were made in Jiangsu and Zhejiang provinces. These impressive bronze-derived forms (Figure 2) have mottled ash glazes applied to their upper bodies, shoulders and lids—apparently achieved by sifting wood-ash over the objects before firing (Ayers *et al.* 1988). The kiln sites responsible for these so-called 'proto-porcelain' wares seem to have operated in areas that were later famous for their Yue ware productions (Sato 1981).

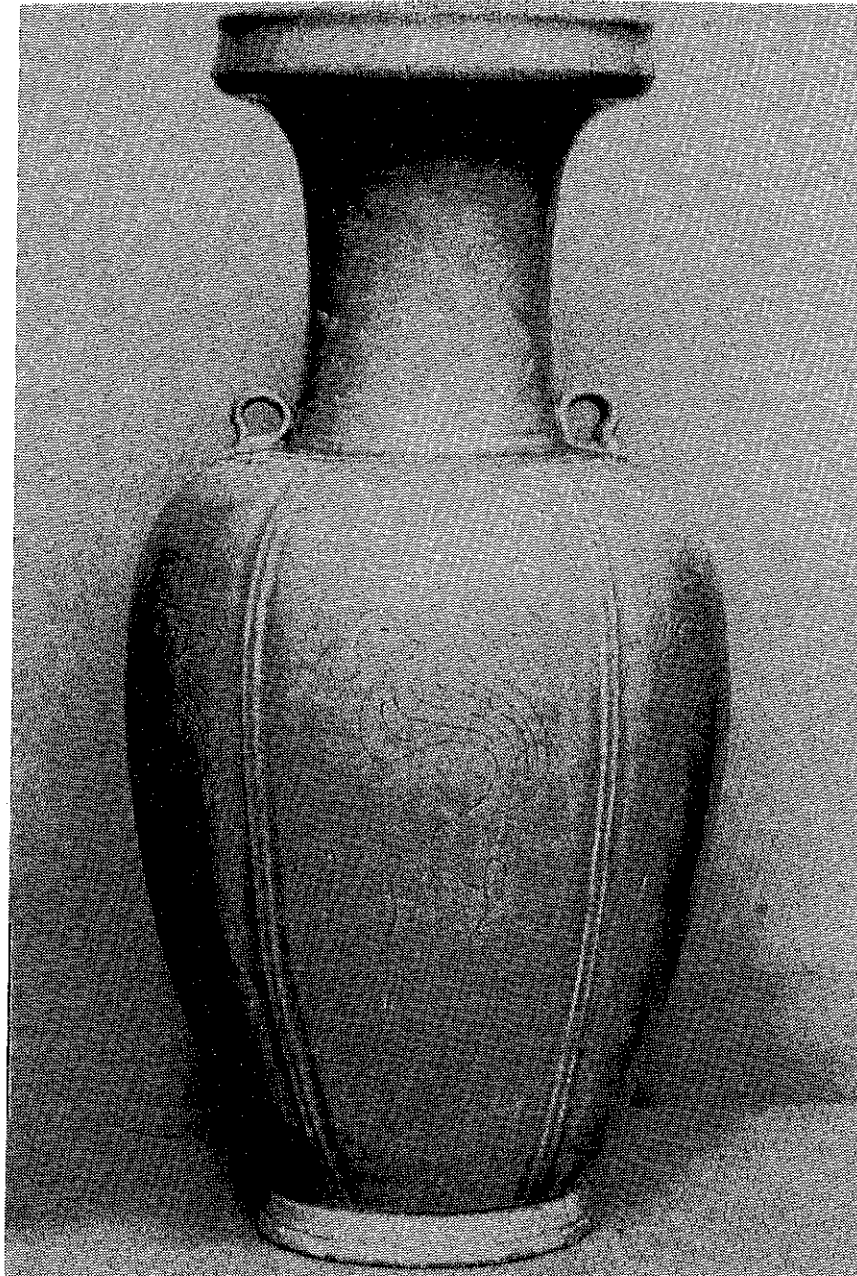
By the 3rd and 4th centuries AD, wheel-thrown stonewares with fine grey-green all-over clay and ash glazes were being made on a considerable scale in Jiangsu and Zhejiang provinces in south China. From these fully glazed stonewares developed south China's famous Yue wares. These took their name from a district between Hangzhou, Shaoxing and Ningbo that was known as the state of Yue as early as the Spring and Autumn periods (770-476 BC). This district (in northern Zhejiang) later became the prime producing area for the grey-green glazed stonewares known as Yue wares, particularly during the later Tang Dynasty (AD 618-907). The term 'Yue ware' is often used more generally today to describe the huge range of grey-green stonewares that were made in many provinces of southern China from about the 4th to the 11th centuries AD (Zhu 1989).



**Figure 2** Glazed stoneware covered jar with three small feet and two large handles, made in the form of a bronze pou. [The cover and bowl of this example may not have originally belonged together.] Probably glazed by sifted wood-ash, or by a sifted ash-clay mixture.  
3rd-4th c. BC, northern Zhejiang or southern Jiangsu; height 10.5"

### Yue ware technology

Three technical principles above all were responsible for the success of the south Chinese Yue ware industries: 1) the presence in south China of abundant deposits of siliceous and flux-rich stoneware materials that were easily matured into tough stoneware bodies, as described above; 2) an efficient kiln design known as the *long* kiln; and 3) a glaze-making technique that mixed wood-ashes with body-clays to create grey-green stoneware glazes of fine technical quality (Figure 3).



**Figure 3** Greenish-grey glazed stoneware vase, with the body divided into six shallow lobes and engraved with cloud designs.

Late Yue ware or early Longquan ware, Zhejiang province; early 10th c. AD, height 12.5"

### *Yue ware kiln design*

The *long* ('dragon') kiln principle, developed in south China in the Warring States period (485-321 BC), was essentially a short tunnel built up a low slope. Its firebox was at the bottom of the tunnel, while the top of the tunnel narrowed somewhat and served as the kiln's exit flue (Lao & Ye 1986). The wares were placed on short thrown columns set on the kiln's floor, which was either stepped or covered in a layer of quartz grit or sand. The earliest *long* kilns were tunnelled or 'cut and covered' into hillsides; they were only a few metres long and about one metre wide inside. They were packed and unpacked by crawling through the firebox end and into the excavated space. *Long* kilns were fired mainly with brushwood and reeds, although some later south Chinese *long* kilns used small amounts of coal as a supplementary fuel (Bureau of Foreign Trade 1933).

*Long* kilns are efficient because the flame-speed is slowed by forcing the combustion gases to follow a near-horizontal flame-path. This slower flame-speed meant more effective transfer of combustion energy to the wares, and it allowed high kiln temperatures to be achieved and sustained more easily than in the earlier updraught designs.

By the 3rd century BC, the Chinese *long* kiln had been improved through the addition of side-stoking ports along the upper part of the tunnel's length. These allowed fuel to be pushed into the kiln chamber itself where it burned fiercely amongst the wares, compensating for the fall-off in heat inevitable in those parts of the kiln chamber furthest from the main firebox. This 'stretched' version of the *long* kiln was later built from brick, with doorways set into the kilns' sides to make setting and drawing of the wares less awkward. These more advanced *long* kilns often ended with exit flues built as open brickwork chequers, protected by a low brick wall.

Soon a *long* kiln-firing regime was established in southern China whereby the lower part of the kiln was brought to full heat by stoking its main firebox, which was then bricked up. Side stoking then took over at the lowest port, and the full heat was gradually moved up the entire length of the kiln by the side-stoking of successive ports. By allowing air into the kiln some distance before the current stoking-port, the combustion air was pre-heated by passing over the cooling wares. This use of very hot air to burn the side-stoked fuel vastly improved combustion efficiency, allowing high kiln temperatures to be achieved rapidly with a minimal use of fuel. This principle of side-stoking made any length of *long* kiln feasible, and the design reached its zenith in the Longquan district of Zhejiang in the Southern Song Dynasty (AD 1127-1279), when *long* kilns approaching 100 metres in length were constructed (Zhou *et al.* 1973). The technique of side-stoking caused fairly rapid cooling of the wares; a firing time of 24 hours followed by a cooling period of 24 hours was not uncommon with smaller versions of the design. Such kilns are still abundant in the countryside of southern China.

At the premier Yue ware kiln-complex of Shanglinhu (Shanglin Lake) in northern Zhejiang province, which operated from the 4th to 11th centuries AD, the remains of some 106 long kilns can still be traced on the lightly-wooded slopes around the lake's perimeter. The longest of the Shanglinhu kilns was about 40 metres and was capable of firing thousands of pieces in a single setting. From the 9th century onwards, many of these wares were sent for export from the nearby port of Ningbo, whence they took a 5000-mile sea route to East Africa and the Near East, via Sri Lanka, where quantities of Yue wares have been found. Other export destinations for Chinese Yue wares in the 9th-11th centuries were Japan, Korea and the Philippines.

### Yue ware glazes

As stated above, the third essential principle for the success of Yue ware technology was an approach to glaze-making that combined wood ashes with the same materials as were used for the bodies of vessels (Li *et al.* 1989). The two materials were mixed with water to make a creamy suspension; they were then applied to the wares by dipping, pouring or brushing.

Yue ware ash glazes exploited a chemical phenomenon now known as a 'eutectic mixture'—that is, a particularly fusible combination of two or more materials (Gr. *eutektos*: 'ideal-melting'). The Yue-type glaze compositions that resulted from this balanced mixture are known as 'lime glazes' because calcium oxide (loosely known as lime) acts as the primary glaze-flux.<sup>1</sup>

The chemical foundation of the Yue ware glaze is a mixture of silica, alumina and calcia in roughly eutectic balance. Individually, these three oxides are outstandingly infusible: silica (silicon dioxide, SiO<sub>2</sub>) melts at 1713°C, alumina (aluminium oxide, Al<sub>2</sub>O<sub>3</sub>) at 2050°C, and calcia (calcium oxide, CaO) at 2572°C. However, in the correct proportions, a mixture of all three oxides will begin to melt into a glass or glaze at about 1170°C and will provide a good 'lime glaze' at another 20°C or so above this temperature (1190°C). According to Singer & German (1978), the proportions of this valuable eutectic mixture are:

**62% silica + 14.75% alumina + 23.25% calcia**

The ratios of silica to alumina in south Chinese stoneware clays tend to be similar to those in the eutectic mixture given above (about 4:1 by weight percent), so that all that was needed to make glazes from southern stoneware clays was a concentrated source of calcium oxide. This was easily supplied by wood ash (a rich source of calcium compounds) or, in later south Chinese glazes, by limestone, which is practically pure calcium carbonate (CaCO<sub>3</sub>). Both wood ash and limestone break down to calcia (CaO) in the kiln at about 800°C, with a consequent loss of carbon dioxide (CO<sub>2</sub>).

Judging from the minor elements present in Yue ware glazes—mainly manganous oxide (MnO) and phosphorus pentoxide (P<sub>2</sub>O<sub>5</sub>), wood ashes seem to have been their main source of calcia. Unlike wood ashes, oxides of manganese and phosphorus are not found in Yue clays or in limestones to any extent, so they can be discounted as significant suppliers of MnO and P<sub>2</sub>O<sub>5</sub> to the Yue glazes.

This use of wood ash/clay mixtures seems logical in view of the history of glazes stoneware in south China, and a mixture of the Yue ware body clay with about 30-40% wood ash would account for most analyses of Yue glazes so far published (Table 1).

**Table 1** Yue ware body and glaze analyses.

(compiled from Guo *et al.* 1980; British Museum 1994, unpublished data)

compos.	SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	TiO <sub>2</sub>	Fe <sub>2</sub> O <sub>3</sub>	CaO	MgO	K <sub>2</sub> O	Na <sub>2</sub> O	P <sub>2</sub> O	MnO
body	75.4	17.7	0.8	2.4	0.3	0.6	3.0	0.5	---	.03
body	77.0	15.8	1.0	3.2	0.3	0.6	2.6	1.0	0.1	0.03
body	76.6	16.1	0.9	1.6	0.2	0.5	3.0	0.9	---	0.01
glaze	60.9	12.1	0.7	3.0	16.5	3.0	1.4	0.8	1.6	0.4
glaze	57.9	13.7	0.6	1.7	19.7	2.4	2.0	0.7	0.9	0.9
glaze	57.4	12.5	0.8	1.8	20.3	3.0	1.3	0.9	1.5	0.4
body*	60.6	12.7	0.8	2.7	19.0	0.8	2.1	0.8	1.8	0.4

\*experimental mixture of wood ash with siliceous clay in 65/35 proportions, made by the author and analysed at the British Museum, 1994.

The 1170°C lime eutectic itself provides a nearly colourless glaze, but the typical grey-green colours seen in Yue glazes derive from the iron and titanium oxides (FeO, TiO<sub>2</sub>) that they contain; these were supplied mainly by the clay components of the original glaze recipes. Yue glazes were fired in reducing (slightly smoky) kiln atmospheres that were probably survivals of the reducing atmospheres already used for centuries in southern China for firing grey earthenwares and greyish stamped stonewares. Under reducing conditions, iron oxide would provide a bluish-green colour in the quantities found in Yue glazes, but this is modified to a yellower grey-green in most Yue glazes by their relatively high titania contents (0.7-0.9% TiO<sub>2</sub>).

### Chinese celadon glazes

Bluish-green celadon glazes are usually regarded as a major Korean innovation, but there do exist a few rare examples of Chinese stonewares with bluish-green, iron-coloured glazes, made in both the north and south of China in the 9th and early 10th centuries. These Chinese wares seem to anticipate the Koryŏ principle of applying bluish glazes to grey stoneware bodies.

One example is a small bottle, described as being Tang Yue ware, that is on display in the Palace Museum, Beijing. This piece has a rather experimental bottle

<sup>1</sup> A flux is a material that melts the glass-forming base of a glaze mixture, usually silicon dioxide.



form with an almost spherical body and tall cylindrical neck—a style that was later used successfully for some Koryŏ inlaid wares. This bottle shows a fine greyish-blue glaze that could easily be mistaken for a Korean celadon. It is hard to see how such a glaze could have been produced with traditional Yue-ware glaze materials, so it may have used some low-titania rocky ingredient in its original glaze composition.

Rather glassy bluish celadons, with colours reminiscent of some Koryŏ wares, have also been found at the Yaozhou kiln-complex in Shaanxi province (Liu 1992), and these stonewares are dated to the Five Dynasties period (907-960). These very rare 10th-century bluish Yaozhou glazes have yet to be analysed and their colours explained. There is also a Chinese tradition for an Imperial stoneware, made in the reign of Chai Shizong (r. 954-959), and known as Chai ware. No examples have been found, but the Chai kilns are thought to have operated in Zhengzhou, Henan province. Chai ware had a glaze that early Ming writers compared to the "colour of the sky after rain," a description that was later applied to the bluish-green Imperial Ru wares of the late 11th to early 12th centuries.

Ru wares have been analysed and shown to have low-titania lime-glazes which were coloured with small amounts of iron oxide and applied to greyish stoneware clays. These glazing principles were continued by the Imperial Guan wares of Zhejiang province, made in the late 12th and 13th centuries (Guo & Li 1986; Guo 1987). Bluish celadon wares therefore enjoyed unusual prestige, and this admiration was later extended among Chinese connoisseurs to the Koryŏ wares themselves.

Finally, and perhaps more relevant to the Korean celadons, are some fine bluish-glazed late Yue-type wares recently excavated at the ancient Yue kiln site of Ningbo in northern Zhejiang. These have glazes very similar in colour to Koryŏ celadons, and their style suggests an 11-12th century date (R. Krahl, pers. comm. 1992). Ningbo was the main port of dispatch for Yue wares destined for Korea.

## Korean celadons

### Geology and history

The main Korean celadon-producing sites were in the coastal areas to the west of the Korean peninsula, and reference to a map of East Asia shows most Koryŏ celadon kilns to be on the same parallels as the great ceramics-producing centres of north China, found in Henan, Shaanxi and Shandong provinces (Figure 4). These northern provinces were the homes of such famous celadon wares as Yaozhou, Linru and Ru-yao. Chinese potters in these areas exploited the clay-rich stoneware raw materials, described towards the start of this paper, that were often associated with the extensive coal fields of northern China.

Given that most Korean celadon kilns are found on the same geographical parallels as the celadon sites of north China, it is something of a surprise to find that Korean celadon clays are quite different from those used for northern Chinese ceramics. Korean celadon clays are of the low-clay, quartz-rich and high-potassia

types and are virtually identical in their compositions to the Yue ware bodies made some hundreds of miles to the southwest of Korea in northern Zhejiang (Table 2).

**Table 2** Korean celadon body analyses.

(compiled from the Oxford analyses; Lim 1986; Choo 1994)

compos.	SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	TiO <sub>2</sub>	Fe <sub>2</sub> O <sub>3</sub>	CaO	MgO	K <sub>2</sub> O	Na <sub>2</sub> O	P <sub>2</sub> O <sub>5</sub>	MnO
sample a	76.0	17.0	0.8	2.1	0.3	0.5	2.5	0.7	---	0.01
sample b	69.5	22.7	0.7	2.5	0.3	0.5	3.2	0.5	---	0.02
sample c	73.0	17.5	0.9	2.8	0.2	0.7	2.6	0.8	tr.	---
sample d	73.0	18.0	1.2	2.5	0.5	0.5	3.4	0.9	---	---

The explanation for this apparent paradox is that the landforms that underlie the provinces of southern Jiangsu and northern Zhejiang have a general southwesterly/northeasterly bias. These south Chinese igneous rocks disappear under the East China and Yellow Seas, to reappear as the landscape of south Korea, some 300-400 miles to the northeast of Zhejiang. In fact, if the Nanshan-Qinling divide were projected to include Korea, virtually the whole Korean peninsula would be found south of the divide. This vital relationship with the landforms of south China was summarized by the geographer Albert Kolb (1971: 251):

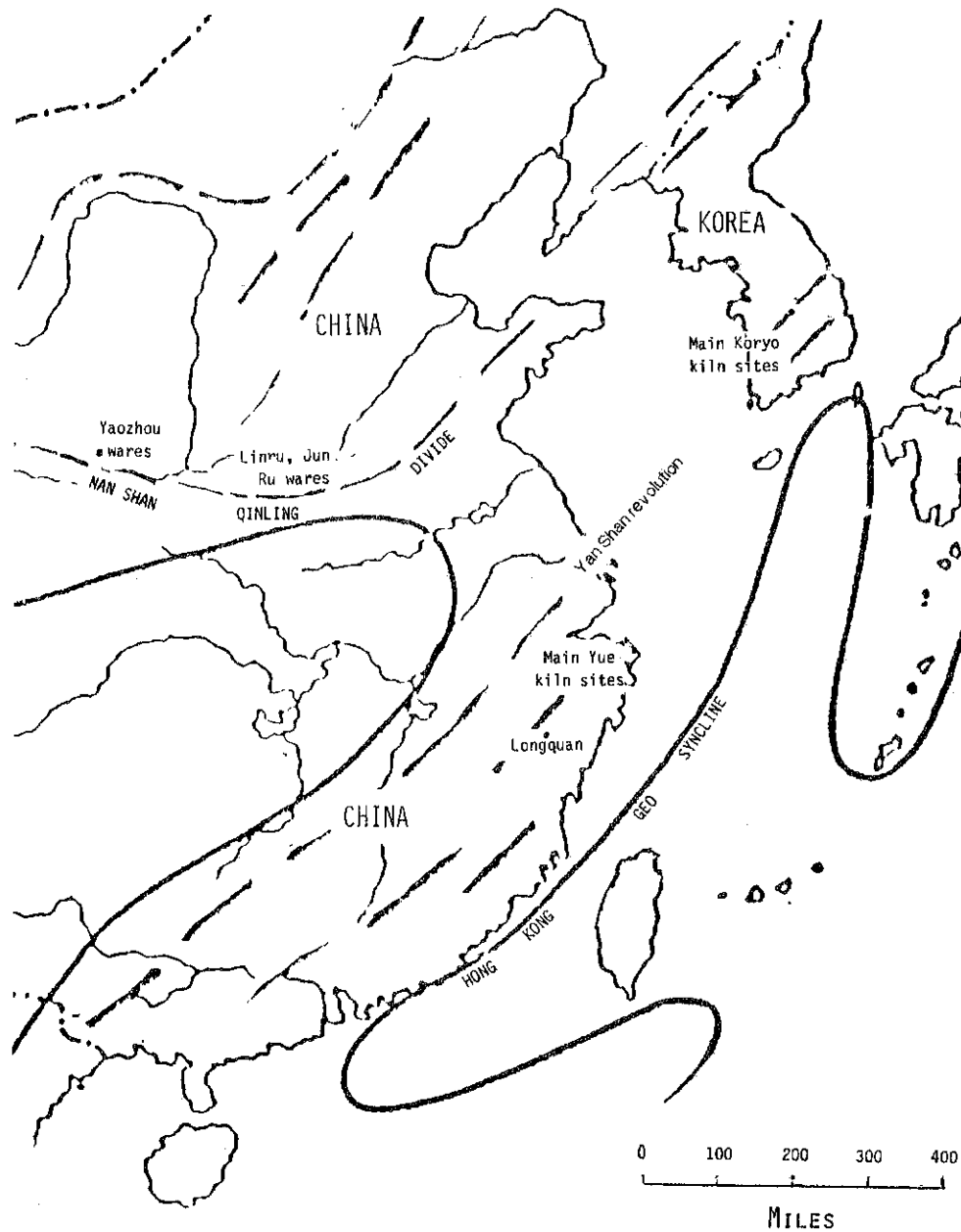
...the axis of south China's mountain system...can be traced from Canton to the south of Ningbo....This axis is not a mountain range in the ordinary sense but consists of long stretches of isolated massifs, ridges and crests, irregular areas of rugged heights rarely reaching 1899 m.

This zone, marking an ancient anticlinal ridge...aligned from north east to south west, can be grouped with the Chusan [Ryūkyū] archipelago, the island of Quelpart [Cheju-do] and southern Korea as a single tectonic region.

Korean celadons and south Chinese Yue wares, therefore, share a common underlying geology, with the development of stoneware in Korea tending to follow a very similar path to that seen in south China—although at least 2000 years separate the beginnings of the two high-fired traditions.

Recent research at Oxford (Tite & Barnes 1992) has shown that Korean hand-built earthenwares were made from iron-bearing siliceous clays. Experimentation during the 1st to 6th centuries AD led to gradual firing at higher and higher kiln temperatures until some of the earthenwares were transformed into true stonewares towards the end of this period (Figure 5). Nearly all the body analyses of Korean earthenwares, made for the Oxford study, have direct parallels in published analyses of later southern Chinese glazed stonewares, such as those from Sichuan, Hunan, Zhejiang and Jiangxi provinces (Guo *et al.* 1980). This suggests that most of the Korean earthenware clays, analysed at Oxford, were potential stoneware materials.

By the Unified Silla period (AD 668-935), thrown stonewares—fired in reducing atmospheres and often showing large perforations in their thrown feet and covers—



**Figure 4** Geological map showing direction of Yan Shan revolution (Upper Jurassic) geology as continuous between the areas of Yue and Koryŏ kiln production. (after Tregear 1980, fig. 2D)

were being made in Korea. From about 600 to 850, reduction-fired thrown ceramics, decorated with repeating bands of stamped ornament, had become part of the Korean potters' repertoire. By the late 10th century, true celadon wares with grey-green glazes were being made at kiln sites in southern Korea (Vandiver 1989). And by the early 11th century, the familiar blue-green celadon glazes, for which Korean ceramics later became so famous, were beginning to appear (Choo 1984).



**Figure 5** Grey-brown covered dish with a tall foot; near-stoneware with traces of natural wood-ash glaze (kiln-gloss). Korean, Unified Silla period (668-935 AD); height 7.25", width 5.5"

### Celadon glaze qualities

Once established, fine Korean celadon glazes changed little in essential composition for hundreds of years. Like Yue glazes, Korean celadons are lime glazes, but they seem even closer than Yue glazes to the 'ideal' silica-alumina-lime eutectic mixture. However, where Koryŏ celadons differ markedly from Yue glazes is in their general levels of colouring oxides—particularly the oxides of iron and titanium (Table 3).

**Table 3** *Koryŏ celadons and Chinese Yue ware glazes compared.*  
(compiled from Vandiver 1989; Lim 1986; Choo 1994)

compos.	SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	TiO <sub>2</sub>	Fe <sub>2</sub> O <sub>3</sub>	CaO	MgO	K <sub>2</sub> O	Na <sub>2</sub> O	P <sub>2</sub> O <sub>5</sub>	MnO
Yue	58.9	12.7	0.7	2.4	19.5	1.9	2.2	0.8	0.8	0.2
Yue	63.7	11.7	0.6	2.2	15.1	2.7	1.6	0.8	1.6	0.4
Yue	57.4	12.5	0.8	1.8	20.3	3.0	1.3	0.9	0.2	0.3
Koryŏ	57.6	12.4	0.1	2.1	17.7	4.2	2.8	0.7	0.2	0.3
Koryŏ	58.1	13.9	0.2	1.4	19.9	1.8	2.9	0.5	0.9	0.4
<b>Koryŏ*</b>	<b>60</b>	<b>12</b>	<b>0.1</b>	<b>1.0</b>	<b>19.0</b>	<b>2.5</b>	<b>2.5</b>	<b>0.75</b>	<b>0.8</b>	<b>0.5</b>

\* mean of Koryŏ celadon measures

Above all, the levels of titanium dioxide are responsible for the celebrated Koryŏ glaze-colour, as they are low enough to allow true iron-blue colours to develop in the Korean glazes. As mentioned above, the natural colour of FeO dissolved in a lime glaze (Fe<sup>++</sup>) is a watery blue, which soon modifies to green with small additions of titanium dioxide (>0.2%) (Ishii 1930). Another feature of Korean celadon glazes (compared with Chinese Yue glazes) is their relatively high potassium oxide (K<sub>2</sub>O) contents—averaging about 3% K<sub>2</sub>O compared to about 2% K<sub>2</sub>O in the Yue glazes. A further important difference is that Koryŏ glazes are generally lower in iron oxides.

### Raw materials for Koryŏ celadons

A possible explanation for all these features (low titania, higher potassia, lower iron) might be that the Koryŏ potters used porcelain stones rather than body-clays in their celadon glaze recipes. Porcelain stones are low titania, high potassia, low iron materials, but otherwise they are similar to Korean and South Chinese stoneware clays in their silica and alumina levels.

It may be significant that white-firing quartz-mica porcelain stones, of the well-weathered type, were often found in south China in association with stoneware raw materials. This was a convenient situation that led many important kiln-complexes such as Jingdezhen in Jiangxi province, to convert from stoneware to porcelain-making in the 10th to 11th century AD.

Given the strong geological parallels that exist between south China and Korea, it seems likely that porcelain stones of this same type occurred nearby many Korean kiln sites specializing in early celadon wares (Figure 6). Indeed, the production of white porcelain itself in Korea is almost as ancient as that of its bluish-green celadon wares, although the porcelain industry operated on a much smaller scale than in China. Some support for the idea that Koryŏ potters were able to use porcelain stones in their celadon glazes comes from two sources (see also Table 4). First, Choo has published a single analysis of an 11th-century Korean white porcelain that has a composition typical of a 'single rock' porcelain, such as Jingdezhen *yingqing* ware (Choo 1995). There is also an interesting analysis of a rock collected from a 12th-century Korean celadon kiln site, Sadang-ri. This rock consisted of compacted volcanic ash, known as tuff, as did many Chinese porcelain stones of the Jingdezhen type (Lee, 1989; Wood 1986; Nikulina & Taraeva 1959).

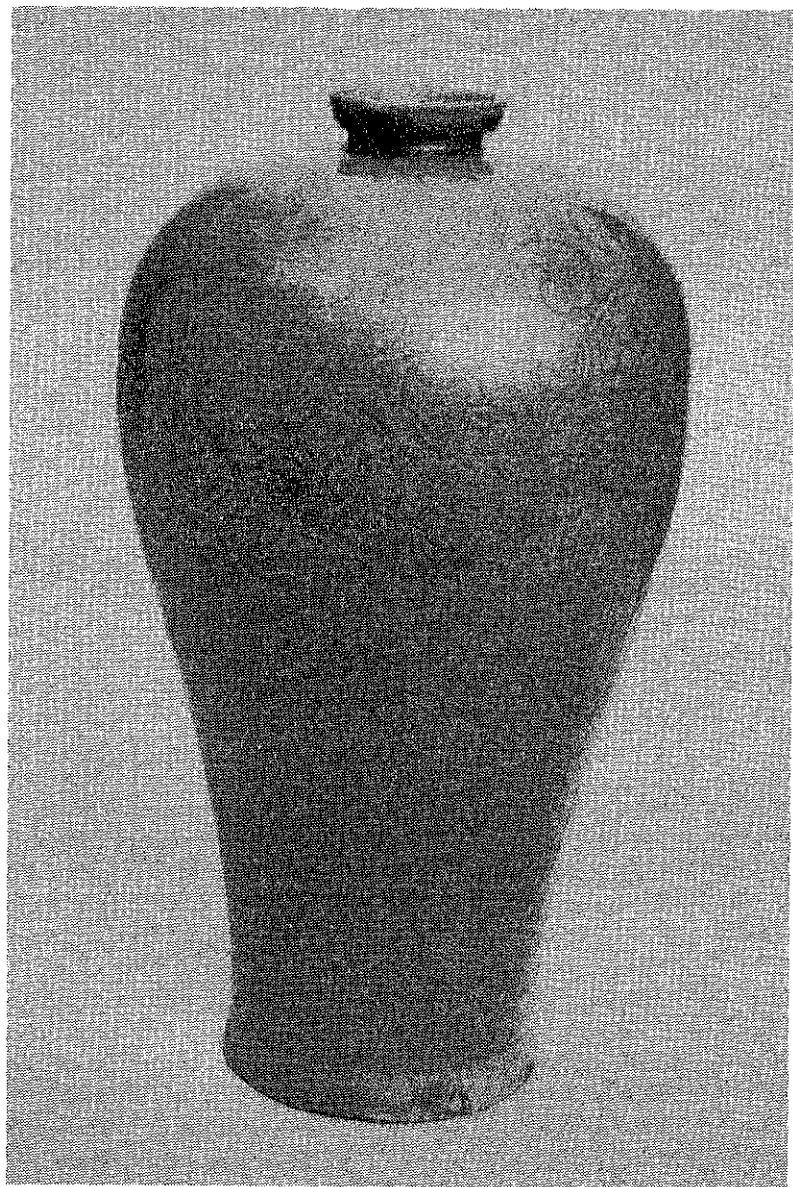
Further important finds from the Sadang-ri site were quantities of both wood ash and shell. Shell consists almost entirely of calcium carbonate, suggesting that the material may well have served as a useful supplementary source of calcia in some Koryŏ celadon glazes.

**Table 4** *Comparison of Jingdezhen yingqing ware, Korean porcelain and Sadang-ri tuff.* (compiled from Wood 1986; Choo 1995; and Lim 1986)

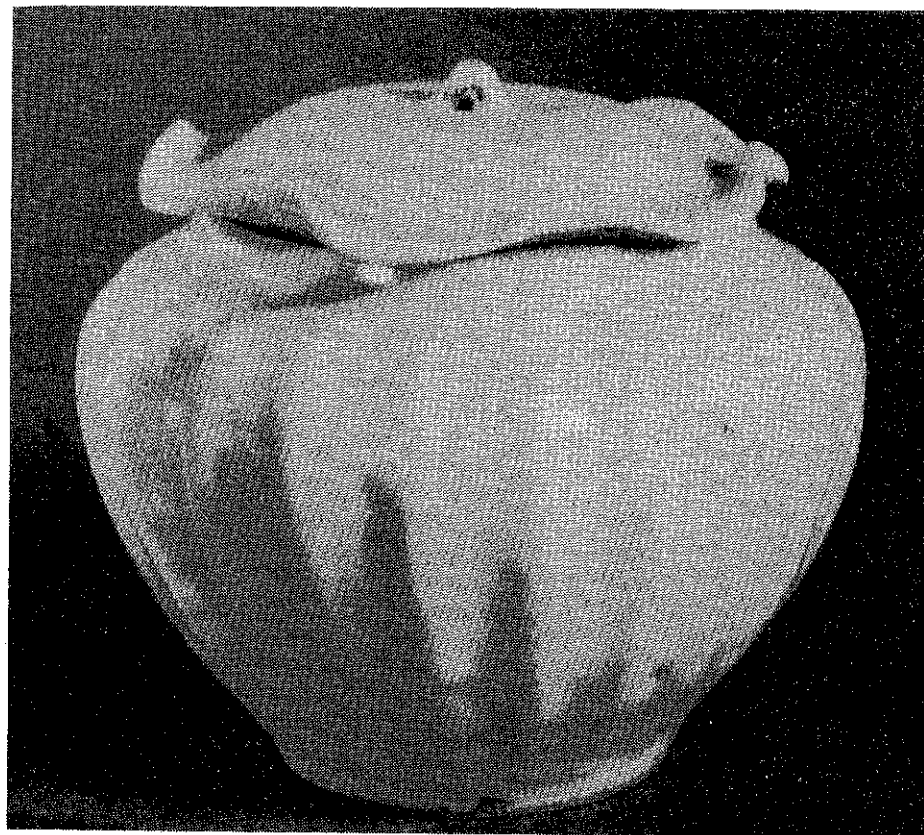
compos.	SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	TiO <sub>2</sub>	Fe <sub>2</sub> O <sub>3</sub>	CaO	MgO	K <sub>2</sub> O	Na <sub>2</sub> O
<i>yingqing</i>	77.8	16.2	0.07	0.6	0.8	0.2	3.1	1.0
Koryŏ	73.6	17.6	0.1	1.8	0.3	0.4	5.8	0.4
Sadang-ri	71.6	17.5	0.2	2.7	0.5	0.3	4.6	2.5

However, oxide analyses of Koryŏ celadon glazes (particularly when viewed from their phosphorus and manganese contents) tend to suggest that mixtures of porcelain stone with about 30-50% of wood ash were the most typical glaze recipes used by the Korean celadon potters. This mixture can provide a near-eutectic oxide balance of the lime-glaze type, giving stable and transparent compositions that accommodate well to variations in firing-temperature and kiln-atmosphere. With such a successful glaze-base, it is perhaps not surprising to discover that this same celadon glaze remained in use in Korea for many hundreds of years (Vandiver 1989).

In China, by contrast, Yue-type wares developed gradually into the Longquan celadon tradition between the 12th and 13th centuries; it exploited the more unctuous and jade-like qualities that were possible with lime-alkali glazes. This process involved the development of celadon kilns some two hundred miles to the south of Shanglinhu in order to exploit the light-firing porcelain stones so abundant in southern Zhejiang but rarer in the north of the province. The Longquan lime-alkali glazes appear to have been made from porcelain stone/limestone mixtures in about 8.5:1.5 to 8:2 proportions (Wood 1978) (Figure 7).



**Figure 6** Celadon maebyeong vase with lotus designs engraved into the stoneware body. Korean, probably 12th c.; height 13.4"



**Figure 7** Longquan covered jar with a fine bluish lime-alkali kinuta-style celadon glaze. Chinese, 12th c. AD; height (with cover) ca. 5"

#### **Korean kiln technology**

Barnes (1993) has proposed that small kilns of essentially *long* design were in use in Korea from at least the 3rd century AD for firing earthenwares and that this design was probably introduced to Korea from China in the late Eastern Han Dynasty (AD 25-220). *Long* kilns of generally small scale (5-17 metres long and about a metre wide inside), but with facilities for side-stoking, later became the standard kilns used by the Koryŏ celadon industry. These 'small' *long* kilns allowed faster firing and cooling rates than were possible with most Chinese Yue wares, which made the Korean glazes less likely to develop anorthite crystals in the early stages of cooling (Vandiver 1989; Vandiver *et al.* 1989). Koryŏ celadons are consequently more



transparent than Yue ware glazes, a characteristic that contributed to the notable success of the Korean inlaid stoneware tradition.

Li Jiazhi has proposed that the firing temperatures used for Shanglinhu Yue wares "averaged 1100°C" (Li *et al.* 1989), and Vandiver puts the firing temperatures for Koryŏ celadons to between 1100 and 1150°C. These are low temperatures for wares with true stoneware glazes and are in the 'high earthenware' rather than the 'low stoneware' range. Recent reconstructions of Yue ware and Koryŏ celadon glazes, made by the author in 1994, would not melt much below 1200°C and were not overfired at 1230°C; thus the original firing temperature may be an aspect of Koryŏ celadon technology that needs further study.

### *Koryŏ slip-painted wares*

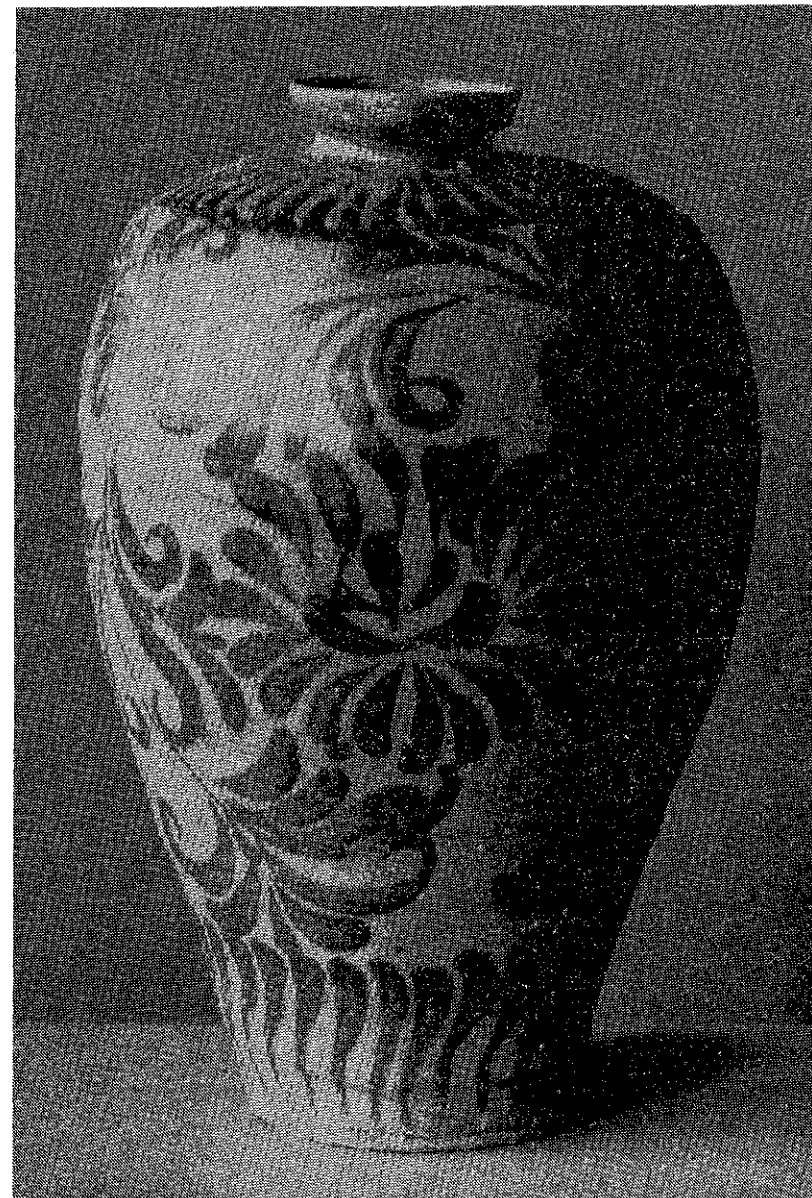
Lime glazes of the Yue and Koryŏ types were unsuitable for use with underglaze painted decoration with concentrated oxide pigments, as these colouring oxides tended to diffuse into the glazes during firing—as seen on the early Yue 'iron spotted' wares. The more viscous style of lime-alkali glaze had to be developed in China before underglaze painting with oxide-rich pigments (particularly cobalt blue) could become important in East Asian ceramics.

Nonetheless, underglaze *slip* decoration is possible with lime glazes because the high-temperature solubility of the oxide pigment is then inhibited by the substantial presence of clay in the pigment mixture. Even so, Korean potters tended to fire most of their slip painted wares in oxidizing to neutral atmospheres, which gave the wares a yellowish or amber cast. The reasons for these oxidized firings are still obscure: oxidation may have been useful in preventing the iron oxide from taking its lowest ferrous form (FeO), where it could act as a powerful flux. In its ferric (Fe<sub>2</sub>O<sub>3</sub>) and ferroso-ferric (Fe<sub>3</sub>O<sub>4</sub>) states, iron oxide is rather inert and will not react strongly with the glaze above. There is also the aesthetic consideration that well-reduced greenish blue celadons, with underlying black slips, show a rather stark colour contrast, while amber glazes and dark brown slips present a more harmonious appearance (Figure 8).

Using these two approaches (clay-rich iron-bearing slips and oxidizing to neutral firings), rather broad slip-painted designs beneath lime-rich celadon glazes became possible. The technique was used successfully at a number of Korean celadon kiln-sites.

### *The inlay technique*

The greatest innovation of the Koryŏ celadon tradition was the use of white and black inlay materials on the surface of the greyish Korean celadon clays. This technique dates from the mid-12th century in Korea, and it allowed sharp and finely detailed designs to be used beneath the bluish-green, transparent Koryŏ celadon glazes. In creating this style of ware the Koreans solved a problem that had eluded Chinese potters for centuries: that is, how to achieve well-contrasting and highly detailed designs with traditional high-lime glazes.



**Figure 8** Maebyeong vase with painted iron-brown slip, covered with an amber glaze. Korean, late 14th or early 15th c.; height 10.2"

Inlay is a relatively simple process. The designs are first carved, engraved, rouletted or stamped into the half-dry 'leatherhard' wares. Thick, coloured slips are then dabbed into the patterns with a brush until the designs are filled with slip, a process which may involve a series of applications to complete. After further drying, the surface is scraped or sponged level to remove surplus slip, leaving the impressed or carved designs in sharp detail and in contrasting colours. Unlike conventional slips, the materials used for slip-inlay should contain a good deal of non-plastic material so that they shrink less than the clay bodies beneath. This ensures that the inlaid designs are gripped firmly by the shrinking clays that surround them during the final stages of drying.

Such would be the usual approach for making slip-inlaid wares. However, there is some evidence that the inlay material was applied to some Korean celadon wares after a preliminary biscuit firing because some biscuit-fired Koryŏ sherds exist with 'empty' carved patterns.<sup>2</sup> In this case the inlay material would have needed to have had a very low shrinkage indeed, in both drying and firing, if it were not to contract visibly in the finishing processes.

Korean inlay under celadon glazes used two tones in particular: white and black (Figure 9). These have been investigated mineralogically (although not analysed quantitatively) by Vandiver. The white Koryŏ slip proved to be "quartz particles sintered with small amounts of glass and clay: x-ray diffraction indicates...minor amounts of mullite" (Vandiver *et al.* 1989: 370). Given this description and the proposed use of porcelain stone in Korean glazes, it seems possible that the material studied at the Smithsonian laboratories was a rather siliceous porcelain stone. However, full quantitative analysis would be necessary to test this proposal.

The black Koryŏ inlay slip has also been studied by electron microscopy and x-ray diffraction techniques at the Smithsonian. Vandiver found that anorthite had developed in the black inlay during firing— anorthite being a mineral that is only found rarely in the Koryŏ glaze itself. She suggests that the black inlay may have been a mixture of "black magnetite and ilmenite particles with the raw materials for the glaze," and she believes that it "was sintered to nucleate the crystals prior to inlaying [followed by] refiring to grow them" (Vandiver *et al.* 1989: 372).

## Conclusions

Study of the technology of Koryŏ celadon is now well established, and the main features of this work that have emerged so far are as follows.

The kiln-complexes that produced Korean celadons exploited similar rocks and clays to those employed by the huge and ancient south Chinese stoneware and porcelain industries. Moreover, the stoneware-producing areas of southern Korea

<sup>2</sup> Examples are held in the Fitzwilliam Museum, Cambridge, England.



Figure 9 Celadon bottle with bluish-green glaze; inlaid in white and black with touches of copper-red within the four roundels. Korean, probably 13th c.; height 10"

and southern China appear to have been part of the same extensive geological system.

Both China and Korea began their stoneware-making with hand-built, paddle-beaten vessels that were rendered grey by reduction firing. In both regions, these unglazed stonewares developed from more ancient grey unglazed earthenwares that were made from near-stoneware materials. However, the time difference between the commencement of the Chinese and Korean stoneware traditions was probably at least 2000 years. On present knowledge, the first unglazed Chinese stonewares seem to date from about the 16th century BC and the first Korean stonewares from the 6th century AD. The first *glazed* Chinese stonewares may have been made as early as the 15th century BC, while the first Korean glazed stonewares are dated to the 10th century AD. In both China and Korea, a significant production of grey unglazed stoneware continued in parallel with the new glazed stoneware materials.

Chinese grey-green glazed stonewares from Jiangsu and Zhejiang provinces (now known as Yue wares) provided the models for the first Korean celadons, which were probably made in the late 10th century AD. Korean celadon wares that have been analysed show body compositions that are virtually identical to Chinese Yue wares.

Korean celadon potters also used smaller versions of the Chinese *long* kiln design to fire their glazed stonewares. *Long* kilns had been pioneered in south China in the Warring States period and were used in the country on a large scale from the 4th to 11th centuries AD to fire south Chinese Yue wares. The design appears to have been transmitted to Korea from China in the late Eastern Han Dynasty (AD 25-220). Initially, the Korean potters used their *long* kilns for grey earthenware production, but the design proved ideal for glazed stoneware.

The Chinese Yue ware glaze appears to have been made from mixtures of the Yue ware body material with wood ash in about 6:4 proportions. In reduction firing, this resulted in glazes with greyish-green colours. The chemical basis for this glaze was the 1170°C silica-alumina-calcia eutectic mixture.

The earliest Korean celadons seem to have been of the Yue 'clay and ash' type, but sometime in the 11th century, the characteristic Korean blue-green celadon evolved. It is proposed by the author that this glaze could have been made from mixtures of a white quartz-mica porcelain stone, combined with lesser amounts of wood-ash (Wood & Kerr 1992). The fine bluish tone, characteristic of Koryŏ celadon glazes, is due to ferrous oxide dissolved in a lime glaze; and the low titania contents of the Koryŏ celadon glazes seem to have prevented Koryŏ celadon colours from displaying the very pronounced green tones that are typical of most early Chinese celadon wares.

As for the beginnings of the Korean celadon tradition, excavation and analysis have shown that both kiln-types and clay bodies suitable for making stoneware were in use in Korea for hundreds of years before glazed celadon wares were made in the country. As kiln temperatures in Korea increased between the 6th to 10th centuries, unglazed stonewares began to be produced from similar materials to those already in use for Korean earthenware. Soon a glazing technology based on Chinese Yue ware

was developed in Korea, in the late 10th century, and this was adapted in the 11th century to exploit low-iron, low-titania Korean glaze raw materials. This characteristically Korean approach to stoneware glaze construction resulted in the extraordinary visual qualities for which Koryŏ celadons are now so universally admired.

### Acknowledgments

Credit is due to the Nelson-Atkins Museum of Art, Kansas City, Missouri (Nelson Trust Purchase 34-253), for Figure 1; the Eugene Fuller Memorial Collection, Seattle Art Museum, for Figure 2; Trustees of the British Museum for Figures 3 and 7; and the Board and Trustees of the Victoria and Albert Museum for Figures 5-6, and 8-9.

### References

- Ayers, J.; Medley, M. and Wood, N. (1988) *Iron in the fire*. London: Oriental Ceramic Society.
- Barnes, Gina (1993) "The development of stoneware technology in southern Korea." In Rhee, S.N. & Aikens, C.M. (eds.) *Pacific Northeast Asia in pre-history*, pp. 197-208. Washington State University Press.
- Bureau of Foreign Trade (1933) "Pottery." Chapter 44 in *China industrial handbooks: Kiangsu*, pp. 979-807. Shanghai.
- Choo, Caroline K.C. Koh (1995) "A scientific study of traditional Korean celadons and their modern developments." *Archaeometry*, forthcoming issue.
- Deng, Zequn and Li, Jiazhi (1992) "Studies on chemical composition and technology of the ancient pottery and porcelain unearthed at Yuanqu Shang city." In Li, J. and Chen, X. (eds.) *Science and technology of ancient ceramics 2*, pp. 55-63. Shanghai: Shanghai Research Society of Science & Technology of Ancient Ceramics.
- Guo, Yanyi (1987) "Raw materials for making porcelain and the characteristics of porcelain wares in north and south China in ancient times." *Archaeometry* 29.1: 3-19.
- Guo, Yanyi; Wang, Shongying [sic] and Chen, Yaocheng (1980) "A study on the northern and southern celadons of ancient Chinese dynasties." *Guisuanyan Xuebao* [Journal of the Chinese Silicate Society] 3: 232-43. (in Chinese)
- Hatcher, H.; Pollard, M.; Tregear, M. and Wood, N. (1985) "Ceramic changes at Jingdezhen in the seventeenth century AD." *The 2nd International Conference on Ancient Chinese Pottery and Porcelain (ABSTRACTS)*, pp. 69-70. Beijing.
- Ishii, Tsuneshi (1930) "Experiments on the Tenriji yellow celadon glaze." *Transactions of the British Ceramics Society*, Wedgwood Bi-centenary Memorial Number, pp. 352-9. London.
- Kolb, Albert (1971) *China, Japan, Korea, Vietnam: geography of a cultural region*. London: Methuen.

- Lao, Fasheng and Ye, Hongming (1986) "Ancient long kiln and kiln furniture in Zhejiang province." In Shanghai Institute of Ceramics (ed.) *Scientific and technological insights into ancient Chinese pottery and porcelain*, pp. 314-20. Beijing: Science Press.
- Lee, Kyung Hee (1989) "Reproduction of Koryŏ celadon." Paper presented at the 1989 International Symposium on Ancient Ceramics, Shanghai. Full version privately printed and presented to attendees; abstract published in Li, J. & Chen, X. (eds.) *Proceedings of 1989 International Symposium on Ancient Ceramics*, p. 164. Shanghai.
- Li, Jiazhi (1986) "Formation and development of green glaze in Zhejiang province. In Shanghai Institute of Ceramics (ed.) *Scientific and technological insights into ancient Chinese pottery and porcelain*, pp. 64-8. Beijing: Science Press.
- Li, Jiazhi; Chen, Xianqiu; Chen, Shiping; Zhu, Boqian; and Ma, Chengda (1989) "Study on ancient Yue ware body glaze and firing technique of Shanglinhu." In Li, J. & Chen, X. (eds.) *Proceedings of 1989 International Symposium on Ancient Ceramics*, pp. 365-71. Shanghai.
- Li, Jiazhi; Luo, Hongjie; and Gao, Liming (1992) "Further study of the technological evolution process of the ancient Chinese pottery and porcelain." In Li, J. and Chen, X. (eds.) *Science and technology of ancient ceramics 2*, pp. 1-25. Shanghai: Shanghai Research Society of Science & Technology of Ancient Ceramics.
- Lim, Eung Keuk (1986) "The Korean spirit: celadons." *Yuŏp chaeryo ūi kwahak kwa kisul* [Ceramics] 1.1: 78-93. (in Korean)
- Liu, Zunyi (ed.) (1992) *Yaozhao kiln*. Xian: Shaanxi Tourism Publishing. (in Chinese)
- Luo, Hongjie; Li, Jiazhi; and Gao, Liming (1992) "Study on manufacture sites for proto-porcelain excavated in north China." In Li, J. and Chen, X. (eds.) *Science and technology of ancient ceramics 2*, pp. 101-9. Shanghai: Shanghai Research Society of Science & Technology of Ancient Ceramics.
- Nikulina, L.N. and Taraeva, T.I (1959) "The petrographic features of Chinese porcelain stone." *Steklo i keramika* 16.8: 455-8. Moscow.
- Sato, Masahiko (1981) *Chinese ceramics: a short history*. New York & Tokyo: Weatherhill/Heibonsha.
- Singer, F. and German, W. (1978) *Ceramic glazes*. London: Borax Consolidated.
- Sundius, N. and Steger, W. (1963) "The constitution and manufacture of Chinese ceramics from Sung and earlier times." In N. Palmgren (ed.) *Sung sherds*, section two, pp. 374-505. Stockholm: Almqvist and Wiksell.
- Tite, M. and Barnes, G. (1992) "Stoneware identification among proto-historic potteries of south Korea." In Li, J. and Chen, X. (eds.) *Science and technology of ancient ceramics 2*, pp. 64-9. Shanghai: Shanghai Research Society of Science & Technology of Ancient Ceramics.
- Tregear, T. (1980) *China: a geographical survey*. London: Hodder.
- Vandiver, Pamela (1989) "The technology of Korean glazes, 10th-16th centuries." In Li, J. & Chen, X. (eds.) *Proceedings of 1989 International Symposium on Ancient Ceramics*, pp. 165-7. Shanghai.
- Vandiver, P.; Cort, L. and Handwerker, C. (1989) "Variations in the practice of ceramic technology in different cultures: a comparison of Korean and Chinese celadon glazes." In P.E. McGovern and Notis, M.D. (ed.) *Ceramics and civilization 4*: 347-88. Westerville, Ohio: American Ceramic Society.

- Wood, N. (1978) *Oriental glazes; their chemistry, origins and re-creation*. London: Pitman, and Watson Guptill (USA).
- Wood, N. (1986) "Some implications of some recent analyses of Song *yingqing* wares from Jingdezhen." In Shanghai Institute of Ceramics (ed.) *Scientific and technological insights into ancient Chinese pottery and porcelain*, pp. 261-4. Beijing: Science Press.
- Wood, N. and Kerr, R. (1992) "Graciousness to wild austerity: aesthetic dimensions of Korean ceramics explored through technology." *Oriental Arts* 23.23: 39-42.
- Yang, Gen; Zhang, Xiqiu; and Shao, Wengu (1985) *The ceramics of China; the Yangshao culture to the Song dynasty*. Beijing and London: Science Press and Methuen.
- Zhang, Fukang (1986) "The origin of high-fired glazes in China." In Shanghai Institute of Ceramics (ed.) *Scientific and technological insights into ancient Chinese pottery and porcelain*, pp. 40-45. Beijing: Science Press.
- Zhu, Boqian (1989) "Yue ware." In Li, J. & Chen, X. (eds.) *Proceedings of 1989 International Symposium on Ancient Ceramics*, pp. 392-7. Shanghai.
- Zhou, Ren; Zhang, Fukang; and Zhang, Yongfu (1973) "Technological studies of Longquan celadons of successive dynasties." *Kaogu Xuebao* 1: 131-56. (in Chinese)



## Ancient glass trade in Korea

Insook LEE

### Introduction

The presence of numerous examples of ancient glass at many archaeological sites in Korea is clear evidence of cultural contact with neighboring countries in the ancient world (Figure 1). The synthetic study of ancient glasses from the prehistoric to the historic period in Korea according to type and distribution cast light on their cultural context.

Having examined many glass beads and glass vessels with the help of scientific analyses to understand the initiation and manufacturing of glass in Korea, and having compared the types of glasses with data from other regions in East Asia, I have determined whether or not a piece of glass was imported and have been able to identify evidence of glass making in Korea. On the basis of glass distribution in East Asia, I have outlined possible routes for glass trade and cultural exchange in ancient times.

### Glass composition in Korea

According to scientific analyses by Lee, Brill & Fenn (1991), it becomes evident that at least four distinctly different families of glass compositions exist: A) lead-barium-silica glass, B) potash-silica glass, C) soda-lime-silica glass, and D) lead-silica glass.

#### A) Lead-barium-silica glass (Table 1)

The fact that some of the specimens found in Korea are lead glass is not surprising, since this composition is commonly found among the glasses of China, Korea and Japan (Lee 1990). Among the high lead Korean specimens, some also contain significant levels of barium. This, too, is the case among Chinese and Japanese glasses, which often contain between 5 and 25% BaO (Brill, Tong &

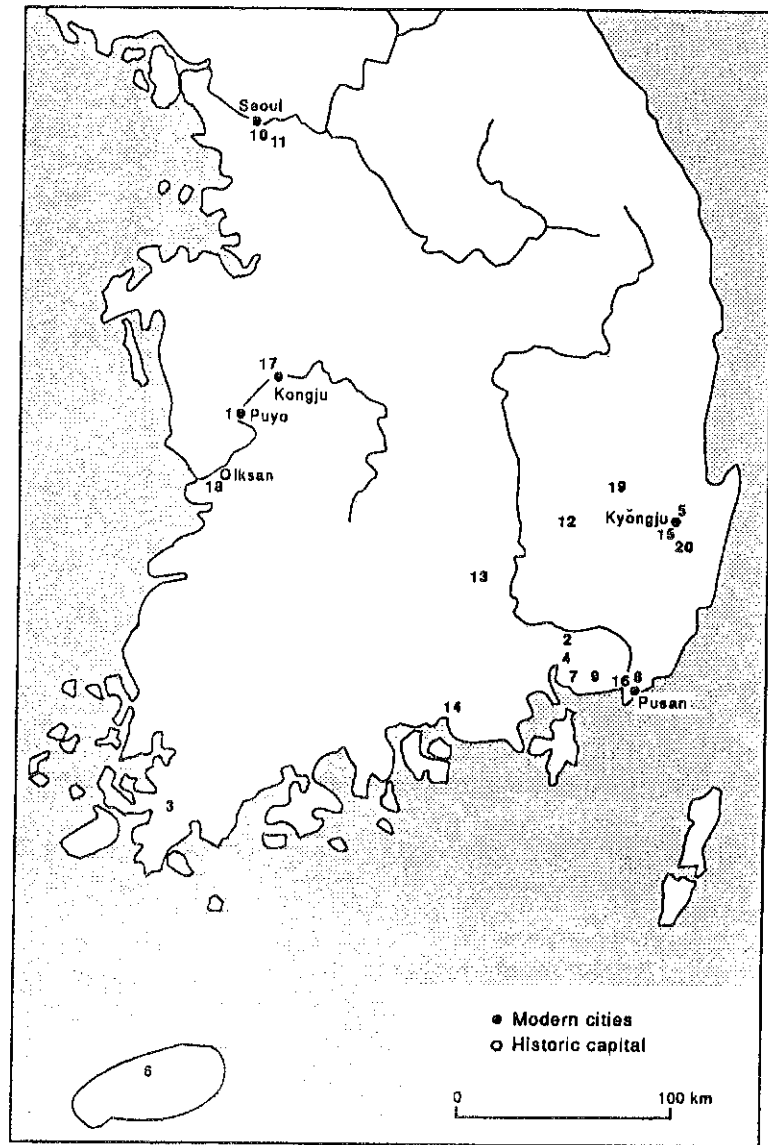


Figure 1 Map of sites yielding glass on the Korean peninsula.  
 1. Hapsong-ri; 2. Taeho-ri; 3. Gun'gok-ri; 4. Taepyong-ri; 5. Joyang-dong;  
 6. Yongdam-dong; 7. Samdong-dong; 8. Nop'o-dong; 9. Togyedong;  
 10. Sokch'on-dong; 11. Mongch'on; 12. Imdang-dong; 13. Okjon; 14. Chinju;  
 15. Hwang'o-ri, Hwang'o-dong; 16. Tugu-dong; 17. Muryong tomb; 18.  
 Miruk Temple; 19. Songlim Temple; 20. Sobong-ch'ong

SITE	OBJECT	COLOUR	DATE	SiO <sub>2</sub>	Na <sub>2</sub> O	CaO	K <sub>2</sub> O	MgO	Al <sub>2</sub> O <sub>3</sub>	Fe <sub>2</sub> O <sub>3</sub>	TiO <sub>2</sub>	SnO <sub>2</sub>	MnO	CuO	CoO	SrO	PbO	BaO	Total %
Hapsong-ri	tubular bead	blue	2cBC	51.38	6.28	0.65	0.04	0.53	0.69	0.26				1.08		tr.	26.73	11.98	99.62
Taeho-ri	annular bead	green	BC1c	34.9	2.9	0.86	0.15	0.12	0.3	0.17	0.001	0.05	0.001	0.88	0.01	0.1	53.00	6.48	99.84
Gun'gok-ri	tubular bead	blue	AD1c	39.0	3.36	3.69	0.06	0.40	0.43	0.16	0.001	0.01	0.001	0.84	0.01	0.001	37.5	14.4	99.87
Taepyong-ri	tubular bead	light blue	AD2-3c	66.94	2.44	0.51	0.85	0.20	1.69	0.60							19.45	4.81	97.49
?	bead	dark blue	?	68.69	15.51	4.23	2.45	2.58	1.35	0.21			0.29	0.04			4.12	1.13	100.6
Gun'gok-ri	annular bead	bright green	AD1c	25.11	1.27	0.06	0.14	0.13	0.39	0.14	0.001		0.001	0.2		0.02	72.5	0.01	99.99
Gun'gok-ri	annular bead	dark green	AD1-2c	27.34	0.04	0.14	0.11	0.25	0.13	0.13			0.01	0.46			72.4	0.1	100.98
Togyedong	bead	blue/black	AD4-5c	0.008		0.048				0.113							39.3	39.47	
Chinju	spherical bead	brown	AD5c	16.3	0.76	0.188		3.41	1.08								75.4	97.14	
Chinju	spherical bead	colorless	AD5c	61.92	2.36	1.86		2.07	0.46								30.37	99.04	
Kyongju #96 tomb	vessei	blue	AD5c	0.27	0.46			0.07									27.3	28.1	
Silla tomb	bead	gray	AD5-6c	24.6				0.01	0.48								73.9	98.99	
Miruk temple fragment	fragment	green	AD7c	26.73	0.01	0.05	0.09	0.06	0.27	0.13	0.001	0.01	0.01	0.26	0.01	0.08	72.2	0.01	99.92
Anap pond bead	bead	yellow	AD8c	57.5	0.03	0.05	0.01	0.16	0.35	0.01	0.01	1.08	0.01	0.13	0.01	0.001	40.1	0.003	99.57

Table 1 Lead-barium-silica glass and lead-silica glass compositions.

Dorenwend 1987). Consequently, there is a good chance that some of those glass objects were imported, or that they were fashioned into objects in Korea from imported cullet (waste glass for melting and reuse). However, one should not dismiss too quickly the possibility that Korean glassmakers might have learned to make glass from Chinese glassmakers and that they therefore could have used similar batch materials, thereby producing glasses of the same compositional families.

The production of barium-containing lead glass appears to have ceased at least by the end of the Eastern Han Dynasty (AD 220) and possibly even earlier—by the end of the Western Han Dynasty (AD 24). Thus, the compositions of samples from Hapsong-ri, Taho-ri and Kun'gok-ri Shellmound (Lee 1989) are consistent with their dates between 200 BC and 100 AD. Interestingly, these dark blue glasses appear to be coloured only with copper; no cobalt was present.

### B) Potash-silica glass (Table 2)

Some of the Korean specimens were found to be potash-silica glass, a composition which is beginning to take on great significance in the study of East Asian glass. Because this type of glass is present in many different sites, ranging in date from AD 0-500, it must have been widespread in Korea.

Potash-silica compositions are unknown in ancient glass of the West. However, recent studies (Shi, He & Zhou 1986) have established that such compositions are, in fact, quite common among Han Dynasty glasses excavated in China. It is not yet certain whether this type of glass was made in China or whether it was imported from Southeast Asia (Brill 1991). A few specimens have characteristically Chinese forms, but most are ubiquitous shapes. In any event, the Korean analyses are, for all practical purposes, chemically indistinguishable from the glasses found in China (Lee, Brill & Fenn 1991). Among the Southeast Asian analyses, we have three undated beads from Ban Chiang, Thailand, which are a very close match for the Korean and Han Dynasty glasses, and also eight 4th-century BC beads from Ban Don Ta Phet, Thailand, (Basa, Glover & Henderson 1991) which are potash-lime-silica glass. The Ban Chiang beads seem to have come from the same glassmaking tradition as the Korean and Han dynasty glasses, and the Ban Don Ta Phet glasses appear to be their second cousins. The analysis of these beads from Korea is indeed intriguing.

### C) Soda-lime-silica glass (Table 3)

Many samples proved to be soda-lime glass. Generally, these soda glass examples can be separated into two chemical types: one resembling western glasses (although they were not necessarily made in the west), and another having unusually high alumina and titanium contents but very low lime contents (Brill 1991). We can call the latter an Asian type of soda glass found in India, Sumatra and Korea.

SITE	OBJECT	COLOUR	DATE	Choyang-dong spherical bead	Choyang-dong dk blue AD1c	Yondam-dong tubular bead	Yondam-dong blue AD2-3c	Samdong-dong bead	Samdong-dong blue AD3c	Nop'o-dong bead	Nop'o-dong blue AD3c	Sokch'on-dong spherical bead	Sokch'on-dong brown AD3-4c	Imdang-dong bead	Imdang-dong dk blue AD4-5c	Togyedong bead	Togyedong dk blue AD4-5c	Mongch'on spherical bead	Mongch'on dk blue AD3-5c	Chinju bead	Chinju brown AD5c	Chinju bead	Chinju blue AD5c	Kyongju #98 tomb bead	Kyongju blue AD5c
	%WT			73.5		74.4		77.32		78.33		83.36		77.17		76.7		57.97		62.69		67.48		0.67	
	SiO <sub>2</sub>			0.89		1.11		0.36		1.19		0.37		0.99		1.55		3.59		0.39		0.44		12.6	
	Na <sub>2</sub> O			1.42		3.84		1.16		1.24		3.37		0.99		1.1		19.50		18.45		15.30		0.73	
	K <sub>2</sub> O			14.9		14.5		17.61		16.7		6.95		18.54		17.14		10.31		10.90		11.03		1.28	
	MgO			0.42		0.37		0.32		0.33		0.24		0.24		0.26		3.73		4.13		3.40		0.78	
	Al <sub>2</sub> O <sub>3</sub>			3.48		2.55		1.36		1.32		4.58		1.19		2.22		2.67		4.13		0.95		1.32	
	Fe <sub>2</sub> O <sub>3</sub>			2.38		1.33		1.89		0.85		0.42		1.59		1.19		0.44		0.48		0.78			
	TiO <sub>2</sub>			0.2		0.15		0.12		0.06		0.21		0.11		0.08		0.27							
	Sb <sub>2</sub> O <sub>5</sub>			0.01		0.01																			
	MnO			2.29		1.24		1.8		1.52		1.7		0.04		1.43		0.45		0.08					
	CaO			0.02		0.01		0.04		0.05		0.04				0.02									
	CoO			0.1		0.05																			
	SnO <sub>2</sub>			0.001		0.001																			
	Ag <sub>2</sub> O			0.001		0.001																			
	PbO			0.01		0.01				0.01		0.03		0.03		0.03								0.12	
	BaO			0.3		0.3		0.27		0.3		0.25		0.25		0.23									
	Total %			99.02		99.83		100.45		101.9		98.89		102.22		101.95		98.93		99.35		98.86			

Table 2 Potash-silica glass compositions.

SITE	Kun'gok-ri tubular bead green	Kun'gok-ri bead opaque orange	Yang-dong bead blue	Nap'o-dong bead dark blue	Mongch'on annular bead light green	Okjon bead blue	Togye-dong bead bluish green	Imdang-dong bead greenish blue	Hwang'ri sword ornament blue
OBJECT	AD1c	AD2c	AD2-3c	AD3c	AD4-5c	AD4-5c	AD4-5c	AD4-5c	AD5-6c
COLOUR	AD1c	AD2c	AD2-3c	AD3c	AD4-5c	AD4-5c	AD4-5c	AD4-5c	AD5-6c
DATE	68.37	61.82	73.87	74.46	63.38	11.2	64.33	65.33	68.3
%WT	17.8	7.97	17.12	17.54	19.76	11.2	20.72	22.36	19.36
SiO <sub>2</sub>	1.73	2.40	1.99	3.49	2.09	1.46	3.94	2.93	5.54
Na <sub>2</sub> O	2.92	3.54	1.32	0.55	2.06	1.46	2.38	1.65	1.1
CaO	0.94	0.36	0.36	0.33	0.31	1.72	0.43	0.43	2.19
K <sub>2</sub> O	6.29	11.19	3.28	2.12	9.12	0.68	5.01	7.77	2.44
MgO	1.34	5.00	1.49	0.97	1.21	0.68	1.48	1.19	1.63
Al <sub>2</sub> O <sub>3</sub>	0.25	0.52	0.15	0.11	0.53		0.29	0.39	0.23
Fe <sub>2</sub> O <sub>3</sub>	0.01								
TiO <sub>2</sub>	0.07		2.1	1.46			0.09	0.19	0.17
Sb <sub>2</sub> O <sub>5</sub>	0.003	6.45	0.02	0.02		0.03	0.95	0.62	0.16
MnO	0.01								
CuO	0.05								
CoO	0.001								
SnO <sub>2</sub>	0.001								
Ag <sub>2</sub> O	0.05								
PbO	0.1								
BaO	99.93	99.25	102.04	101.37	98.58	13.43	101.01	103.02	101.32
Total %									

Table 3 Soda-lime glass compositions.

SITE	Hwang'ri spherical bead dark blue	Kyongju #88 tomb bead blue	Tugu-dong bead blue	Muryong tomb bead opaque yellow	Muryong tomb bead blue	Muryong tomb bead opaque orange	Muryong tomb bead green	Muryong tomb bead yellow	Muryong tomb bead black
OBJECT	AD5-6c	AD5c	AD6c	AD6c	AD6c	AD6c	AD6c	AD6c	AD6c
COLOUR	AD5-6c	AD5c	AD6c	AD6c	AD6c	AD6c	AD6c	AD6c	AD6c
DATE	63.53	65.0	66.81	62.97	70.27	59.35	70.36	67.58	67.63
%WT	19.3	14.9	20.14	19.68	18.72	13.21	17.71	17.73	16.57
SiO <sub>2</sub>	4.83	5.58	5.38	5.41	4.01	2.77	0.95	1.36	2.27
Na <sub>2</sub> O	2.43	1.11	1.64	3.2	1.05	2.23	0.81	2.07	2.0
CaO	5.74	2.84	1.68	2.85	0.58	0.63	0.53	0.45	0.63
K <sub>2</sub> O	2.32	5.94	3.46	2.53	4.12	10.94	5.01	7.74	10.23
MgO	1.26	2.16	1.47	4.59	1.8	2.67	2.14	1.33	2.13
Al <sub>2</sub> O <sub>3</sub>	0.18	0.27	0.3	0.12	0.26	0.74	0.72	0.63	0.6
Fe <sub>2</sub> O <sub>3</sub>	0.01								
TiO <sub>2</sub>	0.13	1.2	0.14	0.22	0.3	0.05	0.09	0.06	0.07
Sb <sub>2</sub> O <sub>5</sub>	0.03	0.08	0.09	0.01	0.09	9.34	1.0	0.01	0.01
MnO	0.06	0.31							
CuO	0.02								
CoO	0.001								
SnO <sub>2</sub>	0.05	0.2	0.05	0.04	0.06	1.1	0.01	0.01	0.01
Ag <sub>2</sub> O	0.01	0.06	0.07	0.04	0.05	0.1	0.06	0.14	0.13
PbO	99.89	99.45	101.23	101.62	101.04	103.03	99.38	99.14	102.28
Total %									

Table 3 Soda-lime glass compositions (cont'd).

The two soda groups must certainly have been made from different types of batch materials and, therefore, were probably made in different places or at different times. There is not a perfect one-to-one correlation between the chemical types and the places or dates of manufacture, although the one earliest glass from Kun'gok-ri Shellmound is of the low CaO (1.73%), high Al<sub>2</sub>O<sub>3</sub> (6.29%), high TiO<sub>2</sub> (0.25%) group. The other glasses in this group are from the tomb of King Muryŏng of Paekche (r. 501-523) (Lee, Brill & Fenn 1991). Because it is described as being very different from the other King Muryŏng glasses, perhaps it is unsurprising that it has a different chemical composition, too.

The closest match we have for the low CaO, high Al<sub>2</sub>O<sub>3</sub> high TiO<sub>2</sub> soda glasses are some glasses from Kausambi and elsewhere in India. They date from about 200 BC to AD 200. It is possible that they share a common origin with the Korean glasses, but the point is far from proven.

We cannot say much about the other Korean soda glasses with 'more ordinary' compositions except that they deserve further study. In fact, the most important conclusion to be drawn from my study to date is that chemical analyses of glasses excavated in Korea are already yielding significant findings, and the entire subject certainly deserves further attention.

#### D) Lead-silica glass (Table 1)

Two samples also from Kun'gok-ri Shellmound (200 BC-AD 100) have very high lead contents (70% PbO) but only trace levels of barium. Their bright green color is produced by copper in a high-lead matrix. Such lead-silica compositions are familiar to us from Tang Dynasty (AD 618-907) glasses in China and from the Kofun-Nara periods in Japan (AD 300-794). A chunk of brownish turbid glass found in Korea beneath a stupa at the Miruk Temple at Iksan, N. Chŏlla province (Lee 1989), has a composition almost identical to the two green beads from Kun'gok-ri. The Miruk Temple glass is said to date from the 7th century or earlier.

The presence of lead in the glasses offers another opportunity to learn more about where these glasses might have been made (Brill & Wampler 1965). Lead isotope analyses, which can be performed on extremely small samples, can be used for this purpose. Such analyses yield numerical ratios which characterise the lead. By comparing these ratios with those of the lead in other objects, it is possible to distinguish objects made using lead from a particular mining region. Under the most favorable conditions, this is done by matching the lead ratios with those ores from particular mining regions. The technique has been applied to Chinese and Japanese glasses with considerable success (Brill *et al.* 1979). The first lead isotope ratio analysis of Korean glass done by the author (Lee 1990) shows that glass artefacts from the Miruk Temple are a Korean local product because the lead from the glass sample was proved by its isotope analysis to come from a mine in central Korea.

I hope to follow up the chemical analyses with lead isotope analyses of more Korean glasses so as to determine if they were made in the same or different places as the Chinese and Japanese glasses analysed previously (Brill *et al.* 1979, 1991).

### Developmental stages in glass manufacture

Following the basic typology of glass objects by compositional group, a three-stage developmental sequence of glass manufacture is proposed (Lee 1988).

During the first stage, which began in the 2nd century BC, only glass beads are found, and their forms and colours are very variable. In the second stage, around the 4th century AD, glass vessels began to be introduced alongside numerous glass beads. More than forty glass vessels—including those from nine legally excavated Old Silla and Kaya tombs (*ca.* AD 300-600) are known to us (Lee 1990). Most of these vessels are probably of Late Roman type (Grose 1984), but I also identified local Korean products. It is very interesting that all of them are concentrated in the Kyŏngju area, capital of the Old Silla Kingdom in the southeastern part of the Korean Peninsula. If we consider the distribution of similar types of vessels in the Russian region and northern China (Yoshimizu 1977), it seems that these Roman glass vessels were probably made in the Syro-palestinian region (Whitehouse 1987) and transported across the Silk Road (the steppe route).

Finally, the 3rd stage began in the 7th century AD when high lead-silica glass, usually in the form of *sarira* bottles (Buddhist relic containers), prevailed in Korea.

Each of these stages is discussed in further detail below, and the correspondence of these three morphological stages with the duration of the major compositional classes can be seen in Figure 2.

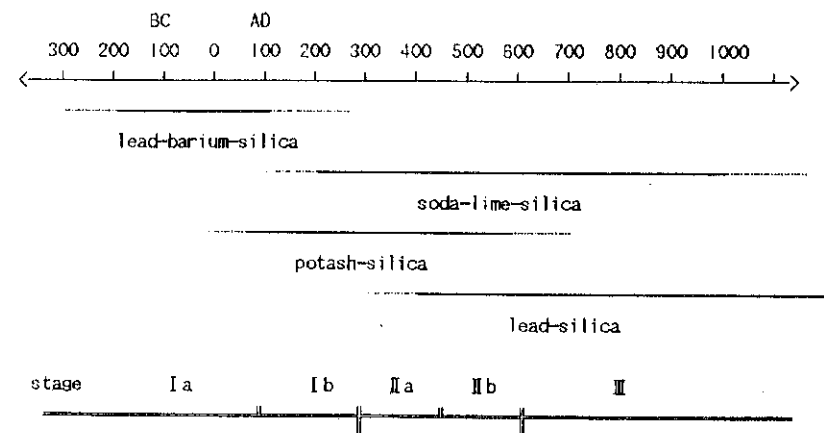


Figure 2 Stages in the popularity of different glass types in Korea.



### Stage 1: Glass beads (200 BC ~ AD 300)

The initiation of glass technology in ancient Korea must be discussed with reference to imported technology and objects from China in the early Iron Age. So far, the earliest example of glass in Korea comes from the Hapsong-ri site, dated to the 2nd century BC. These blue cylindrical beads proved to be lead-barium glass, which is characteristic of Chinese glass of the Late Zhou and Han Dynasties (ca. 4th c. BC - AD 3rd c.) (Seligman & Beck 1938). Accompanied by bronze and iron artefacts (Lee K.M. *et al.* 1989), they are typical of early Iron Age assemblages in ancient Korea.

Lead-barium glass in Korea may be explained in the same cultural context as Japanese Yayoi-period glass objects made from Chinese materials (Brill *et al.* 1979). It is probable that glass beads and typical Korean bronze artefacts were introduced from Korea to Kyushu, as found at the Yoshinogari site (Ota 1989). So we can say that Korea took the role of intermediary in cultural exchanges between China and Japan.

Potash glass, having the same composition as Han Dynasty Chinese glass, prevailed from the prehistoric period until the early Three Kingdoms period (3rd-7th c. AD) (Lee 1989). But we cannot yet identify its exact place of manufacture or the trade route by which it was distributed. We can only say that it was probably produced somewhere in Southeast Asia.

In the Proto-Three Kingdoms period (AD 0-300), many kinds of beads enjoyed great popularity among the people of southern Korea, as recorded in Chinese historical sources. During this time, people often substituted glass beads for precious stones. An extraordinary abundance and widespread distribution of glass beads throughout the southern Korean Peninsula may imply some special socio-cultural meaning or cultural background. Glass objects may have played an economic role, such as being used as currency; and owning special kinds of beads was probably an indicator of social status or privilege.

Soda-lime glass, from the West or from Southeast Asia, is presumed to have been first introduced to Korea in the early Christian era by trading in the southern seaside area (Kim 1987). Thus cultural exchange was facilitated by the maritime Silk Road as well as by the steppe route across northern Eurasia. This sea trade contributed to the increasing availability and popularization of glass objects. Thus, glass manufacturing in ancient Korea may have been stimulated by the introduction of glass products of distant origin.

### Stages 2 and 3: Glass vessels (4-6th c., 7-10th c. AD)

From the 4th century, the glass trade and glass-making in Korea became more active and flourished in more varieties than ever before. Not only were glass beads available in many colours, shapes and chemical compositions (Figure 3), but glass vessels were also accessible through trade or local production (Lee 1990). Furthermore, Korean artisans attempted to make special kinds of glass objects such

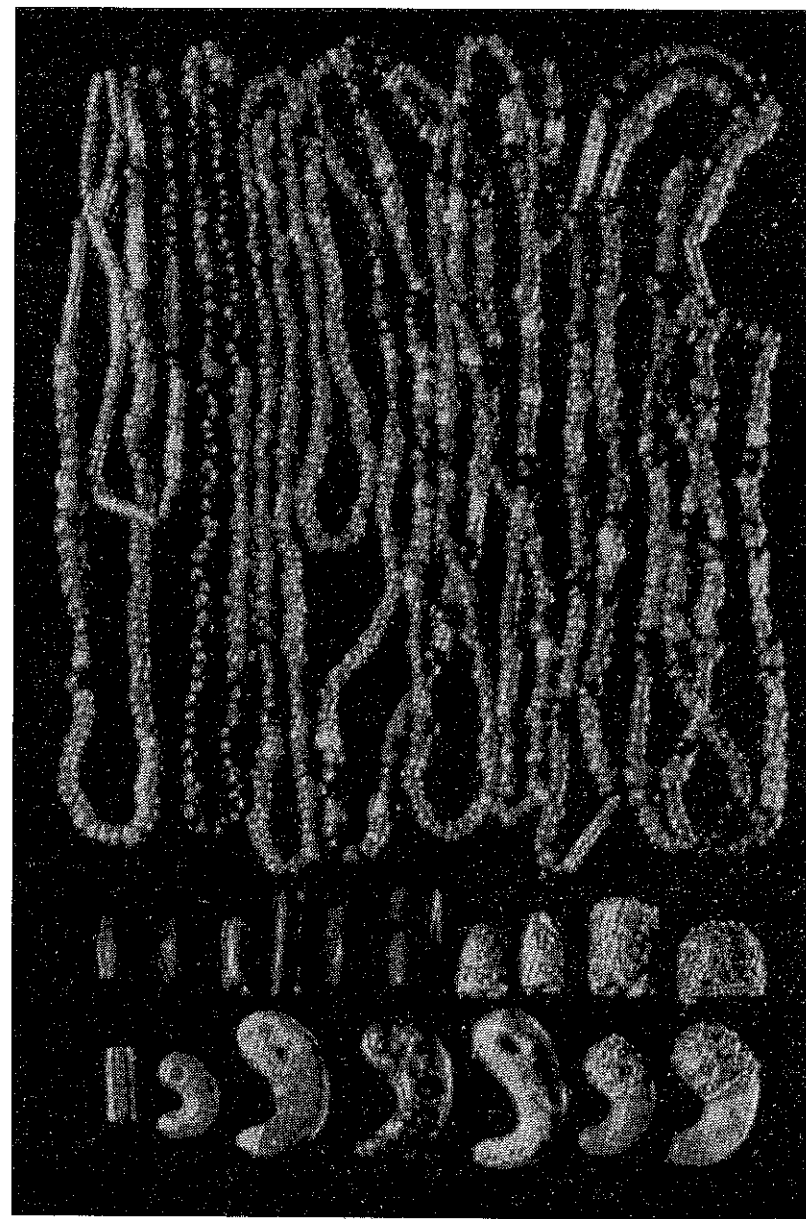


Figure 3 Glass beads from King Muryŏng tomb, Puyŏ.

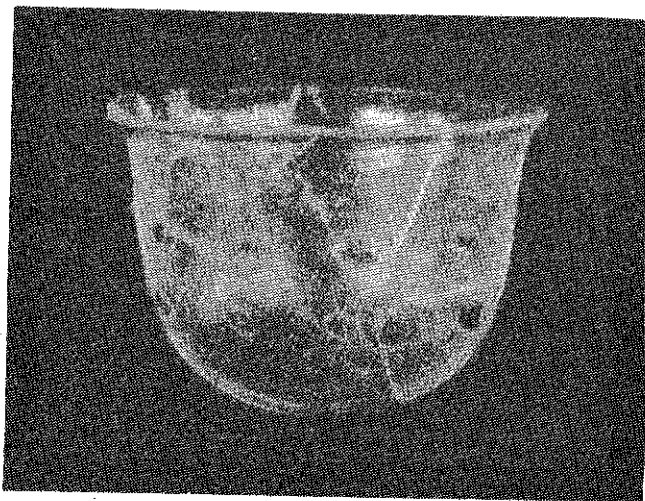


**Figure 4** Glass amulet from King Muryŏng tomb.

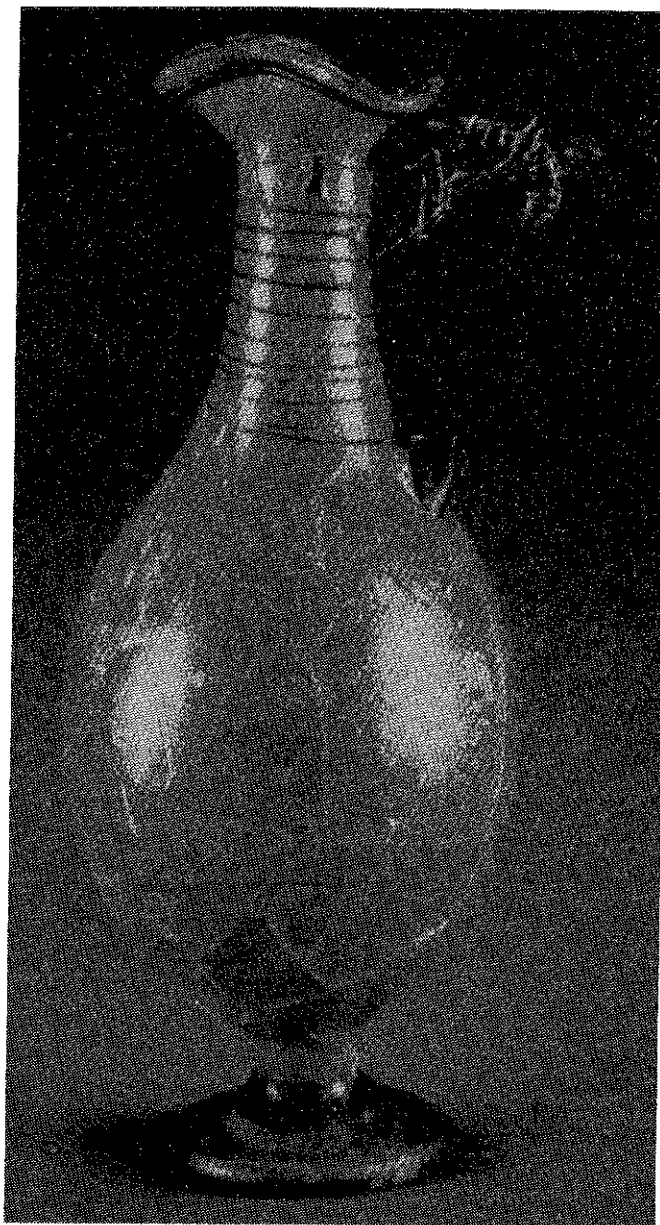
as horse harness ornaments, girdle pendants, and small amulet sculptures (Figure 4)—some being unique to Korea (Lee 1990). In particular, Old Silla played a major role in the development of technical and creative features of glass craftsmanship as a result of direct trade with the West and with Central Asia—traceable through many Western elements found only in Old Silla culture (Kim 1991; Kwŏn 1991; Lee 1988). Similar circumstances, resulting from Korean influences, emerged in Tomb-period Japan (AD 300-710) (Yamasaki 1974).

Glass vessels excavated in Korea are thus of two kinds: imported vessels from the West and local Korean products (Figure 5). The former can also be broken down into two categories: Late Roman glass from the Syro-palestinian area (Figures 6, 7, 8), and Sassanian glass (Figure 9). No Islamic glass has yet been found in Korea.

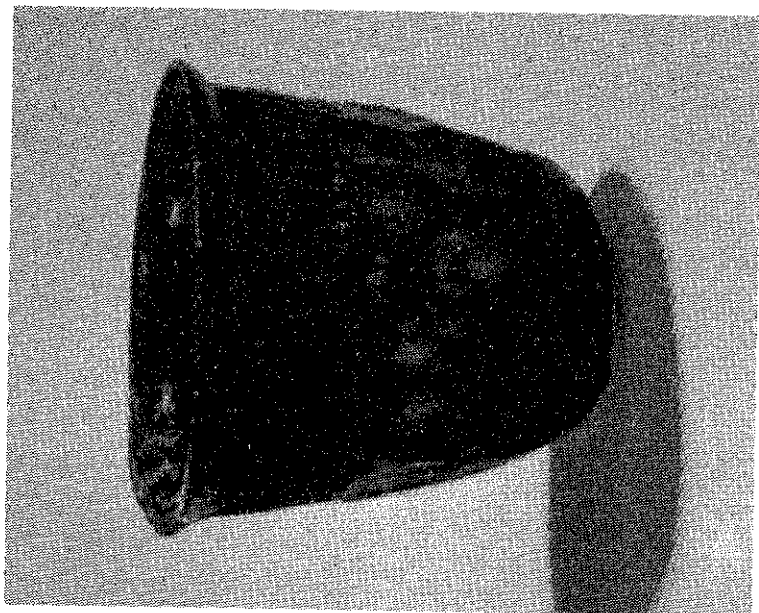
Around AD 400, lead glass without barium began to be made in Korea (Lee 1990). In China, barium-free lead glass prevailed from the 6th century, so it was Korea that led the rebirth of lead glass. Thereafter, lead glass-making continued and flourished, the main product being sarira bottles during the Unified Silla period (AD 668-935).



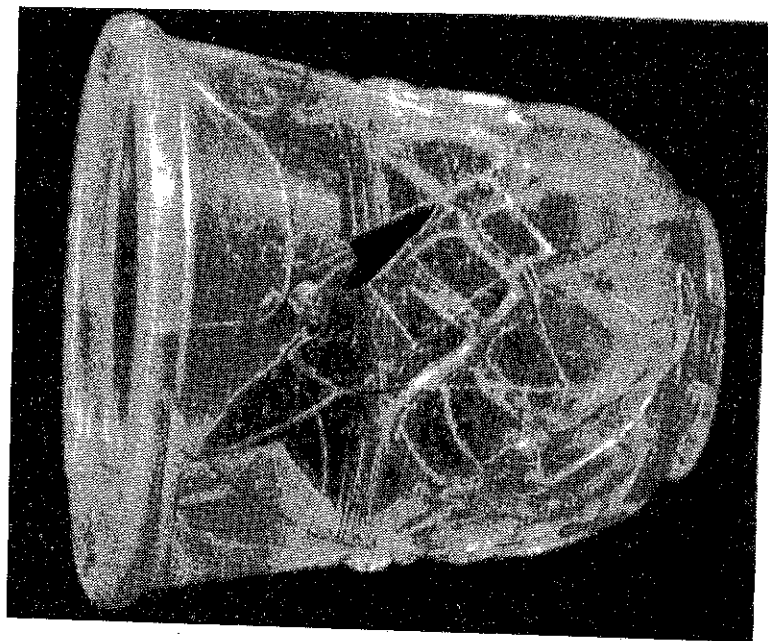
**Figure 5** Korean-made cup with blue dot decoration from an Okjŏn tomb, Hapch'ŏn.



**Figure 6** Syro-palestinian oinochoe from Tomb No. 98 (South Mound), Kyŏngju.



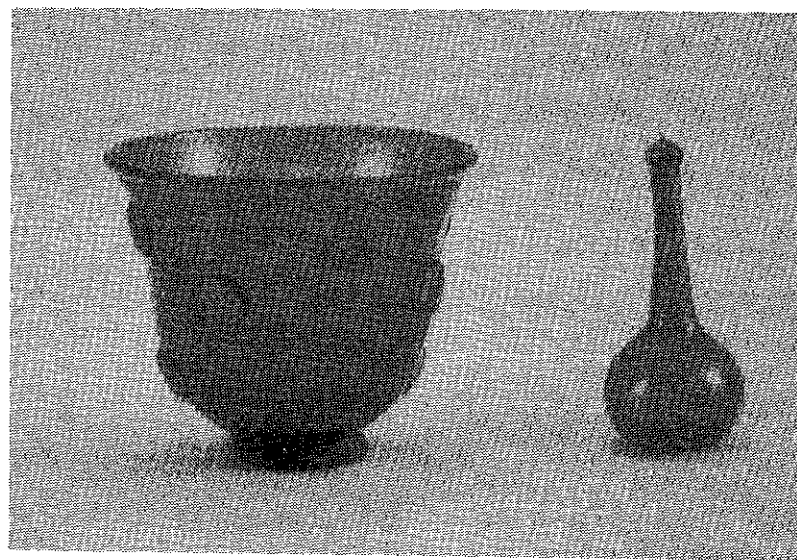
**Figure 8** Syro-palestinian honeycomb patterned cup from the Flying Horse Tomb (Ch'ŏnma-chi'ong), Kyŏngju.



**Figure 7** Syro-palestinian glass beaker with trailing decoration from Sŏbong-chi'ong, Kyŏngju.



**Figure 9** Sassanian cut glass cup from Tomb No. 98 (North Mound), Kyŏngju.



**Figure 10** Sassanian glass cup and sarira bottle from Songlim Temple, Ch'ilgok, N. Kyŏngsan.

## The glass trade in ancient Korea

As we have seen above, potash glass and the Asian type of soda-lime glass were both present in ancient Korea, though they were probably made in Southeast Asia or India. In addition, some special types of glass beads—such as *mutisalah* beads (wax red opaque glass beads), gold-foil glass beads, eye beads, and cornerless cube glass beads—which were manufactured mostly in India or Southeast Asia were also rather common in Korea from about AD 0 to 300 (Lee 1989; Basa 1988). Thus, we cannot deny that there was a close relationship between ancient Korea and Southeast Asia from the beginning of early Christian era or earlier. There seems to have been much more active trade, most likely by sea, between East and Southeast Asian countries than we had imagined.

Both archaeology and ancient literary works attest to early trade between East and West. So-called Roman trade (Stern 1991) was already established at the beginning of the Christian era (Loewe 1971) through the Indian Ocean (Francis 1991). This trade might have reached the southeastern Chinese sea coast (modern Guangdong province) (An 1991) by way of the Indonesian sea route: India > Malaysia > Thailand > Indonesia > Vietnam > The Philippines > China (Basa, Glover & Henderson 1991). Early sea trade routes like this should be considered to have continued further east—that is to say, on a more extended scale to the southern coast of the Korean Peninsula (Lee 1990). This Far Eastern trade in ancient times was probably conducted by Koreans, who were very active in sea commerce as Chinese sources state. From the early historic period, there could have been many predecessors of Chang Pogo (d. 846), who was the most famous general of Silla and who dominated sea trade in East Asia during the early 9th century.

The routes by which glass objects and techniques of glass manufacture reached Korea from the West changed with time. In the Proto-Three Kingdoms period, ancestors of Silla and Kaya people traded glass beads and Roman glass objects by sea via Southeast Asia and southeastern China (Lee 1993). On the other hand, people in the northern part of Korea imported Chinese Han glass together with other cultural materials through the Lelang commandery by the land route.

In the early Three Kingdoms period, glass objects and vessels from Western Asia (Iran, Syria, Syro-palestine and the eastern Mediterranean) were imported to Korea. This trade may have been conducted over the Silk Road steppe route via the Caucasus, southern Siberia and northern China (Lee 1993). In central China, Roman glass vessels of the same age are very rare.

We can point to some cultural elements in the Old Silla Kingdom which prove that there was contact and eastward influence between Silla and Central and Western Asia. Thus, Old Silla and Kaya were in direct contact with these places by sea and through the steppes without China acting as intermediary. This situation changed dramatically in the Unified Silla period when all foreign cultural influences were

transmitted to Korea through the Tang Dynasty, the cultural melting pot of Asia at that time.

## Closing comments

I would like to emphasize the importance of ancient glass with three main observations. Firstly, glass is a completely artificial material; secondly it is virtually indestructible over the long term; and thirdly, among many archaeological materials, glass has many hidden advantages which can be verified scientifically, making it the most important evidence and the clearest item with which to investigate society, economy, technology and trade in the ancient world.

More attention should be paid to glass objects in East Asian archaeology. As has been shown here, ancient glass studies have many problems to solve. In the near future, we may throw more light on the history and development of ancient techniques. Furthermore, we can clarify the eastward transmission of ancient civilisation along the Silk Road—which might be renamed with greater accuracy as the “Glass Road.”

## Acknowledgments

Figure 1 redrawn by Catherine Lawrence. Figures 3-10 courtesy of the National Museum of Korea, Seoul.

## References

- An, J. (1991) “Glass trade in Southeast Asia.” In *Integral study of the Silk Road: road of dialogue*. Document No. 11, pp. 1-6. Bangkok. (in English)
- Basa, K.K. (1988) “Early glass trade in Thailand.” In *Southeast Asian Archaeology*, edited by M. Santoni, pp. 16, 32. Paris: Musée Guimet.
- Basa, K.K.; Glover, I. & Henderson, J. (1991). “The relationship between early Southeast Asian and Indian glass.” *Bulletin of the Indo-Pacific Prehistory Association* 10: 366-85.
- Brill, R.H. (1991) “Scientific investigation of ancient Asian glass.” In *Unesco maritime route of Silk Roads: Nara symposium '91, report*, pp. 70-9. Nara. (in English)
- Brill, R.H. & Wampler, J.M. (1965) “Isotope ratios in archaeological objects of lead.” In *Application of science in examination of works of art*, pp. 155-66. Boston: Museum of Fine Arts.
- Brill, R.H.; Tong, S.S.C. & Dorenwend, D. (1991) “Chemical analyses of some early Chinese glasses.” In *Scientific Research in early Chinese glass*, edited by R.H. Brill and J.H. Martin, pp. 31-58. Corning, NY: The Corning Museum of Glass.
- Brill, R.H.; Yamasaki, K.; Barnes, I.L.; Rosman, K.J.R. & Diaz, M. (1979) “Lead isotope in some Japanese and Chinese glasses.” *Ars Orientalis* 11: 87-109.
- Francis, P. (1991) “Beads, the bead trade and state development in Southeast Asia.” In *Integral study of the Silk Roads: roads of dialogue*. Document No. 7, pp. 1-17. Bangkok.



- Grose, D.F. (1984) "The origins and early history of glass." In *History of glass*, edited by D. Klein and W. Lloyd, pp. 9-38. Orbis: London.
- Kim, B.M. (1987) "Karakuk höhwangok-tü chulja" [The origin of Huh Whang-ok, Queen of the Kaya Kingdom]. In *Sambul Kim Wönyong kyosu chöngnyön toeim kinyöm nonchong 1*, pp. 673-81. Seoul: Sambul Kim Wönyong kyosu chöngnyön toeim kinyöm nonchon kanhang wiwönhoe. (in Korean)
- Kim, Wönyong (1991) "Ancient Korean envoys on a wall painting in Samarkand." In *Korean culture and the Silk Roads*, pp. 183-5. Seoul: Korean National Commission for UNESCO. (in English)
- Kwon, Y.P. (1991) "Ancient Korean art and Central Asia: non-Buddhistic art prior to the tenth century." *Korea Journal* 31.2: 5-20. (in English)
- Lee, Insook (1988) "Ancient glass in Korea." *Annales du 11e congrès de l'Association Internationale pour l'Histoire du Verre, Basel*, pp. 281-90. Amsterdam: A.I.H.V. (in English)
- Lee, Insook (1989) "Han'guk kodaie yuri-üi punsök chök yöngu 1" [Analytical study of Korean ancient glass 1]. *Komunhwa* 34: 84-93. (in Korean)
- Lee, Insook (1990) *Han'guk kodaie yuri-üi kogohak chök yön'gu* [Archaeological study of ancient glass in Korea]. Ph.D. dissertation, Department of History, Hanyang University, Seoul. (in Korean)
- Lee, Insook (1993) "The Silk Road and ancient Korean glass." *Korean Culture* 14.4: 4-13.
- Lee, I.; Brill, R.H. & Fenn, P.M. (1991) "Chemical analyses of some ancient glasses from Korea." *Annales du 12e congrès de l'Association Internationale pour l'Histoire du Verre, Vienna*, pp. 163-75. Amsterdam: A.I.H.V.
- Lee, K.M.; Lee, Y.H.; Yoon, K.H. & Shin, D.K. (1989) "Uich'ang Tahori yujök palgul chinjön pogo" [Research report of excavation of the Proto-Three Kingdoms burial site at Tahori in Uichang-gun]. *Kogohakchi* 1: 5-174.
- Loewe, M. (1971) "Spices and silk: aspects of world trade in the first seven centuries of the Christian era." *Journal of the Royal Asiatic Society of Great Britain and Ireland* 2: 21-39.
- Ota, H. (1989) "Yoshinogari to Kitakyushu no Yayoi jidai" [Yoshinogari site and Kitakyushu in the Yayoi period]. *Yomiuri Special* 31: 38-41. (in Japanese)
- Seligman, C.G. & Beck, H.C. (1938) "Far Eastern glass: some Western origins." *Bulletin of the Museum of Far Eastern antiquities* 10: 1-80
- Shi, M.; He, O. & Zhou, F. (1986) "Investigations of some Chinese potash glasses excavated from tombs of the Han Dynasty." In *Archaeometry of glass: papers of the 14th International Congress on Glass*, edited by H.C. Bhardwah, sec. 2, pp. 15-20. New Delhi.
- Stern, E.M. (1991) "Early exports beyond the empire." In *Roman glass: two centuries of art and invention*, pp. 141-54. London: Society of Antiquaries.
- Whitehouse, D. (1987) "The provenance and date of a distinctive group of late Roman glass objects." Corning, NY: The Corning Museum of Glass. (reprint of unpub. paper)
- Yamasaki, K. (1974) "Chemical compositions of ancient glasses found in Japan." *Proceedings of the Tenth International Congress on Glass* 2: 15-20. Kyoto. (in English)
- Yoshimizu, T. (1977) *Töyö no garasu* [Glass of East Asia]. Tokyo: Sansaisha. (in Japanese)

## Crowning glory: headdresses of the Three Kingdoms period

Lisa Kay Bailey

Archaeologically, the Three Kingdoms period in Korea subsumes a span of approximately three and a half centuries, from around AD 300 to the mid-7th century. During this period the peninsula was divided into three distinct cultural and political entities: Koguryö in the north, Paekche in the southwest and Silla in the southeast. In addition, a federation of small states known collectively as Kaya occupied territory in the Naktong river basin (Figure 1). Kaya was eventually absorbed by Silla in AD 582; and with the help of Tang Chinese allied forces, Silla succeeded in unifying the peninsula in AD 668.

Study into the material culture of early civilizations such as the Three Kingdoms tends to rely heavily on tomb data. Evidence of mortuary practices constitutes the material residue of intentional behaviour on the part of the living members of society to produce a specific environment for the deceased. In this context, the choice of tomb construction, the inclusion or exclusion of certain types of burial goods, the adornment of the body and so on can be treated as social messages. When decoded, these may provide some of the lost information about any given society concerning outside cultural influence, belief systems, social hierarchy as well as funerary customs.

In this paper, I analyse such external stimuli through discussion of one type of burial object, the crown or headdress, which affected the arts and traditions of each of the Three Kingdoms. In doing so, I particularly hope to highlight the distinctive aspects of Silla tomb culture which set it apart from the rest of the peninsula.

### Koguryö

Bordering on China, the kingdom of Koguryö was strongly influenced by the influx of northern Chinese culture. This was facilitated through the so-called Four Chinese Commanderies to the north of the Han River, which existed between 108 BC and AD 313. Koguryö was also the first of the Three Kingdoms to receive Buddhism



from China in AD 372. As a result, Buddhist motifs were readily adopted by Koguryō craftsmen and artisans.

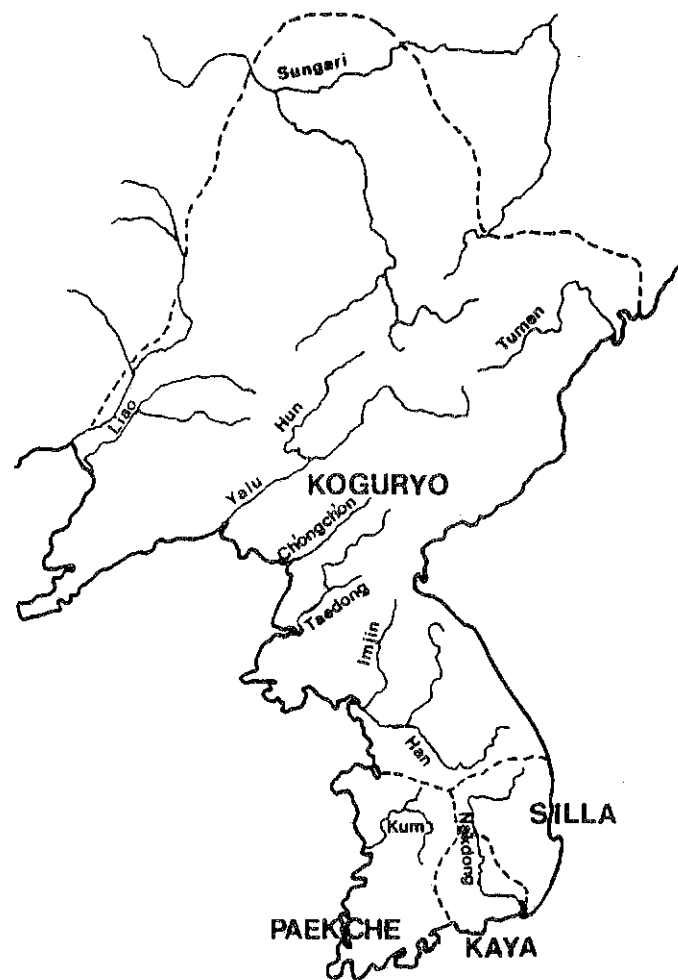


Figure 1 The geographical divisions of the Korean peninsula in the Three Kingdoms period, AD 300-668.

The early native tomb structures employed in Koguryō were simple cairns which gradually developed into stepped, stone pyramid-like structures. A new burial type introduced from China consisted of stone-built chambers surmounted by earthen mounds. These structures became popular interments for the Koguryō elite during the mid-4th to early 7th centuries AD. Located around the Koguryō capitals of

Tonggou and P'yōngyang, these tombs were often decorated with multi-coloured murals. Scenes of Chinese cosmological imagery and auspicious symbolism, as well as depictions of daily activity, mingled with Buddhist motifs such as lotuses and flying apsarasas.<sup>1</sup> Due to the easy accessibility afforded by their horizontal entranceways, all Koguryō chamber-tombs discovered to date have been robbed of their burial goods, leaving only fragmentary relics.

Amongst the scant materials from Koguryō is a gilt bronze crown discovered at the fortification at Ch'ōnggam-dong, P'yōngyang (Figure 2). The circlet is decorated with plant motifs in open-work, with six-petalled flowers attached at regular intervals. Above the circlet are a number of open-work ornaments whose design is reminiscent of leaping flames around a circular core. These ornaments share stylistic affinity with the flaming mandalas often seen on Buddhist bronze work reflecting the artistic influence of the Northern Wei period in China (AD 386-535).<sup>2</sup>

### Paekche

While Koguryō was thus clearly influenced by northern Chinese traditions, Paekche enjoyed close relations with the southern courts of China. Buddhism was introduced into Paekche in AD 384, and the art of this kingdom shows a preference for Buddhist subject matter imbued with the artistic elegance of the southern Chinese

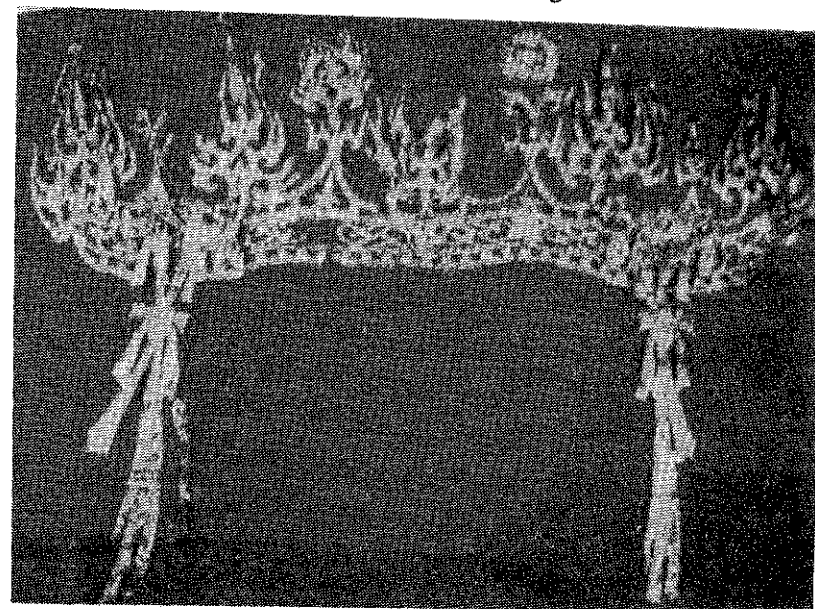


Figure 2 Gilt bronze crown from the fortification at Ch'ōnggam-dong, P'yōngyang, 6-7th c. AD. (Han 1987: pl. 188)

<sup>1</sup> For colour illustrations of Koguryō tomb wall paintings, see Chosen Gahosha Shuppanbu (1985).

<sup>2</sup> For similar designs on flaming mandalas of the Northern Wei period, see Sickman & Soper 1982: 103-5; figs. 63, 64, 65).

style.<sup>3</sup> The tombs of Paekche were predominantly earth-covered mounds with stone or brick chambers and long horizontal entranceways. As with Koguryŏ tombs, they have proved easy to penetrate and rob of their contents; as a result, few burial objects have survived.

In 1971, however, a unique unspoiled Paekche tomb was discovered on the outskirts of the former capital of Paekche, present-day Kongju. Epitaph plaques identified the occupants as a famous Paekche ruler, King Muryŏng (r. AD 501-523) and his Queen (Munhwajae Kwalliguk 1974). The tomb was constructed according to contemporary Chinese funerary structures, using moulded bricks decorated with geometric patterns and lotuses. The decoration of many burial objects found in the chamber reflects a preference for Buddhist-derived floral and plant motifs, which were particularly popular in the southern Chinese court of Liang (AD 502-557). Two pairs of gold open-work cap ornaments, thought to have been originally attached to silk headgear worn by the King and Queen, illustrate this influence.

The cap ornaments of the Queen are symmetrically oriented arrangements of half and full palmette leaves which flank a central lotus base (Figure 3). Spouting from a vase-like receptacle above the base is a fully opened lotus blossom topped with a palmette leaf. A strikingly similar design is seen on a moulded tile from the brick tomb of the southern Chinese style at Dengxian, southwest Henan province, dated to the second quarter of the 6th century AD. In this symmetrical configuration, the vase with lotus base and palmette sprig is flanked on either side by flying apsaras (Juliano 1980: 102; fig. 58).

The cap fixtures belonging to the King have also been created using a similar arrangement of full and half palmette leaves (Figure 4). However, they have a more asymmetrical flame-like design, and the attachment of many small gold foils to each piece further enhances their dynamic outline. Stylistic similarities between these ornaments and Liang-dynasty Chinese motifs are evident when compared to funerary monuments in Nanking—such as the stone stele of Xiao Hong who died in AD 526 (Juliano 1980: 111; fig. 87).

### Silla

While Koguryŏ and Paekche were heavily influenced by the arts and traditions of northern and southern China respectively, the kingdom of Silla, in the southeast, was shielded from direct access to Chinese culture due to its distant geographical location. It was the last of the Three Kingdoms to receive Buddhism, in AD 535; thus it maintained native cultural traditions, which are well evidenced in its funerary remains.

Excavations on the plains of the former Silla capital (present-day Kyŏngju) over the last 70 years or so, have provided a wealth of material with which to study Silla

<sup>3</sup> For a detailed examination of the artistic similarities between Korea and southern China during this period, see Bush (1989).

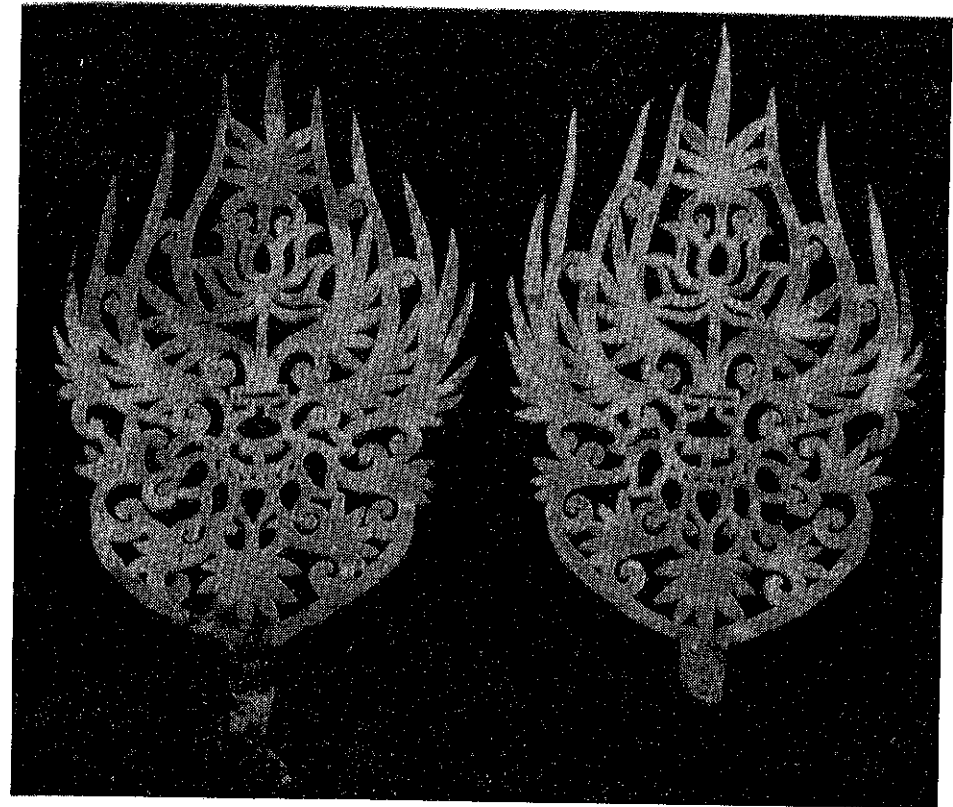


Figure 3 A pair of gold cap ornaments belonging to Queen Muryŏng, early 6th c. AD. (Munhwajae Kwalliguk 1974: pl. 2)

tomb culture (cf. Ch'oe 1992). The number of burial chambers found with their funerary objects intact attests to the impregnable and highly distinctive type of tomb structure employed solely at the Silla capital. Such structures, known as *choksok mokkwangpun* ('stone-surround wooden-chamber tombs'), were built by firstly digging a deep or shallow pit into which a wooden chamber with a vertical shaft was installed. Any gap between the pit wall and the wooden chamber would be filled in with river cobbles. At the conclusion of the funerary ceremony, the shaft was sealed with a wooden lid, which was then covered with a huge pile of stones and further mounded over with earth. In addition, layers of clay applied over the stone pile—and the outer earthen mound itself—acted as barriers to water seepage. Finally, a wall of perimeter stones was built around the mound, marking its boundaries. When the wooden chamber eventually collapsed through decay, the stones and earth above would fill in the chamber space, making it almost impossible to pilfer. At the time

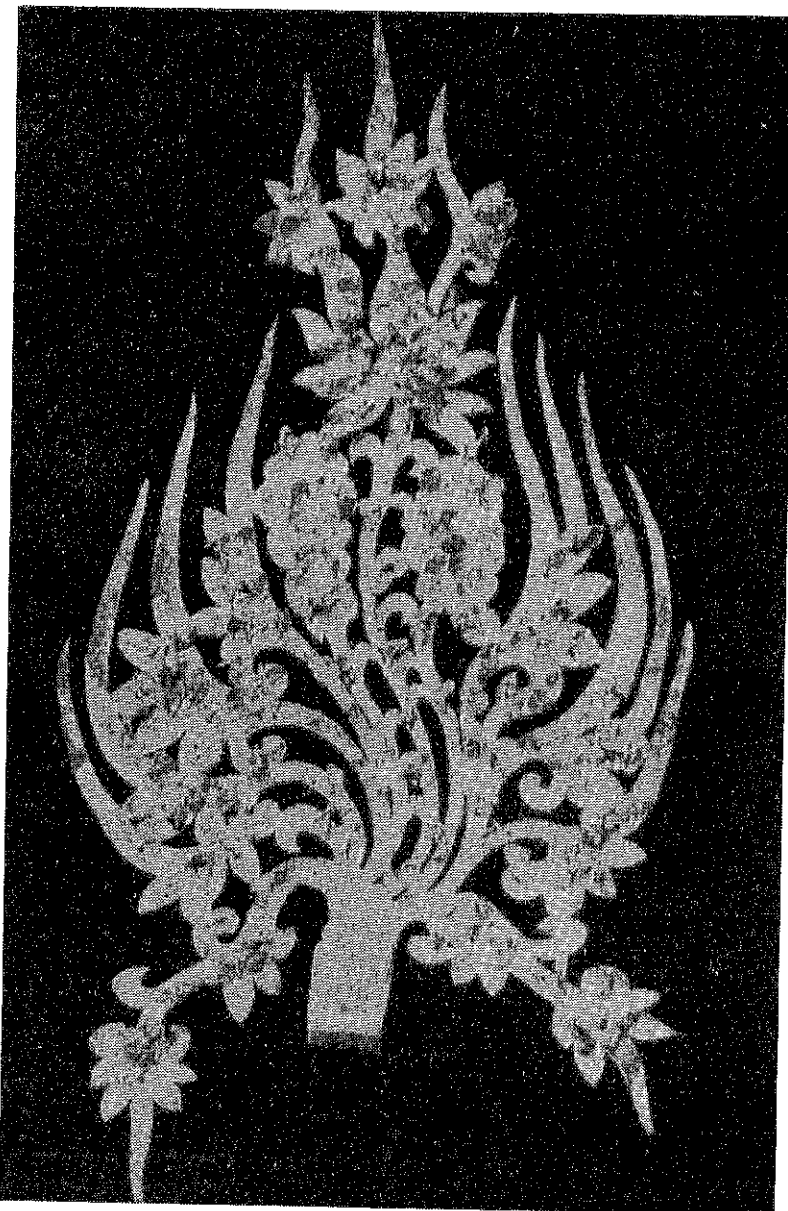


Figure 4 One of a pair of gold cap ornaments belonging to King Muryōng, early 6th c. AD. (Munhwajae Kwalliguk 1974: pl. 3)

of construction, some mounds were doubtless of impressive size: the double mound of Tomb 98 at Hwangnam is about 20 metres high and 120 metres in lengthwise diameter (Munhwajae Kwalliguk 1985).

Many tombs excavated on the Kyōngju plains have yielded a wide variety of burial objects, including earthenware vessels, glass and lacquerware, and bowls made of pure gold and silver. The bodies interred in some of these tombs were adorned with an array of personal ornaments. These included crowns, ear pendants, necklaces, belts and funerary shoes—all made from precious metals. The quantity and quality of the goods found in these tombs indicate that they were burial chambers of the high ranks of the social hierarchy.

The most sumptuous chambers can be distinguished further by the inclusion of crowns made from thin sheet gold which had adorned the head of the deceased, such as that recovered from the North Mound of Tomb 98 at Hwangnam-dong, Kyōngju (Figure 5). Dated to the mid-5th century AD, this crown is thought to be the earliest of its type found to date. The design of these royal gold crowns of Silla, of which five have so far been discovered, all follow the same stylistic pattern. This consists of a gold circlet to which five upright ornaments are attached. The three ornaments placed at the front of the circlet are each composed of a central vertical stem, with three pairs of right-angled branches—all terminating in a bulbous shape. The remaining two are gently curving, antler-shaped uprights positioned at the rear of the circlet.

All crowns of this type are embellished with small gold foils, and all but one crown—that recovered from the Gold Bell Tomb—are also decorated with *kogok* ('curved jades'), which are attached to the crown with gold wire. Pendants liberally decorated with more gold foils hang in front from thick hollow rings. One crown of this type found in the Auspicious Phoenix Tomb deviates slightly from this format. Three birds are perched on a triple branch finial which is attached to a simple inner frame of intersecting gold bands.<sup>4</sup>

There has been some debate as to the precise function of these crowns. Their flimsy construction and elaborate embellishment have led to the widespread belief that they were either for purely funerary use, copied from a sturdier model worn during the owner's lifetime, or used during special rituals or ceremonies.

#### Silla crown descendants and Central Asian prototypes

Judging from the funerary goods found to date, the distinctive design of the Silla crowns has no direct parallel in China. However, crowns following their general shape have been recovered from tombs in former Kaya territory as well as in Japan (cf. Ishikawa 1987). A gold crown, reportedly from Koryōng, North Kyōngsang province in former Kaya territory and dated to between the 5th and 6th centuries

<sup>4</sup> Colour illustrations of this crown are to be found in Han (1983: 72-3; figs. 65, 66).

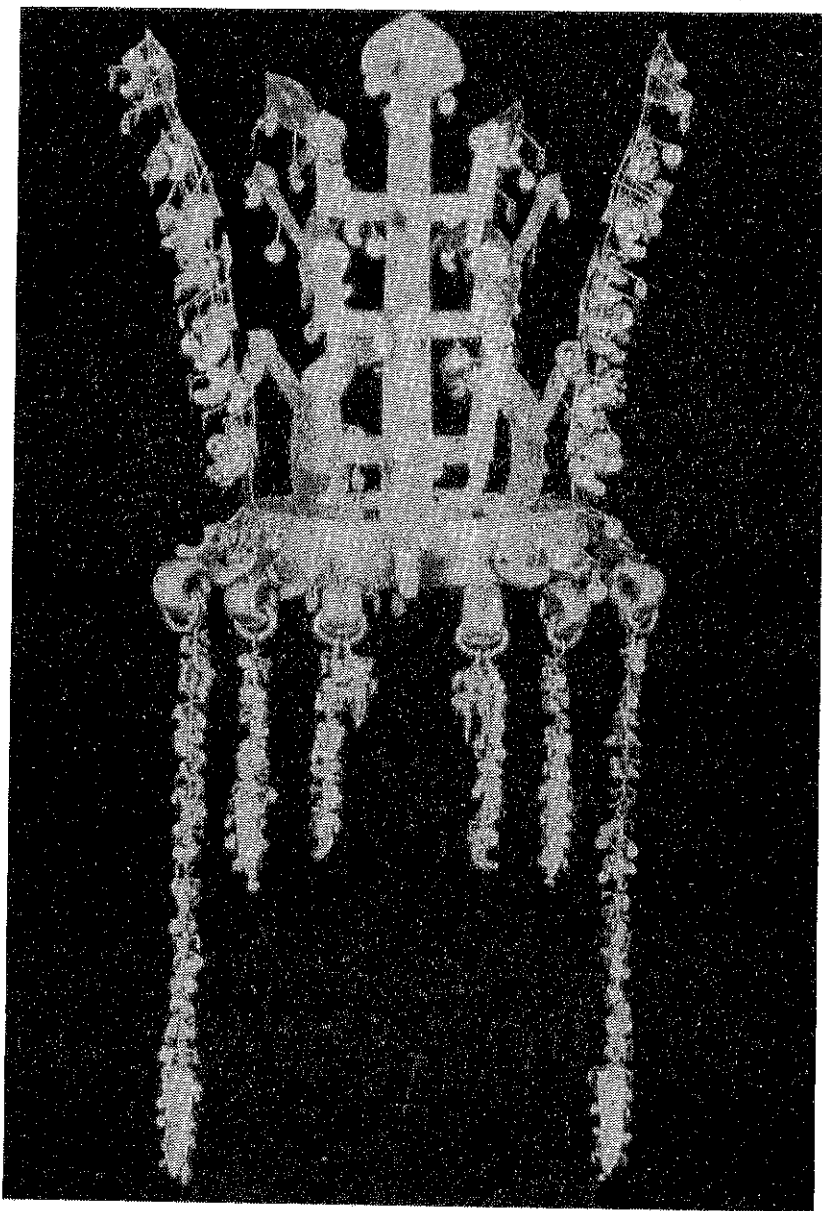


Figure 5 Gold crown from the North Mound chamber of Hwangnam-dong Tomb 98, Kyōngju, early mid-5th c. AD. (Munhwajae Kwalliguk 1985: pl. 6)

AD, shows a modest variation of the elaborate Silla crown type. It has four short uprights with the same bulbous terminating shape, while the paired branches on each stem curl downwards, rather than upwards at right angles. The crown is decorated with gold foils and curved jades in a fashion similar to the Silla crowns (Han 1983: 97; fig. 91). A gilt bronze crown recovered from the late 6th-century Fujinoki tomb in Nara prefecture, Japan, shows a similar scheme of tree and bird motifs (Kashikōken 1989: 34; pl. 60). The 6th-century Sannō Futagoyama tomb, in Gunma prefecture, Japan, also yielded a gilt bronze crown similar in shape to the Silla gold crowns, with gilt bronze foils and elongated branch-like uprights terminating in bulbous shapes (Gunma 1990: 81; fig. 115).

While the above examples provide evidence of the dissemination of the Silla crown shape and choice of motifs, they do not aid the quest for its stylistic prototype. In order to trace the origins of the Silla crown—in which tree, antler and bird motifs are present—it is necessary to consult materials from tombs of the Scytho-Siberian culture (*cf.* Kang 1983).

The term Scytho-Siberian is used to describe the people and culture which stretched across the steppe and mountain region of Eurasia in the latter half of the first millennium BC (Figure 6). This term includes, but is not limited to, Scythians in the West, Sakas in Central Asia and Xiongnu in the Far East. These nomadic and semi-nomadic peoples lived between the broad stretches of mountain ranges, with natural corridors providing accessible routes from one grassland to another. In this environment, the exchange of cultural items was swift, causing widespread coexistence of certain motifs (*cf.* Jettmar 1967).<sup>5</sup> Tree, antler and bird depictions on items found in Scytho-Siberian tombs may have influenced the design of the Silla gold crown.

The popular employment of tree and antler forms in a ritualistic context is evidenced in goods excavated from the Pazyryk tombs, or barrows, dated to around the 4th century BC (Rudenko 1970). As indicated in Figure 8, the Pazyryk site is located near the Russian frontier with Mongolia and China. These interments, of which eight have been excavated, are considered to be those of Xiongnu chieftains. Interestingly, the Pazyryk burials were similar in construction to stone-surround wooden-chamber tombs in Kyōngju. All had circular mounds, the largest measuring up to 40 metres in diameter, with rectangular pits into which wooden chambers had been installed. When sealed, the chambers were covered with a thin layer of earth which was then topped with a large pile of stones.

Amongst the objects recovered from Barrow 5 were five full sets of horse trappings, all containing stag masks with large antler tines made from leather. It is

<sup>5</sup> For a detailed examination of the stylistic interchange between these peoples, see Jacobsen (1983, 1984, 1988).

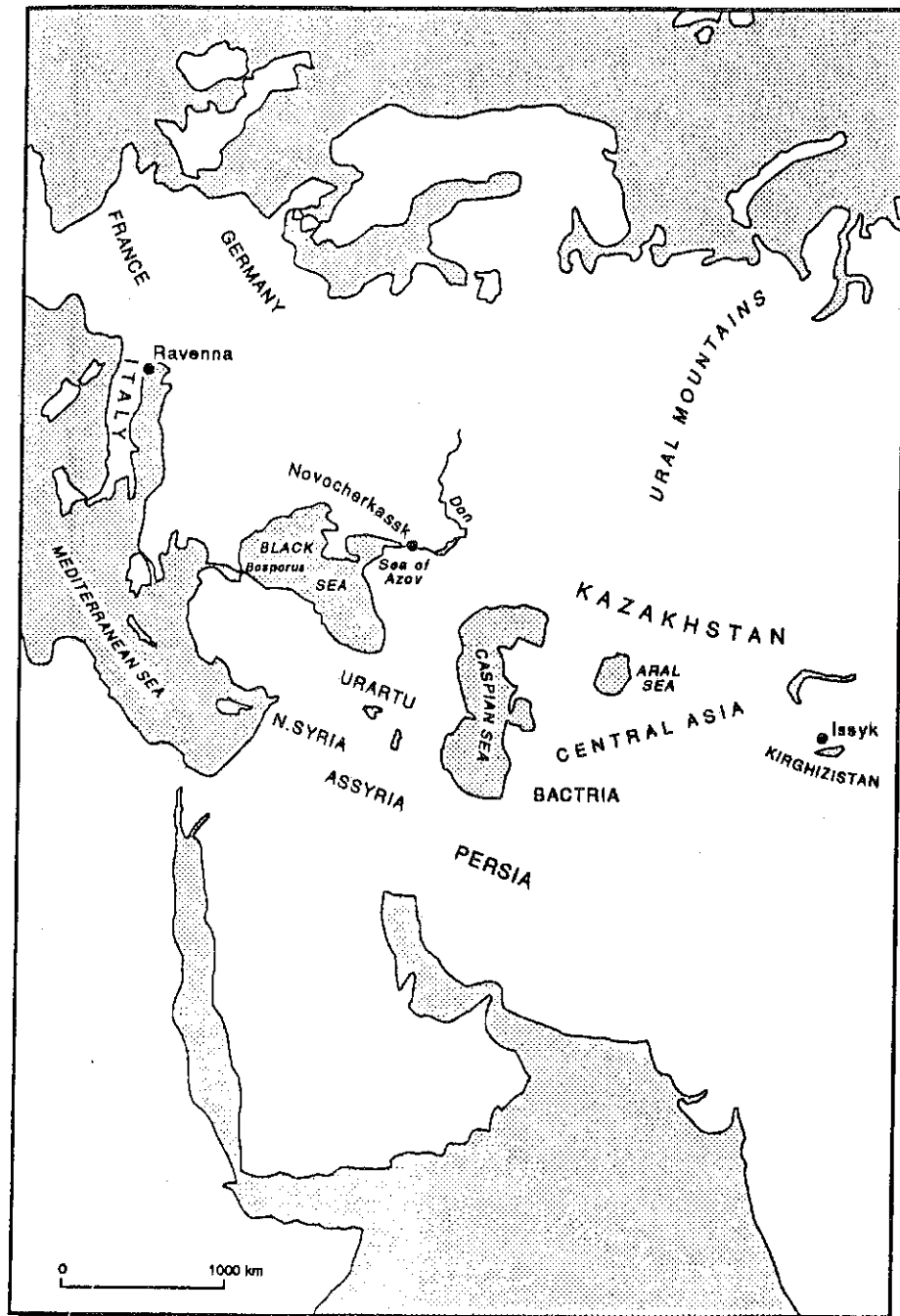
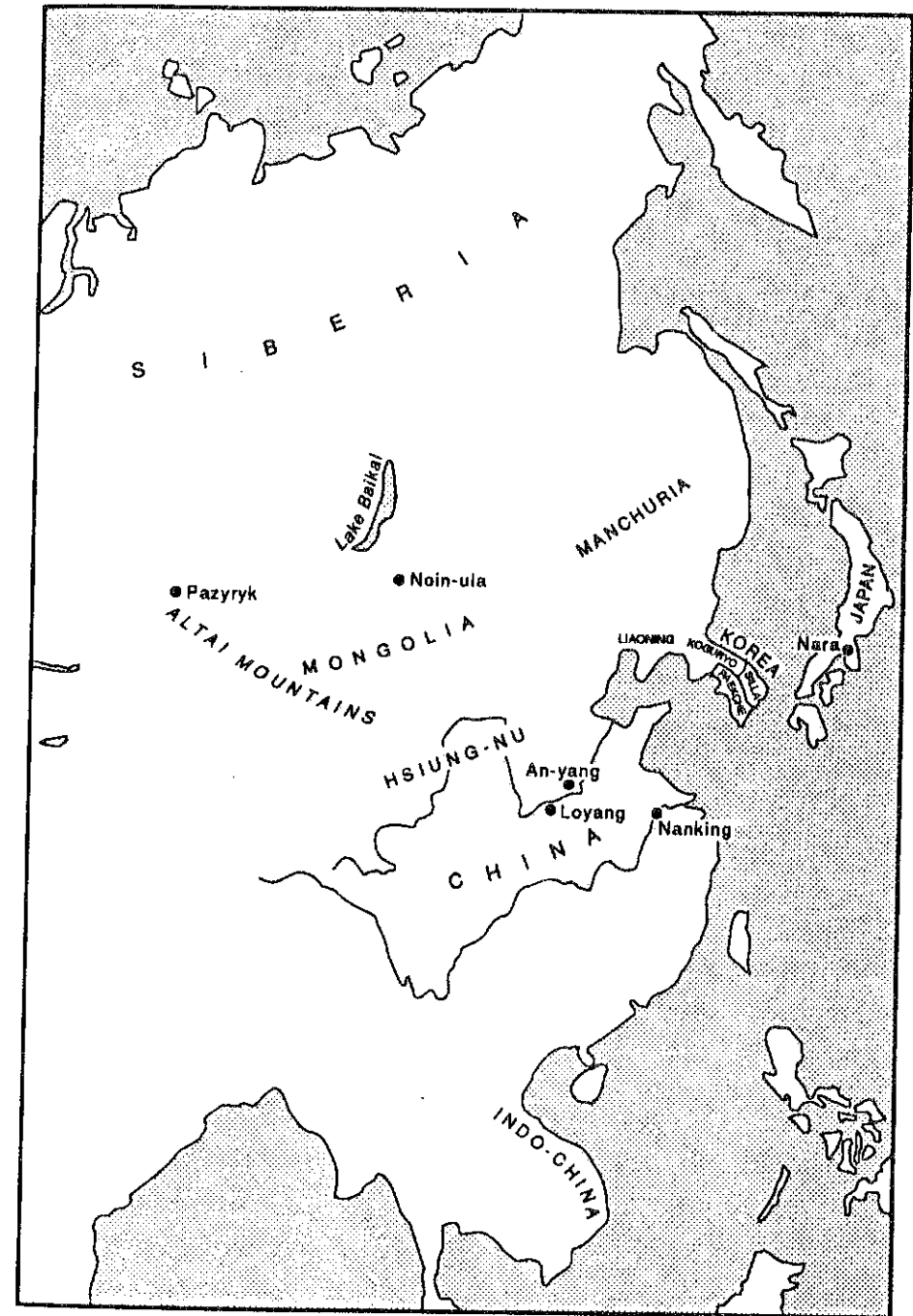


Figure 6 The steppe and mountain region of Eurasia during the first millennium BC.





believed that these masks indicate an earlier dependency of the nomadic peoples on the strength and supremacy of the reindeer for riding and pulling, a dependency which would be recalled at times of ceremony and ritual. In some instances, the antlers of the mask were topped with griffin heads, exemplifying the merging of tree and stylised antler motifs. Barrow 5 also yielded a felt appliqué wall hanging in which tree and antler forms are again present. The scene shows a figure, seated on a throne, holding a blossoming branch and facing a mounted rider (Figure 7). Behind the rider (not shown here) stands a winged sphinx-like creature crowned with a large splayed antler (Figure 8). The wall hanging appears to illustrate a ritual or ceremony, with the seated figure probably representing Apia, goddess of the Earth, promoting fertility and rebirth. The branch consists of five pairs of different shaped flowers which may represent the Tree of Life, symbolic of her life-giving forces. The significance of the antlered creature is unclear; but given the context, it would appear to be a benevolent force, complementing the presence of the goddess. Material from this tomb indicates the importance attached to tree and stag motifs as symbols of regeneration, fertility and strength.



Figure 7 Detail of a scene on a felt appliqué wall hanging from Barrow 5 at Pazyryk, Russia; 5th c. BC. (Rudenko 1970: pl. 154)



Figure 8 Winged creature with antler crown on the felt appliqué wall hanging from Barrow 5 at Pazyryk, 5th c. BC. (Rudenko 1970: pl. 173)

During the excavation of a cemetery site at Issyk, 50 km east of Alma Alta, a sumptuous burial yielded numerous precious ornaments including many small gold plaques, a gold belt and a headdress depicting tree and bird motifs (Akishev 1978). The occupant of this tomb, dated to the 4th or 5th century BC, was a male, and judging from the quality and nature of the items, he was probably a spiritual or political leader. The tomb consisted of a wooden chamber installed within a pit,

with rocks placed in the gap between the pit and chamber walls. A large earthen mound had been built over the chamber and a circular row of perimeter stones placed around the mound. With the decay of the wooden chamber, the central part of the mound had caved in and had filled the space of the chamber below.

A conical three-sided hood found at Issyk was covered with gold appliqué images (Figure 9). Of particular note are the rows of jagged peaks from which sprout stylized trees topped with birds. The overall scheme of the headdress, showing ascending layers of beasts, rocks, trees and birds, is thought to describe the vertical rise associated with the journey of the soul at death (Jacobsen 1985: 140-1). In this

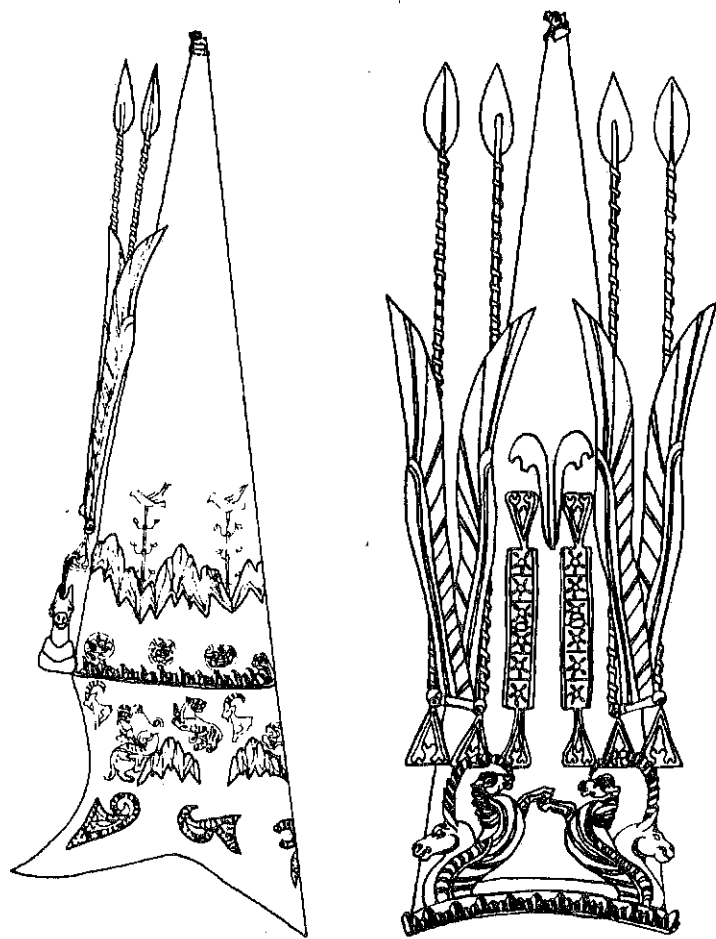


Figure 9 Hood with gold ornaments from the Issyk cemetery site, Russia 4-5th c. BC. (Akishev 1978: fig. 63)

context, the bird is seen as the ultimate mediator between earth and the heavenly realm, carrying the soul of the departed to the next world. The tree motifs within this scheme may also be interpreted *not* as the Tree of Life representing regeneration and fertility but as the embodiment of the concept of the World Tree. This symbolises a hierarchical structure which distinguishes between chaos and order, the structure of the tree itself representing an ideal organizing system. Within the mythical scheme portrayed on this headdress, the World Tree Structure is analogous to the bird or heaven at the top, the hooved animal in the middle range, and the fish and snake at the base.

Evidence of the continuing employment of these motifs on headdresses is found two or three centuries later in the Samartian *kurgan* burial in Novercherkassk on the northeastern shore of the Black Sea (Minns 1913: 230-6). Dated to around the 1st to 2nd century BC, the burial goods included many gold objects studded with precious stones and hundreds of small plaques which were originally sewn on to clothing. The quantity and quality of these goods indicate that this was probably a royal burial, possibly of a queen.

The gold crown consists of a wide gold circlet inset with a miniature bust of a Roman empress fashioned from quartz, and large amethysts and garnets (Figure 10). Gold pendants hang down from the base of the crown, as they do in the Silla crowns. Gold trees arranged around the top of the crown are interspersed with deer or stags sporting spayed antlers. The tallest tree is placed in the centre of the crown and seems to be growing out from the centrally located quartz head. This scheme is thought to depict the Tree of Life from which the antlered creatures are deriving nourishment (Martynov 1991: 110-11); it may represent a reordering of familiar motifs into a new and original arrangement.

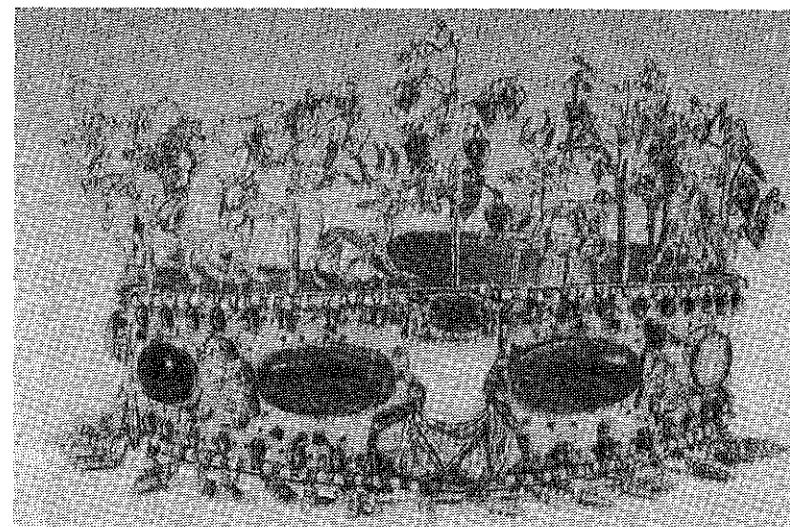
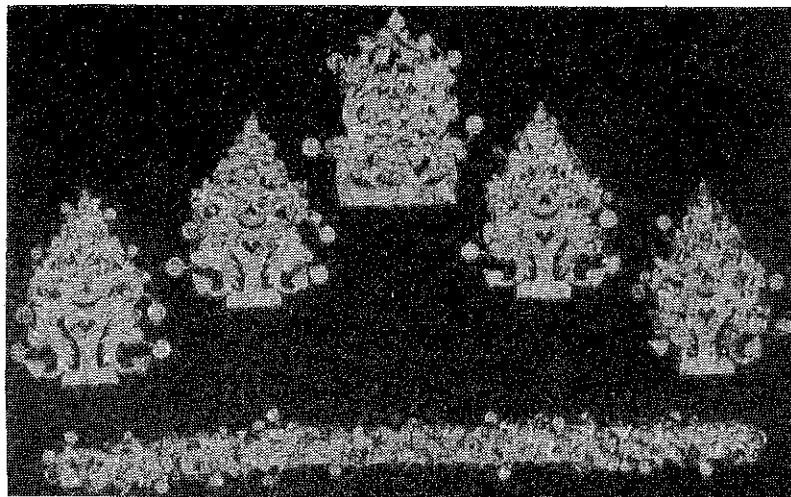


Figure 10 Gold crown from a Samartian kurgan burial in Novercherkassk, 1st-2nd c. BC. (National Museum of Korea 1991: pl. 203)

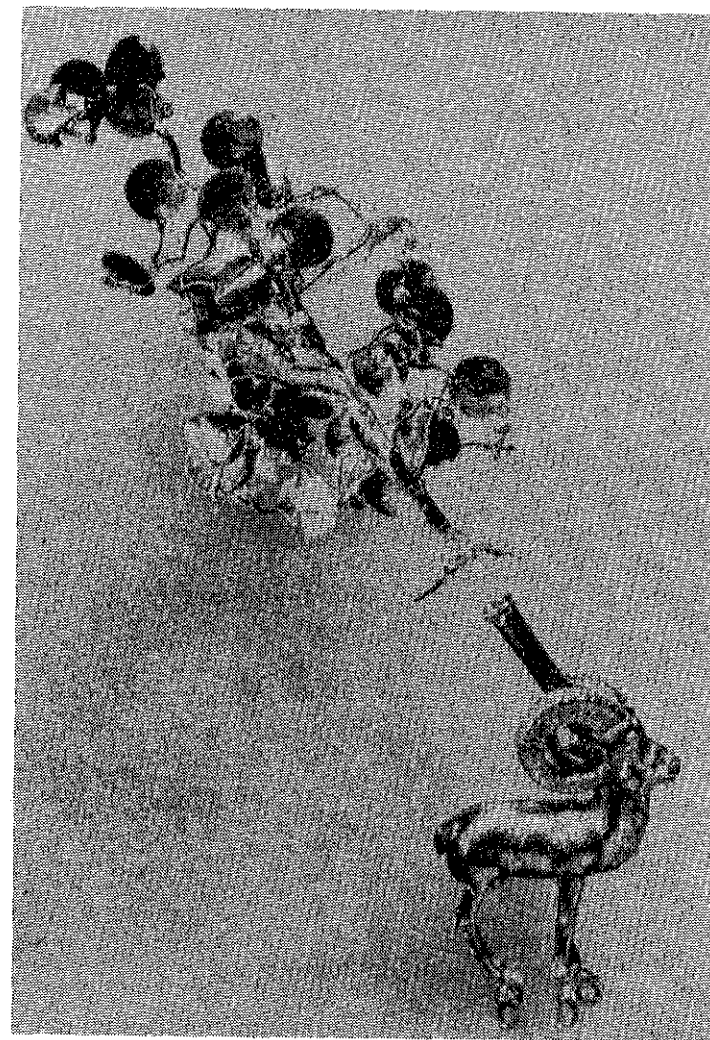
Although the design of the Silla crowns shares common stylistic characteristics with the headdresses from Issyk and Novercherkassk, the latter do not share the same lineage of metal working techniques, such as the use of thin sheet gold, gold foils and open-work designs which are distinctive features of Silla craftsmanship. A crown which bears much closer resemblance to the Silla pieces in these respects—and combines tree and bird motif—was discovered adorning the head of a young female from Tomb 6 at the burial site of the Tillya Tepe necropolis in the former kingdom of Bactria, in present-day northern Afghanistan. Dated to the 1st century AD, the site is thought to be the cemetery of a royal or noble family of Kushans who migrated from southern Siberia and settled in the kingdom of Bactria in the mid-2nd century BC (Sarianidi 1985).

Constructed from thin sheet gold, the Tillya Tepe crown comprises a gold circlet decorated with gold foils, to which five upright ornaments are attached (Figure 11). Each ornament is designed as a stylised tree with six-petalled florets, originally inset with turquoise stones, and gold foils attached with fine gold wire throughout. At the top of each tree are perched pairs of birds with upstretched necks and outspread wings. While the Silla crowns are constructed solidly, with each upright attached to the headband by tiny gold rivets, this Tillya Tepe headdress consists of six separate pieces. The ends of the headband are secured together with gold loops, and each tree ornament is attached to the band by small gold rivets, which were inserted through slots located on the inside of the headband and on the back of each ornament. This type of construction, facilitating easy assemblage and dismantling, suggests that the crown was made to be worn in life rather than purely as funerary adornment. Although its precise function is not known, it was probably either worn during specific rituals or as a symbol of leadership. It has been suggested that this crown was so designed as to be easily packed away and transported vast distances in accordance with nomadic lifestyle (Sarianidi 1985: 13).



**Figure 11** Gold crown recovered from Tomb 6 at the Tillya Tepe necropolis in the former kingdom of Bactria (modern Afghanistan), 1st c. AD. (Sarianidi 1985: pl. 15)

Another ornament combining tree and horned ram or ibex images within a gold headdress was found in Tomb 4 at Tillya Tepe (Figure 12). According to the excavation report, the head of the male occupant had been placed on a small cushion, which had itself been positioned on a gold bowl (Sarianidi 1985: 35). Attached to the upper edge of this bowl was the tree ornament affixed to the ibex figure, suspended above the head of the deceased. The tree constitutes a gold trunk from which protrude branches made from thin gold wire. Round gold foils and tiny pearls, representing leaves and fruit, decorate the branches.



**Figure 12** Gold headdress ornament from Tomb 4 at Tillya Tepe. (Sarianidi 1985: pl. 15)



Although the gold crown of Tomb 6 at Tillya Tepe is undoubtedly both technically and stylistically most similar to the Silla crowns found to date, the question of the transmission of these metal working techniques and motifs to Korea has to be addressed. Evidence from tombs excavated in Liaoning suggests that northeast China may have provided the point of entry for these objects into the Korean peninsula. Burial hoards, which include gold items, glassware, stirrups and other horse trappings, recovered from tombs in this region, confirm the presence of various groups of non-Chinese nomadic peoples who established successive short-lived states after the fall of the Han empire in AD 220.<sup>6</sup> Certain tombs in particular have yielded gold objects whose design and technical craftsmanship attest to the presence of the type of gold-work seen at Tillya Tepe.

For example, amongst the numerous precious items recovered from Tomb 2 at Fangshen, in Liaoning province, dated to the Northern Jin period (AD 265-316) were two pairs of gold crown or cap ornaments. Two small open-work plaques decorated with gold foils are thought to have been attached to a cap made of a material which has long since rotted away (Figure 13). The open-work patterns of

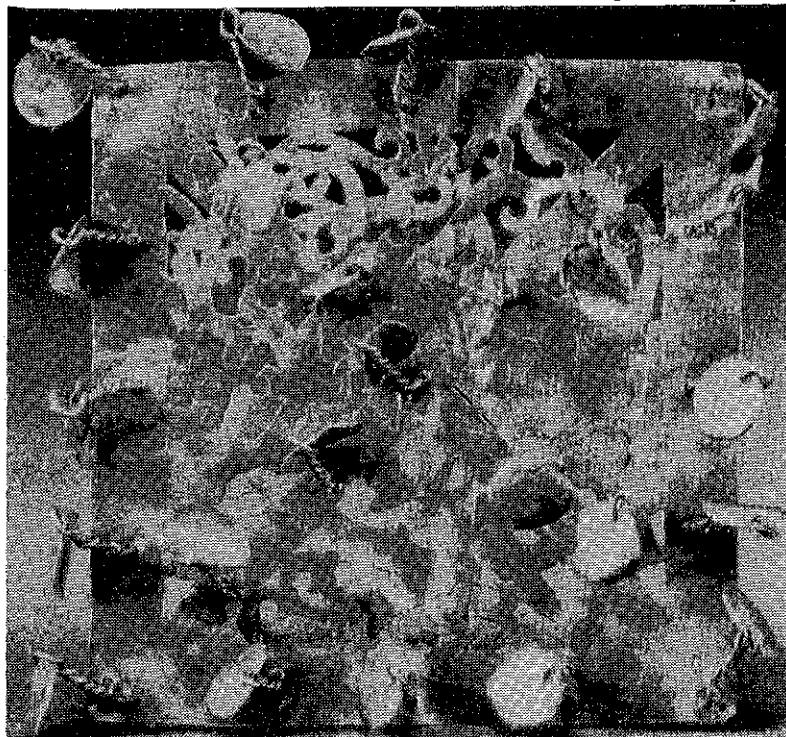


Figure 13 One of a pair of gold headdress ornaments from Tomb 2 at Fangshen, Liaoning province, China; Northern Jin period, AD 265-316. (Kashiwara Hakubutsukan 1992: pl. 2)

<sup>6</sup> For a detailed examination and comparative study of burial goods found in tombs in northern China, southern Korea and Japan dated to the 3rd-5th c. AD, see Kashiwara Hakubutsukan (1992).

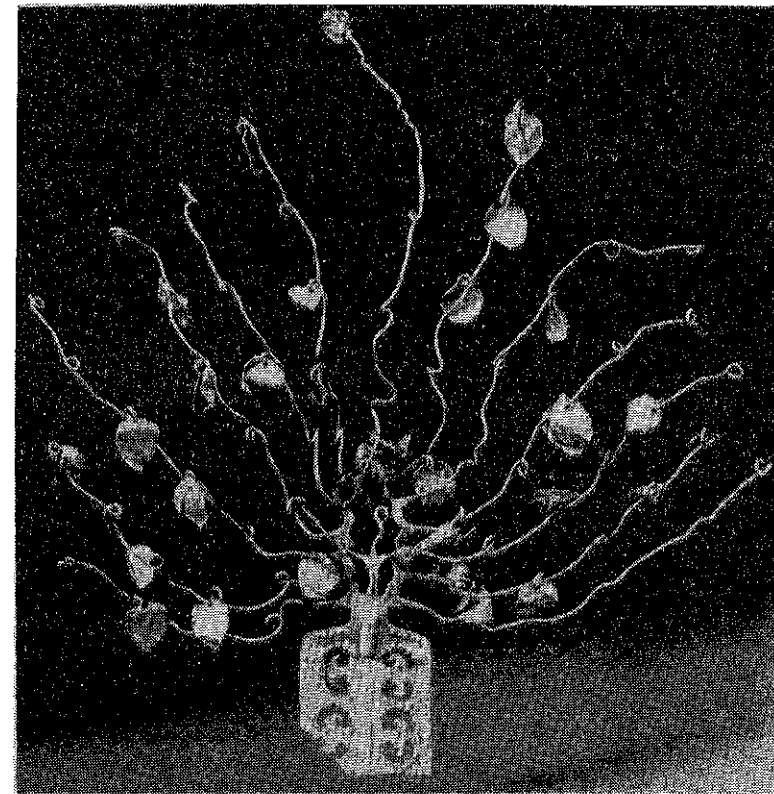


Figure 14 One of a pair of tree-shaped headdress ornaments from Tomb 2 at Fangshen. (Kashiwara Hakubutsukan 1992: pl. 3)

facing and opposing phoenixes and dragons produce a symmetrical design. This seems to indicate that they were not worn squarely on the headdress but with the intersecting bands of gold running horizontally and vertically. The other two pieces show striking similarity to the tree ornament found at the Tillya Tepe Tomb 4 (Figure 14). However, the gold foil leaves are secured to the branches by simply twisting the wiry branches to form loops. The open-work bases have a hollow shaft running up the centre for the attachment to a spike or pin protruding from the headdress.

### Conclusions

From the examples of crowns and head ornaments discussed—which share permutations of a common collection of tree, antler and bird forms—it is clear that

over a period of seven or eight centuries, certain motifs spread throughout the whole steppe region. The wandering life of nomads was clearly a major factor in this stylistic diffusion. Their frequent hostile encounters and raids to plunder enemy goods all contributed to a wide interchange of material possessions between different social groups, eventually reaching northern China and Korea.

However, it was possibly not only the nomadic lifestyle which contributed to the continued employment of the tree, antler and bird motifs within headdress forms. If these crowns were worn during specific spiritual or religious ceremonies—with their designs symbolising fundamental beliefs about life, death and regeneration—then it is not surprising that they endured the passage of time. In contrast to the ever-changing environment of daily life, the enactment of a religious ceremony involves a conscious effort to imitate the previous ceremonial performance, and by extension, all previous performances of that ceremony. In this context, ritual related items imitate their predecessors and thus tend to resist stylistic change in a way that everyday objects do not.

Judging from the limited tomb material available, it is evident that the kingdoms of Koguryō and Paekche were both heavily influenced by Chinese culture in tomb construction, religious and spiritual beliefs, and decorative and artistic taste. In contrast, the distinctive tomb structure of Silla, employing wooden chambers and huge stone and earth layered mounds, together with the design of certain burial goods, particularly that of gold crowns, strongly suggests the influx of culture from the steppe region, via northeastern China, into the Silla kingdom by the 5th century AD.

### Acknowledgments

Figure 1 drawn by G.L. Barnes and Figure 6 redrawn by Catherine Lawrence. Permission to reproduce the plates has been applied for in all cases.

### References

- Akisev, K.A. (1978) *Kurgan Issyk* [The Issyk tomb]. Moscow: Iskusstvo. (in Russian)
- Bush, Susan (1989) "Some parallels between Chinese and Korean ornamental motifs of the late fifth and early sixth centuries." *Archives of Asian Art* 34: 60-78.
- Ch'oe, Pyong-hyon (1992) *Silla kobun yōn'gu* [The study of Silla tombs]. Seoul: Ilchisa. (in Korean)
- Chosen Gahōsha Shuppanbu (ed.) (1985) *Kokuri kofun hekiga* [Murals of Koguryō Tumuli]. Tokyo: Chosen Gahōsha. (in Japanese)
- Gunma (Gunma Prefectural History Museum) (ed.) (1990) *Fujinoki kofun to Azuma no kuni no kofun bunka* [The Fujinoki tomb and the tomb culture of the eastern provinces]. Gunma: Gunma Kenritsu Rekishi Hakubutsukan. (in Japanese)
- Han, Byong-sam (ed.) (1983) *Kungbo I: kobun kumsok* [National Treasures of Korea 1: metalworks from ancient tombs]. Seoul: Yegyong Publications Co., Ltd. (in Korean)

- Han, Byong-sam (ed.) (1987) *Kobun misul* [Tomb art]. Han'guk ūi Mi, vol. 22. Seoul: Chung'ang Ilbosa.
- Ishikawa, Mie (1987) "Jumokujo risshoku kanmuri no keifu to igi" [Geneology and significance of the crown with tree-shaped ornament]. *Bulletin of the Ancient Orient Museum* 9: 45-71. (in Japanese)
- Jacobsen, Esther (1983) "Siberian roots of the Scythian stag image." *Journal of Asian History* 17: 117-20.
- Jacobsen, Esther (1984) "The stag with bird-headed antler tines: a study in image transformation and meaning." *Bulletin of the Museum of Far Eastern Antiquities* 56: 113-80.
- Jacobsen, Esther (1985) "Mountains and nomads: a reconsideration of the origins of Chinese landscape representation." *Bulletin of the Museum of Far Eastern Antiquities* 57: 133-80.
- Jacobsen, Esther (1988) "Beyond the frontier: a reconsideration of cultural interchange between China and the early nomads." *Early China* 13: 201-40.
- Jettmar, K. (1967) *Art of the steppes. The Eurasian animal style*. London: Methuen.
- Juliano, Annette J. (1980) *Teng Hsien: an important Six Dynasties tomb*. *Artibus Asiae supplementum* 37. Ascona: Artibus Asiae.
- Kang, Duk-hee (1983) "Gold crowns of Shibarghan in Afghanistan and of the Three Kingdoms period of Korea." *Korea Journal* 23.6: 16-9.
- Kashikoken (Nara Prefectural Kashiwara Archaeological Institute) (1989) *Ikaruga Fujinoki kofun gaihō* [Summary of the excavation of the Fujinoki tomb in Ikaruga]. Tokyo: Yoshikawa Hiroshi Bunkan. (in Japanese)
- Kashiwara Hakubutsukan (Nara Prefectural Kashiwara Archaeological Museum) (1992) *Tokubetsu-ten. 1500 nen mae no shiruku rōdō. Niizawa senzuka no yuihō to sono genryū* [Art from the Silk Road region 1500 years ago. Archaeological treasure of Niizawa tomb cluster]. Nara: Kashihara Kōkōgaku Kenkyūsho Fuzoku Hakubutsukan. (in Japanese)
- Martynov, Anatoly I. (1991) *The ancient art of northern Asia*. University of Illinois Press.
- Minns, E.H. (1913) *Scythians and Greeks: a survey of ancient history and archaeology on the north coast of the Euxine from the Danube to the Caucasus*. Cambridge Univ. Press.
- Munhwajae Kwalliguk (1974) *Muryōng wangnung* [Official report on the excavation of the tomb of King Muryong of the kingdom of Paekche]. Seoul: Samhwa Ch'ulp'ansa. (in Korean)
- Munhwajae Kwalliguk (1985) *Hwangnam daech'ong I (pukbun) palggul chosa pogoso* [Excavation report of the north mound of the great mound at Hwangnam]. Seoul: Munhwajae Kwalliguk. (in Korean)
- National Museum of Korea (ed.) (1991) *Sukitai hwanggum* [The Scythian gold from the Hermitage]. Seoul: Chosun Ilbo. (in Korean)
- Rudenko, Sergei I (1970) *Frozen tombs of Siberia: the Pazyryk burials of Iron Age horsemen*. London: J.M. Dent and Sons.
- Sarianidi, V. (1985) *The golden hoard of Bactria: from the Tillya Tepe excavations in northern Afghanistan*. New York: Abrams.
- Sickman, Laurence and Soper, Alexander (1982) *The art and architecture of China*. Tennessee: Kingsport Press.



## Discoveries of iron armour on the Korean Peninsula

Gina L. Barnes

The spectacular recent finds of iron armour in South Korean protohistoric tombs have renewed debate over the relationship of the Korean Peninsula and the Japanese Islands in the period of early state formation. Since the immediate post-World War II period, two theses have been vying for acceptance: that there was a Horserider conquest of Yamato by Puyö/Paekche peoples in the late 4th century AD (Egami 1964; Ledyard 1975) or that the Yamato state had a colony on the southern Korean Peninsula named Mimana (Suematsu 1958). Much ink has been spilled on both sides of the question but especially in rejecting the Horserider Theory (Kirkland 1981; Edwards 1983; Kidder 1985). The new finds of iron armour in the Kaya region—many of which types are already known from Japanese tombs—reopen the question of the role of military aggression during state formation. While these larger questions go unanswered here in this brief descriptive paper, the recent discoveries are introduced followed by commentary on their political significance, and a proposal is made for the origins of the early Pen/Insular<sup>1</sup> armour with reference to data from Mainland China.

### Chinese precedents

The practice of wearing body armour in East Asia dates back to the protohistoric periods on the China Mainland (*cf.* Dien 1981/82; Yang 1985). Bronze helmets are known from the Shang period (Table 1), iron plate helmets have been excavated from the Late Zhou period, and full body armour is depicted on the terracotta army statues from the tomb of the First Qin Emperor—well known through international exhibitions (Cotterell 1981). The types of armour represented on the Qin sculptures are quite varied in accordance with function and/or military status. Vests were constructed with longer or shorter aprons in front depending on whether the soldier

---

<sup>1</sup> The term Pen/Insular (with a slash) is used in this article to denote the Korean Peninsula and the Japanese Islands as an integral developmental unit vis-à-vis China (*cf.* Barnes 1993).

was riding a horse, driving a chariot or walking; and draped shoulder protectors could be added to the ensemble (*cf.* Dien 1981/82).

All the body armour depicted on the Qin sculptures was made of rectangular plates—some smaller, some larger. Since these plates were anchored onto a backing (or to each other) at more than one spot, the armour is called lamellar. Scale armour, in contrast, has plates attached only at the top, with the bottoms left loose to flap freely. On the Qin replicas, thongs can be seen crossing over the boundaries of some plates, while other plates have only small dots or bosses to show the connecting element. These are thought by Chinese archaeologists to represent rivets, but they could equally well represent knots of the thongs which are brought to the front through the hole, knotted, and immediately passed to the back again through the same hole (Bishop 1989). The plates themselves are thought to have been made of leather, perhaps lacquered; this would partly explain the dearth of real armour finds from this period, since the organic matter of leather plates and leather thongs would have decayed quickly. Had the armour been made of iron, then one would expect to have found some remains in archaeological excavations; moreover, had the plates been rivetted, one would expect to find rivetted armour in the earliest sequences of Korea and Japan, but this is not the case.

Flexible lamellar armour was carried forward into Han Dynasty times, when jade body suits of similar construction were made for certain deceased persons such as Liu Sheng and his wife, buried in the rock-cut tombs at Mancheng, Hebei (Ku 1973; Institute of Archaeology 1981; Kao & Yang 1983). Only for the Han period has iron armour begun to be recovered through excavation, such as the lamellar jacket from Huhehot (Dien 1982/82: fig. 15), but other types are known through tomb murals.

Figurines and tomb paintings from the Northern Wei Dynasty show the development of lamellar armour suitable for mounted warfare. Some of the figure representations, however, are wearing what look to be solid or fixed-plate chest protectors (Figure 1). The solid type was probably transformed into a type of chest armour known as *liangtai* in the Tang period, as depicted on tomb figurines (*cf.* Yang 1985: 54-5). Among the Northern Wei fixed-plate chest protectors, some are clearly shown as composed of long vertical strips, and vertical-strip chest armour is also depicted in the tomb of Dong Shou (d. 357) on the Korean peninsula (Figure 2).<sup>2</sup> As we shall see below, vertical-plate cuirasses are the earliest known form of body armour in the Pen/Insular region. Thus, Northern Wei might be the immediate source of inspiration for the development of the fixed-plate cuirass in the 4th-century Yamato and Kaya areas.

Given the dearth of Chinese examples of actual body armour (despite all the elite tombs excavated from the early historic periods), the recovery of iron body armour

on the southeastern Korean Peninsula in the early 1980s was most surprising. More curious yet, the material being recovered from the unassuming stone pit-chamber graves at the Kaya sites of Pokch'ŏn-dong and Okjŏn, for example, very much

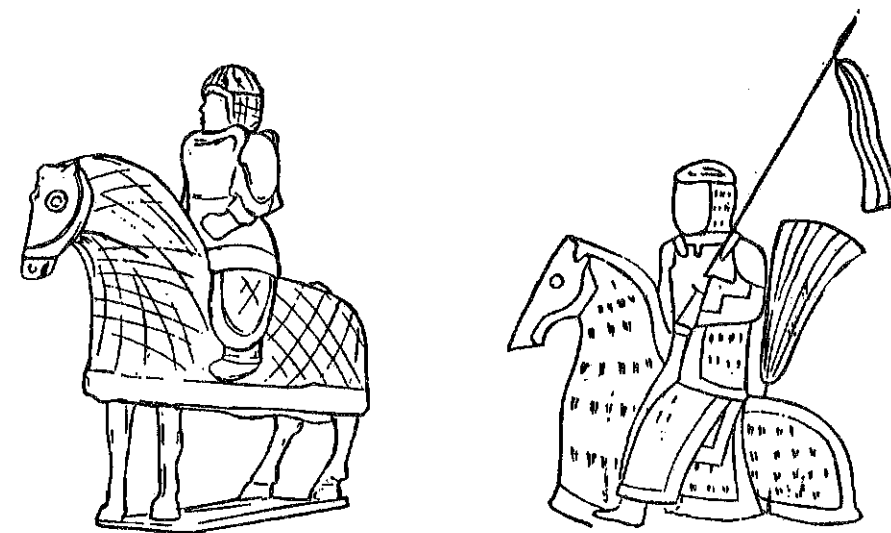


Figure 1 Northern Wei figurines and tomb painting depicting chest protectors of various construction. (Yang 1985: figs. 28, 31)

<sup>2</sup> Dong Shou is thought to have been an independent Chinese 'governor' who ruled the P'yŏngyang region between the destruction of Lelang by Koguryŏ in AD 330 and the removal of the Koguryŏ capital from Tonggou to P'yŏngyang in 374 (Gardiner 1969: 42).

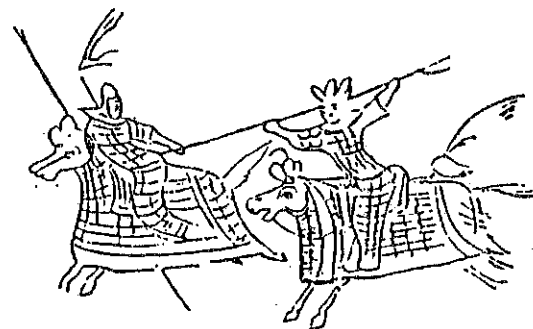


**Figure 2**  
Vertical-strip chest armour  
depicted in the Dong Shou  
tomb mural, P'yongyang.  
(Yang 1985: fig. 31.4)

resembles the examples of armour periodically excavated from the monumental tombs of the Kofun period (300-710) in the Japanese Islands. To put these discoveries into chronological and developmental perspective, both the sites and the armour types will be examined in some detail below.

**Table 1** Chronology of transformations in East Asian armour types relevant to cuirass development.

1700-1050 BC	Shang	cast bronze helmet
475-221 BC	L. Zhou	iron plate helmet from Yan
220-206 BC	Qin	terracotta army, some statues depicted wearing armour
206 BC-AD 220	Han	iron plate jacket from Huhehot, Inner Mongolia; jade body suits from Mancheng tombs, Hebei
AD 386-534	N. Wei	figurines and tomb paintings showing lamellar body suits and bib-like chest protectors
4th c.	Paekche	bone lamellae for horse bardings at Mongch'on
4th c.	Yamato & Kaya	iron vertical-plate cuirass, thonged
5th c.	Koguryō	lamellar-suited horseriders in tomb murals
5th c.	Yamato & Kaya	iron horizontal-plate cuirass, rivetted; lamellar suits
AD 618-907	Tang	liangtai chest plates depicted on tomb figurines



## Peninsular discoveries

Protohistoric armour was previously known from the Korean Peninsula in the form of 5th- and 6th-century mural paintings in the Koguryō tombs (Figure 3). Excavations in 1985 at the Mongch'on T'osōng site at the edge of the Han River in Seoul provided the first examples of real armour on the peninsula (Mongch'on 1985); these were, however, rectangular plates of bone! Each piece, ca. 10.1-11.4 cm long x 2.4-3.3cm wide, has several holes for tying together with thongs (Figure 4), and the resultant armour is interpreted by some archaeologists as horse armour—specifically, the bardings (drappings) which cover the horse's body. The fortified site of Mongch'on might have belonged to the early Paekche state, which occupied the Han River basin before being pushed south by Koguryō in AD 474.

**Figure 3** Drawings of Koguryō  
armour in 6th-century tomb  
murals at Donggou.  
(Dien 1981/82: fig. 26)

top and centre:  
Three-chambered Tomb  
bottom:  
Tomb #12

Iron armour was first discovered in southeastern Korea (the Yŏngnam area) during the Japanese occupation. Most of these finds belong to the Okura collection of the Tokyo National Museum, but the whereabouts of some of the actual objects are unknown and only their drawings remain (Anazawa & Manome 1991). Other early finds, lacking exact provenience, are kept in the Sungjŏn and Korea University museums (*ibid.*: 252-3). Since the mid-1980s, several new sites—mostly cemeteries consisting primarily of pit-chamber stone-lined graves—have been excavated in the Yŏngnam region by Korean universities and museums. These sites have yielded many different varieties and combinations of armour. If the graves once had mounds, they were very low and small—thus very different from the large round and keyhole-shaped mounded tombs which have yielded iron armour in Japan.<sup>3</sup> As of February 1993, pieces of armour had been recovered from 33 graves in Kaya territory and 9 in Silla territory, with material known from another 11 localities where the depositional context is unclear (Shin, K.C. 1993, pers. comm.). It is significant that these sites are mainly in the southeastern Kaya region, and no iron armour finds have yet been made in central Paekche or Koguryŏ territory. It is thought that these states simply did not have the custom of burying armour with the deceased, although its apparent absence might be caused by previous looting of the above-ground Koguryŏ stone pyramid tombs or insufficient excavation of Paekche tombs.

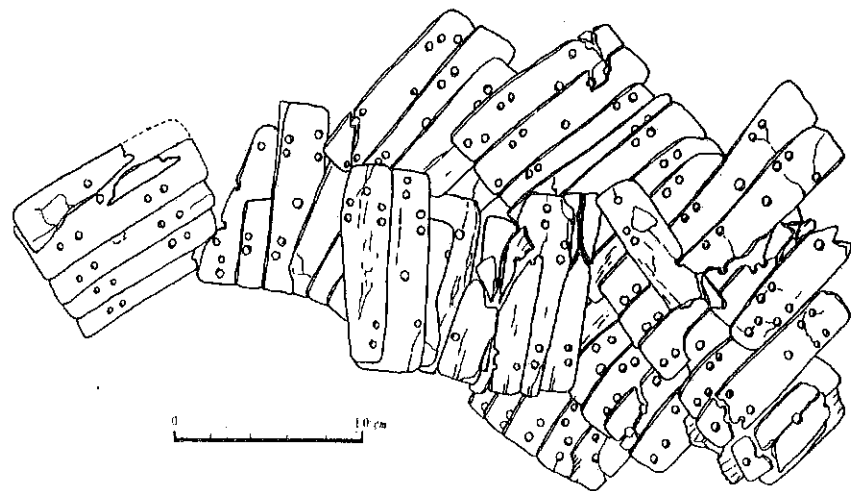


Figure 4 Bone lamellae for horse bardings, excavated at Mongch'on Tosŏng near Seoul. (Mongch'on 1985: fig. 61)

<sup>3</sup> K.C. Shin believes that highly mounded tombs were not built in the Yŏngnam region until the mid-5th century (Shin 1992: 143).

### The sites

The new sites yielding armour are large cemeteries in southern Korea (Figure 5) spanning the Late Iron Age and Three Kingdoms periods (*ca.* 1st to 6th centuries AD). These cemeteries contain a variety of burials whose structures and contents changed through time. The facilities changed from popular wood coffin burials in the 2nd century, to wood-chamber burials in the 3rd century, to pit-style stone chamber burials in the 4th century, with the introduction of the corridor-type stone chamber in the late 5th century. The special Silla-type stone-mounded wooden chamber appeared in the late 4th century, as did the first high earth-mounded tomb, also in Silla territory. In many Kaya cemeteries, earlier style burials continued even as newer ones superseded them in popularity. One important trend was for 4th-century high-ranking burials to have two chambers: the main chamber containing the deceased, made in the new stone pit-chamber style, and an accessory chamber in the older wooden chamber style or plain pit. Armour is often found in the accessory chambers rather than in the main chambers, where gold crowns provide evidence of higher status.

Some Kaya cemeteries which have recently been excavated on a large scale are Chisan-dong, Imdang-dong/Choyong-dong, Okjŏn, Pan'gyeje, Pokch'ŏn-dong, Taesung-dong, Wŏlsan-ri and Yangdong-ri.<sup>4</sup> (Site numbers are keyed to Figure 5.)

1. Chisan-dong: Located west of Koryŏng village in South Kyŏngsang province on a ridge of 160-180 m m.s.l., the cemetery is comprised of several large mounded tombs, *ca.* 20 m in diameter, and medium-sized tombs, *ca.* 10 m in diameter. Other stone chambers whose mound sizes are unclear are also known. Mound size appears to be correlated with altitude, with the largest positioned at the highest points on the ridge. These are thought to be the burials of the Tae-Kaya kings (tombs #47-51) and nobles (#44-45). Excavations were carried out in the late 1970s, and the largest armour find came from tomb #32, a medium-sized mound. Included was a 5th-century set comprised of rectangular-plated rivetted cuirass, rivetted keeled helmet, and the two halves of a yoke-guard (see type descriptions below, Figure 16). This combination of armour and helmet, well known from 5th-century tombs in Japan, is the first set to be discovered in Korea.

2. Imdang-dong/Choyong-dong: This cemetery is spread across two administrative districts near Kyŏngsan City in South Kyŏngsang province, giving rise to its two names. At Imdang-dong are 10 medium-sized tombs, 7-10 m in diameter, plus several smaller tombs. Excavated in 1982, 1987 and 1989, the cemetery yielded 10 gold crowns, gilt bronze and silver ornaments, weapons, horse trappings and armour, including helmet, neck-guard and lamellar suit.

3. Okch'ŏn: Located in Hapch'ŏn county, South Kyŏngsang province, this cemetery is believed to be the central burial grounds of the Tara-Kaya leaders. Tombs yielding armour included tomb #28 (Mongolian helmet, rectangular-plated

<sup>4</sup> Descriptions are compiled from Tokyo National Museum (1992).

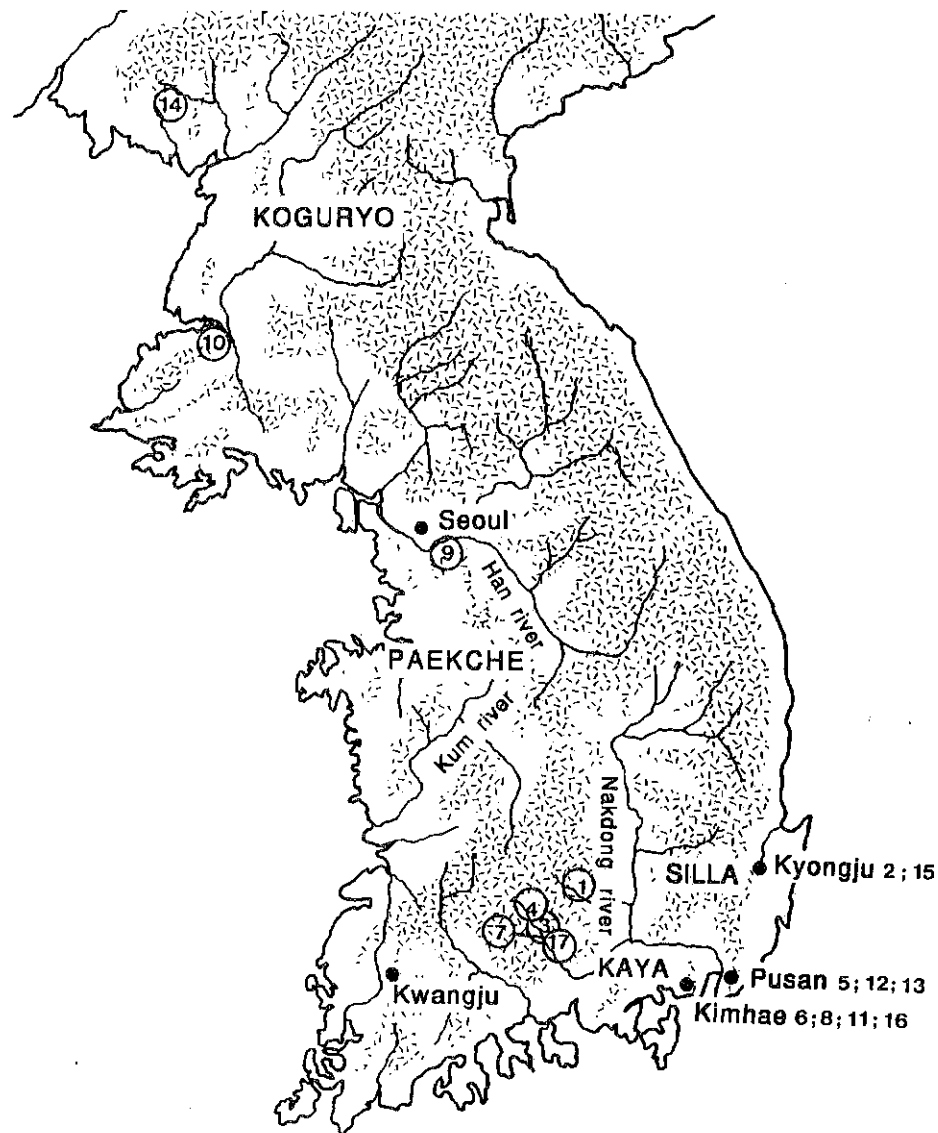


Figure 5 Sites mentioned in the text.

1. Chisan-dong; 2. Imdang-dong/Choyang-dong; 3. Okjön; 4. Pan'gyeje; 5. Pokch'ön-dong; 6. Taesung-dong; 7. Wölsan-ri; 8. Yangdong-ri; 9. Mongch'on T'osöng; 10. Koguryö mural tombs; 11. Yean-ri; 12. Tongnae; 13. Yönsan-dong; 14. Nong'o-ri Sansöng; 15. Kujöng-dong; 16. T'oena-ri; 17. Sangpaeng-ri; 18. Yönsang-dong

riveted cuirass, chamfron, and bardings—all dating to the 5th century); tomb #8 (5th-6th century Mongolian helmet); tomb M-3 (a 5-6th-century gilt riveted helmet and 2 chamfrons of the same date); and tomb #68 (5th-century triangular-plated cuirass, thonged). Tomb M-3 is assessed to have belonged to the highest-ranking warrior.

4. Pan'gyeje: Excavated as part of the Hapch'ön Dam project in South Kyöng-sang province between 1984 and 1986, this cemetery consisted of three tomb clusters (areas Na, Ta, Ka), each containing two large tombs and many small tombs. The largest tomb in area Ka, tomb Ka-A, yielded a square-plated helmet topped by a crown-shaped cap. A rare type, it is thought to be related to a Chinese helmet type first seen at Yan Xiadu tomb #44 in the Late Zhou period (cf. Nogami 1992: pl. 65).

5. Pokch'ön-dong: Located on a hill promontory 700 m long by 80-100 m wide in Tongnae-ku, Pusan City, this is one of the largest Kaya cemeteries, probably part of Kungwan Kaya. It was mainly used in the 4th and 5th centuries, with the largest tombs built on the highest hill points and smaller tombs on the slopes. Excavated in the early 1980s, several of the large tombs were ascertained to have multiple chambers; at tomb #42, both chambers were made of wood, but at tombs #10-11 and #21-22, the main chambers were of stone and the accessory chambers of wood.

6. Taesöng-dong: Thought to be the burial place of the Kungwan Kaya kings or royal family, this cemetery is located in Kimhae, west of Pusan. It has been excavated several times, yielding horse trappings and armour as well as an astonishing group of objects from the Japanese islands (bronze ferrules, *tomoe*-shaped bronze ornaments, and several imitation talc objects such as arrowheads and the enigmatic three-tiered concentric circular boss).

7. Wölsan-ri: Located in Namwön-gun, northeast of Kwangju City, this cemetery consists of 9 tombs positioned at 45 m m.s.l. The largest mound, M1, covered 7 burials, the richest of which was M1-A. In this stone chamber measuring 8.6 m long were found a vertical-plate helmet, a standup neck-guard, and shin-guards.

### The armour

The types of iron armour so far recovered on the peninsula are as follows, with thonged fixings generally being older and riveted fixings newer among them (cf. Han 1991; square brackets enclose locations of discoveries or repository for unprovenanced goods, and dates [e.g., 5c = 5th century]):

#### 1. Helmets:

A. Vertical-plated helmet (Figure 6), with the plates thonged together; may have horizontal neck-guard plates attached at back or square-plated flaps attached at the sides. Probably of the same lineage as the later so-called 'Mongolian' helmet but with a different top formation. The plates curve inwards at the top without recurving upwards again as in the Mongolian helmet. Most of the top fixtures



themselves are missing; an exception is an unusually small (8.7cm high) vertical-plate rivetted helmet with a projecting nose-guard and a completed top ring topped by a double-bowl-shaped ornament holder. [Yean-ri #150; Wölsan-ri #M1-A 5-6c; *chön*-Tongnae = odd example]<sup>5</sup>

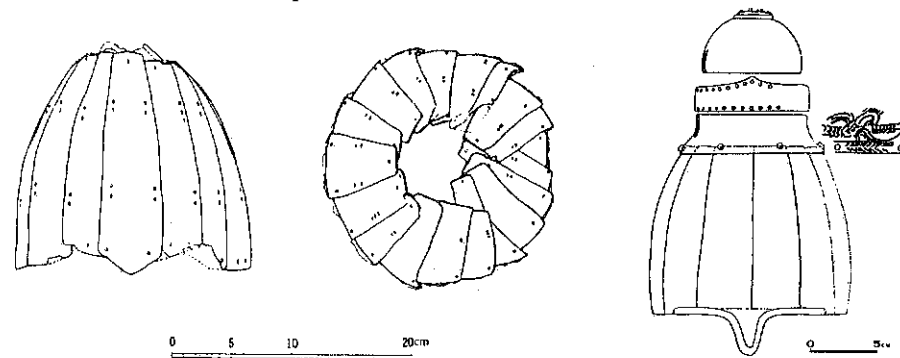


Figure 6 Vertical-plate helmets: left, *thonged* (Chöng & Shin 1991: fig. 2); right, *rivetted* (Anazawa & Manome 1991: fig. 5).

B. Visored (Figure 7); the foundation plates usually run vertically and are rivetted to three ranks of horizontal bands. The top is usually covered by an inverted bowl-shaped piece from which projects a plume-holder. The visor is often decorated with openwork designs, and horizontal neck-guard plates may be attached at the back. [Sungjön University Museum = this one is Medieval in date!; Korea University Museum; *chön*-Yönsan-dong; Samseong Museum of Publishing]

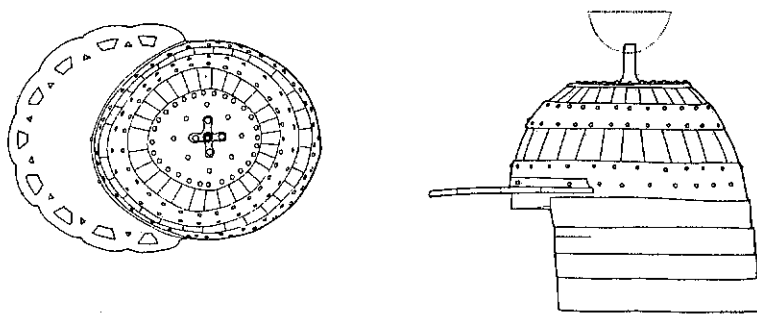


Figure 7 Visored helmet with horizontal neck-guard plates. (Anazawa & Manome 1991: fig. 1)

<sup>5</sup> The prefix '*chön*-' denotes alleged provenience.

C. Keeled (sometimes referred to as 'peach-shaped') (Figure 8). The component plates are layered horizontally, and the vertical seam of the helmet where the plates converge is covered with a separate plate, forming a keel, that also extends over the crown. The keel is positioned at the front, and horizontal neck-guard plates may be attached at the back. [Chisan-dong #32, rivetted, 5c]

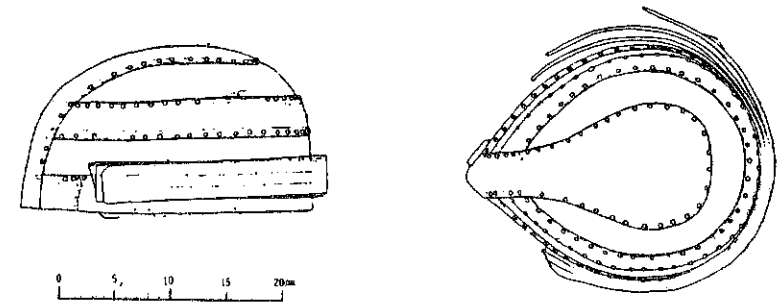


Figure 8 Keeled helmet with horizontal plates. (Chöng & Shin 1991: fig. 4.3)

D. Mongolian (also called recurved helmets) (Figure 9); made of vertical strips secured with thongs or rivets, surmounted by an overturned bowl-shaped cap supporting a plume; may occur with horizontal neck-guard plates or ranks of squarish neck-guard plates; and/or vertical cheek-guard plates. A projection over the bridge of the nose and arches following the eyebrows are stylistic peculiarities of this type of helmet. [Chisan-dong #32; Wölsan-ri M1-A; Pokch'ön-dong #11 & #10, 5c; Pokch'ön-dong #21-22 accessory chamber; Okjön #28, 5c; Okjön #8, 5-6c; *chön*-Kümhae]

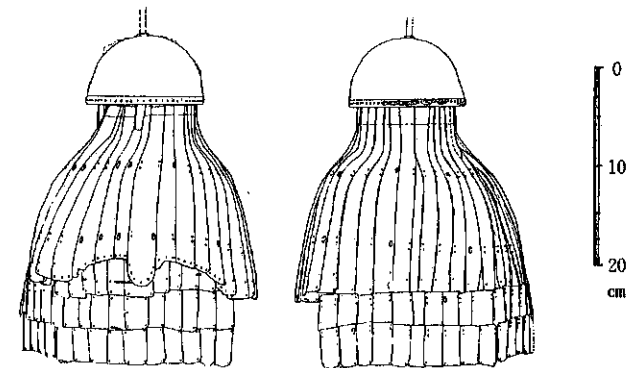


Figure 9 Mongolian helmet with square-plated neck guard. (Fukuo 1991: fig. 3.2)

E. Square-plated (Figure 10); an unusual helmet composed of small square plates thonged together, perhaps of the lineage of the Late Zhou-period helmet from Yan Xiadu tomb #44 (cf. Li 1985: fig. 145; surmounted by crown-shaped cap (see below). [Pan'gyeje Ka-A; Okjŏn M3]

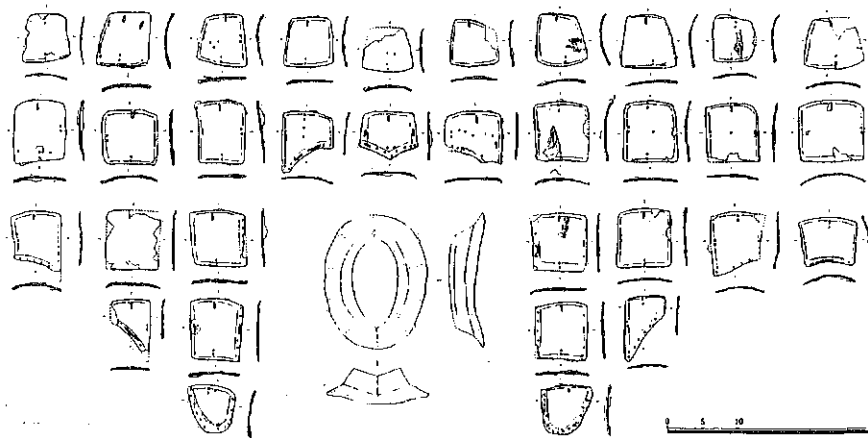


Figure 10 Square-plated helmet from Pan'gyeje, disassembled. (Chinju National Museum 1987: fig. 20)

F. Crown-shaped caps (Figure 11); one made of gilt bronze bearing an impressed dotted line pattern in wave and vine forms, another made of iron. [Pan'gyeje; chŏn-Yŏnsan-dong]

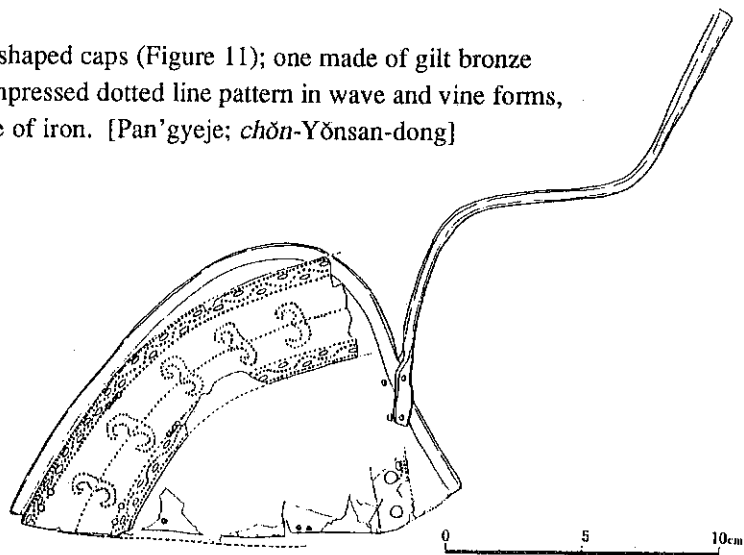


Figure 11 Crown-shaped cap, gilt bronze. (Chinju National Museum 1987: fig. 20)

G. Gilt iron rivetted helmet, plate shape and method of fixation not known, but possibly large plates moulded around the head and finished at the top with a top band much like the Nongo-ri find (Han 1991: fig. 94). [Okjŏn #M-3, 5-6c; Nongo-ri Sansŏng]

H. Bowl-shaped helmet, with no obvious seams (Anazawa & Manome 1991: 255, fig. 10). [Sungjŏn University Museum]

2. Cuirasses: These are rigid upper body protectors made of iron plates fastened together with either thongs or rivets. Cuirasses are usually made in three sections, solid back with right and left front portions opening down the middle front from side hinges. The component plates making up these sections might be square or triangular plates, or long rectangles arranged vertically or horizontally; some mixing of plate shapes also occurs on individual cuirasses. The different combinations of plate shape and orientation, coupled with the two different anchoring techniques, gave rise to a great variety in known constructions:

A. Vertical plated cuirass (Figure 12), thonged [Kujŏng-dong] or rivetted [chŏn-T'oenae-ri, 5c; Pokch'ŏn-dong #46, 4c; Pokch'ŏn-dong #10, 5c; 2 chŏn-Kimhae]; front opening; may have a back collar-like neck guard (these are later in date) and chest ornaments both front and back. [Pusan City Museum, Pokch'ŏn-dong #10, T'oenae-ri; rivetting technology not found in Japan on vertical plated cuirasses (Nogami 1991: 10)]

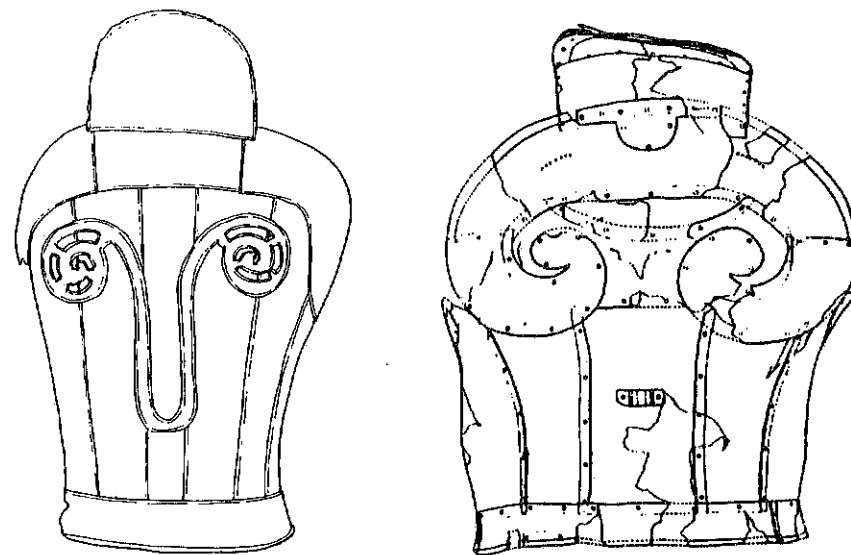


Figure 12 Examples of vertical-plate cuirasses. (Fujita 1991: figs. 3, 4)

B. Horizontal plated cuirass (Figure 13)

a. rectangular plate, rivetted. [Chisan-dong #32, front opening, 5c; Okjön #28, front opening, 5c]

b. triangular plate, thonged [Okjön #68, 5c]; rivetted, front opening. [Sangpaeng-ri, front opening w/ right side hinges, 5c; chön-Yönsan-dong; Okjön #68, thonged]

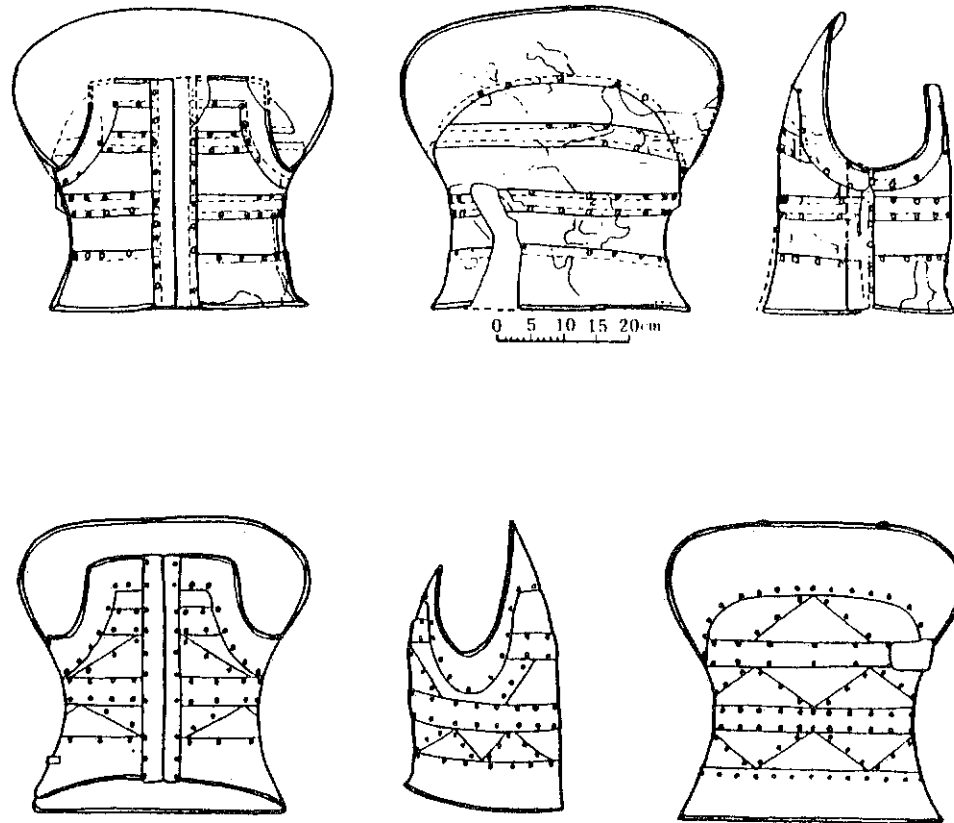


Figure 13 Horizontal-plate cuirasses, front, side and back views. (Kobayashi 1991: figs. 8, 9)  
top: rectangular plated, rivetted  
bottom: triangular plated, rivetted

3. Lamellar long-suit armour: These are thigh-length coats of armour made of small plates thonged or rivetted together. Since these types of suits are depicted in the Koguryö tomb paintings, they are considered to be a northern style and are identified with a horserider culture. [Pokch'ön-dong #11, 5c]

4. Accessories: shoulder guards, neck guards, belts and gauntlets are some of the small pieces of armour that accompany the major coverings.

a. Standup neck-guard for lamellar suit (Figure 14); vertical plates, thonged but some rivets; front neck panels on hinges. [Pokch'ön-dong #11, 5c; Pokch'ön-dong #21, 5c; Wölsan-ri M1-A, 5-6c]

b. Shin-guards (Figure 15) [Pokch'ön-dong #11, 5c; Wölsan-ri M1-A]

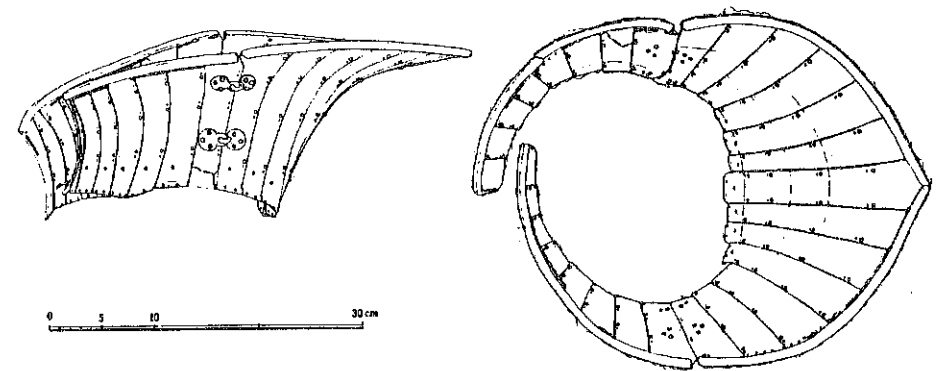


Figure 14 Standup neck-guard for lamellar suit. (Chöng & Shin 1991: fig. 6).

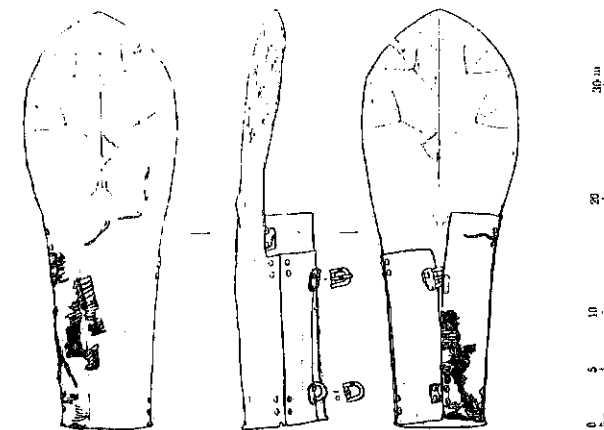


Figure 15 Shin-guards. (Pusan University Museum 1982: fig. 69)

c. Yoke-guard (Figure 16); two squarish sheet-metal pieces with rounded neck openings, worn over the shoulders. [Chisan-dong #32, rivetted, 5c]

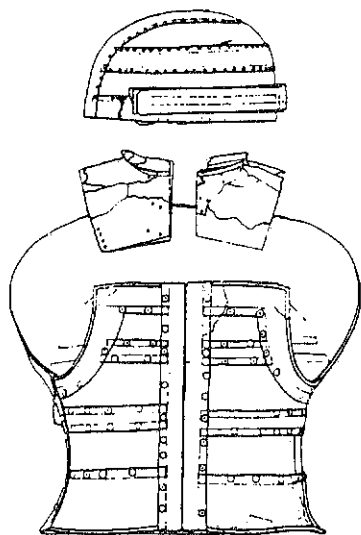


Figure 16 Neck-guard as part of a cuirass and helmet set. (Fujita 1991: fig. 5)

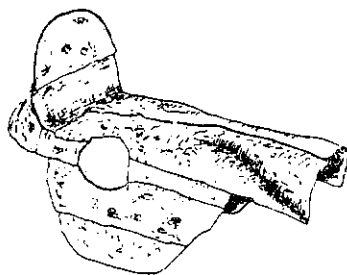
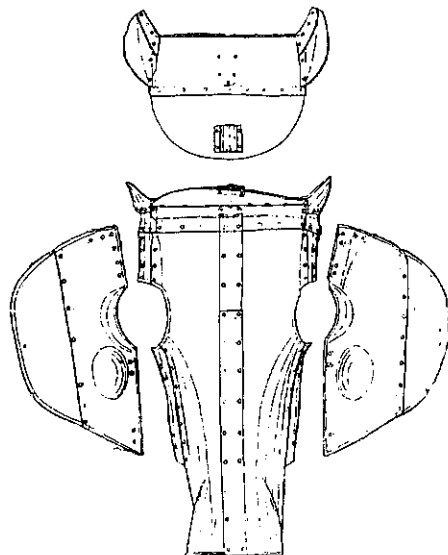


Figure 17 Chamfron parts (right) and drawn in oblique profile (upper left). (Han'guk Kogo Misul Yŏn'guso 1984: 37)

#### 5. Horse armour:

a. Chamfron (face plate) (Figure 17; made of wide iron plates moulded to horsehead morphology, with eye perforations and standup crest. [Pokch'ŏn-dong #10, 5c; two from Okjŏn #M-3, 5-6c; Okjŏn #28, 5c]

b. Bardings; thonged square-plated armour draped over horse's body. [Okjŏn #28, 5c]



Miscellaneous plates from these various forms of armour are often found isolated or disarticulated in the burials. It is rarely easy to determine from which type of armour they came.

Shin (1991) has divided these armour types into two main groups: local (helmet types 1-A,B,C; and cuirass type 2) and foreign (Mongolian helmet type 1-D; lamellar suit type 3; accessory type 4a). However, there are problems with this divisioning. Even the 'local' types might have originated elsewhere on the continent; and some of the types are shared with Japan—engendering dissenting opinions as to their locus of manufacture. Nevertheless, it is agreed by all researchers that a whole new type of armour was introduced into the southern peninsula and islands in the early 5th century by Koguryŏ. This armour consisted of so-called Mongolian helmets (1-D) and long lamellar suits (3) with various accoutrements (4a) as well as horse bardings. Indigenous 4th-century armour is considered to have belonged to warriors conducting foot warfare, while the foreign, Koguryŏ-type armour is assessed as horserider equipment. Despite the adoption of lamellar suits by the southern elite in the 5th century, cuirasses, the 'local' body armour, did not disappear. Instead, this older type of armour was relegated to lower ranks in the political hierarchy, as evidenced by its occurring in small, subsidiary tombs or being worn by 'followers in death'<sup>6</sup> (Shin 1992: 139).

'Local' peninsular armour of the 4th century was mainly thonged; rivetting was a later technology. But one rivetted vertical-plated cuirass has been recovered from Pokch'ŏn-dong tomb #46, dated to the 4th century; if this dating is accurate, this is the earliest incidence of riveting in either Korea or Japan, where the origin of the technique is hotly debated (Kitano 1991; Yoshimura 1991). From the 5th century, rivetting was adopted in local cuirass and helmet manufacture and became the standard technique on both the Korean peninsula and Japanese islands. The 'local' rivetted types include both vertical- and horizontal-plate cuirasses as well as visored and keeled helmets. All of these types also occur in Japan, and opinions differ concerning the area to which the various forms are indigenous. Most vertical-plate cuirasses have been excavated in Korea, whereas horizontal-plate cuirasses are more common in Japan. It thus seems reasonable to propose that these different types are native to different areas.

#### Local armour and its political significance

##### Peninsular armour in Yamato

The oldest examples of vertical-plate cuirasses were actually found in Japan and are thonged,<sup>7</sup> while most of the peninsular vertical-plate cuirasses are of the newer,

<sup>6</sup> This term indicates subordinate(s) who were buried with a leader, though the archaeological record does not reveal whether these were voluntary or sacrificial deaths.

<sup>7</sup> at Omaruyama tomb, Yamanashi prefecture, and Shikinzan tomb, Osaka prefecture (Nogami 1991: 9; caption plate 29).

riveted type. Nogami concludes rightly that the peninsular riveted examples cannot be the prototypes of the insular thonged ones (1991: pl. 29 caption), implying that the vertical-plate cuirass originated in Yamato. But Fujita argues that the thonged examples found in Yamato were probably imports from the peninsula (1991: 397-8). The mechanisms by which cuirasses of Yōngnam manufacture might have come to rest in Yamato tombs must be investigated in the context of an Paekche-Yamato alliance of the late 4th and early 5th centuries (*cf.* Hirano 1977).<sup>8</sup> In the late 4th century, Paekche was busy defending itself from Koguryō incursions from the north, which forced Paekche to move its capital from the Han River valley south to the Kūm River drainage in 375. Paekche tried to bolster its position vis-à-vis Koguryō by developing alliances with the Chinese dynasties (sending tribute to Eastern Jin in 372 [Shin 1992]) as well as placating Yamato (a prince was sent to Yamato in 397 [Hirano 1977: 55]). The seven-branched sword, manufactured in Paekche in 369 but housed at the Isonokami Shrine in Nara, is believed to have been presented to Yamato as part of the alliance in 372 (*cf.* Shinpō 1975; Hirano 1977: 56). In these relations between Paekche and Yamato, "Kara [Kaya] apparently acted as an intermediary" (Hirano 1977: 59); thus avenues and opportunities were evidently available for the transfer of small numbers of material objects, including Yōngnam iron, from the peninsula to the islands in the 4th century.

#### *Yamato armour in Yōngnam*

Again, several examples of similar helmets and horizontal-plate cuirasses are known from both Korea and Japan. Among those discovered on the peninsula, some (3 visored helmets in the Korea University and Sungjōn University Museum collections) are determined to have been made by entirely different techniques than those in Japan, while others (1 visored helmet from the Yōnsang-dong tomb in the Okura collection and 2 triangular-plated cuirasses, one in the Tokyo National Museum and one excavated in 1972 from the Sangpaeng-ri tomb) are identical to the Japanese examples (Anazawa and Manome 1991: 235-6).

Initially, when the latter, Yamato types of armour were discovered in Korea, Japanese scholars claimed these constituted proof of the Mimana hypothesis—that the southern peninsula was under Yamato military control in the 4th century as written in the *Nihon Shoki*.<sup>9</sup> This interpretation is now disputed by both Korean and Japanese scholars on the basis of minute typological work on the armour finds. Firstly, the triangular-plated cuirasses and visored helmets of Yamato type found on the peninsula are late 5th-century products, not 4th-century, and so are too late to support the Mimana hypothesis. Secondly, they are so few in number among other local armour types that they can hardly be indicative of a military occupation (Shin 1992). Thirdly, Shin notes that the cuirasses and helmets, even if made in Yamato,

<sup>8</sup> The interpretation of an alliance is diametrically opposed to the Horserider Theory, which postulates hostile and competitive relationships between Paekche and Yamato.

<sup>9</sup> See Aston (1896) for the original documentation and Barnes (1990) for a discussion of the political interpretations.

were buried with political subordinates, while the Yōngnam 5th-century elite were wearing Koguryō-style lamellar suits and Mongolian helmets (Shin 1992).

Nevertheless, it is still possible that the Yamato-type examples excavated in Korea were actually made in Yamato, since they so closely resemble Japanese examples;<sup>10</sup> in any case, it must be explained how they got to Korea. Anazawa and Manome (1991: 263-4) have developed two main hypotheses: 1) they were traded or gifted from Yamato to Kaya; or 2) they belonged to Yamato militarists who invaded Kaya territory, died, and were buried on the peninsula, or the armour was captured from Yamato soldiers by Kaya warriors and buried with the latter instead.

Finally the inscription of the Kwanggaet'o stele, erected in AD 414 in the Koguryō capital at Tonggou, must be taken into account. Part of the text, though highly controversial (Szczesniak 1946), has been interpreted to say that "in the Naktong river basin, [King Kwanggaet'o] crushed a Wa Japanese force attacking Silla" (Lee 1984: 38). And a few lines later, it is said that "The pieces of armour and helmets, that were captured, numbered over ten thousand" (Szczesniak 1946: 263). It is not clear whether these two statements relate to the same incident, but the general idea provides a vehicle for the presence of Yamato objects on the Korean peninsula.

#### *High- and low-status Kaya warriors*

As stated above, Shin and others believe that the highest class of 5th-century Kaya warriors or political leaders wore only Koguryō-type lamellar armour suits but that both lamellar armour and cuirasses (made with the new riveting techniques) were available also to lower-ranking warriors. These interpretations derive from only a few excavated examples—especially Pokch'ōng-dong tombs #11/10 and #22/21 (Table 2), and the Pan'gyeje 'Ka'-area and 'Ta'-area tombs.

In these examples, differences in size and construction of burial, and in quantity and kinds of grave goods are interpreted as reflecting status differences among the deceased (Figures 18, 19). In terms of the former variables, there are vast differences between the simple earthen pit of #21 and the stone-built chamber of #22. As for contents, the main burials not only had many more objects than the accessory burials in the same categories (stoneware, iron tools), they also had prestige goods (crown and earrings, beads, edge-curved and end-curved knives), wealth goods (iron ingots) and power goods (iron weapons) that were virtually absent from the latter. In these chamber sets, the cuirass is indeed absent from the highest status burials, and lamellar armour occurs in both main and accessory burials—as stated by Shin.

Similar status differences and the presence of lamellar armour at the top levels of the hierarchy can be seen at Pan'gyeje (Chinju National Museum 1987), though

<sup>10</sup> The Yōnsan-dong example resembles a cuirass from Hakayama #1 tomb in Nara, and the Sangpaeng-ri example is very close to the Kurohimeyama tomb find in Osaka (Anazawa & Manome 1992: 235).



armour is much more scarce here. Areas 'Ka' and 'Ta' both contain large and small burials, with vast differences between the largest (Ka-A) and others. Ka-A is a pit-style stone chamber, 2.1m x 6.3m, that was filled with some 450 artefacts including: stoneware vessels; iron tools such as chisels, sickles and knife blades; iron nails and brackets; belt buckles and ornaments; and then a full complement of weapons (arrowheads, ring-handled straight single-edged swords), horsegear (bits, stirrups, ornaments, bells, saddle edgings) and some armour (a lamellar helmet with gilt bronze keeled cap ornament [type E, above]). In contrast, the smaller tombs in area Ka, whose chambers averaged about 2.5m in length, all have several stoneware vessels and perhaps one knife blade or arrowhead or spindle whorl each—but no armour.

In area Ta, there were two large tombs, Ta-A and Ta-B; neither, however, was as large or as rich as Ka-A. Ta-A, whose chamber was 5.5m long, held some 115 artefacts, including stoneware vessels, cylindrical net weights, spindle whorl, chipped stone tools, adzes, sickles, arrowheads, stirrup, bit and cheekplate, socketed spearpoints, belt buckles, plume spike, iron rings, nails and brackets—but no armour. Ta-B's chamber was 3.4m long and held 65 articles (stoneware vessels, knives, brackets, a wrapped adze and sickle, a socketed spearpoint, arrowheads, ring, buckle, and rivetted plaques)—but no armour. Correspondingly, the smaller tombs in area Ta had just a few vessels and maybe one small iron object, as in area Ka, and no armour.

The largest tombs in areas Ka and Ta can thus be ordered in terms of size and contents, with Ka-A the greatest, then Ta-A and finally Ta-B. Though ranging in size from 6.3m down to 3.4m in chamber length and varying from 450 to 65 grave goods, all three of these tombs contained armour or horse trappings—in contrast to even smaller graves of maximum 2.5m length and less than 10 objects which had no armour or trappings. Thus, at least three levels of the warrior hierarchy had access to the new 'foreign'-style goods in term of horse trappings or lamellar armour.

In assessing these data for armour and status relations, it must be noted that the 'high status' Pokch'ön-dong tomb #22 had no armour at all and that the 'high status' Pan'gyeje Ka-A tomb had only a Mongolian helmet. These cases recall the earlier statement cited above that main chambers often had gold crowns as their high status good and that armour was relegated to accessory chambers. I perceive here difficulties in interpretation based on small sample size and considerable variation in the burial assemblages. Are main chambers with lamellar armour, though 'high' status', still lower than one with a gold crown? Is some differentiation between king and warrior being indicated—such as I have suggested for the 5th-century Yamato tomb of Mesuriyama (based on an equally small sample size; Barnes 1988: 193)? Only a thorough database analysis of Yöngnam materials will allow us to accept or refute the generalisations being made in the current archaeological literature.

However, one insight attainable from these data is that the variation in Yöngnam burials suggests decentralised manufacture and use of armour in local political systems—just what we might expect of the many small Kaya polities as described in

the historical literature. This situation contrasts greatly with the case that is currently being made for organised, centralised production of iron armour in 5th-century Yamato (Yoshimura 1991).

**Table 2** Comparison of grave goods in main and accessory burials at Pokch'ön-dong. (compiled from Pusan University Museum 1990)

<u>Main chamber (#11)</u>	<u>Accessory chamber (#10)</u>
Lamellar suit with standup neck-guard	Vertical-plate cuirass
Mongolian helmet, thonged	Mongolian helmet, thonged
Shin-guards, set	—
Gilt bronze crown & earrings	—
Iron weapons: arrowheads, socketed spearheads, edge-curved spearheads, swords	—
Quiver fixings: buckles, rivets, edgings	—
Iron ingots	—
—	Chamfron
—	Horse trappings; saddlery, bit, stirrups, buckles, bell
Stoneware	Stoneware
Iron tools: knives, curl-end knives, socketed axe/adzes, sickles, point planes, bracket nails	Iron tools: chisel, knives
<u>Main chamber (#22)</u>	<u>Accessory chamber (#21)</u>
—	Lamellar armour waist-plates
—	Standup neck-guard
—	Mongolian helmet with vertical neck-plates
Horse trappings: stirrups, bells, saddlery, bit	Horse trappings: bit, stirrups, buckles
Iron weapons: arrowheads, edge-curved spearheads, socketed spearheads, swords	Iron weapons: arrowheads
Quiver fixings: buckles, edging, plaques	—
Iron ingots	—
Personal ornaments: beads, earrings	—
Stoneware	Stoneware
Iron tools: knives, curl-end knives, socketed axe/adze, socketed spade shoe, bracket nails	Iron tools: sickles, knives, socketed axe/adzes

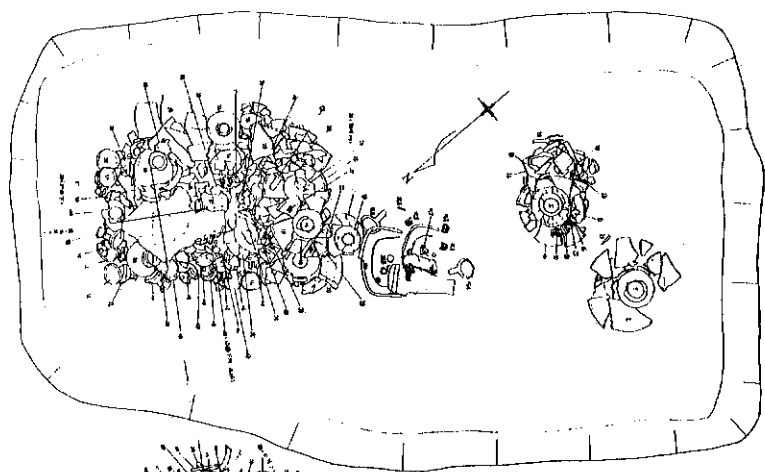
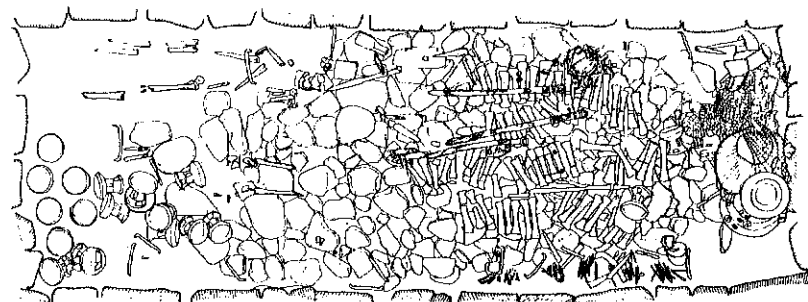


Figure 18 Main burial #11 (above) and accessory burial #10 (below) at Pokch'ŏn-dong. (Pusan University Museum 1982: figs. 6, 14)

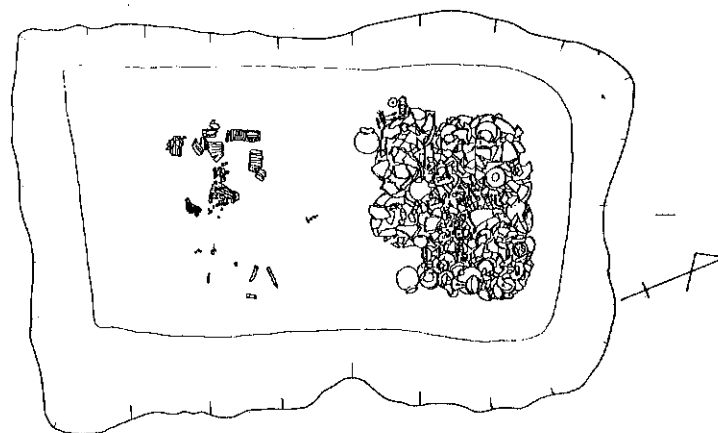
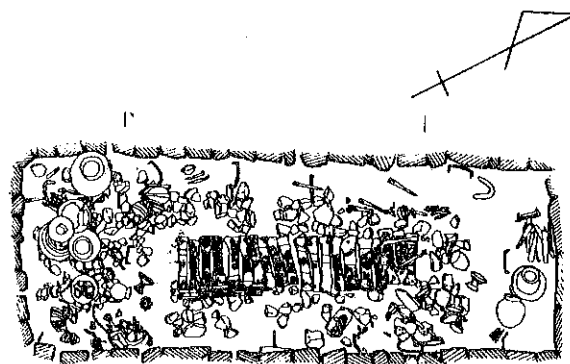
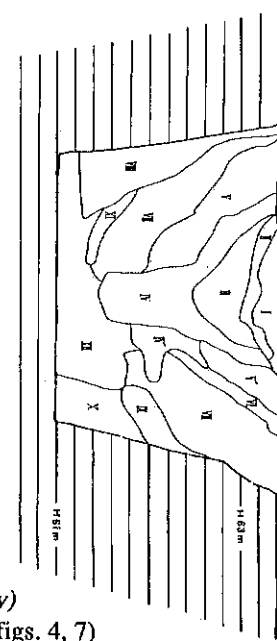
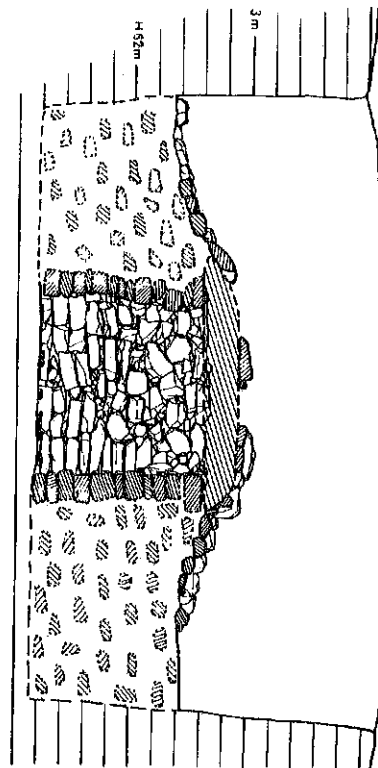


Figure 19 Main burial #22 (above) and accessory burial #21 (below) at Pokch'ŏn-dong. (Pusan University Museum 1990: figs. 4, 7)



## Concluding remarks

It is notable that the tomb construction and accompanying grave goods in these burials with armour on the south Korean coast are entirely peninsular in nature. A minute number of objects that obviously came from the Japan Islands—such as the talc and bronze pieces in the Taesong-dong tombs—are significant in their rarity. It is very difficult to argue on this basis that the armour-bearing tombs might belong to Yamato militarists holding the fort at Mimana.

More difficult to determine from these data are the relationships between the Kaya polities in the Yŏngnam region and the larger states of Koguryŏ, Silla and Paekche. Are some of the Yŏngnam burials with lamellar armour actually Koguryŏ warriors, as suggested by the Kwanggaet'o stele inscription? Or did the Kaya elite merely adopt lamellar armour from the Koguryŏ at this time? Ethnic identity cannot be established on stylistic data alone—such as the type of armour or style of ornamentation. But by understanding the social position of the wearers of armour and the means by which such armour was produced and came into their possession, we might gain insights into the social organisation of Yŏngnam society and its relations with its neighbours. Undoubtedly the region's historic reputation as a source of iron for the surrounding peoples (*cf.* Gardiner 1969: 48) was responsible for much of Kaya's interaction with other Pen/Insular states. Whether the iron armour discovered in Yŏngnam's tombs helped the wearer to protect such iron resources from encroachment or whether it represents efforts to co-opt those resources is the greatest question facing us today.

## References

- Anazawa, W. & Manome, J. (1991) "Nanbu Chōsen shutsudo no tessei byōdome kachū" [Riveted iron armour unearthed in southern Korea]. In *Ronshū bugu*, J. Nogami (ed.), pp. 235-69. Tokyo: Gakuseisha. (in Japanese)
- Aston, W.G. (1896) *Nihongi: chronicles of Japan from the earliest times to A.D. 697*. Vermont & Tokyo: Charles E. Tuttle Co., 1972.
- Barnes, G.L. (1988) *Protohistoric Yamato: archaeology of the first Japanese state*. Ann Arbor: Center for Japanese Studies & Museum of Anthropology, University of Michigan.
- Barnes, G.L. (1990) "Early Korean states: a review of historical interpretation." In *Bibliographic Review of Far Eastern Archaeology 1990*, G. Barnes (ed.) Oxford: Oxbow Books.
- Barnes, G.L. (1993) *China, Korea and Japan: the rise of civilization in East Asia*. London: Thames & Hudson.
- Bishop, M.C. (1989) "The articulated cuirass in Qin dynasty China." *Antiquity* 63: 697-705.
- Chinju National Museum (1987) *Hapch'ŏn Pan'gyeje kobun* [The Pan'gyeje tombs in Hapch'ŏn]. Kyōngsan Namdo: Kungnip Chinju Pangmulgwan. (in Korean)

- Chōng, Ching-wŏn and Shin, Kyōng-ch'ŏl (1991) "Kodai Kannichi kachū dansō [Discussions of ancient Korean-Japanese armour]. In *Ronshū bugu*, J. Nogami (ed.), pp. 438-67. Tokyo: Gakuseisha. (in Japanese)
- Cotterell, Arthur (1981) *The First Emperor of China*. London: MacMillan.
- Dien, Albert (1981/82) "A study of early Chinese armor." *Artibus Asiae* 43.1/2: 5-66.
- Edwards, Walter (1983) "Event and process in the founding of Japan: the horserider theory in archeological perspective." *Journal of Japanese Studies* 9.2: 265-95.
- Egami, Namio (1964) "The formation of the people and the origin of the state in Japan." *Memoirs of the Tōyō Bunko* 23: 35-70.
- Fujita, K. (1991) "Nikkan shutsudo no tankō ni tsuite" [Concerning cuirasses unearthed in Japan and Korea]. In *Ronshū bugu*, J. Nogami (ed.), pp. 293-405. Tokyo: Gakuseisha. (in Japanese)
- Fukuo, M. (1991) "Mabusashi tsuke kabuto no keitō" [The lineage of visored helmets]. In *Ronshū bugu*, J. Nogami (ed.), pp. 406-437. Tokyo: Gakuseisha. (in Japanese)
- Gardiner, K.H.J. (1969) *The early history of Korea*. Canberra: ANU Press.
- Han, Byōng-sam (ed.) (1991) *Special exhibit: mysterious ancient kingdom—Kaya*. Seoul: National Museum of Korea. (in Korean)
- Han'guk Kogo Misul Yŏn'guso (1984) *Han'guk kogohak kaejōng yongojip* [Revised vocabulary of Korean archaeology]. n.p. (explanations in Korean with English vocabulary translation)
- Hirano, Kunio (1977) "The Yamato state and Korea in the fourth and fifth centuries." *Acta Asiatica* 31: 51-82.
- Institute of Archaeology (1981) *Excavations of the Han tombs at Man Ch'eng*. Beijing: Cultural Relics Publishing House. (in Chinese)
- Kao, Jeffrey and Yang, Zuosheng (1983) "On jade suits and Han archaeology." *Archaeology* 36.6: 30-7.
- Kidder, J. E. Jr. (1985) "The archaeology of the early horse-riders in Japan." *Transactions of the Asiatic Society of Japan* 3rd series 20: 89-123.
- Kirkland, R.J. (1981) "The 'horseriders' in Korea: a critical evaluation of a historical theory." *Korean Studies* 5: 109-28.
- Kitano, Kōhei (1991) "Chūki kofun no fukusōhin to sono gijutsushi-teki igi: tessei kachū ni okeru shin-gijutsu no shutsugen" [Middle Kofun-period grave goods and their technological significance: the appearance of new techniques in iron armour]. In *Ronshū bugu*, J. Nogami (ed.), pp. 75-95. Tokyo: Gakuseisha. (in Japanese)
- Kobayashi, Ken'ichi (1991) "kodai no keikō" [Ancient lamellar armour suits]. In *Ronshū bugu*, J. Nogami (ed.), pp. 494-508. Tokyo: Gakuseisha. (in Japanese)
- Kobayashi, Yukio (1991) "Kofun jidai no tankō no genryū" [Origins of Kofun-period cuirasses]. In *Ronshū bugu*, J. Nogami (ed.), pp. 358-72. Tokyo: Gakuseisha. (in Japanese)
- Ku, Yen-wen (1973) "Han tombs at Mancheng." In *New Archaeological Finds in China*, 2nd ed., pp. 14-20. Peking: Foreign Languages Press. (in English)
- Ledyard, Gari (1975) "Gallop along with the horseriders: looking for the founders of Japan." *Journal of Japanese Studies* 1.2: 217-54.
- Lee, Ki-baik (1984) *A new history of Korea*. Harvard University Press.

- Li, Xueqin (1985) *Zhou and Qin Civilizations*. Yale University Press.
- Mongch'on [Mongch'on T'osǒng Palgul Chosadan] (1985) *Mongch'on T'osǒng palgul chosa pogo* [Mongch'on T'osǒng excavation report]. Seoul: n.p. (in Korean)
- Nogami, Jōsuke, ed. (1991) *Ronshū bugu* [Collected works on armour]. Tokyo: Gakuseisha. (in Japanese)
- Pusan University Museum (1982) *Tongnae Pokch'ŏn-dong kobungun 1* [Tongnae Pokch'ŏn-dong tomb cluster 1]. Pusan University Museum Site Reports, no. 5: figures and plates. (in Korean)
- Pusan University Museum (1983) *Tongnae Pokch'ŏn-dong kobungun 1* [Tongnae Pokch'ŏn-dong tomb cluster 1]. Pusan University Museum Site Reports, no. 5: text. (in Korean)
- Pusan University Museum (1990) *Tongnae Pokch'ŏn-dong kobungun 2* [Tongnae Pokch'ŏn-dong tomb cluster 2]. Pusan University Museum Site Reports, no. 14, 2 vols.: figures and plates, text. (in Korean)
- Shin, Kyōng-ch'ŏi (1992) "Reinan no jōsei to Kannichi kōshō" [Conditions in Yōngnam and negotiations between Korea and Japan]. In *Shinpojiumu higashi ajia no saihakken: nazo no go-seiki o saguru*, ed. N. Egami & S. Ueda, pp. 115-44, 270. Tokyo: Yomiuri. (in Japanese)
- Shinpō, K. (1975) "Shichishitō no kaishaku o megutte" [Focus on interpretations of the seven-branched sword]. *Shigaku zasshi* 84.11. (in Japanese)
- Suematsu, Y. (1958) "Japan's relations with the Asian continent and the Korean peninsula (before 950 AD). *Cahiers d'histoire mondiale* 4.3: 671-87.
- Szczesniak, Boleslaw (1946) "Japanese-Korean wars in AD 391-407 and their chronology." *Journal of the Royal Asiatic Society* 15: 54-66.
- Tokyo National Museum (1992) *Kaya—ancient kingdom of Korea*. Exhibition catalogue. Tokyo: Asahi. (in Japanese with English list of exhibits)
- Yang, Hong (1985) *Zhongguo gubingqi luncong* [Treatise on ancient Chinese military implements]. Beijing: Wenwu Press. (in Chinese)
- Yoshimura, Kazuaki (1991) "Tankō keitō shiron" [Investigations on cuirass types]. In *Ronshū bugu*, J. Nogami (ed.), pp. 468-93. Tokyo: Gakuseisha. (in Japanese)

## Objects, sinkers, nets, behaviour and subsistence:

the use of culturally specific and relational analogies in  
archaeological reasoning

Youn-sik CHOO

*I am the very model of a modern Archaeologist:*

*a geoethnoarchaeoeconomobiologist.*

*I've seventeen research degrees, from fifteen different colleges...*

Patty Jo Watson, 1986

### Introduction

Many of the generalisations about archaeological cultures are drawn by analogy with living ethnographic or folk cultures. Whether the very early uses of analogical inference in archaeology are traced back to the ancient Athenian times (Charlton 1981: 133) or to the 16th century in England (Orme 1981: 3), they show that the use of analogy has a long history. Such analogical inference has been accomplished through different types of analogy used in different geographical regions according to the nature of the archaeological record archaeologists deal with.

Broadly speaking, in the Old World, paralleling the expanding ethnographic knowledge of the New World, general comparative analogy had been widely applied to prehistoric culture of the Old World "for the understanding of artefacts and for the comprehension of development in human culture" (Orme 1981: 13), and it became conceptually linked with the 19th century unilineal evolutionary schemes. A typical example of general comparative analogy conceived in the tradition of unilineal evolutionism was Sollas's *Ancient Hunters* (Sollas 1924). However, these

formal relations of comparison through analogy and "enthusiasm about analogy" (Wylie 1985: 65) gradually decreased in response to the criticisms by diffusionists and functionalists of unilineal evolutionism during the first two decades of the 20th century. After that, there were few significant developments until the middle of this century in the Old World (Orme 1981: 15). In contrast, since the late 18th century (Hodder 1982: 35), specific historical analogies have been well developed in the New World, especially in the southwestern United States where comparisons of excavated material with contemporary Indian material culture in the same areas were carried out. The tradition of a specific historical problem orientation in American archaeology began with this kind of analogy, and it was elaborated through Boasian historical particularism, creating the direct historical approach (Steward 1942).

Analogues in archaeological reasoning had been used for a long time, as mentioned above, but it was only in the 1950s that critical evaluations of the sources, content, and types of analogy was carried out in the Old and the New World. Both people who were trying to exploit one of the methodological options for upgrading analogy, accepting that research is unavoidably limited or unavoidably speculative (Clark 1951: 1953, 1954; Ascher 1961; Anderson 1969), and people who avoided interpretive extensions beyond the archaeological record (Hawkes 1954; Thompson 1956) attempted to come to grips with "a fundamental dilemma that archaeologists confront whenever they seriously undertake to use their data as evidence of the cultural past, namely, that any such broadening of the horizons of inquiry seems to be accomplished only at the cost of compromising actual or potential methodological rigour" (Wylie 1985: 81).

In the 1960s and 1970s, the New Archaeologist, who was against traditional forms of research, insisted that the use of analogical inference in archaeological research should be strictly limited, and analogy should serve only as a means of generating hypotheses whose credibility must be established on independent, non-analogical grounds (Binford 1967, 1968, 1972). After that, the importance of analogy was not in the forefront of theoretical discussions until logical positivism had lost some of its sway (Kelley & Hanen 1988: 368-9).

In recent years, epistemological viewpoints about analogy have been suggested by several archaeologists and archaeologically trained philosophers (Charlton 1981; Gould 1980; Gould & Watson 1982; Hodder 1982; Kelley & Hanen 1988: 256-74; Murray & Walker 1988; Ravn 1993; Salmon 1982: 57-83; Small 1987; Wylie 1980, 1982, 1985, 1988, 1989). Through these arguments, methodological approaches for strengthening and evaluating analogical inferences have been advocated. Consequently, much more has been said about the usefulness of analogical inference in archaeology and analogy as an integral part of scientific explanation (Kelley & Hanen 1988: 261). Furthermore, it has been argued that causal, functional, and structural analogies (according to Wylie's term, relevance-based analogies or relational analogies; Wylie 1985, 1988) are more likely to be theoretically relevant than mere similarities. Even though most archaeologists agree that a proper use of analogical arguments in archaeology is a field awaiting systematic development (e.g.

Murray and Walker 1988: 251; Trigger 1989: 391), the actual practice in archaeological fields has made little progress.

This paper attempts to examine the potential of the use of reliable analogical arguments through an archaeological case study. For clarity of exposition, first of all, types of analogy will be classified into two groups based on two different aspects: a substantive aspect and a logical aspect. On the basis of this argument, the strongest form of analogical arguments will be suggested. In the second part of this paper, culturally specific and relational analogies will be applied to a case study. Through these analogical arguments, the explanation of 198 perforated clay cylindrical objects from Tomb 20 of the Jopo-ri B site<sup>1</sup> in Korea, the type of net associated with these kinds of archaeological objects, the fishing behaviour involved in the use of specific nets, and daily subsistence of Jopo-ri people in the 4th century AD will be attempted using several different sorts of data: geographic data; floral data; faunal data such as fish ecology; data of fishery science such as fishing gear technology and fishing methodology; folklore data including the folk-culture study at Woljam-ri; historical texts; and archaeological data. This paper will show that even when the archaeological evidence is incomplete, the use of many classes of data, in ensuring culturally specific historical context and in establishing causal relations, provides a stronger basis for inference than the use of only a few classes of data in formal similarities.

### **Analogy in logical usage and types of analogy**

Analogy is a form of inductive inference by which the identity of unknown items (subject) may be inferred from those that are known (source). An argument by analogy is founded on the premise that if two classes of phenomena are alike in one respect, they may be alike in other respects as well (Copi & Cohen 1990: 357-76). In this case, one of the classes of phenomena to be compared must be a confirmed phenomenon since an analogy is to be inferred within the interrelationship between known and unknown items or relations. Therefore, when inferring an archaeological phenomenon through analogy, we must have a correct knowledge of known items or relations.

Generally speaking, the known items used in archaeological inference come from five kinds of sources: 1) historical accounts that describe societies in the past; 2) ethnographic or folk-culture studies that describe present-day societies; 3) experimental studies that attempt to duplicate conditions that existed in the past (Sharer & Ashmore 1979: 465-73) and that attempt to understand the natural processes involved in the formation of the archaeological record (Bower 1986: 394; Gifford 1981: 366); 4) palaeontological knowledge that provides general analogies for materialist inquiry into remains from the past; and 5) biological knowledge that

<sup>1</sup> Place names, personal names and Korean terms are spelled in accordance with the prescriptions of the Ministry of Education, Korea (Ministry of Education 1984). For Chinese the pinyin romanization is employed and for Japanese the Hepburn system.



provides analogies of the interconnectedness of different classes of natural phenomena, ecological analogies that humans form part of the natural world, and an awareness that the evolution of specific organisms may offer an analogy for developmental adaptations by past communities (Murray & Walker 1988: 253-254). However, although we have all these substantial sources, they are not sufficient to draw a reliable analogy. That is to say, even where analogies are based primarily on a comparison for total similarities through all these sources, there are a number of logical criteria that can be used to determine their relative strength. Therefore, archaeologists have developed several types of analogy in order to draw an accurate explanation or interpretation about past human behaviour and culture.

Such types of analogy can be basically divided into two groups according to different aspects. One aspect (1), a substantive aspect, is whether historical or ethnological continuity is assumed. According to this aspect, analogy can be divided into two types: 1-i) general comparative analogy, and 1-ii) specific historical analogy. Although slightly different types of analogy have been named new analogy (Ascher 1961: 319) and general ethnographic analogy (Rouse 1972: 147), the earlier terms continue to be used by archaeologists under the influence of Willey's grouping (Willey 1953: 229).

General comparative analogy (1-i) "can be applied in areas where the ethnographic or historic people no longer lead traditional lives and where ethnographic literature is incomplete" (Gould 1974: 38). In this analogy, explanations of the past "are projected through broadly comparative and essentially universalistic observations and generalisations about human cultural behaviour rather than being derived from the narrow confines of a specific historical context" (Willey & Sabloff 1980: 205-6). Therefore, this type of analogy was widely used by unilinear cultural evolutionists. However, although the resulting explanations might be said to be based on methodological rigour, they often prove to be displaced resemblances. The limitations of this type of analogy have been pointed out by many archaeologists; nevertheless it has been argued that in order to cover a vast temporal and spatial tract, consisting of over 95% of human history and a large proportion of the globe, a slightly different sort of general comparative analogy has to be used with great care (according to Ascher's term, new analogy; Ascher 1961: 319-20).

The second type is specific historical analogy (1-ii). This is made when living, ethnographic societies can be shown to be historically continuous with the archaeological culture of the same areas (Gould 1974: 39). Therefore, the archaeologist can be fully aware of such variables as cultural continuity, comparability in environment and similarity of cultural form in this analogy rather than in general comparative analogy (Sharer & Ashmore 1979: 460-5). Consequently, specific historical analogy guarantees a higher degree of probability than general comparative analogy, and can provide a clue to a series of specific problems involving archaeology. This is more commonly called ethnographic analogy and is found in folk-culture studies in the Old World (Clark 1951), in the direct historical approach in the New World (Steward 1942) and in ethno-

archaeological researches nowadays (Gould 1978; Kramer 1979; Gould and Schiffer 1981; Gould 1990).

The second aspect of analogy (2), a logical aspect, is whether analogy is based upon the formal similarities between source and subject or the functional and structural interrelations between source and subject. This logical aspect was first introduced into archaeology by Wylie in her brief conference paper (Wylie 1980) and was later adopted by Hodder (1982). More detailed arguments were expressed through a series of articles (Wylie 1985, 1988, 1989).

She divided analogy into two types: 2-i) formal analogy, and 2-ii) relational analogy. According to her, formal analogy (2-i) is "when analogs are compared for the simple presence or absence of the properties considered independently of one another" (Wylie 1985: 95). Therefore, formal analogy "may be entirely accidental and may not be indicative of further similarities" (*ibid.*: 94).

In contrast, relational analogy (2-ii) is "when analogs are compared for the relations that hold among the properties they share" (*ibid.*: 95). That is, "analogies that incorporate considerations of relevance are typically relational analogies" (*ibid.*: 95). Therefore, this analogy may be nonaccidental and may be indicative of further similarities because "relational comparisons involve demonstrations that there are similarities between source and subject with respect to the causal mechanisms, processes, or factors that determine the presence and interrelationships of their manifest properties" (*ibid.*: 95).

In logic there are various ways in which the different types of analogical inference can be systematically strengthened and evaluated (see Achinstein 1964; Cohen 1989; Copi & Cohen 1990; Helman 1988; Hesse 1959, 1966; Russell 1989; Shaw & Ashley 1983; Uemov 1970). Among them the following are general criteria that are mentioned in connection with the appraisal of analogical arguments: "(1) the greater (fewer) the number of analogous features mentioned in the premises, the stronger (weaker) the argument; (2) the more dissimilar the entities mentioned in the premises, the stronger the argument;...[3] causally relevant factors [or causal relations] are extremely important in strengthening analogies" (Salmon 1982: 62-3). From this, it can be said that formal analogy is based on just the first two logical criteria, and relational analogy heavily on the third in addition to the first two.

Analogical inferences in archaeology have been accomplished through different types of analogy, used in different geographical regions and with different kinds of sources, according to the nature of the archaeological record archaeologists deal with and according to different perspectives on or thoughts about the whole archaeological subject matter. In practice, analogies of substantive and logical aspects are not isolated but reinforcing. That is to say, such analogies can be connected to each other according to which region or period is being considered. In theory, the combination of specific historical analogy and relational analogy will be ideal and offer a high degree of probability in explanation (Table 1).

**Table 1** The various combinations of analogies in terms of relative strength.

Substantive aspect Logical aspect	General comparative analogy	Specific historical analogy
Formal analogy	The lowest probability	
Relational analogy		The highest probability

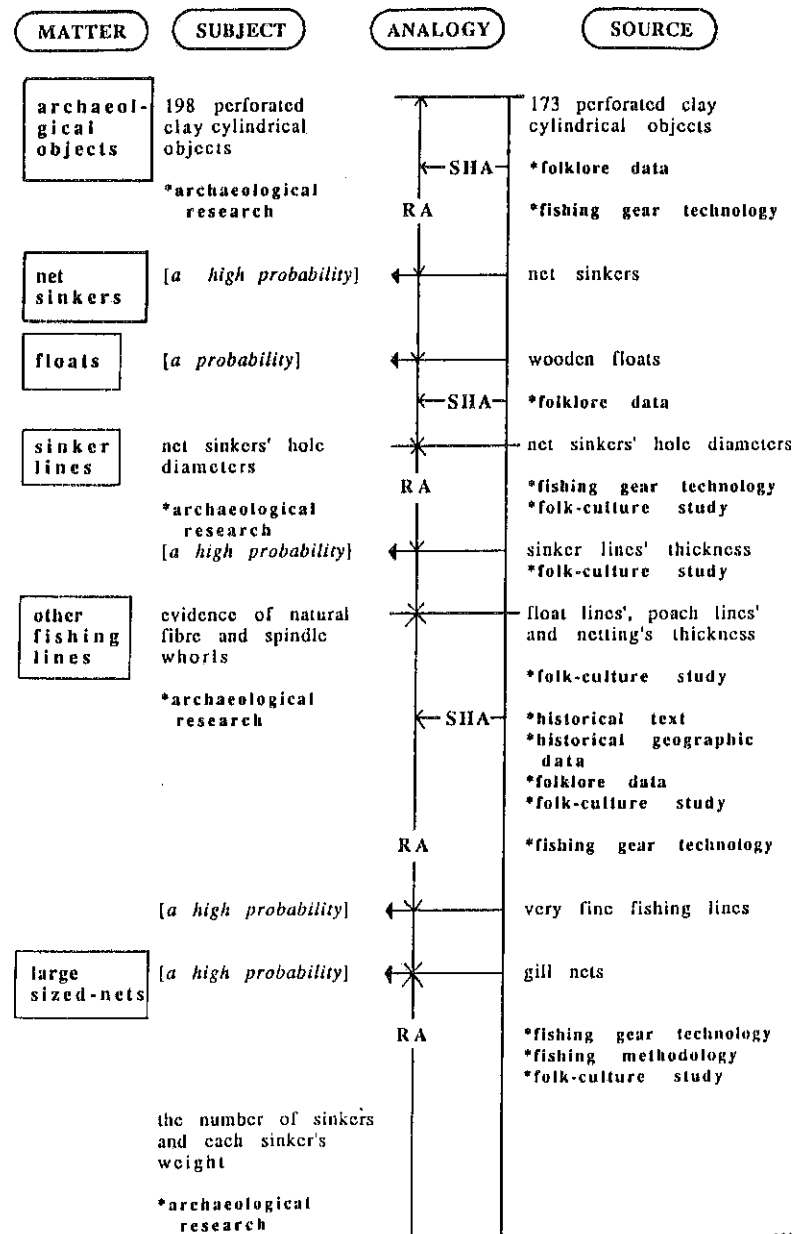
**The use of culturally specific and relational analogies**

**The methodological framework**

In drawing both general comparative analogies and specific historical analogies (Figure 1), three variables which the archaeologist must be aware of are the degree of cultural continuity, comparability in environment, and similarity of cultural form, between source and subject (Share & Ashmore 1979: 460).

Among these, the maximum cultural continuity between source and subject is the most important, so that specific historical analogy commonly offers a higher degree of probability than general comparative analogy. However, even in making a specific historical analogy, the situation in the Old World seems very complicated in contrast with the New World's case, especially the case in the southwestern United States (Steward 1942: 337-40). In other words, since the historic period is several times as long in Korea as in the United States, it is reasonable to say that as the time span between source and subject increases, the possibility of change in other variables (cultural material form, natural environment and cultural complexity such as economic and social life) increases.

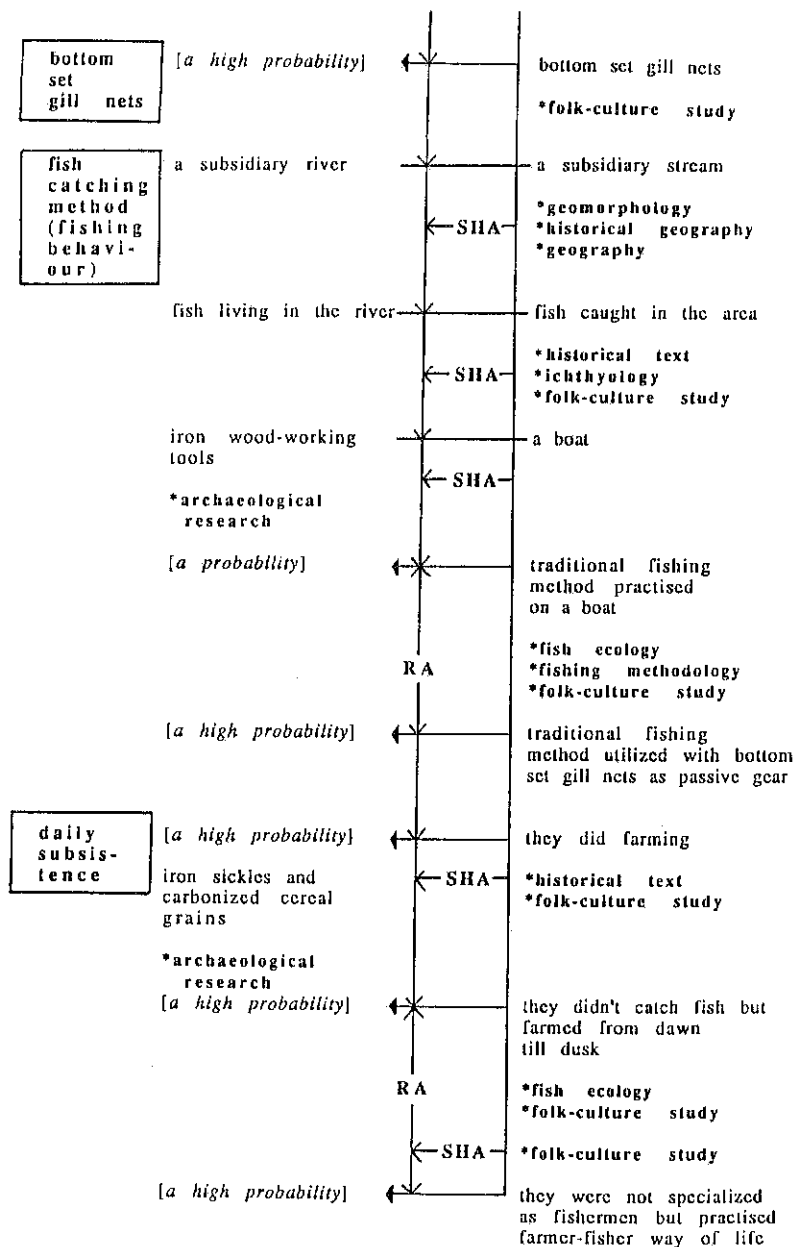
Ever since the Bronze Age, however, it is possible to trace the continuity of cultural material forms down to our own day in Korea. The peasant basis, incorporating even elements from the Bronze Age farmer-fisher way of life, continues to exist in the rural community of modern Korea. The most familiar example is provided by a prehistoric bronze engraving which depicts one man digging a narrow bed of soil with an angled two-pronged implement (*ttabi*), while another breaks up the clods with a hoe. This kind of agricultural implement is still used by Korean peasants (Han 1971; Bray 1984: 216-8). Another instance with reference to the fisher way of life will be provided in this paper. In order to reduce the temporal gap between Jopo-ri's case of the 4th century AD and Woljam-ri's case of the present day, I shall utilise historical texts, historical-geographic data such as old maps and folklore data including folk-culture study.



...cont'd

**Figure 1** A flow model of the use of culturally specific and relational analogies.

SHA= specific Historical Analogy, RA = Relational Analogy (detailed arguments appear below in relation to individual artefact categories; cf. Figure 25)



Although we can ensure the maximum cultural continuity between Woljam-ri and Jopo-ri, if the analogies are based only on formal similarities between source and subject, the analogical arguments will be formal analogies. That is to say, "point for point assessment of similarities or differences in the properties of source and subject" (Wylie 1985: 94) can hardly justify a conclusion which can elucidate further similarities.

In contrast, having relevant knowledge about underlying causal connections "that structure source and subject" (*ibid.*: 94), we can draw relational analogies. In this case, the meaning of relevance is extremely important. This "is to be explained in terms of causality" (Copi & Cohen 1990: 366). That is to say, "one attribute or circumstance is relevant to another, for purposes of analogical argument if the first affects the second, that is, if it has a causal or determining effect on that other" (*ibid.*: 366). In other words, relational analogies "are those that deal with causally related attributes or circumstances" (*ibid.*: 366). Therefore, we can elucidate further similarities on the basis of relational analogies.

In order to understand unknown archaeological objects (198 perforated clay cylindrical objects), the cultural material form (bottom set gill nets), the fishing behaviour behind the use of bottom set gill nets, and daily subsistence of Jopo-ri people in the 4th century AD, I will draw relational analogies (Figure 1, vertical arrows) to be supported by specific historical analogies (Figure 1, horizontal arrows) using several kinds of knowledge about fishing gear technology, fishing methodology, fish ecology, ichthyology, palaeoethnobotany, geomorphology, historical geography, geography, archaeology, history, folklore and philosophy. Using such types of knowledge, I will stress the functional and causal mechanisms that determine interrelationships of the manifest properties between source and subject.

### The Jopo-ri site and the folk-culture study at Woljam-ri

#### The archaeological research

Excavations in the middle reaches of the Hwang River basin were intensively conducted from 1986 to 1988 as a rescue project associated with the construction of Hapch'on dam (Figure 2). During this period, 1 Mesolithic open site, 3 Neolithic pit-dwelling sites, 5 Bronze Age pit-dwelling sites, 6 Bronze Age dolmen sites, 3 Kaya Period pit-dwelling sites and 11 Kaya-period tomb sites were excavated (Figure 3). Among them, the Kaya-period sites are mainly close to one another at the Jopo area and Ponggye area during the period from the 2nd to the 7th century AD.

In the Jopo area (Figure 4), it was known that past Jopo-ri people used different hills in different periods for their cemeteries, with a careful succession from A hill to E hill through time (Jeong *et al.* 1987: 289; Park and Choo 1988: v; Yun 1987: 141). Moreover, it was observed that cemeteries which belong to the period from the middle 5th to the early 6th century AD were not constructed in the Jopo area (Lee

1987: 137; Yun 1987: 141). Instead, the cemeteries were made in the Ponggye area on a large scale.

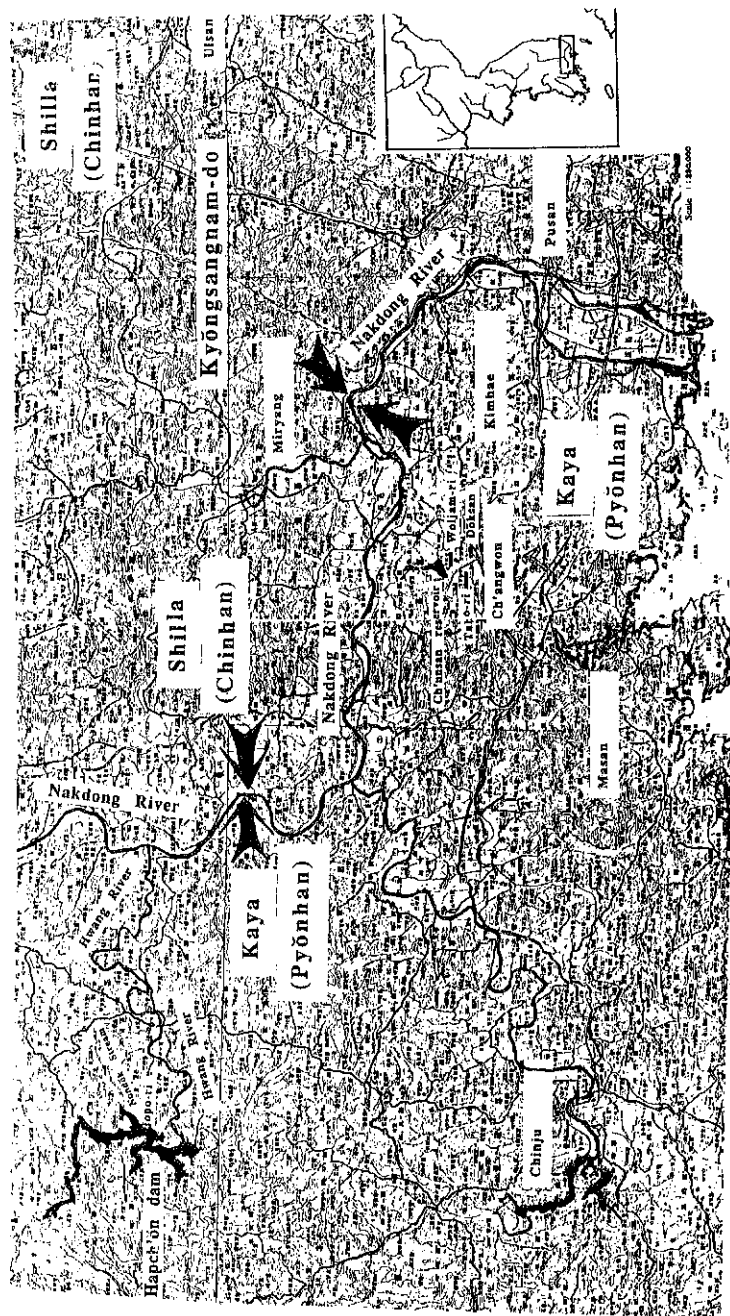


Figure 2 Topographic map of the Nakdong River basin.

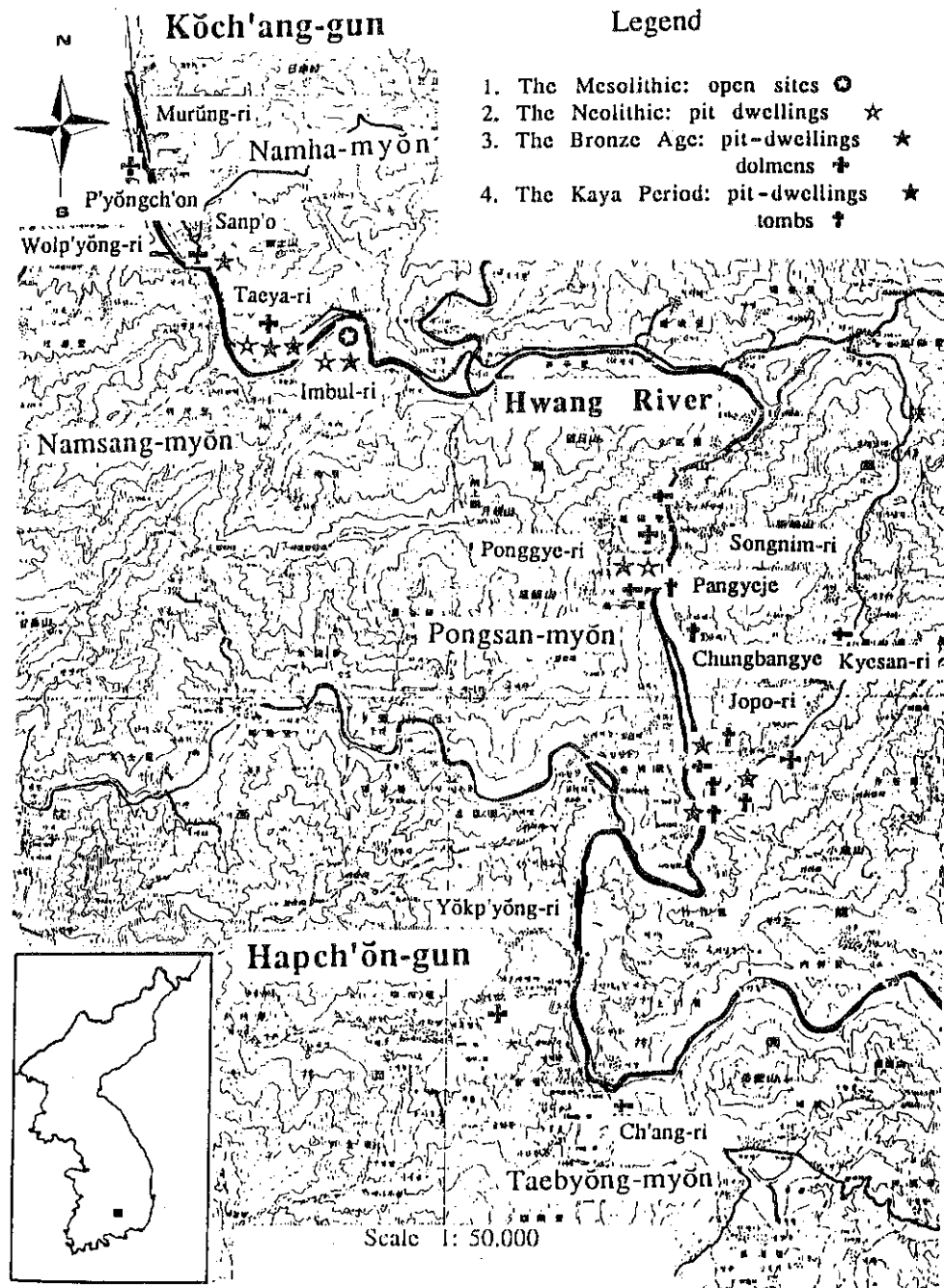


Figure 3 Distribution map of sites in the middle reaches of the Hwang River basin.

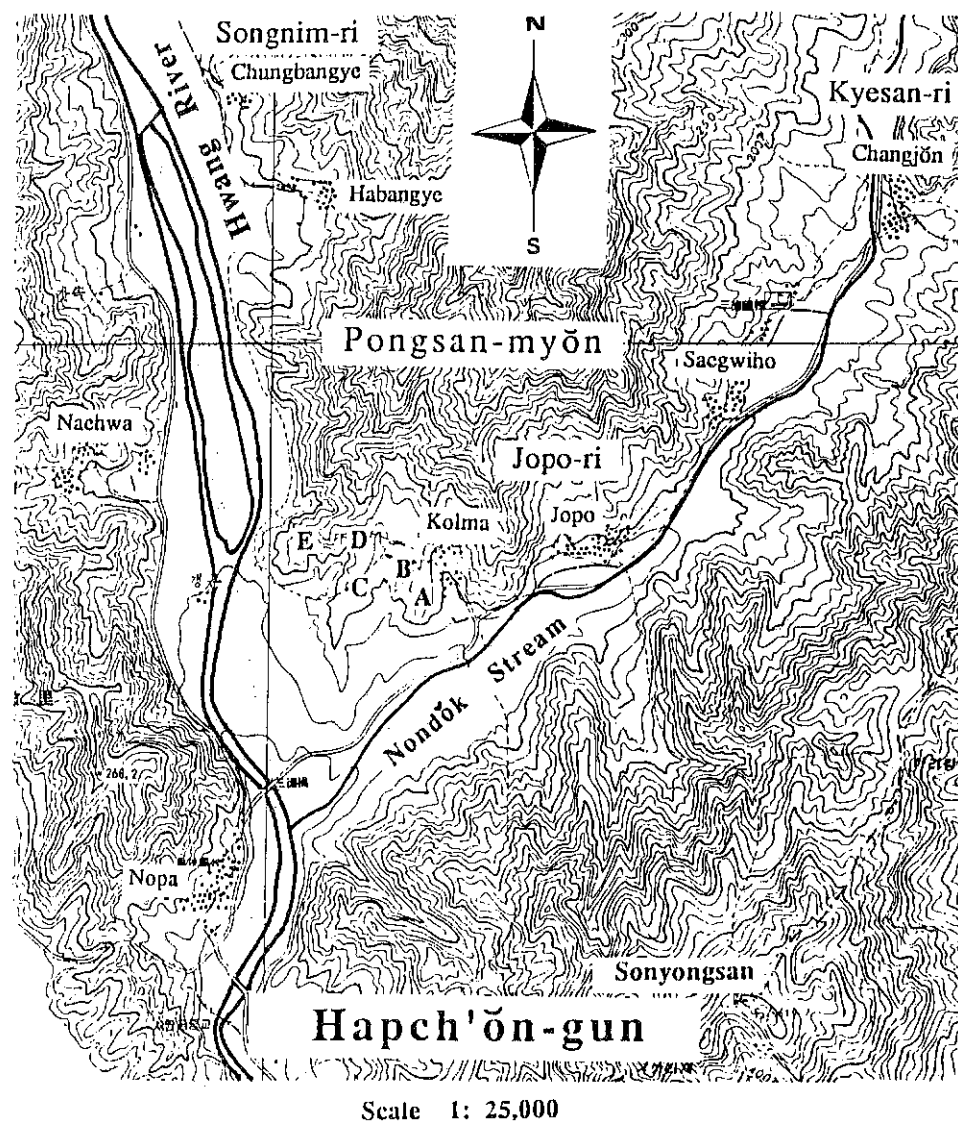


Figure 4 Locations of Jopo-ri A, B, C, D, and E sites.

The Jopo-ri B was excavated in 1987 for 54 days (4th May - 26th July) under my supervision (Park & Choo 1988). The excavation was conducted using a grid system over the whole Jopo-ri B hill (Figure 5). The features excavated at this site were 1 jar coffin tomb and 23 wooden coffin tombs. The artefacts excavated from those wooden coffin tombs included: various types of pottery, iron implements such as weapons and tools, jade objects, spindle whorls and net sinkers, etc. Through examining the features and the excavated artefacts, it was known that people who lived at Jopo utilized the Jopo-ri B hill as their public cemetery for about 100 years from the late 3rd or the early 4th century AD to the late 4th or the early 5th century AD (Park & Choo 1988: 174-217).

Most notable among the excavated artefacts were 198 net sinkers recovered en masse from Tomb 20, located on the top of Jopo-ri B hill (Figure 5). Most features of the tomb were destroyed due to natural and cultural factors, and artefacts on the tomb's floor were found at a depth of only about 27cm from the present ground surface. The floor area measured 3.83m long x 1.09m wide. The net sinkers were found to the north part of the centre (Figures 6, 7). If the rest of the floor level had not been disturbed in the process of making modern holes, more net sinkers would have survived (Park & Choo 1988: 95-108).

#### The folk-culture study

When I recovered such a large number of net sinkers, I primarily concentrated my efforts on understanding the type of net on which more than 198 net sinkers could be threaded. I did so by inquiring of the people who presently live at Jopo-ri what kind of net they had used in order to catch freshwater fish in the Hwang River. A local villager stated, "we used gill nets and cast nets until the 1970s, but after that—because we have used electrical stupefying gear, which is prohibited by law, instead of using those kind of nets—no actual fishing gear such as gill nets and cast nets remains." I had to find another place where a net, on which net sinkers similar to Jopo-ri's were threaded, had been used in a similar environment. Although I tried to find a specific area to observe among the areas which are situated along the Hwang River and the Nakdong River, I could not.

The first season of folk-culture field work at Woljam-ri was conducted on 16th March 1988 when I visited the Taho-ri site (cf. Yi *et al.* 1989), which is a remarkable burial site in Korean archaeology (cf. Figure 2). At that time, I accidentally found bottom set gill nets at the Park house where the excavation team stayed. Net sinkers threaded on Woljam-ri's bottom set gill nets were very much the same as Jopo-ri's net sinkers (Figure 8), and they still use this kind of net to catch freshwater fish in the Ch'unsan reservoir (commonly called the Chunam reservoir).

The second season of field work at Woljam-ri was carried out on the 8th of January 1991 in order to get more information and check the data I had already collected. This field work was conducted by participant observation and informal interviews with Mr. Hye-sik Park, my informant. The Parks live near a subsidiary stream flowing into the Nakdong River. Mr. PARK Hye-sik, 46 years old, first moved to the area at the age of 20 in 1965. He lives with his wife and two children,



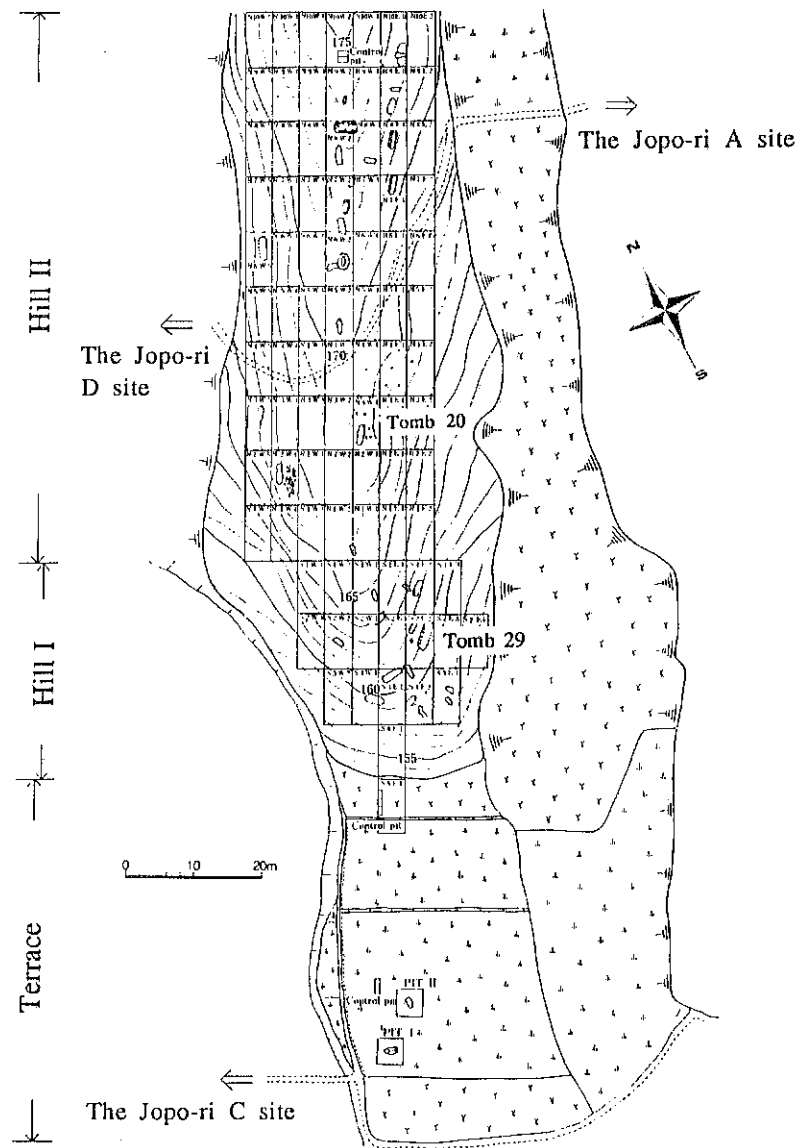


Figure 5 Site grid on Jopo-ri B hill.

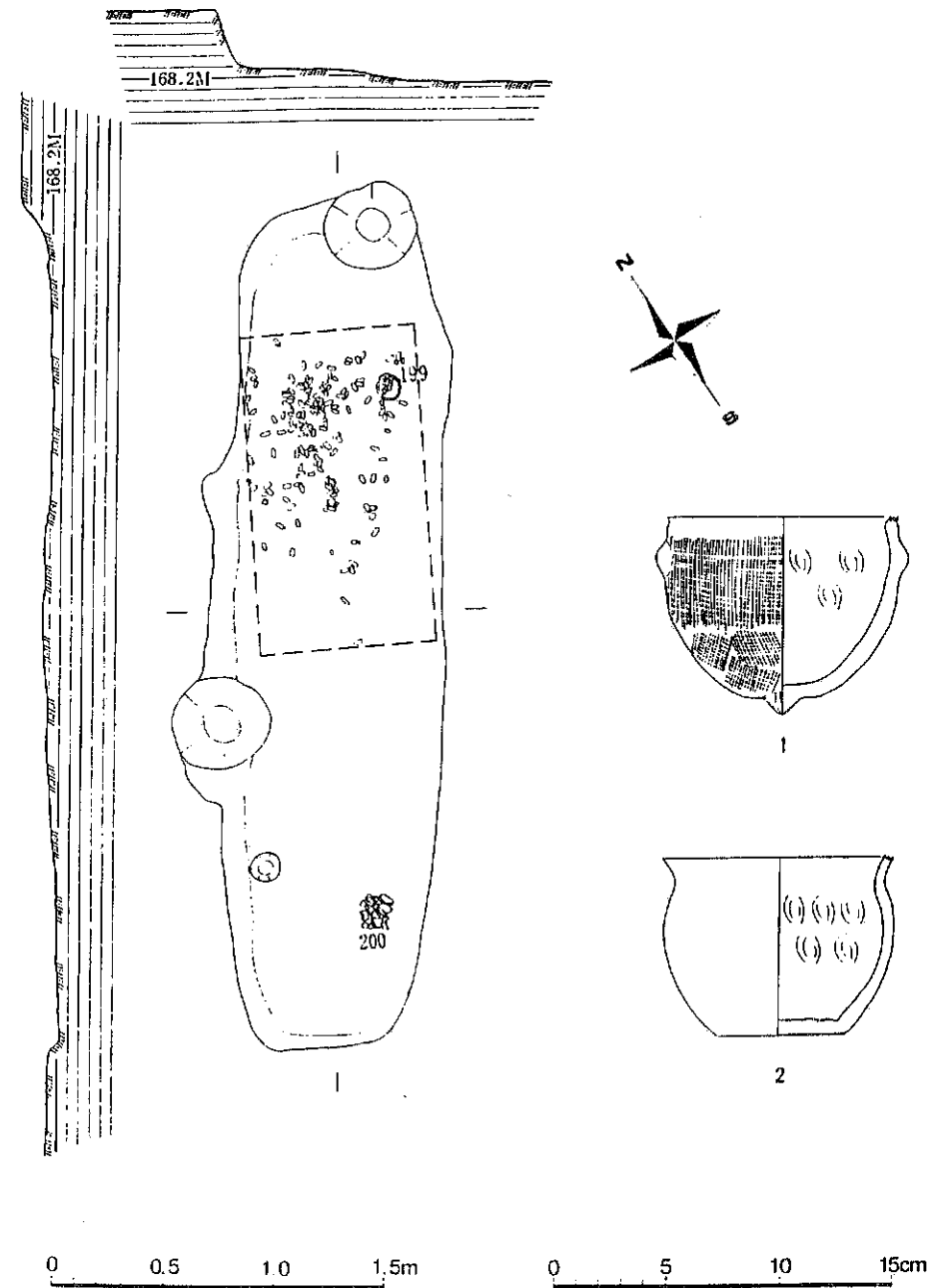
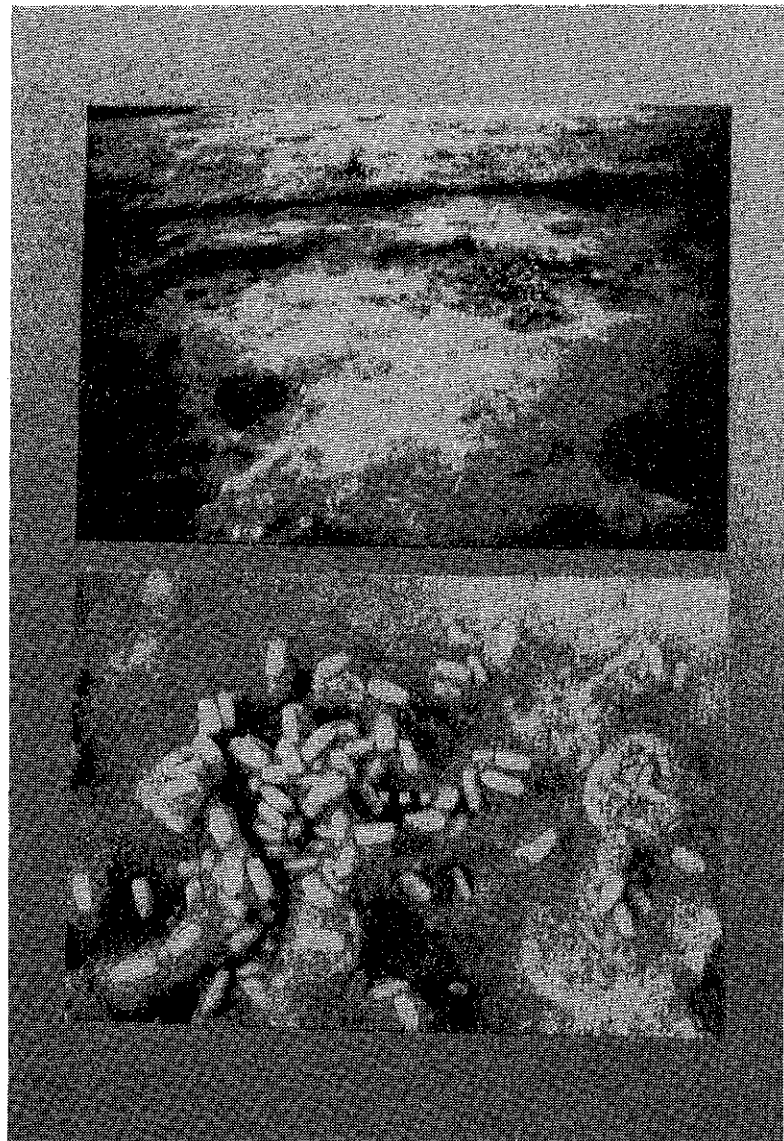
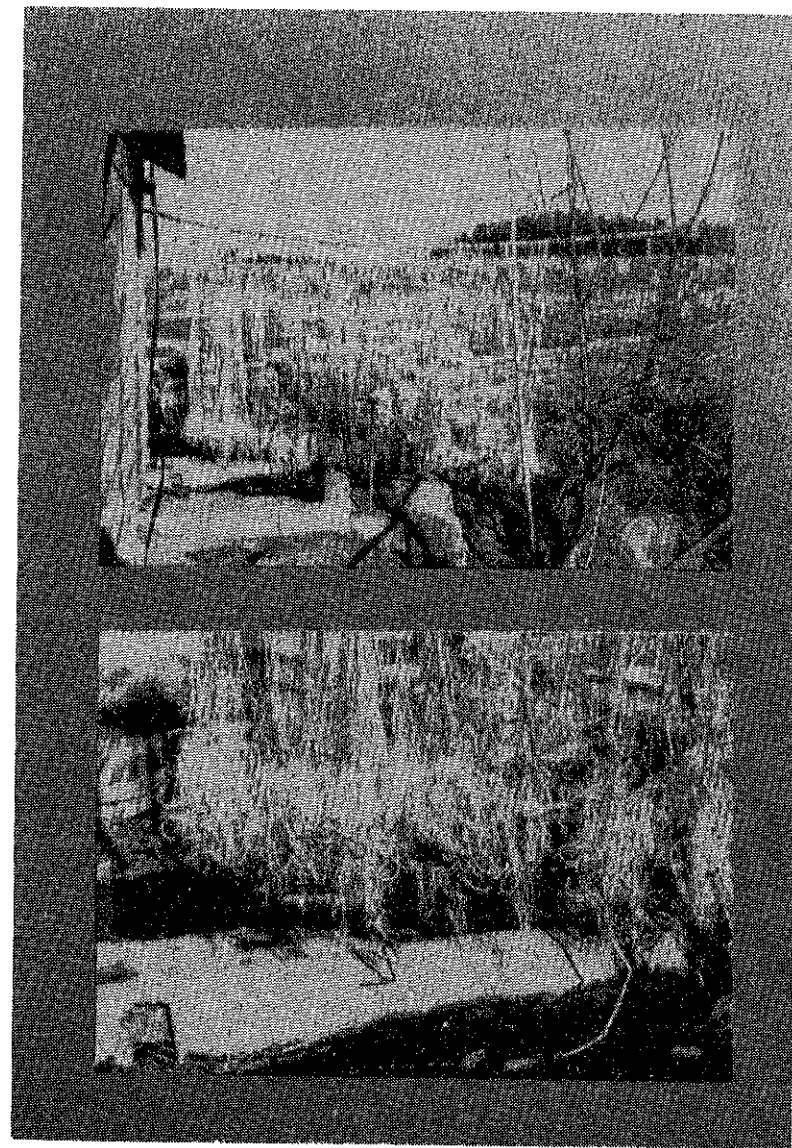


Figure 6 Plan and section of Tomb 20 and its pottery contents.



**Figure 7** Excavated scene of Tomb 20 (above) and detailed scene of excavated cylindrical net sinkers (below).



**Figure 8** Woljam-ri's bottom set gill net (above) and cylindrical net sinkers threaded on bottom set gill nets (below).

running a raw fish restaurant (Haehunjang Hoetgib Shikdang) at 270 Woljam-ri, Tong-myŏn, Ch'angwon-gun, Kyŏngsangnam-do. When I conducted my first field season in 1988, he was catching freshwater fish with bottom set gill nets for his customers; but after enlarging his restaurant and extending his business, he stopped catching fish and has purchased freshwater fish/marine fish from his neighbours and the fish market in Masan (*cf.* Figure 2) since 1989. Although the situation had changed when I conducted the second field season in 1991, he was a good informant because he had not only been a fisherman before but had been able to listen to all kinds of village news through his restaurant.

During the first season of this field work, I mainly concentrated on observing and participating in the fish catching method, the kinds of fish caught, and the drying and keeping method of nets. At that time, I bought one piece of bottom set gill net and measured items of the net. After that, in the course of my research on fishing gear technology/fishing methodology/fish ecology by consulting with specialists in these subjects, I felt that the first field season's work was inadequate, especially because the fishing method I had observed was not a traditional but a reformed one designed for use in a reservoir. Therefore, during the second season, I relied on informal interviews with my informant and solicited information directly from him, prompting him to speak by posing specific questions about traditional fishing methods/kinds of fishing gear/the materials of the items, manufacturing process of fired clay net sinkers, the transformation of the topographic situation of the area, and fish ecology of the area.

### Fishing gear in Korea

In Korea, the natural setting suggests intensive utilization of aquatic resources (Figures 2, 9). Historically the sea, surrounding the Korean peninsula on three sides, and a large number of rivers and streams have provided valuable resources for and played important roles in developing the fish communities and industry (Park 1981). For this reason, traditionally, most of the animal protein consumption of the Korean people has been provided by sea food and freshwater fish (Kang 1990; Park 1974). Therefore, Korean archaeologists have paid particular attention to understanding to what extent past people based their subsistence economy on aquatic resources, and especially to understanding the interaction between fish and human beings in prehistory.

However, in Korean archaeology, although some ichthyologists have contributed a number of works concerned with the identification of fish species from shell middens based on osteological remains, they have only answered the questions posed to them by archaeologists. As a result, many Korean archaeologists are still not aware of the wide range of data that ichthyologists or palaeontologists can provide from their own disciplines: the environment of deposition of the matrix sediments; the season of occupation of sites; and the range of aquatic environments exploited by past people (Shackley 1981: 181). Consequently, they have focussed heavily on just

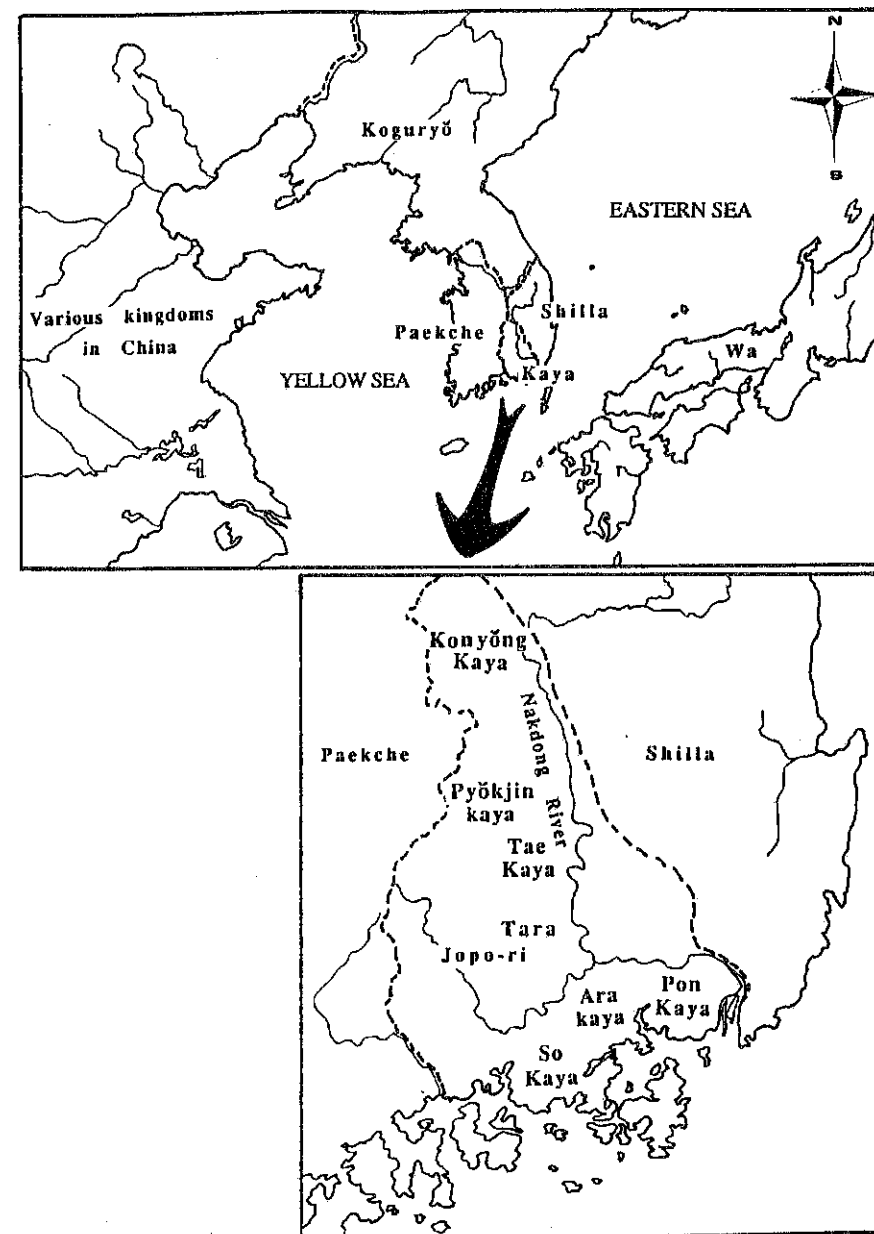


Figure 9 Historical map of East Asia in the 4th century AD.  
(based on Collcutt *et al.* 1988; Lee & Lee 1985)

the archaeological remains related to fishing behaviour because of the lack of an adequate methodological framework in economic approaches.

From the Neolithic there are archaeological remains related to fishing behaviour, recovered from various archaeological contexts such as shell middens, pit-dwellings, dolmens and several types of tombs in historical times. These are divided into three groups according to different fishing methods (Park 1987: 16-82). It can be said that spears, harpoons and arrowheads made of stone, bone and iron are related to the grappling method, which extends the range of the human arm with long-handled implements which can be pushed, thrown or shot. The second group involved the use of lines. The gorge made of bone is the simplest type of hook which belongs to this method. It functions by lodging in the fish's throat, and, when caught, the fish can be pulled in. A more elaborate manner of capture is for the fish to be offered a real or supposed bait which is presented in such a manner that it is difficult for the fish to let it go once it is taken. One-piece hooks and composite hooks made of stone, bone and iron may be related to this fishing method. The third one is the netting method. Although there are no actual remains of netting found in the archaeological context, the existence of net sinkers suggests that the netting method could have been practised.

In Korea, various types of net sinkers have been recovered at sites from the Neolithic to the historical period. Twelve types—identified by clusters of attributes that occur together repeatedly in the same artefacts (*cf.* Sharer & Ashmore 1979: 277)—are distinguished on the basis of form, technological, stylistic and functional attributes. Form attributes include the forms of parts of net sinkers: side-notched or grooved; presence/ absence of a hole; a central short bore hole or a long one; and overall shape such as irregular, shell, disk, oval, spherical and cylindrical forms. Technological attributes include characteristics of the raw materials used to manufacture net sinkers (stone, potsherd, shell and clay) and whether the material was altered or not (raw material and altered material such as ceramic). Stylistic attributes involve secondary alterations (chipped, polished, scraped and bored). Functional attributes are based upon the assumption that the forms of parts of net sinkers can be directly used to infer the way in which sinkers are weighted on the bottom edge of a net (Table 2, Figure 10).

Some researchers are sceptical about using such archaeological materials, mainly side notched small flat river cobbles (Type I), always being used to interpret fishing behaviour. Kent and Nelson suggest an alternative use such as weaving behaviour in addition to fishing behaviour, using an analogy with Ainu ethnography (Kent & Nelson 1976: 152). In fact, in the cases of disk-shape and spherical net sinkers (Types VI, IX and X), it is also hard to distinguish them from spindle whorls and clay beads in terms of size, so that it might be argued that there are some difficulties in relating all these materials to fishing behaviour.

Attribute	Form attributes		Technological attributes		Stylistic attributes	Functional attributes
	the form of parts without a hole A: side-notched B: grooved	overall shape a: irregular b: shell c: disk d: oval e: spherical f: cylindrical	raw material	raw or altered material = ceramic		
Type I	1: a central short bore hole	a (c)	1) stone	a)	i)	the way to be weighted
II	1: a central short bore hole	a	2) potsherd	a)	ii)	ⓐ dangled
III	1: a central short bore hole	a	3) shell	a)	ii) + iv)	ⓑ secured
IV	2: a central long bore hole	a (c)	4) clay	a)	iii)	ⓒ secured and threaded
V	1: a central short bore hole	b	1) stone	a)	iv)	ⓓ threaded
VI	1: a central short bore hole	c	2) potsherd	b)	i)	ⓔ
VII	1: a central short bore hole	d	3) shell	a)	ii)	ⓕ
VIII	1: a central short bore hole	d	4) clay	b)	ii)	ⓖ
IX	1: a central short bore hole	c (d)	1) stone	b)	i)	ⓗ
X	1: a central short bore hole	e	2) potsherd	b)	ii)	ⓘ
XI	1: a central short bore hole	d	3) shell	a)	iii)	ⓙ
XII	2: a central long bore hole	f	4) clay	b)	iv)	ⓚ

Table 2 Typology of net sinkers in Korea. (Roman numerals are the same as in Figure 10)

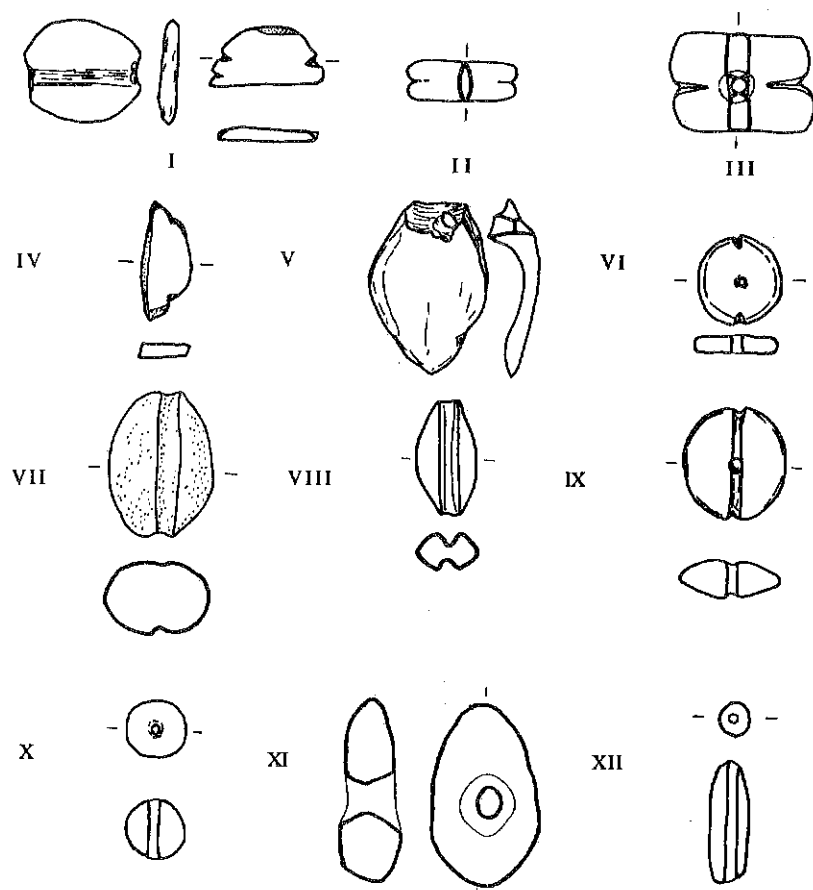


Figure 10 Various types of net sinkers in Korea.

(not to scale; Roman numerals are the same as in Table 2)

**Type I** from House 31 of the Namgyōng site (after Kim and Sōk 1984) and from the ground surface of the Ponggye-ri site (after Sim 1989). **Type II** from the Shinhūng-dong site (after Sō 1964). **Type III** from P'yōngch'anggang (after Institute of Asian Culture 1986). **Type IV** from House 9 of the Ponggye-ri site (after Sim 1989). **Type V** from the Tongsam-dong site (after Choi 1971). **Type VI** from House 4 of the Jopo-ri E site (after Jeong et al. 1987). **Type VII** from the Ch'odo site (after Institute of Archaeology and Folklore 1956). **Type VIII** from the Togok-ri site (after Kim 1967). **Type IX** from House 15 of the Taeya site (after Im et al. 1989). **Type X** from House 3 of the Taeya site (after Im et al. 1988). **Type XI** from the Kwakji shell midden (after Lee & Lee 1985). **Type XII** from House 13 of the Hunamni site (after Im 1978).

### Perforated clay cylindrical objects, net sinkers, bottom set gill nets, fishing behaviour and daily subsistence

#### Perforated clay cylindrical objects, net sinkers and bottom set gill nets

It is true that there are some difficulties in relating all materials to be shown in Figure 10 to fishing behaviour. However, it is my view that the perforated clay cylindrical objects (Type XII) should be regarded as net sinkers.

When comparing Jopo-ri's ancient perforated clay cylindrical objects with present-day ones from Woljam-ri in terms of morphological similarities, we can see at a glance that the two cases look very similar in overall shape, material (clay), perforated form, size, hole diameter and colour (Figure 11). Archaeological objects of these shapes—such as those recovered from Tomb 20 at Jopo-ri B—are found from the early phase of the Bronze Age onwards (Choi et al. 1985: 12); in the historical period larger objects of the same type are found at the Mongch'on fortress site (Kim et al. 1984: 256). This type of material object is used even in the present-day as net sinkers (Yang 1987: 127) (Figure 12). This comparison of formal similarities between source (Woljam-ri's cylinders) and subject (Jopo-ri's cylinders) based on morphological similarities and the continuity of the material form comprises a formal analogy of net sinkers.

When we are looking at present-day cylindrical net sinkers in terms of causal mechanisms, they should have a certain shape and be heavy enough to weight the bottom edge of a net to hold it taut in order to keep sinking force. That is to say, according to fishing gear technology (Fridman 1986: 48-52), the shape, position and steady-state dimensions of fishing gear depend on the magnitude and direction of the external forces acting on it. These forces include gravity, hydrostatic forces and hydrodynamic forces (Figure 13). Among these, gravity is directed downwards, while hydrostatic lift or buoyant force is directed upwards. Consequently, in order to maintain the shape of fishing gear in a steady-state from the pressure of the water moving in relation to the gear, the important factor is how the lift force (buoyant force) and sinking force (gravity force) harmonize well in water.

Therefore, in order to maintain the sinking force in water, two relevant factors in constructing a relational analogy for net sinkers are sufficient weight for sinking and the proper shape for being weighted solidly to the net. In the Neolithic, side-notched objects made of river cobbles (Type I) and potsherds (Type IV) were mainly used (Sō 1986: 96). If these objects are net sinkers, they were secured to the net in various ways. Although they were heavy enough to sink the nets (judging from the fact that the weight of these types is similar to that of Woljam-ri sinkers [Park & Choo 1988: 202-204]), they were easily lost because of insecure fastening to the net. Since the Bronze Age, a new type of object (Type XII) has been made in order to mitigate inconvenience in securing a sinker to the net; this object was made with a central bore hole so that the material would weight the bottom edge of the net more firmly by being threaded on a sinker line (*ibid.*: 198) (Figure 14).



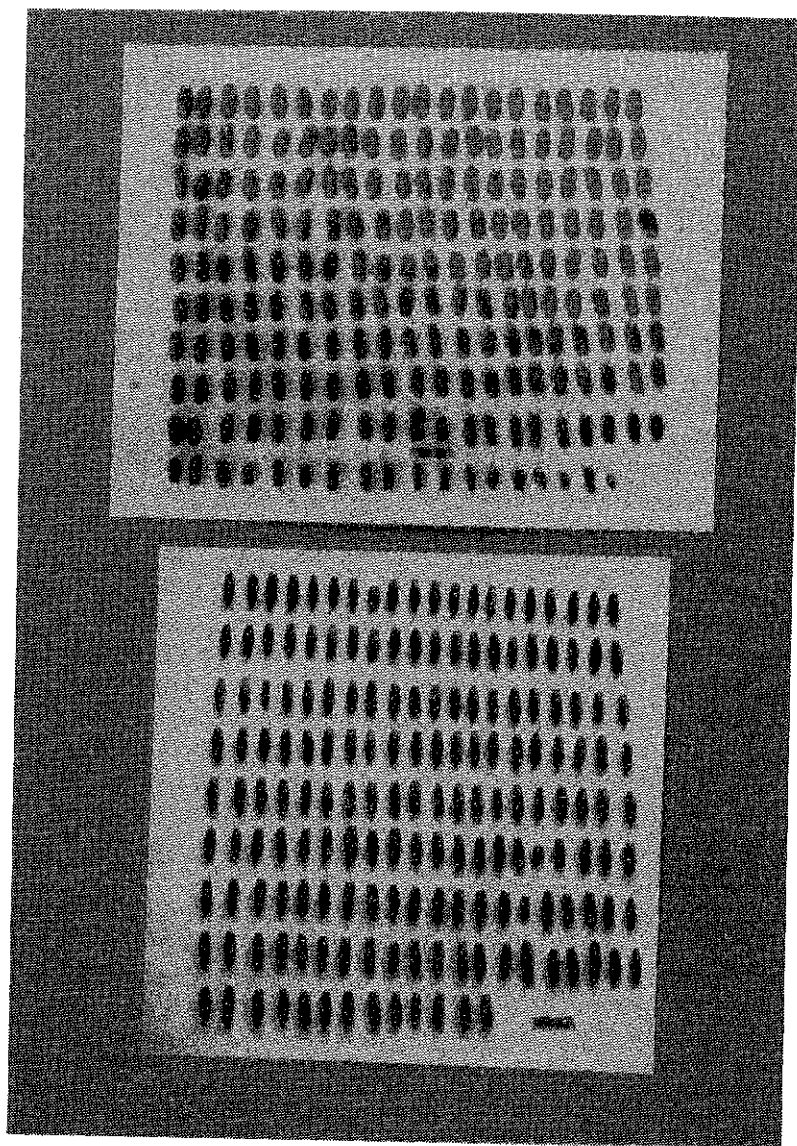


Figure 11 Cylindrical net sinkers from Tomb 20 at Jopo-ri B (above) and those threaded on the Woljam-ri bottom set gill net (below).

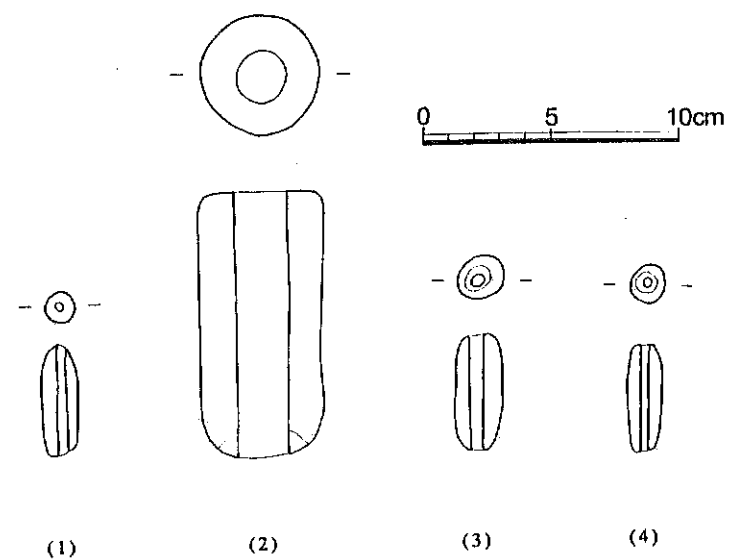


Figure 12 Cylindrical net sinkers from various periods.

(1) a net sinker from House 13 at Hunamni (after Im 1978); (2) a net sinker from the Mongch'on site (after Kim *et al.* 1984); (3) a net sinker from Tomb 20 at Jopo-ri B; (4) a present-day net sinker secured to Woljam-ri's bottom set gill nets.

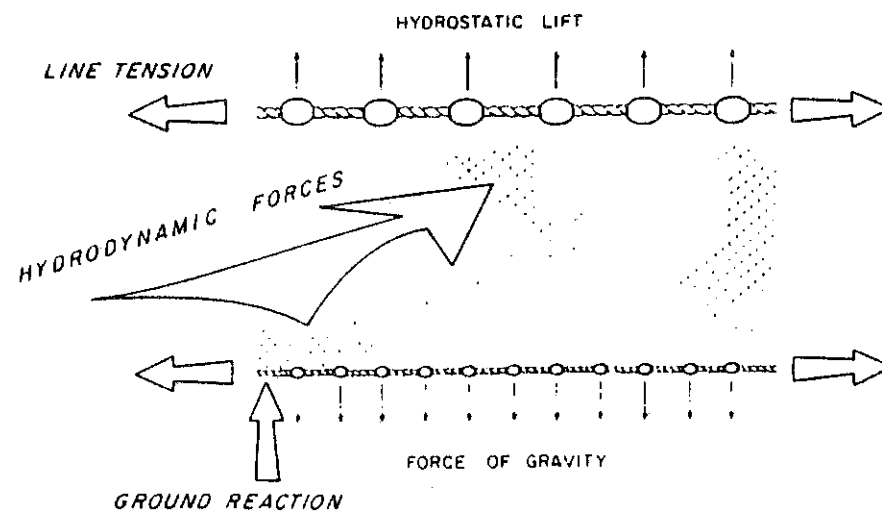


Figure 13 Classes of external forces acting on fishing gear. (after Friedman 1986)

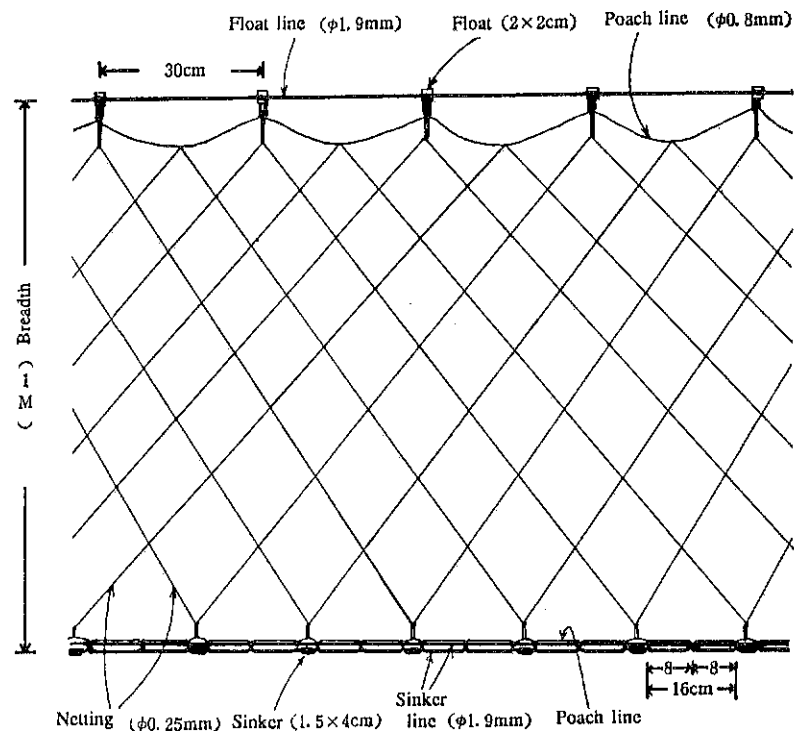


Figure 14 Construction and terms of present-day Woljam-ri's bottom set gill net.

From this causal relationship, I believe the reason why these perforated cylindrical archaeological objects have been continuously used since the Bronze Age is because of the functional advantage of being weighted easily and solidly, with enough weight given to the net by being threaded on a sinker line—somewhat as the v-shape of a ship has been kept on because of the functional advantage. Consequently, there is a high probability that these cylindrical archaeological objects were used as net sinkers in the past, judging from the continuity of the material form and its functional advantage. This also implies that there will not be a great difference between past nets and present-day nets in terms of the type of net. Using this hypothesis, I drew an analogy between the attributes of 198 net sinkers excavated from Tomb 20 of the Jopo-ri B site and the attributes of 173 net sinkers threaded on

the present-day Woljam-ri's bottom set gill net (Park & Choo 1988: 199-205).<sup>2</sup> However, as I did not examine the situation very much, focussing only on net sinkers, in this paper a finer analysis will be presented using the data I have collected previously and utilizing other kinds of data I have newly secured through my second season of folk-culture field work at Woljam-ri.

The present-day bottom set gill net of Woljam-ri (Figure 14) is composed of several items such as sinkers attached to a sinker line to keep it under water, the sinker line threaded through the holes of sinkers, floats attached to the net to support it in water, a float line secured to floats, netting knotted into a net, and poach lines connected to float line and sinker line (Park & Choo 1988: 200). From among these kinds of items, only sinkers have been preserved in Jopo-ri Tomb 20 (*cf.* Figure 11). Nevertheless, judging from the fact that wood was utilized as the material of floats before synthetic resins were introduced (Yang 1987: 127), it seems that floats made of wood could have been secured to the net in the past (Park & Choo 1988: 201). Floats are made of sponges in the case of Woljam-ri's bottom set gill net.

As for fishing lines, although there is not any direct information about fishing lines in either historical documents (Park 1984: 24-40) or among archaeological data for the 4th century AD, through the analysis of the net sinkers' hole diameters, the thickness of the sinker line can be estimated. That is to say, as a sinker line is going to be threaded through the hole in the sinkers, there is a functional relationship between the thickness of sinker line and the size of sinkers' hole diameters. In Figure 15, we can see very similar frequency distributions between the hole diameters in the two cases. In Woljam-ri's case, most hole sizes cluster at a diameter of 4mm, and in Jopo-ri's case at a diameter of 4 to 5mm. Therefore, in light of the frequency distribution of hole sizes, it can be said that Jopo-ri's sinker line was similar in thickness to Woljam-ri's. From this, it is reasonable to say that a thickness of about 2mm was the approximate size of Jopo-ri's sinker line, judging from the thickness of Woljam-ri's sinker line (Park & Choo 1988: 201-202).

As we can see in Figure 14, if the Jopo-ri sinker line has a thickness of 2mm, the rest of the fishing line will be thinner than the sinker line in light of the construction of fishing lines. According to current fishing methodology, which is a scientific discipline to contribute to a better understanding of the fishing and related processes and of the interaction between fish, fishing gear and the fishing vessel (Lee 1981: 5), netting used in gill nets is so thin that it is almost impossible for the fish to identify the net, and the net is a flexible one (Ko 1975: 357). Although synthetic fibres are presently used in Woljam-ri, according to my informant, silk was used until the 1960s.

<sup>2</sup> I have previously described the present-day nets of Woljam-ri as 'drift gill nets' (*yujamang*) before (Park & Choo 1988: 199), according to my informant's explanation. However, I now feel that this term is incorrect in terms of the classification adopted by the Fisheries Administration, Korea (O *et al.* 1987). I therefore amend the term 'drift gill nets' to 'bottom set gill nets' (*padak kojong kŏlgŭmul*) on the basis of the classification adopted in this paper.

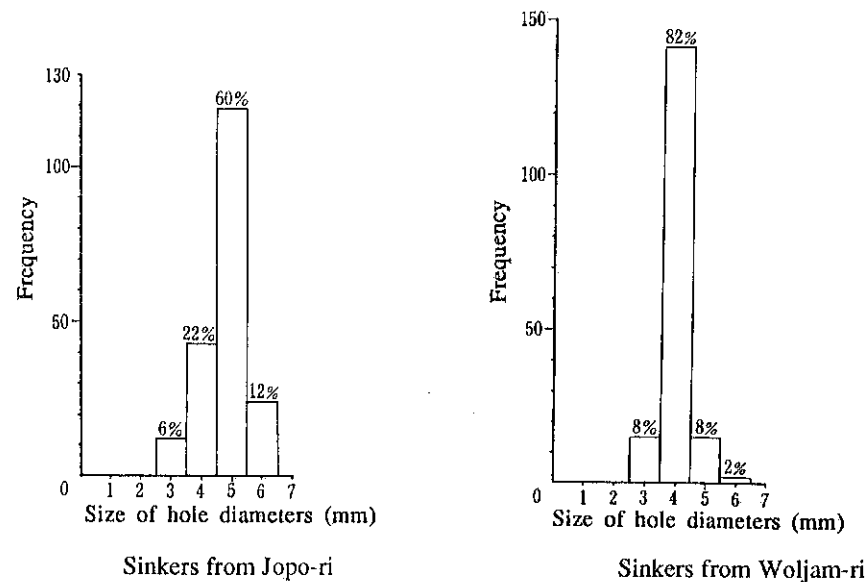


Figure 15 Histograms of net sinker bore diameters.

Was it possible to produce such a fine thread as silk at the Jopo-ri in the early 4th century AD? The *Dongyi zhuan* ("The account of the eastern barbarians") in the Chinese historical text *Sanguo zhi* (Chronicles of the Three Kingdoms Period)—in which detailed historical circumstances of the 3rd century AD are described—states that the people of Pyŏnhan, which is the name of the socio-political entity of this region in the 3rd century AD (Figure 2), grew mulberry trees, reared silkworms and produced silk (Chen 232-97: 52). Moreover, evidence of the natural fibre was recovered from Tomb 29 of the Jopo-ri B site (Park & Choo 1988: 129) (Figure 5), and spindle whorls aiding the rotation process of a spindle were excavated from Tombs 9, 14, 25 and 33 at Jopo-ri B (*ibid.*: 181). Furthermore, the Chinese character *jo* (苧) of the Jopo-ri means ramie fabric (K. *mosi*) and *po* (浦) means an inlet. Therefore, although we do not know exactly when this location name appeared, it is true that there was an inlet used to transport ramie fabric produced at this village. In addition, as I have observed, the people who lived at Jopo-ri also grew mulberry trees and reared silkworms until their village was submerged by the Hapch'ŏn dam waters. According to this evidence, it is reasonable to say that in the 4th century A.D., the Jopo-ri people produced very fine fibre such as silk, and they may have made large-sized nets such as gill nets whenever they needed. This means that they could have intensively exploited the aquatic environment (e.g. the Hwang River and the Nondŏk Stream, cf. Figure 4) using such large-sized nets.

The invention of nets made of fibrous materials was an important technological innovation in the development of fishing. Although we do not know whether a text

with reference to fishing methodology existed at that time (the first appearance of fishing methodology in a historical text was in the middle of the 18th century (Park 1987: 116; Kim 1989: 207-22)), it seems that people knew how to select fishing grounds, fishing gear and fish-catching methods through learning from their predecessors.

According to current fishing methodology, six engineering and technological problems arising in the activities of a fisherman are as follows (Fridman 1986: xxi-xxii):

1. Selecting fishing gear and type of vessel according to fishery resource data for the given area;
2. Determining optimal technical parameters for the fishing gear, taking into account the characteristics of the area, type of catch and available vessels;
3. Designing fishing gear and calculating the quality and quantity of the materials required for its construction and rigging;
4. Prescribing the best pattern of operation (towing speed, fishing position, rigging details, etc.) under various conditions;
5. Demonstrating possibilities for improvements and implementing them in existing fishing gear used in a given fishing area;
6. Modifying traditional fishing gear for operation under different conditions.

In order to solve these problems, the following factors need to be considered (Fridman 1986: xxii):

1. Fish (species, type and size of concentration, behaviour, migration speed, biometric characteristics of individual fish, etc.);
2. Fishing grounds (fishery resources, food availability, distance from the port, depths, currents, temperature, salinities, availability of bait, etc.);
3. Technological level (skills of fishermen, availability and types of fishing vessels, appropriateness of fishing gear, availability of materials, etc.);
4. Economic conditions (general demand and specific market preferences, distance to markets, availability of capital, etc.).

Although it is beyond the scope of this paper to examine commercial aspects of fishing, other factors (fish, fishing grounds and technological level) will be considered in order to determine whether Jopo-ri people could have in the past used large-sized nets to intensively exploit the aquatic environment. What also needs to be emphasized is that these three factors are interrelated. In order to understand the exact type of fishing gear (tools of the ancient Jopo-ri people) and their fishing methods (fishing behaviour enacted with the fishing gear), the aquatic environmental situation (fishing grounds and fish) must first be examined. This is because fishing behaviour was the way that Jopo-ri people adapted to the Hwang River and the Nondŏk Stream, utilizing the knowledge of freshwater fish behaviour in order to subsist.

Korea is largely mountainous and has a relatively large number of rivers and streams. The Nakdong River (521km) is the second longest river in the southern part of Korea. The river is slightly meandering and has a slight slope especially in the

middle and lower reaches (Hong 1985: 399-402). Its role in irrigation has played a significant part in the development of Korea's ancient civilisations: Kaya (Pyŏnhan) and Shilla (Chinhan) (cf. Figures 2, 9).

The Hwang River (111 km) is a subsidiary river flowing into the middle reaches of the Nakdong River. The slope of its bed is so steep that erosion of the basin has occurred everywhere (*ibid.*: 402). The Jopo area is also a sort of erosion basin. The Nondŏk Stream flows into the Hwang River and the Jopo-ri site is at the junction of two rivers. In Figure 4, the river is about 80m wide, but if the summer rainy season has set in, the river becomes about 300m wide. At the same time the Nondŏk Stream also becomes about 100m wide (personal observation). It might be argued that environmental change due to erosion could have occurred and the river flow patterns could have changed in this region. There is no way to rule out this possibility, but judging from the steep topographic situation, it is unlikely that the river flow patterns have changed in the last 1700 years. Moreover, no large-scale engineering works had been practised before the construction of Hapch'ŏn dam (Hong 1985: 391-590). Therefore, it is considered that the characteristics of the river should be the same, and consequently the kind and quantity of freshwater fish are also the same.

It is known that a relatively large number of freshwater fish live in the middle reaches of the Hwang River. According to ichthyological research carried out before this area was submerged by Hapch'ŏn dam, 23 species lived in this location (Han & Park 1985) (Figure 16: Table 3), comprising about 28% of the species of freshwater fish in the Nakdong River and about 14% of those in Korea.

In the lower reaches of the Nakdong River, alluvial plains have developed everywhere (Hong 1985: 402) (cf. Figure 2). Therefore, when the summer rainy season comes, people suffer from a flood annually. Consequently transformation of the topographic situation is frequent. Two recent studies on the Kimhae delta using the method of a borer in an archaeological context clarified that the geomorphological situation of the Kaya period was quite different from the present-day situation (O & Kwak 1989; An, Kim & Pan 1990).

The Woljam area is not exceptional either. As we can see in Figure 2, several reservoirs are formed in the Woljam area. However, a mid-19th century map of the area (Figure 17) shows no reservoirs (Kim 1861: 63). In fact, according to my informant, the Ch'un-san reservoir and the others were made in the 1960s. Although Woljam-ri's fishermen have reared and caught freshwater fish in these reservoirs through reformed fishing methods since the 1960s, according to my informant, the traditional fishing methods were practised in a subsidiary river of the Nakdong River using bottom set gill nets made of silk twine until the 1960s. Through the traditional methods, their elders caught 10 species of freshwater fishes (Table 4).

The classification of fishing gear in Korea has been made on the basis of the International Standard Statistical Classification accepted by FAO (Food and Agriculture Organization of the United Nations), because this classification includes all catching methods throughout the world in sea and freshwater fisheries (O *et al.*

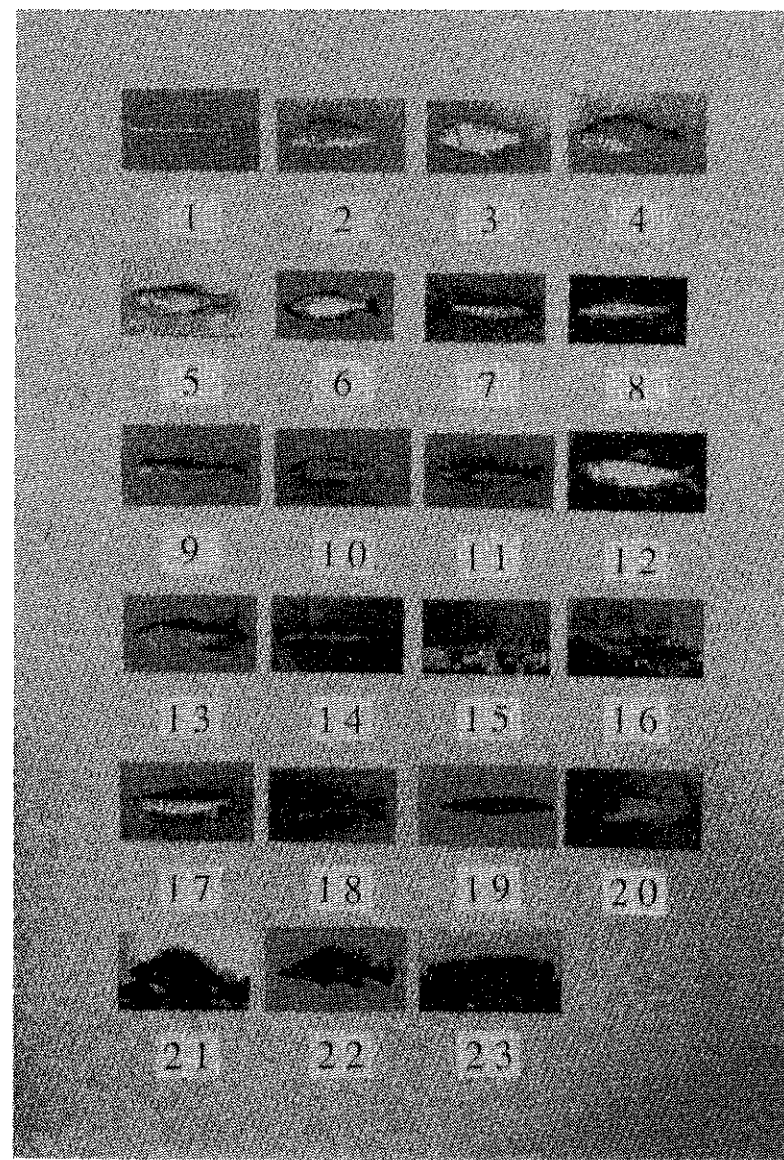
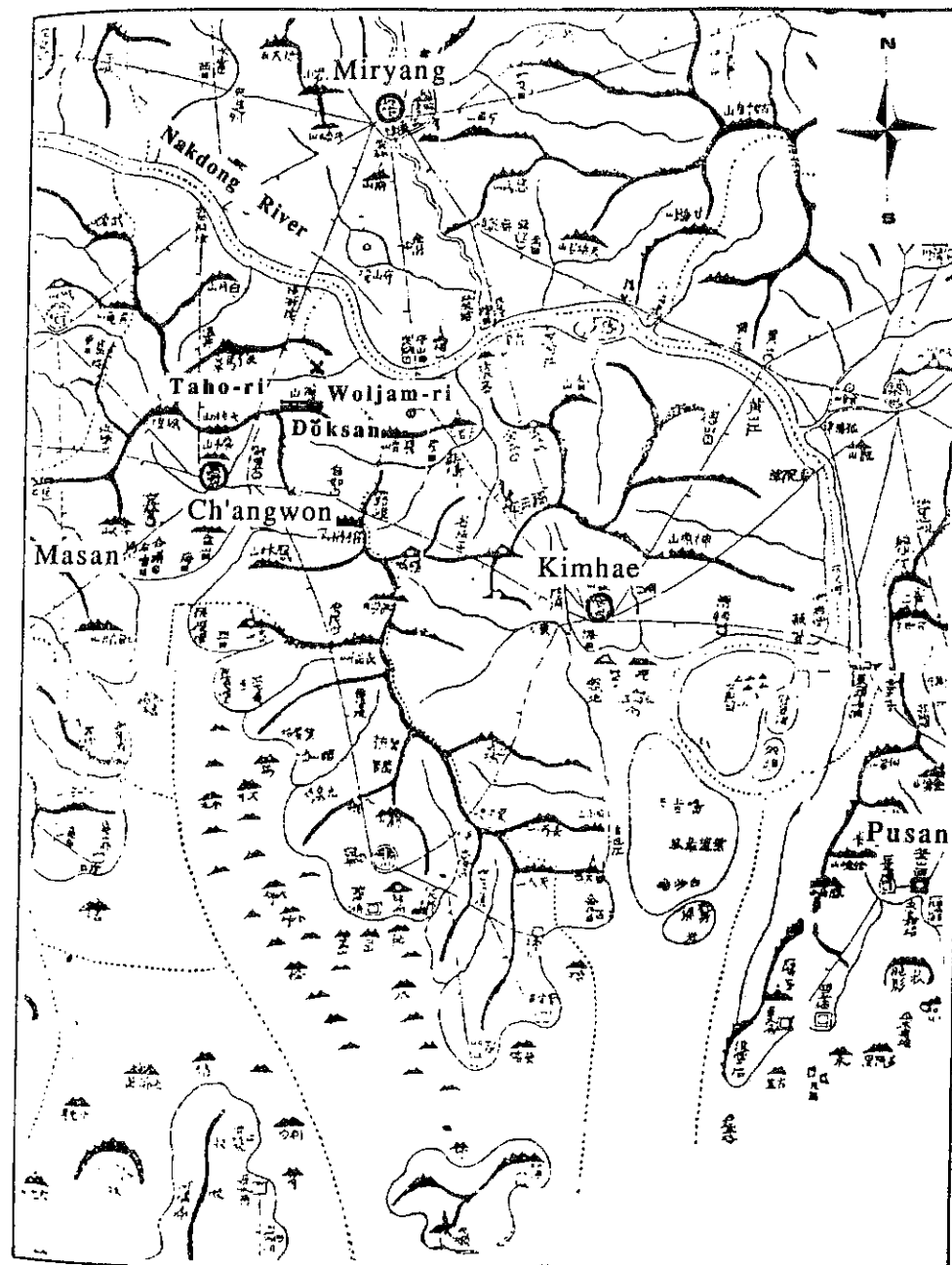


Figure 16 Freshwater fish living in the middle reaches of the Hwang River. (Arabic numerals are the same as Table 3)

**Table 3** List of freshwater fish living in the middle reaches of the Hwang River.  
(Arabic numerals are the same as Plate 4)  
(compiled from Han & Park 1985; Choi *et al.* 1990)

	Family	Genus	Species	English name	Korean name
1	Anguillidae	<i>Anguilla</i>	<i>japonica</i>	Bel	Paemjangô
2	Cyprinidae	<i>Cyprinus</i>	<i>carpio</i>	Carp	Ingô
3	"	<i>Carassius</i>	<i>auratus</i>	Crusian carp	Pungô
4	"	<i>Rhodeus</i>	<i>uyekii</i>		Kakshi bungô
5	"	<i>Acheilognathus</i>	<i>yamatsutae</i>	Korean striped bittering	Chulnap charu
6	"	<i>Acheilognathus</i>	<i>imtermebia</i>	Slender bittering	Nap charu
7	"	<i>Hemibarbus</i>	<i>labeo</i>	Steed barbel	Nuch'i
8	"	<i>Hemibarbus</i>	<i>longirostris</i>	Long nose barbel	ch'ammaja
9	"	<i>Pseudogobio</i>	<i>esocinus</i>	Goby minnow	Moraemuji
10	"	<i>Abbottina</i>	<i>rivularis</i>	Chinese false gudgeon	Pôdûl myaech'i
11	"	<i>Microphysogobio</i>	<i>koreensis</i>		Morae chusa
12	"	<i>Zacco</i>	<i>platypus</i>	Pale chub	P'irami
13	"	<i>Zacco</i>	<i>temmincki</i>	Dark chub	Kalgyôni
14	Cobitidae	<i>Misgurnus</i>	<i>mizolepis</i>	Chinese muddy loach	Mikkuraji
15	"	<i>Cobitis</i>	<i>sinensis</i>	Spined loach	Kirum chonggae
16	"	<i>Nemacheilus</i>	<i>toni</i>	Siberian stone loach	Chonggae
17	Plecoglossidae	<i>Plecoglossus</i>	<i>altivelis</i>	Sweet smelt	Unô
18	Bagridae	<i>Pseudobagrus</i>	<i>fulvidraco</i>	Korean bullhead	Tongjagae
19	Siluridae	<i>Silurus</i>	<i>asotus</i>	Far Eastern catfish	Megi
20	Oryziidae	<i>Oryzias</i>	<i>latipes</i>	Songsari	Songsari
21	Serranidae	<i>Coreoperca</i>	<i>herzi</i>	Korean auch perch	Kkôkchi
22	"	<i>Siniperca</i>	<i>scherzeri</i>	Mandrin fish	Ssogari
23	Channidae	<i>Channa</i>	<i>argus</i>	Snake head	Kamulch'i



**Figure 17** A mid-19th century map of the Woljam area. (after Kim 1861)



Table 4 List of freshwater fish caught in the Woljam area. (Choi et al. 1990)

	Family	Genus	Species	English name	Korean name
1	Anguillidae	Anguilla	japonica	Eel	Paemjangô
2	Cyprinidae	Cyprinus	carpio	Carp	Ingô
3	"	Carassius	auratus	Crusian carp	Pungô
4	"	Rhodeus	ocellatus	Rose bittering	Hinjul nabjulgae
5	"	Pseudogobio	esocinus	Goby minnow	Molaemuji
6	"	Zacco	platypus	Pale chub	P'irami
7	"	Erythroculter	erythropterus		Kang chunch'i
8	Cobitidae	Misgurnus	mizolepis	Chinese muddy loach	Mikkuraji
9	Siluridae	Silurus	asotus	Far Eastern catfish	Megi
10	Channidae	Channa	argus	Snake head	Kamulch'i

1987; Brandt 1984: 387-93). The basis for the classification is the principle of how the fish are caught, that is the fish-catching method, and subdivisions are based on such factors as material, construction and method of operation. Sixteen main groups are the following (O et al. 1987: 9-12):

1. Fishing without gear
2. Grappling and wounding gear
3. Stupefying devices
4. Lines
5. Traps like barriers, fences and fyke nets
6. Aerial traps
7. Bag nets like scrape net and gape nets without wings
8. Dragged gear like bottom trawls and midwater trawls
9. Seine nets like double stick nets, beach seines and boat seines
10. Surrounding nets
11. Drive-in nets
12. Lift nets like hand lift nets
13. Falling gear like cover nets and cast nets
14. Gill nets like bottom set gill nets, drift gill nets, encircling gill nets and lay out on bottom gill nets
15. Tangle nets like entangling nets and trammel nets
16. Harvesting machines like fish pumps.

Fishing gear having netting is classified in groups 5 to 15. Of these, there are five groups of net having sinkers to catch freshwater fish: fyke nets with one or three wings (among traps); double stick nets and boat seines (among seine nets); cast nets (among falling gear); bottom set gill nets (among gill nets); and trammel nets (among tangle nets) (Table 5; Figures 18 and 19). These can be grouped into active and passive gear. That is to say, seine nets and falling gear belong to active gear.

Table 5 Five groups of nets having sinkers to catch freshwater fish in modern Korea. (Cho et al. 1989; O et al. 1987) (Arabic numerals are the same as in Figures 18 and 19)

Figure number	Group	Type of net	Quantity of sinkers	Weight of each sinker
(1)	Traps (Hamjông ôguryu)	Fyke nets with one wing (Ilgakmang)	a large number	c. 80 g
(2)		Fyke nets with three wings (Samgakmang)	a large number	c. 85 g
(3)	Seine nets (Huriô kuryu)	Double stick nets (Ch'aehuri kûmul)	a small number	-----
(4)		Boat seines (Paehuri kûmul)	a large number	-----
(5)		Hand thrown cast nets (Son t'umang)	a small number	c. 40 g
(6)	Falling gear (Tôpô kuryu)	Cast nets with gallows (Kalûmdae t'umang)	a small number	-----
(7)		Cast nets for boats (Pae t'umang)	a small number	-----
(1)	Gill nets (Kôrô kuryu)	Bottom set gill nets (Padak kojông kôlgûmul)	a large number	5 g
(2)	Tangle nets (Olgae kuryu)	Trammel nets (Samjung olgaeu)	a large number	7 g

A double stick net (Figure 18-3) has small sheets of netting held between two sticks. Fish are captured by surrounding a certain area and scooping up the catch. Although this net is popular with river fishermen, the net should be the right length for handling in water; consequently this net is operated by one person, and it has a few net sinkers, although the weight of each sinker is similar to Jopo-ri's.

Boat seines (Figure 18-4) are operated by a single boat or by two fishing boats. Fish are captured by surrounding and towing the net over an area with both ends tied to a fixed point on a boat. This kind of gear is used to catch both coastal and freshwater fish, but in order to use this net in the river, the river must be very wide and deep (Cho et al. 1989: 438). Consequently, the weight of each sinker is more than 100g (Watanabe 1983: 36) because of the water current. In the case of beach seines, the weight (more than 750g) is much heavier than the boat seines' sinker (Cho & Chông 1908: Appendices 1) (cf. Figure 13).

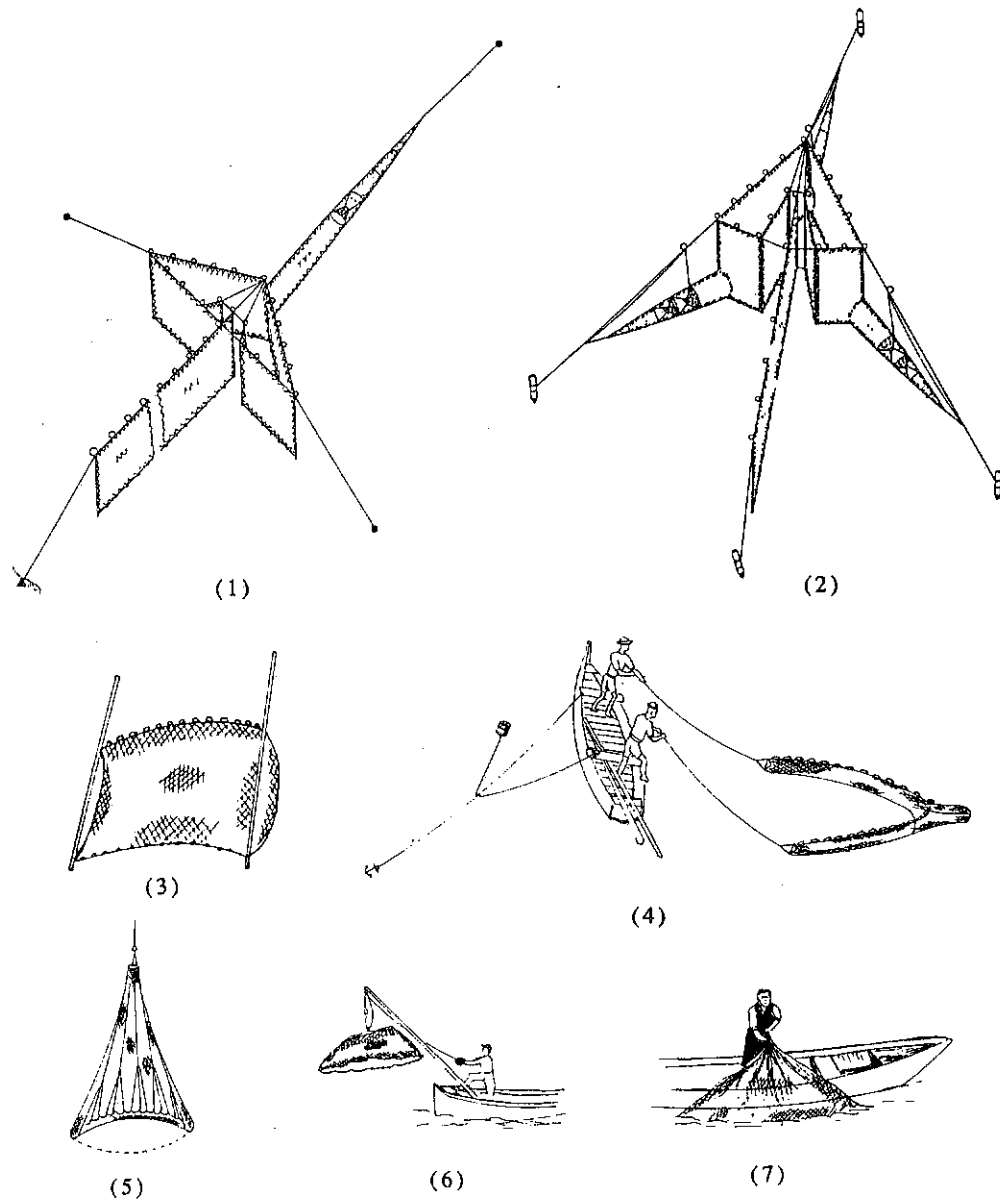


Figure 18 Nets having sinkers to catch freshwater fish in modern Korea.

(Arabic numerals are the same as in Table 5)

- 1) fyke nets with one wing (after Choi *et al.* 1989); 2) fyke nets with three wings (after Choi *et al.* 1989); 3) double stick nets (after O *et al.* 1987); 4) boat seines (after O *et al.* 1987); 5) hand thrown cast nets (after O *et al.* 1987); 6) cast nets with gallows (after O *et al.* 1987); 7) cast nets for boats (after O *et al.* 1987)

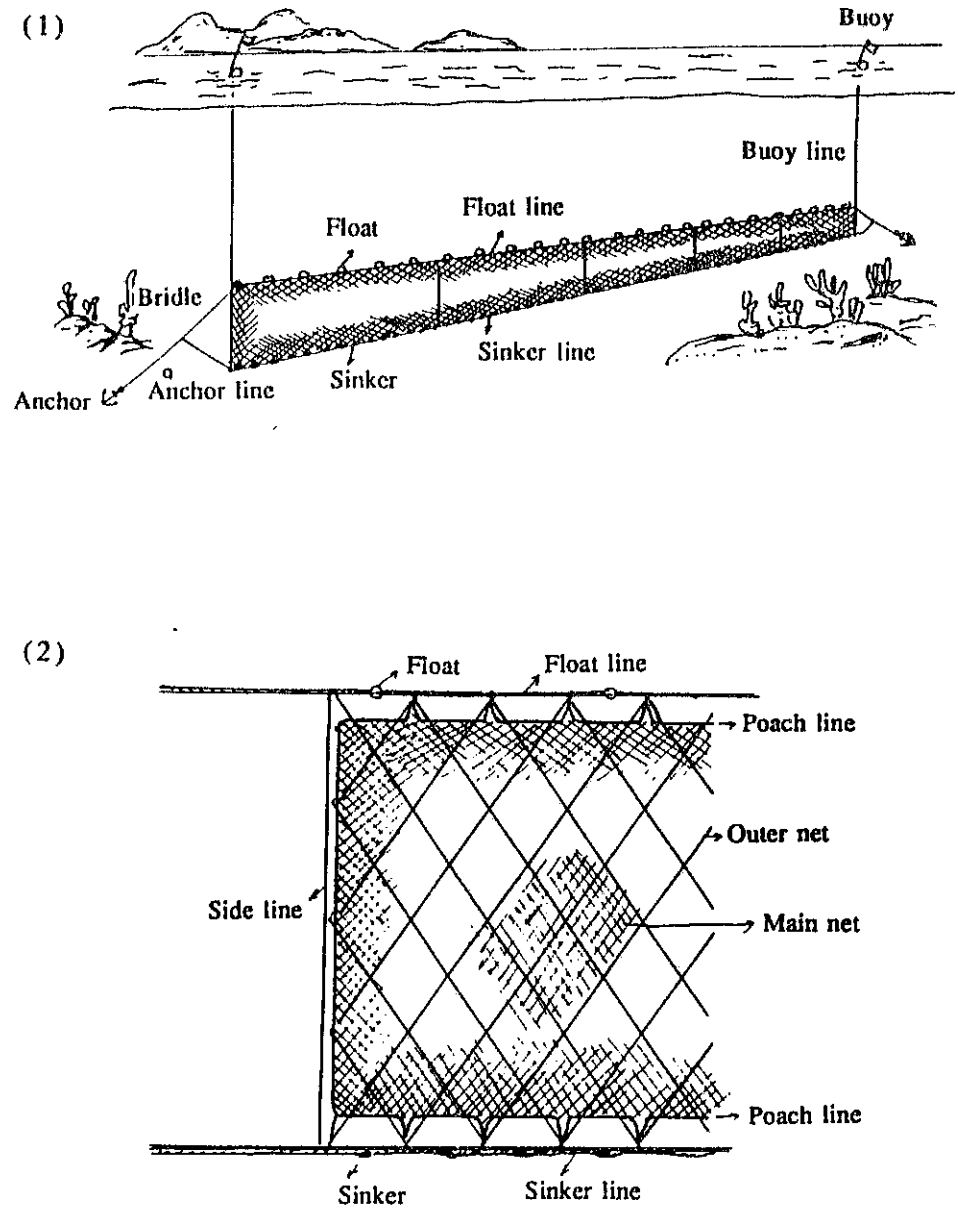


Figure 19 Construction and terms of bottom set gill nets (1, above) and trammel nets (2, below). (after O *et al.* 1987)

(Arabic numerals are the same as in Table 5)

Another group of active gear is falling gear (Figure 18-5, -6, -7). The manner of capture is to cover the fish with falling gear. This can be done in shallow water, but is difficult in deeper water (Cho *et al.* 1989: 490). There are three kinds of falling gear with sinkers being used in the river, but all nets are operated by one person on a boat or in water. The size of the net should thus be restricted for convenient handling on board or in water. Consequently the quantity of sinkers is small, but the weight of each sinker (*ca.* 40g) is heavier than Jopo-ri's sinkers (*ibid.*: 491-2).

When looking at the recovery situation of 198 net sinkers from Tomb 20 (Figure 3), we find that the circumstances are quite particular. In contrast with the small number of net sinkers at Jopo-ri E (Figure 11) heaped up in a restricted area (15cm x 20cm; 51 net sinkers) (Jeong *et al.* 1987: 235-8), at Jopo-ri B, a large number of net sinkers are distributed over a wider area (>143cm x 80cm; >198 net sinkers). This means there is a high possibility that nets having more than 198 sinkers would be large-seized nets such as gill nets rather than being a small-sized net such as a double stick net or cast net (Park & Choo 1988: 204).

When using passive gear, the fish have to come voluntarily—as in traps, gill nets and tangle nets. There are several kinds of passive gear for catching freshwater fish in Korea (Table 5; Figures 18 and 19). Two types of traps made of netting (Figures 9-1, 9-2) have been used for catching pond smelt, crucian carp, carp and eel (Cho *et al.* 1989: 145, 165). Traps are implements in which the fish enters voluntarily but is hampered from coming out (*ibid.*: 97). The devices are semi-permanent barriers having one or three wings to be fixed like the longline method in a river (*ibid.*: 145). Therefore, the weight of each sinker (*ca.* 80-85g) to be threaded is much heavier than Jopo-ri's. Nowadays, the sinkers are made from cement (*ibid.*: 146, 166).

As both gill nets and tangle/trammel nets (Figure 19) are similar in terms of their construction and method of operation, these two groups of nets are usually classified into one category (*ibid.*: 566). Strictly speaking, however, the fish catching methods are different. Bottom set gill nets (Figure 19 above) are set on or near the bottom and have a mesh opening of such a size that the fish can gill themselves in the netting voluntarily (*ibid.*: 493). That is to say, "the pressure of the mesh twine on the throat of the fish can cause the opercula to spread, and the net twine then hooks behind them so that the fish can go neither forward nor backward" (Brandt 1984: 355).

In contrast, in the case of tangle nets the fish entangle themselves in the netting by voluntarily coming into single-, double- or triple- walled nets (Figure 19, below) (Cho *et al.* 1989: 566-7). Of these, "trammel nets are triple-walled. Between the two wide-mesh stretched outer walls, a rather loose interior netting with smaller meshes is inserted. This small-meshed inner sheet of netting has plenty of slack. When a fish swims through the large outer meshes it encounters and pushes against the loose interior net so that a pocket is formed around the fish in which it becomes entrapped" (Brandt 1984: 373-4) (Figure 20).

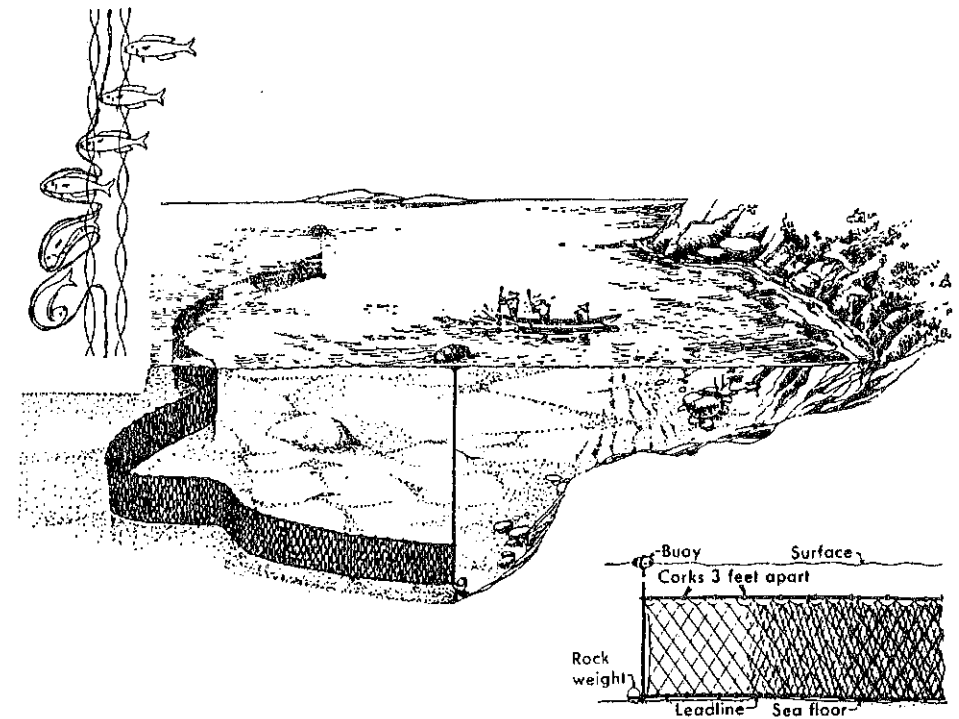


Figure 20. Trammel net illustrating how fish are captured by the three layers of netting. Net illustrated is a Philippine example set on the bottom. (from Rounsefell 1975)

As we can see in Table 5, both bottom set gill nets and trammel nets are similar in terms of having a large number of sinkers of similar weights. These factors resemble the Jopo-ri case: in terms of weight, each sinker for bottom set gill nets and trammel nets is 5 and 7 grams in weight, respectively. In fact, at Woljam-ri, most sinkers are 7 to 9 grams and comprise about 74% of whole net sinkers (Figure 21). At Jopo-ri, each sinker does not fall into one cluster in weight, but sinkers at both Woljam-ri and Jopo-ri weigh 21 grams or less (Park & Choo 1988: 202-3). Despite their similar sinkers, trammel nets can be used by fishermen to catch bottom fish like flatfish and cuttlefish which can not be caught with bottom set gill nets due to their construction (Cho *et al.* 1989: 566). Moreover, trammel nets are a very specialized gear; they are considered too complicated in their construction, too difficult to repair, and also more labour-intensive (Brandt 1984: 375-8). In this sense, although nowadays people use both bottom set gill nets and trammel nets for catching freshwater fish, it is reasonable to say that it would not have been possible to make such specialized and developed form of nets as trammel nets in the 4th century AD.

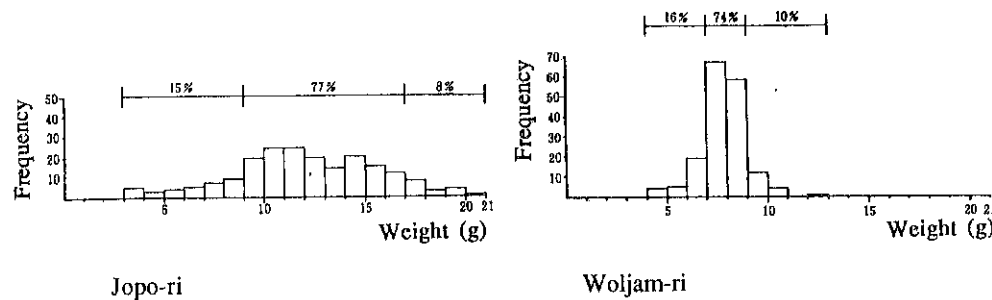


Figure 21 Histograms of net sinker weights.

#### Fishing behaviour and daily subsistence

So far it has been argued that it is highly probable that the 198 net sinkers from Tomb 20 at Jopo-ri B may have been secured to nets similar to Woljam-ri bottom set gill nets. Passive gear like bottom set gill nets requires detailed knowledge of fish behaviour, in contrast with active gear operated by skilled fishermen or by communities with a high level of technology (Brandt 1984: 4-5). That is to say, in the case of passive gear, the knowledge of the fisherman about the behaviour of his prey is a major factor in his success.

Since the 1960s, Woljam-ri fishermen have practised fish culture in several reservoirs using professional knowledge about fish behaviour. Consequently, the cultural form has changed from subsistence fishing to commercial fisheries. Since they supply their catch to several restaurants in the Woljam area, they must use a reformed fishing method in order to catch more fish within a short time. They usually work by day using the technique of drive-in fishing with bottom set gill nets. The mode of capturing is as follows: five pieces of net (each 40m long) are set in the form of a circle on the bottom in 2-metre deep water using two bamboo sticks by one or two people on a boat. For frightening the fish, a boat is usually placed in the middle of a shoal encircled by nets. The fish are then frightened by striking the water with sticks or oars. When frightened by this method, they will gill themselves in the surrounding netting. In this way, original passive gear is changed into active gear.

However, according to my informant, the traditional fishing method utilising bottom set gill nets as passive gear was used before the construction of reservoirs. Older fishermen were interested only in catching sufficient fish for their daily needs—that is, subsistence fishing. They used bottom set gill nets as passive gear, using knowledge about fish behaviour, in a subsidiary stream flowing into the Nakdong River.

The most recent estimate of the number of fish known from the Nakdong River was made from April 1972 to March 1973. According to ichthyologists, fish from the river comprised 82 species from 60 genera in 24 families—about 36.6% of the species of freshwater fishes in Korea (Yang 1973: 17). Of these, according to my

informant, 10 species from 10 genera in 5 families were caught in the Woljam area in the mid-20th century (Table 4). These species of freshwater fish are still reared and caught in the reservoirs. These bony freshwater fish (*Osteichthyes*) are divided into two groups: primary and secondary. Most primary freshwater fish are physiologically incapable of surviving exposure to salt water and are therefore restricted to the fresh waters of the landmass in which they have evolved (Wheeler & Jones 1989: 32). The family *Cyprinidae* is representative of primary freshwater fish (Choi *et al.* 1990: 6). Only eels belong to secondary freshwater fish, which can tolerate salt water even though individually they may never be exposed to it (Wheeler & Jones 1989: 32; Choi *et al.* 1990: 6).

The size of these freshwater fish varies from 20 to 70cm. They are omnivorous, eating planktonic organisms as well as animalcules living on the bottom of a river. Their most important habit is that they live on the bottom. That is to say, they hide themselves on the bottom and do not move by day but set about their feeding activities by night on the bottom (Choi *et al.* 1990: 22-216).

As older fishermen knew such fish behaviour, they used bottom set gill nets as passive gear. According to my informant, the traditional fishing method was as follows: four pieces of nets were set out in lines on the bottom using two bamboo sticks by one or two people on a boat. This operation was conducted in the evening. When morning dawned, they got on the boat and hauled in the bottom set gill nets on which many freshwater fish were gilled (Figure 22). Therefore, they did not catch fish but farmed from dawn till dusk, when the fish hid on the bottom. In fact, according to my informant, they were not specialized as fishermen but practised a farmer-fisher way of life. Fishing was just part of their subsistence economy. Fish-catching methods traditionally utilising bottom set gill nets in the Woljam area can give us insights into the fishing behaviour involved in the use of bottom set gill nets practised by Jopo-ri people in the 4th century AD.

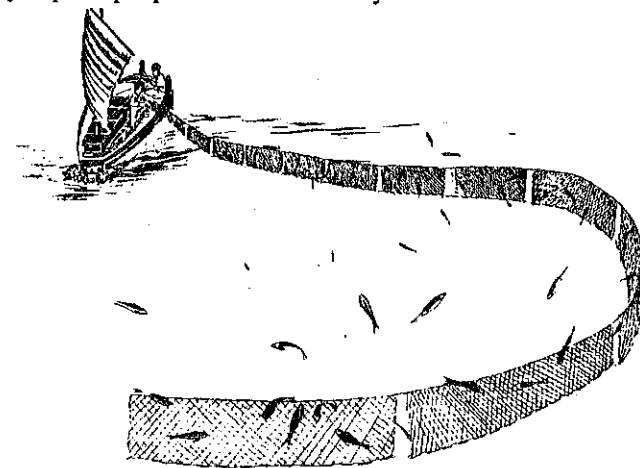


Figure 22 A scene of hauling in bottom set gill nets which were set in a river. Net illustrated is a Manchurian example. (after Nozawa 1937)

According to a historical text, *Shinjŭng tongguk yŏjisŭngnam*, and collections by ichthyologists, the total species of freshwater fishes from the middle reaches of the Hwang River are 23 species from 23 genera in 9 families (Han & Park 1985: 284). Of these, 8 species caught in the Woljam area were also identified in the Jopo area. These 23 freshwater fish also belong to the bony fish and are divided into primary and secondary freshwater fish (Table 3, Figure 16). The size of these species varies from 3 to 70 cm, but most cases are 10 to 30 cm. These freshwater fish mainly inhabit the middle and upper reaches of a river, and they like warm and clean water. Their omnivorous eating habits are the same as in the Woljam area, and they too feed on the bottom by night as in the Woljam area (Choi *et al.* 1990: 22-216).

This kind of information on fish ecology increases the probability that the 198 net sinkers from Tomb 20 at Jopo-ri B may have been secured to bottom set gill nets. The problem is whether or not Jopo-ri people had fishing boats. In order to set bottom set gill nets on the bottom of the Hwang River or the Nondŏk Stream, they would have needed a boat or a substitute such as a raft. Unfortunately, there is no direct evidence of boat building in either the historical documents or archaeological data. However, at the Taho-ri site near Woljam-ri (Figure 2), a boat-shaped wooden coffin containing lots of iron wood-working tools with wooden hafts intact was recovered from Tomb 1. This wooden coffin was made of a split oak log, one part hollowed out to form a corpse container and the other part serving as a lid. It looks like a log boat (Figure 23) and its date was estimated as the 1st century BC in the Early Iron Age (Yi *et al.* 1989: 14-27). This suggests that the Pyŏnhan people could have built boats with iron wood-working tools. Moreover, iron wood-working tools for cutting (axes), planing (adzes) and carving (chisels) were recovered from Tombs 5, 6, 8, 29, 30 and 32 at Jopo-ri B (Park & Choo 1988: 181) and from Tombs 24, 25, 37, 40, and 42 at Jopo-ri A, belonging to the same period as Jopo-ri B (Chŏng *et al.* 1987: 246-7). Therefore, it is reasonable to say that in the 4th century AD the Jopo-ri people could have built a sort of boat and thus may have practised the same kind of fishing method as Woljam-ri's traditional fish catching method on the similar fishing ground, catching the similar species of fishes at the similar technological level.

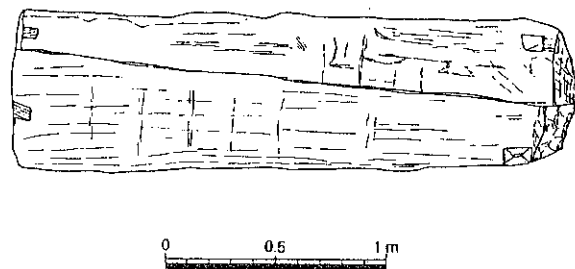


Figure 23 The wooden coffin from Tomb 1 of the Taho-ri site. (after Yi *et al.* 1989)

If they did, we can elucidate further similarities on the basis of fishing method. It is reasonable to suppose that Jopo-ri people also set the bottom set gill nets in the evening and hauled in the nets the next morning. If so, what activities did past Jopo-ri people practise from dawn till dusk? The *Dongyi zhuan* in the Chinese historical text *Sanguo zhi* states that as the soil of the Pyŏnhan region was rich, the people of Pyŏnhan produced rice and five species of cereals (Chen 232-97: 52). Iron sickles for cutting such cereals were recovered from Jopo-ri B Tombs 5, 6, and 29 (Park & Choo 1988: 181) and from Jopo-ri A Tombs 7, 8, 22, 25, 37 and 42, all of which belong to the same period (Chŏng *et al.* 1987: 246-7). In fact, palaeoethnobotanical evidence verifying both this historical document and archaeological material was recovered from the Jopo-ri C pit-dwelling site (Lee 1987, 232; Lee 1988: 159). While the Jopo-ri people used Jopo-ri A and B hills as their public cemeteries, they occupied the Jopo-ri C hill for their dwelling space (Figure 4). Plentiful carbonized rice, barley, adzuki beans, mung beans and foxtail millet were recovered through flotation techniques from House A-7 and House I-1 (Figure 24).

It is thus reasonable to say that in the 4th century AD, the subsistence economy of the Jopo-ri people was a mixed system in which various subsistence patterns were combined (Park & Choo 1988: 216). Therefore, they were interested only in catching sufficient fish for their daily life and also practised a farmer-fisher way of life as the Woljam-ri people did. That is to say, they farmed from dawn till dusk, set bottom set gill nets on the bottom of the Hwang River and the Nondŏk Stream using a sort of boat in the evening, and hauled in by boat bottom set gill nets on which lots of freshwater fish were gilled the next morning (Figure 25).

## Conclusions

A great many arguments met with not only in archaeology but in most scientific disciplines are inductive rather than deductive (Copi & Cohen 1990: 373). Some serious misconceptions about the distinction between inductive and deductive arguments, belonging to the Baconian scheme and introduced into archaeology by some New Archaeologists (Fritz & Plog 1970; Watson *et al.* 1971), have been disputed by archaeologically trained philosophers (Salmon 1976; Kelley & Hanen 1988, 44-59).

In logic, it has been clarified that the fundamental difference between these two kinds of argument lies not in the idea that deductive inferences move from the general to the particular, while inductive inferences from the particular to the general, but in the relation between premises and conclusions (Copi & Cohen 1990: 45-9). In other words, in a correct deductive inference "the truth of the premises guarantees the truth of the conclusion, while in an acceptable inductive inference all the premises may be true and the conclusion yet be false" (Kelley and Hanen 1988, 46). This means that "the conclusion of a valid deductive inference is said to be implicit in the premises of the inference....In contrast, inductive inference is said to be *ampliative*" (*ibid.*: 47-8; emphasis in original).



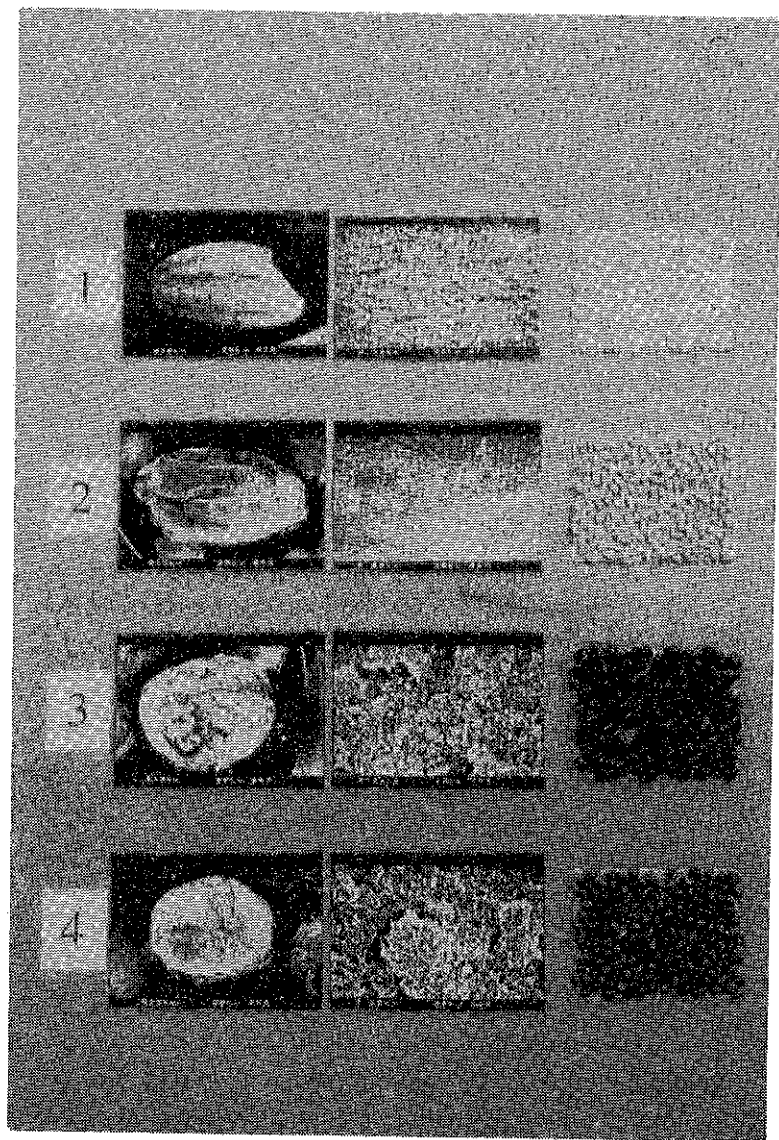


Figure 24 Photomicrographs of various plant species recovered from House A-7 at Jopo-ri C and their modern counterparts. (1. rice, 2. barley, 3. adzuki beans, 4. mung beans)

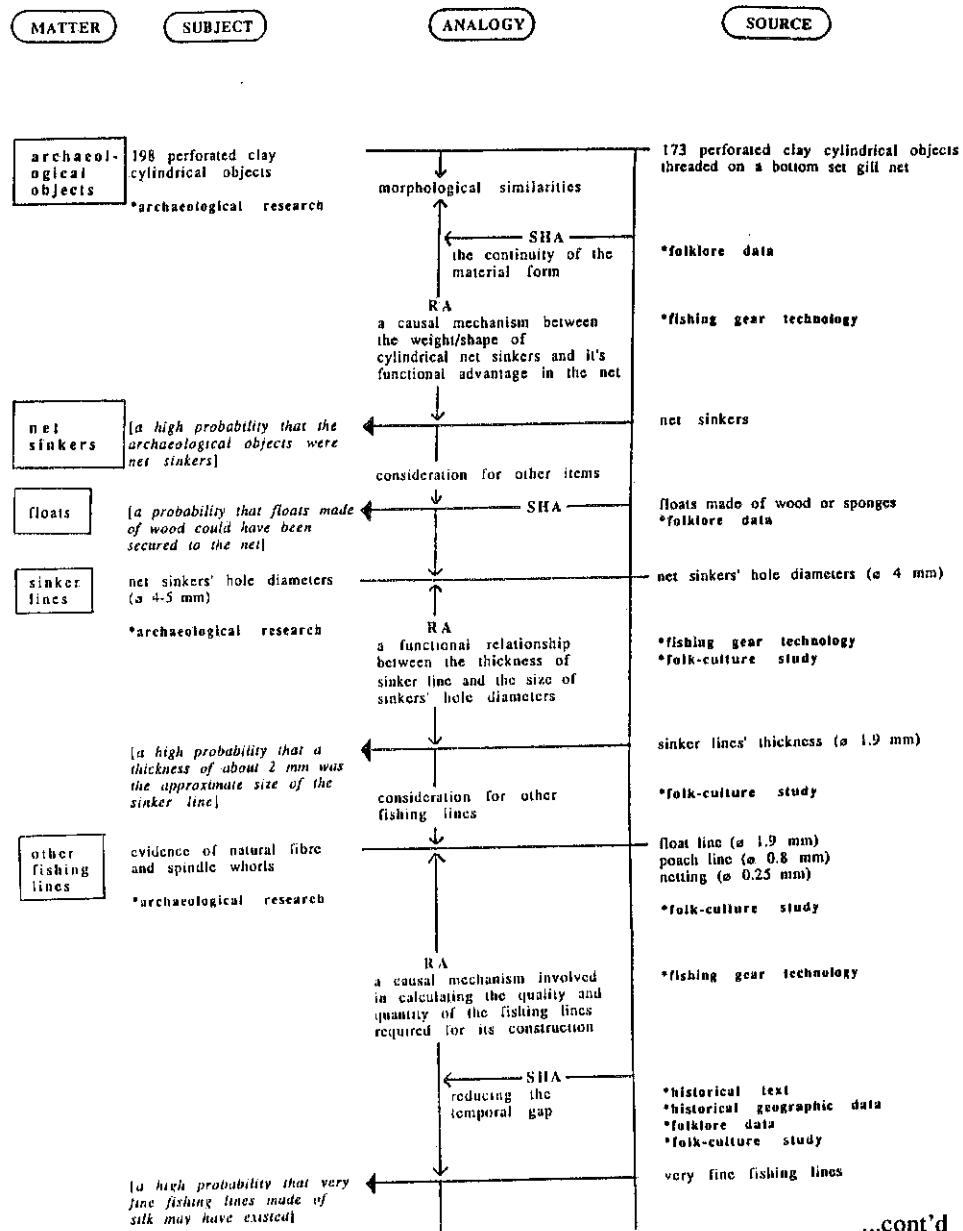
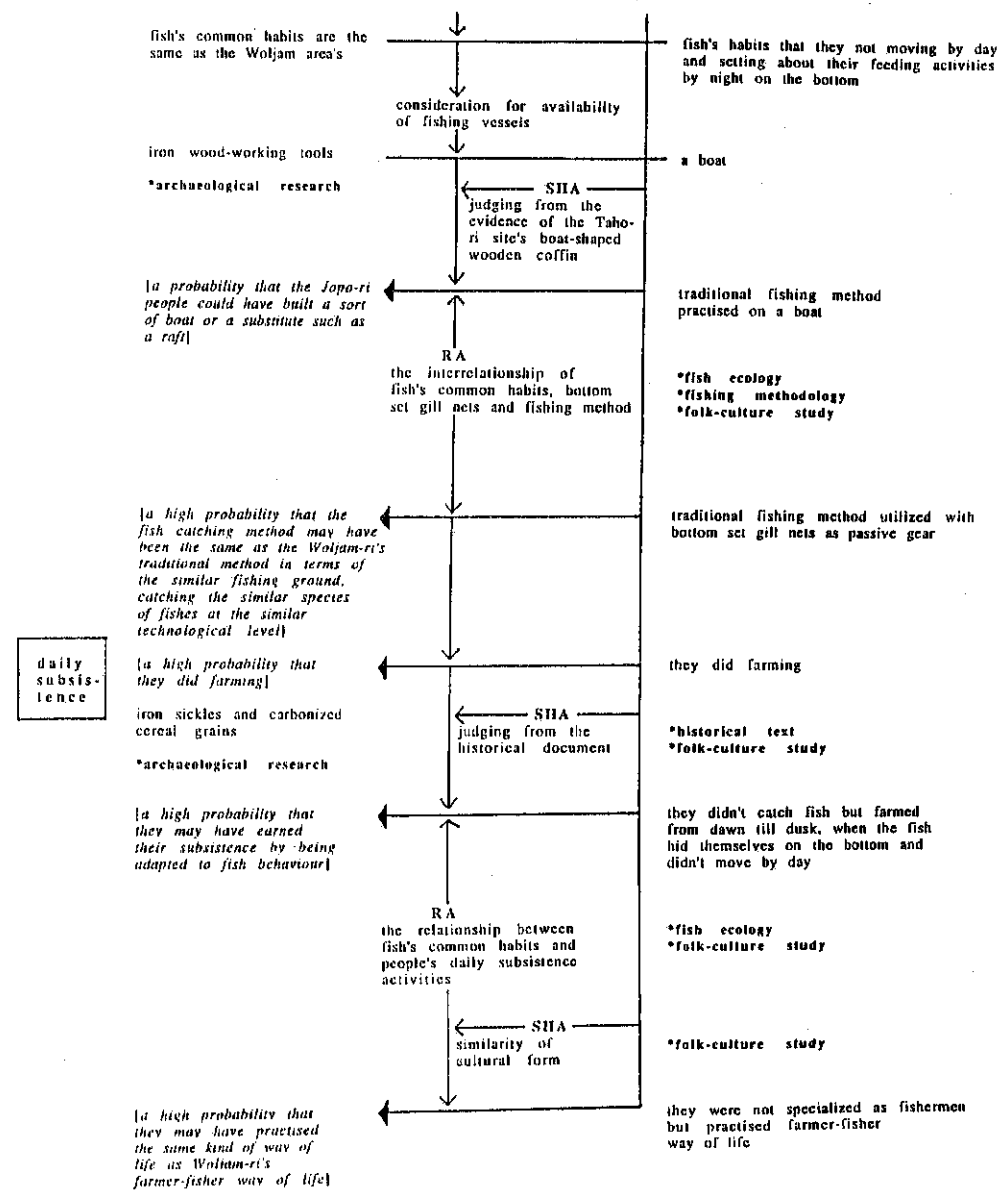
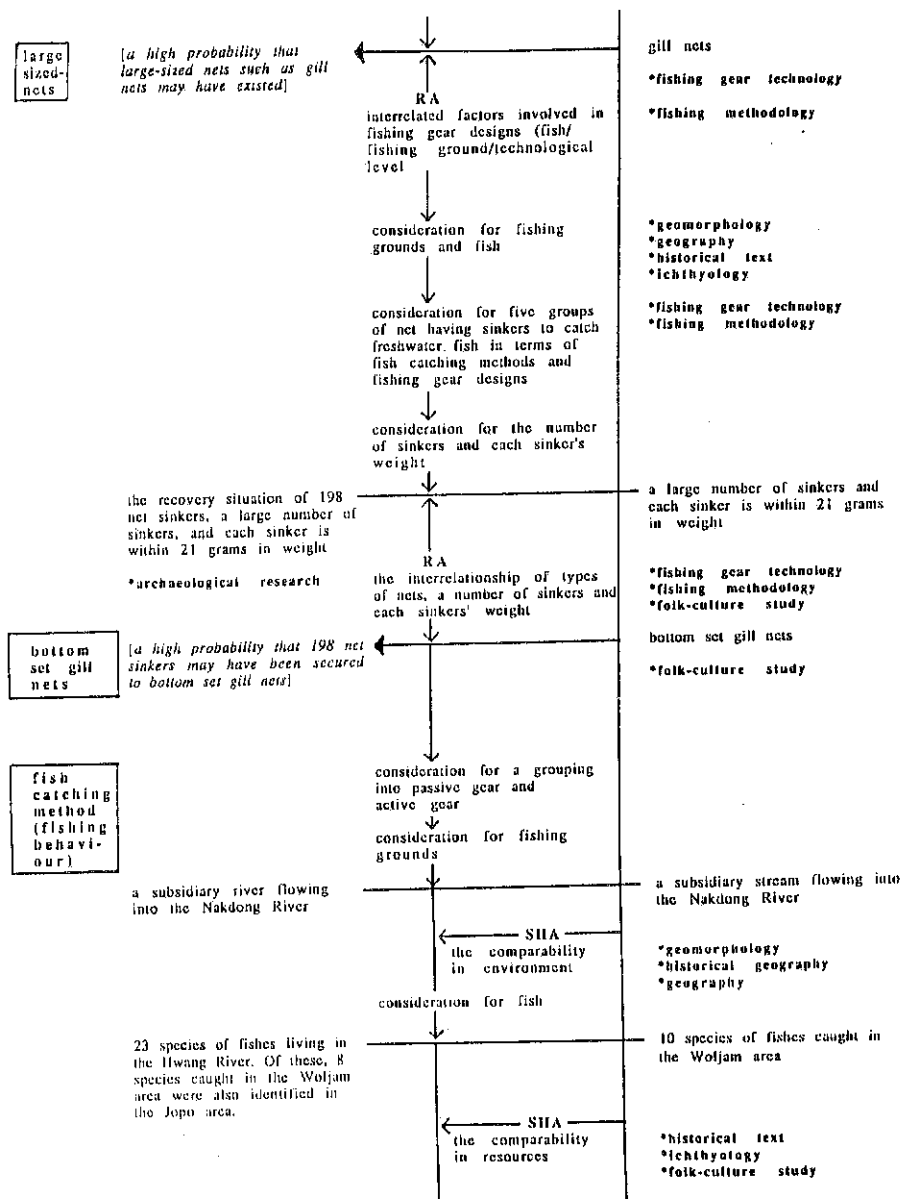


Figure 25 Flow chart summarizing the use of culturally specific and relational analogies. SHA = Specific Historical Analogy, RA = Relational Analogy

...cont'd



..cont'd

Therefore, deductive arguments are to be classified as either valid or invalid, so whether an inference is deductively valid (or invalid) is about "an all-or-nothing matter" (*ibid.*: 185). On the other hand, in strong inductive arguments, the conclusion "ventures beyond the factual claims made by the premises...It risks the possibility of leading from true premises to a false conclusion, [but it has] the possibility of discovery and prediction of new facts on the basis of old ones" (Skyrms 1975: 8-9; cited in Kelley & Hanen 1988: 48). That is, whether an inference is inductively strong is a matter of degree. I believe that in archaeology "explanatory worth is not an all-or-nothing matter but one of degree" (Kelley & Hanen 1988: 185).

Analogical arguments as a form of inductive inference are aimed to support a conclusion as probably true. This means that arguments by analogy "are not to be classified as either valid or invalid. Probability is all that is claimed for them" (Copi & Cohen 1990: 358). In this case, the problem is the degree of probability: to explain is to show what something was, may have been and could have been, or, what past people did, may have done and could have done. As we can see in Figure 16, I have argued that the cylindrical archaeological objects were net sinkers; floats made of wood *could have been secured* to the net; a thickness of about 2 mm was the approximate size of the sinker lines; very fine fishing lines made of silk *may have existed*; large-sized nets such as gill nets *may have existed*; 198 net sinkers *may have been secured* to bottom set gill nets; past Jopo-ri people *could have built* a sort of boat or a substitute such as a raft; the past Jopo-ri's fishing method *may have been* the same as the Woljam-ri's traditional fishing method; they *did* farming; they *may have earned* their subsistence by being adapted to fish behaviour; and they *may have practised* the same kind of way of life as Woljam-ri's farmer-fisher way of life.

The fact that analogical arguments are inductive or ampliative forms of inference means that the truth of the conclusion cannot be guaranteed (Kelley & Hanen 1988: 264). However, if the different sorts of knowledge are subsumed in functional/causal relations and in culturally specific historical context, the conclusion by analogical arguments will indicate a high degree of probability. This means that it is likely that culturally specific and relational analogical arguments will be acceptable *truthlike* conclusions. Thus, the conclusions made here—that more than 198 archaeological objects from Tomb 20 of the Jopo-ri B site were net sinkers; that these net sinkers may have been secured to bottom set gill nets; that the past Jopo-ri's fishing method utilized with the bottom set gill nets may have been the same as the present-day Woljam-ri's traditional fishing method; and that past Jopo-ri people may have practised a farmer-fisher way of life as the Woljam-ri people did—are hypotheses with high probability, and likewise it is possible that these conclusions are going to be the best current hypotheses.

Such inductively strong analogical arguments (culturally specific and relational analogies) afford us the possibility of proposing new facts on the basis of previous facts. I believe that without this kind of procedure, science cannot create new models and theories, and it is essential to scientific progress.

This means that we can explore further cultural aspects of past Jopo-ri people on the basis of these strong arguments. So far I have argued—despite incomplete archaeological evidence—how culturally specific and relational analogies can be used in understanding the unknown archaeological objects (net sinkers), the cultural material forms (bottom set gill nets), the fishing behaviour involved in the use of bottom set gill nets, and daily subsistence of past Jopo-ri people. By the way, what also needs to be emphasized is that the socio-cultural meaning of nets in the 4th century AD, the daily subsistence, the fishing behaviour, and bottom set gill nets are not discrete entities independent of one another. It has been argued that behaviour (socio-economic actions interpreted within a system of meaning) is not separate from culture (a system of meaning, symbols and ideals) or from cultural material forms (the tangible products of behaviour)—but culture, behaviour, and cultural material forms are interrelated. They can be separated only analytically in order to examine parts of the whole (Kent 1984: 12-13).

In the Jopo-ri case, the 198 net sinkers were recovered not in a pit-dwelling but in a wooden coffin tomb. From the evidence at Tomb 20 (Figure 6), it can be said that the people at Jopo-ri used bottom set gill nets for their ancestor's funeral ceremony. Although it is not an obvious case, another example is Tomb 29, which contains a relatively larger number of artefacts—including evidence of natural fibre, iron wood-working tools and an iron sickle—than others (Park & Choo 1988: 181). Both tombs belong to the early 4th century AD, and there is no evidence that net sinkers have been recovered from other tombs which belong to the same period at Jopo-ri A and B (*ibid.*: 214-216). This interesting situation allows us to explore the symbolic meaning of nets in the Jopo-ri culture and the socio-economic behaviour inter-related with a system of meaning (Figure 26).

These cultural aspects will require different databases such as knowledge about the historical situation in the 4th century AD (a transitional historic period in East Asia), socio-economic relationships and socio-political organisation among Kaya federation including Tara (which is the name of the socio-political entity in the 4th century AD past Jopo-ri people belonged to, cf. Figure 9), and religious beliefs which can be inferred from past Jopo-ri people's funeral ceremonies. These socio-cultural systems will be explored in the near future through another paper. On the basis of future discussions, I will examine whether or not Hawkes's ladder of inference (Hawkes 1954)—which is his postulation about archaeological reasoning that there is...

an ascending scale of difficulty in interpreting archaeological data in terms of human activities: technology [is] the easiest category, while economy, social and political organisation, and ideology [exhibit] escalating difficulties<sup>3</sup>

—still has relevance to archaeology, especially in the proto-historic period of Kaya.

<sup>3</sup> as reported in Trigger (1989: 392).

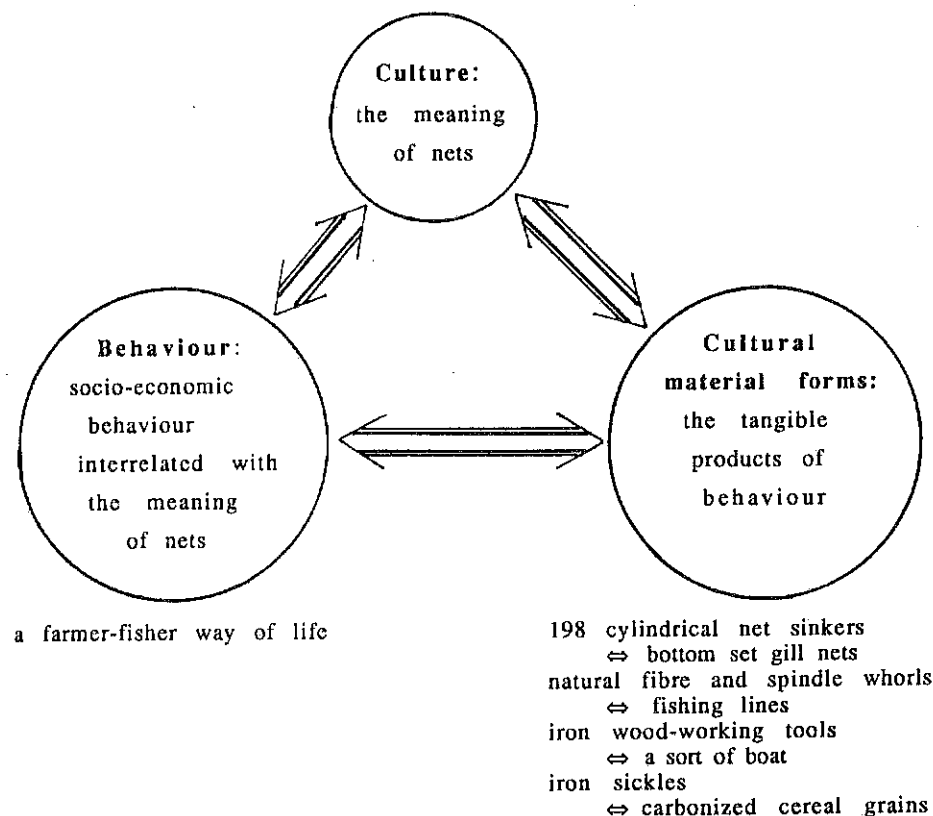


Figure 26 A schematic model of the interrelationship of culture, behaviour and cultural material forms at Jopo-ri in the 4th century AD.

### Acknowledgments

This paper is a slightly revised version of my M.Phil. dissertation submitted to the Department of Archaeology, University of Cambridge in May 1991. I would like to thank many people in Cambridge, notably Gina Barnes, Geoff Bailey, Ian Hodder, Todd Whitely, Sander E. van der Leeuw, Marie L.S. Sørensen, Simon Kaner, who made thoughtful comments that helped me clarify my thinking. I, of course, take full responsibility for the contents of this paper.

### References

- Achinstein, P. (1964) "Models, analogies and theories." *Philosophy of Science* 31: 328-50.
- An, C.B.; Kim, W.K. and Pan, Y.B. (1990) "Kayasahoeti hyöngsöng kwajöngyöngu: Kimhae chiyököül chungsimüro" [A study of formation process of Kaya society with particular reference to the Kimhae region]. *Kaya munhwa yöngu* 1: 45-114. (in Korean)
- Anderson, K.M. (1969) "Ethnographic analogy and archaeological interpretation." *Science* 163: 133-8.
- Ascher, R. (1961) "Analogy in archaeological interpretation." *Southwestern Journal of Anthropology* 17: 317-25.
- Binford, L.R. (1967) "Smudge pits and hide smoking: the use of analogy in archaeological reasoning." *American Antiquity* 32: 1-12.
- Binford, L.R. (1968) "Archaeological theory and method." In Binford, S.R. and Binford, L.R. (eds.) *New perspectives in archaeology*. Chicago: Aldine, pp. 5-32.
- Binford, L.R. (1972) "Archaeological reasoning and smudge pits-revisited." In Binford, L.R. *An archaeological perspective*. New York, Seminar Press, pp. 52-8.
- Bower, J. (1986) *In search of the past: an introduction to archaeology*. Chicago: The Dorsey Press.
- Brandt, A. von. (1984) *Fish catching methods of the world*. Farnham: Fishing News Books, 3rd edition.
- Bray, F. (1984) *Science and Civilisation in China, Vol. 6: biology and biological technology, Part II: agriculture*. Cambridge University Press.
- Charlton, T.H. (1981) "Archaeology, ethnohistory, and ethnology: interpretive interfaces." In Schiffer, M.B. (ed.) *Advances in Archaeological Method and Theory* 4. New York, Academic Press, pp. 129-176.
- Chen, S. (232-297) *Sanguo zhi* [Chronicles of the Three Kingdoms Period]. (in Chinese). Pages cited from Park, Y.S. (ed.) (1986) *Kugyök Chungguk chöngsa chosönjön* [Korean translation on the account of Chosön in Chinese authentic history]. Seoul: National History Compilation Committee. (in Korean)
- Cho, T.H.; Yi, P.M.; Yun, C.A.; Cho, K.U. and O, H.K. (1989) *Hyöndaek Han'guk ögudogam* [Modern fishing gear of Korea]. Kyöngnam: National Fisheries Research and Development Agency. (in Korean)
- Cho, C.U. and Chöng, C.H. (1908) *Han'guk susanji* [A gazeteer of Korean fishing]. Hanyang [Seoul]: Fisheries Bureau, Ministry of Agriculture, Trade and Industry. (in Korean)
- Choi, K.C.; Chon, S.L.; Kim, I.S. and Son, Y.M. (1990) *Wonsaek Han'guk tamsuö togam* [Colored illustrations of the freshwater fishes of Korea]. Seoul: Hyangmunsa. (in Korean with English summary)
- Choi, M.L. (1971) "Han'guk sönsa wonsayujök ch'ulto öguryu, 1" [Fishing gear excavated from prehistoric and protohistoric sites in Korea, 1] *Komunhwa* 9: 17-21. (in Korean)
- Choi, M.L.; Yi, Y.N.; Park, S.P. and Park, Y.C. (1985) "Yöju Hunamni sönsa ch'wilakji ch'ulto sökkilyu, 1" [Stone implements excavated from the Hunamni site, Yöju, 1]. *Pyön T'ae-söp paksa hoegabkinyöm sahaknonch'ong* [Essays in honour of Dr. Pyön T'ae-söp on his 60th birthday]. Seoul: Samyöngsa, pp. 11-39. (in Korean)

- Chông, Y.H.; Yang, T.Y. and Kim, Y.S. (1987) *Hapch'ôn Jopo kobun A palgul chosabogo* [A group of tombs at Jopo-ri A area of Hapch'on]. Archaeological Research Report 8. Taegu: The Yongnam University Museum. (in Korean)
- Clark, J.G.D. (1951) "Folk-culture and the study of European prehistory." In Grimes, W.F. (ed.) *Aspects of archaeology*. London: Edwards, pp. 49-65. Page cited from and reprint in Clark, J.G.D. (1989) *Economic prehistory*. Cambridge University Press, pp. 136-148.
- Clark, J.G.D. (1953) "Archaeological theories and interpretation: old world." In Kroeber, A.L. (ed.) *Anthropology today: an encyclopedic inventory*. The University of Chicago Press, pp. 343-60.
- Clark, J.G.D. (1954) *Excavations of Star Carr*. Cambridge University Press.
- Cohen, L.J. (1989) *An introduction to the philosophy of induction and probability*. Oxford: Clarendon Press.
- Collcutt, M., Jansen, M. and Kumakura, I. (1988) *Cultural atlas of Japan*. Oxford: Phaidon.
- Copi, I.M. and Cohen, C. (1990) *Introduction to logic*. New York: Macmillan, 8th edition.
- Fridman, A.L. (1986) *Calculations for fishing gear designs*. Food and Agriculture Organization of the United Nations (FAO) fishing manuals. Farnham: Fishing News Books, Revised edition.
- Fritz, J.M. and Plog, F.T. (1970) "The nature of archaeological explanation." *American Antiquity* 35: 405-12.
- Gifford, D.P. (1981) "Taphonomy and paleoecology: a critical review of archaeology's sister disciplines." In Schiffer, M.B. (ed.) *Advances in Archaeological Methods and Theory* 4. New York, Academic Press, pp. 365-438.
- Gould, R.A. (1974) "Some current problems in ethnoarchaeology." In Donnan, C.B. and Clewlow, C.W., Jr. (eds.) *Ethnoarchaeology: monograph 4*. Los Angeles, Institute of Archaeology, University of California, pp. 27-48.
- Gould, R.A. (ed.) (1978) *Explorations in ethnoarchaeology*. University of New Mexico Press.
- Gould, R.A. (1980) *Living archaeology*. Cambridge University Press.
- Gould, R.A. (1990) *Recovering the past*. University of New Mexico Press.
- Gould, R.A. and Schiffer, M.B. (ed.) (1981) *Modern material culture: the archaeology of us*. New York: Academic Press.
- Gould, R.A. and Watson, P.J. (1982) "A dialogue on the meaning and use of analogy in ethnoarchaeological reasoning." *Journal of Anthropological Archaeology* 1: 335-81.
- Han, B.S. (1971) "Sönsashidae nonggyöngmun ch'öngdonggi-e taehayö" [On the prehistoric bronze engraving on which agricultural scene is depicted]. *Kogomisul* 112: 2-13. (in Korean)
- Han, C.K. and Park, Y.S. (1985) "Hapch'ôn dam sumoljigu tongmulbunya haksuljosa pogosö" [Research report on zoology in the submerged area by Hapch'ôn dam]. In *Hapch'ôndam sumoljigu chip'yojosa pogosö* [Field survey report in the submerged area by Hapch'ôn dam]. Ch'angwon: Kyöngsangnam-do Provincial Government, pp. 271-90. (in Korean)
- Hawkes, C. (1954) "Archaeological theory and method: some suggestions from the Old World." *American Anthropologist* 56: 155-68.

- Helman, D. (ed.) (1988) *Analogical reasoning: perspectives of artificial intelligence, cognitive science, and philosophy*. Dordrecht: Kluwer Academic Pub.
- Hesse, M.B. (1959) On defining analogy. *Proceedings of the Aristotelian Society* 60: 79-100.
- Hesse, M.B. (1966) *Models and analogies in science*. Notre Dame: University of Notre Dame Press.
- Hodder, I. (1982) *The present past: an introduction to anthropology for archaeologists*. London: Batsford.
- Hong, S.W. (ed.) (1985) *Han'guk chiji: chibangp'yön II Pusan, Taegu, Kyöngbuk, Kyöngnam* [Korean geography: regional series III]. Seoul: National Physical Environment Planning Board, Ministry of Construction. (in Korean)
- Im, H.J. (1978) *Hunamni chugöji, IV* [The pit-dwelling site of Hunamni, IV]. Archaeological and Anthropological Papers 8. Seoul: The Seoul National University Museum. (in Korean with English summary)
- Im, H.T.; Kwak, T.C. and Cho, H.P. (1988) *Taeya-ri chugöji, I* [The pit-dwelling site of Taeya-ri, I]. Academic Series 2. Pusan: The Tongüi University Museum. (in Korean)
- Im, H.T., Kwak, T.C. and Cho, H.P. (1989) *Taeya-ri chugöji, II* [The pit-dwelling site of Taeya-ri, II]. Academic Series 3. Pusan: The Tongüi University Museum. (in Korean)
- Institute of Archaeology and Folklore (1956) *Najin ch'odo wonshiyujök p'algulbogo* [Excavation report on the Najin ch'odo site]. Site Excavation Report 1. P'yöngyang: Kwahak paekgwasajön ch'ulp'ansa. (in Korean)
- Institute of Asian Culture (1986) *Kangwon-döi sönsamunhwa* [Prehistoric culture in Kangwon-do]. Ch'unch'ön: Hallim University. (in Korean)
- Jeong, J.W. et al. (1987) *Hapch'ôn Jopo-ri E chigu yujök* [The site of Jopo-ri E area, Hapch'ôn]. Site Excavation Report 11. Pusan: The Pusan National University Museum. (in Korean)
- Kang, I.H. (1990) *Han'guk shiksaenghwalisa* [A history of Korean foodways]. Seoul: Samyöngsa, 2nd edition. (in Korean)
- Kelley, J.H. and Hanen, M.P. (1988) *Archaeology and the methodology of science*. University of New Mexico Press.
- Kent, K.P. and Nelson, S.M. (1976) "Net sinkers or weft weights?" *Current Anthropology* 17: 152.
- Kent, S. (1984) *Analyzing activity areas: an ethnoarchaeological study of the use of space*. University of New Mexico Press.
- Kim, C.H. (1861) *Taedongyöjido* [Map of Korea]. Page cited in An, C.B.; Kim, W.K. and Pan, Y.B. (1990) "Kayasahoetü hyöngsöng kwajöngyöngu: Kimhae chiyökül chungsimüro" [A study of formation process of Kaya society with particular reference to the Kimhae region]. *Kaya munhwa yön'gu* 1: 45-114. (in Korean)
- Kim, J.H. (1967) "Han'guk Mumuntogi munhwaüi yöngu" [A study on the Mumun pottery culture]. *Paeksanhakbo* 3: 1-98. (in Korean)
- Kim, W.Y.; Kwon, H.S.; Lee, H.J.; Im, Y.J.; Han, S.I. and Choo, Y.S. (1984) *Chöngbi, pokwonül uyihan Mongch'on tosöng palguljosa pogosö* [Excavation report on the Mongch'on fortress site]. Seoul: The Seoul National University Museum. (in Korean)
- Kim, Y.G. and Sök, K.J. (1984) *Namgyöng yujöke kwanan yöngu* [A study on the Namgyöng site]. P'yöngyang: Kwahak paekgwasajön ch'ulp'ansa. (in Korean)



- Kim, Y.J. (1989) *Nongnimsusan komunhön piyo* [A summary of historical texts with reference to agriculture, forestry and fishery]. Research Series 9, Institute of Agricultural Economic Studies, Korea. Seoul: Samhwa ch'ulp'ansa, 4th edition. (in Korean)
- Ko, K.S. (1975) *Ogu öböpak* [Fishing gear technology and fishing methodology]. Seoul: Koryö ch'ulp'ansa. (in Korean)
- Kramer, C. (ed.) (1979) *Ethnoarchaeology: implications of ethnography for archaeology*. New York: Columbia University Press.
- Lee, K.B. and Lee, K.D. (1985) *Han'guksa kangjwa: kodaep'yön* [An introduction to ancient Korean history]. Seoul: Ilchokak, 2nd edition. (in Korean)
- Lee, P.G. and Lee, C.G. (1985) *Kwakji paech'ong* [The shell midden of Kawkji]. Site Excavation Report 1. Cheju: The Cheju National University Museum. (in Korean)
- Lee, P.K. (1981) *Oböpak wollon* [An introduction to fishing methodology]. Pusan, T'aehwa ch'ulp'ansa. (in Korean)
- Lee, S.J. (1988) "Jopo-ri C chigu chugöji ich'a paigulsöngkwa" [The result of second season of excavation at Jopo-ri C area]. *Abstracts of Papers Presented at the 12th Annual Conference of the Korean Archaeological Society*, pp. 153-65. (in Korean)
- Lee, U.C. (1987) *Hapch'ön Jopo-ri C, D chiguyujök* [The site of Jopo-ri C and D areas, Hapch'ön]. Archaeological Research Report 3. Taegu: The Hyosong Women University Museum. (in Korean)
- Mackie, J.L. (1972) "Fallacies." In *The encyclopedia of philosophy* 3. New York: MacMillan, pp. 169-79.
- Ministry of Education (1984) *Taehanminguk chuyo chimyöngüi romat'cha p'yogi yongnyegip* [Korean gazetter]. Seoul: Ministry of Education. (in Korean with English summary)
- Murray, T. and Walker, M.J. (1988) "Like what? a practical question of analogical inference and archaeological meaningfulness." *Journal of Anthropological Archaeology* 7: 248-87.
- Nozawa, S. (1937) *Manshükoku gyögu benran* [Illustrations of fishing gear in the Empire of Manshü]. Dalian: National Fisheries Development Agency in Yingkou, the Empire of Manshü. (in Japanese)
- O, H.K.; Cho, T.H.; Yi, P.M.; Cho, K.U. and Yun, C.A. (1987) *Ogubullyu mit kakbumyöngch'ing* [Classification and terms of fishing gear]. Pusan: National Fisheries Research and Development Agency. (in Korean)
- O, K.H. and Kwak, C.C. (1989) *Kimhae p'yöngya-e taehan kogohakjök yöngu I: chihyöng hwangyönggwa yujök* [An archaeological study of Kimhae plain: geographical environment and sites]. *Kodaeyöngu* 2: 3-49. (in Korean)
- Orme, B. (1981) *Anthropology for archaeologists: an introduction*. London: Duckworth.
- Park, D.B. and Choo, Y.S. (1988) *Hapch'ön Jopo-ri B Kobungun* [A group of tombs at Jopo-ri B area of Hapch'ön, Kyöngsangnam-do]. Archaeological Research Report 2. Ch'angwon: The Ch'angwon National University Museum. (in Korean)
- Park, K.B. (1984) *Han'guk öpsa* [A history of Korean fishery]. Seoul: Chöngümsa. (in Korean)
- Park, K.B. (1987) *Hyöndaeh Han'guk susansa* [A history of modern Korean fishery]. Seoul: Sadanböpin suhae. (in Korean)

- Park, K.S. (1981) *Han'guk öp kyöngjesa yöngu: öp gongdongch'aelon* [A study of fishing economic history of Korea: a theory of fishing community]. Seoul: Yepung ch'ulp'ansa. (in Korean)
- Park, Y.G. (1974) *Han'guk shikyopumsa* [A history of Korean food]. Seoul: Jöngümsa. (in Korean)
- Ravn, M. (1993) "Analogy in Danish prehistoric studies." *Norwegian Archaeological Review* 26: 59-90.
- Rounsefell, G.A. (1975) *Ecology, utilization, and management of marine fisheries*. Saint Louis: Mosby.
- Rouse, I. (1972) *Introduction to prehistory*. New York: McGraw-Hill.
- Russell, S.J. (1989) *The use of knowledge in analogy and induction*. London: Pitman.
- Salmon, M.H. (1976) "'Deductive' versus 'inductive' archaeology." *American Antiquity* 41: 376-81.
- Salmon, M.H. (1982) *Philosophy and Archaeology*. New York: Academic Press.
- Scriven, M. (1976) *Reasoning*. New York: McGraw-Hill.
- Shackley, M. (1981) *Environmental archaeology*. London: George Allen and Unwin.
- Sharer, R.J. and Ashmore, W. (1979) *Fundamentals of archaeology*. Menlo Park: Benjamin and Cummings.
- Shaw, W.H. and Ashley, L. (1983) "Analogy and inference." *Dialogue* 22: 415-32.
- Sim, B.K. (1989) *Hapch'ön Ponggye-ri yujök* [The site of Ponggye-ri, Hapch'ön]. Site Excavation Report 15. Pusan: The Dong-A University Museum. (in Korean)
- Skyrms, B. (1975) *Choice and chance*. Encino: Dickenson, 2nd edition.
- Small, D.B. (1987) "Toward a competent structuralist archaeology: a contribution from historical studies." *Journal of Anthropological Archaeology* 6: 105-21.
- Sö, K.T. (1964) "Shinhüng-dong p'aengigürüt chibjari" [The pit-dwelling site of Shinhüng-dong]. *Kogominsok* 64.3: 35-45. (in Korean)
- Sö, K.T. (1986) *Chosönüi shinsökghishidae* [The Neolithic in Korea]. P'yöngyang: Sahoe Kwahak Ch'ulp'ansa. (in Korean)
- Sollas, W.J. (1924) *Ancient hunters and their modern representatives*. London: Macmillan, 3rd edition.
- Steward, J.H. (1942) "The direct historical approach to archaeology." *American Antiquity* 7: 337-43.
- Thompson, R.H. (1956) "The subjective elements in archaeological inference." *Southwestern Journal of Anthropology* 12: 327-32.
- Trigger, B.G. (1989) *A history of archaeological thought*. Cambridge University Press.
- Uemov, A.I. (1970) "The basic forms and rules of inference by analogy." In Tavanec, P.V. (ed.) *Problems in the logic of scientific knowledge*. Dordrecht: D. Reidel, pp. 266-311.
- Watanabe, M. (1983) *Jömon jidai no chishiki* [A guide to Jömon culture]. Tokyo: Tokyo Bijutsu. (in Japanese)
- Watson, P.J. (1986) "Archaeological interpretation, 1985." In Meltzer, D.J.; Fowler, D.D. and Sabloff, J.A. (eds.) *American archaeology past and future: a celebration of the Society for American Archaeology 1935-1985*. Washington: The Smithsonian Institution Press, 439-57.

- Watson, P.J.; LeBlanc, S.A. and Redman, C.L. (1971) *Explanation in archaeology: an explicitly scientific approach*. New York: Columbia University Press.
- Wheeler, A. and Jones, A.K.G. (1989) *Fishes*. Cambridge Manuals in Archaeology. Cambridge: Cambridge University Press.
- Willey, G.R. (1953) "Inference and analogy in archaeology." In Tax, S.; Eiseley, L.C.; Rouse, I. and Voegelin, C.F. (eds.) *An appraisal of anthropology today*. Chicago: University of Chicago Press, pp. 251-52.
- Willey, G.R. and Sabloff, J.A. (1980) *A history of American archaeology*. San Francisco: Freeman, 2nd edition.
- Wylie, M.A. (1980) "Analogical inference in archaeology." Paper presented at the 45th annual meetings of the Society for American Archaeology.
- Wylie, M.A. (1982) "An analogy by any other name is just as analogical: a commentary on the Gould-Watson dialogue." *Journal of Anthropological Archaeology* 1: 382-401.
- Wylie, M.A. (1985) "The reaction against analogy." In Schiffer, M.B. (ed.) *Advances in Archaeological Method and Theory* 8. New York, Academic Press, pp. 63-111.
- Wylie, M.A. (1988) "'Simple' analogy and the role of relevance assumptions: implications of archaeological practice." *International Studies in the Philosophy of Science* 2: 134-50.
- Wylie, M.A. (1989) "Archaeological cables and tacking: the implications of practice for Bernstein's 'Options beyond objectivism and relativism'." *Philosophy of the Social Sciences* 19: 1-18.
- Yang, C.M.; Chang, S.D.; Kang, Y.C.; Ko, K.S.; Chang, C.W.; Kim, I.P.; Yi, U.N. and Chang, S.H. (1987) *Susanhak kaeron* [An introduction to fishery science]. Seoul, Chip'yönsa. (in Korean)
- Yang, H.J. (1973) "Nakdonggansan öryuüi chosa: mongnokkwa punp'oe tachayö." [Studies on the fish from the Nakdong River: the list of fishes and their distribution]. *Han'guk yuksuhakhaeji* 6: 19-36. (in Korean with English summary)
- Yi, K.M.; Yi, Y.H.; Yoon, K.J. and Shin, D.G. (1989) "Uich'ang Taho-ri yujök palguljinjönbogo I." [A preliminary research report of excavation of the Proto-Three Kingdoms burial site at Taho-ri in Uich'ang-gun]. *Kogohakchi* 1: 5-174. (in Korean with English summary)
- Yun, Y.J. (1987) *Hapch'ön Jopo-ri D chiguyujök* [The site of Jopo-ri D area, Hapch'ön]. Site Excavation Report 4. Taegu, Department of Archaeology and Anthropology, Kyöngbuk National University. (in Korean)