FINAL REPORT
For Japan-Korea Joint Seminar

AREA
1. Mathematics & Physics
2. Chemistry & Material Science
3. Biology
4. Informatics & Mechatronics
5. Geo-Science & Space Science
6. Medical Science
7. Humanities & Social Sciences

1. Title of Seminar:
Research of Heat Treatment and Production Technique of High-Tin Bronzes of the Korean Peninsula

2. Period of Seminar: From November 28, 2009 To November 28, 2009 (date) (date)
1 day

3. Place of Seminar: Gimhae, Korea (city) (country)

4. Total Budget
   a. Financial Support by JSPS: Total amount: 1,200 thousand yen
   b. Other Financial Support: Total amount: ____________ thousand yen

5. Co-Organizers
   a. Japanese Organizer
      Name: Nagae Takekazu
      Institution / Department: Faculty of Art and Design, University of Toyama
      Position: Associate professor
   b. Korean Organizer
      Name: Kim Gyu-Ho
      Institution / Department: Dept. of Cultural Heritage Conservation Science, College of Natural Science, Kongju National University
      Position: Professor
6. Participants

a. List of Japanese-side Participants (Except for Organizer)

<table>
<thead>
<tr>
<th>Name</th>
<th>Institution/Department</th>
<th>Position</th>
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</thead>
<tbody>
<tr>
<td>Mifune Haruhisa</td>
<td>Faculty of Art and Design, University of Toyama</td>
<td>Professor</td>
</tr>
<tr>
<td>Shimizu Yasuji</td>
<td>Archaeological Institute of Kashihara, Nara Prefecture</td>
<td>Senior researcher</td>
</tr>
<tr>
<td>Sugaya Fuminori</td>
<td>Archaeological Institute of Kashihara, Nara Prefecture</td>
<td>Director</td>
</tr>
<tr>
<td>Muramatsu Yosuke</td>
<td>The doctor's course of Busan National University Graduate School</td>
<td>Graduate student</td>
</tr>
<tr>
<td></td>
<td>The doctor's course of Kokugakuin University Graduate school</td>
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b. List of Korean-side Participants (Except for Organizer)

<table>
<thead>
<tr>
<th>Name</th>
<th>Institution/Department</th>
<th>Position</th>
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</thead>
<tbody>
<tr>
<td>Lee Chungkyu</td>
<td>Cultural Anthropology College of Liberal Arts, Yeungnam University</td>
<td>Professor</td>
</tr>
<tr>
<td>Cho, Namchul</td>
<td>Dept. of Cultural Heritage Conservation Science, Kongju University</td>
<td>Professor</td>
</tr>
<tr>
<td>Lee, Eun-Soek</td>
<td>Cultural Heritage Administration of Korea Gaya National Research Institute of Cultural Heritage</td>
<td>Senior Researcher</td>
</tr>
<tr>
<td>Kwon, Ju-Han</td>
<td>Division of Arts and Design, College of Arts and Design, Daegu University</td>
<td>Professor</td>
</tr>
<tr>
<td>Shin, Yong-Min</td>
<td>Foundation of East Asia Cultural Properties Institute</td>
<td>Chairman</td>
</tr>
</tbody>
</table>

b. List of Other Countries' Participants

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<tr>
<th>Name</th>
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<th>Position</th>
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</thead>
</table>

Number of Participants: 151

Japanese: 9
Korean: 142
Others: 0
7. Objective of Seminar

Japanese bronze culture started in Yayoi Era when bronze ware was introduced from the
Korean Peninsula. Researchers in Japan and Korea have been investigating metal casting
techniques of ancient bronze ware in Korea and Japan. However, since casting molds have not
been excavated in both countries, they have not been able to yield satisfactory results.
Consequently, as a new approach, we focused our studies on high-tin bronzes. High-tin bronzes
contain 10 to 33 % tin, which is higher rate compared to ordinary bronzes. In ancient times,
high-tin bronze was used to make mirrors, weapons, musical instruments, and dishes. High-tin
bronze is hard but brittle, which is its defect. The way to resolve brittleness is to quench after
casting process. Quenching causes δ phase to disappear in metal structure and change it to β
phase. Our aim is to observe metallic structure of high-tin bronzes and to figure out heat treating
technique of ancient times. There are three ways in making high-tin bronzes. One is by casting,
second is by casting and hammering, and third is by hammering. It is possible to figure out what
methods were used by observing the structure of high-tin bronzes. This research focuses on
special technique of bronze production, which can present new approach of research.

In Korea, people use metal dishes called Yugi when eating. There are workshops which make
high-tin bronze Yugi containing 22 % tin in all over Korea. In the Korean Peninsula, high-tin
bronze swords, pikes, and mirrors were made after the Bronze Age, and high-tin bronze bowls
and spoons were made after Three States period until now. In Japan, bronze weapons and
mirrors were made in Yayoi period and Kofun period using the method introduced from Korea.
Japan and Korea have such historically close relationship, so it is significant for the two
countries to hold an academic exchange seminar on the production technique of high-tin
bronzes.

August 2008, Japanese team received 10 samples of medieval high-tin bronzes from
Foundation of East Asia Cultural Properties Institute in Korea and analyzed them. Starting from
2007, a joint team of Japan and Korea did fieldwork at six Yugi workshops in Korea.
Temperature of the heat treatment was measured by an infrared thermometer, and microstructure
of Yugi was observed. Based on these two researches, we found clues to figure out ancient
techniques. Results from the two researches will be the main topic of the seminar.

This seminar aims to develop Korea’s unique traditional culture of high-tin bronze (Yugi) and
to strengthen cooperative framework between Japanese and Korean researchers.