



Bangjja Bronzeware

Bangjja bronzeware is a traditional form of Korean tableware. It is beautiful to look at, and very durable. The secret of its strength lies in using a unique ratio of copper and tin, which defies modern engineering standards. Thanks to the minerals it naturally produces when water is stored in it, Bangjja has beneficial health effects, enhancing the taste of food and counteracting infections such as the lethal O-157 colon bacillus.

Bangjja bronzeware is another item rich in wisdom and tradition commonly found on the Korean dining table. Each country and region has different foods, and serves them in different dishware. Within East Asia, China traditionally favored porcelain, Japan preferred wooden tableware, and Koreans preferred metal. The hand-forged *Bangjja* bronzeware of Korea has been in use for thousands of years, and is part of its culinary tradition.

In the Shosoin, a Japanese royal treasure house, there are 436 *Bangjja* bowls from 8th century Korea. The ancient Japanese were clearly impressed by their compactness and consistency of design. Up to ten bowls can be stacked together at a time, meaning that their utility is proportionally greater relative to the space required to store them.⁴⁰

Bangjja is a unique bronzeware found nowhere but in Korea. It is made from an alloy of 78% copper and 22% tin, a ratio that no other nation is known to have used for tableware items.

A ratio of 22% tin is in fact contrary to the conventions of modern science. Tin is a malleable metal which increases the brittleness of an alloy. Its content level is hence limited to 19% in the manufacture of modern materials. *Bangjja*, however, does not break even though it consists of 22% tin. High resistance to corrosion and deterioration meant that it was widely used in Buddhist and Confucian ceremonies, and even for musical instruments such as gongs and bells.

The secret of *Bangjja*'s durability lies in the method used to create it. The tin and copper are mixed together at a high temperature of 1200°C, and the molten mixture is then poured out and hammered into a thin sheet. Once it cools, it is again heated and then hammered. When the molten alloy solidifies, it is initially more than 1 cm thick, and it is converted into a thin sheet by heating and hammering. If it were simply to be hammered and beaten continuously, the sheet would break. However, because the *Bangjja* is produced by heating and hammering alternately, the α formations (soft structure) are transformed



Before and after processing

40. Sang-woon Jeon, A History of Science in Korea, 202-203.

into β formations (hard structure) through the distribution of tin, as can be seen below from a structural image taken with an SEM (Scanning Electron Microscope). As the process is repeated, more of the β arrangements appear, and as the tin and copper particles become further integrated, potential faultiness disappears, so the material becomes more resistant to shattering.⁴¹



Bangjja Tableware

Another characteristic of *Bangjja* is its beautiful appearance. The whitish gold luster of *Bangjja* gives the illusion that it is actually made of gold. It blends in naturally with the diverse colors of a Korean meal, and brings a feeling of grace and homeliness to the table. If the level of tin is reduced to below 19%, in line with modern guidelines, this color cannot be achieved, and so it remains unique to Korean *Bangjja* produced in accordance with the traditional methods.

Metallic dishware has not been used only in Korea. Ancient Romans also used metal dishes, generally containing lead. The toxic properties of lead seem to have been poorly understood by the Romans, who made extensive use of the metal, as it was plentiful, had a low-boiling point, and was easy to process. Besides dishware, lead was also used in kitchen utensils, jars, liquor bottles,

and even water pipes. Some historians therefore have identified lead poisoning as the cause of Rome's eventual downfall.

In the modern era, the invention of stainless steel by Harry Brearley in the early 20th century not only overcame the principal weakness of iron – rust – but in addition produced an alloy which was light and relatively inexpensive. However, stainless steel contains nickel and chromium, which are heavy metals like lead. These metals are not discharged easily once accumulated in the body, even in negligible quantities, and may have negative effects after an extended period.

In contrast, *Bangjja* has been shown to have a beneficial effect on the human body. Anecdotal accounts of its benefits, passed down by Korean housewives, tell us that when dropwort is soaked in a *Bangjja* container, poisonous insects stick to the sides of the dish, making the vegetables easier to clean. One traditional method used to improve the taste of Kimchi and other fermented vegetables is to cover the vegetables with straw that has been used to clean the bronzeware. When shaving a monk's head, a knife made from *Bangjja* was also used. This was because even if the knife made a cut by mistake, the wound would not become infected. How can these traditional beliefs be explained?

In November 2003, at the Kyungwon University Department of Foods and Bioengineering, a series of experiments was conducted to investigate the scientific basis of these claims regarding *Bangjja*'s properties⁴². Water was poured into 3 containers, made of porcelain, stainless steel, and *Bangjja*, and after 24 hours the properties of the water were tested for changes. The water in the porcelain and stainless steel showed no changes in mineral content, but inside the *Bangjja* small quantities of minerals such as sodium, copper, and zinc were detected. Minerals such as these are an essential part of the human diet, and must be obtained externally, as they are not produced by the body.

In another experiment, flowers were placed inside bowls of porcelain, stainless steel, and *Bangjja*, which were all filled with water. The flowers in the porcelain and stainless steel withered after a week, but the flower

⁴¹ Tong-chan Chong, *Korean Science: Crafts* (Seoul: Minsokwon, 1999), 152-154.

⁴² The findings were broadcast in a documentary on 22 Nov. 2003 by the Korean Broadcasting System (KBS). This can be seen at www.kscpp.net.



Left: *Bangjja* bronzeware Middle: Porcelain Right: Stainless steel

inside the *Bangjja* remained fresh. This is because the mineral elements passed on by the *Bangjja* supplied inorganic nutrients to the plant, assisting its biotic activity.

Ultimately, the improved taste of kimchi and jangajji may also be attributed to these mineral elements produced by the bronzeware, which enhance the taste and nutritional value of the fermented foods.

Another experiment demonstrated the ability of *Bangjja* to eradicate the lethal O-157 colon bacillus, which claimed many lives during an outbreak in Japan in 1996. A quantity of O-157 was mixed with distilled water and placed inside containers made of stainless steel, porcelain and *Bangjja*. When the water in the *Bangjja* was tested after 24 hours, not a trace of the original pathogen was discovered, while the bacteria in the other containers remained unaffected. Professor Park from Kyungwon University points out that *Bangjja* dishware has a sterilizing, rather than antibiotic, effect in this case. Accord-

ing to his explanation, pathogens with a high level of toxicity contain many anions (negatively charged ions), and since the copper in the *Bangjja* produces cations (positively charged ions), the pathogens are therefore eliminated, and the water stored in the *Bangjja* comes out cleaner and safer.

The disadvantage of *Bangjja* bronzeware is that it is heavier compared to other forms of tableware and cannot be mass-produced, and it is therefore quite expensive. During the last century, demand for traditional tableware decreased significantly, and it became quite rare in ordinary Korean houses. In the early 21st century, however, the health benefits of *Bangjja* are once again gaining attention. Both beautiful and durable, producing beneficial minerals and neutralizing harmful substances, *Bangjja* is not merely a variety of dishware, but a tangible legacy of enlightened wisdom.

Source: Excerpt from "Fifty Wonders of Korea" Vol. 2 Science and Technology, Korean Spirit & Culture Promotion Project,
Photographed by Kim Jiho, Korea Tourism Organization

