ANCIENT DNA FROM SORGHUM

The Evidence from Qasr Ibrim, Egyptian Nubia

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ABSTRACT

This paper describes the successful extraction and sequencing of DNA from two loci in archaeological sorghum recovered from Qasr Ibrim in Egypt. The DNA from all the ancient races was identical, and showed no differences from modern sorghum. The longer sorghum has been in cultivation, the more diversity there should be in its DNA. The lack of any diversity, therefore, supports a recent domestication event in north-east Africa, in contrast to some claims suggesting much greater antiquity. The archaeological record is examined, and it is concluded that there is at present no unequivocal proof that sorghum cultivation must be earlier than the 1st millennium BC.

Keywords: ancient DNA, sorghum, domestication, Qasr Ibrim, Egypt.

1. INTRODUCTION

The purpose of this contribution is twofold. Firstly, we will present the results of a study of ancient DNA from the sorghum from Qasr Ibrim, Egyptian Nubia. Secondly, we will discuss the implications of these results for the origin and history of domesticated sorghum. Ancient DNA has the potential to become a major source of information for the archaeologist, by helping to resolve questions about the phylogenetic relationships between plant and animal taxa found in the archaeological record; but it is important to stress that ancient DNA does not present a "magic solution" to archaeological problems, but is only one (albeit very useful) line of evidence to be considered in the framing of hypotheses.
2. QASR IBRIM AND ITS SORGHUM

Qasr Ibrim lies on the east bank of the Nile (now Lake Nasser), some 40 km north-east of Abu Simbel. The site is in one of the lowest rainfall areas in the world, and organic remains are spectacularly well preserved. A wide variety is routinely found, including basketry, leather, manuscripts, hair, dung, textiles and wood. Remains of agricultural plants are preserved in remarkable profusion; the agricultural history of the site has been presented elsewhere (Rowley-Conwy, 1989).

The site was occupied from c. 1000 cal BC until final abandonment historically recorded in AD 1811. Sorghum of various forms is found among the plant remains throughout this period. The taxonomy we employ is that put forward by Harlan and De Wet in several papers (e.g. Harlan and De Wet, 1972). All domesticated sorghums and their closest wild relatives are placed in the species *Sorghum bicolor*. Subspecies *arundinaceum* contains the four wild races most closely related to cultivated sorghum. Subspecies *bicolor* contains the five cultivated races bicolor (the most primitive), kafir, caudatum, guinea, and durra, as well as their intermediates.

It has proved fairly straightforward to place the sorghum finds from Qasr Ibrim into this scheme on morphological grounds. Four taxa have been distinguished: (1) morphologically wild sorghum, the only type found in the 1st millennium BC; (2) domesticated race *bicolor*, which appears around AD 100 on stratigraphic grounds (although radiometric determinations have not yet been carried out) and continues in cultivation until one or two centuries before abandonment; (3) a domesticated race intermediate between races *bicolor* and *durra*, which makes a brief appearance that has been radiocarbon dated to cal AD 420–640; and (4) domesticated race *durra*, which appears at or shortly before AD 1200, and becomes the only cultivated race by the abandonment of the site (Figure 1; for further details and illustrations see Rowley-Conwy, 1991; Rowley-Conwy, Deakin and Shaw, 1998).

3. DNA FROM THE QASR IBRIM SORGHUM

Placement of the Qasr Ibrim sorghums into the Harlan/De Wet morphological scheme as described above does not resolve the interrelationships between the various types, either at Qasr Ibrim or on a larger geographic scale. Thus for example we cannot on morphological grounds assume a development from *bicolor*, via the *durra/bicolor* intermediate, to...