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▶ **To cite this version:**

Stéphanie Leroy, Mitch Hendrickson, Enrique Vega, Emmanuelle Delqué-Kolic, Alexandre Disser, et al.. An integrated archaeometallurgical investigation of architectural crampons for documenting the iron economy of Angkor, Cambodia (10th to 13th c.). BUMA IX (9th International Conference on the Beginnings of the Use of Metals and Alloys), Oct 2017, Busan, South Korea. cea-02331835

HAL Id: cea-02331835
https://cea.hal.science/cea-02331835

Submitted on 24 Oct 2019

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An integrated archaeometallurgical investigation of architectural crampons for documenting the iron economy of Angkor, Cambodia (10th to 13th c.)

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Abstract

The Khmer Empire, based at Angkor (UNESCO) in Cambodia, rapidly extended their political influence across mainland Southeast Asia between the 11th and 13th c. AD. Traditionally, Angkor's power base is attributed to an elaborate bureaucratic system interconnected to regional centres via a road system. Lack of key resources around the capital suggests this network provided materials necessary to enhance a broad range of activities including temple building, external trade, and military campaigns. Iron with its broad technological characteristics and universal utility is known as being one of the most dynamic materials for facilitating social transformation. Reconstructing how iron was managed in the Khmer Empire is therefore a critical perspective for understanding the socio-economic processes that enabled the rise of this influential state. The IRANGKOR project was established to investigate the diachronic organization of iron consumption and distribution practices. In combination with INDAP, which focuses on the evidence of iron production, our broader aim is to address the overall impact that iron played in the processes of Angkorian state-building during this time period.

In this paper, we discuss the results of a comprehensive archaeometallurgical typology of iron architectural supports that represent the most frequent evidence of iron consumption in Angkor (9th to 15th c. CE). The study has examined a statistically significant number of crampons (100) recovered from five major temples that span the 11th to 13th centuries. Technological, chronological and sourcing analyses of this class of iron objects were combined to generate information about secondary manufacturing, association with reduction systems, and date of production. The large sample size and range of construction dates for each building allow us to assess diachronic patterns of metal consumption and manufacture during the critical period of Khmer expansion. This investigation was paired with extensive analyses of the vast iron production landscape of two known production zones (Cambodia, northeast Thailand) (200 sites) that were part of the Khmer empire. It was therefore possible to investigate the origin of the ore resources and to shed new light on the broader exchange system. Compiling this vast data set allows us to identify changes in the production and consumption strategies of the Khmer state that seem to be linked to key historical developments of the empire. More importantly, this study provides an important step in the reconstruction of premodern iron economies and the interrelationship between the sociotechnical system and historic trajectory of states and empires in the past.