

# AN ARCHAEOLOGICAL INTERPRETATION; DESIGN, AGE, AND PERFORMANCE OF ANCIENT CRUCIBLE STEEL FURNACES FOUND IN YODHAWEWA, SRI LANKA

W.M.T.B. Wijepala<sup>1\*#</sup> and H. Ishiga<sup>2</sup>

<sup>1</sup>*Faculty of Social Sciences and Humanities, Rajarata University of Sri Lanka, Mihintale, Sri Lanka*

<sup>2</sup>*Interdisciplinary Faculty of Science and Engineering, Shimane University, 1060, Matsue, Shimane, Japan*

\*Correspondence E-mail: [tbwijepala@ssh.rjt.ac.lk](mailto:tbwijepala@ssh.rjt.ac.lk), Phone: +94718578188

#Presenting Author

**Abstract:** The main objective of this study was to examine the design, age, and performance of the ancient crucible steel furnaces found in the Yodhawewa archaeological site, Northern dry zone of Sri Lanka. An archaeological survey and two vertical excavations were carried out near the excess water canal of the Yodhawewa tank in 2018. This investigation is mainly based on archaeological materials such as furnace debris, slags, crucible fragments, and burnt wood charcoal unearthed from the field observations. According to the stratification of the entire area, two cultural layers were located between two natural layers, mainly representing metal activities from the c. 1<sup>st</sup> to 9<sup>th</sup> century AD. Furnace debris, slags, and crucible fragments were the evidence of crucible steel production of there among other archaeological materials found. An important discovery of the Yodhawewa research was the lower half-spherical shape furnace used for making crucible steel. Archaeologists have so far been unable to find in South Asia, such a furnace except at Kodumanal, a South Indian archaeological site used for high-carbon steel production in c. 300 BC. Among the first-millennium AD metal artifacts in the Yodhawewa site, this furnace has received an absolute date of c. 680 ± 30 AD from the Accelerator Mass Spectrometry (AMS) Radiocarbon dating. Further, this is the first discovery of a furnace activated through the "Bellow method" for making crucible steel in the Northern dry zone of Sri Lanka. According to the size factors and structural features seen in the furnace, it can be concluded that a steel-making crucible file (10-15) in these furnaces may have been used at the same time. A rare model of the c. 9<sup>th</sup> century AD was selected for crucible steel production in Sri Lanka; however, this could indicate that the ancient metal-workers possessed the technical skills to use it sparingly.

**Keywords:** Bellow method; Crucible steel; Furnace; Yodhawewa; Sri Lanka