Trade in the Ancient Sahara and Beyond

Edited by D. J. Mattingly, V. Leitch, C. N. Duckworth, A. Cuénod, M. Sterry and F. Cole

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Saharan trade has been much debated in modern times, but the main focus of interest remains the medieval and early modern periods, for which more abundant written sources survive. The pre-Islamic origins of Trans-Saharan trade have been hotly contested over the years, mainly due to a lack of evidence. Many of the key commodities of trade are largely invisible archaeologically, being either of high value like gold and ivory, or organic like slaves and textiles or consumable commodities like salt. However, new research on the Libyan people known as the Garamantes and on their trading partners in the Sudan and Mediterranean Africa requires us to revise our views substantially. In this volume, experts reassess the evidence for a range of goods, including beads, textiles, metalwork and glass, and use it to paint a much more dynamic picture, demonstrating that the pre-Islamic Sahara was a more connected region than previously thought.

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Preface

When I was working on my PhD thesis on the Roman province of Tripolitania (north-west Libya) in the early 1980s, I became intrigued by a desert people who inhabited Fazzan, the area of the Central Sahara to the south of Tripolitania. This was my first introduction to the Garamantes. They were regularly mentioned in the ancient Greek and Roman sources, though seldom in complimentary terms – for the most part being depicted as nomadic and uncouth barbarians.[1] However, some pioneering archaeological work in the 1930s and then again in the 1960–1970s had revealed their physical traces to be considerably more sophisticated than would be assumed on the basis of the literary stereotypes.[2]

This volume arises out of my subsequent direct engagement across twenty years now with the archaeology of Fazzan. In 1996, I was given the chance to renew field research in what were effectively the Garamantian heartlands. Following an initial scoping visit that year, I directed the Fazzan Project across six years, carrying out excavations and surveys around the capital of the Garamantes at Garama (Old Jarma), with an emphasis on tracing evidence for their settlements, but also mapping other archaeological features including cemeteries and irrigation systems.[3] A notable result of this work was the clear demonstration of the sophisticated and substantial network of oasis farming settlements that lay at the heart of the Garamantian territory. Rather than being 'nomadic barbarians', the Garamantes now appear to have been predominantly sedentary oasis farmers, living in substantial permanent and complex settlements of mudbrick buildings. That is not to say that the Garamantes did not also incorporate pastoral elements, as will be further discussed in Chapter 1, but simply to highlight the unexpected density and sophistication of sedentary oasis settlements. There is strong evidence to

[1] See in particular, Mattingly 2003, 79–81; 2011, 34–37 on the concept of 'progressive barbarisation' imposed by ancient authors as a factor of distance from the Mediterranean.

[2] Ayoub 1967; Daniels 1968; 1970; 1971; 1989; Pace *et al.* 1951.

[3] There were five seasons of fieldwork (1997–2001) and a finds study season (2002). The results are now fully published as Mattingly 2003; 2007; 2010; 2013a. Funding for the Fazzan Project came primarily from the Society for Libyan Studies, the Leverhulme Trust, the British Academy and the Arts and Humanities Research Council.

identify the top level of their settlement hierarchy as 'urban' in character and their overall society as an early Saharan state.[4]

My work on the Garamantes has subsequently evolved through a series of further projects. In 2007–2011 I directed the Desert Migrations Project, which had a particular focus on Garamantian burials and funerary traditions.[5] The increasing availability of high-resolution satellite imagery opened a new avenue of research in 2011, the Peopling the Desert project, which extended research on the Garamantes to another of the major oasis bands in Fazzan, the Murzuq depression.[6] The Trans-SAHARA Project (2011–2017) marked a further evolution of this body of work, as it sought to place the Garamantes in their Saharan context and to address the wider implications of the results obtained in the earlier work.[7]

The work of the Trans-SAHARA project was organised around a series of four workgroups, each one supported by early-career, post-doctoral research associates, and each dealing with a discrete group of themes: trade; migration, burial practice and identity; mobile technologies; urbanisation and state formation. As a key element of the work programme, a workshop was held at Leicester for each of the workgroups, to which international scholars working on neighbouring areas of the Trans-Saharan zone were invited. From the outset, these workshops were conceived as offering a chance to engage a group of leading experts in the field in a high-level debate about the implications of the new information on the Garamantes for studies of the wider Trans-Saharan world. Papers were commissioned for an intended series of agenda-setting volumes on Trans-Saharan archaeology and pre-circulated so that the workshop sessions focused entirely on discussion of their content.

This volume, the first in a projected series of four with the Society for Libyan Studies and Cambridge University Press, thus presents some of the key work of the Trans-SAHARA team and an international pool of collaborators on the theme of trade. The recent systematic work on the Garamantes has amplified the earlier hints of significant levels of imports of goods from the Mediterranean to the Jarma area during the Roman period.[8] Several contributions to this volume describe and analyse some of

[4] Mattingly 2013a, 530–34; Mattingly and Sterry 2013.

[5] Five planned seasons of fieldwork were completed by 2011, but the scheduled study season could not take place in 2012 because of the Libyan civil war. Interim reports have been published in *Libyan Studies* in 2007–2011, Mattingly *et al.* 2007; 2008; 2009; 2010a/b; 2011a. Funding for the Desert Migrations Project came primarily from the Society for Libyan Studies.

[6] Sterry and Mattingly 2011; 2013; Sterry *et al.* 2012. The Peopling the Desert Project was funded by the Leverhulme Trust.

[7] The Trans-SAHARA project was funded by the European Research Council (grant no. 269418).

[8] Fontana 2001; Mattingly 2010, 313–38, 523–30; 2013a/b.

the main evidence for the trading connections of the Garamantes, while others present complementary studies on neighbouring regions and later time periods.

As we are asking our readers to often step outside their core areas of knowledge and expertise to engage with material from other parts of the Trans-Saharan zone, place names and their mapping have exercised us all. Systems of transliteration and spelling of place names across the Trans-Saharan region vary enormously and the same site can be presented in several distinct ways. We have tried to impose a measure of consistency in the transliteration of names, following the practice I adopted for the *Archaeology of Fazzan* series. However, for ease of recognition some exceptions have been allowed for sites whose canonical spelling is so well established in the literature. We trust that the maps provided will prove helpful with the identification of places named in the text, but hope that readers will share our sense of being on a journey of discovery as they read the following contributions.

David Mattingly

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1 The Garamantes and the Origins of Saharan Trade
State of the Field and Future Agendas

DAVID MATTINGLY

Introduction

The origins and early development of trade in the Sahara merit reappraisal today as a result of ground-breaking research in different parts of what I define as the Trans-Saharan zone.[1] There has of course been a long-running debate about the possibility of pre-Islamic trade in the Sahara,[2] but the hard evidence has been lacking and by the late twentieth century researchers had become increasingly dubious.[3] Mounting a challenge to the consensus view that there was little Trans-Saharan contact in pre-Islamic times and that the Sahara was primarily a barrier to movement at this time is difficult when the evidence is so obviously lacunous and there has been so little research focused on pre-Islamic sites. However, in the last decades work focused on one ancient Saharan people has raised questions about the wider world with which they interacted.

The Garamantes of the Libyan Sahara are by some way archaeologically the best-known indigenous people of the ancient Sahara as a result of a long programme of investigation in and around their capital at Garama (modern Jarma in the Wadi al-Ajal valley in Fazzan, south-west Libya).[4] The new evidence gathered contrasts markedly with the ancient literary tradition, which depicts them with the essential tropes of nomadic barbarians.[5] As a result of the archaeological investigation we can now demonstrate that from the early first millennium BC the Garamantes had a significant focus on sedentary oasis cultivation, with numerous permanent villages created along a series of three parallel linear depressions that define the landscape

[1] On what I mean by the Trans-Saharan zone, see below. Some of the ideas in this introductory chapter build on an earlier unpublished synthesis paper delivered in 2009 at the Oxford Roman Economy Project conference, but the material has been significantly expanded and amplified as part of the Trans-SAHARA project research and as a result of the enlightening discussion at the workshop held in April 2014.

[2] Bovill 1968; Law 1967; Salama 1981. [3] Austen 2010; Swanson 1975.

[4] Ayoub 1967; Daniels 1968; 1970; 1971; 1989; Mattingly 2003; 2007; 2010; 2013a; Pace *et al.* 1951.

[5] Daniels 1970, 12–17; Desanges 1962, 93–96; Mattingly 2003, 79–81.

of Fazzan. Their agriculture and other technological achievements, as well as their material culture, mark them out as an advanced society. During the late 1990s and early 2000s, the Italian Mission to the Akakus and Wadi Tanzzuft also carried out detailed studies of settlements, cemeteries and rock art contemporary with the Garamantes in that area (*c.*400 km south-west of Jarma). They too discovered evidence of early development of oasis farming and settlements, though with fewer signs that the sites were fully engaged with trading networks.[6] This area seems to have been under Garamantian control of some sort, but the contrasts in the material culture suggest that its occupants may in fact have seen themselves as distinct from the Garamantes.[7] What this suggests is that the Garamantes were not alone as a Saharan society that engaged with oasis agriculture and some commerce.

The results of all these projects have demonstrated the considerable quantity and variety of goods circulating in the Sahara, from the Proto-Urban Garamantian period (500–1 BC) through the Classic Garamantian period (AD 1–400) and beyond.[8] In addition to many imports into the Garamantian heartlands of material that was made in the Mediterranean zone, there is some material that must have been sourced either elsewhere in the Sahara or in the Sub-Saharan zone. Setting aside for the moment questions of scale, what these discoveries have indicated is that the Trans-Saharan zone was more connected than has been previously realised or widely admitted (see below). This work has thus led to a revival of interest in the debate about the possibility of pre-Islamic Saharan and Trans-Saharan trade.[9] A number of recent studies have been devoted explicitly to the Garamantian trade.[10] While some scholars still hold onto the idea of the Sahara as an impermeable barrier to movement prior to the (supposed) increased use of the camel in Islamic times,[11] studies of traditional Saharan route-ways have highlighted the significance from early historic times of inland routes in the desert.[12]

A word of explanation is necessary about what I mean by 'Trans-Sahara' in this volume (Figure 1.1). When I speak of the Trans-Saharan zone, this relates to the hypothetical reach of contacts and networks encompassing all

[6] Liverani 2006; Mori 2013. [7] Mattingly 2013c.
[8] See Mattingly 2003; 2007; 2010; 2013a; Mattingly *et al.* 2007; 2008; 2009; 2010a/b; 2011b.
[9] Dowler and Galvin 2011; Guédon 2012; Mitchell 2005.
[10] Gatto and Mori 2012; Liverani 2000a; 2006; Mattingly 2002; 2011b; 2013b; forthcoming; Schörle 2012; Wilson 2012.
[11] Desanges (1999) seems to retreat somewhat from views expressed earlier (Desanges 1978; 1980); Ennabli 2004, 23: 'Contrairement à la mer qui a été vaincue par la navigation, le sahara qui sépare l'Afrique du nord de la partie sud a été un obstacle infranchisable.'
[12] Förster and Riemer 2013; Guédon 2010; 2012; Rebuffat 2004; Thiry 1995.

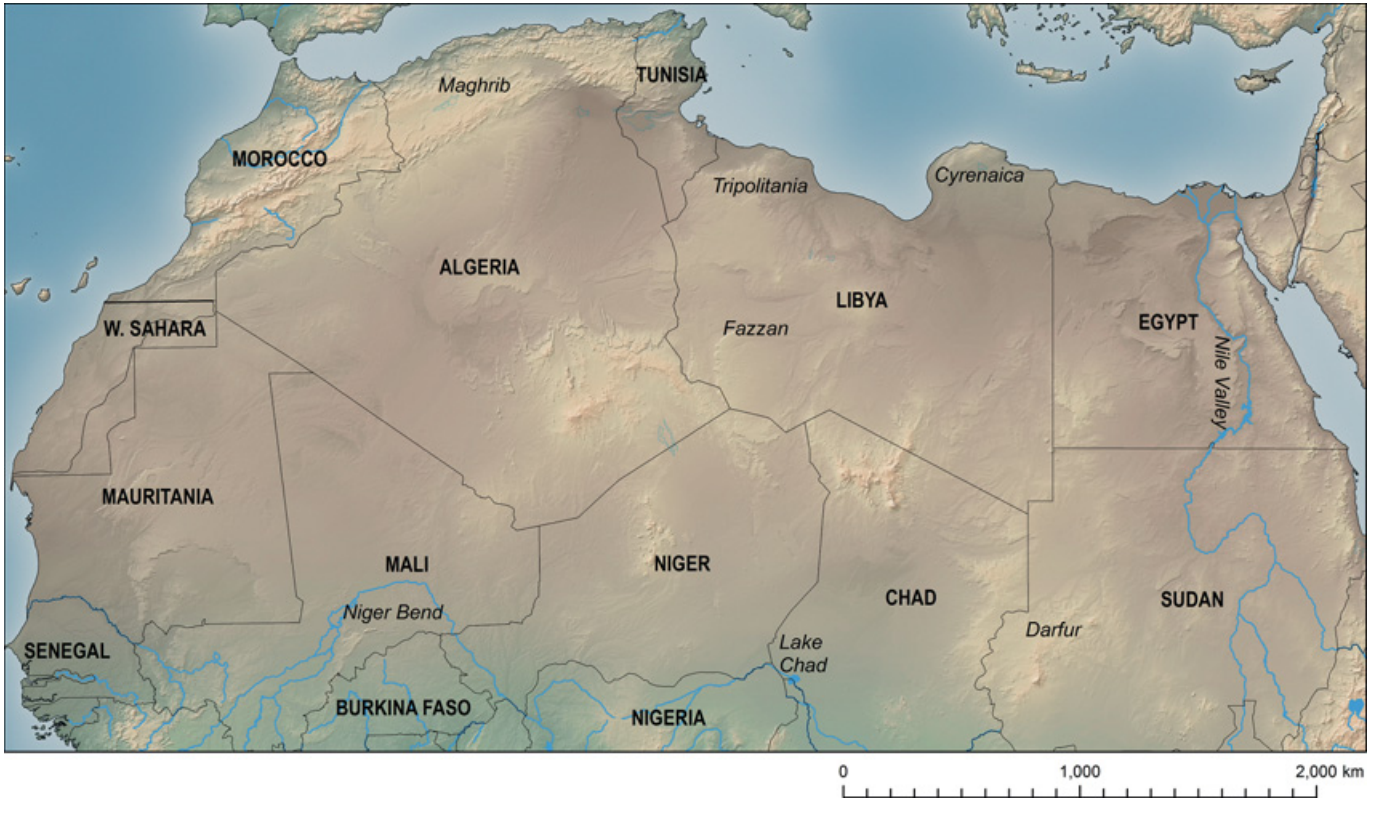

Figure 1.1 Map of the Trans-Saharan zone, showing names of modern countries and main regions.

parts of the Sahara, plus the Maghrib (broadly Morocco, Algeria and Tunisia), the Mediterranean parts of Libya (Tripolitania and Cyrenaica), the coastal region of Marmarica connecting Libya and Egypt, the Nile Valley down to Sudan and the Sub-Saharan regions and countries running from east to west (Darfur, Chad, Niger, Mali, Burkina Faso, Mauritania, Western Sahara, Senegal). More tenuously connected are further areas of the Horn of Africa, East Africa and the northern edge of the forest belt and the West African coastal countries. It is not my intention to imply that this vast zone was ever a coherent and fully networked unity – in the way it is possible to talk of the Mediterranean, say – but rather to present this as a geographical frame within which archaeologists and historians need to consider the potential for contact and trade to have taken place, linking peoples and cultures that were extremely distant from one another, albeit often via intermediaries.[13] That does not make these diverse peoples 'Trans-Saharans' in any meaningful sense, but I do feel that the real and latent connectivities of the Trans-Saharan zone in Antiquity should be an important starting point for future debate. Not all contributors to this volume share a common view of the idea of a Trans-Saharan zone; indeed, many of the chapters have a more regional focus. However, the key idea behind this volume was to bring together these regional specialists in a broader framework of debate, even if a consensus view on some issues remains elusive.

As will be readily apparent from what follows, tracking the movement of materials across the Trans-Saharan zone is extremely difficult, still more so demonstrating whether things travelled all the way intentionally, or more haphazardly as a sequence of smaller-scale trades and exchanges. At one level, most commerce in all periods has been 'Saharan' rather than 'Trans-Saharan',[14] but an essential issue in the current debate is to ask at what point in time the inter-regional contacts were sufficiently evolved to constitute a network that can be perceived as Trans-Saharan in overall reach and impact.

In the rest of this chapter I shall first present a more detailed introduction to the debate about Trans-Saharan trade and where the Garamantes fit into this picture. The final part will then preview in more detail the specific contributions of the chapters in each of the following sections of the book.

[13] On the Mediterranean, see Abulafia 2011; Broodbank 2013; Harris 2005; Horden and Purcell 2000.

[14] See Scheele, Chapter 2, this volume.

The Issue of Climate Change

At the outset, it is necessary to situate the discussion of the evolution of Saharan trade within the wider debate about climate change and the hyper-arid desert character of the Sahara. There is now broad scientific consensus that after alternating phases of aridity and higher rainfall during the prehistoric era, the last major climatic change occurred about 5,000 years ago.[15] From that point onwards the Sahara has been in a consistent hyper-arid phase, with scorching summer temperatures and minimal and unpredictable rainfall. Although there have been some minor fluctuations in rainfall since then, these must be understood to have been of greater effect in the mountain enclaves like the Tassili n'Ajjer than in the depressions, where subsequent oases have been based.[16] Some slight variability above a hyper-arid rainfall norm does not change the fundamental equations of sedentary life in a desert, though it may provide some additional (but localised and not easily predictable) grazing possibilities for pastoral groups. Oasis cultivation was not dependent on rainfall, but rather was tied to the availability of springs or a high-water table that could be mechanically exploited for irrigation. The nature of the desert conditions, broadly similar to today, is amply demonstrated by studies of vegetation patterns in Late Pastoral (Neolithic) and Garamantian or Roman periods. In the Late Pastoral era, the vegetation can be seen to reflect a change from a savannah to a more steppic landscape as rainfall diminished towards 3000 BC.[17] Both in the Central Sahara and in the northern pre-desert borderlands, the Garamantian era and Roman period–cultivated plants (a Mediterranean/Nilotic 'agricultural package') stand in sharp contrast to many of the weeds and wild plants, which were predominantly drought-resistant desert species.[18] There is some evidence that overall models of Saharan climate and environment disguise much local variation. We need to recognise the importance of certain environmental niches and the overriding significance of localised patterns of desertification.[19]

[15] See Barker *et al.* 1996, 291–302; Brooks *et al.* 2003, 37–74; Cremaschi 2001; Cremaschi and di Lernia 1998; Mattingly 2003, 327–46 for detailed discussions of climate change in the Sahara and fuller references.

[16] Cremaschi *et al.* 2006, for a dendrochronological study of doors from Ghat using wood sourced in the Tassili that seems to indicate a higher level of rainfall there.

[17] Mercuri 2008; cf also Mercuri *et al.* 1998, 107–24.

[18] For Fazzan, see Pelling 2013a, 478–86; Van der Veen and Westley 2010, 491–519; for the pre-desert region, see Van der Veen in Barker *et al.* 1996, 230–49.

[19] Barker and Gilbertson 2000; Cremaschi and Zerboni 2009; Kröpelin *et al.* 2008.

A separate, but highly significant, issue concerns the availability of groundwater for human communities. By and large the Saharan groundwater aquifers have been non-renewable since the end of the prehistoric pluvial phases. Lakes and springs have dried up over time, while wells have tended to get deeper and less regularly spaced along Saharan trails.[20] The story of the Sahara in the last 5,000 years has been generally one of people adapting to the challenges of exploiting a diminishing and increasingly elusive groundwater supply.[21] There has thus been a very close relation between the development of oases and trade. As will be explained in the next section, this has important implications for our understanding of the network of Saharan routes.

Along Desert Trails: A Saharan Network

The study of Saharan route-ways is more than a question of topography and hydrology. The Saharan climate and environment are implacable and unforgiving of novices or poorly prepared travellers. Navigating, without the benefit of GPS or even a good compass, in a landscape that is for long stretches almost featureless is challenging and literally a matter of life or death, since survival depends on the ability to relocate the few water points in the wastes. The trails are not well-developed 'roads' and in sand tracks are often covered over. Following routes and recognising landmarks are thus acts of memory and imagination, as much as intuitive progression along a natural corridor.[22] The mental maps of experienced desert guides have mostly far exceeded the capacity of physical maps available.[23] Shortage of water points and lack of grazing opportunities along them impose a further significant burden on travellers to carry water and fodder. While the environmental conditions of travel highlight the navigational skills of pastoral groups as key, the need for stockpiles of food and fodder and of well-developed water sources along the routes also highlights the symbiotic role of sedentary oasis communities.

[20] See Brooks *et al.* 2003, 71–74; Drake *et al.* 2004.

[21] Cremaschi and Zerboni 2009, with fuller discussion and bibliography.

[22] The significance of memory of ill-defined trackways cannot be underestimated and underlies much Saharan culture, in the same way that MacFarlane 2012 has shown the social significance of the 'old ways' in his classic study of Britain and beyond.

[23] I could cite numerous incidents from my own travels in the Sahara, where the navigational skills of Tuareg drivers lacking any technical aids have proved far superior at finding a lost route in extreme conditions.

The fully evolved network of Saharan trails was extremely complex and extensive. Different routes were of pre-eminent importance in various eras, making overall generalisations about the shape of this network difficult and potentially contentious. All the connecting lines on maps in this volume are to a greater or lesser extent hypothetical representations of a complex and changing pattern of desert trails. However, ancient Saharan trails were ultimately reliant on the existence of regular watering and feeding points along them, so unsurprisingly the underlying infrastructure comprised wells and oases that were developed wherever water was accessible. As will be argued at various points in this volume, there are good reasons to suppose an initial spread of oasis cultivation from east to west within the Sahara, though outside the Western Egyptian Desert and the Central Saharan heartlands of the Garamantes there are few data at present to chart the chronology of this process.[24] The question is of high importance since it involved far more than the opening up of trade along desert routes; movement in this environment was dependent on an adequate supply of pack animals (donkeys, horses/mules and camels) and supply depended on the spread of irrigation technology and an agricultural package to the incipient oases. While the location of the main Saharan centres changed over time, in many of these oasis clusters we can also trace a succession of pre-eminent sites. The eclipse of a prominent site did not necessarily herald the decline of the entire oasis and its network of contacts.[25] The principal oasis clusters of the Sahara, once established, have tended to have long-lived roles in Saharan trade. Likewise the locations of the main wells between oases have determined the favoured lines of travel between Sahara, Sahel, Mediterranean and Nile.[26]

Water was key to the establishment and maintenance of trails. Early colonial maps of the Sahara were often annotated with information about the depth at which water could be found and its quality. The hydrology of the Sahara is extremely complex, but a recurrent feature is for water to be found along particular division lines between major landforms, such as sand seas and mountains (the Wadi al-Ajal is a classic example of a linear depression sandwiched between sand sea and a steep escarpment; similarly the Tuwat oases run down the eastern edge of the Erg Iguidi). Rather as in mining of metals, once the existence of the seam is recognised, this will tend to be recurrently followed over time. The line of some routes was also

[24] Liverani 2006, 445–56; Mattingly 2003, 346–42.

[25] As is very evident in the story of Fazzan, after the decline of Jarma, see Mattingly 2013a, 525–44.

[26] Some key works on the overall Saharan networks include, Austen 2010; Bovill 1968; Devisse 1988; Förster and Riemer 2013; Lydon 2009, 49–99; Salama 1981; Thiry 1995; Wilson 2012.

dictated by the existence of natural resources that were quarried to provide key items for exchange, such as salt (as at Taghaza, Tawdenni and Bilma).

The desert terrain of the Sahara is highly varied, but some of its landforms are particularly challenging for traversing, notably the great sand seas and mountain ranges (Figure 1.2). Some routes have accordingly been channelled not only by water availability, but by the key mountain crossings (as in the Moroccan Atlas), or by the existence of corridors of good going in regions of difficult terrain (sand seas or boulder strewn plateaux). The harshest terrain, like the sand seas and the mountain massifs, was more commonly skirted than crossed. For good reasons then, routes have not always followed the most direct line. The size and composition of a caravan (camels or equids) could be significantly affected by the extent of waterless stages or shortage of grazing resources on particular routes. The existence within the Sahara of areas of cultivation or episodically higher vegetation levels has been another vital area of knowledge for those seeking to make long-range journeys across the desert spaces (Figure 1.3).

It is thus hazardous and inexact to depict Saharan trails on maps as though they were established as major highways. The historical geography of Saharan trails is in fact very complicated, with numerous variants on routes followed (contemporaneously as well as over time), depending on the shifting geopolitical realities as well as the natural limitations of travel across a hyper-arid zone. The map produced here (Figure 1.4) must thus be viewed as a palimpsest and an approximation, designed to locate the principal routes and sites discussed in this chapter. A great deal of local complexity has been removed for reasons of simplicity, but, as will emerge from the chapters in this book, the underlying network can be viewed as representing the latent potentiality of Sarahan connectness.

The archaeological evidence for the formation of oases within the Sahara has been neglected in past discussions.[27] Arguably the oldest Saharan oasis routes were those that linked Egypt with Nubia, Egypt with the Western Desert Oases and Nubia with Darfur (especially the so-called '40-day route').[28] The extension of the route leading west from Siwa, via al-Jaghbub, Awjila, to Fazzan, the Wadi Tanzzuft and plausibly onwards to the Niger far to the south-west appears to date to the late second/early first millennium BC.[29] A more southerly east to west route, starting at Dakhla or Kharga in the Western Desert, ran towards Kufra and then on towards Tibesti and Fazzan. Although this route appears to have been always

[27] This will be reviewed in much fuller detail in a later volume in this series.
[28] Förster and Riemer 2013. [29] Liverani 2006, 448–50.

Figure 1.2 Map of the major landforms (massifs and sand seas) in the Sahara.

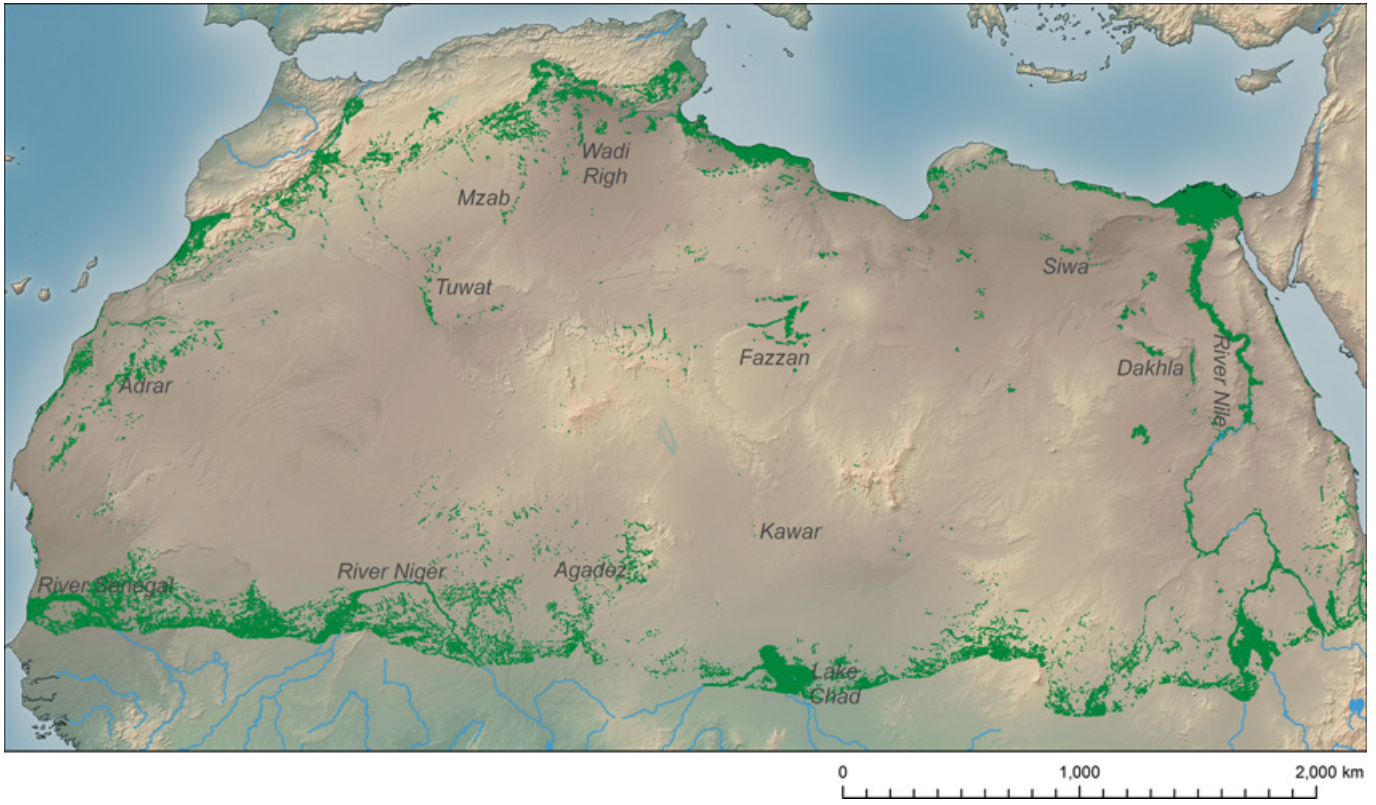

Figure 1.3 Map of the principal oasis groups and areas of modern vegetation (as identified from a MODIS NDVI) in hyper-arid and arid areas of the Sahara.

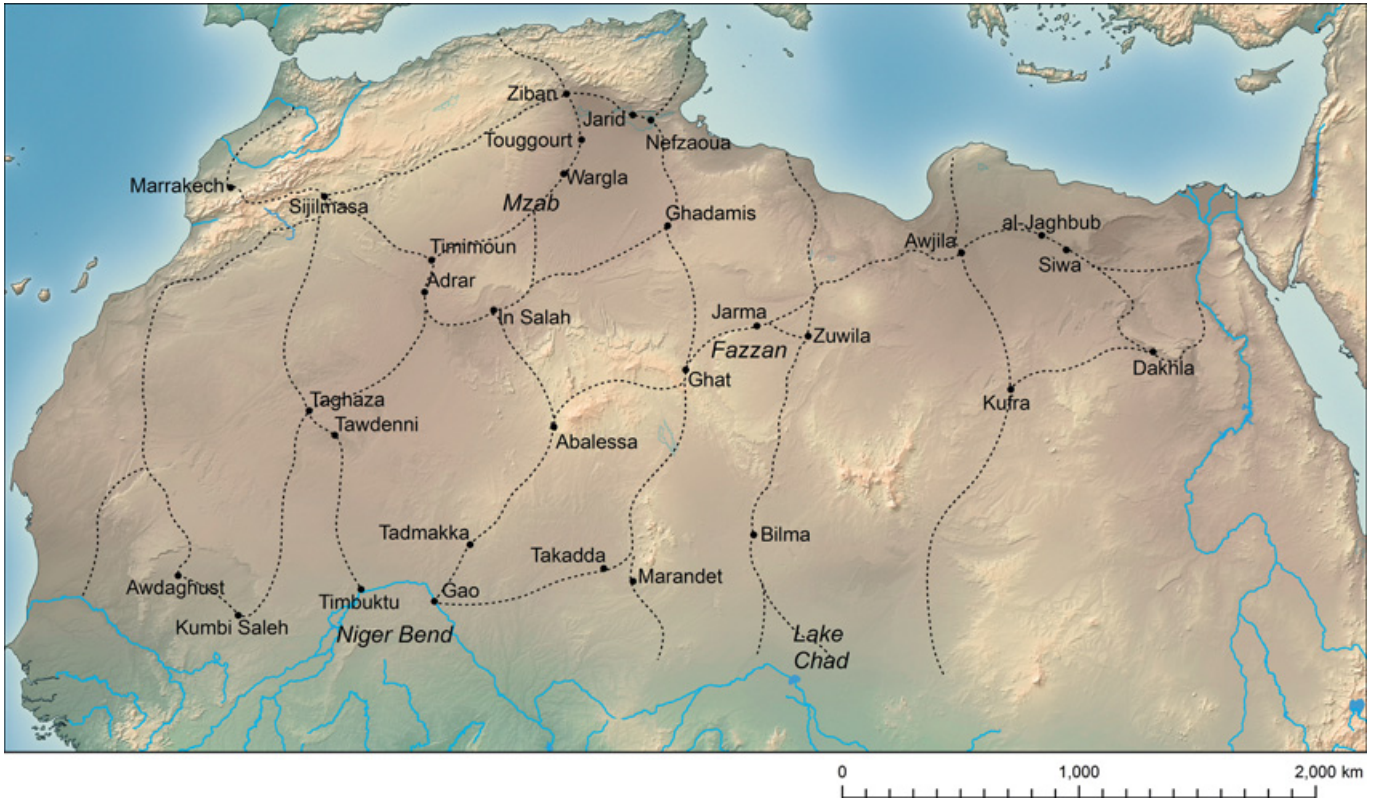

Figure 1.4 Diachronic map of the principal Saharan trails and some key oases.

difficult and less frequented than the northern one, political instabilities elsewhere on the Saharan network have at certain times favoured this route as an alternative means of access into Eastern Fazzan and Ennedi. During the Garamantian era, north–south routes seem to also have been initiated connecting Fazzan to the Mediterranean and possibly with several Sub-Saharan regions (Kawar/Bilma and the Chad basin, Agadez and northern Nigeria, Ahaggar and the Niger Bend area). The Kawar and Bilma oases have historically been of particular importance because of the extraction of salt (a key commodity of trade in Sub-Saharan lands). Ghadamis in western Libya is another oasis with a known early foundation and connections to the south-east with Fazzan and with the Nefzaoua group to the north by the Chott Jarid. The Nefzaoua oases have also produced evidence of pre-Islamic origins. From Ghadamis there are difficult connections through the Great Eastern Erg towards the Mzab and three principal routes to the south and south-west. Two of these were variations on the southerly route that again crossed sand sea down to Ghat, where it split into a Kano branch (going via the Aïr massif, the oases of Takaddâ (Azelik) and Agadez) and a Niger branch (that reached Gao and Timbuktu via Tadmakka (Essouk)). A more direct route also ran south-west of Ghadamis to Timbuktu via the Tidikelt oases and Tadmakka on the south-western edge of the Adrar des Iforas.

Further west, the foundation dates of the main oasis clusters are unknown or commonly assumed to belong in the Islamic era, though there is some compelling evidence to suggest earlier origins in many cases. The main oases and the routes to which they relate can be quickly summarised.

Along the Roman frontier in southern Tunisia and Algeria, there are a number of oasis groups where significant Roman activity is attested: Nefzaoua, Jarid, Nemencha, Ziban, Suf. These may well have been linked by an east–west desert route running parallel to the frontier, but it is also possible that already at this date further routes extended south to link these with the oases of Touggourt and Wargla (Mzab) and further out Gourara, Tuwat and In Salah.

In the Western Sahara, several main routes are emphasised, two connecting the great salt mining district of Taghaza and Tawdenni with the Timbuktu area and with the Awdaghust/Kumbi Saleh area respectively. A third route ran north from the latter area direct to the Moroccan Atlas and a sequence of reception centres (Sijilmasa, Fez and Marrakech, etc.), while a fourth route ran south-east from Sijilmasa via the Tuwat oases to Tadmakka. There were also further routes that followed a line closer to the Atlantic coast north from Awdaghust. Because of the relative paucity of archaeological investigation at many oasis groups it is highly probable that much greater complexity remains to be uncovered.

The Garamantes and the Debate about Pre-Islamic Origins of Saharan Trade

The idea of pre-Islamic Trans-Saharan trade has had both advocates and doubters, as well as those taking a more intermediate position by recognising some contacts, while questioning the regularity and scale of pre-Islamic commerce.[30] This is one of those scholarly debates that has tended to be based on relatively little hard evidence, some comparative analogy and plenty of strong opinions. One of the main obstacles to advancing discussion is that it has tended to be very much determined by the presence or absence of recognisable Mediterranean artefacts in the Sahara and in Sub-Saharan zones.[31] As we shall see there are good reasons to suspect that such identifiable Roman material tells only part of the story. However, the presence of substantial amounts of Roman imports in Fazzan has inevitably placed the Garamantes at the heart of the debate about the possibility of pre-Islamic Saharan trade.[32]

The Garamantes are no longer the mythical people or the mystery they have so often been portrayed as, both in Greco-Roman sources and modern accounts.[33] Nor can they be any longer ignored, as has also often been the case in general works on African history and archaeology.[34] Following on the remarkable pioneering work of Charles Daniels in the 1960s and 1970s, my work in the 1990s and 2000s has demonstrated that the Garamantes constituted a significant early state and a true civilisation.[35] They practised intensive irrigation and created oases on a scale not equalled again in Fazzan until the mid-twentieth century.[36] The agricultural economy was founded on a package of crops, most probably introduced from the direction of the Nile, via a chain of oases (Bahariya, Siwa, Awjila, Zala, al-Jufra, Fazzan): the date palm, bread wheat, barley, the grape vine, the fig.[37] The scale of oasis cultivation reached impressive heights due to the adoption of irrigation technology – the foggaras – and the organisation of large-scale labour to

[30] See for example, Advocates: Mauny 1956; 1978; Wheeler 1954; Doubters: Austen 2010; Brett 2006; Swanson 1975; Intermediate positions: Bovill 1968; Law 1967.

[31] Mauny 1956; 1978; Salama 1981. See now, MacDonald 2011; Magnavita, Chapter 14, this volume.

[32] Ayoub 1967; Daniels 1970; Pace *et al.* 1951.

[33] Mattingly 2003, 76–90.

[34] See inter alia, Connah 2001; Phillipson 2005; Stahl 2005. For a rare exception, see Mitchell 2005, 140–46.

[35] Daniels 1970; 1989; Mattingly 2003; 2007; 2010.

[36] Wilson and Mattingly 2003; Mattingly and Wilson 2004.

[37] Pelling 2005; 2008; 2013a/b; van der Veen 1992; van der Veen and Westley 2010.

construct and maintain them.[38] By the early centuries AD, a number of Sub-Saharan crops had been added to the package, with sorghum and pearl millet opening the way for double cropping of irrigated plots and at a stroke increasing the productivity of Garamantian farming. Cotton was another addition to the range of crops; the cultivation of this water-intensive commodity was also made possible by increased food production from the remaining gardens, following the introduction of Sub-Saharan summer crops like sorghum and pearl millet.[39] Their main settlements were nucleated centres of considerable size and complexity – at the upper end of the site hierarchy are a number of towns, but the vast majority of the population lived in a dense network of permanently occupied villages and hamlets, in rectilinear, complex and multi-roomed houses.[40]

The geographical location of the Garamantes explains their importance to the initial evolution and subsequent growth of Trans-Saharan trade (Figure 1.4). Their heartlands encompass the largest and densest clusters of Saharan oases, lying astride a crucial junction of communication lines. The shortest overland journey from the Mediterranean to Sub-Saharan Africa passes through their territory.[41] They were also at a key location on the Herodotean north-east to south-west line linking the Nile and Niger.[42] Mario Liverani's acute reanalysis of the account of Herodotus has highlighted this line as being significant in the early evolution of Saharan oases and trade.[43]

I support the logic of Liverani's argument for the early date and direction of trade for several reasons. First is the fact that the development of the oasis communities demanded regular communication between them. One of the great puzzles of Saharan oases is that they do not make economic sense if solely dependent on irrigated agriculture. The high start-up costs of irrigated farming, coupled with recurrent high labour inputs, casts doubt on the ability of most oases to be self-sufficient without some other raison d'être.[44] Trade provided that missing ingredient, probably from a very early stage in their development. It is striking that the repeated figure of ten days' journey between the spring mounds referred to by Herodotus[45] correlates with the most common journey stage length of Islamic accounts. The significance of the ten-day figure is that it constitutes the maximum travel time between major water points for a caravan carrying goods and

[38] On the underground irrigation channels known as foggaras, see Wilson and Mattingly 2003.
[39] Pelling 2008. [40] Mattingly 2003, 155–68; Mattingly and Sterry 2013.
[41] Martin 1969; Rebuffat 2004. [42] Herodotus, *Histories*, 4.181–85; Liverani 2000a.
[43] Liverani 2000a/b; 2006, 445–56. [44] Scheele 2010, 284–88.
[45] Herodotus, *Histories*, 4.181–85.

the water for its sustenance.[46] Not all oases in fact developed as major trading centres, but the latent potential that agricultural production could be supplemented by income from trade may have been a strong stimulus for the initial investment in oasis development.

Secondly, we can observe the movement of 'things' – primarily plants, animal species, ideas, knowledge and technologies – along this line in the period from the late second to the early first millennium BC. In this period, the agricultural package (wheat, barley, vines, date palms) was imported (probably from oases in the Egyptian Western Desert), with Sub-Saharan crops (millet, sorghum, cotton) only introduced later, towards the end of the first millennium BC. Notable additions to the Central Saharan faunal record include horses, camels and chickens. A number of technologies (such as foggara irrigation, metallurgy, glass-making, weaving, chariots) also seem to have been adopted in the Central Sahara through contact with Egypt (or perhaps in some cases the Mediterranean).[47]

How might we envisage such contacts? Were they simply the result of trade and emulation, or connected with large-scale population migrations or small-scale pioneer groups reinforcing existing Saharan communities? There is a hint in Herodotus that the last option may be correct. He provides information on a small group of young men belonging to the Nasamones people (whose home oases lay south of Cyrenaica and the Gulf of Sirte) making a long journey south-west across the Sahara till they reached a substantial river, clearly in the Sub-Saharan zone and almost certainly to be equated with the River Niger.[48] The human skeletal evidence supports the idea that the Garamantes were a mixed population of Berber, Saharan and Sub-Saharan elements, which accords well with the idea that individuals from the north or east were absorbed into the Late Pastoral Saharan populations in the formative stages of the emergence of Garamantian civilisation.[49]

The third and crucial point is the recognition that the Garamantes developed into a Central Saharan state.[50] As noted already, the Garamantes were routinely denigrated in Greco-Roman sources, but the archaeological

[46] Longer stages between main water sources are attested, but they are rare and often of notorious and perilous reputation, Thiry 1995. In the mid nineteenth century, journeys from Ghadamis were computed in day stages, the journey to Tripoli was 9–12 days; to Ghat 18–20 days for a caravan; from Fazzan nine days, but with no houses and few resting places with water, Richardson 1848, I, 203, 207.

[47] For the spread of foggara technology, for example, see Wilson 2006.

[48] Herodotus, *Histories*, 2.32–33. [49] Mattingly 2003, 342–46; 2010, 375–408.

[50] Liverani 2006, 431–44; Mattingly 2006a; 2011b.

evidence amply contradicts this literary trope of the barbarian 'Other'.[51] This was a well-organised and hierarchical society, living in towns and villages of well-built complex mudbrick architecture, practising sophisticated irrigated agriculture on a scale not achieved again in the region until the late twentieth century (Figure 1.5).

Although a strong advocate for the existence of pre-Islamic trade, Liverani is cautious about its overall volume and economic significance.[52] However, his perception of these aspects of the trade is clouded by the fact that he has investigated minor settlements, such as Aghram Nadharif, at the extreme south-western periphery of Garamantian power. The relative material poverty of these settlements can be contrasted with sites closer to the heart of the Garamantian kingdom. It is also worth reflecting on the potential impact on societies on either side and within the Sahara from a regular flow of trade. Even the annual movement of a few hundred camel loads of goods in the Sahara at this date had the potential to be a transformative event for these societies.[53]

However, the evolution of Saharan trade should be seen as a dynamic process and we need to recognise that it was not unchanging across time. Part of the challenge for modern scholars seeking to elucidate potential pre-Islamic Trans-Saharan contacts is that our thinking is conditioned by the abundance of Islamic literary evidence and the later archaeological data. In a recent overview, Austen has concluded that for the moment the conventional picture of minimal pre-Islamic contact is sustainable:

> Historians of ancient North Africa are not entirely sure whether relations between its Mediterranean and Saharan regions extended beyond the desert to include trade with the Western and Central Sudan. On balance, available evidence suggests that no significant level of such commerce – or perhaps none at all – took place before the arrival of the Arab conquerors . . . The richest and most reliable evidence on the Garamantes comes from archaeological sources, they reveal that they carried on extensive trade with Egypt and the Mediterranean coast . . . However, the archaeology of the Sudanic areas of the desert where dense settlement took place before Islamic times, tells a different story. No one has discovered in the Lake Chad area, the Niger Delta, Dar Tichett, or the Senegal River valley enough Mediterranean artifacts dating before 900 CE to indicate their regular importation . . . The bottom

[51] Mattingly 2003, 79–81; 2011a, 34–37 on the concept of 'progressive barbarisation' imposed by ancient authors as a factor of distance from the Mediterranean.

[52] Liverani 2006, 445 ('a small affair'), 455 ('a rather minor affair compared to medieval or early modern trade . . . also . . . compared to the contemporary trade on the eastern periphery of the Roman empire, making use of identical technologies and trading habits'), 456 ('the poor scenario against which we must measure the importance of the modest Trans-Saharan trade').

[53] Mattingly 2013a, 505–44; Wilson 2012 for comments along these lines.

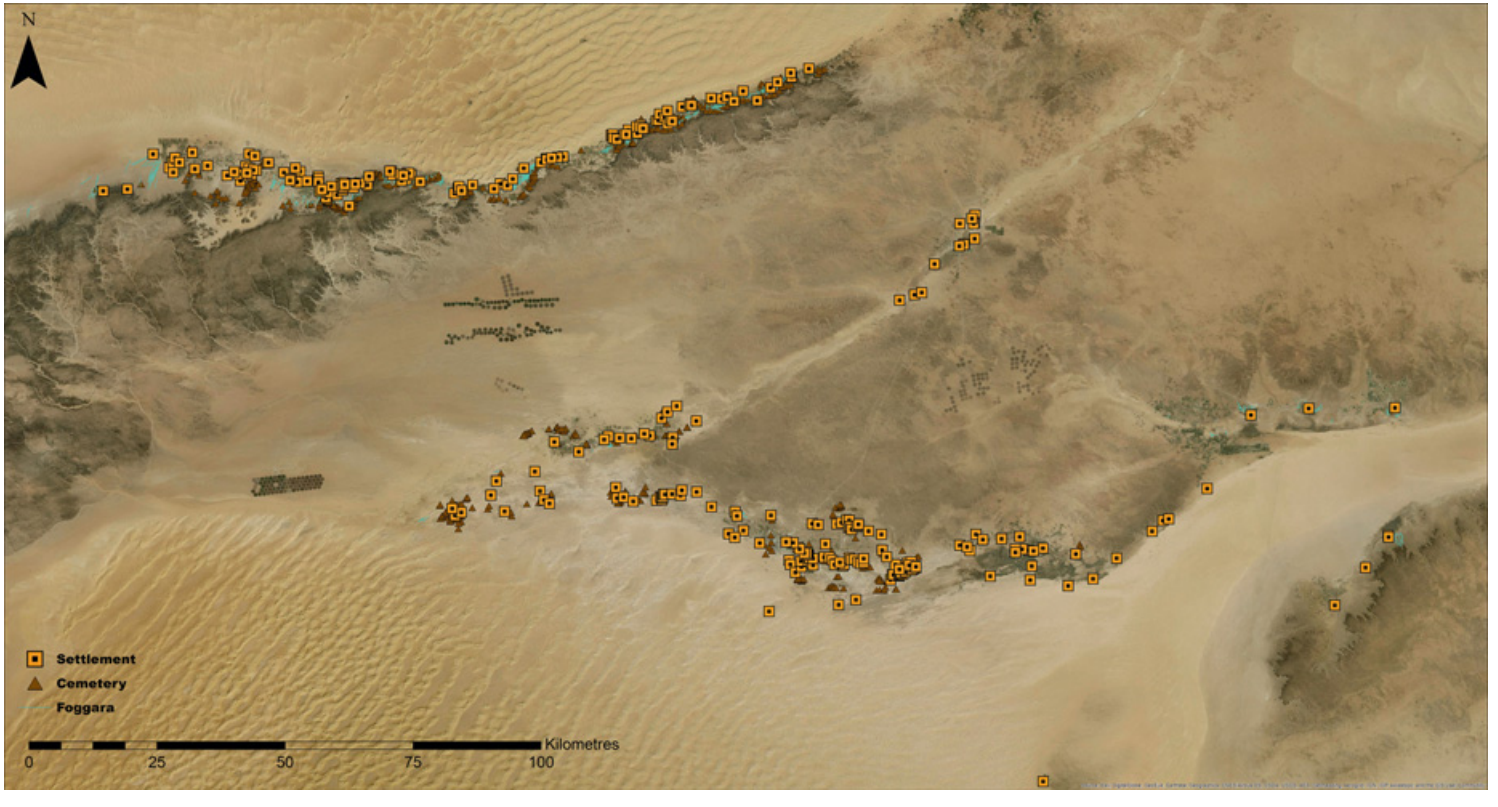

Figure 1.5 Garamantian oasis settlements in Fazzan. Image data © Esri.

line regarding the historical evidence is that before the Arab conquests of the seventh century CE, we have no clear indication of a caravan traffic linking the Sudanic and Mediterranean neighbors of the Sahara.[54]

But is this really evidence of absence, or is it a case of absence of evidence or ignorance of evidence? There are two flaws in the arguments advanced by Austen as I see it. First, his focus on the relative absence of Mediterranean material culture in the Sub-Saharan zone is not necessarily proof of a lack of trade, but at best indicative of an underdeveloped trade in these commodities or also due to deficiencies in archaeological research at pre-Islamic sites.[55] Nor does he consider the potential contribution of goods manufactured or sourced in the Central Sahara on the southern half of the early Trans-Saharan networks. It is in fact possible to offer an explanation for the relative absence of Mediterranean trade goods in the Sudanic zone, linked to a new model of the trading dynamics of pre-Islamic Saharan commerce, in which the Saharan Garamantian kingdom played a crucial role.

Roman Trade with the Sahara: Extent and Scale

Prior to working in the Garamantian heartlands I was sceptical about the scale and extent of Garamantian–Mediterranean trade and the degree to which this made a significant contribution to the economy of Tripolitania, the Roman coastal territory of the great cities of Lepcis Magna, Oea and Sabratha.[56] However, my direct engagement with the evidence in Fazzan has convinced me that this trade was quite substantial and potentially highly profitable on both sides. As we shall see, there is also growing evidence that the Garamantes traded with the Sub-Saharan zone, though few commodities from the Mediterranean were passed down the line by the Garamantes.[57] This relative absence of Mediterranean goods in Sub-Saharan Africa has contributed to the reluctance of Islamic specialists to

[54] Austen 2010, 11, 13, 14, 17. Cf. also Lydon 2009.

[55] Possible deficiencies include the relatively small number of well excavated (and fully published) sites close to the southern termini of the main Saharan trails, the lack of fine sieving at some of those sites, the lack of scientific analysis of materials recovered to determine provenance. There are also major gaps in archaeological research. On Mediterranean artefacts in the Sahara and Sub-Saharan zones, see MacDonald 2011; Magnavita 2013; Mauny 1978.

[56] Mattingly 1995, 155–57; cf. Daniels 1970, 42–44; di Vita 1982, 588–94; Law 1967. For the distribution of Roman coins and other artefacts in the Sahara and at its southern fringe, see Mauny 1956 and Salama 1981, esp. 514–15, for annotated maps and discussion of findspots.

[57] MacDonald 2011, 75–76.

recognise the earlier manifestation as Trans-Saharan trade. The lacuna certainly highlights a crucial difference in the pattern of trade that emerged in pre-Islamic and Islamic periods (though given the 1,300-year time-span covered by the latter and the documented passage of thousands of camel-loads of goods each year, even Islamic trade has perhaps left less material trace than might be expected in terms of inorganic goods). I would argue that the Garamantes were involved in separate bilateral trading arrangements with neighbouring states and peoples to the north and south, rather than being middlemen passing along goods originating at the northern and southern termini of the Trans-Saharan routes as Austen seems to assume. This leads on to further intriguing questions. If we accept there was pre-Islamic trade between the Garamantes and the Sudanic region, we need to investigate afresh what was being traded between those two zones.

Long-distance trade, and especially overland trade, has sometimes been projected in a negative light with regard to the Roman Empire and its economy. However, while many goods had a restricted market range at the regional level, being consumed within a day or two's journey from where they were grown or produced, we now have a substantial dossier of archaeological evidence for commodities that achieved interprovincial distributions.[58] This has effectively refuted Finley's archaeologically blinkered view that long-distance trade was only in luxuries.[59]

But what of trade outside the Empire? Mortimer Wheeler commented more than 50 years ago on the extraordinary occurrences of Roman finds in Scandinavia, India and the Sahara and speculated on what this might signify in terms of trade or Roman diplomatic ties outside the territorial Empire.[60] We are now in a better position to assess the implications of this evidence – perhaps most notably on the realities of the trade between Rome and India, via the Red Sea routes.[61] The value of trade between the Roman Empire and South Asia, for instance, has been emphasised by publication of the Muziris papyrus, providing details of a single shipload of goods arriving from the Red Sea route valued at more than HS 9 million (before

[58] Wilson 2009, 218–44 on evidence of maritime trade in a range of commodities; cf. Mattingly 2006b, 283–87, 295–97, for an overview.

[59] Cf. Finley 1985, 133, 'How then do we rank the exports? I cannot, for a start, attach any significance to agricultural products, not even olive oil and wine'.

[60] Wheeler 1954, building on Pace *et al.* 1951. Despite the modern colonial overtones of Wheeler's analysis, he plumped for trade as the most important explanation of the distribution of Roman material beyond the frontiers (p. 18). Cf Fontana 2001 for a modern re-evaluation of the 1930s Italian finds.

[61] De Romanis and Tchernia 1997; Sidebotham 2011; Tomber 2008.

the levying of Rome's 25 per cent tax on this cargo).[62] However, the external trade with Arabia and India has often been seen as exceptional and the evidence of the penetration of Roman goods beyond the imperial frontiers in central and western Europe or in Africa has often been downplayed or attributed to non-commercial mechanisms such as booty, gift exchange or political subsidy.[63]

The case study from Fazzan sheds light on the 'long reach' of the Roman economy and the extent to which trade developed opportunistically across the vast distances (geographical and social) of the Sahara desert.[64] The overland journey from the Mediterranean to Sub-Saharan Africa (in excess of 3,000 km) took a minimum of about three months in one direction in days before mechanised transport (Figure 1.4). However, because of the need to change teams of pack animals (camels, horses, donkeys), to make arrangements for protection while passing through 'lawless' desert lands and to rest and recuperate during the hottest periods of the year, the round trip from the Mediterranean to the Sub-Saharan zone and back often occupied a period of a year or two. Such lengthy travels provide the severest test of the commonly observed cost differentials between sea–river–land transportation of goods.[65] But can such long-range trade be demonstrated for the Roman period and if so on what scale was it carried out and did it extend beyond irregular transport of a restricted range of luxury items?

Andrew Wilson has argued that we might conceive Saharan trade as a network of independent sub-systems, linking the coastal territories with the pre-desert frontier zone, this zone with the Garamantes, and the Garamantes with their neighbours to south and south-west, ultimately reaching to the Niger Bend area and Lake Chad. He also notes the transformative effects of this trade on the Central Saharan societies.[66] I agree with much of this, though would nuance it in two respects. First, the economic dimension of the relationship between Rome and the Garamantes has to be seen as a long-term consequence of the fluctuating imperial contact situation. The economic activity here was in part at least a barometer of the imperial economy

[62] Rathbone 2003; Wilson 2009, 217 for discussion.

[63] On the Northern Barbaricum generally, see Jørgensen *et al.* 2003; Germany, Erdrich and Teegen 2002; Scandinavia, Grane 2007; Britain, Mattingly 2006c, 428–52.

[64] Mattingly 2002; 2003, 355–61; 2010, 523–30; 2013a, 511–17; 2013b; forthcoming for previous discussions of the evidence.

[65] See Mattingly 2006b, 285. However, see discussion of the potential importance of textiles in overland transport in the chapter by Guédon below.

[66] Wilson 2012. A similar argument is advanced by Scheele 2010, for more recent periods of the trade. Her argument is that Trans-Saharan trade proceeds by regional stages, with the eventual long-range transport of selected goods accomplished by numerous more local exchanges.

and the scale and intensity of activity mirrors to some extent the pattern evident in other frontier regions and beyond. The periods of strongest flows of Roman material goods beyond the frontiers to Ireland, Scandinavia, Free Germany and Saharan Africa reveal an intriguing synchronicity, with the third century AD seeming in each case to mark a low point in material exchange. Secondly, the emergence of a powerful polity in the Central Sahara was also critical to the nature and direction of Saharan trade in pre-Islamic times. While the main phases of trade may reflect the ups and downs of the Roman Empire to the north, many of the physical characteristics of pre-Islamic Saharan trade were determined by the Garamantes. This suggests something quite different from Islamic trade, which was more susceptible to manipulation and direction by the trading partners at the northern and (to a lesser extent) at the southern end of the trade routes. These powers succeeded for long periods in imposing their political authority on Fazzan. The Ottoman authorities and Qaramanli dynasty based in Tripoli dominated the trade in the Early Modern era, while for a period in the thirteenth to fourteenth centuries the Sub-Saharan kingdom of Kanim established its own control of Fazzan.[67]

With the notable exception of Fazzan, Roman material culture appears to be rare in the Sahara and in the Sub-Saharan zone. However, it is not absent and even individual finds are potentially revealing of elements of a network of connected communities. Mauny's work drew together the rare finds of Roman artefacts, the majority from Saharan oases that are commonly believed to have originated in later times. Even far south-west of the Garamantes there are the notable finds of Roman artefacts in the celebrated female burial at Tin Hinan at Abalessa in the Ahaggar mountains.[68] In the Sub-Saharan zone finds have been made recently at a range of sites from major centres on the Niger, such as Jenné-jeno and Tambouze 1 (close to Timbuktu) in Mali, or Bura Asinda-sikka (Niger), to smaller-scale trade centres, like Marandet, and minor sites close to gold sources like Kissi (Burkina Faso) and Garbey Kourou (Niger).[69] Moreover, recent work in Dogon country, and the Séno plain, deep inside the Niger Bend and far from the potential primary contact points for Saharan traders, has started to reveal previously unsuspected early imports from beyond the Sahara,

[67] Mattingly 2003, 90–106 for historical summary of post-Garamantian Sahara. See also el-Hesnawi 1990; Thiry 1995.

[68] Hachid 2006.

[69] See fuller discussion and primary references, Magnavita 2013; 2015 and Chapter 14, this volume; MacDonald 2011.

including glass beads.[70] What is most striking about the finds at sites such as Dourou Boro and Pégué in Dogon country is that the rare Mediterranean imports occur at a time of considerable societal cultural change in the local community (as revealed in the broader archaeological record), indicative of long-range contacts.[71] This sort of research initiative in West Africa, focused on re-evaluating the emergence of social complexity and exploring potential links with 'long-range global exchange networks', parallels almost exactly the interests of the Trans-SAHARA Project.[72]

Trade within the Sahara and with the Sub-Saharan Zone

If the full extent of Saharan trade and contact is difficult to trace in detail from Roman material evidence, are there proxy markers that can also be brought into play? More recently, an inscription in Latin letters has been recorded south-west of Tin Hinan at Tmissao.[73] The Greco-Roman sources certainly indicate that the Garamantes were effective travellers within the Sahara, with some attestations of long-range expeditions as far south as Agisymba, where rhinoceros gathered close to a lake (almost certainly Lake Chad in the context).[74]

Saharan rock art is notable for a rich repertoire of images of horses, warriors on horseback, horse-drawn chariots and camels. While camel imagery (some showing mounted warriors, but others the conjoined camel trains of caravans) is mostly assumed to be Islamic in date, it is not independently datable and some at least could be pre-Islamic if we accept other evidence of camels being used in pre-Islamic Saharan trade at face value.[75] Lhote's misguided vision of the chariot imagery mapping out Garamantian trading activity has been rightly ridiculed.[76] However, at a basic level horse and chariot engravings are indicative of enhanced Saharan mobility in the first millennium BC (Figure 1.6). This is potentially closely linked to the creation of a supporting network of oasis communities, something that is explicit in the occurrence of rock engravings in the Garamantian heartlands and in the Akakus, where there are also depictions of dates palms (oases), possible representations of Garamantian fortified sites, a Roman amphora alongside

[70] Mayor *et al.* 2014, 18, 31–35 (first millennium AD); Ozainne 2013, 145–46 (late first millennium BC).
[71] Mayor *et al.* 2014, 37–38. [72] Mayor *et al.* 2014, 18; cf also Magnavita *et al.* 2009.
[73] Euzennat and Camps 1997. [74] Ptolemy 1.8; Mattingly 2003, 85.
[75] Well summarised in Guédon 2010, 83–88.
[76] Lhote 1982; See various papers in Camps and Gast 1982, for the rebuttal.

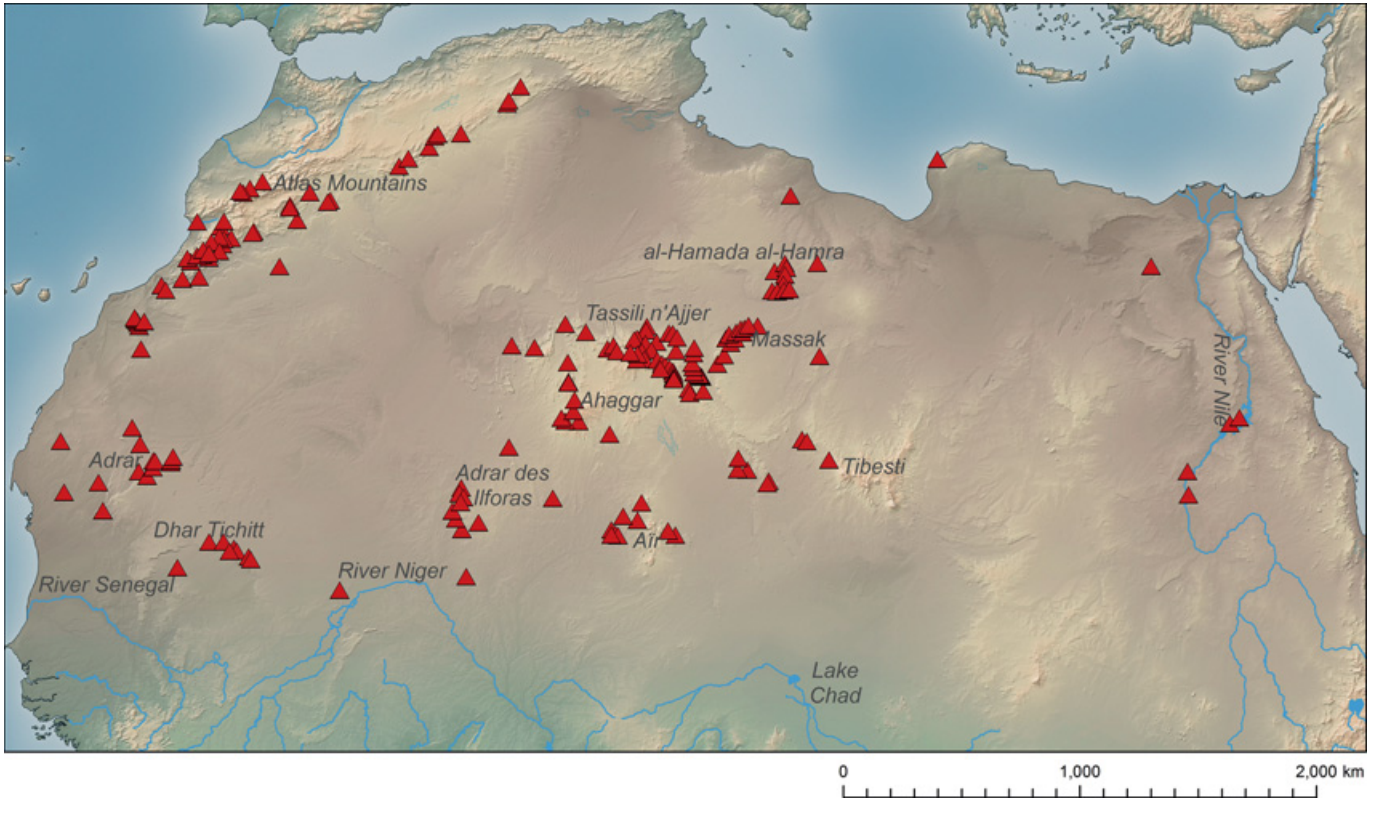

Figure 1.6 Map showing the distribution of chariot and horse rock art from the Sahara (after Gauthier and Gauthier 2011).

images of horses and horse-drawn chariots.[77] The cumulative weight of the evidence suggests that we should take the literary accounts seriously in this instance and recognise the inherent interconnectedness of much of the Sahara in the pre-Islamic era. That is not to say, of course, that it was all equally developed and that trade existed between every region. Part of the challenge of the next phase of research will be to tease out more detail of the evolution of routes and interconnections. However, what we can be more confident of now is that the raw elements needed to open up connectivity across the Sahara were becoming more widespread during the latter centuries of the first millennium BC: comprising oases and associated crops and irrigation technologies, horses and other equids (perhaps also camels) and new manufacturing technologies. The Garamantes were the most developed example of such a Saharan society, but there were other zones of the Sahara in which similar socio-economic changes were also underway (and where in due course the strong more westerly trade routes of the Islamic era would emerge).

Commodities of Trade: Organics and Inorganics

So what were the commodities of this trade? As so often in discussions of trade we must talk of 'visible' and 'invisible' components and acknowledge that some of the least visible commodities were probably among the most valuable. The picture probably also changed considerably over time and indeed the southern partners in trade may have shifted periodically between the Sub-Saharan zones around Lake Chad and the Niger Bend communities. For example, a strong case has been made by Garrard for the opening up of trade in West African gold, via the Garamantes, in Late Roman times.[78]

The early development of Trans-Saharan trade posited along the Niger–Nile route by Liverani is difficult to trace archaeologically in terms of trade goods, though it is possible to demonstrate technological transfer along this line. The arrival of a developed package of agricultural crops and irrigation technologies to sustain oases is one example; horses and camels and wheeled chariots another. In both cases we may envisage transfer down the chain of oases stretching from the Western Desert, via Siwa and Awjila to Fazzan. This seems to me to be a good set of proxies for an incipient trade in mainly organic and archaeologically invisible commodities.

[77] Di Lernia and Zampetti 2008, 90–94.

[78] Garrard 1982; Wilson 2007, 122–23. See further Nixon *et al.* 2011; Nixon, Chapter 6, this volume.

Punic and Roman period developments in this trade saw a progressive refocusing of the movement of goods onto a series of north–south aligned routes.[79] There is an increasing presence of Mediterranean wheel-made pottery in Fazzan in the latter centuries BC, mainly Punic-style bowls and amphorae, along with finds of glass and faience from early settlements such as Zinkekra and Tinda.[80] The early ceramic imports were not initially adopted as grave goods, though some Punic bowls were used as offering vessels outside burials, either standing in place of or supplementing rough stone bowls and proto-offering tables.[81] Most Garamantian burials of the Proto-Urban phase (500–1 BC) did not contain pottery within the grave. The change in behaviour in the mid–late first century AD was very marked and coincided with a significant rise in the volume of Mediterranean imports. Thereafter, Garamantian burials at all social levels commonly contained material of Mediterranean production through to Late Antiquity.

Liverani characterises Roman-period Trans-Saharan trade as a circular and asymmetrical single system, with salt from the Central Sahara being traded south to Sudan (but not the Mediterranean); with gold, slaves and wild beasts for the arena being the most important commodities from the Sudan traded northwards and with Mediterranean goods traded with the Central Sahara (but not Sudan) focused on consumer and status goods like pottery, glass, metal artefacts, wine and oil.[82] The weakness of such a model is that it is based on uneven data – sparse literary indications, archaeological evidence from a few select locations of durable artefacts and a degree of supposition based on what we know of Islamic trade. It is in fact possible for us to expand the list and the trading relationships beyond this simple model.

Table 1.1 lists what we can demonstrate archaeologically about the nature of the trade. An interesting aspect of this list is that it includes on the one hand luxury and high-value items (gold, other metals, ivory, semi-precious stones), but on the other basic requirements of life, such as salt, dates and cereals. Salt has always been a key commodity in the trade between Sahara and Sahel, though it is important to understand that provision of 'salt' extended beyond the need for human consumption

[79] Pliny, *NH*, 5.35–38, notes first the round-about route from the coastal cities to Ghadamis and from Ghadamis to Jarma, but adds that the military campaign of Valerius Festus in AD 70 discovered a new shorter route to the Garamantian heartlands.

[80] Mattingly 2010, 95–102 (Tinda); 412–15 (glass).

[81] Mattingly *et al.* 2010b, 113, for offering use of early imported ceramics.

[82] Liverani 2006, 453. Cf. Scheele 2010, 297–300, for a model that sees Trans-Saharan trade as deriving from multiple intra-Saharan networks involving a wide range of goods, including locally traded bulk goods alongside the few commodities with genuine Trans-Saharan reach.

Table 1.1 *Postulated main trade commodities of pre-Islamic era trade between Rome and the Garamantes and between the Garamantes and the Sub-Saharan zone.*

MEDITERRANEAN	GARAMANTES	SUB-SAHARAN
Fine pottery produced	**Fine pottery** received	**Fine pottery** not received in any quantity
Glass and **Faience** vessels produced	**Glass** and **Faience** vessels received	**Glass** and **Faience** vessels not received?
Amphorae (wine and oil esp.) produced	**Amphorae** received	**Amphorae** not received?
Building materials (tile, marble, hydraulic mortars, etc.) produced	**Building materials** received	**Building materials** not received?
Gold received	**Gold** received, partly worked and consumed in Fazzan (?) and partly traded on to Mediterranean	**Gold** produced in West Africa and traded as dust in Sub-Saharan zone and to Garamantes?
Silver produced and traded in form of **coins** (*denarii*)	**Coins** (*denarii*) received and reworked as **silver** artefacts?	**Coins** rarely received? Might have received **silver**?
Copper ingots produced for trade?	**Copper ingots** produced and received	**Copper ingots** received?
Large potential to export finished **metal artefacts** – some evidence that this done	**Iron and copper alloy artefacts** produced and received	**Iron and copper alloy artefacts** produced and received
Semi-precious stones received (for gemstone production)	**Semi-precious stones** (carnelian and amazonite) traded in unworked and worked form	**Semi-precious stones** received
Glass **beads** produced	Semi-precious stone **beads**, ostrich eggshell beads and possibly glass beads produced, glass **beads** received from Mediterranean	Ebony **beads** and cowrie shell beads produced, glass, amazonite, carnelian and ostrich eggshell **beads** received
Ivory received	**Ivory** received and worked/traded north	**Ivory** collected
Textiles produced and possible item of trade	**Textiles** produced – potential item of trade to north and south	**Textiles** produced and received?
Finished garments produced	**Finished garments** – produced and received?	**Finished garments** produced and received?
Dyeing pigments and **dyed wool** produced?	**Dyeing pigments** and **dyed wool** produced and received?	**Dyeing pigments** and **dyed wool** produced and received?
Leather products (water skins?) produced and received	**Decorative leatherwork** produced	**Leatherwork** potentially received
People/Slaves received	**People/Slaves** received and some traded north	**People/Slaves**

Table 1.1 (*Cont.*)

MEDITERRANEAN	GARAMANTES	SUB-SAHARAN
Dates received	**Dates** produced	**Dates** received?
Cereals received	**Cereals** produced	**Cereals** received?
Salt and **natron** received?	**Salt** and **natron** produced	**Salt** and **natron** received?
Camels and **horses** received?	**Camels** and **horses** bred	**Camels** and **horses** received?
Wild animals received for arenas	**Wild animals** hunted locally or received from Sub-Saharan zone and traded with Rome	**Wild animals** hunted and traded
Miscellaneous (aromatic and medicinal plants, ostrich feathers) received	**Miscellaneous** produced and received	**Miscellaneous** produced and received

and food preservation. There are a range of complex salts, like natron and alum, which give special significance to a few locations in the Sahara.[83] In some regions of the Sahara, salt is the main currency unit.[84] That there was a trade in cereals with the Roman Empire is demonstrated by an *ostracon* from the Roman frontier fort at Bu Nijim that refers to the arrival of a small convoy of Garamantian donkeys carrying a consignment of barley.[85] The inclusion of such lower-value bulky items also hints at a larger overall volume of traffic, a point supported by the large numbers of Roman pottery imports into Fazzan.

Slaves were potentially one of the most lucrative commodities available to the Garamantes for trade with the Mediterranean, but the scale of the ancient trade is hard to assess.[86] For one thing, the construction and maintenance of the underground irrigation systems (foggaras) was a major and continuing labour drain for their society (estimated at 72,000 man years of work), probably in large measure accomplished by the use of slaves.[87] Insofar as they were trading slaves with Sub-Saharan Africa, it is apparent that the Garamantes had a large capacity to absorb the labour of these people in their own communities. Fentress has suggested that the Mediterranean-oriented slave trade may have been focused on a more

[83] Liverani 2006, 453–54; Lovejoy 1986; Mattingly 2003, 359–60; Thiry 1995, 496–500; Vikør 1999; Cf. Levtzion and Hopkins 2000, for numerous references to 'salt' in the index to the Islamic sources.

[84] Interestingly, al–Muqaddasi, a tenth-century source, records that a Saharan people called the Qaramattiyyun (Garamantes?) 'transact with salt', Levtzion and Hopkins 2000, 54.

[85] Marichal 1992, no. 72.1–2.

[86] Fentress 2011, for a recent review on Garamantian slave-trading.

[87] Wilson and Mattingly 2003, 273.