Enchanting Myanmar Vol 5, P 6-9
2006

Iron in Myanmar

Bob Hudson

If a farmer digs up an ancient stone axe, a bronze spear, some agate or carnelian beads, or perhaps some gold jewellery lost in ancient times, there will be great excitement. If he digs up an iron hoe, a hard rusty lump, it is more likely to be thrown aside. Old iron is not very attractive stuff. However in the ancient world, iron was the most valuable of metals, if not the most precious. In Myanmar, the network of wealthy agricultural villages that appeared in the Samon Valley from around 500 BC and the great Pyu cities of the First Millennium AD with their brick walls, buildings, irrigation works and rice fields really owe their existence to iron.

Scientists agree that bronze appeared in Myanmar and neighbouring countries around 1500 BC. It was quite a rare metal. At the famous Bronze Age site of Nyaunggan in Budalin Township, some people were buried with their bronze axes amid evidence of community feasting. Archaeologists found dozens of food containers with each skeleton. But the bronze axes were rare. Only a dozen or so were found. Farmers would have still used stone implements for their daily work, for such tasks as shaping wooden tools.

The arrival of iron around 500 BC changed the economy. Iron tools can chop through roots and hard soil perhaps ten times more efficiently than stone or bronze. This allowed people to grow more crops, and to create more extensive wells, canals or weirs to irrigate them. In the Samon Valley, around Pyawbwe, archaeologists- as well as local treasure hunters- have found burial sites where the dead were interred with jewellery made from semi-precious stones and many bronze items. One of these sites, Ywahtinkon,

Remains of an old furnace near Mount Popa

An archaeologist from the field school at Pyay examines an old furnace near Sriksetre

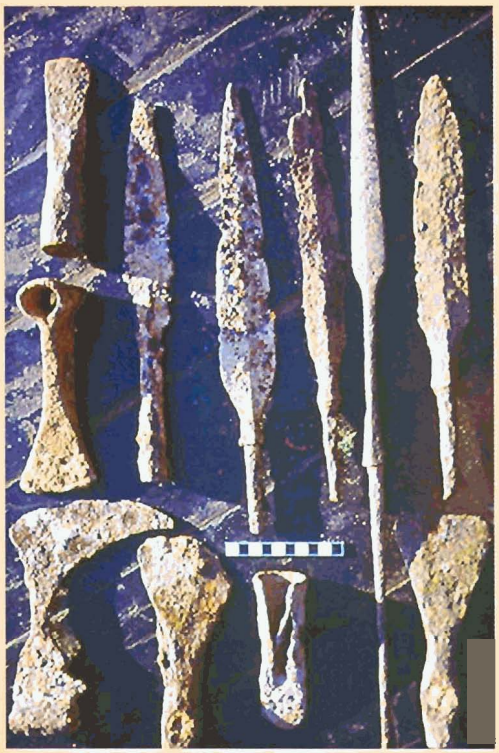
Old iron furnaces on a hilltop at Konzin, east of Sriksetra

Remains of a clay tuyere, a clue that old furnaces are nearby

has been radiocarbon dated by a Myanmar-French team to between 700 and 100 BC. They represent an age of agricultural expansion and increasing wealth. Most ancient bronze objects found in Myanmar date not from the Bronze Age, but from the Iron Age, when people could afford to buy them. We can picture the Samon Valley farmers of 2,000 years ago with shiny bronze ornaments, bells, bracelets or axes on display in their houses, as they were later displayed in their graves. The iron farm tools that had brought them their wealth would probably have remained under the house with the pigs and chickens. Swords with strong iron blades and elegant cast bronze handles have been found in some of those burials, perhaps an indication that this new wealth needed to be protected.

So where did the iron come from? Well, the raw material was just lying on the ground waiting to be used. If you walk through parts of the Myanmar countryside today you may see reddish-brown lumps of haematite, natural iron, as part of the landscape. By 500 BC the ancient people were familiar with the idea of heating copper to make bronze, and also with heating semi-precious stones such as carnelian to enhance their colour. As their experience with heat technology increased, they discovered that if they mixed haematite with charcoal and heated it for long enough, they could produce iron.

The process took place in a clay furnace dug into the side of a hill. This was essentially a square hole in the ground, about three metres deep. At the base there was an opening to allow the air to enter. The furnace was filled with a mixture of haematite and charcoal, and a fire lit from below. The opening at the base was then blocked with a temporary clay wall which was built around rows of hollow clay tubes. The technical term for these is *tuyere*. The iron-makers used these tubes to control the flow of air into the furnace, to maximise the heat. Since they had cleverly built the furnaces on a hillside, they did not need to use



A handprint from the past, still visible on the clay wall of the furnace (above)
Old iron tools and weapons from Halin (left)
Archaeologists expose the structure of the furnace at Zi-o (bottom)

bellows. The natural draft of air coming up the hill and through the tuyeres was enough to keep the furnace burning. This same technique was used in furnaces in Sri Lanka.

When the furnace had cooled down, the tuyeres were broken away to reveal a slab of iron, called a bloom, which had formed as heavy molten iron trickled down through the furnace. The hard lumps of heated haematite, called slag, were shovelled out and thrown away. The iron would have been taken to a blacksmith. Old furnaces can be recognised

Excavation a furnace at Zi-o, between Bagan and Mount Popa

today by the slagheaps on the slopes below them, and by the square outline of the burnt clay walls of the furnace in the ground.

A traditional Myanmar story involving iron focuses on Mount Popa. Maung Tin De was a blacksmith at Tagaung, renowned for his great strength. A jealous king burnt him and his sister in a great fire. They became spirits, and floated down the river until they reached Bagan. As the Mahagiri nats, they are today worshipped at Mount Popa, and their statues flank the eastern gate of Old Bagan. The area between Bagan and Mount Popa was, in fact, a vast iron production area in early times. Archaeologists have located hundreds of furnaces there. It has been estimated that a single furnace would have produced around 40 kilograms of iron per firing day, so it was a substantial industry.

Historical records show that the furnaces in the Bagan - Mount Popa area were in use until the 19th century. A furnace at the village of Zi-o, excavated by a joint Myanmar-Australian team, has been radiocarbon dated to between 1500 and 1800 AD. However as only this one of the 800 or so Popa furnaces has been dated, we cannot yet tell how far back they go. Iron furnaces have been located outside the old Pyu city of Beikthano, and near Sriksetra. Some of the furnaces outside Sriksetra seem to be a simpler shape than the one excavated at Zi-o, which suggests they may be an older model. We might expect the oldest furnaces to be found near the oldest cities. The ancient iron industry of Myanmar provides both a challenge and an opportunity for young archaeologists to investigate their nation's technological, economic and cultural heritage.

If you should be wandering through the countryside and come across some little clay walls about a metre square poking up out of the ground, or a hillside covered with hard blue-black chunks of slag, spare a thought for the old iron workers. The goldsmiths, the bronze sculptors, the gem cutters, the architects and painters of Myanmar's great pagodas, deserve praise for their wonderful works of art. But just as the economic development of modern society relies on the products of industry, so also did the economic growth that supported the earliest Myanmar cities rely on hand-made iron from Myanmar furnaces. ▲

(Bob Hudson is an archaeologist from the University of Sydney, Australia. He conducts regular research in Myanmar, and is a visiting lecturer at the Myanmar Archaeology Department's Field School at Pyay.)