



ブロンズ: The enchanting world of Japanese Bronze

Bronze, Brass, Copper... these terms are sometime interchangeably used to describe objects that have a yellowish colour when polished. As Japanese artisans have always been particularly talented at casting metalwork, Japanese antiques offer a profusion of objects in bronze or similar alloys.

“Bronze”, coming from the same French word, is a metal alloy mostly consisting of copper (Cu), usually with tin (Sn) as the main additive. The mastering of that alloy to cast metal objects was so significant in antiquity that when civilisation supposedly attained such expertise it was described as having reached the “Bronze Age”.

Bronze alloy is stronger and more durable than pure copper and it is easier to cast. This because the addition of a small percentage of tin (as low as 1 or 2%) lowers the melting point considerably and increases the fluidity - an important property for a material used in the casting of intricate details. Also



Pair of small bronze vases with silver and gold overlays; 10x5cm; Meiji era.

copper alone shrinks considerably more than bronze upon cooling, and is much more prone to corrosion.

“Bronze” composition differs from place to place and in time. The variations are based primarily on the main additive, tin being in more or less proportion or replaced altogether with other metals like lead or zinc, or iron. Reasons for this include economy or creating a softer or stronger alloy, depending of the purpose of the casting. But the term bronze is often misused; some Greek castings

called “bronzes” are really pure copper, ancient Russian bronzes are actually an alloy of copper and iron, and many labelled “bronze” relics in museum are actually just coppery metal.

Although the earliest tin bronze found in Mesopotamia and China dates from around 4000 years BC, the Bronze Age came relatively late to Japan, at around 300 BC. Still later on came the invention of specific alloys based on copper, with patinas that can attain a degree of richness and variety unknown in other cultures. Even today, craftsmen are experimenting with original alloy recipes or improving traditional ones. Some of these recipes have become known worldwide after the Meiji Restoration, and are used by bronze casters outside Japan. To better understand the variety of bronze alloys used in Japan, it is necessary to understand the Japanese terms used for bronze alloys.



Two tortoises, bronze with *niiro-shiage* patina by Nogami Ryûki (野上龍起 1865-1932).

Copper (dô 銅) is the basic ingredient of all bronze cast. This orange-pink metal found everywhere on earth as nuggets was probably the first worked by people in Japan as it was anywhere else.

Haku-do 白銅 (= white copper):

Haku-dô designates a family of alloy made of copper (*dô* 銅) and a white (*haku* 白) metal like zinc, tin and/or nickel. Bronze (ブロンズ) falls in the family of *haku-dô* (白銅), and, in ancient times, was typically made of 70-85% copper and 15%-30% tin. A low amount of tin offers strength, ideal for casting blades, while a larger amount gives a shiny white surface when buffed, ideal for casting mirrors.



Detail of two tortoises.

Ô-dô or shinchû 真鍮:

Among *haku-do* types is also brass (*ô-dô* or *shinchû* 真鍮), improperly called bronze in English, or commercial bronze (*laiton* or *cuiivre jaune* in French). It is made of copper and zinc (90% Cu / 10% Zn).

Brass (Cu+Zn) is not considered “noble” in arts as it does not develop patinas well. But brasses are easier to cast than real bronze (Cu+Sn), since the melting point of bronze is

usually around 950° Celsius, compared to 930° Celsius or less for brass.

Yet, *shinchû* (or *o-dô*), has been widely used in Japan for low-cost casting since the Nara period (710-794), and the city of Kyoto was famous for its *shinchû* artisans, specialising in the casting of religious icons or temple lanterns. It seems that in early Buddhist sculpture in Japan, *shinchû* was more common than bronze. Zinc does not oxidise as much as tin, and was probably more available and cheaper than tin. Arsenic was sometimes added to increase the hardness of the alloy, or further lower the fusion point.

Sahari 佐波理,

Sahari is a *haku-dô* made of copper (87%), tin (9%) and small amounts of zinc, lead¹ and silver. It produces a typical dark grey coloured alloy without patina, but also rich tones when struck. It has been historically used to make gongs (*dora*) and bells.

Finally, two precious alloys, although not technically bronze since they do not contain tin, are nonetheless among the most esteemed and are unique to Japan: *shaku-dô* (赤銅) and *shibu-ichi* (四分一).

Shaku-dô

Shaku-do is a mixture of copper and 3 to 5% of pure gold. It has the appearance of bronze after casting, but usually receives a special *niiro-shiage* (煮色仕上げ) patina² which gives it a purple black shininess resembling lacquer. It is used for small, precious objects, like sword ornaments (*menuki* 目貫) or jewellery, with other different alloys arranged as inlays and overlays. *Kuromi-dô* (黒味銅), with 99% copper and 1% arsenic is an economical version of *shaku-dô*.



Pair of *menuki* (目貫) casted in bronze, *shaku-dô*, *shibu-ichi* and silver. Rare design of *namban-jin* (Portuguese sailors) with their dog. *Menuki* are ornaments found under the handle wrap on a *katana*. They define the character of the sword and can tie the owner to the sword. 19th century.

¹ Lead further increase fluidity, but was not extensively used in old Japanese bronze, because its import from China increased the price of casting. One well known exception is the head of the Kamakura Daibutsu, which contains a very high percentage of lead (tin 9%, lead 20%), probably to give it a nice dark patina.

² *Niuro-shiage* 煮色仕上げ is the most used patina used by Japanese casters on their works. *Rokusho* 緑青 is one of its main ingredients, also called “copper rust”. *Niuro-shiage* 煮色仕上げ solution is heated and works are immersed in it for more or less time, until the desired tint is achieved.

Shibu-ichi

Shibu-ichi (meaning “one fourth”) might be the most valued alloy unique to Japan, traditionally made with one fourth silver and three fourths copper, sometimes with one or two percent of gold. The proportion of copper and silver varies according to the desired malleability of the final alloy. A wide range of colours can be achieved using the whole range of alloy compositions, and *niiro-shiage* patina, from shades of blue and green to dark or light greys.

Finally, here are some hints to help one distinguish bronze (Cu+SN) from brass (Cu+Zn).

With a natural patina, bronze is darker, having an almost reddish brown colour, while brass turns more greenish greyish or bluish and will tarnish more quickly.

With years, bronze and brass both take on a fine verdigris patina without maintenance, but it will take more time for bronze, as it is more corrosion resistant.

Bronze is stronger and harder.

When polished, bronze has a more golden colour; brass has a duller yellow colour. This can sometime been observed if a part (like the foot) of the bronze has been abraded by contact with its support.



Bronze incense burner in shape of a reading boy riding a bull. Meiji era.