 ISSN 0267-8179. DOI: 10.1002/jqs.3041

JQS Journal of Quaternary Science QRA Quaternary Research Association

Earliest *Musa* banana from the late Quaternary sequence at Fahien Rock Shelter in Sri Lanka

RATHNASIRI PREMATHILAKE[1]* and CHRIS O. HUNT[2]
[1]Postgraduate Institute of Archaeology, University of Kelaniya, Colombo, Sri Lanka
[2]School of Natural Sciences and Psychology, Liverpool John Moores University, Liverpool, UK

Received 6 October 2017; Revised 27 March 2018; Accepted 6 April 2018

ABSTRACT: The domestication and time of arrival of bananas in South Asia and Africa are unresolved issues. We provide banana seed and leaf phytolith evidence from the archaeological sequence at Fahien Rock Shelter, south-west Sri Lanka, to help understand the geographical configuration of hybridization, dispersal, cultural association and chronology of banana domestication. Phytolith evidence indicates that *Musa accuminata* subspecies and *M. balbisiana* existed in the south-western lowland rainforest of Sri Lanka from 44952–47854 to 3845–3985 cal a BP. Rock Shelter occupants exploited those taxa for starchy food. Edible diploid bananas may have been introduced from Indonesia or Papua New Guinea before 5994–6194 cal a BP. From this time onwards, phytoliths morphologically identical to those from triploid banana cultivars appeared in the lowland rainforest of Sri Lanka. This precocity appears unique to Sri Lanka. Dispersal of these triploids to the east coast of Africa may have followed maritime trade networks in the Indian Ocean from the first half of the sixth millennium BP. Northward dispersal, *e.g.* to urban Harappan sites, occurred in the middle of the fifth millennium BP. This discovery shows the interconnection of prehistoric cultures and their engagement with the management of starchy staples in the lowland rainforests of Sri Lanka. Copyright © 2018 John Wiley & Sons, Ltd.

KEYWORDS: bananas; dispersal; maritime interaction; phytoliths; Sri Lanka.

Introduction

Knowledge of *Musa* bananas (section: *Eumusa*) is important for understanding sustainable agriculture today, because domesticated bananas derived from *Eumusa* are globally the fourth most widely consumed crop used by humans after rice, wheat and maize (Smith, 2010). Perrier *et al.* (2011) argue that understanding complex issues in the banana domestication process is essential in breeding programmes and improving banana agriculture for the future. The earliest known domesticated banana cultivation (*Eumusa*) is at 6950–6660 cal a BP at Kuk Swamp in the Papua New Guinea (PNG) highlands (Denham *et al.*, 2003). The dispersal of domesticated bananas from PNG and their arrival in other regions in Asia and Africa on terrestrial (De Langhe, 2007) and maritime routes (De Langhe, 1995; Blench, 2009) are poorly documented, but the issue has recently been discussed using data from archaeology, phytoliths (i.e., microscopic silicate bodies formed inside plants), genetics and linguistics (Mbida *et al.*, 2001; Lejju *et al.*, 2006; Kennedy, 2008; Donohue and Denham, 2009; Fuller and Madella, 2009; Perrier *et al.*, 2009, 2011). Banana phytoliths are reported from Munsa, Uganda, by 5400–5100 cal a BP (Lejju *et al.*, 2005, 2006) and Kot Diji, Pakistan, by 4550–3950 cal a BP (Fuller and Madella, 2009). The appearance of banana phytoliths at these early ages and their status as true *Musa* sp. cultivars have been questioned (Fuller and Madella, 2009; Neumann and Hildebrand, 2009). Banana phytoliths from Nkang, Cameroon, West Africa, at 2350–2810 cal a BP (Mbida *et al.*, 2000, 2004, 2005, 2006; Blench, 2009) have also been questioned (Neumann and Hildebrand, 2009). It seems that there is still dispute on chronological (Donohue and Denham, 2009; Neumann and Hildebrand, 2009), archaeological (Neer, 1990; Mbida *et al.*, 2001; Eggert, 2005; Eggert *et al.*, 2006; Fuller *et al.*, 2011), historical/linguistic (Diamond and Bellwood, 2003; Vansina, 2003; Blench, 2009) and archaeobotanical (Vrydaghs *et al.*, 2003; Neumann and Hildebrand, 2009) grounds.

Identifying the exact appearance of domesticated bananas in archaeological contexts is challenging (Vrydaghs *et al.*, 2003; Ball *et al.*, 2006; De Langhe, 2009; De Langhe *et al.*, 2009; Donohue and Denham, 2009; Lentfer, 2009; Perrier, *et al.*, 2009, 2011). The latter work suggested that banana seed and leaf phytoliths preserved in well-dated long archaeological sequences are the best proxies for understanding the domestication process. Here, we address this issue by reporting the results of phytolith analysis from the deposits at Fahien Rock Shelter, Sri Lanka, which contains a sequence of cultural deposits from rainforest hunter-gatherers dating from 44 952–47 854 to 3845–3985 cal a BP.

Environment of the Fahien Rock Shelter

Fahien Rock Shelter (80°12′55″ E, 6°38′55″N and 130 m above mean sea level) is situated in gneiss cliffs at Yatagampitiya Village, near Bulathsinhala in the Kalutara District of south-west Sri Lanka (Fig. 1). It is one of a complex of rock shelters (Cooray, 1984). Its mouth has a width of 30 m and an average height of 20 m. The interior is about 10 m deep and the floor slopes downward into the rock shelter. The regional climate is humid-tropical. Mean annual temperature is 27–29 °C and rainfall is 5016 mm, mostly from the South West Monsoon (SWM). This record is from the meteorological station in Sinharaja, in lowland rainforests, located 10 km from Fahien Rock Shelter (Zoysa and Raheem, 1987; Gunatillake *et al.*, 2004). The surrounding landscape is today characterized by disturbed lowland rainforest. Paddy fields occur in the slightly incised valley system below the rock shelter.

*Correspondence: R. Premathilake, as above.
premathilake@hotmail.com