

SOME RELATIVELY UNKNOWN 'WORLD FIRSTS' IN ANURADHAPURA STŪPA RELATED TECHNOLOGIES

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Objectives

The present paper points to some lesser known "World Firsts" of Anuradhapura Stūpa and associated monasteries' technology.

Methodology

Methodology is through examination of remains of sites, descriptions in the *Mahavamsa*, Western historical trajectory of lightning conductors and organic architecture, the 500 tantra texts taken in the Tang dynasty by Amoghavajra from Abhayagiri, the observations by Needham that the main impact of South Asia on Chinese science and technology was through tantra, the spread of Amoghavajra's tantra to Japan (Shingon sect), Korea and Indonesia, the presence of Anuradapura type irrigation systems and Sri Lanka steel technology in Shingon Japan.

Lightning conductors

The development of lightning conductors for tall buildings is conventionally attributed to Benjamin Franklin (1706-1790). But during the early first millennium, Sri Lanka had built some of the tallest brick structures in the then world in the form of three tall Stūpas which without a proper discharge of electricity, would be natural targets for lightning strikes as did strike similar Stūpas in other countries. But there are no records of lightning attacks on Anuradapura Stūpas. The *Mahavamsa* (chapter 36.36) relates king

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Samghatissa (303-307 CE) placing a *vajiracumbatam* – literally thunderbolt-touch - on the top of the Mahathupa. The later *Mahavamsa Tika* has the following notice (p. 487, 19) of the King making “a device and fixing it on the pinnacle itself in order to avoid thunder and flash of lightning.” Further, King Dhatusena (460-478 CE) had “made for the three big Stūpas ... a ring for protection against lightning” (*Culavamsa*, Geiger 1929, 1992, p.37). The electrical configuration for these was first presented by Goonatilake (2006, 2007, 2009), followed by Gomes (2009) who gives a somewhat different technical explanation. The present paper summarises the history of lightning conductors putting Anuradapura at its beginning and concludes that Gomes had misunderstood a keyword *vajiracumbatam* equating it with the *ChudaManikya*.

Ergonomics

Ergonomics as a formal discipline of fitting the artefact to the human began in the 1950s replacing earlier Western modes of fitting the human to the machine as in the self-styled ‘Scientific Management’ school of the early 20th century as well as the idealistic form as expressed by da Vinci during the Italian Renaissance. But lumbar hugging ergonomic seats are found as a development of earlier rounded South Asian seats in the meditation (‘Western’) monasteries (*padhanaghara*) (Goonatilake 2014) associated probably with the Abhayagiri complex dated to Wijesuriya 1998). The paper summarises the evolution of this ergonomic tradition as due to Buddhist meditation practices which emphasise mindfulness of the body and awareness of its muscle structure.

Tantra exports from Abhayagiri

Historian of Chinese science, Needham had observed that the main inflow into China of South Asian thought for observation and experimental sciences was through the transmission of Tantric Buddhist ideas also noting that this literature remains largely unexplored (Needham 1978-1995 Vol. 1 p. 272). The largest single export of Tantric literature to China was by Amoghavajra (704-774 CE) who took 500 key Buddhist tantra texts from the Abhayagiri complex during the Tang Dynasty (618-907 A.D) (Weerasinghe 1995, pp. 25-27). Amoghavajra's influence spread to Java and to Japan – the latter as the Shingon sect (Sundberg 2004, pp. 95-123). Chinese sources mention Amoghavajra's knowledge of astronomy/astrology and mathematics (Yu, 1961-1965, pp. 482- 487). These provide direct evidence of Abhayagiri associated scientific knowledge and also explains some puzzles. Juleff (1996) described the emergence in Sri Lanka of a wind-driven mass production steel technology in the first millennium and its possible spread further afield to Japan (Juleff 1998). This coincides roughly with the emergence of the Shingon sect of Kukai, a disciple of 'Amoghavajra thought', Kukai himself being considered of a scientific and technology bent (Kashiwahara, 1999) suggesting a transfer of Abhayagiri knowledge to Japan. Kukai's irrigation works also had a striking resemblance to those of ancient Sri Lanka, for which Mogi has again suggested another transfer of technology from Sri Lanka (Mogi, 2012).

Organic architecture

The 20th century saw the emergence of new architecture movements in the West replacing its earlier conventional metaphors. One of these was 'Organic Architecture' associated most visibly with Frank Lloyd Wright, one of whose buildings has been termed the "best American building in the

previous 125 years". Organic architecture focused on creating buildings that grow out of nature, in particular their site, reminiscent of some of the Japanese temple architecture which Wright had seen. Buddhist 'architecture' had been first associated with meditation in caves, and thus was 'living with nature', but hardly could be called a formal architecture. A formal architecture having the requisite of 'growing out of nature' is seen in the set of 'Western Monasteries' Tapovana of circa the 8th to 9th century Wijesuriya 1998, pp. 18, 26, 30, 33, 34, 60, 63, 65). These are reminiscent of the requirements of 20th century organic architecture (Goonatilake 2007, 2009).

Conclusion

Stupa building rested on a deep science and technology knowledge base, unfortunately not yet mined. This has led to false Eurocentric descriptions such as Marx's Asiatic Mode of Production, Weber's Buddhism as otherworldly and recently the 'theocracy' of Cunningham (Goonatilake 2011).

References

- Degroot, Ve'ronique. (2006) 'The Archaeological Remains of RatuBoko: From Sri Lankan Buddhism to Hinduism'. *Indonesia and the Malay World*. Vol. 34. 55-74
- Gomes, Chandima. (2009) 'The Lightning Protection of Ancient Stūpa in Sri Lanka'. paper presented at SLAAS Annual Sessions.
- Goonatilake, Susantha, 'Sri Lankan Lightning Conductors in Comparative Perspective', Annual Research Sessions of the Royal Asiatic Society, 2006
- Goonatilake, Susantha. (2007) 'Sustainable Sri Lankan Architectural Futures: A Socio-cultural Product' at the Annual Conference of the Sri Lanka Institute of Architecture. (Conference theme 'Sustainable Design Futures').
- Goonatilake, Susantha. 'Some Asian sources (and examples) of Scientific Creativity'. paper presented at 'Asia-Europe Dialogue and the Making of

- Modern Science', 2009) at the Institute of Southeast Asian Studies, Singapore.
- Goonatilake, Susantha.(2011) 'Social construction and deconstruction of a 'theocracy'' *Antiquity*. Volume: 85 Number: 329 pp: 1060-1065
- Goonatilake, Susantha.(2013)'The Transmission belt for Steel Technology: Ideas Transfer from Sri Lanka towards Japan' *Journal of the Royal Asiatic Society of Sri Lanka*.New Series. Vol. LVIII Part I. pp. 51-66
- Goonatilake, Susantha.(2014)'Ancient Sri Lankan Lumbar-Supported Seats' *Ergonomics in Design: The Quarterly of Human Factors Applications*. 22: 27
- Juleff, G. (1996)'An ancient wind-powered iron smelting technology in Sri Lanka' *Nature* 379(6560)
- Juleff, G. (2009)'Technology and Evolution: a root and branch view of Asian iron from first millennium BC Sri Lanka to Japanese steel'. *World Archaeology*. 41(4).
- Kashiwahara, Yusen. Sonoda, Koyu. (1999) *Shapers of Japanese Buddhism*. translated by Gaynor Sekimori. Kosei, Tokyo.
- Sundberg, J. (2004) 'The wilderness monks of the Abhayagirivihara and the origins of Sino-Japanese esoteric Buddhism' *Bijdragen tot de Taal- Land- en Volkenkunde* 160. no: 1. Leiden.
- Wijesuriya, Gamini.(1998) *Buddhist meditation monasteries of ancient Sri Lanka*. Colombo: Dept. of Archaeology.Govt. of Sri Lanka.