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THE ARCHAEOLOGY OF ISLAND COLONISATION AND ABANDONMENT

HELEN DAWSON

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The Archaeology of Island Colonisation and Abandonment

Helen Dawson

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To Karsten and Charlotte
&
To my parents

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Acknowledgements

I was born on an island, Sicily. Not really an island in the eyes of some (being so large and close to Italy), it most definitely is an island if you grew up there. Sicily is the reason why I am so fascinated by islands and turned to archaeology to explain their paradoxes: it is an island where, famously, everything must change in order to stay the same (Tomasi di Lampedusa 1958). Thus, first and foremost, I must thank my parents for settling down in Sicily and for instilling me with a love for archaeology. Growing up there, it was just a matter of time before I would set off in search of some answers.

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Montecristo. I have always strived to acknowledge and check every primary source and to give a fair representation of everybody's research, but, in a work of this scale, some mistakes are inevitable and I am fully responsible for them. I hope this book is as comprehensive as its title claims to be, and I can only apologise in advance for any omissions or errors. I shall be grateful to anyone who will point these out to me.

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Chapter 1
Island Archaeologies

This book is a comparative study of the archaeology of colonisation, abandonment, and resettlement of the Mediterranean islands in prehistory. Presenting an extensive and up-to-date body of evidence, it provides a pan-Mediterranean review of island data, a task last completed in the mid-1990s (Patton 1996). The considerations made over the course of the following chapters are supported by a database of 147 islands, from the Balearics in the west to Cyprus in the east, and cover some 10,000 years (from the Mesolithic to the Iron Age, with a few earlier instances).

Colonisation is a subject that has been extensively discussed in archaeology; by comparison, abandonment has received less attention, at least in the Mediterranean. Islands offer ideal case studies for exploring social connectivity, episodes of colonisation, abandonment, and alternating phases of cultural interaction and isolation. Nonetheless, distinguishing between visitation, utilisation, occupation, establishment, abandonment, and recolonisation remains a considerable challenge. How did these activities vary spatially and temporally, and what were the potential reasons behind different islands' colonisation and abandonment processes? Any observations must be placed against the backdrop of the changing palaeogeography of the prehistoric Mediterranean, by taking into account physical changes in sea levels and in the islands' environments, and the resulting perceptions of landscape, all contextualised within the broader scheme of reference of Mediterranean prehistory.

Three concepts have proved particularly useful in this study and underpin the key points in this book: (1) 'island archaeology' and its approaches designed with islands specifically in mind (e.g., 'islandscapes'; Broodbank 2000); (2) colonisation as a process encompassing multiple activities, including (but not limited to) settlement (e.g., 'landscape learning' and 'place making'; Rockman 2003); and (3) abandonment as a form of settlement 'strategy' and not necessarily as a failure (Nelson 2000). A principal goal of this book is to unravel the key processes and dynamics in the initial colonisation and subsequent abandonment(s) and recolonisation(s) of the islands

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and to present these, as much as possible, as processes of social interaction leading to 'Mediterraneanisation', as discussed by Horden and Purcell (2000) and by Morris (2003). It would be unrealistic to attempt this for all the islands in the Mediterranean, but it can be achieved by following the long-term histories of individual islands (up to the recent past in certain cases), highlighting the recurring yet irregular nature of these processes and teasing out meaningful parallels across time and space.

Although the structure of the study follows a conventional geographical and chronological framework, its comparative and thematical approach encourages anthropological reflections on the archaeology of the islands, ultimately focusing on people rather than geographical units, and specifically on the relations between islanders and mainlanders, highlighting the long-term development of island communities and seeking points of convergence between different periods. The book thus advances theoretical discussions in island archaeology and their relevance to Mediterranean archaeology (Broodbank 2000; Fitzpatrick, ed. 2004; Knapp 2007; Rainbird 2007), and it provides alternative explanations to colonisation paradigms prevalent in the 1980s and 1990s, expanding these to include considerations of abandonment and recolonisation.

Island Archaeology in the Mediterranean

'Island archaeology' can be broadly defined as a theoretical and analytical framework of comparison that recognises a number of common themes and questions relevant to islands (I am grateful to Cyprian Broodbank for this definition). In the Mediterranean, it is a growing area of research and one that, while born from approaches devised for other areas of the world, is increasingly developing its own character. Its key strengths are that it encourages productive comparisons between data and models derived from different islands and periods and that it deals with the archaeology both of isolation and of interaction (Broodbank 2000; Waldren and Ensenyat 2002; Fitzpatrick 2004; Rainbird 2004). Island archaeology aims to understand the striking diversity of island cultures and identify common underlying themes. These features set it apart both theoretically and methodologically from being merely a compiled archaeology of the Mediterranean islands.

Over the years, islands across the globe have been claimed to provide ideal 'laboratories' for studying ecosystems and societies (Vayda and Rappaport 1963; MacArthur and Wilson 1967; Evans 1973; 1977) and to illustrate lessons about environmental overexploitation (Bahn and Flenley 1992; Kirch and Hunt eds. 1997) and demographic change (McArthur et al. 1976; Black 1978; Williamson and Sabath 1984; Paine 1997). Recent regional studies of islands have combined a number of theoretical and practical approaches and brought detailed and synthetic focus to the subject (Patton 1996; Bass 1998; Broodbank 2000; Cooper 2002; Rainbird 2004; Costantakopoulou 2007; Phoca-Cosmetatou ed. 2011; Bevan and Conolly 2013).

Island archaeology is highly adaptable to the study of individual islands and archipelagos and to their relation (and comparison) with mainland cultures (cf.

Anderson 2004; Renfrew 2004). The comparison of island cultures points increasingly to isolation and interaction being culturally structured features that are not necessarily fixed in time by geographical variables. Islands are convenient units of analysis that can be compared, but their geographical characteristics (e.g., size, distance, and resources) are mediated through culture-specific lenses: this can be seen in the historical trajectories of human communities on islands and archipelagos, and their alternating centrality and marginality. Technology, for example, can overcome distance and lack of resources and affect the value of resources or the perception of time.

Several specialist interests fall under the broad remit of island archaeology, such as the archaeology of expansion, colonisation, refuge, abandonment, resettlement, subsistence, and so on. Because of the comparative nature of the field, archaeologists working with islands engage with great diversity and have identified a set of analytical categories and developed an effective vocabulary (often borrowed from biogeography) to refer to these: terms such as 'island effect' (usually emphasising physical isolation), 'founder effect', 'commuter effect', 'super-attractors', 'nurseries', 'stepping-stone effect', and more recently, 'islandscape', 'seascape', and the like, which are now regularly to be found in island-related publications to explain concepts derived from island archaeology. These concepts draw on wider archaeological theories, ranging from evolutionary and ecosystem approaches to more cultural approaches, but frame broad questions within specific spatial variables and investigate whether these variables have a measurable effect on the development of culture and how this effect varies over time and space.

Island archaeology thus contributes to the study of prehistory in general, by testing questions relating to migration, colonisation, human–environmental interaction, domestication, and cultural diversification, among others, within specific parameters (those afforded by islands). This characteristic finds parallels with other specialisms employing comparative frameworks. As Anderson put it, island archaeology is 'separable but not separate from the wider discipline' (2004:267)—that is, island archaeological research has much to contribute to non-island-related studies of the past. Apart from framing general questions asked by prehistorians within an island setting, island archaeology is also developing its own questions. For example, how does insularity (or how do specific geographical characteristics) affect culture and vice versa? How is being/living on an island different from being/living on the mainland? How did people experience changes in palaeogeography, or what did people make of islands?

While island archaeologists are developing their own questions and vocabulary, they have also retained some generic terms borrowed from prehistory. The terms 'colonisation' and 'abandonment' are a case in point: their use is in need of refinement, as a number of rather distinct activities fall under these labels. Here lies an important potential development of island archaeology and a primary aim of this book: achieving clearer understanding of these activities through the analysis of archaeological assemblages found on islands, and identifying diagnostic remains or material correlates for each of these activities. Palaeoenvironmental data can be used effectively to understand exploration, while other data (e.g., changes in material culture) can give indications as to whether dispersal was slow and colonisation rapid, gradual, or purposive. In general, such data can help us to understand issues of settlement, adaptation, viability, population dynamics, and cultural networks. Is the colonisation or abandonment of an island different from that of other landforms?

More than thirty years have passed since Cherry (1981) first synthesised the colonisation data available at the time and formulated a theoretical and practical framework for studying colonisation in the Mediterranean islands. That initial review was followed by an update almost ten years later (Cherry 1990), but while the body of island data has continued to grow and there have been considerable advances in the theory of island archaeology, theory and practice have rarely been brought together again as equal players in the Mediterranean (most recently by Broodbank 2000). As we will see, Patton's study favoured a theoretical approach (1996), Gaffney et al. (1997) had a more practical remit, and Bass (1998) had a regional focus, though his reach exceeded those spatial limits in terms of its theoretical framework.

The questions posed by island archaeology must be adapted to make them relevant to different settings. Empirical data and their context set the pitch as to the issues that may be addressed, leading to the identification of a series of questions that are specifically 'Mediterranean'. Spatial analysis, for example, is a key theme of island archaeology, but it has to be customised to the configuration of the regions in question and the questions being asked. Biogeographical approaches developed for the Pacific islands must be considerably adjusted if they are to be applied effectively to the Mediterranean islands. Mediterranean configuration would suggest that island life should have developed here more readily than in areas where islands are more remote. In reality, however, this was not always the case, and the development of island life was only superficially a cumulative process. In fact, in the Mediterranean context it is impossible to discuss island colonisation without taking abandonment into consideration, since this was (and still is) a fundamental component of island life. However, despite the fact that islands were repeatedly abandoned and recolonised, there is still an imbalance in the amount of research that has gone into understanding colonisation and abandonment, the latter being largely overlooked. This discrepancy needs to be addressed.

The physical elements and social make-up of islands are inseparable features, but their meanings have to be taken apart and then reassembled if they are to be fully gauged. Mediterranean islands offer a wide spectrum of physical and cultural elements that combine to create the diversity that characterises this region. At the same time, some regular features can be identified, and it is on these that this study focuses first. Geographical and environmental data thus provide the first port-of-call in this study and present the setting (both in terms of restrictions and opportunities) for understanding the unfolding of the processes being investigated. The geographical scope of the study is at first pan-Mediterranean, but once common Mediterranean underlying features are identified, the book moves on to address why island regions developed in either similar or different ways, by focusing on increasingly fine scales of enquiry, highlighting variations and similarities within the processes, at a regional scale and then at the level of individual islands.

This study is also conducted at different chronological levels. The overall chronological breadth of the analysis encompasses prehistory from the end of the Pleistocene to the Iron Age. This scope takes into account many colonisation and abandonment events and processes, from the first time that human presence is recorded on any island to the time when it is documented on most of them. It is, of course, rare that the development of an island can be followed through a period of ten thousand years, but by combining data from different islands, regional patterns do emerge over long time periods, while the data from the individual islands afford a series of snapshots of the making of such patterns. This book thus investigates what colonisation and abandonment processes entail in different spatial and temporal settings, and whether, and to what degree, sequences of colonisation and abandonment in separate parts of the Mediterranean are interconnected. Their chronological and spatial variations (often within the same archipelago), and potential reasons behind these, are also explored, and suggestions are made with regard to social interaction between different island regions (both in the short and long terms).

Cherry (2004:236) claimed that, because of the vastness of the data now available, 'syntheses of Mediterranean prehistory as a whole are [thus] rare (e.g., Trump 1980; Patton 1996), and generally disappointing'. The comment is partly justified, as these studies have taken on the immense task of amalgamating human histories spanning several millennia and therefore succumb to 'ex cathedra generalization' (Cherry 2004:243). The validity of the very idea of 'Mediterranean archaeology' has been criticised recently, and there has been a reaction to archaeological studies that consider the region on a macro-scale, often adopting a so-called top-down approach. Instead, it is argued that 'research on any topic in a specific Mediterranean context' is to be preferred to 'all-encompassing Mediterranean-wide studies' (Catapoti 2007:201). This kind of research can promote understanding at the detailed and local scale; however, it can result in excessive fragmentation and in the proliferation of specialist studies with tenuous links to the bigger picture. The present study aims to overcome this impasse using both top-down and bottom-up approaches: it focuses on individual islands in order to identify overarching themes and questions while recognising there is also a great deal of divergence, as seen from specific case studies and as is to be expected given the scale of the study. There is a huge amount to be learnt from comparing the histories of individual islands and conceptualising the Mediterranean as a 'unique cultural zone' (e.g., Blake and Knapp 2004). This book, then, strives to differ from previous syntheses by making a contribution to the discourse of Mediterranean prehistory through a study of specific aspects of island life. It aims to provide a theoretical framework for comparison between island regions to oppose the increasing 'segmentation and hyperspecialisation' of Mediterranean studies that Cherry (2004) equally stigmatises.

This work addresses the changing nature of colonisation and abandonment in the Mediterranean islands by making the most of switching between different scales of enquiry. The sources of the data used to support this investigation are necessarily highly eclectic, as they are derived from archaeological publications that date from the start of the twentieth century to the present day. This is interesting in its own right, as it affords an insight into how island studies have evolved in this area over the past century. However, it also presents several challenges and can be frustrating, as the data were originally collected and interpreted according to different research agendas and thus may be lacking in some aspects that would be useful to this project. While this study cannot always offer a full picture of the processes under examination in discrete areas, individual parts do concur to create a coherent whole, thanks to the wide spatial and chronological scope. Capitalising on all the evidence available is important if we are to clarify the dynamics behind the development of island societies, which in turn will provide crucial elements to understanding a wholly Mediterranean way of life.

Island archaeology is an evolving subject, comprising as it does several kinds of archaeologies: new theoretical frameworks are developing, and more data are becoming available as research continues to progress also in other fields, allowing researchers to address old and new questions in different ways. This plurality is an asset for its practitioners. Archaeological emphasis continues to shift, and views alter over the relationship between humans and the environment, a relationship that is problematic in some ways and still changing today, as seen by the abandonment of several small Mediterranean islands in the present. Archaeologically, 'Mediterraneanisation' can be traced back to the Bronze Age and possibly earlier, but in fact it is still ongoing, as people in this region continue to interact and their identities to transform. These past dynamics are important in themselves, as well as in terms of understanding significant issues faced by island populations today, such as environmental and climatic change, demographic decline, and new forms of cultural interaction, particularly the effects of globalisation, tourism, and migration. This work endeavours to capture the core of this shifting relationship, by revealing the opportunities and restrictions imposed by islands, but also, when the detail of individual island histories allows this to emerge, by highlighting the prominent role played by humans in forging a social space for themselves. It is my belief that the detail afforded by linking together the short-term history of several islands will make a contribution towards the understanding of long-term human history in the Mediterranean, and that comparative analysis is one of the best ways to achieve this. I hope that collectively the results of this comparative approach will add to the insights that one can gain from existing studies of individual Mediterranean islands and island groups.

Structure of the Book

The book begins by describing the Mediterranean as the physical backdrop for colonisation and abandonment processes (Chapter 2). Islands evoke multiple interpretations, generally escaping fixed definitions because of their geographical variability. Traditionally, however, certain concepts have been adopted in their study, such as isolation and marginality. More recently, studies have focused on ideas of cultural interaction, connectivity, and networking. Changing perceptions of the Mediterranean are addressed first by looking at the region's physical characteristics, resources, and peculiarities (endemic species). This section illustrates the process of landmasses becoming islands and raises the question of the cultural significance of insularisation. These changes are analysed in terms of land and resources lost to rising sea levels but also of the creation of new networks and opportunities. The discussion then moves on to consider the creation of conceptual Mediterranean spaces, as seen not just by geographers and archaeologists but potentially also by islanders themselves. It charts both maritime and terrestrial views of the islands and possible conceptualisations by islanders and mainlanders of these spaces (e.g., Grima 2001; 2008). The chapter explains the need to focus not just on physical land but 'encultured' space (cf. Papayannis and Sorotou 2008).

The following step is a discussion of different colonisation theories. Chapter 3 begins by reviewing island biogeography, the prevailing approach in the 1960s and 1970s for understanding initial settlement (MacArthur and Wilson 1967). Cherry's (1981; 1990) work on the colonisation of Mediterranean islands, which was inspired by biogeography, is considered in particular detail because of its influence on subsequent studies, and its continuing relevance is gauged in the light of other colonisation and migration theories, and also of recent developments in the area of DNA studies of prehistoric populations. The chapter discusses potential triggers for colonisation and investigates what kind of evidence has been taken to represent colonisation in the archaeological record in different periods. This leads to a discussion of the concept of 'landscape learning' (Rockman 2003): colonisation is no longer simply equated to permanent settlement but is seen as encompassing a variety of activities, ranging from adaptation to modification of island environments, and both as contributing to the creation of cultural identities and as being influenced by social factors. This chapter debates whether colonisation means permanent settlement alone or whether we should be thinking instead in terms of different types of colonisation. The theoretical review of colonisation also prompts a discussion on the nature of islands and insularity, and whether the colonisation of islands is different from that of any other territory.

This theoretical discussion sets the scene for Chapters 4 and 5, which present a comprehensive data review for initial colonisation from the western and eastern Mediterranean islands, respectively. All uncalibrated radiocarbon dates from survey and excavation publications and reports consulted have been calibrated, enabling cross-referencing and comparison. Cherry's 1990 evaluation of island colonisation data (which Patton relied on in his 1996 study) forms the initial basis of the two chapters. However, this list is amended in the light of discoveries that have taken place in the intervening years, and data from islands that Cherry did not include in either of his reviews (for reasons that will be discussed) are also examined. Data from the islands are inevitably described in differing degrees of detail, depending on the level of research conducted there. For this reason, the two chapters focus on initial colonisation, with particular attention paid to islands whose colonisation is still surrounded by controversy, such as the Balearics, Sardinia, and Cyprus. While Cherry's sample was predominantly eastern Mediterranean (it included 78 islands in the eastern Mediterranean and 34 in the western Mediterranean), the database for this study contains data from 83 islands from the east and 64 from the west (almost twice as many as Cherry's 1990 western sample). The database indicates the increasing evidence of human presence on Mediterranean islands before the Neolithic and sets the scene for the main argument in the following chapter: while the data indicate that the Neolithic settlement of the islands is archaeologically the most visible, it is by no means the only relevant process to understanding colonisation.

Building on the data review, Chapter 6 contrasts colonisation trends on a pan-Mediterranean scale and a regional scale, assessing different colonisation activities. Different types of analysis are explored that highlight the 'ups-and-downs' of Mediterranean island colonisation, rather than presenting it as a linear and incremental process of island settlement. Although the Neolithic emerges from this analysis as the main period of colonisation at the pan-Mediterranean level, this is not always the case at the regional level. When different island groups are compared, and pre- and post-Neolithic occupation explored, it becomes evident that settlement varied during the Neolithic (with islands occupied both intermittently and permanently at this time). Sites from different islands and periods are discussed to illustrate various types of colonisation and the material remains that might represent such activities. The chapter investigates whether there were any links between certain activities, areas, and periods and, therefore, how colonisation changed over time. This entails questioning, for example, how 'utilisation-led' colonisation in the Mesolithic differed from 'trade-led' colonisation in the Bronze Age, and identifying differences as well as similarities. These trends are not discussed as an abstract process or as pan-Mediterranean 'forces'; their significance is linked to islanders' changing attitudes and perceptions, using case studies to gauge the significance of the local scale—for example, in terms of 'place-making'. Throughout this discussion, linear and teleological approaches to island colonisation (in which human activity on islands is seen as largely geared towards settlement) are contrasted with a punctuated view of island–human interaction, where different activities (including abandonment and resettlement) form a broader and more complex way of viewing colonisation. This new view of colonisation also highlights its irregular nature and the need to study island abandonment.

While there is a substantial body of literature on the colonisation of Mediterranean islands, abandonment, reviewed from a theoretical perspective in Chapter 7, has been largely overlooked. This chapter therefore draws initially on abandonment studies (in anthropology and archaeology) developed mostly outside Europe. In particular, it explores the idea that abandonment may be considered a mobility strategy rather than a form of settlement failure, contributing, albeit counterintuitively, to the continuity of island lives when viewed overall. The chapter then goes on to discuss different types of island abandonment. Particular attention is paid to issues of geographical scale, demography, resources, and the environment, in both objective and subjective terms. These are considered by looking at ethnographic studies that focus on human perception and on responses to these variables. The chapter debates whether island abandonment is intrinsically different from any other kind of regional abandonment and discusses different types of abandonment, which find parallels in mainland situations.

Colonisation studies have focused on identifying the earliest evidence for human presence on the islands but have ignored what happened subsequently—that is, whether colonisation was sustained or terminated. This idea is explored in Chapter 8, which considers the possible effects of geographical and social variables on the islands' long-term histories. This chapter focuses by necessity on a subset of islands, selected on the basis of their extensive archaeological investigation, so that their long-term cultural development can be followed in terms of the relative influence of different factors. Evidence reviewed in this chapter suggests that Bronze Age colonisers inhabited the islands for considerably shorter periods than did their Neolithic counterparts. The introduction of sailing and agricultural terracing during the Bronze Age led to the settlement of the smaller islands; nonetheless, the islands experienced short occupation periods (lasting only a few centuries) and were often abandoned. New technology was critical in terms of overcoming the small islands' lack of resources, providing islanders with a buffer against crop failure and increasing the distances that they could travel. At the same time, seafaring made abandonment a more viable option than before. Sailing connected islanders to the wider world, creating new opportunities, but also made them more vulnerable. This chapter reviews the evidence for abandonment and recolonisation for some of the islands up to the historical period. Although there are significant differences between these processes in the prehistoric and historic periods, the aim of this discussion is to show that Mediterraneanisation was not a linear process: the succession of colonisation and abandonment resulted in a condition of 'stable instability'.

The final chapter (Chapter 9) brings together the key findings of this study and redefines island colonisation and abandonment. Studying these processes in parallel and combining archaeological and anthropological data can provide new insights for Mediterranean archaeology and the study of prehistoric communities in general. Final observations are made on both the large scale and the local scale, on the long term and the contingent, on geographical spaces and cultural places. The chapter highlights the connections between initial colonisation and the islanders' subsequent history up to the present day. Further comparisons with contemporary migration, well beyond the scope of this book, may lead to a fuller understanding of the dynamics of cultural interaction in the past and to greater integration in the present.

Chapter 2

The Mediterranean

Physical and Cultural Spaces

A variety of geographical, climatic, and cultural features characterises and distinguishes the Mediterranean region (Fig. 2.1). Starting with the physical environment, geographers and ecologists alike have commented on the Mediterranean's 'regional tapestry' (Blondel and Aronson 1999:90; also Manzi 2001:200). Grove (a geographer) and Rackham (a botanist and ecological historian) have claimed that, in view of its diversity, 'the Mediterranean is no place for facile generalization' (2001:12). Similarly, Blondel (a biogeographer and animal ecologist) and Aronson (a plant ecologist) defined the Mediterranean basin as an ecological 'patchwork' (1999:112), which is best understood in terms of climate, soil, and vegetation (1999:16; also Bolle 2003:14). Islands are also considered 'different' from mainlands in view of their endemic fauna and vegetation. Islands and coasts clearly form a key component of this 'fragmented topography of microregions' (Horden and Purcell 2000:5). Islands are parcels of land neatly framed by the sea; and yet the sea, while separating islands from the mainland, also connects them to the wider world. The sea, in effect, 'defines' the islands: it can both divide and unite them.

From a cultural perspective, island societies display different attitudes towards the land and the sea, and these attitudes can cast light on group identities. 'First, landscape is more or less the space where people perform their everyday tasks. Second, land, the ancient Greek *topos*, may be considered to embody ancestral energies, spiritual forces, memories, dreams and identities' (Papayannis and Sorotou 2008). The physical characteristics of islands (e.g., size, distance, and resources) are in fact time-dependent factors, mediated through society and culture. Islands, then, are *topoi* (places) par excellence, offering ideal case studies for exploring cultural topography and the relationship between humans and their environments, and for analysing the importance of knowledge in the cultural construction of space, all within a comparative framework. Although the sea connects the islands, ethnographic studies of present-day communities (e.g., Vannini and Taggart 2013) show that it also contributes to

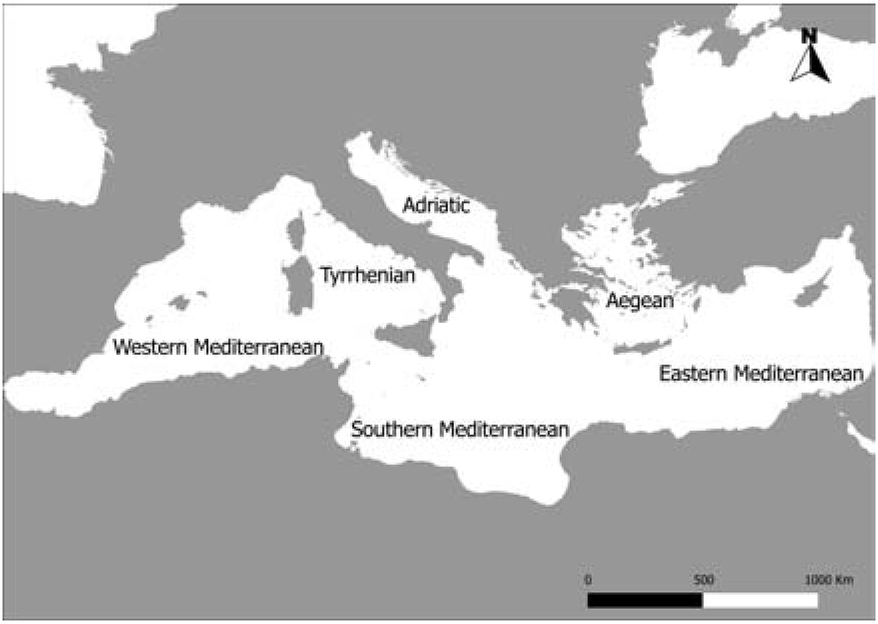

FIG. 2.1 Map of the Mediterranean region.

the islanders' 'sense of place'—that is, to a sense of belonging to the island: 'islands are places—special places, paradigmatic places, topographies of meaning in which the qualities that construct place are dramatically distilled' (Hay 2006:31). A complex web of relationships entangles islanders, mainlanders, their cultures and worlds. The islands themselves are physical nodes in this network, both enabling and restricting the scope of the interaction (cf. Hodder 2012; Knappett 2011). Settlement strategies give important insights into the islanders' changing perception of their environment. This perception is affected by interaction with other communities and, in turn, affects the islanders' sense of identity, which is then reflected in their material culture.

When considering the earliest colonisation and the subsequent abandonment of the islands, we must then take into account both their physical and cultural spaces. Phoca-Cosmetatou discusses both 'constraints' and 'enabling factors' (2011:92) in establishing island life. Although many of the islands were impoverished from a biotic point of view, their mineral resources and their configuration might have facilitated their colonisation. We should also consider that social interaction was a key enabling factor. As we will see in subsequent chapters, there appear to be meaningful relations between colonisation (in terms of duration and location of occupation/settlement) and different geographical zones. Nonetheless, it is challenging to establish regularities in such relations, given that people respond to and adapt their living space in a variety of ways, ways that are also linked to their culturally specific perceptions of the environment.

Changes in the region's palaeogeography are also important in light of the increasingly earlier evidence for island colonisation and seafaring in the Mediterranean. The study of ancient coastlines, which falls under the remit of palaeogeography, gives us precious insights regarding the probability of early human presence on islands, including human movement and site distribution (which may be linked to an area and its resources). In addition, it can shed light on cultural concepts, such as 'territory' and 'boundary' (Shackleton et al. 1984:312), and even sense of place and space-related identities. Cherry claimed long ago that 'ultimately [palaeogeography] may offer an insight into possible motivations involved in island colonisation' (1990:194). Reconstructing the ancient environment is thus crucial to modelling island colonisation dynamics appropriately. Cherry (1990:201) was prescient when he claimed that changes in shorelines and the potential consequent loss of coastal sites (both on the mainland and the islands) may have distorted our understanding of the timing and nature of island colonisation. This appears to have been confirmed at least for the earliest sites, as recent underwater investigations have begun to reveal along the southern coast of Cyprus (see Chapter 5). Significant cultural transitions, from developments in seafaring technology to shifts in site location, were also influenced by changes in the environment and coasts.

The Physical Environment

The Mediterranean Sea is 'the largest inland sea of the world' (Blondel and Aronson 1999:9). It covers an area of about 2,969,000 sq km, roughly measuring 3,800 km from east to west (from Gibraltar to Lebanon), and varying in width from ca. 740 km (Marseilles to Algiers) to ca. 200 km (Sicily to Tunisia) to ca. 400 km (southern Greece to Libya).

The Romans referred to it as *Mare Mediterraneum* (or 'sea among the lands'). The coastline of the northern peninsulas and the major islands defines 'interior seas' within the Mediterranean. From west to east they are: the Balearic/Alboran Sea (between the Balearic/Alboran islands and mainland Spain/Morocco), the Tyrrhenian Sea (between Corsica/Sardinia/Sicily and mainland Italy), the Adriatic and Ionian Seas (between Italy and Croatia/Albania/Greece), and the Aegean Sea (between Greece and the Anatolian peninsula) (Blondel and Aronson 1999:9). The southern coastline, on the other hand, is very linear, except for the Cap Bon Peninsula (Tunisia). The Libyan coastline stretches for about 1,900 km, offering a coastal lowland with lagoons and salt pans (known as *sabkhas*); the lowland coast of Tunisia extends for about 1,300 km; while the Algerian coast (ca. 1,100 km long) has little coastal lowland and is bordered by steep mountains (Jelgersma and Sestini 1999:295–6). In modern times, population density along the North African coast varies greatly, from more than 1,000 people per sq km in the Nile Delta to fewer than 20 per sq km along the coast of Libya (Milliman et al. 1992:5).

The Mediterranean coastline overall is 47,000 km in length, of which ca. 40% (ca. 17,000–18,000 km) consists of islands (Greek islands: 7,700 km; Croatian: 4,024 km; Italian: 3,766 km; Spanish: 910 km; French/Corsica: 1,047 km) (figures from Blondel and Aronson 1999:12). There are approximately 5,000 islands and islets, covering a combined area of 103,000 sq km. In view of these figures, King and Kolodny have stated that 'Mediterranean insularity has a quasi-continental form' (2001:237). Insularity varies within the Mediterranean between extremes, with the Croatian islands popularly referred to as 'Mediterranean Scandinavia' (in view of its thousands of small islets and fjords), and the largest Italian islands being much more akin to 'continental' landmasses.

Tides in the Mediterranean are in the order of just 20 to 30 cm, except at Gibraltar (1 m) and around the island of Jerba (Tunisia) (up to 3 m) (Flemming 1992:247; Blondel and Aronson 1999:9). Unlike those in northern Europe, these tides are minimal, and there is hardly any liminal zone exposed at low tide between the land and the sea. In this respect, the boundary between land and sea in the Mediterranean is more clearly defined, at least from a spatial point of view.

The geology of the Mediterranean region comprises mostly limestone interspersed with igneous (volcanic) outcrops. Blondel and Aronson (1999:7) remarked that, since the land within/around the Mediterranean is mostly mountainous, the area is best understood in 'vertical' terms—that is, as a succession of 'life zones' or 'elevational belts', where similar flora and fauna tend to occur together (Blondel and Aronson 1999:91). Thus, the Mediterranean environment should be viewed from both a vertical and horizontal perspective. Several islands have elevations of 1,000 m and more: these include the larger ones (e.g., Sicily, Sardinia, Corsica, Crete, and Cyprus) as well as some very small ones (e.g., Elba and Samothraki), which display several of these 'environmental belts' in close succession. It is worth contrasting the maximum altitude of Sardinia (1,834 m) with that of Samothraki (1,611 m). The two are comparable, but Sardinia is a landmass of some 24,000 sq km, whereas Samothraki barely reaches 180 sq km. Blondel and Aronson (1999:95) state that, on average, the distance between sea and mountains in the Mediterranean area is 100 km; these bands are thus often compressed and, to complicate things further, can be further dissected into smaller 'catchments' by intervening mountains. Therefore, an island's elevation has an important effect on its ecological diversity, while its size affects the distribution and prominence of these ecozones. All of these variables also affect an island's visibility from the mainland and consequently the likelihood of its being spotted and colonised.

These observations have further implications in terms of understanding the islands' initial settlement. Let us consider the time lag between the development of agriculture in the Neolithic and the much later settlement of the smaller Mediterranean islands, many of which are rocky and mountainous. In the context of such small islands, the development of terraces would have made land available for agriculture on steep slopes, a necessary step towards their permanent settlement. Archaeological evidence for the development of terracing is scant, as direct dating is rare. But proxy indicators can be used to assess the establishment of terracing—for instance, evidence for utilisation of mountainous and hilly environments and for pastoralism (Grove and Rackham 2001:111–2). In the Aegean islands, terracing has been dated to the second millennium BC (see recent work on Antikythera, Chapter 5), and on mainland Italy to the first millennium BC, although these could be conservative estimates (Bevan et al. 2013). Terracing gradually transformed the landscape and modified the topography of the islands.

Water availability is clearly another important factor for human settlement, and it varies greatly within such an extensive region (Lindh 1992). Domestic sheep and goats, which are well adapted to coping with periods without water and can satisfy most of their water needs from the plants they eat, were successfully introduced to the islands by Neolithic colonisers. Mediterranean 'bimodal' climate alternates dry hot summers and wet cold winters, with periods of drought followed by heavy rainfall (Goossens 1985; Blondel and Aronson 1999:16; Bolle 2003:8). Most of the water necessary for vegetation is provided by evaporation (either from the sea itself or from other water basins) (Bolle 2003:34). This means that, even during the driest months, some water is supplied to the Mediterranean regions. However, the availability of groundwater would have been a considerable magnet for settlement. This can be seen, for example, in the Maltese islands, where, as we will see, all known Neolithic settlements were located close to perennial springs associated with the blue clay sub-stratum (Bonanno 2011:153).

Water was also prized from a cultural point of view. Springs, wells, lakes, and rivers (to which we may add stillicide water in caves and volcanic water) presented both a locus and a focus—that is, 'a clearly defined place, an obvious focus of attention' for ritual practices (Woolf 2003:133; see also Bradley 2000; Whitehouse 1992). Although cultural activities focusing on watery locales are not a prerogative of islands, it is possible that the juxtaposition of saltwater and freshwater, together with volcanic phenomena (where present), was especially powerful on small islands and inspired ritual behaviour. Evidence for ritual activity (in the form of offerings) is found on the island of Panarea, at the Calcara site, which is located in an extinct volcanic crater riddled with fumaroles (Bernabò Brea and Cavalier 1968:17); another example is the Punic (though possibly earlier) sanctuary at the Lago di Venere on Pantelleria (Acquaro and Cerasetti 2006). Volcanism is especially evident in the southern Mediterranean, between Sicily and Tunisia, where there is a natural phenomenon of 'disappearing' volcanic islands. One such island, Ferdinandea Island, 30 km south of Sicily, emerged during the First Punic War (264–241 BC) (its latest appearance and disappearance took place in the nineteenth century; Mazzarella 1984). Latin tradition recounts that the Romans and the Carthaginians signed their peace treaty on an island in the southern Mediterranean, which eventually sank, only to leave a few rocks, referred to by Vergil as the 'Altars of Neptune' (Mangialupi 2006). Therefore, a range of environmental features, from volcanism to changing sea-levels, would have resulted in dynamic perceptions of the landscape which, as we will see in the next section, were also culturally mediated.

Mediterranean Palaeogeography

The following review of palaeogeography provides the necessary backdrop to the increasingly earlier evidence for island colonisation and seafaring in the Mediterranean. Progressively more detailed palaeogeographical maps for the Mediterranean have become available over the past twenty years. Previously, these maps varied considerably because they were based on different sea-level rise curves. A major breakthrough was the production of a reliable global sea-level change curve by Fairbanks (1989), subsequently refined by Lambeck (1996). Cherry referred to the Fairbanks curve in his 1990 update of Mediterranean island colonisation data. Recent studies have further refined this picture, and it has become apparent that global sea-level reconstructions should incorporate local data from test sites to produce accurate regional maps (e.g., Lambeck et al. 2004; Lambeck and Bard 2000; Lambeck and Purcell 2005). Lambeck and Purcell (2005) were thus able to provide an estimate of sea levels for the entire Mediterranean at 20, 12, and 6 kyr BP, with equivalent levels of −142, −54, and 0 m, respectively (Fig. 2.2a–c).

The main features in the western Mediterranean at the Last Glacial Maximum (LGM), when sea levels were at their lowest (Fig. 2.2a), can be summarised as follows (Shackleton et al. 1984; van Andel 1989; Mussi 2001; Lambeck et al. 2004; Lambeck and Bard 2000; Lambeck and Purcell 2005):

1. Italy, southern France, eastern Spain, and Tunisia were bordered by extensive coastal plains. West of Tunisia, the coastal plain was up to 200 km wide and incorporated present-day Jerba and the Kerkennah Islands. The distance between Tunisia and Sicily was reduced to ca. 60 km, with intervening stepping-stone islets. The North African coast bordering Morocco and Algeria was very similar to that of the present day; the Strait of Gibraltar was ca. 8 km wide (it is ca. 14 km wide in the present day).

2. Sicily incorporated Malta to the south, the Pelagie Islands to the southwest, and the Ègadi Islands to the northwest. Pantelleria appears to have been already insular. A recent palaeogeographic reconstruction of the Strait of Messina shows that a landbridge between Sicily and Italy existed from 21.5 to 20 kyr cal BP (Antonioli et al. 2012:1168).

3. The Spanish islands, whose distance to the mainland was reduced by the eastern Spain coastal plain, formed two larger islands, one made up of the Balearics (Menorca, Mallorca, Conejera, and Cabrera), the other of the Pitiussae Islands (Ibiza and Formentera).

4. Corsica and Sardinia formed a single island, separated from Italy by a 15 km-wide sea crossing. Strong anti-clockwise currents made this crossing treacherous (Bonifay 1998:134). Coastal plains along the western shore of Italy incorporated the islands of Elba and, farther south, Capri, with their surrounding smaller islands.

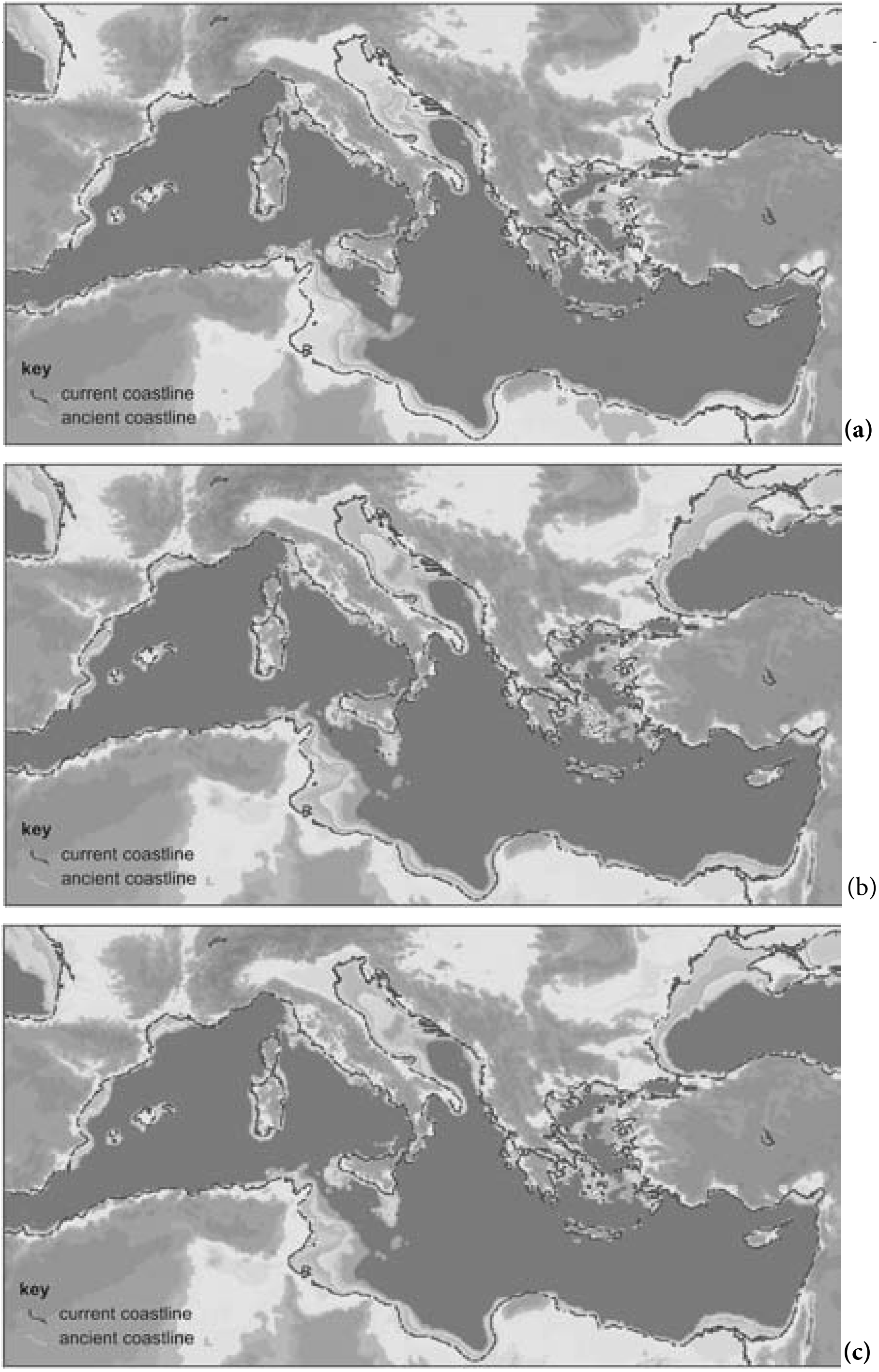

Fig. 2.2a-c The Mediterranean coastline at (a) 20, (b) 12, and (c) 6 kyr BP, with equivalent sea levels of −142, −54, and 0 m (*Lambeck and Purcell 2005, figs. 14a–c, reprinted with permission from Elsevier*) (*redrawn by J.J. Fuldain*).

5. The northern Adriatic was an extensive plain with meandering rivers and hills along the eastern side (the present-day Dalmatian islands) (Bortolami et al. 1977; Markovic-Marjanovic 1971:187; Pirazzoli 1996:71). The coastline ran east–west and was located roughly across the middle of the present-day Adriatic (Pirazzoli 1996:71). This plain, which has now completely disappeared, hosted large herds of animals (equids and deer), providing accessible food resources (Shackleton et al. 1984). The Italian side of the southern Adriatic also had a coastal plain. One can still gauge the extents of this coastal plain, now submerged, by looking at the present-day Tavoliere plain, which covers an area of about 4,500 sq km. Along the present-day coast, there are still lakes (Lago Salso and Lago Salpi, around the Gulf of Manfredonia) (Boenzi et al. 2001), extensive coastal marshes, and two more lakes to the north of the Gargano (Lago Lesina and Lago Varano) (Sargent 1983:223). The lakes and marshes are the remnants of ancient lagoons, which made coastal navigation easy in this region (Delano Smith 1987:15).

In the eastern Mediterranean:

1. Late Palaeolithic Greece had several extensive coastal plains (e.g., between Attica and the southeast Argolid), with lakes and hills (now islands), including the Cycladic landmass, which lay very close to the mainland (Lambeck 1996; Broodbank 2000).

2. Crete was insular throughout the LGM but featured larger coastal plains; and the distances to the mainlands to the east and west were reduced by large stepping-stone islands (as current small islands were welded together at lower sea levels).

3. The southern Ionian islands (Lefkada, Kefalonia, Ithaka, and Zakinthos) formed a landlocked sea which 'gave the impression of a continuous landscape' (Ferentinos et al. 2012:2172). Kefalonia, Ithaka, and Zakinthos were connected as one large island, separated from the mainland by narrow straits between 5 and 7.5 km long, with intervening islets, while Lefkada was connected to the mainland. On the other side of the mountains, another plain extended from Corfu along the northwest coast of the Peloponnese to the Gulf of Korinth (van Andel and Shackleton 1982: fig. 2; van Andel 1989:737; Souyoudzoglou-Haywood 1999).

4. Cyprus had slightly more extensive coastlands, small islets (now submerged), facilitating crossing from the mainland, which at this time was ca. 60 km away (Held 1992; Gomez and Pease 1992:4; Peltenburg et al. 2001:59; 2002:76).

Following the LGM, sea levels began to rise and continued to do so until ca. 6,000 BP (Fig. 2.2c), by which time most areas had achieved their present configuration (Lambeck and Purcell 2005). In the western Mediterranean, Sicily and the Maltese islands became separated ca. 12,000 years BP (Fig. 2.3). To the northwest of Sicily, sea levels 10,000 years ago have been estimated at ca. –47 m; thus Levanzo and Favignana still formed a hilly promontory off the western coast of Sicily, but

Marettimo had already become an island (Antonioli 1997:147–8). Two thousand years later, Levanzo became insular, whereas Favignana remained linked to Sicily via a narrow isthmus. The coastal plain of eastern Tunisia was flooded, and the distance between Sicily and North Africa increased to 200 km. Sardinia and Corsica became separated by a seaway 10 km wide at ca. 9,000 BP, when their distance from Italy increased from 15 km to 60 km. Around the same time, the Adriatic coastal plain was submerged. Several islands emerged as a result, while evidence for late Palaeolithic campsites would have been gradually submerged (Fig. 2.3).

In the eastern Mediterranean, the Cycladic landmass began to split, at first into two (northern and southern parts) and then gradually into individual islands soon after 12,500 BP (Lambeck 1996:606; Broodbank 1999a:20) (Fig. 2.4). Lambeck (1996: 606) calculated that sea-level rise during Late Neolithic and Bronze Age times took place at a rate of about 0.7 to 1.0 mm per year (or ca. 1 m per millennium). Although this is slower than during earlier periods (when it reached up to 12 mm per year, or ca. 1.2 m per millennium), these figures indicate that during the Early Bronze Age, sea levels were up to 5 m lower than in the present (Lambeck 1996:607).

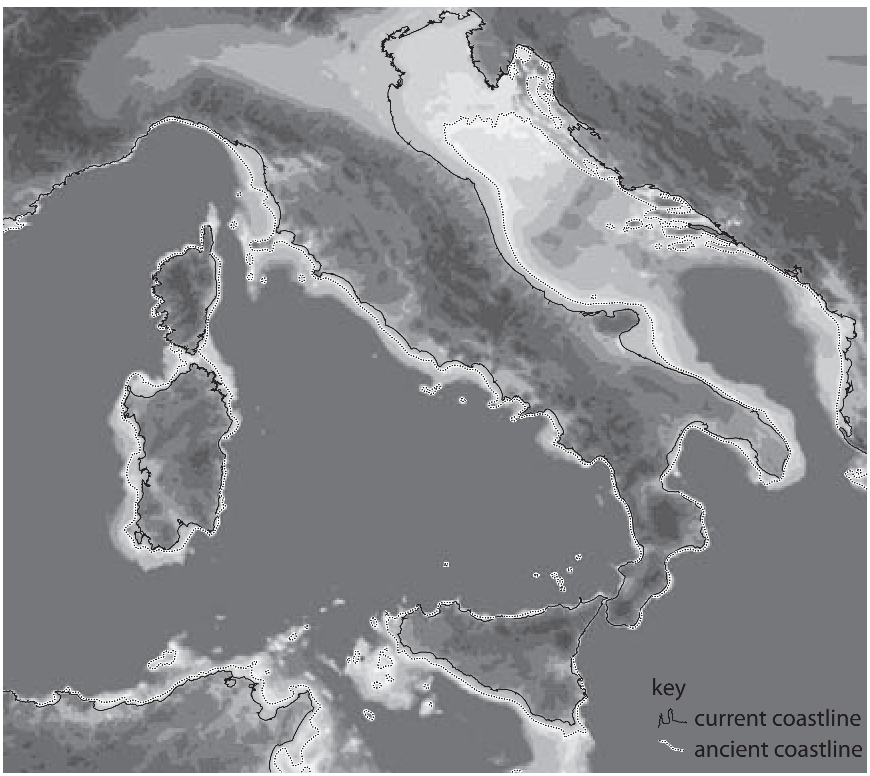

FIG. 2.3 The Italian coastline at 12 kyr BP (*Lambeck and Purcell, unpublished data*) (*redrawn with permission of the authors by J.J. Fuldain*).

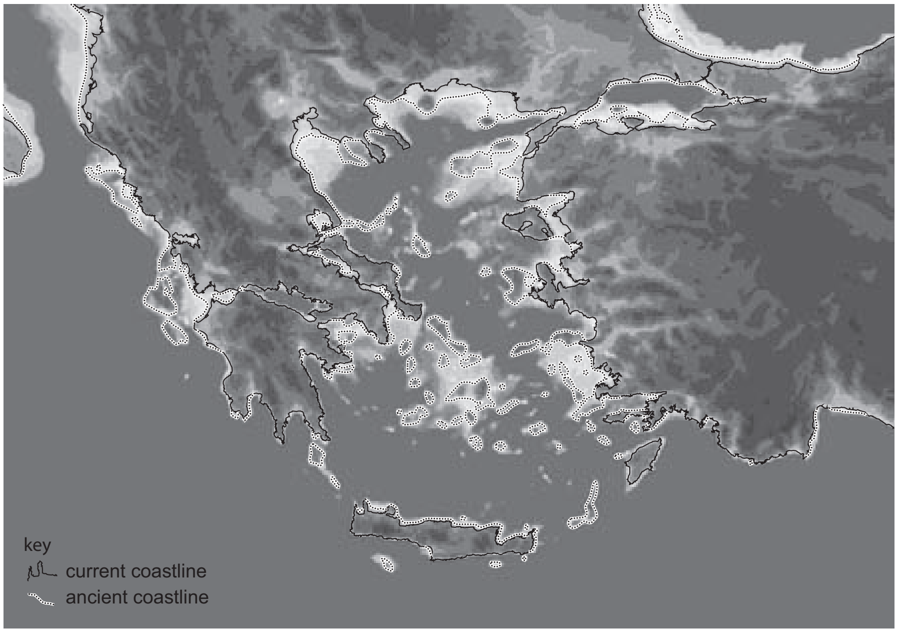

FIG. 2.4 The Aegean coastline at 12 kyr BP (*Lambeck and Purcell, unpublished data*) (*redrawn with permission of the authors by J.J. Fuldain*).

Chios, Samos, Kos, Thasos, and Skiathos became islands when sea levels reached a depth of 25 m, followed shortly after by Lesbos, Spetses, and Dokos, while Euboia, Tenedos, Salamis, and Poros became insular towards the end of the Neolithic and perhaps as late as the Bronze Age (Broodbank 1999a:23–4). The southern coastline of Cyprus at 9,000 BP was between 1.5 and 2.5 km farther out than it is now, and the island reached its present configuration by ca. 5,000 BP (Gomez and Pease 1992:4).

Dynamic spaces

We are now able to view changes in coastal palaeotopography in greater detail and explore the Mediterranean at critical times for colonisation. Although there are uncertainties in the ice models and Earth response parameters, the maps should be accurate to within several metres (A. Purcell, pers. comm.). By modelling differences in the shorelines, we are now in a better position to address the changing relationship between humans and their environment through specific colonisation questions: Does the dating of human presence correspond to periods of high/low sea levels? Can differential 'insularisation' explain the variation in the colonisation dates of the islands? The maps will provide an essential reference when discussing the colonisation data in Chapters 4 and 5.

Lambeck (1996:610) argued that evidence for early human visits to the islands may have been lost through the destructive effect of rising sea levels on coastal plains. He also pointed out that at times of rapid sea-level rise (especially after 14,000 BP), coastal displacement in low-lying regions may have been in the order of ca. 1 km per year (Lambeck 1996:606). Such coastal changes may have been noticeable over just a few generations and thus within the span of human memory. Perhaps a glimmer of this can be seen in the rock art on the island of Levanzo (Grotta del Genovese; Fig. 2.5), which shows at first large fauna, followed by human figures and schematised quadrupeds (identified as bovines, pigs, and deer) and large fish or dolphins. The different subjects depicted likely reflect different periods in the lives of the cave's inhabitants: first when the cave was located upland and surrounded by plains with Palaeolithic fauna, and then when the island became separated from Sicily and the islanders relied on both wild and domesticated animals as well as marine resources (Pluciennik 1994).

As we will see in the next two chapters, there is some correspondence between broad colonisation horizons and phases of environmental change. Nonetheless, these must be understood within the sociocultural context in which they took place and in terms of the dynamic relationship between islanders and their environment.

Island Resources

The human carrying capacity of islands is directly related to the availability of basic resources. The islands' size, distance, configuration, and geology all affect the availability of resources, as do rainfall, water sources, and the extent of agricultural soil. These factors impose constraints, but not absolute limitations, to human resourcefulness, as seen, for example, in the ability to create arable land by terracing hillsides, or to acquire external resources by various means. In this respect, we should also consider human

FIG. 2.5 Neolithic art inside Grotta del Genovese (Levanzo, northwest Sicily), showing domesticated animals, large fish (tunny?), and human figures/idols (*reproduced with the permission of the Soprintendenza Beni Culturali e Ambientali di Trapani*).

perception as a key element in determining whether an island can ensure a community's survival. The distribution of mineral resources and lithic materials—such as flint and chert, clay, and marble—and other materials, such as salt, would have added a strong incentive to colonise. These materials were needed to forge tools for clearing land (e.g., stone axes) and processing food (e.g., grinding stones), or may have been desirable for their aesthetic properties or as status markers, as was possibly the case for obsidian, ochre, and marine shell (Robb and Farr 2004:27–31). Initial colonisers may have brought with them entire 'packages' consisting of plant seedlings and animal stock. A minimum number of individuals would have been essential to establish a viable population on an island. In the case of Crete, Broodbank and Strasser (1991: 240–1) envisaged that a group of 40 to 50 migrant farmers (re)colonised the island by carrying sufficient livestock (pigs, ovicaprines, cattle) and grain, on some 10 to 15 vessels. Similarly, the Maltese islands lacked resources to such an extent that the entire Neolithic package had to be transported from Sicily (Bonanno 2011:151). Simmons describes these missions as 'veritable Noah's arks' (2011:67).

Within popular culture, islands are often considered different from mainlands, but there are some valid reasons for this. Their endemic fauna and flora are partly responsible for such a view, with plant and animal species found only on certain islands. Endemism is a consequence of the succession of climatic events (Blondel and Aronson 1999:27, 89): during the coldest phases of the glacial periods, boreal animal and plant species migrated to the southern Mediterranean, where they survived side by side with Mediterranean species in *refugia* or 'conservatories'. Certain mountain slopes, large peninsulas, islands, and river valleys were typical *refugia* for forests and their fauna. Thus, during glacial times, the Mediterranean environment hosted a combination of Mediterranean and boreal species, with many islands populated by large sea-bird colonies which are now found in the Northern Hemisphere (Blondel and Aronson 1999:29). As the climate warmed, the forests and related boreal biota moved north again, but some species remained within the Mediterranean area. This migration may have lasted into the Neolithic and after—that is, more than five thousand years after it had begun (Grove and Rackham 2001:159). According to Grove and Rackham (2001:157), most areas for which a pollen record exists had oak or pine around 7000 cal BC. However, most areas had a mix of forest and steppe. Several plant and animal species that effectively had been isolated within the 'conservatories' began to differentiate (Blondel and Aronson 1999:59). This process of differentiation is responsible for the high degree of endemism.

The degree of endemism in the flora varies between islands and mainlands and between islands themselves: it reaches 11% in Corsica, 11.7% in Crete, 9.7% in Sicily, and 12% in each of the Balearics (Blondel and Aronson 1999:60). The islands also display high levels of faunal endemism, with animals developing peculiar characteristics linked to the lack of natural predators (e.g., dwarf elephants and hippos, and giant rodents). These characteristics may have made such species highly vulnerable to humans (Grove and Rackham 2001:163) and to climatic fluctuations (Blondel and Aronson 1999:45). The demise of island endemic species is a matter of debate, in terms of explaining their extinction by the arrival of human predators on the islands, as we will see in Chapters 4 and 5. For the Cyclades, Phoca-Cosmetatou (2011: 82) explains that the endemic fauna had become extinct by 21,000 BP, and that the absence of fauna 'meant that people had to bring all their livestock to the islands from the mainland, including cattle'. Cyprus is thought to offer evidence for the mass exploitation of island endemic species (pygmy hippopotami and dwarf elephants) by human beings (at the site of Akrotiri-*Aetokremnos*) (Simmons 1999:43, 324). Binford (2000:771) and more recently Ammerman (2010) have challenged this hypothesis, while Knapp proposes that humans may in fact have coexisted with the last survivors of the 'mini-megafauna' or else used the bones as fuel (Knapp 2010:105) (see Chapter 5). Similarly, Ramis et al. (2002:8–9) believe that the bone deposits of *Myotragus balearicus*, an endemic antelope found in the Mallorcan caves (Balearics), were the result of natural and not anthropogenic accumulation, discounting earlier claims of human-related extinction by Waldren (1982) (see Chapter 4). The introduction of domesticated species may have had an impact on the islands' original fauna (if indeed present) and could only be the result of human introductions (Vigne 1996:65). Vigne argued that these introductions began a little earlier in the eastern Mediterranean (sixth millennium cal BC) than in the west (fifth millennium cal BC), only to increase considerably during the Middle and Late Neolithic.

Humans introduced species to the islands not just for domestication but also for hunting: wild boar (*Sus scrofa*) was introduced to Cyprus at Akrotiri-*Aetokremnos* in the 11th millennium cal BC (Vigne et al. 2009); fallow deer (*Cervus dama*) was also introduced to Cyprus as early as the eighth millennium cal BC (Davis, S. 1984; Guilaine et al. 1995; 1996); fox (*Vulpes vulpes*) to Cyprus and Corsica from the start of the Neolithic; and red deer (*Cervus elaphus*) to Sardinia before the end of the Neolithic (Fonzo 1987). The arrival of small mammals was probably a by-product of increased maritime contact (Vigne 1996:67–9). In fact, wild mammals introduced to the islands are a better indicator of the 'prehistoric compartmentalisation of the Mediterranean' than the domestic species, which were more or less ubiquitous in the Mediterranean (Vigne 1996:69). Vigne further notes that between the eighth and the second millennia cal BC, no eastern wild species were brought to the Tyrrhenian islands, nor were any animals from the Italian area introduced to the Balearics; he also claims that differences in composition between Sardinian and Corsican fauna (specifically in the rodents) may indicate two separate colonisation horizons (Vigne 1996:69). This possibility is reinforced by the fact that human genetic data indicate different colonisation histories as well as minimal amount of gene flow between the two islands, although gene sharing during the early stages of colonisation may have been swamped by the islands' complex subsequent colonisation histories (Francalacci et al. 2003:270).

Mediterranean Voyages

Adequate seafaring technology was the necessary means for island communities to come into being, maintain contact, and remain alive. Clearly, without boats and knowledge of the sea, there could be no settlement on any of the islands. Similarly, boats were also needed when islands were abandoned (i.e., when what occurred could be termed 'active' abandonment), unless abandonment was the consequence of a population dying out ('passive' abandonment) (Dawson 2008; 2010; see also Chapters 7–8).

These maritime voyages may have entailed discovery, exploration, migration, exodus, success or failure, and possibly return to the mainland or to another island. The strength and direction of the winds, being unpredictable, would have made navigation challenging (Giardino 1995:269). It is fair to say that such endeavours posed considerable difficulties for these early pioneers. If the return journey, the Greek *nostos*, of Odysseus is anything to go by, travelling on a boat would have taken a long time, entailing peripatetic drifting and plenty to keep one occupied en route, in spite of one's home longing or *nostalgia*. We should view these journeys not as fully purposeful and directional in a modern sense, but as carrying a good deal of expedience.

The obsidian found at Franchthi Cave in the Greek Argolid in a context dated around 11,000 cal BC has become the textbook example for early seafaring in the Mediterranean. It indicates that people were able to journey repeatedly over 200 km, 'island-hopping from the mainland to the island of Melos in the Cyclades' (Broodbank 2006:209; Perlès 1979). In terms of the raw materials found on islands, seafaring would have affected the value ascribed to such resources (with hard-to-get resources valued highly). Bradley (2000:41) has suggested that islands that were hard to reach may have conferred special qualities on the materials that were found there (e.g., obsidian), which, in effect, came to be regarded as 'pieces of places' (Bradley 2000:87, 88).

Broodbank (2006) has recently published an extensive review of the evidence for early maritime activity in the Mediterranean, providing an in-depth analysis of the current state of knowledge. In his detailed study, he analyses the significance of the evidence for early seafaring that is gradually emerging in the eastern Mediterranean. Not long ago, Broodbank pointed out that 'pre-Neolithic evidence is still lacking from Crete' (2006:212), but this has since been remedied (Strasser et al. 2010a; 2010b). Broodbank identified two principal phases of maritime activity: the first, around the eleventh millennium cal BC, may have been connected to a climatic phase known as the Younger Dryas; the second occurred in the third millennium cal BC and featured the earliest appearance of deep-hulled sailing ships in the Mediterranean (Broodbank 1989:327–9; 2000:96). Climatic, palaeogeographic, and social causes have been invoked in the case of pre-Neolithic colonisation, with lowered sea levels providing ideal conditions for the development of seafaring (Broodbank 2006).

A recent study of sea levels in the Adriatic lends support to Broodbank's (2006) hypothesis (Maselli et al. 2011). The authors point out that sea-level rise following the LGM was not monotonic; instead, two phases of enhanced glacial melting led to rapid sea-level rise or 'meltwater pulses' (MWP) (Fairbanks 1989). Detailed sediment analysis of the Adriatic seabed has shown three main units or deposits, punctuated by two phases of rapid sea-level rise (MWP 1a and 1b), which were warm, wet phases. During these two phases, starting at 14.2 kyr cal BP and 11.3 kyr cal BP, respectively, sea levels rose by about 20 m in less than 500 years (Maselli et al. 2011: 54). These two events were separated by 'a minor, but significant, sea level fall during the Younger Dryas event', in the order of about 2 m. The Younger Dryas also corresponded to a drop in temperature and a decline in vegetation cover (Maselli et al. 2011: 57–8). It may well be that this slight drop in sea level, made more noticeable after a phase of rapid rise over the short span of a few centuries, offered more stable conditions and a stimulus for venturing at sea.

Evidence for such early seafaring and its relation to subsequent Neolithic colonisation are discussed at length by Broodbank (2006) and Ammerman (2010; 2011). Broodbank makes the point that 'hunter-gatherers were not playing the ferryman to land-lubber farmers' (2006:213), as the lengthy pause involved (ca. 3,000 years) makes it clear that pre-Neolithic and Neolithic colonisation were separate processes. Ammerman (2011) also points out what he calls the 'paradox' inherent in the slowness (on average, only 19 km per human generation) of the spread of agro-pastoralism from Cyprus to Crete, then from Crete to the Greek mainland, and from Greece to southern Italy (given that there is evidence for the early capability of sea-crossings in the range of 100 km), while the transfer occurred swiftly in its initial stages from the Near East to Cyprus and in its final leg from Italy to the Iberian Peninsula. Cherry already noted that 'patterns in human island colonisation displayed a great deal of *noise*' (1990:199, emphasis added). By this, he meant 'anomalies, or colonisation events not following general models'. Such anomalies or 'paradoxes' could be attributed mainly to gaps in our knowledge. Zilhão (2000) has offered an explanation based on a punctuated advance model, characterised by different degrees of interaction between Mesolithic and Neolithic groups (Zilhão 1993: 51–2; 2000; also Fiedel and Anthony 2003:147, 150). Both Broodbank and Ammerman have argued along similar lines that we should envisage initially two coexisting ways of life, a land-based and a seafaring one, in order to explain such anomalies. Knapp has also pointed out that seafaring may have been a better strategy under variable climatic conditions than cereal cultivation and animal domestication (2010: 103). These hypotheses offer innovative ways of considering colonisation data.

What kind of boat technology could early colonists rely upon? The earliest vessels were canoes, known only from graphic representations found in the Aegean. In the Neolithic, small dugouts would have been used and, by the Early Bronze Age, 'longboats', powered by up to 25 paddlers (Broodbank 2000:99). Small canoes could travel up to 20 km in a day and longboats ca. 40–50 km, carrying up to a tonne of cargo (Broodbank 2010:253). Broodbank has estimated that crossing the whole of the Cyclades in a longboat would have taken less than a week if conditions were fine all the way, but was more likely to have taken two weeks in unfavourable conditions, in which case a return trip would have required around a month (2000:105; 2010:253). These figures indicate that most islands (in the Aegean but also elsewhere in the Mediterranean) were in 'colonising range' from each other within a day or two (Broodbank 2000:103). Sailing clearly represented a major breakthrough. The earliest representations of sailing vessels in the Mediterranean are from Cretan sealstones dating to the Middle Minoan II period (ca. nineteenth to eighteenth century BC), with one possible earlier seal from the late Middle Minoan IA or Middle Minoan IB period (twentieth century BC). Conversely, most representations of sailing vessels in the central and western Mediterranean are considerably later (from the first millennium BC), indicating 'westward expansion' of this new technology from the Levant to the Aegean, eventually reaching the Italian and Iberian peninsulas (Broodbank 2010:255–7).

As sails replaced paddling and rowing in the Mediterranean, distances would have been perceived in a completely different way, as days of travel were reduced. This would have had considerable social and cultural knock-on effects. An attractive explanation put forward by Broodbank (2000:341–9) for the Aegean is that islands that had thriving economies centered on the movement of goods using longboats could no longer compete with islands that offered good harbours for ships, and thus their settlement declined. Clearly, this technology was developed gradually and would not have caused a sudden change to settlement patterns. However, once sufficiently developed, it would have enabled people to cover greater distances and also to establish settlements on more remote islands than before.

The development of sailing not only enabled the settlement of faraway islands (though possibly its decline on others), but once trading networks faded, it also provided the means to pursue alternative settlement. With increased maritime movement, islands may also have become easy targets of raids and piracy. Permanent occupation of small islands would no longer be deemed viable in the absence of trading systems, and they were abandoned, presumably well before physical survival was at stake ('active' abandonment). 'An appropriate prehistoric map would presumably require stretching and warping geography to represent travel time rather than invariant spatial relations' (Robb and Farr 2004:27). Broodbank has attempted to picture this for the third millennium BC, by showing different 'maritime interaction zones' (2010:250, fig. 20.1) and the 'shrinkage' caused by sailing technology (2010:259, fig. 20.3), with travel time reduced in the east and increasingly greater towards the west, where sailing was yet to spread. In broader, sociocultural terms, the introduction of sailing vessels would have had two effects: on the one hand, it would have connected the small islands to the wider world, and, on the other hand, it would have made them more vulnerable. 'Mediterraneanization created winners and losers' (Morris 2003:51). The development of fortifications in the Bronze Age and the occurrence of destruction horizons in the archaeological record of the islands suggest that incursions (piracy) were a real concern and offer indirect evidence of changes in patterns of travel (Holloway 2005).

The development of seafaring created knowledge along its routes. In practical terms, currents determine the shape of a journey at sea. In general, winds in the Mediterranean tend to blow from the north and currents are counter-clockwise (Abulafia 2011:xxiv). Giardino (1995:272–6) has identified a number of paths of 'least resistance' that could reflect possible prehistoric seafaring routes at different times of the year. We should bear in mind that these reconstructions are based on the assumption that winds and currents have not changed considerably over the course of the millennia. If travelling westward across the Mediterranean, a sailing ship could take a northern route along the European shore and return eastward along a southern route (i.e., the North African coast) (Giardino 1995:338; see also Abulafia 2011:xxiv–xxix). Setting off from the Peloponnese, the westward journey across the Mediterranean could be undertaken between May and July using currents flowing up the coasts of Epirus and Albania, crossing the Adriatic towards southeast Italy (Puglia) and towards Sicily (Messina), following the coast around the tip of Italy. The opposite crossing of the Adriatic could be undertaken more easily between July and November (Giardino 1995:337). From December to May, currents favour the journey from western Sicily to southern Italy, then up to the western coast of central Italy (Campania and Latium). From there, a vessel could reach northern Sardinia and southern Corsica more easily between December and March (but also in May and in October). During the summer months, a journey in the opposite direction would lead from central and southeast Sardinia to the Pontine Islands and then to the Campanian coast of Italy. A number of seasonal currents around the Iberian Peninsula make the journey possible any time of the year from Cape Tortosa to the Ebro delta, on to Cape Nao and then towards the Balearics, from which Sardinia can be reached. From southern Iberia, there are two main eastward routes. The southern route uses currents that flow along the North African coast to Cape Bon (Tunisia) from September to May, from which vessels can head for Syrtis and Cyrenaica (Libya) and then into the eastern Mediterranean, taking advantage of the Ionian and Levantine current circuits. Alternatively, a vessel leaving from Cap Bon could reach either southwest Sicily (and then Italy) or Malta, via Pantelleria and the Sciacca banks. The second route leads from Cape Nao to the Balearic and Pitiussae Islands, into the Hesperian circuit and towards North Africa (Algeria), and uses currents that flow between April and June, in August, and between October and November (Giardino 1995:338).

Trans-Mediterranean voyaging is a feature of later prehistory, and it is likely that earlier short-range movements were affected by even greater variability. Castagnino Berlinghieri (2003:17–26) has described in detail the dynamics affecting the crossing between Sicily and the Aeolian Islands throughout prehistory and suggested that, although the short journey could be undertaken throughout the year, the crossing could be treacherous (being located at the confluence of very strong currents, which in Greek mythology became the monsters Scylla and Charybdis), as indicated by the high number of ancient wrecks (2003:34). Papageorgiou (2008) has identified seven main routes allowing year-round navigation within the Cyclades, and linked these 'sea-lanes' to the early discovery and exploitation of resources on Melos and to the establishment of early sites on a number of other islands (such as Kythnos). She goes on to suggest that these can be used in a predictive way to identify further early sites along these sea routes (as has indeed been the case on Ikaria) (Papageorgiou 2008: 10). In the Adriatic, two major currents from the east and the west converged on the island of Palagruža, making it a natural stopping point 'almost impossible to miss' (Forenbaher and Kaiser 2011:106).

Overall, navigating through different parts of the Mediterranean was possible at various times of the year, although currents could have effectively 'isolated' certain islands or favoured others that are situated on convenient routes. Seafaring would have required detailed knowledge of local conditions and the exchange of such knowledge between different communities, via oral tradition, collective memory, and mental maps (Robb and Farr 2004:26). In the case of Cyprus, Simmons (2011:57) envisaged multiple maritime journeys in order to colonise the island, driven by a desire to increase the food supply and satisfy the pioneer ethic (and perhaps curiosity), and conceivably instigated by 'disgruntled mainlanders' (2011:66). He believes these journeys were made possible by 'communal knowledge' of the island and coastal environment (Simmons 2011:67; cf. Knapp 2010:101). Knapp (2010:84) also argues that the first people to set foot on Cyprus were 'fisher-foragers and hunters' who made 'short-term, periodic visits' to the island to exploit its resources. They were pushed to brave the open water by rising sea levels and environmental changes in their Levantine homeland, with coastal plains rapidly disappearing and steppe-like vegetation taking over forests (Knapp 2010:92, 102, 106). 'The pull of an uninhabited place like Cyprus . . . would have been strong' as competition over resources intensified in the mainland (Knapp 2010:108). Keegan (2010:176) has pointed out that the 'decision to strike out is rarely an easy one', as each individual involved faced considerable challenges.

The archaeological evidence points to a wide range of activities carried out by early colonists reaching the islands, and consequently islanders would have experienced travelling at sea in different ways, depending on their prior knowledge of the sea and their expectations of what they would encounter. Such Mediterranean voyages would have taken the form of maritime exploration and migration in earlier periods, and then consolidated into voyages for trade, religious, colonial, and various other purposes in later periods. It is tempting, of course, to view the colonisation of the islands as essentially a maritime process. Rainbird (2007) argued that the sea is the most distinctive feature of island societies. Berg pointed out that 'the sea itself remains under-theorised and under-investigated', partly because, from an archaeological perspective, the sea 'does not allow us to build up a picture of its utilisation through time' (2010:20–1). Broodbank had already made the point some ten years earlier: 'What is still missing is an archaeology of the sea to match that of the land' (2000:34). He defined such an approach not merely as traditional maritime archaeology (e.g., the study of technological aspects of boat remains) but rather as the investigation of the 'dynamics of maritime culture', suggesting the following questions: How was the sea used, by whom, for what objectives, over what distance, at what cost, and how often? Rainbird has advocated a phenomenology of the sea, focusing on experience, embodiment, perception, and movement (2007:57–8).

Knapp makes a useful distinction between earlier 'seagoing' (defined as 'occasional forays into the sea') and subsequent 'seafaring' ('more constant, practised, and adept' travel) (2010:83). Seafaring has been defined as 'travelling upon and making a living from the sea' (Anderson et al. 2010:xiii). Abulafia has recently emphasised, in his lucid synthesis of Mediterranean history, the human experience of crossing the sea, or of 'living in locations that depended on the sea for their very existence' (2011:xxx). This is the case for prehistoric communities, in that travel to reach the islands took place by necessity across the sea; however, the extent to which people engaged with the sea once they were living on the islands would have varied, ranging from regular to occasional contacts with neighbouring communities and mainland populations, involving different distance ranges, and also depending on the type of resources being exploited (terrestrial, coastal, pelagic).

Variations in colonisation data indicate that 'making a living from the sea' was not a prerogative of all island communities; this seems especially true for 'land-loving' Neolithic colonists. In the case of Cyprus, Simmons noted that not all early Neolithic settlements were coastal, and not all of them were villages (2011:61). Phoca-Cosmetatou (2011) and Castagnino Berlinghieri (2011) have both commented on the relative scarcity of fishing remains in the Cyclades and Aeolian Islands, respectively, and referred to isotope analysis pointing to a terrestrial base for the Neolithic island diet (Castagnino Berlinghieri 2011:128). This dietary pattern also emerged from the excavations of the Brochtorff Circle on the island of Gozo (Malone et al. 2009). Larger islands especially have inland populations that do not engage with coast or sea (Fitzpatrick et al. 2007:232). Issues of island size and distance to other land have a strong bearing on these issues. We should consider, however, that while these islanders were not always using the sea to extract resources, it is likely that they still ascribed a profound significance to their watery surroundings. The 'islandscape' comprises 'land, coast, sea, horizon and sky' or 'three bands and two liminal zones' (Broodbank 2000:23), which are likely to be reflected in the islanders' cosmology.

In the case of Malta, Grima (2008) used spatial software analysis (ArcGIS) to highlight the liminality characterising the islanders' choice of where to locate their temples, which were built at the boundary between land and sea. More than 30 temple sites shared the same characteristics: access to the sea, freshwater springs, and agricultural land. Moreover, the iconography and spatial organisation of the temples may mirror their insular location (Grima 2001), with spiral motifs and fish associated with the cosmological domain of the sea (in the area of the temple courts); and domestic animals and terrestrial plants associated with the domain of the island (in the area of the temple apses). Grima makes the fascinating point that moving inside the temple was a 'metaphoric journey' and that 'the temple complexes may themselves have been metaphors for islands' (2001:63). Similarly, Broodbank (2010:253) has suggested that, by the Bronze Age, the iconography of boat representations (ranging from celestial imagery to female genitalia) indicates that seafaring in the Aegean was an integral part of the islanders' ideology and cosmology.

By enabling people to travel more effectively, improvements in seafaring technology brought communities closer to one another. It may be that this link or association with other people and places, particularly in terms of knowledge (Helms 1988), was an asset that was being sought, while in the case of hard-to-get-to places, access to resources may have strengthened ties between communities or triggered further competition. Mediterranean island prehistory entailed many voyages of colonisation, abandonment, and recolonisation.

Conclusions

Most studies of 'The Mediterranean' appear to be based on a land/sea dichotomy, generally emphasising one at the expense of the other. Some consider it as a world of coastal lands and islands held in a watery matrix, others as a sea enclosed by lands and studded with islands. These opposing conceptualisations can result in arbitrary juxtapositions of positive and negative spaces, in which the sea is considered either a boundary or a highway, and islands either gateways or dead ends. These views are not entirely unfounded, since specialist studies of the Mediterranean, focusing on specific periods or areas, may identify these particular features as being more prominent at any given time. The advantage of viewing the Mediterranean through a wide-angle lens, considering it in its entirety and over a long chronological period, is that it emerges as being all those things: terrestrial and maritime elements confer mutual meaning to the whole, but it is people who act as the binding agents. As people negotiate their natural surroundings, taking advantage of existing assets and overcoming any shortcomings to the best of their abilities, they define the islands and the sea as cultural entities rather than simply as physical spaces. The sea and the (is)lands are not merely a theatrical backdrop; rather, they are active agents in cultural processes. Changes in coastlines, climatic fluctuations, volcanic phenomena, the availability of resources, and human capacity are all dynamic forces, not prime movers in a deterministic sense, but taking lead roles at different times. Making sense of these processes and conveying them through conventional means, such as maps and text, entails some degree of simplification, but increasingly sophisticated theories are being devised to capture these shifting relationships, as we shall see in the next chapter.

Chapter 3

Theories of Colonisation

The term 'colonisation' has been used rather differently by individual researchers over the years, but it has generally been equated to permanent settlement. Increasingly, new evidence is leading to a better understanding of the various uses that people make of islands and, consequently, of different forms of colonisation. These data suggest that colonisation in an island context may not necessarily take the form of permanent settlement, as may be considered the norm in a mainland setting. Different kinds of human activity on islands can now be better discerned than in the past, although the degree to which they can be practically separated varies from case to case. A growing body of theory has also contributed to major changes in the concept of insularity.

The following review of previous colonisation studies aims to clarify some of the complexities of this process and the multiple activities it encompasses. Therefore, where possible, the study will refer to these specifically (e.g., visitation, utilisation, occupation, settlement). Case studies, some explicitly concerned with islands and others with mainlands, are also analysed for comparative purposes. The ultimate aim of this review is to foreground an improved theory of island colonisation, which is discussed in Chapter 6. Initially, I adhere to the following basic definition: colonisation is the 'setting up' of people's presence in a geographical area. This definition will be elaborated later, as we investigate whether this 'setting up' took place in an empty area or an inhabited one (where people were previously present or were there at the time of the newcomers' arrival), what that setting up involved, what motivated it, what triggered that presence, how long it lasted, what obstacles it encountered, and what its outcomes were.

The Island as an Object of Study

An island is deceitfully simple in its form. During the 1960s and 1970s, islands appealed to scientists who considered them to be discrete entities displaying special

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Mediterranean Voyages: The Archaeology of Island Colonisation and Abandonment, by Helen Dawson, pp. 42–68.

characteristics: 'an island is a dry-land of less than continental size surrounded and isolated from other dry land by water' (Fosberg 1963:5); and accordingly: 'an island is certainly an intrinsically appealing study object . . . a visibly discrete object that can be labelled' (MacArthur and Wilson 1967:3). The development of the 'special' characteristics of the 'island ecosystem' (Fosberg 1963:5) was explained by Vayda and Rappaport in terms of the 'founder effect' principle, which postulates that a species colonising an island will develop differently from its parent population, because only part of the gene pool is brought to the island (1963:134). Conveniently, while they did display such distinctive characteristics, islands could also be studied in order to understand mainland processes: 'by studying clusters of islands, biologists view a simpler microcosm of the seemingly infinite complexity of continental and oceanic biogeography' (MacArthur and Wilson 1967:3). This approach echoed the work of early twentieth-century French geographers (e.g., Brunhes 1920 and Vidal de la Blache 1926), who believed it possible to study the Mediterranean environment by focusing on the islands. These 'biogeographical approaches' also influenced the development of the 'laboratory' analogy, which views islands as closed microcosms, an approach which gained popularity in studies of the Mediterranean and Pacific islands alike (Evans 1973:519; 1977:13; Keegan and Diamond 1987:50).

Broodbank and Strasser (1991:233) originally embraced the island laboratory argument, stating in an article on the colonisation of Crete that 'an island offers a clearly definable unit in which to conduct the search for antecedent human occupation, combined with a typically distinctive and often impoverished range of island biota—excellent circumstances to compare indigenous and exogenous. . . . An island environment furnishes favourable conditions for a feasibility study of migrant colonization as a mode of agricultural expansion'. These statements echoed the words of Evans, who emphasised the 'special' physical conditions of islands, which made them particularly appropriate for the archaeological study of populations: 'island communities may offer a number of significant advantages . . . essentially from the limitations imposed by this kind of habitat on the various forms of life which may be present' (1973:517). More recently, Bevan and Conolly (2013:6) have highlighted the empirical value of the island unit (not to be confused with issues of isolation), reviving the 'much maligned idea of the island laboratory' in their survey of the small island of Antikythera.

The effects of biogeographical variables could be gauged through geographical and mathematical formulae. For example, MacArthur and Wilson (1967) originally devised formulae to calculate the potential roles of island area, distance, and presence of intervening stepping-stone islands (Fig. 3.1).

Held also devised a target/distance ratio (T/D ratio) (1989a:13), which takes into account island target size (measured in degrees) on the horizon, rather than actual island size, and relates to the likelihood of an island being discovered (the higher the value, the higher this potential):

$$T/D = \text{target width (in degrees)}/\text{distance from staging point (km)}$$

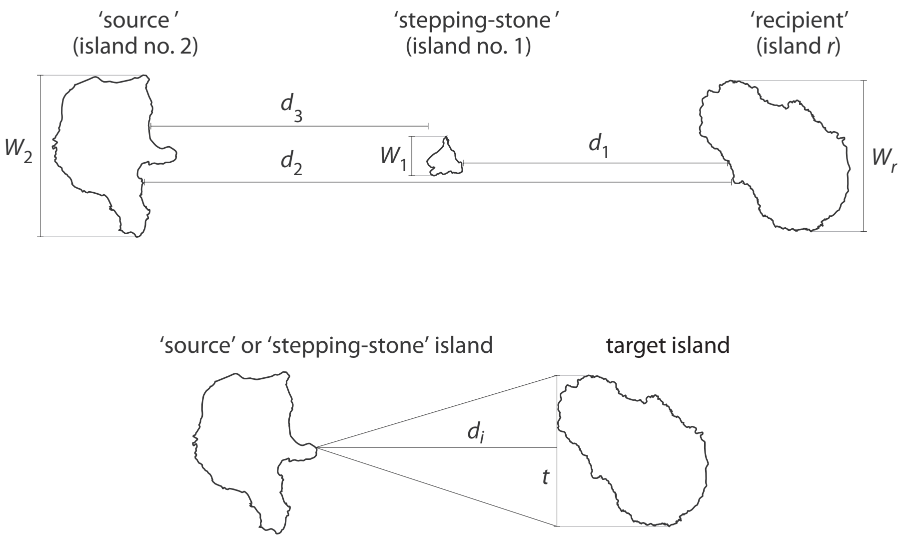

FIG. 3.1 Island biogeography: stepping-stone effect and target/distance ratio (*MacArthur and Wilson 1967*) (*redrawn by J.J. Fuldain*).

Island biogeography was used to explain not just initial colonisation but also subsequent development: the 'rescue effect' (Brown and Kodric Brown 1977; Keegan and Diamond 1987) postulates that island populations close to other sources of population are less likely to go extinct; and the 'commuter effect' (Keegan and Diamond 1987:59) indicates that islands that are not self-sufficient can support populations if they are within 'commuting' distance of another source. Using variables such as island area and 'longest single voyage' (LSV) (Patton 1996:40), biogeographers calculate an island's 'biogeographic ranking' (BGR), which indicates the likelihood that an island will be colonised and that, once there, a colonising population will survive (a high value indicates a high probability):

BGR = island size (sq km)/LSV (km)

Biogeographical categories are obvious simplifications of reality and far removed from any true experience of navigation. For example, the angle formed by an island on the horizon (target/distance ratio) varies not just depending on its distance from any given staging point but also on the actual visibility from that point. In reality, visibility depends not just on distance but also on altitude and vegetation (Levison et al. 1973:21), as well as on weather conditions, which may differ on both a seasonal and a daily basis (Bass 1998:180). Strasser (2003) has pointed out that the application of T/D ratios to Mediterranean islands is misleading in view of their configuration, while Anderson has stressed the importance of not treating distance and maritime travel as given facts, as 'in the past, relative isolation of islands depended on the fundamental relationship between the sea and boats' (Anderson 2004:263).

Broodbank and Strasser claimed, at the start of the 1990s, that 'maritime movement requires a distinct spatial re-location, whose minimum range is conveniently calculated as the distance between landfalls' (1991:233). This study was part of a general movement towards 'humanising' the sea, and hence a move away from the sea as a barrier—the 'isolated island' paradigm (e.g., Helfrich and Townsley 1963)—towards the idea of 'seascapes' or a more contextualised island (Gosden and Pavlides 1994; Lape 2004). This movement was already in progress in fields other than archaeology, as expressed by Vernicos some years earlier: 'minor islands, particularly those of the Mediterranean, have been enclosed by a web of human activities extending over a large regional area and beyond it' (1987:101). Perpillou (1966:18) defined islands 'as little regions held in a matrix', and King and Kolodny as 'semi-closed systems' (2001:238), emphasising that between the two extremes lies a whole spectrum of possibilities.

The realisation of the importance of configuration and of viewing islands in relation to nearby islands and mainlands, rather than as isolated units, is not that new, but only recently have configuration studies gained coherence. Held (1989a; 1989b) already argued in the 1980s that insular configuration should include distance, presence of stepping-stone islands, palaeocoastlines and morphology, and island size. Broodbank has also claimed that 'regional configuration of mainland coasts and islands, rather than individual islands' configuration, based merely on size and distance, are more relevant for the overall analysis of colonization' (1999a:19). Renfrew (2004), too, emphasised the need to include in island studies the mainland and islands 'acting' as mainlands. He identified two processes in the formation of networks of interaction and island cultural development: 'archipelago intensification' and 'main island intensification' (Renfrew 2004:289).

Because of their geographical configuration, Mediterranean islands cannot be considered as physically closed entities. This realisation has made the labelling of islands as 'natural cultural laboratories' (Evans 1973) increasingly unfashionable (Rainbird 1999; 2004). A theoretical transition from viewing islands as segregated units to seeing them as interconnected entities has taken place. Clearly, the shift between the micro- and the macro-scale of observation in island studies depends on the questions being asked; and, as long as isolation is rigourously assessed (rather than arbitrarily rejected or embraced), focusing on individual units of study can be advantageous if carried out within a comparative framework. This change in emphasis is partly related to the shifting attitude towards the role played by the sea itself (e.g., unifying or segregating), which has also gradually changed. The important question in relation to this is whether distance and isolation are directly proportional, or whether physical isolation and distance can be overcome through networking.

Recent years have seen the development of a more flexible attitude towards insularity that emphasises the need to understand how land and sea are articulated. Connectivity is a theme in Fitzpatrick's edited volume on island archaeology (2004). Nonetheless, in his contribution to that publication, Anderson has warned of the dangers of exchanging one extreme (isolation) for another (interaction)

(2004:255). Thus, each insular situation should be judged individually, in order to ascertain an island's changing degree of isolation/interaction over time. The critical issue is not so much whether islands constitute individual units in the eyes of researchers but rather what prehistoric people made of island environments. Broodbank (1999a:21) proposed that, because of Crete's sheer size, its Neolithic settlers might not have even realised they were on an island. Perhaps, then, while some prehistoric settlers may have been unaware of the insular status of their new bases, archaeologists have overemphasised insularity, with the result that islands are often still regarded as closed units simply because they are surrounded by the sea (cf. Waldren 2002). Guerrero (2001:136), for instance, viewed the human colonisation of the Balearic Islands as 'radically different from the occupation of new territories on the mainland'. He compared the Balearics to 'oceanic' islands, contrasting them with other Mediterranean islands in view of their 'isolation'. This argument was then used to support the idea that the Balearics had been colonised later than other Mediterranean islands of comparable size and had undergone two consecutive phases of colonisation (Guerrero 2001:141). On closer inspection, it becomes evident that this reasoning is arbitrary, since the Balearics are larger and less distant from the nearest mainland than an island such as Lampedusa, which was colonised earlier in the Neolithic and has been described as 'the most isolated island in the Mediterranean' (Camps 1988:46).

Island archaeologists are increasingly accepting that geographical isolation could be overcome, and that 'insularity was a social construction' (Lull et al. 2002:124). In some cases, 'configuration simply refutes the stereotype of the remote and isolated island' (Moss 2004:180). At the same time, however, several researchers have expressed concern about the fact that, although isolation should also be understood in terms of 'social' factors, geographical isolation is being downplayed excessively (Cherry 2004: 244; Anderson 2004:255). This debate has encouraged the creation of a whole new set of colonisation models and of new takes on traditional models, all of which share an underlying concern with establishing the role played by configuration and resources—that is, how islands (and islanders) are articulated with other physical and cultural entities (Broodbank 1999a; 2000; Terrell 2004; Kennett and Clifford 2004).

A useful new paradigm has emerged in recent years: the 'islandscape'. This concept blends islands, sea, and mainlands, and it is not static but dynamic (Broodbank 2000:21). The islandscape emphasises usefully that the sea does not necessarily isolate islands but rather may provide a connective tissue (cf. Gosden and Head 1994). The concept has been received with much favour by archaeologists. Anderson believes that the islandscape is not applicable to areas where islands are truly physically remote, but that it is effective in the Mediterranean (2004:254). Clearly, the concept of islandscapes cannot be applied ubiquitously; it works extremely well for the Cyclades and has great potential for other areas in the Mediterranean, such as the Dalmatian islands. Nonetheless, it is the element of social and cultural interaction inherent in the concept that makes it appealing and broadly applicable, even to areas with disparate geographical characteristics.

As islandscapes are created not only through direct knowledge of neighbouring places but also indirect contact and accumulation of knowledge, they are potentially hard to define, since they combine spatial and cultural aspects. Zedeño has pointed out that 'landscapes may not be bounded, but they are finite' (2000:97), and that their limits correspond to the extent of people's direct and indirect interaction with other people and their lands and resources. Archaeological data are necessary in order to define accurately the range of this interaction (i.e., the extent of an islandscape). Broodbank offered an approach to 'model the extent of the islandscapes' by determining navigation ranges from the islands, which depend on technology and environmental conditions varying over time (2000:260; cf. Irwin's [1992] 'mutual accessibility matrices'). Broodbank used 'proximal point analysis' or PPA (another technique applied in Pacific island studies) to predict patterns of connection between the Cyclades at different times. Combining the PPAs with navigation ranges, he was able to identify different interaction zones which showed good correlation with the distribution of known sites and stylistic groupings of material culture (2000:199).

To return to the issues posed at the start of this section, it has become increasingly clear that Mediterranean islands can provide units of study but that these units are not sealed, since, at least for smaller islands, interaction was vital to community survival, and the sea (and maritime technology) provided the means for that contact. Larger islands, such as Crete and Cyprus, were less reliant on networks, as they were large enough and had sufficient resources to maintain a self-sufficient population. This line encourages a more comparative approach, between different scales of enquiry (e.g., individual islands, island regions). Before we move on to this issue, we need to look at colonisation in more detail.

CHERRY'S MODEL OF ISLAND COLONISATION

Cherry's 1981 paper on Mediterranean island colonisation marked a turning point in island studies. In that article, 'Pattern and Process in the Earliest Colonization of the Mediterranean Islands', he used systematic testing and palaeogeography to highlight both the advantages and the limitations of using analogies drawn from the theory of island biogeography, as developed by MacArthur and Wilson (1967). Cherry aimed to establish any regularity within the islands' archaeological record which might explain what had led to their first occupation. At the same time, he was also interested in the variability in rates and patterns of colonisation. The paper also outlined his theoretical framework by providing the following definitions relating to colonisation (1981:40):

- *Utilisation:* This would involve only seasonal visits to an island (Cherry mentioned, as potential reasons for these, summer pasturage, access to valued resources, and fishing expeditions) by humans who were usually based elsewhere.
- *Earliest occupation:* This he defined as the 'time when the island became for one or more groups the principal provider of the subsistence requirements and the focus of its residential pattern throughout the year', with possible seasonal

> trips away from the island. Cherry noted that built structures and groups of burials were possible signs of permanence (as they would indicate long-term commitment to a specific land).

Cherry also defined colonisation as a series of 'tentative, impermanent, short-distance reciprocal movements' by small groups of individuals (1981:60). Colonisation is thus defined *both* as earliest occupation (or the fulfilment of more or less permanent settlement) (1981:48) *and* as an activity leading to that occupation (i.e., 'tentative movement'). Recent updates have brought little clarity to this issue, since they are largely based on Cherry's theoretical models and rely on the same data.

Patton, for example, used a distinction already made by Cherry between animal and human colonisation to claim that, in the case of animals, discovery and colonisation (or 'the establishment of a population', in Patton's words) usually coincide, while 'a human community may visit an island periodically without actually colonising it' (Patton 1996:36; cf. Cherry 1981:41–2). Here, too, colonisation is viewed as the establishment of settlements, with little attention to other activities carried out by humans on islands, even though Cherry himself had noted that the archaeological record reflects a complex 'variety of strategies' (1981:60).

Cherry (1981:44) made the point that island colonisation should entail human movement to areas that were actually *insular*. Detailed palaeogeographic maps were not available in 1981, but Cherry was aware of the fact that the maximum lowering of the sea during the Würm glaciation had not exceeded ca. 130 m ± some degree of error (Cherry 1981:44; 1990:192–4; and 2004:237, for a recent update, which confirms his original study). This allowed him to recognise islands that could never have been joined to other islands or to the mainland in geologically recent times. After reviewing the various claims for pre-Neolithic human presence on Mediterranean islands, Cherry argued that only the finds from Corfu, Alonissos, and Euboia, and those from Sicily, Levanzo, Corsica, and Elba could be accepted as pre-Neolithic (1981:44–6). However, as noted by Cherry himself, all of these islands could have been reached via landbridges, except for Corsica. His conclusion was that, excepting landbridge islands and close offshore islands, there was scant evidence for 'the human use or occupation of islands anywhere before the beginning of the Holocene' (Cherry 1981:41).

Cherry explained this lack of pre-Neolithic occupation by the fact that 'Mediterranean islands would have been generally unsuitable as home bases for hunter-gatherers' (in his view, being too small to provide sufficient resources) and suggested that improved climatic conditions, the extinction of mainland megafauna, and the inception of farming turned islands into suitable places for permanent settlement, the last by allowing increased production from smaller portions of land (1981:59). However, this seemed to be true only in the western Mediterranean. For the eastern Mediterranean, Cherry criticised Evans's (1973, 1977) claim that island colonisation was a Neolithic phenomenon, although he acknowledged that future finds might change the picture (1981:62).

For the eastern Mediterranean, Cherry identified a substantial interval between the inception of farming and what he saw as the earliest permanent occupation of the majority of the islands, which appeared to cluster in the Bronze Age (1981:62). He explained this time lag in general terms by the fact that, in his view, islands provided 'fragile environments' compared to the mainland (1981:59) and so, logically, they would have been colonised as a late phase of the Neolithic wave of advance in Europe (Ammerman and Cavalli Sforza 1973; 1979). He also noted some important east–west differences in the islands' geography (1981:63), which could account for the fact that the pattern of island colonisation then known appeared to reflect an 'inexorable selective pressure favouring the larger islands' within an 'adaptive framework' (1981:59–60).

Cherry also noticed that while in the eastern Mediterranean islands tended to be 'individual cultural entities' up until the late fourth or third millennium, islands in the western Mediterranean displayed 'a remarkable homogeneity of material culture at this time', even if they were physically very far away from each other (1981: 63). He argued that the lack of correspondence between island and mainland 'cultures' in the eastern Mediterranean could be taken as substantiating the idea that the communities involved in the peopling of the islands were small and isolated (1981: 61). This, he argued, was not the case for the western Mediterranean, where island and mainland cultures could be matched more easily.

One of Cherry's main endeavours was to investigate differences between the eastern and western islands systematically, by using biogeographic analysis (MacArthur and Wilson 1967). By plotting the approximate dates of initial settlement of the islands in the eastern and western Mediterranean in relation to island size and distance to the nearest mainland, he argued that the order in which humans occupied the islands was to some extent simply the reflection of these geographical characteristics, and that ecological differences and 'island hopping' may account for some variability in this pattern (1981:50–2). The pattern was particularly evident in the eastern Mediterranean, where he noticed that larger and closer islands (generally larger than 100 sq km and less than 50 km away from the mainland) appeared to have been colonised earlier. He also noted that most of the smaller islands (generally less than 100 sq km), which were not suitable for sustaining large populations, were colonised in the Early Bronze Age, and that during this period, area, distance, and ecological richness did not appear to have played a prominent role. For the western Mediterranean, Cherry additionally noted that the first sites also occurred on very large islands (e.g., Sardinia and Corsica); however, he noticed a lack of patterning in the spread of colonisation during the Neolithic (which he attributed partly to the lower number of islands in the sample).

Cherry also created a plot of cumulative percentages of the islands in the eastern and western Mediterranean which showed evidence of occupation by a given millennium BC (1981:62; and Fig. 3.2). He argued that during the seventh and sixth millennia and after the third, island colonisation in the eastern and western Mediterranean followed a very similar pattern, and that the major differences emerged during the late sixth to fourth millennia, when colonisation increased substantially in the western Mediterranean islands. The pattern for the second and first millennia suggested the 'gradual infilling' of smaller islands which, according to Cherry, could not support large enough populations without relying on communities on nearby larger islands, which thus must have been colonised first.

Cherry ultimately explained these differences through the dissimilar configuration of islands in the eastern and western Mediterranean: the average distance of the islands to the nearest mainland is similar (according to Cherry's figures, 67 km in the western Mediterranean and 82 km in the eastern), but the western Mediterranean has the larger total island area. The eastern Mediterranean islands are roughly similar in size, while the western ones are either very large or rather small, ultimately suggesting to Cherry the importance of stepping-stone islands and of large islands acting as 'mainlands'.

Cherry's (1981) conclusions were thus:

1. there was no definite pre-Neolithic settlement on any Mediterranean island, although there was evidence of widespread movement;

2. the settlement of most islands was a 'relatively late phenomenon' (mainly a Bronze Age one);

3. the chronological pattern of settlement in the east and west Mediterranean differed, and geographical parameters were likely to be responsible for this.

In 1990, in a new article, Cherry synthesised some significant developments that had taken place since 1981, but he did not update his graphs in the light of these new discoveries. This would have had an equal impact to his original review; so, as it is, several studies of the Mediterranean (e.g., Vigne 1989; Patton 1996; Grove and

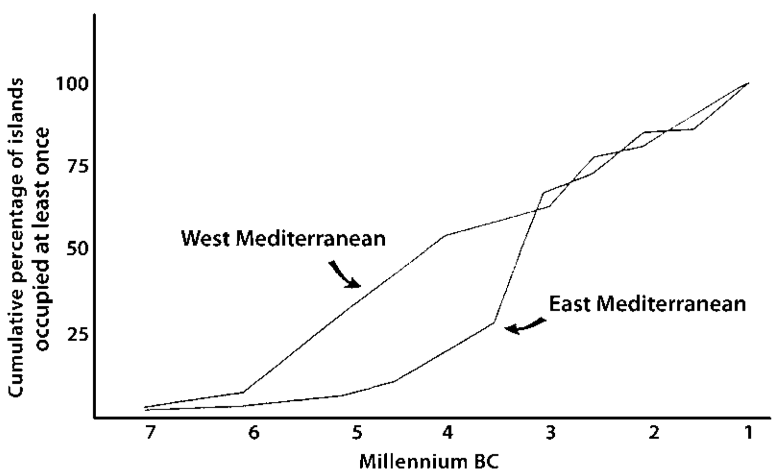

FIG. 3.2 Cherry's (1981) cumulative plot of island colonisation *(reproduced with permission of Proceedings of the Prehistoric Society).*

Rackham 2001) still refer to the graphs contained in the original 1981 article or, at best, to the 1990 review, both of which are by now in need of updating. The 1990 article was intended as a 'resource document', an 'overview of some of the more significant discoveries and interpretative developments during the past decade' (1990: 148). This was in contrast to the primary objectives of his original paper, which attempted to 'extrapolate regional patterns of colonisation from the data' (Cherry 1981:48).

The main developments synthesised in the 1990 paper included a few instances of Palaeolithic occupation of true islands; a ninth millennium BP (eighth millennium cal BC) human presence on all the larger islands or island groups (except Crete); and human presence on Cyprus 'one to two millennia earlier' than previously believed (at the site of Akrotiri-*Aetokremnos*) (1990:145). Cherry also noted an increase in the number of smaller islands colonised between the seventh and fourth millennia BP (ca. the sixth and third millennia cal BC), and suggested that colonisation in the Aegean may have begun slightly earlier than had previously been supposed (1990:164).

Cherry had become increasingly concerned with the need to provide a strong empirical basis for the patterns: 'more and better data, in other words, both from excavations and surveys' (Cherry 1990:202). Thus, in the 1990 paper, he moved towards predictive modelling. He reviewed a series of studies, including Keegan and Diamond (1987) and Held (1989a; 1989b), which explained the likelihood of an island being colonised and the potential of various colonisation staging points based on an island's 'geometric properties' (Cherry 1990:199). Cherry believed that 'this approach could provide an insight, albeit still theoretical, into the likely geographical origins of the island's colonists' (1990:201).

Drawing on the significant advances in the palaeogeography of the Mediterranean islands, he argued in favour of a more sophisticated approach to concepts such as 'area' (which should include considerations of habitat variation on islands), 'distance' (which must include the stepping-stone effect), and 'configuration' (intended in terms of target area and the calculation of target/distance ratios to infer likelihood of discovery/colonisation). He concluded that the 'truth would not simply emerge with more and better data' and that it was 'more profitable to get on with the job of trying to make sense of what we know now' (1990:203). This statement may appear to contradict his previous previous plea for 'more and better data' (1990: 202). However, both express two equally valid points: the constant need to update the models through island surveys and excavations, but also the requirement that an appropriate interpretative framework is in place, as data themselves cannot provide an answer. Recently, Cherry has concluded that the issue as to 'what we mean by "colonization", as distinct from discovery, exploration, occupation, establishment, [and] utilization' is still unresolved (2004:239). Indeed, the evidence that will be reviewed in the following chapters indicates that problems may arise from viewing only permanent settlement as 'colonisation', and we should perhaps be thinking in terms of a colonisation 'category', made up of different types (and/or phases) of colonisation activities that are related to different aims.

Recent Theoretical Advances in Island Archaeology

Advances in ideas about island colonisation since Cherry's original work have come disguised in different kinds of publications: some have an explicitly theoretical agenda (e.g., Patton 1996) and some a practical remit (e.g., Gaffney et al. 1997), while others, these being the most useful of all, offer a combination of both (e.g., Bass 1998; Broodbank 2000; Bevan and Conolly 2013). Recent years have seen an increase in island-based projects, which have produced new data that either complement or radically alter views regarding island cultural development. In some cases, these views are broadly confirmed (e.g., Malta); elsewhere they are changing incrementally (e.g., the Aegean islands). Major advances have concerned particularly Cyprus (Simmons 1999; 2011; Ammerman et al. 2006; 2007; 2008; Knapp 2010; 2013) and the Balearics (Ramis and Alcover 2001), with opposite effects on their chronologies; and new regional syntheses have been published (e.g., the central Adriatic islands: Bass 1998; and the Cyclades: Broodbank 1999a; 2000).

Patton (1996) argued, along similar lines to Cherry's (1981), that the first islands to be colonised (pre-Holocene) had high 'biogeographic ranking' (being large and close to the mainland), while islands with lower carrying capacity and biodiversity were colonised during three subsequent phases of human development: during the Neolithic, the Secondary Products Revolution, and Bronze Age state-organised commerce (cf. Cherry 1981:42). By Patton's own admission (1996:59), his 'sociogeographical' theory is not without its problems, since several Mediterranean islands with high biogeographic ranking were in fact colonised in later periods, contrary to what might be expected. Conversely, some very small and relatively faraway islands were colonised very early. Patton suggested that these anomalies could reflect 'a significant element of *chance* in the process of colonisation' (1996:59, emphasis added). As we will see, 'chance' could also entail choice and/or avoidance. Ultimately, as we shall be able to demonstrate in the following chapters, the three phases invoked by Patton (1996:59–62) are chronologically too broad to offer a strong explanatory framework for island colonisation. This is partly because his spatial focus is pan-Mediterranean (1996:60), with limited enquiry at the regional level, so that local dynamics are not given sufficient weight. Cherry (1997:501), who praised Patton's contribution as being the 'first book-length Mediterranean-wide treatment of the subject', also heavily criticised his cyclical sociogeographical model and the book's 'unacceptably high level of errors on virtually every page' (1997:503). Patton (1996:62), however, did make the important point that the evidence for island colonisation indicates that this was an irregular rather than smooth process of 'infilling' (further discussed in Chapter 6); his book also firmly established island archaeology as a field of study in the Mediterranean. Broodbank's *An Island Archaeology of the Early Cyclades* (2000) has, in turn, placed Mediterranean islands at the forefront of global archaeological studies. In this work, he presents cogent questions and explanations for the colonisation and subsequent cultural development of the Cycladic islands, drawing on approaches originally devised for different geographical regions. The strength of his islandscape approach has already been outlined; here we review how it can be applied to explain initial colonisation. Broodbank argued that the underlying causes of island colonisation in the Aegean could be explained by the islands' configuration, thus offering the following three models (1999a; 2000). According to the first model, 'dry-shod entry and subsequent insularization', colonisation was unintentional, as people simply found themselves on islands owing to rising sea levels. In the second model, a small number of 'super-attractor' islands (generally large islands close to the mainland) were targeted intentionally by early colonists. In the third, the configuration of archipelagos (especially those formed by tight clusters of small islands) would foster maritime movement ('seafaring nurseries') and colonisation through a process of 'autocatalysis' (a concept explored originally for the Pacific by Keegan and Diamond [1987]). This would have been part of a 'relatively unconscious' process of expansion (Broodbank 1999a:33). Broodbank (1999a:27) argued that the presence of large coastal islands (super-attractors), such as Samos, Kos, and Rhodes, made the southeast Aegean the most favoured area for colonisation in the Aegean. Its overall configuration also rendered it a likely 'jump-off zone' into the Cyclades (Broodbank 2000:133).

As discussed in Chapter 2, several islands in the Aegean became insular either towards the end of the Neolithic or even in the Bronze Age (Lambeck 1996). Did it matter that these territories were actually islands? Broodbank raised the question: 'was Kea colonised or the coastal landscape of Kea facing Attica?' (2000:142). Were islands conceived of as separate entities from the mainland or as extensions of it? The fact that several Mediterranean islands were in voyaging range from each other could suggest that they were in fact not regarded very differently. Ultimately, if we are to understand fully the colonisation of islands, we should not isolate them from their nearby mainlands. McCartney (2010:187) has made this clear in relation to the initial colonisation of Cyprus, stating that the island's archaeological record should be seen 'as a normal part of variability within the wider Near East' and not as inherently different because of Cyprus's 'insular status' (2010:185). She proposes that the island may have been perceived by mainland foragers as 'a home away from home', rather than 'a distant land to be conquered' (McCartney 2010:188). Subsequently, however, between about 9000 and 5500 cal BC, 'a unique Cypriot culture crystallised' as the island diverged increasingly from the mainland (Knapp 2010:111).

In the Mediterranean, island discovery did not necessarily correspond to settlement. In the Pacific, on the other hand, Anderson has claimed that distances and boat technology made return voyaging uncommon, and thus, in general, it is likely that discovery coincided with settlement (2003:173). Increasingly, at least in the Mediterranean, the presence of the sea is seen less as an obstacle and more as an enabling factor. Greater emphasis is placed on the cultural value of seafaring, in terms of the duration of travel and thus, by extension, perceptions of distance, interaction, value, and knowledge (e.g., Farr 2006). There is no simple answer to these questions: spatial and cultural features of island populations entailed both restrictions and opportunities.

Broodbank also claimed that 'an archaeology of island colonisation should offer more than an explanation of spatial patterning' and focus on the role of cultures and their interactions in overcoming and mediating geography (2000:144). He was concerned with a number of questions, including:

1. How real are the data-derived patterns currently seen?
2. What coherent or differing factors determined colonisation in each island region?
3. How interconnected were the colonisation sequences in different islands or island groups within individual regions or in the Mediterranean in general?
4. What are the implications of the considerable variations in the colonisation dates attested on different islands?

Broodbank also adopted Cherry's approach to colonisation in the first instance, reworking it to explain specific processes relevant to the early Cyclades (2000: 107–10). As mentioned, Cherry viewed colonisation as a series of tentative human movements but ultimately defined 'successful colonisation' as the establishment of permanent settlement, usually, though not exclusively, resulting from precursor activities such as utilisation (Cherry 1981:48; 1990:198). Vigne (1989), Cherry (1990), and Vigne and Desse-Berset (1995) were all equally concerned with defining accurately different types of archaeological evidence diagnostic of these activities: exotic materials were taken as evidence for either visitation or utilisation; other indicators of temporary activities included waste from tool manufacturing and from food preparation and consumption (e.g., wild animal or plant remains). Finally, only structural remains, such as the remains of huts and burials, were taken as evidence for permanent establishment. Broodbank noted that this approach was too strict, as amply demonstrated by the discovery of a growing number of Neolithic sites on the Cycladic islands (2000:125). He also observed that variation in the archaeological record of the earliest colonisation of the islands could be explained as representing 'different ways of inhabiting these islands' and not necessarily as pre-colonisation or failed colonisation (2000:4). This approach marked a considerable departure from previous studies of colonisation; and, as we shall see in the following chapter when we review the actual evidence for colonisation, it is amply supported by the archaeological record.

COLONISATION AS 'PLACE-MAKING'

It is likely that initial colonisation entailed a process of 'landscape learning', which, as we shall see, was essential to 'place-making'. Rockman investigated different kinds of colonisation, which she linked to various forms of knowledge acquisition, depending on whether colonisation took place in empty spaces or already inhabited spaces (2003:17). In the first case, the main obstacle encountered by the colonisers would be the acquisition of knowledge about the new environment (mostly in terms of its resources), whereas in the second instance, incoming colonisers would also have to deal with social and cultural differences. In both cases, overcoming these obstacles would depend in part on the primary resource needs of the newcomers. Rockman explains that subsistence systems based on large wild animals, which have large ranges of adaptation, are relatively transferable; those based on plants are less transferable, as plants are impacted more heavily by small variations in climate and topography; and finally, those based on non-organic resources, such as the acquisition of lithic materials, are the hardest to transfer, as location affects their geological qualities, so that existing knowledge systems may have to be heavily modified in order to adjust to newly found material properties (Rockman 2003:19). All of these processes involve the acquisition of new knowledge, which may be more or less visible in the archaeological record.

Tolan-Smith (2003) also envisaged a process of 'landscape learning' in order to explain the punctuated colonisation of the British Isles, where he identified three colonisation pulses. The first phase of recolonisation (following a seven-thousand-year occupation gap caused by the extreme glacial conditions from ca. 20,000 BP onwards) began around 12,500 BP. The second pulse (11,000–9,000 BP) saw a period of 'consolidation', with occupation extending into areas previously left empty between settlements, and limited expansion outside these core areas. The third phase (9,000–7,000 BP) saw the settlement of the rest of the island and of Ireland (Tolan-Smith 2003:121–2). This pattern could be explained by the colonisers' need to learn about the resources and topography of western maritime Britain (the intermediate phase), which may have lasted for two thousand years from initial arrival before colonisation could resume (Tolan-Smith 2003:117).

Difficulties in matching archaeological evidence and past activities emerge from the potential overlap between so-called diagnostic correlates. Clusters of burials, for instance, are usually taken as diagnostic of settlement and therefore as a correlate for 'colonisation' (Cherry 1981:48). However, Nelson has pointed out that, through repeated visitation (e.g., for burial), people develop attachment to places that were either never settled or were subsequently abandoned (2000:58). The 'utilisation' phase is hard to identify, as it is likely to leave only faint ephemeral traces in the archaeological record. Cherry suggested that one way of overcoming this problem would be to search for evidence (e.g., mineral resources) that can be traced back to the islands (1981:48). Tykot pointed out that obsidian is a very useful indicator for contact in the Neolithic, since the obsidian found in the Mediterranean comes from island sources: Lipari, Palmarola, Pantelleria, and Sardinia supplied the central and western Mediterranean, and Melos, and to a lesser extent Giali, the eastern Mediterranean (Tykot 1996:42).

There are obvious problems in assessing visitation based on just one category of material; and for some periods, establishing human presence on islands can be made difficult by the lack of markers. Evidence for visitation thus remains in the realm of controversial claims, with the result that anything that cannot be securely ascribed to actual occupation is amassed in the 'visitation' category, with very little benefit to understanding this activity correctly. While a phase of visitation/utilisation is now documented (or perhaps expected/inferred) on most large Mediterranean islands, it is likely that this evidence relates to a variety of different activities. These 'visitation activities' have received little systematic attention and have been pigeonholed as being preliminary to colonisation, rather than as constituting a form of colonisation with its own set of aims and explanations.

Guerrero (2001:139) has made even stronger claims, stating that 'all colonization involves a series of prior steps', which include 'discovery and exploration, frequent visits, stable settlement or colonization and intensive human settlement'. He also says that 'these episodes, stages or phases are regularly to be found in *every* colonizing process, and *never* in any other order' (Guerrero 2001:140, emphasis added). Ramis et al. (2002:19) have rejected Guerrero's (2000; 2001) model for the colonisation of the Balearic Islands, as they argue that the early evidence could be arbitrarily assigned to any 'preliminary' phase. In addition, it is difficult to link phases to one another and to colonisation (or stable settlement), since the episodes that 'represent' them are often separated by several millennia and therefore could be unrelated. Cyprus illustrates this well, as initial human occupation of the island (the *Aetokremnos* phase) apparently did not result in intensification and permanent settlement but in abandonment; similarly, the following pre-Khirokitian and Khirokitian phases, which may represent a long phase of adaptation to the island environment followed by establishment, again possibly ended in abandonment (Peltenburg 2003; Peltenburg et al. 2002).

The material evidence, as we will see in the next chapter, stands in contrast to a teleological approach to colonisation: not all visitation episodes culminated in permanent settlement (e.g., Cyprus and Melos), and not all settlements were preceded by utilisation. This point cannot be stressed too much: islands may have been an integral part of a network (e.g., a trading network) without necessarily ever being permanently settled (e.g., Palmarola, Melos, Palagruža). By its very nature, abandonment has prerequisite phases, though their character and order of succession are context-specific and should be investigated in that light. The evidence from the islet of Vivara in the Gulf of Naples (Italy) also demonstrates the shortcomings of a teleological view of colonisation. The island has no specific biogeographic appeal (it is small and has no resources), which may account for its being colonised later than its neighbours. However, once settled (ca. 1600–1500 cal BC), it very quickly became an integral part of a much wider network, which included the coastal and inland sites of Campania, the Aeolian Islands, and the Aegean (Cazzella and Damiani 1991). Its integration within this system was immediate, with no apparent visitation phase preceding the stage when it flourished as a trading post, a stage that lasted only as long as the transmarine trade that supported it. Vivara clearly represents colonisation in a Bronze Age context (different factors would have been at play in Mesolithic or Neolithic colonisation). Nonetheless, it should not be considered as being exclusive to or typical of a whole period (i.e., a 'Bronze Age' colony) but rather as embodying a certain type of 'activity' (i.e., a 'trading' colony), which could exist (in a variety of forms) in any period when trade was a priority for the founding of 'colonies'.

The examples discussed so far are intended to make two points clear. First, each 'colonisation' process is made up of different components or phases. The nature of these phases is specific to the priorities that lead to the act of colonising in the first place. This becomes clear if we think that the type of exploration that leads to trading is different from that leading to settlement, as each seeks different aims (e.g., access to trading routes and presence of trading partners vs. land and basic resources). The second point has to do with terminology. The term 'colony' is highly misleading, as it has the connotations of a well-planned venture and a degree of permanence (cf. Roman *coloniae*). 'Colonisation' (which is literally the founding of colonies) has equal implications. The first time that Mediterranean prehistory gets close to this type of 'colonisation' is with Neolithic settlement. But to say that the 'colonisation' or the Neolithic settlement of Mediterranean islands took place during the Neolithic clearly adds nothing to our understanding of colonisation: it is merely going in circles. The issue to be addressed is how human activity on islands varies through time and space: substituting 'place' for colony and 'place-making' for colonisation would help highlight these important distinctions. Neolithic colonisation is, in fact, but one example of the process. If, on the other hand, 'colonisation' is viewed as a process entailing a variety of activities, then different sites can be better understood: visitation colonies, for example, may be more short-lived than settlement colonies, while trading colonies will have different characteristics from colonies defined by clusters of burials, and so on. What these all have in common is that they are meaningful places for those who use, visit, and/or inhabit them.

Studying colonisation by type of activity has another advantage: its development can be explored through time (e.g., by comparing Neolithic visitation colonies with Bronze Age visitation colonies). It also opens the way to different sets of questions. For example, does visitation in one period (e.g., the Neolithic) count as settlement in others (e.g., the Mesolithic)? The establishment (or demise) of these activities/sites/colonies/places will go through a series of stages—or not, in some cases (cf. Vivara)—but their order, as already mentioned, is case-specific. This means that there are no 'typical' colonisation trajectories, although there may be parallels in the development of 'places' related to similar activities. The recent archaeological survey of the island of Antikythera lends support to some of these points. Bevan and Conolly (2013) relate the challenges in the identification of chronological phases of initial visitation, consolidation, occupation, and abandonment through field survey (2013:50, 208) and go on to define a set of 'behavioural themes' (2013:73–9): subsistence, shelter, sociality, and conflict. They also investigate the effects of abundance and scarcity, production and acquisition, maintenance and recycling (Bevan and Conolly 2013:79–84). This approach enables them to compare such themes in different periods, resulting in greater understanding of the activities involved.

Viewing colonisation as 'landscape learning' and 'place-making' highlights both its natural and cultural complexities. These are not necessarily the set aims of colonisers, but they are likely outcomes of the process. Resource availability can potentially restrict the scope of colonisation; however, perceptions of an environment's potential, and people's ability to obtain resources through networks of interaction, can overcome such limitations. Through repeated visits or actual settlement, it is likely that people would contribute to and experience a sense of place (as defined by Relph [1976] and Tuan [1974]; cf. Bourdieu's [1977] 'habitus'). These concepts should inform our research strategies for studying colonisation, in terms of devising questions and methodologies that take into account both quantitative and qualitative features, as well as natural and cultural aspects.

COLONISATION TRIGGERS

Is it possible to determine why people risked colonising islands in the first place? Were islands colonised selectively and purposively or by chance? Broodbank and Strasser pointed out that 'the immediate causes of an individual colonization episode will relate to a host of localized social and ecological factors . . . without firmer knowledge of the colonists' origins, attempts to understand motivation through reconstructions of homeland conditions are fruitless' (1991:238). It is likely that several triggers resulted in colonisation in different periods and areas; at the same time, though, there may have been some degree of overlap. The following discussion reviews different potential causes for the pre-Neolithic, Neolithic, and post-Neolithic periods, but also considers the wider relevance of specific causes (such as resources and configuration) beyond arbitrary chronological phases. Finally, this section will consider briefly the contribution of genetic studies to our overall knowledge of island colonisation.

The traditional explanation for island colonisation in the Mediterranean is that it was part and parcel of Neolithic population expansion. Sedentism and demographic growth have been invoked to explain the increasing need for space and the colonisation of marginal space, including the intensified frequentation and settlement of islands. These models are effective in explaining one type of island colonisation (Neolithic settlement), but several other cases require different explanations. The presence of fewer Palaeolithic and Mesolithic than Neolithic sites on islands has a number of explanations: loss of evidence owing to the submergence of land; the different nature of the evidence itself (seasonal camps as opposed to permanent structures); lower population densities (fewer people leave fewer traces); ignorance or inability to reach the island; and deliberate avoidance. Simmons has pointed out that 'if pre-Neolithic sites exist in the Mediterranean, they probably will be in the form of ephemeral, nonarchitectural, occupation' (1999:26). As the review of the data in Chapters 4 and 5 will demonstrate, Palaeolithic and Mesolithic sites present investigators with serious identification issues, since the associated evidence usually consists of surface lithic scatters, and identification and dating are generally based on typological grounds that are often unsupported by radiocarbon dating (with a few important exceptions, such as caves and rock-shelters).

In recent years, some notable research results have added to our understanding of pre-Neolithic colonisation, with increasingly earlier evidence for seafaring and island colonisation, most notably from Cyprus and Crete. Ammerman (2010) and Broodbank (2010) have independently identified the potential impact of a climatic phase known as the Younger Dryas (10,800–9600 cal BC) in the eastern Mediterranean (Rosen 2007), in terms of providing a stimulus to early seafaring in the Mediterranean. Broodbank points out that the earliest known sea-crossings to Melos and Cyprus occurred during this period, which featured cold, arid conditions. These conditions would have put pressure on mainland populations, which may have looked to islands for additional resources, leading to the development of a 'seafaring ethos' (Broodbank 2006:216). Ammerman has suggested that, as a result of adverse environmental conditions, voyaging foragers made seasonal campsites on the island of Cyprus as early as 12,000 years ago, primarily to exploit coastal and marine resources, such as high-quality sea salt.

Given the new, good evidence for early seafaring in the Mediterranean, we may question the apparent absence of human activity from other islands and island groups. In particular, the absence of evidence from the Cycladic islands (with one or two exceptions) until the late Neolithic requires explanation. This absence is particularly striking in view of the islands' palaeogeography, as originally the Cyclades would have formed a much larger single landmass (see Chapter 2) (van Andel and Shackleton 1982:452; Lambeck 1996:607), thus challenging Cherry's argument that islands are 'generally unsuitable' for hunter-gatherers in view of their small size and lack of resources (Cherry 1981:59). Van Andel and Shackleton (1982:451) suggested that Palaeolithic people would likely have visited such a landmass for the purposes of hunting and fishing, and Broodbank (1999a:20) also proposed that such movement would have had the effect of maintaining communication networks within a highly dynamic coastal environment. Cherry interpreted the extreme scarcity of Palaeolithic sites in the Mediterranean islands as being more the result of 'avoidance' than of ignorance or inability to reach the islands (1990:202). He also found it very striking that human presence in the Mediterranean islands increased dramatically when the islands had become less accessible because of rising sea levels, and believed that 'loss of land and resources may have prompted humans to tentatively explore offshore islands' (1990:194). Van Andel and Shackleton objected to Cherry's explanation, arguing that although whole subsistence strategies based on coastal plains had vanished with their flooding, the improvement of the postglacial climate meant people could survive on resources obtained from a much smaller territory than before (1982:446) (a point also made by Lewthwaite [1985a] for Corsica).

The Late Mesolithic site of Maroulas (Kythnos, Cyclades) appears to lend important support to these ideas (Sampson 2002), indicating that Mesolithic people did, in fact, go to the islands. This realisation is becoming increasingly evident from discoveries also in the Northern Sporadhes, the Ionian islands, and the Dalmatian islands, all of which roughly parallel the Cycladic palaeogeography in that they once formed more extensive territories (in some cases, actual coastal plains) or subsequently became part of coastal plain/island systems. However, the general dearth of pre-Neolithic evidence has had the effect that colonisation before the Neolithic has been largely overlooked, and classified as a 'pre-colonisation' utilisation phase rather than as a form of colonisation in its own right.

Evans (1977) was among the first to link island colonisation to the 'Neolithisation' of the whole Mediterranean basin: although his focus was west Mediterranean (having worked extensively on Malta), but also on the basis of his work on Crete, he claimed that 'most Mediterranean islands were first settled at a fairly early stage in the Neolithic' (1977:14). He argued that, most likely, the islands would have been reached by populations living on the nearest land, following the 'wave of advance' pattern envisaged by Ammerman and Cavalli-Sforza (1973; 1979). As mentioned, Cherry originally disagreed with Evans's claim for an early Neolithic colonisation. He noted that, in the west, only a few islands were occupied by the end of the Neolithic, while the majority were in use by the end of the Bronze Age (1981:58). He explained this process as a 'gradual filling' or an 'adaptive process' that could be reflected in the wave of advance model, or Alexander's (1978) 'moving frontier' model, both of which implied several hesitant, short-distance movements lacking any definite planning—that is, random dispersal (Cherry 1981:63). In 1990, he partly retraced his steps, stating that although the general pattern was still the same, more Neolithic sites had indeed become known, particularly in the eastern Mediterranean.

Van Andel and Runnels (1995) reconsidered the wave of advance model for the spread of agriculture (Ammerman and Cavalli-Sforza 1973; 1979), addressing its possible causes and suggesting some changes to a number of the principal tenets of the demic diffusion paradigm. Such suggestions are useful when discussing island colonisation. The evidence from the Thessalian plain indicated that arriving farmers preferred to settle for considerably long periods on floodplains before moving elsewhere (Van Andel and Runnels 1995:481, 495). In this model, movement is related to preference for a certain type of land rather than to demographic pressure. Areas considered to be appealing to early farmers were few and far away from each other, and people therefore settled these desirable lands and exploited them to the maximum before moving on to less advantageous ones. This has the interesting implication that colonisation was not continuous; moreover, the distinction between islands (large ones) and mainlands may not have mattered, as long as this type of attractive land was available.

Substantial floodplains are to be found also in the Morava-Vardar area in the Balkans and the Tavoliere in southeast Italy (van Andel and Runnels 1995:497). According to van Andel and Runnels, 'earlier wandering seafarers' might have located new floodplains (1995:498), so that island colonisation may have been a by-product of this 'scouting' process, and indeed a necessity if exploration was to be sustained. The association between island groups and floodplains can be seen, for example, in the Tavoliere plain and the Tremiti Islands (Cassano and Manfredini 1983; Delano Smith 1976; 1987; Jones 1987; Skeates 2000:170) and in the Thessalian plain and the Northern Sporadhes (van Andel and Runnels 1995). The Adriatic islands have produced Early Neolithic material, and a few Dalmatian islands have yielded possible Upper Palaeolithic and Mesolithic evidence. The Tremiti Islands form, together with the islands of Palagruža, Sušac, Korčula, Hvar, and Vis, a series of stepping-stones across the Adriatic between the Italian and Croatian mainlands. This configuration is likely to be responsible for the fact that the islands were occupied from an early stage, and almost continuously when viewed as a group.

Both the Thessalian and Tavoliere plains lack evidence for Mesolithic population but were densely occupied in the Neolithic (van Andel and Runnels 1995:494). Cherry thought it likely that the settlement of the Northern Sporadhes had begun 'at a relatively early point in the Thessalian Neolithic cultural sequence' (1990:168), and that the first inhabitants were likely to have come from the Thessalian mainland, making the most of the relative accessibility of this stepping-stone chain of islands. This configuration would justify their colonisation a millennium earlier than other island groups in the Aegean (e.g., the Cyclades). The point was followed up by Broodbank, who viewed the early colonisation in the Northern Sporadhes as unsurprising when linked to the development of Early Neolithic settlements in Thessaly and when combined with the distances and currents involved (1999a:29). The model proposed by van Andel and Runnels (1995) could also account for gaps in colonisation—that is, for 'jump dispersal' or 'leapfrogging' (Anthony 1997; Fiedel and Anthony 2003). Peltenburg et al. (2001:55) supported such models of prehistoric migration as potential explanations for archaeological gaps between presumed homeland and destination of early farmers. However, in the case of Cyprus, they disagreed with the idea of a colonisation 'leap' and anticipated the existence of coastal sites that are now lost.

The presence of such sites is likely, given that Galili et al. (2002) have identified submerged settlements, referred to by their investigators as 'Mediterranean fishing villages' (MFV), along the Carmel coast of Israel. MFVs belong to the late ninth to seventh millennia BP (eighth–sixth millennia cal BC) and are found at a depth of about 8 to 12 m. They feature a mixed 'agro-pastoral-marine' economy and similarities in their dwellings, storage facilities, and production areas. According to Galili et al. (2002:168, 183), MFVs represent a new 'economic strategy' focusing on previously marginal areas in response to changes in the environment (rising sea levels, increased population, and intensified land exploitation). This strategy had a marine focus: as stated by Galili et al. (2002:184), 'the option chosen was the sea'. Peltenburg (2003:97) has made a similar suggestion—specifically, that loss of territory and resources on the Levantine mainland may have prompted the colonisation of Cyprus. Potential MFVs include Shillourokambos in Cyprus, Cyclops Cave on Gioura, Vela Spilja on Korčula, Franchthi Cave on the Greek mainland, and Uzzo Cave in Sicily; and Galili et al. propose an east–west spread of MFVs (2002:187–9; for a recent discussion, see Knapp 2010:108–9).

Zilhão identified two main pulses in the process of Neolithisation of central and western Europe, which spread along two directions (a Danubian and a Mediterranean route) and brought about different degrees of interaction between Mesolithic and Neolithic groups (Zilhão 1993:51–2; 2000; Fiedel and Anthony

2003:147, 150). Fiedel and Anthony (2003:163) have pointed out that the Neolithic colonisation of Europe took approximately 2,500 years, and that it was not continuous, having phases of apparent idleness lasting ca. 500 to 1,000 years, during which in-between areas were filled up. They suggest that this pattern indicates a planned venture, with knowledge acquired ahead by scouting agents (2003:146). Zilhão envisaged a 'pioneer colonisation model' to explain the 'enclave situation' of the earliest Neolithic sites in Portugal and, more generally, the 'punctuated, irregular equilibrium' of the movement of farming along the northern side of the west Mediterranean (1997; 2000:170–1). He also made the important point that, from the point of view of workload and sustainability, there would have been very little incentive to adopt early cereal agriculture, provided that alternative resources were available. This implied that the two strategies would have coexisted for some time, a point recently reiterated by Ammerman (2010) and Broodbank (2006). Zilhão thus believed that, initially, farmers would settle only empty areas and that, subsequently, their demographic growth would have led to intermarriage between the two groups, with the result that hunter-gatherer communities were eventually incorporated. In the process, areas that were not agriculturally viable were jumped, producing small, widespread 'colonies' or 'enclaves' (Zilhão 2000:172; 2001).

Economic pressure is not the only reason why pioneering groups may have moved. Zilhão (2000) argued, on the basis of archaeological and ethnohistorical data of the colonisation of the Pacific islands (Kirch 1984; Irwin 1992), that this pioneering was planned and that people moved from one island to the next before they actually needed to (e.g., owing to resource exhaustion), and concluded that social reasons must have been involved. He believed that, as in the Pacific, this 'pioneer ethic' was behind the rapid spread of a Neolithic way of life along the coasts of the western Mediterranean (2000:173). Thus, the main incentive for movement in this area (and consequently for the expansion of the Neolithic package) may have been a social need to 'fission' before groups outgrew resources (conditions that may have been all the more pressing in an island setting) (Zilhão 2000:173). This solution may have involved site colonisation and abandonment, both as a demographic strategy and in response to resource availability, both of which would ensure long-term sustainable land-use (Nelson 2000:58).

Bass (1998) explored the significance of several factors in the colonisation of the Adriatic islands. His study considered insular discovery, colonisation, and resource exploitation using biogeographical analysis (BGR ranking and target/distance ratio). His conclusions were that resource availability and location within the archipelago in relation to resources were more relevant than area and distance. In particular, good-quality flint (though not as desirable as obsidian), found at a few sources such as the island of Palagruža, which lies at the heart of the Adriatic, would have provided an incentive for early maritime contacts (1998:181). Bass claimed that the Adriatic evidence supports Cherry's (1981) distinction between insular colonisation (i.e., settlement) and utilisation. However, the categories he proposed were explored for three degrees of 'insular utilisation' only in the Neolithic, and not for preceding or subsequent periods (Bass 1998:181). To the first category, he ascribed islands that could sustain only short-term human occupation in view of their extremely limited terrestrial resources (such as Palagruža or Jabuka). The second included islands that could support 'medium-term and possibly multi-seasonal cultural commitments' (Sušac and the Tremiti Islands). These islands are described by Bass as having limited terrestrial diversity but also sufficient wild resources to complement the diet, some land for farming and herding, as well as freshwater sources. They are also close to mainland resources and other cultural groups. To the third group, Bass assigned islands that could sustain long-term occupation. Korčula, Hvar, and Brač could maintain a sedentary settlement and a large-enough population (1998:181). These are the islands which have yielded the earliest material (Bass 1998:178).

On first inspection, Bass's categories appear to rely on Cherry's interpretation of 'earliest occupation', defined as 'the time when the island became for one or more groups the principal provider of the subsistence requirements . . . throughout the year' (Cherry 1981:48). However, Bass also set out to explore networks of interaction, sidestepping the idea that an island ought to be the 'principal provider' of a community's sustenance. Although Palagruža appears to defy his classification—in that it is a small, faraway island with limited food resources that has yielded Early Neolithic material and evidence for subsequent occupation (see Chapter 4)—Bass explains that the island's mineral resources and their exchange were responsible for the fact that the island was inhabited intermittently (1998:167). A dual mineral resource exploitation strategy, involving both the Palagruža and Gargano flint sources, on the opposite shore in Italy, would have contributed to the livelihood of the island (Bass 1998:181; Di Lernia et al. 1992; Galiberti et al. 2001). The Tremiti Islands also have their own source of flint, on the small island of Capraia (Fumo 1980). This source strengthens the possibility of their pre-Neolithic exploration, which is is a sound option also based on the islands' overall configuration. Bass (1998) referred to these claims to substantiate the existence of a flint exploitation network across the Adriatic during the Neolithic, although the precise dating of these sites and their relevance to previous periods are open to question. Kaiser and Forenbaher (1999:322) presented Palagruža and its flint source as an example of how people developed 'miniature, attenuated versions of core/periphery systems'. The importance of islands as production, exchange, and resource centres cannot be underestimated. The discovery of metal sources on the island of Vis may explain the continued and intensified use of the Adriatic islands in the Late Archaic, Classical, and Hellenistic periods, when interest in lithic resources declined (as suggested by Colonna 1999:366; also Kaiser and Forenbaher 1999). Configuration and resources played a combined role in the colonisation of other island groups. In the case of the Aeolian Islands, location within the archipelago in relation to the obsidian sources may have determined which islands were colonised first, while the changing value ascribed to obsidian may partly account for variation in the phases of cultural development in the archipelago. While in the Adriatic metal sources ensured cultural continuity, in the Tyrrhenian Sea, the focus of activity eventually shifted from the Aeolian Islands towards the metal sources of Sardinia and Elba.

It seems that the implementation of a variety of strategies was the key to ensuring continuous human presence in 'difficult' environments with limited resources. Relying wholly on farming would have been highly detrimental to human life on the islands, particularly on the smaller ones, as it would inevitably expose islanders to the fluctuations of early crop yields. A good example of the potential integration of different subsistence traditions comes from the cave site of Vela Spilja on the Dalmatian island of Korčula. The earliest Neolithic deposits (early impressed wares), radiocarbon-dated to the very end of the seventh millennium cal BC, included the bones of tunny, dolphin, and sea-bream (Bass 1998:46). Another cave site, Pupićina Peć, this one on the mainland, 20 km west of Rjieka on the Croatian coast, has produced evidence of a mixed economy (Miracle 1997). The earliest Neolithic date there (5680–5280 cal BC) is roughly contemporary to the earliest mainland Neolithic at Edera in the Trieste karst (5670–5450 cal BC) (Biagi et al. 1993) and the Early Neolithic site of Vižula (southern Istria) (5929–5528 cal BC) (Chapman and Müller 1990). However, unlike on Korčula, the domestic animals from Pupićina Peć's cave seem to be the 'intrusive element in what otherwise is a Mesolithic context' (based on lithics and the absence of pottery) (Miracle 1997:57).

These examples indirectly hint at the fact that, however faintly visible to us, the foundations of human presence on islands in the Mediterranean were laid down before the Neolithic. Vigne and Desse-Berset indirectly supported this idea, claiming that 'at last, the abilities of the Mesolithic people for adaptation to different kinds of environments can be richly documented by the Mediterranean islands' (1995:309). A number of researchers have commented on the fact that humans introduced both domesticated and wild species to the Mediterranean islands, before, during, and after the Neolithic (Davis, S. 1984; 1989; 1994; Vigne 1996:65–7; Peltenburg et al. 2001:46). This suggests an effective manipulation of the environment and indicates that, ultimately, lack of resources on islands during any period would have been only a relative hindrance to human survival. This holds, of course, only as long as effective 'rotation' strategies were in place, either in terms of actual human movement or movement of goods, or, as we saw, in terms of a strategy involving a broad spectrum of resources, allowing for their consumption and replenishment.

The models discussed for pre-Neolithic and Neolithic periods are useful to explain colonisation of new territories but are less relevant to the later periods, which entailed expansion into already populated landscapes and were complicated by sociopolitical factors taking on a more prominent role. Broodbank (2006; 2010) referred to this phase of island colonisation, which was fostered by the introduction of sailing in the third millennium cal BC, as a veritable 'maritime revolution'. Bronze Age cultures firmly established connections between distant areas of the Mediterranean, contributing to the creation of a culturally coherent space, ultimately infilling the remaining handful of islands not yet colonised and securing strategic locations in relation to burgeoning trading networks. Iron Age colonisation is associated with expanding indigenous populations and with Phoenician and Greek colonial encounters. It generally involved (re)colonisation of areas with existing settlement networks and preexisting populations: these are complex issues that are beyond the scope of this book. As we will see in the next chapter, on current knowledge, islands settled for the first time in the Bronze and Iron Ages tended to be small or marginally located islands that could be inhabited only when settlements on nearby larger islands were well established. In some cases, their role as strategic outposts of trading networks is clear; in others, despite or perhaps because of the environmental challenges involved, they may have been targeted for specific symbolic or cultural reasons. Some of these issues will be addressed in the following chapters.

Genetic Studies

The question of the first colonisers' origins has recently received momentum from advances in genetic studies, but we are far from definitive answers, as this is still an evolving subject. There are problems with identifying original colonisers because of issues of DNA preservation, recent gene flows, and even modern contamination. According to Francalacci et al., episodes of human movements and settlement can be traced through the genetic record of living populations (2003:270). Quintana-Murci et al. have noted that, in general terms, genetic homogeneity suggests that living populations in the northern and eastern shores of the Mediterranean may share a 'recent' common origin. On the other hand, the marked differences displayed by their Tunisian sample suggest that there was little north-to-south gene flow, with the Mediterranean acting as a relative geographical barrier especially in the west (2003: 166; cf. Bosch et al. 2001). This observation may be related to the slowness in adopting sailing technology in the western Mediterranean, as previously discussed.

Francalacci et al. (2003) attempted to decipher the different population origins of three western Mediterranean islands (Sicily, Sardinia, and Corsica) by looking at Y-chromosome binary haplotypes (which can be traced back to a single male ancestor). Their study was able to demonstrate that Corsicans are related to central-northern Italian and French populations but are also markedly different from Sardinians, which excludes significant gene flow from Sardinia to Corsica. Given that at the LGM, Corsica and Sardinia formed a single island, these data suggest that their colonisation occurred following their separation (the two islands became separated by a seaway 10 km wide at ca. 9,000 BP). Linguistic data indicate that the Corsican language is more closely related to Tuscan than to Sardinian dialects (Francalacci et al. 2003:276). According to this study, Sicily was significantly different from all other populations, except, as one might expect, Calabria in southern Italy. Corsicans and Sicilians seem to be closely related to neighbouring continental populations, while Sardinians appear to have developed in marked isolation, though there appear to have been links with the Iberian Peninsula (Francalacci et al. 2003:274). A recent genetic study has confirmed that the earliest inhabitants of the small island of Favignana, and by extension of Sicily, originated from southern Italy (Mannino et al. 2012).

These studies provide but a quick glimpse into the potential benefits of using human genetic data to reconstruct the processes that led to the original peopling of Mediterranean islands. However, the study of modern genetic markers poses several problems in terms of the correct timing of prehistoric colonisation and the origins of prehistoric settlers, particularly in the case of small islands, which are vulnerable to total population replacements. It is clear that a number of different lines of enquiry should be used in addressing colonisation. Stable isotope analysis, in particular, has emerged in recent years as a reliable way of understanding prehistoric human diets and migration patterns, in terms of the relative contributions of marine vs. terrestrial resources (e.g., Field et al. 2009; Berg 2013) or population movement (e.g., Byers et al. 2011; Kinaston et al. 2013). Nonetheless, as stressed by the authors of these studies, the results of these analyses should always be considered within their archaeological context.

Towards a Comparative Approach

The migration models discussed so far are mostly relevant to Neolithic island colonisation, although some hold broader significance. Certain models have overemphasised the idea of a long-term trajectory in island colonisation, usually in the form of some economic or ideological pioneering (van Andel and Runnels 1995; Zilhão 2000; Anderson 2003). As we will see in the following chapters when we review the actual archaeological data, colonisation involved a variety of activities; demographic growth, sedentism, and a preference for certain types of land are but a few of the reasons that may have prompted the search for new territories. In fact, it would be overly reductive to view even Neolithic colonisation as just a response to these factors, since it involved a much more complex set of processes and activities, some purposeful, others serendipitous.

While there was a strong take-off in island colonisation during the Neolithic, colonisation should be studied also in relation to what happened before and afterwards. The archaeological data indicate that island colonisation was both geographically and chronologically varied, with different sets of priorities leading to a range of results. Mesolithic, Neolithic, and Bronze Age island colonisation were distinct phenomena, though some underlying factors do exist: Mesolithic and Neolithic colonisation, for example, clearly differ, but they are both effective subsistence strategies developed in response to specific requirements. The former is more concerned with 'mobility, aggregation and place-focused residence and land-use' (Nelson 2000:53, 58), where 'continued utilization of land would have extended the duration of claims on the best lands' (Adler 1996:355 in Nelson 2000:57), while the latter has more to do with farming and permanent settlement.

Camps claimed that 'les îles méditerranéennes ne peuvent être étudiées globalement' (1998:129). While he was right to say that Mediterranean islands display such a huge variety of differing characteristics that it may seem counterproductive to consider them collectively, a balance must be struck between a study of islands on a global versus an individual scale. Bass stated that 'all insular settings will have unique aspects that may not correspond with models derived from other areas' (1998:175). As a result, no island or island colonisation event should ever be taken as representative or paradigmatic. Models are, by definition, simplifications of reality; similarly, viewing islands through a comparative framework relies necessarily on a set of generalisations. As long as these are made explicit from the start, the strength of this approach is undeniable in that it offers the opportunity to study islands on several scales, starting with the individual island, moving on to island groups, and then regions, and also to switch between these scales or to choose at which end to start the analysis. This potential will be exploited fully in the course of Chapter 6, where the analysis of the colonisation data from the islands will form the basis for a new approach to colonisation, initial points of which were laid down here.

Within a comparative approach, there is still scope for treating islands as discrete units of study, though not as geographically or culturally isolated. Broodbank singled out a shortcoming of Cherry's analysis of island colonisation: 'Cherry's focus on high-level comparison operates at the expense of context-specific exploration' (Broodbank 2000:108). The analysis of the colonisation data (in Chapters 4–6) aims to redress this imbalance by bringing back individual islands to the stage of pan-Mediterranean analysis and by identifying island basins where factors of a comparable nature appear to be operating. If certain characteristics of islands can be seen to be promoting their colonisation, then their relative importance can be addressed effectively by contrasting the physical characteristics and the cultural trajectories of individual islands. These islands provide the 'laboratories' to be investigated, and it is in this spirit that the data from the islands will be presented in the next chapter. But this is also where the laboratory analogy ends, as the units compared are not sealed or pristine: on the contrary, the 'corrupting' or connecting action of the Mediterranean Sea results in both cultural heterogeneity and homogeneity (Horden and Purcell 2000). If the aim is to identify what coherent or differing factors are promoting colonisation in each island (or island group), these variables will emerge only through comparison between island regions. The resulting observation is that island colonisation may have more to do with relative than with absolute chronology, and with relative size, distance, and resource availability than with absolute thresholds. Archaeologists, however, have concentrated their strengths in the opposite direction, being more concerned with identifying a single moment or set of circumstances which made island colonisation a more viable strategy, without acknowledging that this might have happened several times in the past.

Conclusions

Recent years have seen an increase in island projects as well as some major theoretical contributions to island archaeology. Biogeography remains fundamental to the subject, but researchers have realised that its full potential can be achieved only when used as part of a combined theoretical framework rather than on its own. The models discussed highlight the fact that colonisation has been viewed as a long-term trajectory and is often tied to the inception of farming (van Andel and Runnels 1995; Zilhão 2000). The idea of island colonisation as a long-term strategy stems partly from a tendency to emphasise the difficulties inherent in seafaring, which has made the 'reaching of islands' the explicit object of much archaeological investigation. The data in the next chapters, however, will indicate that distance was not so severe a hindrance to island colonisation in the Mediterranean, with even remote islands being reached early. Despite this, modelling human relocation onto Mediterranean islands has long been an attractive subject and task for island archaeologists.

The review of the literature also highlights changes in archaeologists' attitude towards insularity. Islands still provide 'intrinsically appealing study objects' (MacArthur and Wilson 1967:3), but there has been a major shift in the way they are studied, as exemplified by the move from islands being considered as isolated units to their forming part of broader cultural networks. This has in turn encouraged the development of new approaches to island colonisation. Cherry's work deserves particular attention, as it has provided, more or less directly, a basis for much subsequent work on the subject. With this development, we see the adaptation of approaches typical of the 1970s and 1980s, which have been elaborated during years of applied biogeography in the Pacific islands and have highlighted both its advantages and drawbacks (cf. Rainbird 1999; 2004). As a result, Mediterranean island archaeologists since the 1990s have been able to learn from this tradition and also from their own mistakes and successes (Cherry 1990; 2004; Patton 1996; Bass 1998; Broodbank 1999a; 2000).

Two elements emerge strongly from the review of the studies. The first is an improved awareness of the importance of spatial variables, which has resulted in studies of configuration. The other is the renewed focus on resources, in terms of their availability, location (resource configuration), and changing value, all of which would have varied over time. Primary resources (e.g., edible flora and fauna, water sources, arable land, etc.) were clearly necessary to island life, but some islands were also the source of desirable secondary resources. The importance of these two variables cannot be underestimated, since they are not exclusive to a single period or area but, on the contrary, can be explored within different chronological phases and regions. Thus, they offer the opportunity to move away from explanations of colonisation that are restricted to a single chronological period. Rather than imposing further constraints on human movement, configuration and resources emphasise the potential opportunities that islands have to offer. They therefore have the important consequence of bringing human agency (which has been largely ignored by island biogeography) back to the fore, since it is humans, after all, who were moving between islands and who sought and used such resources, either as hunter-gatherers or farmers or a mixture of both. As well as environmental factors, there were clearly social and cultural elements that triggered the colonisation of the islands; these are discussed in more detail in Chapter 6.

Chapter 4

Island Colonisation in the Western Mediterranean

The number of islands reported to be in the Mediterranean ranges from as few as 150 to as many as 5,000 (including islets), of which the vast majority lie in the western part alone (see Chapter 2). For ecologists and biologists studying the region's fragile ecosystem, each and every one of the islands and islets is important. But in terms of studying human settlement, the vast majority of these are small rocks of little use, except as providing convenient landmarks for navigation. Of this extensive list, just under 200 are habitable, and archaeological data show that at least 147 were colonised at least once in the prehistoric period. This extensive body of evidence—divided, for convenience's sake, into two groups, western and eastern—will be discussed in this and the following chapter.

The review takes as a starting point the data contained in Cherry's 1981 and 1990 papers, which have been added to and/or amended as required through a systematic search by island and/or island group. Most areas are represented in the resulting database which, as mentioned, contains 147 islands. For the review in these two chapters, this represents a fairly comprehensive coverage of the region. Nonetheless, there are areas that are relatively under-investigated compared to others. As further archaeological surveys and excavations are continuously carried out, the body of data is constantly growing, and explanatory models are needed that can accommodate future results. The present review includes data that either have become available since Cherry's (1990) update of island colonisation (e.g., the Adriatic islands and the French islands) or that, although available at the time, were not included in that review (e.g., the North African islands). The aim is to assess the degree to which our knowledge regarding island colonisation has changed in the last two decades. More detailed discussion is reserved for those islands whose colonisation dates remain a matter of contention, particularly the Balearics and Cyprus. Archaeological investigations in recent years have highlighted the potential for finding early evidence for island colonisation if and when research focuses on the right

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Mediterranean Voyages: The Archaeology of Island Colonisation and Abandonment, by Helen Dawson, pp. 69–122.

places. The most striking examples are Cyprus and Crete, the latter believed for a long time to represent a 'classic' example of Neolithic colonisation. It is becoming increasingly clear that earlier colonisation phases took place on both these large islands and that these were potentially unrelated to their subsequent settlement (though further discoveries may change this).

Inevitably, a review of the entire Mediterranean involves dealing with data of differing quality. The evidence discussed in these two chapters is the result of archaeological projects in the Mediterranean islands conducted over several decades, presenting us with the considerable challenge of how to systematise and make sense of data acquired under very disparate research strategies. In many cases, earlier investigations were biased towards identifying more permanent remains on the islands (generally Neolithic onwards): when the same islands have been reinvestigated in recent years, earlier evidence has sometimes been found. This review makes it clear when the evidence is less reliable; and when there is uncertainty, a more parsimonious (i.e., later) date is preferred. Overall, the data presented provide a good idea of how human activity (including settlement) varied spatially and temporally across the entire Mediterranean.

Different research agendas, the uneven degree of archaeological exploration between and within different regions, and the loss of evidence from the islands caused by rising sea levels render the definition of colonisation and abandonment processes problematic but not unfeasible. As the review moves arbitrarily from west to east, there is a sense of the evidence becoming progressively earlier, although a few exceptions (the occurrence of early colonisation horizons in the west) challenge this model, attractive as it may be. Instead, we begin to pick up on both physical and cultural similarities as well as differences among the islands. These, when taken collectively, form the basis for the discussion in Chapter 6, where processes acting within and between the islands will be explored and clarified.

Not all the sources consulted used calibrated radiocarbon dates. For the sake of clarity and to allow cross-referencing and comparison, I have calibrated all dates with the aid of the OxCal 4.1 programme (Bronk Ramsey 2009), using the IntCal 09 calibration curve (Reimer et al. 2009). Dates are shown in the original uncalibrated form (years BP) followed by calibrated date ranges at 2σ confidence levels (95.4%). Present-day maps are included here for ease of location; however, the data should also be read in conjunction with the palaeogeographic maps in Chapter 2, since these give a more accurate context for the islands' colonisation, especially in the earlier periods.

SPANISH ISLANDS

The date of the first human occupation of the Spanish islands (comprising two groups, known as the Balearic or Gymnesic Islands, and the Pitiussae) is a matter of debate, which, particularly for the Balearic Islands, escalated momentously in the last decade. In 1990, Cherry announced that major progress had taken place in the archaeology of the Balearics since his 1981 article, and that a set of over 200 radiocarbon dates, supposedly reaching back to initial colonisation, had become available. Waldren was one of the principal investigators in those years and a major player in promoting Balearic prehistory to international attention (through the organisation of several conferences in Mallorca and the publication of their proceedings) right up to his death in 2003. Indeed, Waldren is rightly acknowledged as being responsible for the islands having 'one of the largest series of ^{14}C dates in Europe' (over 780 dates at the latest count) (Micó 2006:421). Waldren (1992:4) used the radiocarbon dates to produce a 'pentapartite division of Balearic prehistory' (Table 4.1), placing the islands' first colonisation during the Neolithic. More recently, however, this chronology has been challenged, and now a Bronze Age date is widely accepted (Ramis and Alcover 2001; Micó 2006; Ramis et al. 2002). The following section will review the evidence in support of these different chronologies.

At the start of the 1990s, Cherry reviewed the dates that formed the basis of Waldren's (1992) chronology. He selected the sites for which he could identify reliable evidence and observed that the earliest known sites were all found in caves and rock-shelters in the mountainous north of the island of Mallorca (the northern Jurassic sierras) (Fig. 4.1). These included:

- *Son Matge rock-shelter:* This site produced a stratified sequence that was taken to indicate occupation from the sixth millennium cal BC, followed by a second phase of occupation in the fifth to fourth millennia cal BC (Waldren 1982; 1986: 69–84).
- *Ca'n Canet:* Data from this cave site (also known as Cova de Canet) were interpreted as evidence of continuous human presence from at least the ninth millennium BP (P-2408: 10196–7178 cal BC at 95% probability) (Kopper 1984).
- *Son Moleta:* This site produced 36 radiocarbon dates, ranging from 2,180 BP (ca. 350–200 cal BC) to ca. 45,000 BP (Waldren 1982; 1986). Layer 7 (KBN-640d, KBN-640c, and UCLA-1704c) was taken as indicating the possible coexistence of humans and *Myotragus balearicus* (an antelope type of endemic mammal).

Table 4.1 Waldren's (1992) original chronology for the Balearic Islands

	Period	Date
Pre-settlement	Palaeolithic, Mesolithic, Neolithic	8–6 million years ago to 5600 BC
Early settlement	Neolithic	5600–3900 BC
Pre-Talayotic	Copper Age, Chalcolithic, Initial Bronze Age	3900–1300 BC
Talayotic	Bronze Ages	1300–1000 BC
Post-Talayotic	Iron Ages	1000–123 BC Roman colonisation

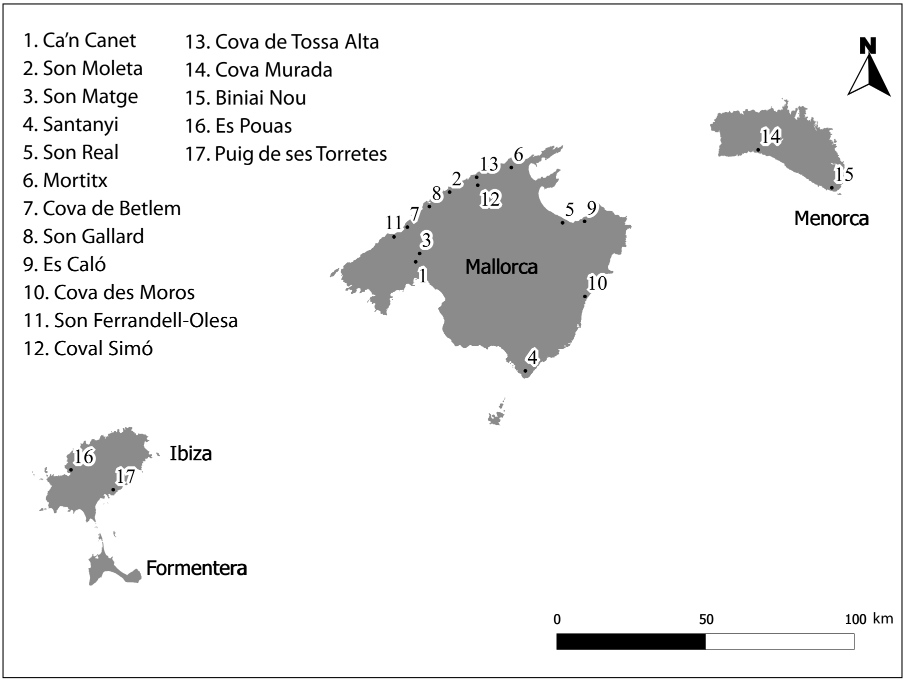

Fig. 4.1 Map of the Spanish islands with location of sites discussed in text.

The three sites were taken to support an interpretation of the process of colonisation of the Balearic Islands that was widely accepted until the late 1990s (Alcover et al. 1981; Cherry 1990; Patton 1996; Vigne 1999). In particular, the evidence from Son Matge and Son Moleta was taken by Waldren (1982) to indicate that Mallorca was inhabited from the first half of the seventh millennium BP uncalibrated (mid-sixth millennium cal BC) and that humans and *Myotragus balearicus* overlapped for some time, suggesting that there might have been attempts to domesticate this species. Other investigators used data from Ca'n Canet as evidence that humans were present on the islands as early as the eighth millennium cal BC (Lewthwaite 1989; Guerrero 1997; 1999; 2000; Alcover et al. 1999; Costa 2000). Cherry (1990:188) noticed that, if reliable, data from these sites implied that domesticated animals and ceramic technology were introduced to the Spanish islands at least two millennia after the initial colonisation of Mallorca (ca. 3500 cal BC) and much later than on other islands (e.g., Corsica, Sardinia, and Sicily).

For the Pitiussae Islands, Cherry (1990:188) listed the following sites for which he saw reliable evidence:

- *Formentera*: A carbon-14 date on human bone of 3270 ± 80 BP (ca. 1600 cal BC) from the megalithic chamber tomb at Ca na Costa indicated that the site was occupied by the early second millennium;

- *Ibiza:* Ca'n Sargent, material possibly later than Ca na Costa;
- *Cabrera and Conejera:* Punic remains.

Cherry (1990:188) commented on the fact that, since the islands provide a series of 'stepping-stones' from the mainland (ca. 100 km away), the late dates for the earliest sites in the Pitiussae Islands were striking, especially when compared to their much earlier Balearic counterparts. The gap was explained as the result of inadequate exploration, though Cherry also suggested that it could be simply that Mallorca was selected for exploration first, as it was the largest island in the archipelago.

Balearic (Gymnesic) Islands

An increasing number of radiocarbon dates from different sites have become available in the past decade; however, while the quantity of radiocarbon determinations has increased, their quality has been called into question (Table 4.2).

Recent publications have revealed key issues and problems with the chronology originally proposed by Waldren: especially Ramis and Alcover (2001) in *Proceedings of the Prehistoric Society*; Ramis et al. (2002), in *Journal of Mediterranean Archaeology*, and Micó (2006) in *Radiocarbon*. Another recent paper by Alcover (2008) offers a useful synthesis and explores several interesting issues regarding the timing and identity of the first settlers (discussed at the end of this section).

The primary lines of argument can be summarised as three main positions regarding the earliest colonisation of the Balearic Islands: (1) Early or pre-Neolithic colonisation, pre-sixth millennium cal BC (Lewthwaite 1989; Guerrero 1995; 1997; 1999; 2000); (2) Intermediate or Neolithic colonisation, sixth, fifth, or fourth millennium cal BC (Rosselló-Bordoy and Waldren 1973; Waldren and Rosselló-Bordoy 1975; Fernandez-Miranda and Waldren 1979; Waldren 1982; 1992; Lull et al. 1999; Guerrero 2001); and (3) Late or post-Neolithic colonisation, third millennium cal BC (Ramis and Alcover 2001; Ramis et al. 2002; Micó 2006; Lull et al. 2008).

1. *Pre-Neolithic colonisation:* The identification on typological grounds of unstratified 'Palaeolithic' tools made by Guerrero (1997) at Son Real (Alcúdia) Lithic Workshop (Mallorca) was ruled out by Hernández et al. (2000). Lewthwaite (1989:545) and Guerrero (1995; 1997; 1999; 2000; 2001) argue that the islands were colonised as early as the end of the eighth millennium cal BC, on the basis of data from Ca'n Canet. The evidence from this site, with dates taken from fine charcoal layers sandwiched between thick accumulations of sterile alluvium, is considered to be of anthropogenic rather than natural origin, with Guerrero arguing that the layers represent deliberate deforestation by humans through the use of fire (2001:141).

2. *Neolithic colonisation:* Waldren (1982:112–4; 1992:3), who rejected the earlier evidence from Ca'n Canet, argued, considering Son Moleta and Son Matge, that humans were present in Mallorca from ca. 5600 cal BC. Guerrero

Table 4.2 Radiocarbon dates for the Balearic and Pitiussae islands referred to in the text

Source	Site	Lab no.	Provenance	Date BP	cal BC 2 sigma
W&RB 1975; W 1992	Mallorca, Son Moleta	KBN-640c	Human bones? (problem with two different attributions for the same date)	10,686 ± 3517	40,404–4045
W 1982	Son Moleta	KBN-640c	Stratum 7, *Myotragus* bone? (see above)	7135 ± 80	6212–5846
W&RB 1975	Son Moleta	KBN-640d	Stratum 7, human bone	5934 ± 109	5205–4539
W 1982	Son Moleta	UCLA-1704c	Stratum 7, *Myotragus* bone	8570 ± 350	8557–6701
Castro et al. 1997	Son Moleta	Beta-135404	Thoracic vertebra (SM Mu 031 H)	3680 ± 60	2274–1896
Kopper 1984	Mallorca, Ca'n Canet	P-2408	Beneath main sink-hole, 2.55 m depth	9170 ± 570 (in Cherry 1990) (9205 ± 535 in RA 2001)	10,196–7178
Kopper 1984	Mallorca, Ca'n Canet	Beta-6948	Beneath main sink-hole, 1.0 m depth	6370 ± 320	5972–4607
W 1982	Mallorca, Son Matge	QL-29	Stratum 35 *Myotragus* bone in hearth	6680 ± 120	5837–5379
FM&W 1979; W 1986; W 1992	Son Matge	CSIC-177*	Stratum 34 *Myotragus* coprolites	5820 ± 360	5488–3964
W 1992	Son Matge	I-5516	Stratum 33 charcoal from hearth	5750 ± 115	4846–4354
W 1982	Son Matge	QL-988	Stratum 28 charcoal	4650 ± 120	3656–3026
W 1992	Son Matge	BM-1408	Stratum 26 latest *Myotragus* bone	4093 ± 392	3656–1666 (rejected by Castro et al. 1997)
FM&W 1979; W 1982	Son Matge	Y-2682	Charcoal	3820 ± 120	2581–1922

Table 4.2 (*continued*)

Source	Site	Lab no.	Provenance	Date BP	cal BC 2 sigma
Castro et al. 1997	Son Matge	BM-1995R	Charcoal	3770 ± 100	2473–1935
W 1992	Son Matge	IRPA-835	?	3700 ± 60	2285–1926
FM&W 1979; W 1982	Son Matge	CSIC-179	Charcoal	3620 ± 80	2201–1756
Castro et al. 1997	Mallorca, Son Gallard	BM-1994R	Charcoal	5160 ± 100	4235–3713
W 1982; 1986	Mallorca, Son Gallard	Y-1789	Charcoal	3790 ± 80	2468–1985
W 1986	Muertos Gallard	BM-1994	Charcoal, earliest pottery horizon	4760 ± 50	3645–3377
W 1986	Mallorca, Ca na Cotxera	I-5515	Charcoal	3750 ± 120	2561–1784
W 1986; 1992	Son Ferrandell-Olesa	BM-1843R	Charcoal	4030 ± 60	2864–2350
W 1982; 1986; 1992	Son Ferrandell-Olesa	QL-1636	Charcoal	3790 ± 90	2473–1976
W 1986; 1992	Son Ferrandell-Olesa	QL-1592	Charcoal	3700 ± 30	2198–1981
W 1986; 1992	Mallorca, Son Ferrandell-Olesa	BM-1981R	Charcoal	3640 ± 100	2299–1740
Castro et al. 1997	Mallorca, Cova Estreta	UtC-5171	*Myotragus* bone	5720 ± 60	4716–4449
Guerrero 2000	Mallorca, Cova des Moro	UtC-7878*	Human bone	3840 ± 60	2470–2130
RA 2001	Mallorca, Cova des Moro	Beta-155645*	Caprine jaw	3750 ± 40	2290–2030
Coll 2001	Mallorca, Coval Simó	Beta-154196*	Caprine bone	3760 ± 40	2300–2030
VS&M 2001	Menorca, Biniai Nou	UtC-8949*	Human bone	3745 ± 35	2200–1970
Cherry 1990	Formentera, Ca na Costa	BM-1677	Human bone	3270 ± 80	1743–1406
W 1986	Ibiza, Ca'n Sargent	BM-1510	Human bone from tomb	2500 ± 100	814–398

Table 4.2 (*continued*)

Source	Site	Lab no.	Provenance	Date BP	cal BC 2 sigma
W 1986	Ca'n Sargent	BM-1511	Human bone from tomb	2670 ± 60	976–673
Costa and Benito 2000	Puig de Ses Torretes, Ibiza	UtC-8319*	Cattle bone	3645 ± 42	2140–1880
RA 2001	Cabrera, Cova des Penyal Blanc	UtC-6517	*Myotragus* bone	6517 ± 40	5558–5375

RA= Ramis and Alcover; FM&W = Fernández-Miranda and Waldren; VS&M = Van Strydonck and Maes; W = Waldren; W&RB = Waldren and Rosselló-Bordoy

See Cherry 1990, RA 2001, and Costa et al. 2007 for original sources not mentioned here.

* Earliest date for human occupation according to RA 2001.

(2001:145) subsequently argued, using pollen diagrams taken in Mallorca, that changes in vegetation, particularly oak, do not appear to be significant before ca. 4500 BC, which is also roughly when the endemic fauna became extinct. He used this evidence to argue that it was at this time that human groups on Mallorca started to have a stronger impact on the island's ecosystem. To reconcile the gap between the earlier colonisation horizon (eighth millennium cal BC) and this change in ecology (fifth millennium cal BC), Guerrero (2001:141) suggested that the earlier evidence from Ca'n Canet represents only 'sporadic visits' to Mallorca, and that these were followed by a phase of intensification in human presence (or 'establishment') on the island. Guerrero selected a series of dates to fit in with his model of human intensification: these included a date of 4798 cal BC (KBN-640d) from the Moleta cave (Waldren 1982:35–72), as well as a date from Son Gallard of ca. 3972 cal BC (BM-1994R) (Bowman et al. 1990; Waldren 1998:154–6). It has been pointed out that both these dates are highly controversial, since they are derived, respectively, from a mixed sample of human bone and from a layer of charcoal which is not securely associated to any cultural features (Ramis and Alcover 2001; Ramis et al. 2002). On this basis, Guerrero suggested that the first inhabitants arrived in the island around ca. 4700–3900 cal BC, and that 'around 3000 BC a stable population may have become established' (2001:148). He concluded that between 2600 and 2500 BC 'the process of adaptation to the island environment in Mallorca was complete' and that, by then, settled communities inhabited all the islands (2001:148). Lull et al. (1999:20) also originally claimed (using evidence from Son Matge) that the earliest human occupation took place around the mid-fourth millennium cal BC and subsequently proposed a new chronological scheme that places occasional arrivals and occupation ca. 5000 cal BC (Lull et al. 2002:123, table 1).

3. *Post-Neolithic colonisation:* Ramis and Alcover (2001), Ramis et al. (2002:4), and Micó (2006) have reviewed all the radiocarbon dates from the islands and have come up with a revised chronology (Table 4.3), which rejects the evidence used to substantiate both an early and an intermediate colonisation horizon for Mallorca.

   Ramis and Alcover (2001) point out that the possibility of a very early colonisation, as early as the tenth millennium cal BC (based on two radiocarbon dates from Ca'n Canet), had already been discarded by both Waldren (1982) and Cherry (1990), because it had proved impossible to link the dated evidence to a human origin. Ramis and Alcover (2001) also rejected the late eighth millennium cal BC date from Ca'n Canet because, apart from the unclear stratigraphy at the site, it is derived from wood samples, which are controversial as evidence for human presence. In addition, none of the remains of *Myotragus balearicus* showed butchery marks, and thus their dating could not be related to a contemporary human presence at the site.

   Son Matge and Moleta present several problems with regard to dating. First, the early dates from Son Matge are either taken from carbonate samples or from unidentified charcoal, and are so inconsistent that four different stratigraphic interpretations for this site have been offered. In addition, the accumulation of coprolites of *Myotragus balearicus*, taken as evidence of stabling (and, by extension, of human coexistence and attempted domestication), is more likely a natural accumulation (Ramis et al. 2002:8–9), as the bones and horns shaped as 'forks' and the alleged butchering marks are likely to be the result of bone chewing by *Myotragus balearicus* itself (Ramis and Bover 2001). The sixth and fifth millennium cal BC dating from Son Moleta is discarded because the stratigraphy of the site is unclear, but also because the 2910 ± 120 BP date given to layer 5 (Y-2258), which yielded pre-Talayotic pottery, was published incorrectly as 3910 ± 120 BP. A new date from this site was taken from a human thoracic vertebra found in a more reliable context in the cave than the mixed human bone remains used by

Table 4.3 Revised chronology for the Balearic Islands

Period/group	Duration (cal BC)
Bell Beaker tradition (Mallorca)	ca. 2500/2300–2000
Settlement in Menorca	ca. 2300?–2000
Epicampaniform/dolmenic	ca. 2000–1600
Naviform	ca. 1600–1100/1000
Proto-Talayotic	ca. 1100/1000–850
Talayotic	ca. 850–550/500
Post-Talayotic	ca. 550/500–123

Source: Micó 2006:432, table 2. Reproduced with kind permission of the author, R. Micó, Dept. of Prehistory, Autonomous University of Barcelona.

Waldren (4798 cal BC; KBN-640d). This may be up to 3,000 years later (Beta-135404: 2274–1896 cal BC at 95% probability) (Ramis et al. 2002:7).

Ultimately, Ramis and Alcover (2001) and Ramis et al. (2002) reject all the earlier dates from Son Moleta and Son Matge, as well as dates from several other sites (Son Ferrandell Olesa, Son Gallard, Escorca, Cova de Betlem, Caló des Cans, Cova de Tossa Alta, and Cova Murada) on the same grounds: because they are either based on charcoal or collected at levels with questionable associated human elements. Thus, they reject the lithic evidence from Santanyí (Carbonell et al. 1981; Pons-Moyà and Coll 1984; Waldren et al. 1984), which Lewthwaite (1989) and Guerrero (1997; 2000) had taken as evidence of a human presence prior to the Neolithic, on the basis of poor dating and lack of parallels with mainland pre-Neolithic industries (Ramis et al. 2002:11). They take this lack of pre-Neolithic lithics from Mallorca to invalidate the early colonisation stance, which implies that the first settlers would have been pre-Neolithic hunter-gatherers. In addition, since no early mainland Neolithic cultural elements, such as cardial pottery, are found at any of these 'early' sites, Ramis et al. (2002) support the idea that humans must have arrived in Mallorca not just after the end of the Epipalaeolithic/Mesolithic, but also after early Neolithic industries had disappeared from the mainland. They support their hypothesis through palynological evidence, which seems to indicate changes in the landscape, perhaps linked to human action, only in the third millennium cal BC, which would also substantially shorten the overlapping between humans and *Myotragus balearicus*.

Two sites are identified as providing sound evidence of the earliest human presence in the Balearic Islands: Cova des Moro and Coval Simó (Ramis et al. 2002:12–3). The evidence from Cova des Moro consists of two dates, one obtained from a human bone (UtC-7878: 2470–2130 cal BC), the other from the jaw of a non-native (i.e., domesticated, or at least introduced by humans) caprine (Beta-155645: 2290–2030 cal BC). The date from the human bone is adjusted by about a century to take into account the marine component of the diet due to the coastal location of the site: thus, a more accurate date is presented as being ca. 2030 cal BC. The two dates are taken as evidence that there was a human presence in the Cova des Moro between 2030 cal BC and 2470 cal BC (2σ).

The dating from Coval Simó, also on a non-native caprine (MNIB 80508; Coll 2001), of which a molar was found in the earliest stratigraphic level of human occupation excavated so far on the site, was 2300–2030 cal BC, 2σ (Beta-154196). This date is used to reinforce the presence of humans on Mallorca only slightly prior to 2030 cal BC, 2σ ($p > 95\%$) (Ramis et al. 2002:13). Ramis and Alcover (2001) and Ramis et al. (2002) thus establish the most likely period for human arrival on Mallorca to be ca. 3000–2030 cal BC. Alcover (2008) has since attempted to narrow this window. His review of the radiocarbon ages from the site of Ca na Cotxera led him to update the terminus ante quem to 2050 cal BC (Alcover 2008:24). Micó's independent review of radiocarbon determinations

> identified the 24 most reliable dates from Cova de Moleta, Cova des Càrritx, Cova des Moro, Cova des Mussol, Coval Simó, Mongofre Nou, Son Matge, and Son Gallard. He argues that 2300 cal BC represents the earliest date for the human use of these natural caves and shelters (2006:428, table 1).

The rigorous review of the evidence places human settlement of the island firmly in the third millennium cal BC, which makes Mallorca and minor surrounding islands 'the last territories in the whole Mediterranean to be colonized by humans' (Ramis and Alcover 2001:267). Ramis and Alcover (2001:265) are totally opposed to the possibility of earlier seasonal occupation but accept that there may have been 'accidental unsuccessful arrivals'. This is because they feel that humans would have rather settled in Mallorca, which offered sufficient resources, than travel periodically to the island across a 120 km stretch of sea. Currents and winds are such that 'passive movement would never follow a straight line from the mainland to the Balearic Islands', posing a 'barrier to overseas colonization' and excluding a scenario of colonisation by passive drifting (Alcover 2008:52). Given that there were no sails yet in this part of the Mediterranean, Alcover (2008:54) envisages the use of 'complex boats, powered by oars or paddles, perhaps with some help from wind and currents' to transport a colonising group with all the necessary agricultural and stock-breeding resources to ensure successful settlement. This, he adds, may have required a previous visit to the island followed by a return home, or it may have been an accidental discovery of a group originally setting off to colonise another territory and being dispersed away from the coast.

Alcover (2008) has suggested that the first successful colonisers may have originated from the coast of Languedoc, between the rivers Vidourle and Rhône. The islands' megalithic burials have a similar orientation to those found in the southern French Mediterranean area, which is different from southeastern Iberian examples (Gili et al. 2006:832; Alcover 2008:65). Alcover also observed similarities in shape and building techniques between the navetas of the Gymnesic (Balearic) Islands (the islands' first monumental living structures in stone) and the Fontbouisse-style houses in Languedoc. This relies on a new, earlier dating of the naviform houses, which is not unanimously accepted. Excavations in 2004 at S'Arenalet de S'on Colom, on the northern coast at Badia (bay) d'Alcúdia, revealed fragmented remains of a building interpreted as a naveta (Ramis 2010). The remains were highly eroded; the preserved elements comprised two parallel north–south dry-stone wall fragments, ca. 1.5 m thick, built using a cyclopean technique with outer megalithic faces enclosing a rubble core, which defined a chamber 4 m wide (Ramis et al. 2007: 334). Two radiocarbon determinations were obtained from the structure's single occupation horizon: KIA-26215: 3670 ± 35 BP (2190–1940 cal BC) and KIA-26226: 3660 ± 35 (2140–1930 cal BC), overlapping ca. 2150–1950 cal BC (Ramis 2010:71). If the interpretation is correct, the site would provide evidence for the early use of cyclopean technique in domestic architecture on Mallorca, as early as the earliest accepted phase of human occupation of the island (Ramis 2010:72). This scenario is far from being widely accepted, and other researchers have pointed out that the Son Colom site was badly preserved and that more reliable dates show that navetas were not being constructed before 1600 cal BC (Gili et al. 2006:832, fig. 3). Using 18 dates from nine 'naviform' sites, Micó concluded that this phase could be dated more accurately to 1400–1100 BC (2006:428, table 1).

Moving on to Menorca, there is no equivalent controversy affecting the dating of initial settlement, as there is no counterpart to the early Mallorcan cave sites. Guerrero (2001) states that it has proved difficult to demonstrate the presence of settled humans on the island before ca. 1800/1700 cal BC. He mentions that the site of Cova des Tancats (Ciudadela) on Menorca has produced *Myotragus balearicus* bones thought to be in physical association with pottery (Guerrero 2001:147). However, the bone was dated 9380 cal BC (KIK-398/UtC-3740), whereas the charcoal associated with the pottery revealed a date of 630 BC (Mestrès and Nicolas 1997). Using new evidence from two dolmen-like monuments known as Biniai Nou-1 and Biniai Nou-2 (Gómez 2000; Plantalamor and Marqués 2001; Van Strydonck and Maes 2001), Guerrero claims, however, that some people had settled on Menorca in the second half of the third millennium BC, after what may have been a previous phase of frequentation around the end of the fourth millennium cal BC (2001:147). The earliest date on individuals exhumed from this cemetery falls around 2200 BC (UtC-8949; UtC-8950), which, according to Guerrero (2001), provides the only secure terminus ante quem for the permanent long-term colonisation of the island.

Ramis et al. (2002) agreed that the earliest date from Biniai Nou, UtC-8949 (2290–2030 cal BC, 2σ), on human bone, currently constitutes the earliest solid proof of the presence of humans on Menorca. The date was further adjusted to allow for the marine component in the diet (Van Strydonck and Maes 2001) to 1930 cal BC. Another approximation of the true age of the sample was calculated by Barrett et al. (2000), who provided a date of 2200–1970 cal BC (2σ). Ramis et al. (2002:14) suggest that the sample shows that humans were on Menorca before about 1930 cal BC, which fits well with their redating of the evidence from Mallorca.

Pitiussae Islands

The initial colonisation of Ibiza and Formentera is generally placed around 2000 cal BC (Bellard 1995:447; Costa and Guerrero 2002:489). This dating is compatible with that of Menorca and more recent determinations for Mallorca (see Table 4.3) and is supported by clear cultural parallels between the Pitiussae Islands and the pre-Talayotic culture on Mallorca at this time (Bellard 1995). These include similarities identified both in settlement and burial practices (boat-shaped habitation structures or 'navetas' and megalithic tombs), as well as in pottery and, to an extent, metalwork (Bellard 1995:448). These parallels have prompted the hypothesis that the initial inhabitants of these islands originally came from Mallorca (Chapman 1990:263–4). However, Alcover emphasises that the 'cultural source region for the colonization of the Pityusic Islands is still uncertain' (2008:65). Bellard (1995:448–9) notes that human presence (documented in open-air habitation sites, caves, and megalithic tombs) does not seem to continue after 1300–1200 BC (see Chapter 8).

Guerrero (2001:145) pointed out that, in view of their position, the earliest human evidence should be found on these islands, rather than on Mallorca or Menorca, and that the lack of Neolithic inhabitants in Ibiza and Formentera may represent a gap in the data (2001:148; Costa and Guerrero 2002:495). He thus expected future research to rectify this situation. Guerrero (2001:145) mentioned two sixth- and mid-fifth millennium cal BC dates from the site of Es Pouàs in Ibiza, taken from apparently charred bones of endemic bird species (Alcover et al. 1994), as evidence for a human presence on the island at that time. Bellard (1995:449) also mentioned the same dates as possible evidence of a human presence on Ibiza in the fifth millennium cal BC. Ramis et al. (2002:14), however, have since rejected the fifth millennium cal BC dates from Es Pouàs, and Costa and Guerrero (2002:488) also have some reservations over this date, both because a direct link between the burnt bird bones and human activity cannot be demonstrated and because the materials found in the layers where some contemporary activity can be demonstrated have different chronologies. In fact, Ramis et al. took the dated bird sample as an indication that humans were not then present on the islands, or that their presence was only very recent (2002:16). This is because they associate the arrival of humans with a rapid process of extinction of all endemic bird species or considerable changes to bird communities (Alcover et al. 1999).

Guerrero (2001) also mentions a cattle bone from the settlement of Puig de Ses Torretes in Ibiza, dated around 2100 cal BC (UtC-8319: 2140–1880 cal BC, 2σ) (Costa and Benito 2000). This date is supported by Ramis et al. (2002:14), who take it as being the earliest evidence for human presence in Ibiza, at some point prior to 1880 cal BC (95%) without a clear terminus post quem. However, they add that human presence cannot be proved on Ibiza prior to 2140 cal BC (95%).

In the 1990s, the late colonisation of the Pitiussae Islands stood out when compared to what was reputedly the Neolithic colonisation of nearby Mallorca, and prompted further thought. Bellard explained it in terms of the islands' lack of large mammals (no remains of *Myotragus balearicus* have ever been found in the Pitiussae) (Alcover et al. 1994), and few water sources, all factors that may have rendered the islands less attractive for settlement than nearby Mallorca (1995:449). However, in the light of the recent review of Balearic prehistory, the alleged gap between Balearic and Pitiussic settlement has been substantially reduced. If the early dates from Mallorca (Moleta) and Ibiza (Es Pouàs) are rejected, the colonisation horizons in the third millennium cal BC of the two island groups are compatible. However, if more reliable 'earlier' dates do emerge, they would begin to substantiate the idea of an earlier human presence on both islands. If the earlier dating from Es Pouàs could be safely linked to some form of human activity, we would be faced with another gap in the archaeological record, which, in the case of Ibiza, would last from about 5000 to around 2000 cal BC. However, considering the previous discussion, it is hard to accept the fifth millennium cal BC date from Ibiza as evidence for initial settlement.

ÎLES D'HYÈRES

Scattered along the coast of southeast France, the Îles d'Hyères, or Îles d'Or, comprise four islands with a combined area of 29 sq km: Porquerolles (the largest), Port-Cros, Île de Bagaud, and the Île du Levant (Fig. 4.2). A dozen islets complete the archipelago.

Prehistoric remains are known from two of the islands: Porquerolles and the Île du Levant (Brun et al. 1997). Archaeological excavations were carried out between 1983 and 1989 on Porquerolles, where initial human presence was documented at a site behind the beach of Notre-Dame around 3000 BC, in the Chalcolithic period. Excavations produced ceramic sherds and a flint drill. The site was interpreted as being possibly a small settlement, or more likely a simple anchorage for fishermen. Palaeogeographic data from this region indicate the islands would have been insular at this time (Lambeck and Bard: 2000:212; see Chapter 2). In the Early Bronze Age, more sites are known on Porquerolles (Anse du Brégançonnet) and the Île du Levant (Petit Avis). These sites indicate increasing human frequentation and fishing activities in the islands between the third and second millennia BC, especially along the beaches of Porquerolles. The remaining two islands have yet to be properly investigated (Brun et al. 1997:17).

An earlier site is reported on Porquerolles at Font San Salvadour (between Carqueiranne and l'Almanarre), where, in the nineteenth century, a substantial shell mound (*kjökkenmöding*) was discovered and dated to the Neolithic and the Chalcolithic (Brun et al. 1997:17). Unfortunately, the shell midden no longer exists, and it was not possible to find any of the original descriptions. According to Brun et al.

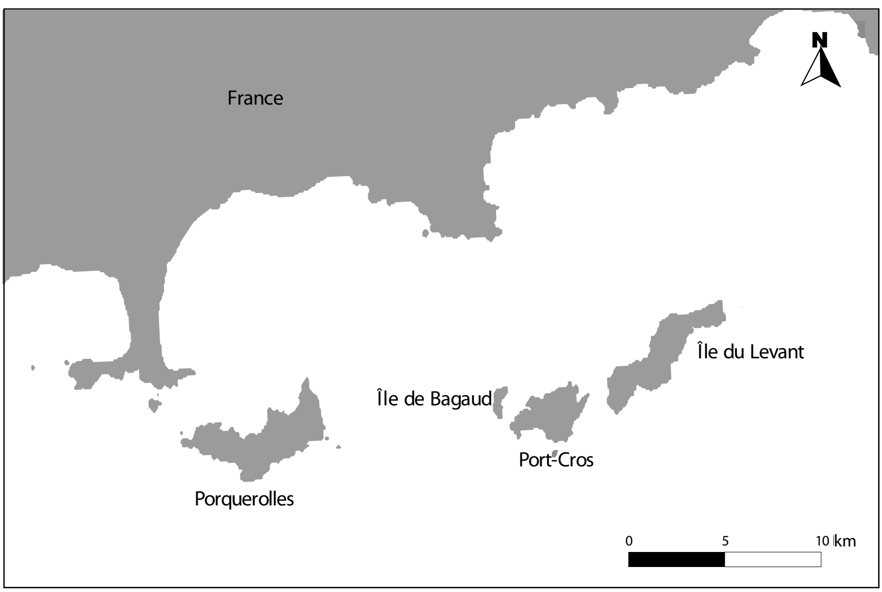

FIG. 4.2 Map of the Îles d'Hyères.

(1997), it contained fish and shell remains mixed with flint tools and polished axes. No Late Bronze Age sites have yet been found on any of the islands, which were apparently abandoned and reoccupied in the Iron Age (Brun et al. 1997:18).

SARDINIA

The past two decades have seen great progress in our understanding of Sardinian prehistory. The most interesting developments concern the earliest known evidence for human occupation, which can now be demonstrated to have occurred in the Upper Palaeolithic. Initial claims for this period were made in the mid-1990s at Corbeddu Cave (Sondaar et al. 1995) but were dismissed by Cherry (1990). Subsequently, evidence in support of the Corbeddu dating was found at another site (Santa Maria is Acquas) (Melis and Mussi 2002; Mussi and Melis 2002). Archaeological research has also led to the identification of four Mesolithic and several Early Neolithic sites (Lugliè 2009a; 2009b; Melis et al. 2012) (Fig. 4.3). Claims for much earlier colonisation, in the Lower and Middle Palaeolithic, could be substantiated in future by further study but at present remain controversial.

Cherry rejected claims for pre-Neolithic colonisation of the island (1990: 173–5). He was especially sceptical of claims for a human presence in the Middle Palaeolithic but also had reservations regarding the Upper Palaeolithic. The main supporters of these early colonisation horizons were Sondaar et al. (1984; 1986; Sondaar 1991; 1998) and, more recently, Martini (2009). The claims are based on a few open-air sites in the area near Perfugas in the Anglona region (northwest Sardinia) (Martini 1999), and on the evidence from Corbeddu Cave (east-central Sardinia). Cherry (1984; 1990; 1992) and Vigne (1992) were both unconvinced by this Palaeolithic occupation, which, for the Lower and Middle Palaeolithic, comprised surface finds and lacked stratigraphy. Cherry emphasised at the time 'the need for caution in accepting these sites as earlier by a margin of at least 100,000 years than any others yet known in the Mediterranean islands' (1990:175). Tykot (1994:118) also rejected the early lithic evidence on similar grounds.

Corbeddu Cave provides some evidence for the Upper Palaeolithic period (Table 4.4). The cave comprises three halls, which were excavated by a joint Italian-Dutch team starting in 1982, for over a decade. The excavation produced a large assemblage of animal bones, stone tools, and a few human bones. The stratigraphic relationships between these features and the human origins of the animal bone assemblage are the key points of contention. Sondaar (1998) proposed that the ancestors of the population at Corbeddu had reached Sardinia ca. 200,000 years BP, when lower sea levels offered an opportunity for migration. This scenario was substantiated by surface scatters of 'Clactonian' lithic assemblages at a number of locations (Martini 1992).

Sondaar also supported this early human presence based on the evolutionary development of Sardinia's Pleistocene fauna, which lacked evidence of dwarfism, a phenomenon generally resulting from lack of predators. Instead, the fauna included

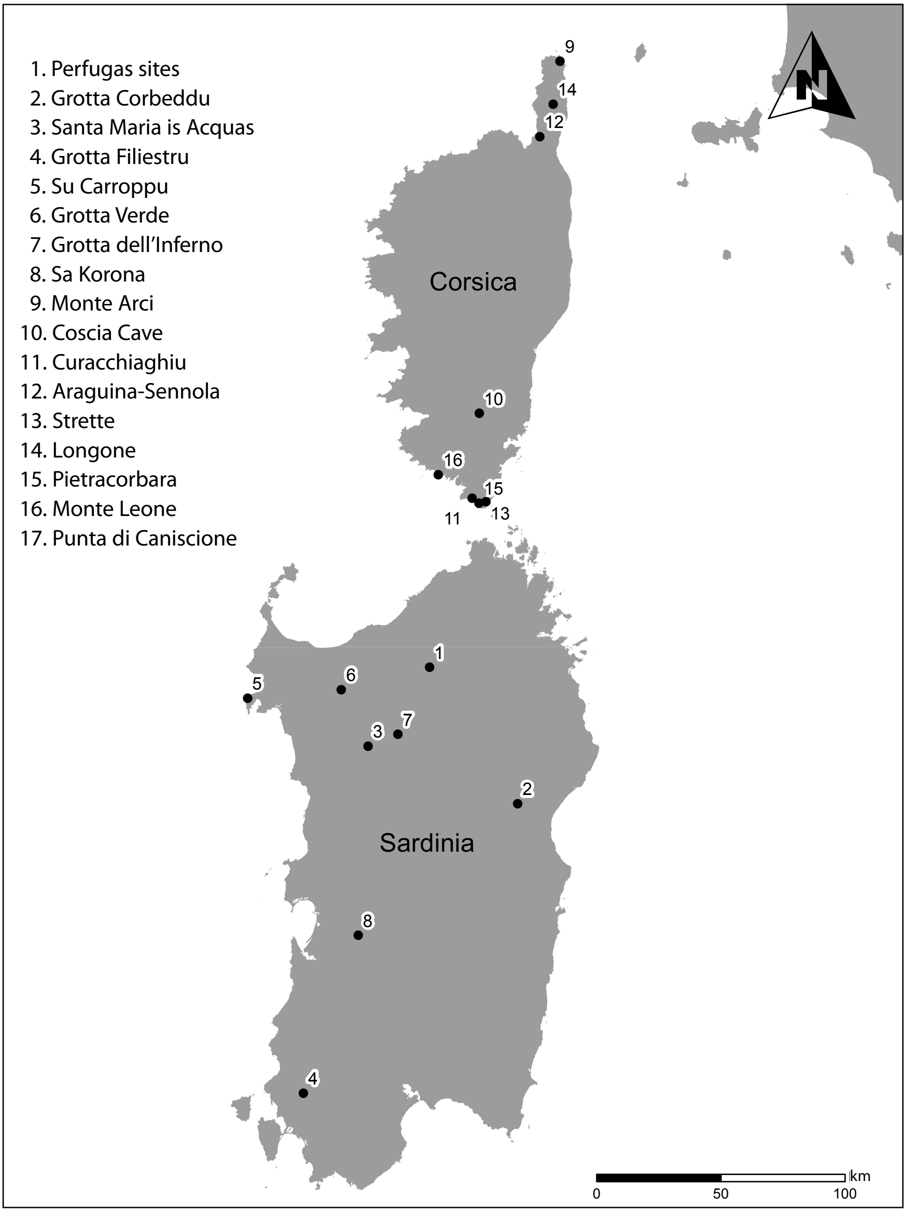

FIG. 4.3 Map of Sardinia and Corsica with location of sites discussed in text.

both a 'decent-sized mammal with high reproduction rates' (*Prolagus sardus*, similar to a hare) and a deer of 'normal mainland' size (*Megaceros cazioti*), which Sondaar interpreted as adaptations to pressure from human predators. Controversially, Vigne (1990) and Cherry (1992) argued that the size of these animals could imply exactly

Table 4.4 Radiocarbon dates for Grotta Corbeddu, Sardinia

Lab no.	Provenance	Date BP	cal BC 2 sigma
UtC-718	Hall 1 Layer F	17700 ± 200	19592–18484
UtC-725	Hall 1 Layer E-base	14600 ± 200	16550–15214
UtC-242	Hall 2 Layer 3, level 5	14370 ± 190	16016–15033
UtC-239	Hall 2 Layer 3, level 7	13620 ± 180	15210–13991
GrN-11405**	Hall 2 Layer 3	13590 ± 140	15112–14212
UtC-244	Hall 2 Layer 3, level 4	13530 ± 170	15083–13690
UtC-240	Hall 2 Layer 3, level 6	13510 ± 180	15057–13669
UtC-722	Hall 1 Layer D-mid	13500 ± 300	15198–13266
UtC-724	Hall 1 Layer E-mid	13500 ± 190	15061–13625
UtC-721	Hall 1 Layer C-base	13100 ± 190	14712–13178
UtC-720	Hall 1 Layer C-mid	12500 ± 150	13214–12115
UtC-241	Hall 2 Layer 3, level 2	11980 ± 140	12216–11506
UtC-719	Hall 1 Layer C-top	11200 ± 170	11429–10746
UtC-250	Hall 2 Layer 2-mid/base	11040 ± 130	11237–10698
UtC-14/237	Hall 2 Layer 2-mid	9820 ± 140	9813–8806
GrN-11434*	Hall 2 level 2 (60–85)	9120 ± 380	9451–7371
UtC-726	Hall 1 Layer B-base	8960 ± 110	8424–7736
UtC-300*	Hall 2 Layer 2-mid/top	8750 ± 140	8235–7582
UtC-235	Hall 2 Layer 2-top	8160 ± 130	7513–6770
UtC-22*	Hall 2 level 1b	8040 ± 180	7482–6534
UtC-301	Hall 2 Layer 2-top	7860 ± 130	7062–6466
UtC-1251	Hall 2 level 1b	6690 ± 80	5722–5486
UtC-15/233	Hall 2 Layer 1-base	6490 ± 90	5617–5310
GrN-11433*	Hall 2 level 1a	6260 ± 180	5557–4792

Source: See Tykot 1994 for references.
* Accepted dates for human presence ** Contested dates for human presence

the opposite—that is, weak predation pressures—and found it hard to accept that there was no other evidence to substantiate several hundred thousand years of human presence on the island.

Cherry (1990:176) accepted the dating of the first two layers excavated in Corbeddu Cave (Sondaar et al. 1984; 1986): layer 1 produced Neolithic material (dated 6260 ± 180 BP = 5557–4792 cal BC, 2σ; GrN-11433) and a very early Cardial assemblage (8040 ± 100 BP = 7482–6534 cal BC, 2σ; UtC-22). Layer 2 in hall 2 contained traces of human activity (in possible association with endemic fauna) from the Mesolithic period, dated 9120 ± 380 BP (9451–7371 cal BC, 2σ; GrN-11434). Layer 3, on the other hand, was more problematic. It contained a bone assemblage of the extinct deer (*Megaceros cazioti*), which produced a date of 13,590 ± 140 BP (15,112–14,212 cal BC, 2σ; GrN-11405). Sondaar et al. (1984; 1986) have argued that the deposit must be anthropogenic, given the distribution patterns of bones inside the cave, preferential selection of younger deer, and evidence for cutting. Cherry (1990:177) disputed this interpretation, pointing out that the bone marks could derive from animal gnawing and that evidence of other human features (such as hearths and tools) is absent from this layer. Sondaar et al. (1995:146) subsequently reported a small collection of lithic implements in hall 1 of the cave, from a layer they dated indirectly as 'time-equivalent with the deer fossils in layer 3 of hall 2'. As it stands, there are still problems with the evidence for Middle Palaeolithic colonisation.

Another important discovery was the find of a human fossil, which was dated to the Upper Palaeolithic period (Sondaar et al. 1995). The fossil (a first phalanx) had been found in a washed sample taken from a layer in the second hall of the cave. Pollen samples from the layer indicated a highly glacial period and were given an age of ca. 20,000 BP, providing an indirect but reliable date for the bone and making this the earliest known human fossil in Sardinia. Two more human fossils, a temporal bone and an upper jaw bone, were also found in layer 2 in hall 2, and dated 8750 ± 140 BP (UtC-300); in hall 1, part of an ulna was found, although unfortunately not in situ. The two skull fragments indicate human presence contemporary to a number of later eighth and seventh millennium BP (seventh–fifth millennia cal BC) Early Neolithic Tyrrhenian impressed ware sites, and to Sardinian obsidian on Corsica in the eighth millennium BP (seventh millennium cal BC) (Tykot 1996:43–46, 52). Sondaar defended his conclusions from Cherry's criticisms in the strongest terms; he was also deeply offended by Vigne's (1990) reference to 'erratic human bones'. In a paper published a year before his death, he reiterated the importance of his discoveries. He claimed that the human fossils from Corbeddu Cave were 'consistent with a long human occupation rather than with "occasional visits" (Cherry, 1990, 1992)' (Sondaar and Van der Geer 2002:4). Martini (2009:22) dismissed Cherry's reservations and endorsed Sondaar's finds at Corbeddu. He supports a Lower and Middle Palaeolithic colonisation of Sardinia on the basis of the relative chronology of the lithic industries of the Anglona sites, which matches the pedogenesis of the layers (Martini 2009:23). These sites are undergoing further investigation; studies at Corbeddu Cave also resumed in 2009, after a long break following Sondaar's death (Martini 2009:19–22).

Stratified Upper Palaeolithic chert and flint tools (nuclei, pebbles, large blades, bladelets) have now been found at Santa Maria is Acquas, in the Sardinian southwest (Melis and Mussi 2002). An area of ca. 10 × 10 km was surveyed and some 70 lithic artefacts collected (several were found in situ, stratified, and in quarry sections, others in drainage channels, naturally eroded, or in plough soil). Direct dating of the aeolianite (fossilised wind-blown sand) containing the artefacts produced an OSL (optical stimulated luminescence) date of ca. 13,000 BP (which is later than the Cor -

beddu phalanx). According to Mussi and Melis (2002:84), the distribution of the finds indicates widespread human presence across the landscape rather than a single site. Thus, the earlier arguments in favour of pre-Neolithic colonisation in Sardinia are more widely accepted, at least for the Upper Palaeolithic. In fact, the Sardinian situation is very reminiscent of Crete, where (as we shall see) only a few years ago similarly early claims were dismissed by the academic community. It remains to be established whether there was any continuity between the island's colonisation horizons in the Upper Palaeolithic, Mesolithic, and Neolithic periods.

Corsica

The colonisation of Corsica (see Fig. 4.3) is generally accepted to have taken place in the ninth millennium cal BC and is less a matter of controversy than Sardinia. Nonetheless, claims for earlier occupation of the island exist for Corsica too, a fact that is not surprising since it is traditionally thought that the colonisation of Sardinia (for which, as we saw, early claims also exist) is likely to have taken place from mainland Italy via Corsica (Camps 1988). The genetic data stands in contrast to this colonisation model, indicating two rather distinct gene pools settling the two islands after they had separated (ca. 9,000 BP) (Francalacci et al. 2003). If colonisers arrived to Corsica in the Palaeolithic, genetic data suggest that they must have died out or abandoned the island.

Camps (1988:22) declared categorically that there was no evidence to substantiate a claim for human presence in Corsica during the Pleistocene and concluded that the only reliable evidence of permanent occupation occurs in the ninth millennium BP (late eighth to early seventh millennia cal BC), which is comparable to developments elsewhere in the Mediterranean (Cherry 1990:178, 180). This dating has recently been pushed back by archaeological investigations at the site of Punta di Caniscione, which produced three radiocarbon determinations from the second half of the ninth millennium cal BC, the earliest so far for Corsica (Pasquet and Demouche 2012).

It is worth reviewing the claims for an earlier colonisation of Corsica, if only because they illustrate the history of archaeological investigation of the island. In the 1950s, two geologists, Ottman and Bonifay, were investigating Coscia Cave, on the east coast of Cap Corse, near Macinaghiu. They found sediments dated to the interstadial between Würm II and Würm III (ca. 80,000–60,000 BC), including ash layers containing remains of *Cervus cazioti*, an endemic mammal. The numerous Mousterian sites on the Italian coasts at the latitude of Corsica and the Mousterian traces (rare surface lithic industries) on the island of Elba were seen as substantiating early colonisation (Bonifay 1998:137). Camps (1988:23) dismissed the finds as being the result of accidental accumulation: no tools were found in the assemblage, and its human origin was disputed, as the ash might have been the result of accidental fire. He pointed out that the lack of evidence for human presence contradicted this dating, since such evidence was to be expected had Neanderthals been present. Nonetheless, Camps admitted that Corsica may have been visited on occasion in the Middle

Palaeolithic, during the Würm period (ca. 70,000 BC), when he envisaged a small group of Neanderthals reaching Corsica, aided by lowered sea levels. Shackleton et al. (1984:313) also suggest that this is a possibility, since although they appear to have left no remains on islands such as Corsica, Sardinia, Malta, and Sicily, Neanderthals would have been able to make such sea-crossings as early as 40,000 years ago.

Subsequently, Bonifay (1998:133) announced that the discovery of new material in Coscia Cave raised once again the question of the first known human occupation of the island. This material, which he dates to the start of the older Würm phase, is in turn used to substantiate claims from the Sardinian sites of apparently Middle or Upper Palaeolithic age—which he admits contain 'industries atypiques et relativement mal datés' (Bonifay 1998:133). Bonifay claims this is further evidence that the Sardo-Corsican block was inhabited during the Middle Palaeolithic by Neanderthals, to whom he ascribes the intention of colonising new territories (1998: 140; Martini 2009:21).

According to Camps, these earlier dates only constitute a 'fréquentation accidentelle' (1988:24) as opposed to permanent settlement. While these renewed claims await further confirmation, the only reliable evidence of earliest settlement in Corsica derives from at least seven sites dated between the ninth and seventh millennia cal BC. Their dates are internally consistent and, as already pointed out by Cherry (1990:180), suggest that people practised foraging on the island for a long period before the introduction of farming (see Table 4.5).

Three of the longer-known pre-Neolithic sites are rock-shelters, which have been described as having 'impoverished and culturally undiagnostic material' (Camps 1988:35). Curacchiaghiu (Camps 1988:26) is less reliable in view of its stratigraphy and bad preservation, partly due to acidic soils and the fact that the site has been partially destroyed. Araguina-Sennola and Strette have better stratigraphies (Camps 1988:28–34), with pre-Neolithic layers (contemporary with Corbeddu layer 2; Camps 1988:24) clearly separated from the early Neolithic by a sterile layer. Araguina-Sennola contained the grave of an individual female ('la Dame de Bonifacio') in its lowest pre-Neolithic level (XVIIIb) (Camps 1988:31, 34). The burial is similar to those found on the mainland dating from the final Palaeolithic and Mesolithic (although the lithic material is described as 'atypical') and completely different from those used in Corsica during the Neolithic. This, according to Vigne and Desse-Berset, would suggest permanent hunter-gatherer groups on Corsica during the eighth millennium cal BC (1995:311). Level XVIIIa above it contained a hearth (Camps 1988:29) with the bones of small endemic fauna (apparently hunted by humans), as well as sheep and pig bones, all of which suggested to Camps that these species were domesticated earlier than anywhere else in the western Mediterranean area. The layer, however, is not without its problems, and there is a strong possibility of contamination from other layers (Cherry 1990:182).

Vigne and Desse-Berset (1995) discuss three other pre-Neolithic sites in Corsica. The first, Pietracorbara, is in the northern part of the island, near Cap Corse. The deepest layer (layer 9) of the 1.5 m thick stratigraphy produced a pre-Neolithic grave

Table 4.5 Selected radiocarbon dates for Corsica

Source	Site	Lab no.	Provenance	Date BP	cal BC 2 sigma
Tykot 1994	Strette	Ly-2837	Layer XXIV	9140 ± 300	9185–7605
Tykot 1994	Curacchiaghiu	Level 7	Gif-795	8560 ± 170	8207–7190
Tykot 1994	Araguina-Sennola	Level XVI–IIa, hearth	Gif-2705	8520 ± 150	8170–7145
Tykot 1994	Curacchiaghiu	Layer 7	Gif-1963	8300 ± 130	7579–7060
Tykot 1994	Curacchiaghiu	Layer 6c	Gif-1962	7600 ± 180	7024–6075
Tykot 1994	Curacchiaghiu	Layer 6a	Gif-1961	7310 ± 170	6481–5842
Tykot 1994	Curacchiaghiu	Level 6	Gif-796	7300 ± 160	6465–5849
Tykot 1994	Araguina-Sennola	Level XVII hearth	Gif-2325	6650 ± 140	5836–5326
Vigne and Desse-Berset 1995	Pietracorbara	LGQ 508	Layer 9	6920 ± 300	6425–5320
Vigne and Desse-Berset 1995	Pietracorbara	LGQ507	Layer 8	7840 ± 310	7524–6103
Vigne and Desse-Berset 1995	Longone	LGQ 617	Layer 4a2	6320 ± 140	5547–4944
Vigne and Desse-Berset 1995	Monte Leone		Layer 5	8225 ± 80	7467–7066

accompanied by rough lithics made of local rocks. Layer 8, above it, produced charcoal, rough lithics, shellfish, and plentiful small mammal bones. However, the two radiocarbon dates are contradictory, with layer 9, supposedly older, being more recent than layer 8 (layer 9: 6920 ± 300 BP, 6425–5320 cal BC, 2σ; LGQ 508; layer 8: 7840 ± 310 BP, 7524–6103 cal BC, 2σ; LGQ507). The dates indicate a recent pre-Neolithic phase of human presence, around the eighth millennium cal BC (Vigne and Desse-Berset 1995:312).

The second site is Longone, in a valley in the south of the island, 650 m south of Araguina-Sennola. The Neolithic sequence begins with a sterile layer (5a1–5a2) over a sandy layer (5a3) directly over the bedrock, neither of which has produced any artefacts, although a 15 litre sample of sediment from the sandy layer was sieved and produced 'traces of charcoal and a few animal remains', some bearing 'clear marks of having been eaten by man' (Vigne and Desse-Berset 1995:313). The remains included large rodents bones (*Rhagamys-Tyrrhenicola*) bearing burn marks; seven bones of *Prolagus sardus* ('rabbit-rat'), three bearing burn marks; seven unidentified small vertebrate remains; and two seashells (one burnt). No radiocarbon date is available for this level, but according to Vigne and Desse-Berset (1995:313), it should be older than 6320 ± 140 BP (LGQ 617) obtained for layer 4a2 above it.

The third site, Monte Leone, 1 km higher in the same valley as Longone, is a very large rock-shelter. Excavation revealed that the upper 2 m of sediment lacked any evidence for human presence, apart from a terminal Late Neolithic grave (Lanfranchi and Vigne, unpublished data, in Vigne and Desse-Berset 1995). The deepest explored layer (layer 5) was excavated in 1992 over a small area of 1 sq m, nonetheless revealing half of a '50 cm thick multiphase structure', with two hearths ascribed to two separate phases of occupation (Vigne and Desse-Berset 1995:313). Excavation and systematic sieving produced thousands of small vertebrate bones (fish and mammals), *Prolagus sardus* bones radiocarbon-dated to 8225 ± 80 BP (eighth millennium cal BC), seashells, and a few quartz and rhyolite lithics. Four other small soundings showed that this pre-Neolithic occupation extended over an area of 25 sq m. The site is interpreted as 'the first large Pre-Neolithic site with domestic structures in Corsica' (Vigne and Desse-Berset 1995:313).

Finally, the site of Punta di Caniscione, located between Sartène and Bonifacio, first discovered in 1998, was re-excavated in 2005. The excavation by Pasquet and Demouche (2012), covering of an area of 23 sq m, revealed the stone foundations of one or more huts. Unusually, a grinding stone was found at this early site. Stone tools made from the local rhyolite and quartz make up 60% of the Mesolithic lithic assemblage for the whole of Corsica. The debitage was unearthed near the stone structures. These features suggest that this site, the earliest in Corsica so far, was used over quite a period of time. The six AMS dates (as yet unpublished) taken from wood charcoal clustered around 8400 cal BC (Pasquet and Demouche 2012:8).

The radiocarbon dates from the Corsican pre-Neolithic span the ninth to the seventh millennia cal BC. The sites share common characteristics: the rock-shelters in particular produced 'idiosyncratic artefacts' and great amounts of small vertebrate bones (Vigne and Desse-Berset 1995:313). With the exception of Curacchiaghiu (ca. 800 m asl; 20 km from the present seashore), they are generally situated at low altitude, up to ca. 4 km (less than an hour's walk) from the shoreline at the time (–35 m). Thus, early Corsicans were hunting small terrestrial mammals and birds and practicing coastal fishing and some shellfish gathering; the environmental data indicate seasonal mobility rather than year-round settlement (Vigne and Desse-Berset 1995:316).

SMALLER NORTHERN AND CENTRAL TYRRHENIAN ISLANDS

These islands are arranged along the Tuscan and Campanian coasts of Italy (Fig 4.4). Mousterian sites on the island of Elba (Lacona, San Martino, and Santa Lucia) and the Lower Palaeolithic evidence from Capri belong to the time when the islands were joined to the mainland at low sea levels (between 20,000 and 18,000 BP, and

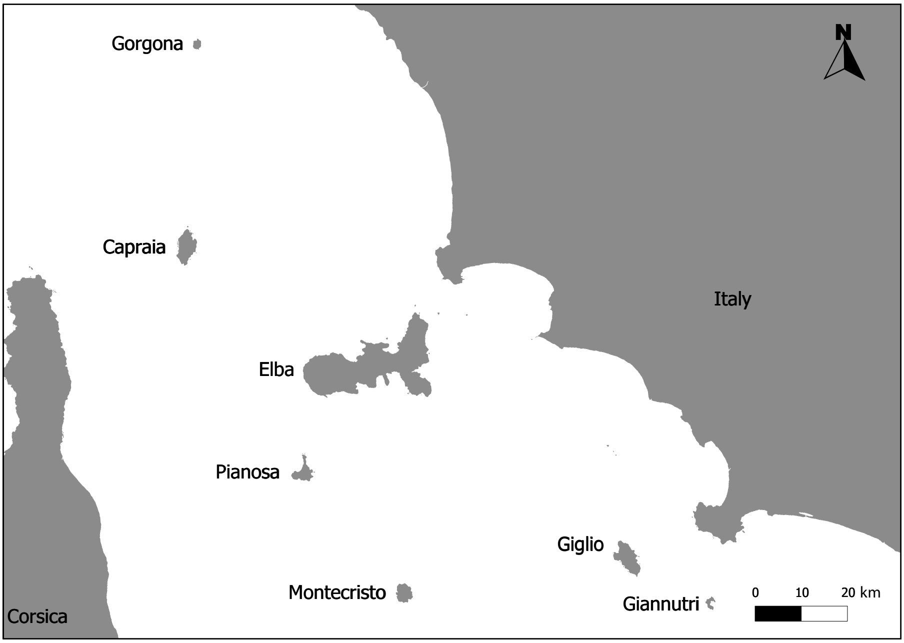

Fig. 4.4 Map of the north-central Tyrrhenian islands.

around 14,000 years ago) (see Chapter 2) (Shackleton et al. 1984:313; Canestrelli 1998:9). The earliest known cross-sea colonisation of the islands is dated later, to the Early Neolithic.

Neolithic impressed ware is found along the Tuscan coast on the Italian mainland and on the islands of Giglio (which is second in size in the Tuscan archipelago), Elba (the largest) (Brandaglia 1985; Guidi and Piperno 1992:310), Capraia, and especially Pianosa, which is the focus of a European Union collaborative project between the Universities of Pisa, Corte, and Cagliari. Neolithic settlements have been excavated on Pianosa and Giglio, but evidence for permanent settlement in the Neolithic from Elba, the largest in this group, is missing (Ducci and Perazzi 2000:54).

Grotta di Cala Giovanna on Pianosa, which was first excavated in the nineteenth century, revealed the earliest known traces of human presence on the island, consisting of a lithic industry from the Upper Final Palaeolithic (Epigravettian) period, when the island was an extension of Elba and connected to the Italian mainland. Also on Pianosa, the rock-shelter on the islet of La Scola was excavated in 1988 (Ducci and Perazzi 1991), revealing an Early Neolithic habitation site (by then Pianosa would have been insular), with hearths and burials. All 14 obsidian artefacts from the site analysed by Tykot (1996) are Sardinian. The recent excavations at nearby Cala Giovanna have revealed an Early Neolithic settlement covering ca. 300 sq m, which extended beyond the excavated area (Colombo and Tozzi 2007:75). Ceramic material at the site belonged to two traditions: Cardial Impressed Ware and Incised Lines Ware. The latter is similar to ceramic styles found in Liguria and Provence and is also found in Corsica. Five AMS dates for the site on charcoal samples fell between 5300 and 4500 cal BC. These dates are roughly contemporary to the nearby site of La Scola, though the excavators suggest that when sea levels rose and the site of La Scola became an islet, people moved to Cala Giovanna (Colombo and Tozzi 2007:77).

The site at Cala Giovanna was exposed to the winds, and it is unlikely that it was permanently inhabited; more likely it was used as a staging point. Structural remains were ephemeral, comprising pits, hearths, and two rounded, shallow depressions of unknown function (possible storage 'silos' or pits). The features contained Neolithic ceramics, quartz tools, an unusually high number of imported green stone artefacts (axes, scalpels, and ornamental objects), a few obsidian finds, shell (both worked and unworked), and abundant animal remains (Colombo and Tozzi 2007:80). Tozzi believes that the high occurrence of green stone artefacts and decorated shell (in far higher quantities than are normally found at nearby Neolithic villages) suggests this site was an 'emporium' or trading post (2007:168).

Elsewhere on Pianosa, investigations led to the identification of megalithic wall remains enclosing a rocky outcrop known as Stronzolo di Orlando to the south of the bay of Cala del Bruciato. The walls were surveyed and dated on typological grounds to the Neolithic and Bronze Age (an obsidian bladelet and ceramic sherds support this dating). According to the investigators, such defensive enclosures are rare in mainland Italy, but similar examples are known in Corsica from the Middle Neolithic period onwards (Mazet 2004). Given its small size, the site has been interpreted as a lookout post rather than a settlement, used to guard transit and mooring at the bay.

There is evidence that the small island of Montecristo was visited in the Early Neolithic. In 1994, archaeologists found two Impressed Ware fragments, possibly from the same vessel, and a flint scraper. The island is steep and rugged, with no agricultural soil, but it has several good anchorage points and perennial springs, which, together with its wild fauna, flora, and mineral resources (granite and quartz), would make it an ideal stopping place for early navigators (La Morgia et al. 1994; Ducci and Perazzi 2000:55).

Vast quantities of obsidian blades have been found on the islands of Elba, Capraia, Giglio, and Giannutri. The sites of Vigna Vecchia and Grotta delle Capre on Giannutri also produced some flint tools and impressed pottery (Vaccarino 1935:127; Bronson and Uggeri 1970). Both Lipari and Monte Arci Sardinian obsidian have been found on Capraia, without any defined context (Arias et al. 1984; Bigazzi et al. 1986). Early Neolithic obsidian finds at the site of Le Secche on Giglio could be either from Lipari (Brandaglia 1985:59–60) or Sardinia and/or Palmarola (Tykot 1996:54). The island of Giglio has also been the focus of extensive research by the Soprintendenza Archeologica della Toscana since 1982, and as a result, a Middle Bronze Age site was discovered and excavated, with several post-holes, a hearth, a pebbled floor, and a pit. The site is strategically located on a hill overlooking the wide Gulf of Campese (Bronson and Uggeri 1970:201; Aranguren et al. 1991–1992).

Going farther south, Palmarola (1.3 sq km) has produced Chalcolithic material, suggesting that it was first settled in the fourth millennium cal BC, although Palmarola obsidian was extracted and exported as early as the Middle Neolithic (Tykot 1996:43). A number of sites in central peninsular Italy, as well as the Foggia area of the Tavoliere (southeast Italy), and farther south in the area of the Gulf of Taranto at Grotta Sant'Angelo-Cosenza have yielded obsidian from Palmarola (Hallam et al. 1976). Obsidian from Palmarola is widespread in northern Italy, but none so far has been identified in France, a fact that, according to Tykot, supports the possibility that only Sardinian obsidian reached the French sites along an island route (Sardinia/Corsica) rather than via the mainland (Tuscany/Liguria) (1996:56). Obsidian found at San Domino in the Tremiti Islands was also reported to be from Palmarola (Cornaggia Castiglioni et al. 1962; 1963), but Tykot (1996:57) argues that this attribution should be taken with caution. In addition, a study carried out by Giaccio and Fumo (1980) indicates Lipari as the most likely source for the obsidian found on the Tremiti (Fumo 1980:78).

In the 1940s, on the hill of the cemetery on the island of Ventotene, not far from Ischia, Buchner identified the remains of a Middle Bronze Age settlement (ca. second millennium cal BC) showing similarities to the site of Punta d'Alaca on Vivara (Buchner and Rittman 1948).

In the Bay of Naples, in the central Tyrrhenian (Fig. 4.5), Capri has produced Lower Palaeolithic evidence (it was not an island at the time). The site of Grotta delle Felci has produced Middle Neolithic material (including three hearths, seven human burials, painted pebbles, painted wares, grinding stones, and shell and bone ornaments), and there is evidence of the cave being in use until Roman times (Giardino 1998). Ischia was first occupied in the Neolithic. Several Neolithic stone tools were found, especially in the 1960s, in the area of Cilento, very close to the entrance of Ischia's cemetery (Buchner and Gialanella 1994:26). Finds included impasto ware, figulina painted ware (similar in style to Serra d'Alto), fishing-net clay weights, flint tools (the flint source is in the Sorrento peninsula), and obsidian blades (from Palmarola). A few finds came from the nearby site of San Michele (Buchner and Gialanella 1994:29). Occupation on Ischia continued into the Bronze Age. There are Middle Bronze Age sites in proximity of natural harbours on the northern and western sides of the island, while there are no sites on the southern coast. A Middle Bronze Age village was excavated by Buchner on the hill of Castiglione (in the area of Casamicciola Terme) in the 1930s. Other prehistoric material comes from Monte di Vico near Lacco Ameno (in the area where Pithecussae would later be founded), on the nearby hill of Mezzavia (in the Mazzola area), and at Punta Caruso, a promontory overlooking the small bay of Forio and the beach at Chiaia (Marazzi 1988).

The tiny island of Vivara, also in the Bay of Naples, was apparently settled for the first time in the late Early Bronze Age (Fig. 4.6). The oldest levels at Punta Mezzogiorno have produced Mycenaean fragments dated to the early sixteenth century BC, as has trench E+1A at Punta Capitello (which also displays links with the final EBA period of Palma Campania, on the mainland) (Buchner 1938; Tusa 1991; Pacciarelli 1991; Cazzella and Damiani 1991; Marazzi and Tusa 1994). Settlement on Vivara was

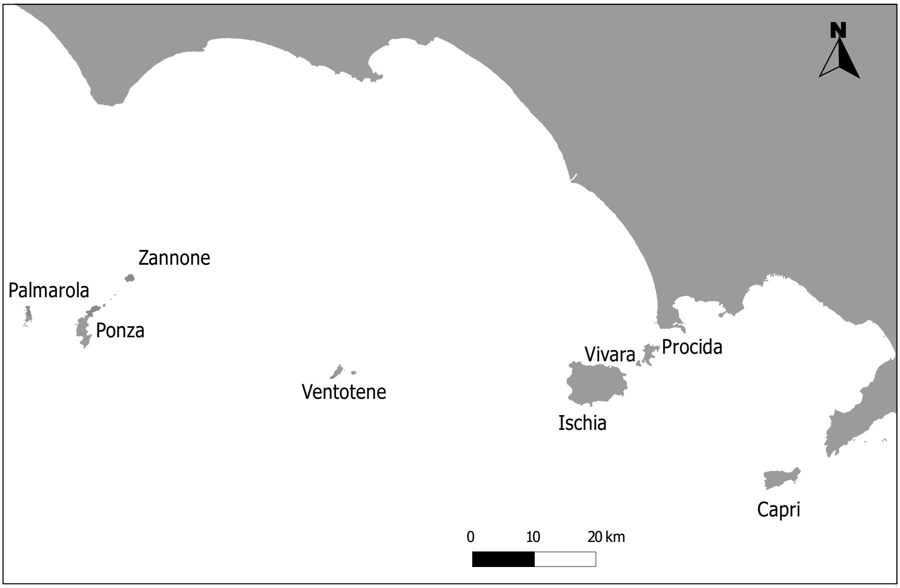

Fig. 4.5 Detail of central Tyrrhenian islands.

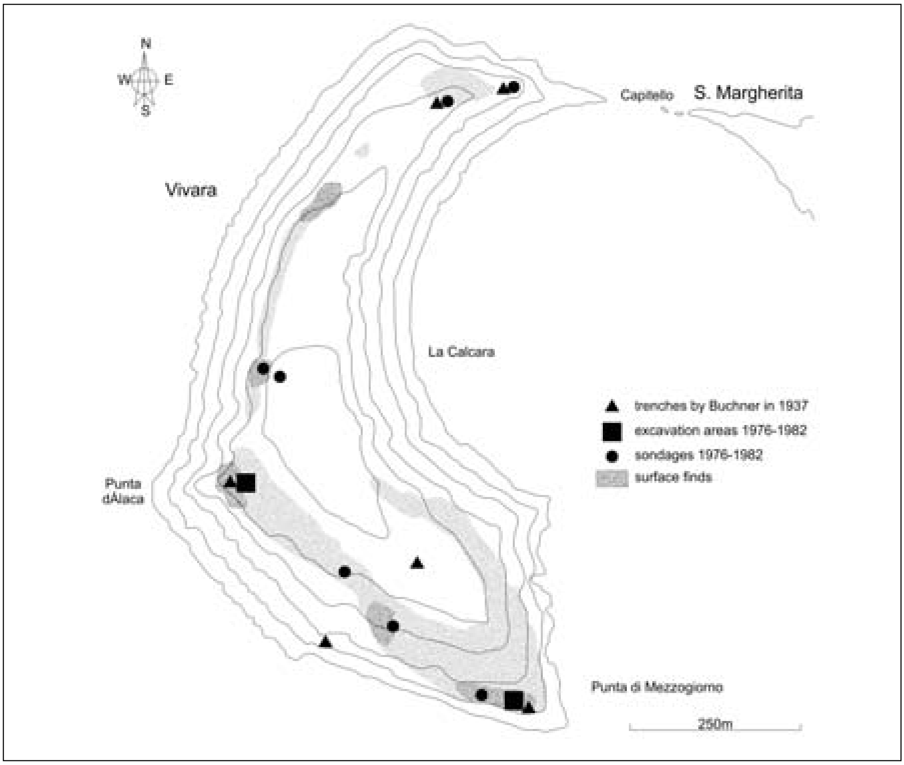

Fig. 4.6 Plan of Vivara with archaeological sites
(*from Marazzi and Tusa 1994, redrawn by J.J. Fuldain*).

continuous throughout the Bronze Age. Middle Bronze Age material comes from Punta d'Alaca (end of the sixteenth to the second half of the fifteenth century BC), while the most evolved Bronze Age phase is at Punta Capitello (Apennine ware) (Giardino 1994:69–70). Procida, which is larger than Vivara and only a few hundred metres away from it (the two islands were likely connected at this time), has not produced any prehistoric material. This is likely owing to a lack of archaeological investigation (the island housed a prison for much of the twentieth century).

Although, when taken overall, the islands' occupation might not have been continuous, there is evidence of human presence in these islands from at least the Early Neolithic, showing close parallels with nearby mainland cultures.

Sicily and Its Satellites

Sicily is a very large landmass close to mainland Italy, to which it lay closer and may have been linked to at times of low sea levels (Fig. 4.7). These physical characteristics prompted Cherry to describe it as a 'false island' (1990:189). Because of the potential existence of a landbridge (see Chapter 2), several controversial claims have been made for a human presence on Sicily since the Lower Palaeolithic. Less controversial is the evidence for colonisation post-insularisation in the Upper Palaeolithic (ca. 15,000 to 10,000 cal BC). Sicily in effect acted as a mainland for its smaller satellite islands (which would mostly have been connected to Sicily during periods of lowered sea levels). The earliest evidence for post-insularisation colonisation in the smaller islands is dated to the Neolithic, but it is possible that Mesolithic groups utilised some of the islands (see Table 4.6 for chronology and Table 4.7 for radiocarbon dates).

This section starts by reviewing the claims for the earliest peopling of Sicily. The picture is fragmented, possibly reflecting a palimpsest of short-lived phases of occupation of the island before it was more permanently settled around 15,000 cal BC. Material identified as Lower Palaeolithic has been claimed to come from two areas: scrapers, points, denticulates, and choppers were identified in the Catania plain (east-central Sicily); whereas a number of denticulates, large bifacials, and scrapers were collected in the province of Agrigento (south-central Sicily) (Leighton 1999: 22). Leighton, however, has pointed out that there are striking similarities between the Neolithic, Copper, and Bronze Age 'Campignan' stone industries (from south-eastern Italy) and several early Palaeolithic forms, and suggested that these early tools should be regarded with caution (Leighton 1999:22; Palma di Cesnola 1979; 1994). This evidence also derives from surface lithic scatters (reviewed by Leighton [1999:21] and by Mussi [2001:90 ff.]), so that their dating is controversial. The unreliability of the claims also seems to be supported by the complete lack of Middle Palaeolithic sites (Mussi 2001:90; Whitehouse, pers. comm.). Nonetheless, Leighton concedes that since Lower and Middle Palaeolithic sites in mainland Italy are known and access to Sicily was easier at this time, it is hard to believe that such a large island was completely unoccupied (Leighton 1999:22).

FIG. 4.7 Map of Sicily and its minor islands.

More reliable claims have been made for the Middle Aurignacian period (ca. 35,000 BP), most notably at the small rock-shelter of Fontana Nuova (in the province of Ragusa) (Chilardi et al. 1996). The lithic material found there included a blade-based industry (some typically Aurignacian), made from two varieties of flint, one sourced to ca. 100 km from the site. There were no microliths. The assemblage included deer bones (90% of total), displaying burn marks, thus suggesting a human presence, which was confirmed by five human bones, as well as teeth, identified as belonging to the Upper Palaeolithic (Bonfiglio and Piperno 1996; Leighton 1999:24). The faunal and human remains from Grotta di San Teodoro suggests migration from peninsular Italy into Sicily at a time when they were physically connected (recently dated at 21.5 to 20 kyr cal BP; see Chapter 2), given that it includes species such as *Equus hydruntinus* (European ass), which would have necessitated a landbridge to reach Sicily (Mannino et al. 2012).

There is good evidence to show that Sicily was widely inhabited by the later stages of the Upper Palaeolithic (later phase of the Epigravettian, from about 15,000 to 10,000 cal BC). This is considered the result of a maritime crossing colonisation into Sicily (Mussi 2001:332).

Recent excavations and genetic analysis of three prehistoric burials found at Grotta d'Oriente on the island of Favignana, off the northwestern coast of Sicily, support this dating (Mannino et al. 2012). The palaeogenetic and morphometric data obtained from one of the individuals (named 'Oriente B') indicate that anatomically modern humans (AMH) in Sicily descended from Epigravettian groups from southern Italy crossing the Strait of Messina relatively late in the Upper Palaeolithic (see Ègadi Islands, below). From this point on, the archaeological record is more consistent with the establishment of a human population on Sicily.

A useful sequence comes from the Grotta dell'Uzzo, in the northwest of Sicily, where there is evidence for the transition from the Mesolithic into the Neolithic. A series of radiocarbon dates indicates that the cave was occupied from the tenth/ninth until the end of the seventh/sixth millennia cal BC, and there is evidence of its use until the Early Bronze Age (Piperno and Tusa 1976; Piperno et al. 1980; Tagliacozzo 1994:9; Tusa 1996; Piperno 1985; 1997:137) (Tables 4.6, 4.7). The cave is one of the largest known Mesolithic burial sites in the Mediterranean, with 12 individuals (Borgognini Tarli et al. 1993). Accordingly, the site has been interpreted as a possible 'home base' for this group, yielding evidence for hunting, foraging, and gathering; alternatively, the cave may also have had a ritual function, receiving episodic

Table 4.6 Sicilian chronology

Period	Culture	Years cal BC
Upper Palaeolithic	Aurignacian, Fontana Nuova	35,000
	Final Epigravettian, Acqua Fitusa/San Teodoro	18,000
Mesolithic	Mesolithic, Uzzo, Grotta di Cala dei Genovesi (Levanzo), Perriere Sottano	10,000–6000
Early Neolithic	Impressed Ware/Stentinello?	6000–5000
Middle Neolithic	Stentinello/Trichrome/Serra D'Alto	5000–4000
Late Neolithic	Diana (Lipari)	4000–3500
Early Copper Age	San Cono/Piano Notaro/Piano Vento, Piano Conte (Lipari)	3500–3000
Late Copper Age	Serraferlicchio/Conca D'Oro/Malpasso/Beaker, Piano Quartara (Lipari)	3000–2500
Early Bronze Age	Naro/La Muculufa/Castelluccio/Beaker	2500–2000
Middle Bronze Age	Castelluccio/Rodì-Tindari-Vallelunga	2000–1500
Late Bronze Age	Pantalica North / Caltagirone	1200–900
Iron Age	Cassibile/Morgantina Finocchito/Sant'Angelo Muxaro/Butera	900–734

Source: Data from Leighton 1999.

Table 4.7 Radiocarbon dates from Sicily, minor islands, and Malta*

Source	Site	Lab no.	Provenance	Date BP	cal BC 2 sigma
Bianchini and Gambassini 1973	Sicily, Grotta dell'Acqua Fitusa	F-26	Hearth 'grey layer'	13760 ± 330	15785–13601
Graziosi 1962	Levanzo, Grotta di Cala dei Genovesi	F-19	Layer 3	11,710 ± 295	12572–10974
Graziosi 1962	Levanzo, Grotta di Cala dei Genovesi	R-566	Layer 3	11189 ± 120	11357–10802
Piperno 1985	Sicily, Grotta dell'Uzzo	P-2736	Trench G.9	10070 ± 90	10031–9331
Piperno 1985	Sicily, Grotta dell'Uzzo	P-2558	Trench C.3	9300 ± 100	8786–8294
Piperno 1985	Sicily, Grotta dell'Uzzo	P-2557	Trench A.16	9180 ± 100	8697–8236
Piperno 1985	Sicily, Grotta dell'Uzzo	P-2556	Trench A.7	9030 ± 100	8542–7843
Piperno 1985	Sicily, Grotta dell'Uzzo	P-2735	Trench F.16–18	8330 ± 80	7567–7143
Mannino et al. 2012	Grotta d'Oriente, Favignana	OxA-15562	Context B4/60 marine shells	6955 ± 36	5570–5310
Mannino et al. 2012	Grotta d'Oriente, Favignana	OxA-14256	Context B100/114 marine shells	8159 ± 37	6790–6440
Mannino et al. 2012	Grotta d'Oriente, Favignana	OxA-V-2364-37	Oriente X human ulna	8653 ± 39	7750–7580
Mannino et al. 2012	Grotta d'Oriente, Favignana	KIA-36049	Oriente B human rib	9275 ± 45	8630–8340
Mannino et al. 2012	Grotta d'Oriente, Favignana	KIA-36050	Oriente B human rib	9395 ± 45	8790–8560
Mannino et al. 2012	Grotta d'Oriente, Favignana	KIA-36051	Oriente B human rib	9440 ± 40	8840–8610
Aranguren and Revedin 1992	Sicily, Perriere Sottano	UtC-1424	Cut 53	8700 ± 150	8230–7530
Aranguren and Revedin 1992	Sicily, Perriere Sottano	UtC-1355	Cut 60	8460 ± 70	7597–7355

* Only earliest occupation (Ghar Dalam/Skorba) and Tarxien Temple–Cemetery dates included for Malta.

Table 4.7 (*continued*)

Source	Site	Lab no.	Provenance	Date BP	cal BC 2 sigma
Piperno 1985	Sicily, Grotta dell'Uzzo	P-2734	Trench F.13–14	7910 ± 70	7043–6642
Piperno 1985	Sicily, Grotta dell'Uzzo	P-2733	Trench F.7–9	6750 ± 70	5771–5531
Barker et al. 1969; Trump 1996	Malta, Skorba (GD phase)	BM-378	Wood charcoal, beside wall FB6	6140 ± 160	5467–4719 (5433–4691 in Trump 1996)
Barker et al. 1969; Trump 1996	Malta, Skorba (GD phase)	BM-216	Wood charcoal, beside wall FB6	5760 ± 200	5207–4237 (5209–4172 in Trump 1996)
Trump 1996, unpublished	Malta, Brochtorff Circle (T phase)	OxA-3572	Human bone, niche in hypogeum	5380 ± 70	4348–4044
Tusa 1994	Lipari, Acropolis (Diana phase)	R-180	Acr. AP	5000 ± 200	4313–3370
Trump 1996	Malta, Brochtorff Circle (T phase)	OxA-5038	Human bone, E tomb chamber	5330 ±100	4349–3966
Tusa 1994	Lipari, Acropolis (Trichrome phase)	R-366	Acr. AO-Y	5200 ± 60	4231–3811
Tusa 1994	Lipari, Contrada Diana (Diana phase)	R-182	Diana XXI	4885 ± 55	3791–3531
Trump 1966, 1996	Malta, Skorba West Temple (T phase)	BM-143	wood charcoal, floor deposit	4380 ± 150	3501–2620
Trump 1966, 1996	Malta, Brochtorff Circle (T phase)	OxA-3570	Context 669, human bone	4300 ± 60	3097–2698
Trump 1996, unpublished	Malta, Brochtorff Circle (T phase)	OxA-3574	Context 731, human bone	4260 ± 60	3077–2638
Trump 1996, unpublished	Malta, Brochtorff Circle (T phase)	OxA-3569	Context 354, human bone	4250 ± 65	3022–2630
Trump 1996, unpublished	Malta, Brochtorff Circle (T phase)	OxA-3575	Context 760, human bone	4225 ± 70	3010–2581
Trump 1996, unpublished	Malta, Brochtorff Circle (T phase)	OxA-3573	Context 783, human bone	4170 ± 65	2896–2579

Continued on the next page

Table 4.7 (*continued*)

Source	Site	Lab no.	Provenance	Date BP	cal BC 2 sigma
Trump 1996, unpublished	Malta, Brochtorff Circle (T phase)	OxA-3571	Context 799, human bone	4080 ± 65	2872–2476
Evans 1961	Malta, Tarxien, south Temple (TC Phase)	BM-141	Carbonised beans in cinerary urns	3880 ± 150	2864–1949
Trump 1996, unpublished	Malta, Brochtorff Circle (TC phase)	OxA-3570	Context 369, animal bone	3580 ± 75	2140–1740
Renfrew 1972	Malta, Tarxien, south Temple (TC Phase)	BM-711	Carbonised barley in cinerary urn	3354 ± 76	1877–1461
Renfrew 1972	Malta, Tarxien, south Temple (TC Phase)	BM-170	Carbonised beans in cinerary urn	3286 ± 72	1740–1427
Tozzi 1978	Pantelleria, Mursia (RTV phase)	R-671	Hut 1, area A, Ib.7	3280 ± 50	1682–1451
Tozzi 1978	Pantelleria, Mursia (RTV phase)	R-669	Hut 1, area A, Ibc.5	2930 ± 50	1307–981
Tozzi 1978	Pantelleria, Mursia (RTV phase)	R-673	Hut 4, area A, IVf.3	2830 ± 50	1187–843
Tozzi 1978	Pantelleria, Mursia (RTVM phase)	R-670	Hut 3, area A, Vc.3–4, hearth	3010 ± 50	1410–1114
Tozzi 1978	Pantelleria, Mursia (RTVM phase)	R-668	Area A, IVbc.4	2990 ± 50	1387–1056
Tusa 1994	Lipari, Acropolis (M phase)	R-365	Acr. BF-17	2900 ± 50	1261–935
Tusa 1994	Filicudi, Capo Graziano (M phase)	R-369	Hut 8	3000 ± 50	1399–1057
Tusa 1994	Lipari, Acropolis (A II phase)	R-367	Acr. BR-6	2820 ± 50	1123–843
Tusa 1994	Lipari, Acropolis (A II phase)	R-367	Acr. BR-6	2770 ± 50	1040–813
Tusa 1994	Lipari, Acropolis (A II phase)	R-181	Acr. BR	2555 ± 50	811–518

A II = Ausonio II
GD = Ghar Dalam
M = Milazzese
RTV = Rodì-Tindari-Vallelunga
RTVM = Rodì-Tindari-Vallelunga/Milazzese
T = Tarxien
TC = Tarxien Cemetery

visitors for burials and feasting (Mannino et al. 2007). Several ongoing studies have been analysing the environmental data from the site, resulting in an increasingly finer understanding of the seasonal exploitation of resources at the cave.

The shift from the Mesolithic to the Neolithic period at the Grotta dell'Uzzo is referred to as the 'transitional' phase. However, there is as yet no precise date for the beginning of the Neolithic, since a thousand-year gap currently separates the transitional phase (dated ca. 7000–6500 cal BC) from the earliest Neolithic date so far available (5750–5500 cal BC), although there is evidence from two trenches (W and X) that the Neolithic extends below the dated layers (Tagliacozzo 1994:10). Three Neolithic phases have been identified so far, two Early Neolithic and one Middle Neolithic. Cattle, sheep, and goat seem to have been introduced already domesticated around 6000 cal BC; however, hunting (red deer) and fishing continued (Tagliacozzo 1994:35). Evidence that occupation was permanent is provided by the seasonality of the fish and migratory birds found in the cave (Tagliacozzo 1994:34).

As mentioned above, various occupation models have been proposed for the cave: initial human occupation seems to have been occasional, becoming more intensive throughout the Mesolithic, and ending with permanent occupation in the transitional period (Tagliacozzo 1994:33). In the first Neolithic phase, the cave was still used for permanent occupation, while during the second Neolithic phase it gradually became a seasonal shelter used by shepherds and their animals. The cave has also yielded a wealth of environmental information, indicating that there was substantial forest cover from the earliest phases. The animal remains and the increase in resources exploited indicate that the climate became wetter between the end of the Mesolithic and the transitional phase.

The information from Grotta dell'Uzzo provides an insight into the environmental conditions extant at the time when Sicily's smaller islands also began to be settled. In particular, it is worth noting that nearly 40% of the 152 obsidian artefacts from Grotta dell'Uzzo come from Pantelleria (Francaviglia and Piperno 1987), providing evidence of an open water-crossing of at least 100 km in the Early Neolithic (Tykot 1996:58, 61). Moving on to the smaller islands, the following review highlights evidence related to a number of activities, ranging from visitation and utilization to actual settlement.

Ustica

Ustica (8 sq km) is an isolated volcanic island ca. 53 km north of Sicily. The earliest known finds consist of a few surface Impressed Ware pottery sherds and red monochrome Diana ware, dated approximately to the sixth and fifth millennia BC (Mannino 1998; Leighton 2004:106). These were located at the Spalmatore, in the southwestern part of the island. Two caves, Grotta Azzurra and Grotta San Francesco, in the eastern part of the island, have yielded pottery sherds of the Conca D'Oro style, which in Sicily is dated to the fourth and third millennia BC. It is possible that the caves were frequented for cult purposes concerning the presence of stillicide water (Whitehouse 1992).

The island's best-known site is that of Faraglioni, a Middle Bronze Age settlement excavated by the Soprintendenza ai Beni Culturali di Palermo since 1974 (Holloway and Lukesh 1995; 1997). Four phases were identified, from the initial building of the huts to the subsequent building and repairing of the rampart, which in parts reached a height of 4 m (Holloway and Lukesh 1997:455). Mannino (1980–1981; 1982) interpreted the site as a large village; the remains of a hut on the very edge of the cliff and of a building and prehistoric material found on the 'grande Faraglione' (an isolated sea-rock facing the site) were interpreted as evidence that the village originally extended over a wider area that had subsequently collapsed into the sea. According to Mannino, the overall extent of the village may have reached 4,000 sq m, with up to 300 huts (Mannino 1982:281). Holloway and Lukesh (1997:460) disagreed with this interpretation and believed that the number of huts was never more than 20. They also interpret the remains on the Faraglione as a lighthouse built by the inhabitants to lure and then ransack passing ships. Holloway and Lukesh (1995:8) interpreted the site as a fortress or citadel and believed its inhabitants were pirates. Leighton (2004) has pointed out that there are problems with some of these interpretations.

Mozia and the Isole dello Stagnone

Set in the lagoon of the Stagnone, a natural marine reserve up to 3 m deep (0.50 m on average) and separated from the northwestern coast of Sicily by a coastal ridge, are the islets of San Pantaleo (better known as Mozia), Isola Grande, La Scola, and Santa Maria (Fig. 4.8). San Pantaleo-Mozia (45 ha) lies just 1 km from the nearest coast, to which it is connected via a submerged causeway that is still in place. Although the water of the Stagnone is five times more saline than normal seawater, the underlying geology of Mozia (calcareous marl clay) protects the soil from saline infiltrations and is instead rich in groundwater and good for preserving rainwater. These features make the island a fertile and prosperous place in all seasons (Nigro 2007:7).

The only island in the group to have revealed prehistoric occupation is Mozia. The island is famous for its Phoenician colony, founded there in the second half of the eighth century BC; however, there is evidence for an earlier occupation, traces of which were first uncovered by Whitaker (1921), a successful Marsala wine entrepreneur who had bought the island, and which are still under excavation. Recent work by La Sapienza University (Rome) on the western slopes of the Mozia acropolis has revealed the earliest material, from the late EBA and early MBA. This material indicates the presence of a settlement, dated to the fifteenth and fourteenth centuries BC, which belonged to the Rodì-Tindari-Vallelunga and Thapsos-Milazzese cultures (Caltabiano and Spagnoli 2010:120). Prehistoric impasto-type pottery has been found at a number of soundings across the island, but the actual set-

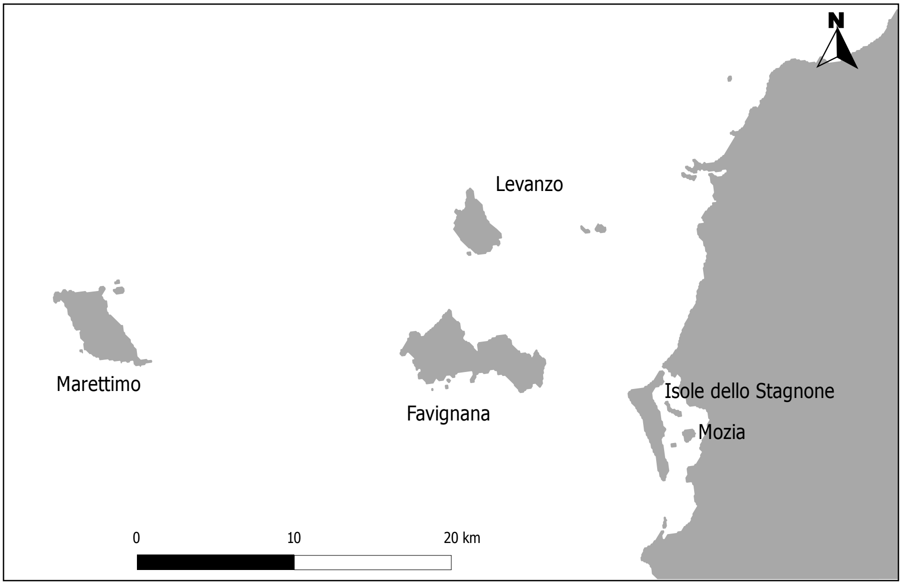

FIG. 4.8 Map of western Sicily: Ègadi Islands and Mozia.

tlement was located in the east-central and northern parts of the island. The pottery includes large shallow dishes (*teglie*) (ca. 50 cm across), which pottery specialists believe were used to dry and evaporate sea salt, a main activity attested on Mozia in several periods (Caltabiano 2007:107). Nigro has noted an apparent lack of evidence for occupation during the eleventh and tenth centuries BC, which has caused some debate over possible abandonment. He hypothesised that further excavations in the area of the acropolis may answer this question, since this area has the longest and most complete cultural sequence of occupation on Mozia (Nigro 2010:3).

Ègadi Islands

The islands of Favignana, Levanzo, and Marettimo, together with the rocks of Formica and Maraone, and Colombaia (just off the northwest coast of Sicily, at Trapani), compose the Ègadi archipelago (see Fig. 4.8). There are hundreds of caves on Marettimo, but none has produced evidence for early human frequentation of the island. Similarly, there is no early evidence on the intervening islets. Cave sites on Levanzo and Favignana, especially Grotta del Genovese and Grotta d'Oriente, have yielded significant data, dating back to the Upper Palaeolithic and Mesolithic periods and consisting of human, lithic, and faunal assemblages.

On Levanzo, Grotta del Genovese (Fig. 4.9) has provided evidence for Late Upper Palaeolithic/Mesolithic, followed by a Neolithic, human presence (Graziosi

FIG. 4.9 Grotta del Genovese, Levanzo, as seen from the sea (*photo by the author*).

1962). Layer 3 provided the earliest dates: 11,764–11,094 (F-19) and 11,034–10,737 cal BC (R-566), 1σ (Leighton 1999:26) (for radiocarbon dates, see Table 4.7). It is worth repeating here that, because of the lower sea level, Levanzo was part of the extreme northwest corner of Sicily at the time of this initial occupation; Levanzo became an island sometime between 9000 and 8500 cal BP (ca. 8th–7th millennium cal BC) (Mannino et al. 2012; see Chapter 2).

Recent work at Grotta d'Oriente, on Favignana, has focused on three prehistoric burials attributable to the late Upper Palaeolithic and Mesolithic periods (Mannino et al. 2012). The cave was first excavated in 1972 and re-excavated in 2005. The stratigraphy indicated four main phases of human use: late Upper Palaeolithic (14,640–13,760 cal BP), Mesolithic (9890–9460 cal BP), Mesolithic–Neolithic transition or early Neolithic (7990–7750 cal BP), and Bronze Age (Mannino et al. 2012). Favignana became insular around 7000 cal BP (6th millennium cal BC). The study also demonstrated that, despite rising sea levels, the diet of Grotta d'Oriente's occupiers was essentially terrestrial, with very low contribution from marine resources. Nonetheless, environmental change would have been noticeable within the span of a human generation and may have influenced the ideological sphere, as suggested by the presence of worked shells in two of the burials; these could either be necklaces or, more unusually, body ornaments (Mannino et al. 2012).

An earlier survey of the island of Favignana in 1968 by Bisi had already led to the identification of a number of other caves (e.g., Grotta delle Pecore or della Madonna, Grotta della Ucceria) on the slopes of the Montagna Grossa, a mountain range that crosses Favignana widthwise, which would also deserve further investigation. The caves contained evidence for human frequentation, in the form of anthropogenic assemblages (shell middens) of *Helix, Trochus,* and *Patella cerulea* and *P. ferruginea*. These also yielded a rather impoverished lithic industry, which Bisi identified as being similar to the preceramic phase from Levanzo. Bisi (1968:27) also found several burials cut into the soft tufa caves. The rock-cut prehistoric tombs are found in the northeast of the island in Località Torretta and near the old cemetery, where there are also hypogaeic chambers that were reused and transformed from Punic until modern times. The hypogaea are decorated with incisions depicting anthropomorphic figures or arrow figures and fish, which Bisi (1968:27–28) saw as being stylistically similar to those of Grotta Genovese on Levanzo.

Aeolian Islands

The seven islands of Alicudi, Filicudi, Lipari, Panarea, Salina, Stromboli, and Vulcano lie in the lower Tyrrhenian, north of Sicily, between 20 and 40 km from the coast and between 55 and 115 km from southern Italy. In 1950, excavations by Bernabò Brea and Cavalier focused on the Lipari acropolis, which was described as 'a real tell like those of the Near East' (Bernabò Brea 1957:49). Bernabò Brea and Cavalier's original chronology, although slightly modified (some phases have been either lengthened or backdated) through recent recalibration of older radiocarbon dates, is still widely accepted (Leighton 1999:2; Malone et al. 1994:169). An important result of this date revision process has been the attribution of Neolithic painted wares to an earlier period than originally believed, overlapping in part with Stentinello pottery (*contra* the idea of an extended early 'pure-impressed' ware phase) (see Whitehouse 1969; Leighton 1999:63).

The distribution of known sites in the archipelago is shown in Figure 4.10 and a general scheme of colonisation in Table 4.8. Lipari and Salina have evidence of early Neolithic Stentinello occupation (generally believed to be the earliest Neolithic culture known in Sicily), suggesting these were the first to be settled. Cherry (1990:190) noted that although the Aeolian Islands have not yet produced material predating Stentinello, there is evidence for pre-Neolithic exploitation of Lipari obsidian, which is found in Sicily and mainland Italy during the ninth millennium BP (ca. eighth millennium cal BC), indicating that the islands were being visited before their settlement. Given that the eruption which produced the obsidian flow has been dated to 8000–7000 BC, this exploitation very early on suggests prior visits to the islands, which are clearly visible from the Sicilian coast (Castagnino-Berlinghieri 2011:115, 121). The earliest known site on Lipari is the village of Castellaro Vecchio (Bernabò Brea 1957). Its upland position has been linked to agriculture and pasture rather than maritime trade, even if, given the huge amounts of obsidian debris, the obsidian industry was an important activity in the village (Malone 1998). The oldest tuna fish bone found in Lipari comes from a burial dated to the Middle Neolithic (Bernabò Brea and Cavalier 1960:113) and was interpreted by Castagnino Berlinghieri (2002:230) as an unusual 'one-off', perhaps a ritual deposit, as none others are known from contemporary settlements. This lack of evidence for deep-sea ventures was interpreted as a sign that the activities of Lipari's Neolithic colonisers focused more on the land than on the sea. In Bernabò Brea's original chronology (1957), settlement at Castellaro Vecchio was followed by that of the acropolis. This chronology, however, is based on Bernabò Brea's distinction be-

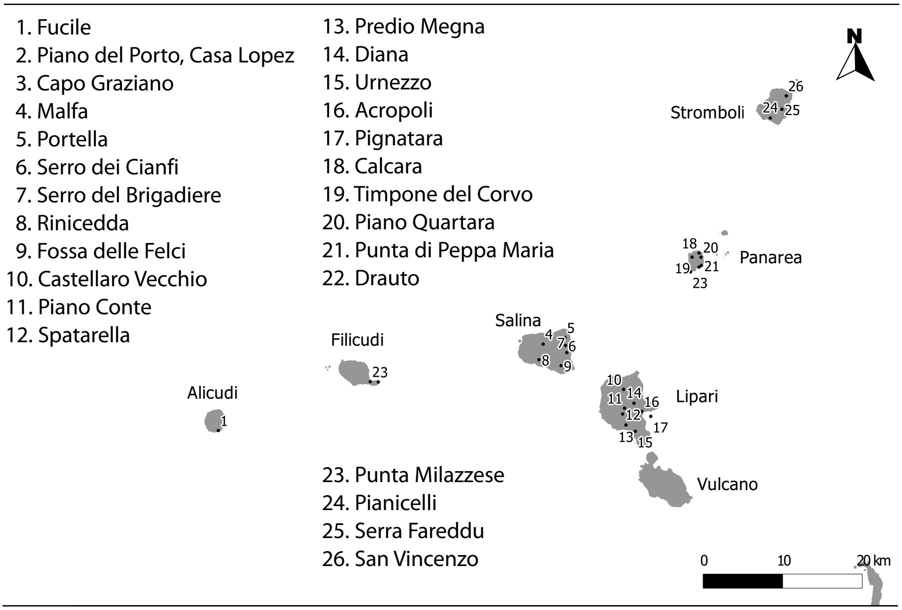

FIG. 4.10. Map of main archaeological sites in the Aeolian archipelago (*redrawn from Balistreri et al., eds. 1997*).

Table 4.8 Aeolian Islands, phases of occupation

Period	Phase	A	F	Sa	L	P	St	V	Years cal BC (approx)
EN	Stentinello/Castellaro Vecchio		■	■	■				5500–5000
MN	Stentinello/Trichrome/ Serra D'Alto		?	?	■	■			5000–4000
LN	Diana/Spatarella		■	■	■	■	■		4000–3500
ECA	Piano Conte				■		■		3500–3000
LCA	Piano Quartara				■	■	■		3000–2500
EBA	Capo Graziano I–II	■	■	■	■	■	■		2500–1500
MBA	Milazzese		■	■	■	■			1500–1200
LBA–EIA	Ausonio I–II				■				1200–850

Sources: Data from Stoddart 1999a:68; Leighton 1999:269; Balistreri et al., eds. 1997:642.
A = Alicudi; F = Filicudi; Sa = Salina; L = Lipari; P = Panarea; St = Stromboli; V = Vulcano

tween their pottery styles (impressed and painted), and, as mentioned, the two styles (and hence the two sites) can be seen as being roughly contemporary.

Turning to the other islands, according to the accepted chronology, Salina (Rinicedda) and Filicudi (Piano del Porto-Casa Lopez) were occupied for the first time roughly contemporaneously with Lipari, followed by Panarea in the Middle Neolithic (Bernabò Brea and Cavalier 1960); Stromboli was occupied for the first time in the Early Copper Age, Piano Conte phase (mid-fourth millennium cal BC), at Pianicelli di Ginostra (Bernabò Brea and Cavalier 1968:45–6), though recent excavations at the site of San Vincenzo in the northeast of the island also found Late Neolithic pottery (Spatarella type) (early fourth millennium cal BC), indicating frequentation if not actual settlement (Levi et al. 2011:169); finally, Alicudi was first occupied in the Early Bronze Age (second millennium cal BC) (Bernabò Brea 1957; Tusa 1992; Balistreri et al., eds. 1997; Stoddart 1999a). Evidence of prehistoric settlement (in the form of hut remains) is found in all the islands except Vulcano, possibly as result of the emergence of Vulcanello, a volcanic structure that began to form around AD 186 and that may have buried traces of previous occupation (Castagnino Berlinghieri 2003:72). The earliest known evidence from Vulcano comprises possible burials dated on the basis of their typology to the first half of the second millennium cal BC; these were located in the area of Porto Levante, near the Faraglione Grande, and in the area of the Piano on the island of Vulcano (Bernabò Brea 1957; Giustolisi 1995). There is also evidence that Vulcano was visited for the exploitation of sulphur and possibly alum in the Middle and Late Bronze Ages, as part of Mycenaean trading interests in Sicily and the Aeolian Islands (Bernabò Brea 1957:120; Giustolisi 1995:52; Castellana 1998; Leighton 1999:132, 157, 181). Judging from the number of known sites and their sizes, this period saw the greatest population expansion in the archipelago.

The Pelagie Islands and Pantelleria

The Pelagie Islands and Pantelleria form a series of stepping-stones between Sicily and North Africa (Fig. 4.11). Lampedusa and Lampione are calcareous and belong to the continental shelf of Africa. Linosa is of volcanic origin. Their colonisation is dated after their insularisation (see Chapter 2).

A Stentinello site on Lampedusa (fifth–fourth millennium BC but possibly earlier) at Cala Pisana yielded obsidian from the island of Pantelleria (ca. 145 km away) (Radi 1972). A single hut, exposed accidentally during modern road construction, was excavated in the early 1970s; it contained Neolithic pottery and domestic refuse (animal bones and shell remains). The full extent of the site is unknown. Copat et al. (2010:46) have remarked that the site was short-lived, probably owing to 'the difficulties of maintaining links to the mainland, and the lack of demographic replenishment'. Nonetheless, earlier reports of surface finds from various locations across the island suggest that prehistoric occupation may have been more extensive than is currently known (Ashby 1911).

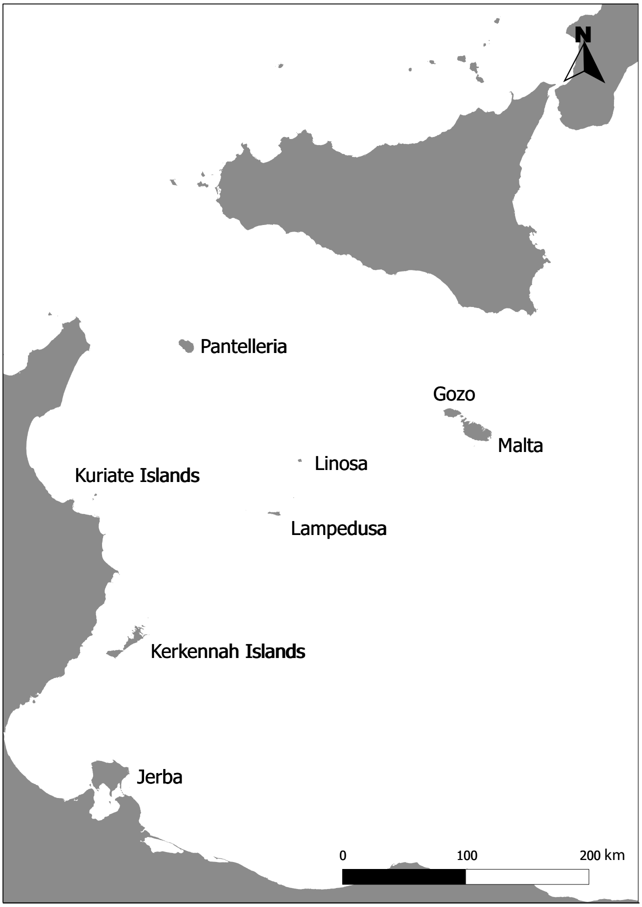

FIG. 4.11 Map of the south-central Mediterranean.

The earliest settlement remains on Pantelleria—the village of Mursia and its adjacent necropolis, found on the western coast of the island—have been dated to the Early Bronze Age and, more specifically, to the seventeenth–sixteenth centuries BC (Orsi 1899; Tozzi 1968; 1978; Ardesia et al. 2006). The island is famous for its megalithic funerary monuments, or 'Sesi', originally studied by Orsi (1899). Mursia was protected on the seaward sides by sheer cliffs, and by an imposing wall (200 m long, 7–8 m high, and with a 10 m wide base) towards the interior (Tusa 1983:276). The oval huts (some with pebbled floors) had hearths inside stone cists, stone vases, and clay slabs fixed in the floors. The pottery found is both purified and coarse impasto, made with clay from either Sicily or North Africa. The style shows links with the EBA Sicilian Rodì-Vallelunga-Boccadifalco culture, and, although the island lies much farther south, with the Aeolian Island culture of Capo Graziano. The lithic industry is almost exclusively obsidian-based, extracted from the southeastern side of the island (Tusa 1983:274). Three sources have been identified on the island: Balata dei Turchi, Gelkhamar, and Lago di Venere (Tykot 1996:43). Pantelleria obsidian, or 'Pantellerite', is readily distinguishable from other western Mediterranean sources because of its chemical content, which makes it look greenish. Pantellerite is of a lower quality than Lipari obsidian and tends to produce thicker blades (Tykot 1996).

The economy at Mursia was based on farming (grindstones and sickles were found) and animal herding (80% sheep bones, 20% cattle, while pig remains are extremely rare), supplemented by hunting and fishing (Tusa 1983:275). Tusa (1997:389) argues that Pantelleria was already populated in the fifth millennium BC, although Mursia indicates that it was permanently settled only by the third millennium BC. Evidence to support Neolithic occupation is still lacking, however, and relies on obsidian found in Neolithic contexts elsewhere (evidence that is more likely to relate to the island's visitation rather than permanent occupation; cf. Melos, Lipari): Lampedusa, Malta, Sicily, and Ustica (Francaviglia and Piperno 1987; Tykot 1995; Tusa 1997: 389), Italy (Bigazzi et al. 1992), France (Williams-Thorpe et al. 1984 in Tykot 1996: 56), and Tunisia (Camps 1988:47). Pantellerian obsidian was found in Tunisia at Kef Hamda near Maktar in contexts dated as early as 7445 ± 125 BP and 7610 ± 125 BP (respectively, 6560–6053 and 6755–6215 cal BC, 2σ), and subsequently in a Middle Neolithic context near Hergla, on the coast, dated 5270 ± 140 BP (= 4436–3771 cal BC, 2σ) (Camps 1988; Tykot 1996). These finds attest to maritime crossings to the North African coast, which are otherwise elusive. The island has been heavily terraced, and as a result, archaeological deposits may have been destroyed or buried under considerable depth of soil. A survey of the island in 1999–2000 revealed a few locations where evidence for Neolithic occupation might be found by targeted excavations. These are the area known as Bugeber (where several rock-shelters may preserve evidence) (Giannitrapani, n.d.) and Punta Fram (Nicoletti 2012).

Excavations at Mursia resumed between 2000 and 2005 (Ardesia et al. 2006). As well as leading to a clearer understanding of the building phases at the site, an interesting result of the campaign was the identification of matt-painted pottery of Levantine type, displaying close similarities to pottery found at the site of Monte Grande and at other locations in Sicily. The investigators suggest this is evidence of contacts between Sicily, Crete, and Egypt during the seventeenth century BC, following a maritime route along the North African coast, with Pantelleria occupying a strategic position in the network of contacts (Ardesia et al. 2006:70-3).

Maltese Islands

The earliest known material from the island of Malta (Fig. 4.12) is Early Neolithic in date and comes from the sites of Skorba (Trump 2002:23) and Ghar Dalam Cave (Evans 1984) (for radiocarbon dates, see Table 4.8; Table 4.9 provides a general chronology). Although the Maltese Early Neolithic period is named after Ghar Dalam Cave, the best evidence for initial occupation comes from Skorba (Trump 2002:28). This site has yielded two of the earliest radiocarbon dates available from the island, indicating human presence around 5000 cal BC.

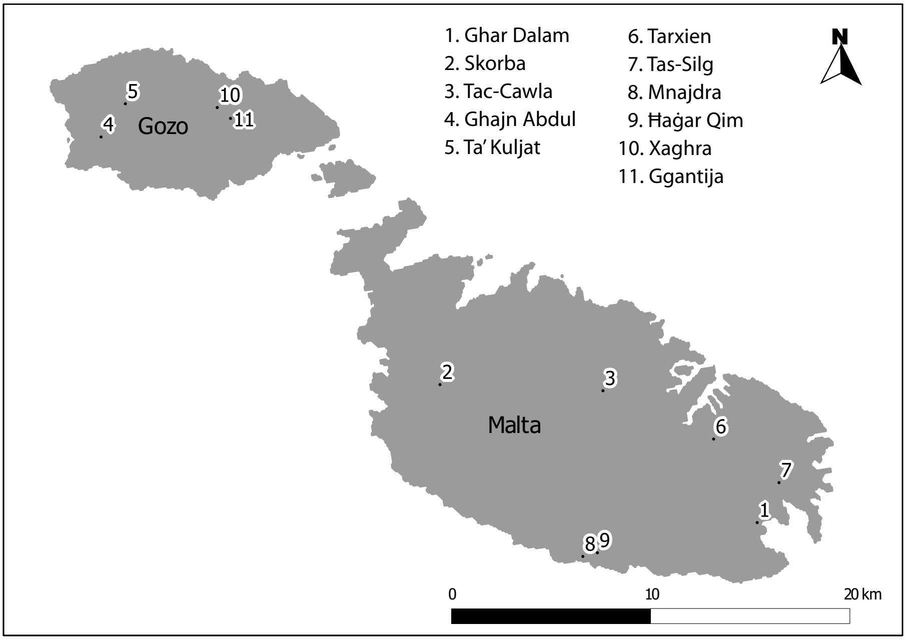

FIG. 4.12 Map of Maltese archipelago with sites discussed in text.

The two dates from Skorba for the (EN) Ghar Dalam phase are BM-378, calibrated as 5433–4691 cal BC (2σ), and BM-216, calibrated as 5209–4172 cal BC (2σ) (Trump 1996:176). A more recent calibration which I carried out yields the slightly earlier dates of 5467–4719 cal BC (2σ) and 5207–4237 cal BC (2σ), respectively. Overall, these dates are taken to indicate the presence of 'well-established' farmers at the start of the fifth millennium cal BC, implying a sea-crossing from Sicily of just under 100 km; indeed, the first settlement of the island might have been earlier in the sixth millennium (Trump 2002:54). Ghar Dalam Cave yielded very little impressed pottery from a disturbed deposit (Trump 2002:56–57). Early Impressed Ware sites are also known from the nearby island of Gozo, at the cave of Ghajn Abdul, and at Ta' Kuljat and Tac-Cawla, where two surface scatters were identified (Trump 2002:28). The earliest known evidence from the small island of Comino is a rock-cut shaft with plaster and paint which is probably Punic and is dated to the first millennium BC (Buhagiar and Sagona 2003).

The Maltese islands have been considered 'amongst the most isolated islands in the Mediterranean' after the Balearics (Schembri et al. 2009:17). On the positive side, Malta has fertile soils and a good number of water springs, located in areas of Upper and Lower Coralline Limestone (Mannion and Vogiatzakis 2007:33, Schembri et al. 2009:17). Despite these attractive features, there is no known evidence earlier than the Neolithic, despite the fact that Ghar Dalam Cave has produced Pleistocene faunal remains at a time when the islands would have formed a headland of Sicily and

Table 4.9 Maltese chronology

Period	Culture	Years cal BC (approx.)
Neolithic	Ghar Dalam	5000–4300
	Grey Skorba	4500–4400
	Red Skorba	4400–4100
Temple period	Zebbug	4100–3700
	Mgarr	3800–3600
	Ggantija	3600–3100
	Saflieni and Tarxien	3100–2400
	Break in dated sequence	2400–2000
Bronze Age	Tarxien Cemetery	2000–1500
	Borg in-Nadur and Bahrija	1500–700

Sources: Data from Cilia (ed.) 2004 and Malone et al. 2009.

therefore the islands would have been relatively easy to access (Schembri et al. 2009:17; see Chapter 2). The absence of pre-Neolithic evidence may either confirm what Cherry stated over twenty years ago—namely, that people from Sicily did not reach Malta across the landbridge that existed from time to time during the Palaeolithic (1990:191)—or indicate that they left no visible traces of their presence. Claims of much earlier structures (now allegedly under water) are dismissed by Trump as 'the work of mermaids' (2002:14).

Evans (1984:490) claimed that the earliest human occupation of the Maltese islands belonged to a late stage of the western Mediterranean Impressed Ware cultures. Trump also described Ghar Dalam as an 'evolved Stentinello derived from Impressed ware' (1996:174). However, he also noted that the earliest dates from Malta are close to Sicilian dates from Poggio/Piano Vento (near Agrigento), a phase described as 'pre-Stentinello' and dated 6130 ± 90 BP (5296–4834 cal BC, 2σ; A-4474). Definitions aside, the Neolithic package brought to the islands is very close to that found in Sicily and Calabria (impressed pottery, flint, chert and obsidian flake lithics; sheep, goat, pigs, dogs, and cattle) (Malone 1998; Stoddart 1999b). Camps (1988:45) also believed that the presence of such a well-established Neolithic package on Malta suggested pre-Neolithic frequentation of the island (for which, as already mentioned, there is no evidence as yet). Trump (1996:174) has recently pointed out the problems attendant on basing an island's initial occupation and duration on just a handful of dates. The early dispersed 'small encampments' (Stoddart 1999a: 69)—which, as mentioned, were very similar to their Sicilian counterparts—were apparently replaced by a nucleated pattern at the start of the fourth millennium cal BC, when differences with Sicily started to emerge, particularly in the mortuary sphere (Zebbug phase) (Stoddart 1999b:140). These differences culminated, in the mid-third millennium cal BC, in the phase of temple building (Tarxien temple phase), which lasted roughly from 3500 to 2500 cal BC. The subsequent development of human settlement on Malta is dealt with in more detail in Chapter 8.

NORTH AFRICAN ISLANDS

The islands considered here are located along the shores of Mediterranean Morocco and western Algeria. They are the island of Plane, the Habibas Islands, Rachgoun (ancient Siga), and the Chafarina Islands (which belong to Spain). A further group of islands is located along the Tunisian coast, comprising Zembra, the Cani Islands, the two Kerkennah Islands, and Jerba (Figs. 4.13–4.14). For a discussion of ancient coastlines, see Chapter 2.

These islands were not included in either of Cherry's or Patton's reviews. In general, there has been an unwillingness to include the North African shores in Mediterranean studies (the rationale being that the evidence is too scant to comment), but it is high time that we begin to incorporate these in our discussions. Since 1995, a joint Moroccan-German mission has been focusing its investigations on the coastal area of northeastern Morocco between the Moulouya River in the east, the Msoun River in the south, and Al Hoceima in the west (Linstädter et al. 2012). This work is starting to reconsider the Neolithisation of the southern Iberian Peninsula and the Mediterranean Maghreb as part of the same process, a pattern supported by new radiocarbon

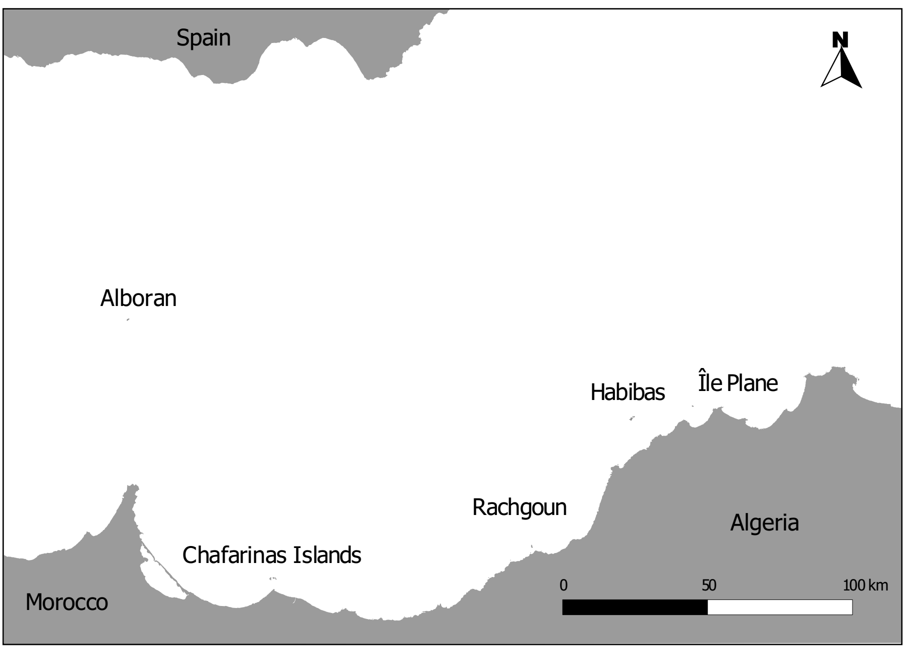

FIG. 4.13 Map of northeastern Morocco and western Algerian coast with islands discussed in text.

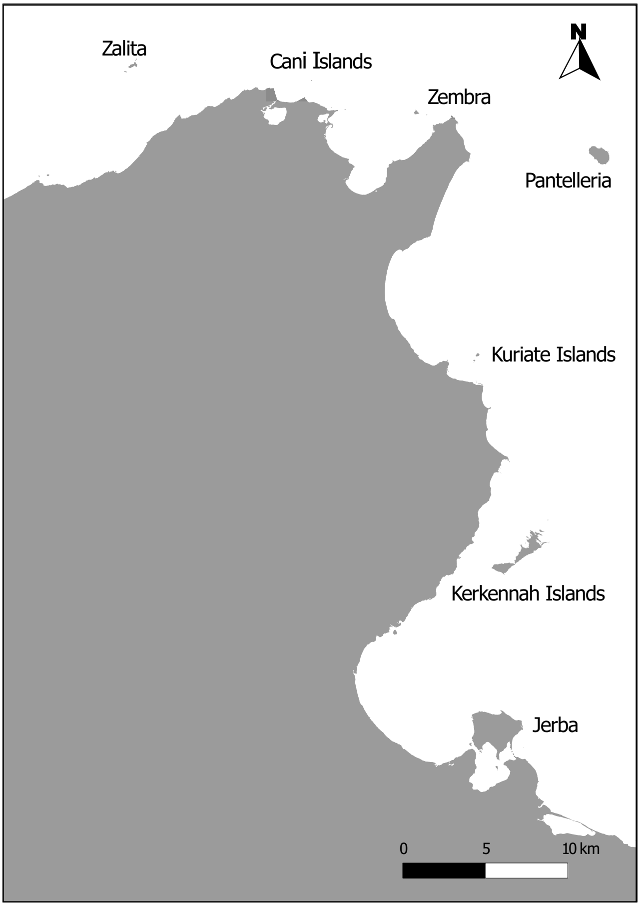

FIG. 4.14 Map of southeastern Tunisian islands.

dates from both areas. The Moroccan coastal sites indicate that, from around 7600 cal BP, Neolithic groups arrived here from the eastern Mediterranean following the littoral of Andalusia, interacting with preexisting hunter-gatherer groups, as seen from African influences in the resulting Neolithic package (high percentage of wild plants and fauna, and a broad subsistence strategy including hunting and gathering) (Linstädter et al. 2012:12).

Systematic work on the North African islands began in the 1940s and 1950s, mainly by French archaeologists. The North African shores were densely inhabited during the Neolithic, both in caves and rock-shelters and in open-air sites (hearths in the middle of dunes or shell middens). In all of these sites, marine fauna, especially seashells, are abundant but not exclusive, suggesting a mixed economy also based on terrestrial molluscs and mammals. While there is little archaeological evidence (e.g., bone harpoons) to support actual fishing (Souville 1958:315, 344), there are indications that the Neolithic inhabitants of these shores frequently went to offshore or littoral islands, and that these visits lasted some time, judging from the great quantities of debris derived from stone tool manufacturing found there (Souville 1958:342). These activities can now be viewed within the context of the growing evidence for contacts between western North Africa and the Iberian Peninsula, already mentioned (Linstädter et al. 2012): it appears that Neolithic inventions were introduced here from eastern Spain, via 'coastal pioneer settlements' on both sides of the Alboran Sea, reversing the generally accepted view that contacts between these regions only began in the following Eneolithic or Copper Age (Balout 1955; Souville 1958:343; Cintas 1961:16; Gilman 1975:125). This model highlights the conspiscuous absence of any Neolithic evidence on the islands of Alboran and Las Nubes, which provide ideal stepping-stones between Spain and North Africa. At the maximum lowering of sea levels, emerging islets would have subdivided the Alboran Sea into smaller stretches; however, this crossing is treacherous because of strong dominant winds and currents (Sautkin et al. 2003). It seems likely that the islands were used as a stopover but that only ephemeral expedient structures were built. It is worth mentioning that all 34 pieces of obsidian found on the small island of Zembra had been imported to the island from Pantelleria (Tykot 1996:59), indicating the broad reach of Neolithic interaction.

The earliest material identified following insularisation is described as Neolithic, belonging to either of the two main North African Neolithic traditions: the 'Iberomaurusian' and the 'Capsian' Neolithic. Some clarifications may be useful at this stage, before the review of the data from the islands themselves. The terms 'Iberomaurusian' and 'Capsian' refer to two distinct preceding Epipalaeolithic traditions, which succeeded the previous so-called Aterien (Acheulian), or Upper Palaeolithic culture, in different areas. The original distinction was made both on a spatial and on a chronological basis (Camps et al. 1968:9; Roubet 1979:56). Until the 1970s, all radiocarbon determinations for the Iberomaurusian fell before 8000 cal BC (with a floruit in the twelfth millennium cal BC), while dates available for the Capsian nearly all fell after 5000 cal BC, resulting in a conspicuous gap (Camps et al. 1968). The two traditions displayed different characteristics: Iberomaurusian sites typically had an abundance of backed blades, few geometric microliths, some microburins, bifacially worked arrowheads, ostrich eggshell, and decorated pottery, and were generally found in the west and along the coasts (particularly in the Oran caves of northern Algeria). The Capsian sites, mainly *escargotières* (shell middens), were distributed in the east and in the interior (especially in eastern Algeria and southern Tunisia) (Gilman 1975:1). New dates have become available since the late 1980s, refining this picture and indicating some chronological and spatial overlap between the two traditions (Thomas 1993). In particular, the site of Kef Zoura in northern Algeria produced some earlier dates for the Typical and Upper Capsian, eliminating the gap with the Iberomaurusian. The Typical Capsian dates now range from the early eighth to the mid-sixth millennia cal BC, and those for the Upper Capsian from the mid-fifth to the mid-fourth millennia cal BC (Close 1988:159; Thomas 1993:24).

Mediterranean Morocco and Western Algeria

Île Plane

The island of Plane is ca. 8 km away from the Baie des Andalouses (Souville 1958:340). Vuillemot collected strongly wind-eroded flint blades on the whole island, with concentrations in two areas, the plateaux du Phare and du Sémaphore. The industry is blade-based, with several raw cores, arrowheads, and long bifacial tools of Saharan type. Some finds were also collected inside three caves on the island, defined as 'industrie atypique' and possibly earlier than the Neolithic at a time when it may have been connected or closer to the coast (Vuillemot 1954:65).

Îles Habibas

Farther west, the archipelago of the Habibas, also opposite the Baie des Andalouses, was surveyed by Louis Gentil, Doumergue, and Vuillemot, who collected on the larger island a great quantity of flint blades, together with some pieces in quartzite and reddish obsidian, which appear to have been worked on the island (Souville 1958:340). The presence of the older Atérien material on the Grande Habiba is linked to lowered sea levels (Balout 1955:482).

Rachgoun

Rachgoun is a small island opposite the mouth of the Oued Tafna (the site of ancient Siga), 2 km from the Moroccan coast. On this islet, a blade industry comparable to that found on the Îles Habibas has been collected, with flint bladelets and blades, all apparently Neolithic in age. The presence of earlier Atérien is disputed (Souville 1958:341), or once again linked to lowered sea levels (Balout 1955:482). The island is also known for the site of the Nécropole du Phare, which has revealed cremation and inhumation burials containing Phoenician material dated to the seventh century BC, and indicating contacts with contemporary sites in Iberia. On the southern side of the island, the remains of domestic dwellings were found, made of stone blocks joined with clay, containing material of the seventh century BC and no later than the fifth (Vuillemot 1955; 1965; Bourain et al. 1992:369).

Îles Chafarinas

The archipelago is made up of three islands: Île du Roi, d'Isabelle II, and du Congrès. The islands were first surveyed in the mid-1950s by Posac. The first two islands produced very little in terms of the typical Neolithic blade industry. On the larger island, Congrès Island, already visited by Pallary in the early 1900s, Posac (1956) collected more than 330 stone pieces, half made of flint, the rest of chalcedonite or quartzite (Souville 1958:341). The repertoire included cores, blades and bladelets, geometric microliths (trapezes and triangles), burins, microburins, and scrapers. These types are generally comparable to the lithic industry found in the islands of western Algeria (Souville 1958:341). In addition, there were fragments of ostrich eggs, huge amounts of snails, and some Neolithic impressed and incised pottery.

The Île du Congrès has been recently reinvestigated. A systematic survey in 2000 led to the identification and excavation of a substantial site at El Zafrín, a coastal open-air Neolithic settlement fronting the Moulouya delta. Radiocarbon age determinations from the site place it in the third quarter of the fifth millennium cal BC (4500–4300 cal BC), or the final stage of the early Neolithic, by which time the new economy was well established across North Africa (Rojo Guerra et al. 2010:159; Gibaja et al. 2012:3098). Several domestic structures were excavated, and the remains of ovicaprids, monk seals, molluscs, and fish indicate a mixed economy (Gibaja et al. 2012). A whole hut was excavated, 3 m in diameter, with a stone wall on the southeastern side and an east-facing entrance. It contained a central hearth, a quern (which was found in situ), and different food-processing areas. The excavators postulate that the simple hut was used on a temporary or seasonal basis by a group of three or four individuals, since the local climatic conditions did not require more permanent shelters (Gibaja et al. 2012:3096). Pollen samples collected near the hearth indicate that this community grew cereals. The cardium-decorated pottery from the site, which is very similar to Early Neolithic pottery from mainland Moroccan sites at Ifri Oudadane and Ifri Ouzabour, may indicate an even earlier date (Rojo Guerra et al. 2010:79). The island would have been initially joined to the North African coast, forming the northern end of an extensive headland (now Cap de l'Eau), but from about 6000 BP, the islands became separated as a result of rising sea levels and sea erosion (Gibaja et al. 2012).

Tunisian Coast

Zembra

The island of Zembra is 12 km northwest of Cap Bon. It is a rock 432 m high, described by Bourain as a 'natural fortress', with one small inlet on the south coast, where the remains of an otherwise unidentified 'ancient' port were found (Bourain et al. 1992:88). Tykot examined 34 pieces of obsidian found during surface surveys and excavation on the island, and remarked that all of them were green in transmitted light and thus from Pantelleria (1996:59).

Îles Cani

Along the Tunisian coast, off the promontory of Cap Bizerte, which is 6 km north of the town of Bizerte and 65 km northwest of Carthage, are the Îles Cani. On the largest of these, a hoard of bracelets, ingots, and 150 silver coins was found, possibly buried a little before the fall of Carthage (Bourain et al. 1992:74).

Îles Kerkennah

The two Kerkennah Islands, Chergui and Gharbi, ca. 20 km off Sfax in Tunisia, belonged to the empire of Carthage. Herodotus (*Histories* IV 195) has left an account of these islands (Bourain et al. 1992:245). No earlier material is documented.

Jerba
Farther to the south, the island of Jerba delimits the Gulf of Gabès to the east. The island is the largest of the North African coast (568 sq km), with a 125 km long coastline. Jerba has no internal relief and no rivers or springs. The only water comes from cisterns and wells, which provide slightly saline water; nonetheless, the island is cultivated with olive trees (Fentress 2000, 2001). The very low sea-bottom around the island and the large variation in tide make Jerba very good for fishing, but caused the sinking of Roman vessels in 253 BC (Polybius I 39, 3–4). The island is littered with Punic ceramics and has many pre-Roman burials (Fentress 2000, 2001; Drine et al. 2009). To the north, the site of Henchir Bourgou was first occupied in the fourth to third centuries BC (Bourain et al. 1992:134; Drine et al. 2009). No earlier material is mentioned.

Libyan Coast

Seal Island and Bombah (or Burdah) Island
Off the Libyan coast, in the Gulf of Bombah, Seal Island and Bombah (or Burdah) Island provide the only good anchorage for small craft (Bates 1914:5). Seal Island is flat and low, and suitable for human occupation; while Bombah Island is described as 'a steep uninhabitable mass of granular limestone' (Bates 1914:5). No material is reported from these islands, though the level of investigation may have been insufficient and the coves of the Gulf of Bombah provide, with Benghazî, the best access from the coast to the interior, via the Gebel el-Ahdar and the Gebel-el-Akabar natural passes.

Marsa Island
The Marmaric coast of Libya, from the Gulf of Sollum to the Egyptian delta, is a long dry stretch (ca. 450 km) with several harbours for small craft, such as Marsa Matruh (Marsa or Bates Island) (Bates 1914:7; Hulin and White 2002:168). The small island (which is oblong in shape, measuring ca. 135 by 55 m and rising to a maximum height of 6 m asl), set in a saltwater lagoon, was possibly the westernmost inhabitable spot along this coast (White 2002:34; Hulin and White 2002:172). Structural remains are few (White 2002:75), while the ceramic reports show that activity on the island started between the fifteenth and fourteenth centuries BC (based on Aegean material) and continued into the thirteenth (Egyptian/Palestinian material) (White 2002:35; Hulin and White 2002:175).

ADRIATIC ISLANDS

Bernabò Brea (1957) suggested that the Adriatic islands (the Tremiti and the Dalmatian islands) formed a 'bridge' that provided an ideal conduit for the first impressed pottery reaching Italy from the east (Fig. 4.15). This possibility seems confirmed by parallels between Early Neolithic Impressed Italian wares and Late Neolithic Dalmatian pottery (Fusco 1965:88; Petrić 1975; Bass 1998:167).

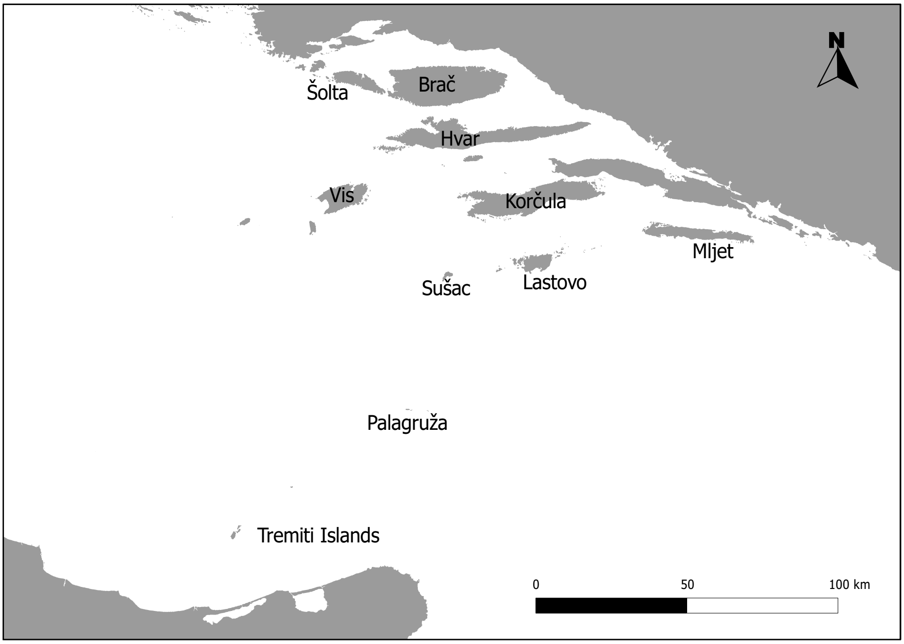

FIG. 4.15 Map of central Adriatic island bridge.

Tremiti Islands

Cherry remarked in his 1981 paper that, on the Italian side of the Adriatic, the Tremiti Islands had produced Early Neolithic pottery, while Pianosa, in the central Adriatic, showed no evidence of having been occupied prior to the Chalcolithic. These discoveries were mainly made by Zorzi, who in the 1950s identified unmistakable evidence for human presence on the Tremiti Islands from the Early Neolithic onwards. This evidence was found primarily on the island of San Domino, where Zorzi located three village sites and a burial site (dated to the Early, Middle, and Late Neolithic). The nearby island of San Nicola seems to lack such concentrations of Neolithic material (with the possible exception of a few obsidian fragments), and the earliest known occupation horizon relates to the post-holes of an Iron Age hut; further finds included Classical and Hellenistic graves and the remains of two Roman houses (Fumo 1980).

Zorzi (1950; 1954; 1955a; 1955b; 1958; 1959; 1960) and Palma di Cesnola (1965; 1967) identified the following sites (all from the northwestern side of San Domino):

- San Domino, Prato Don Michele, near the Cisterna dei Benedettini: Impressed Ware village (Early Neolithic, seventh–sixth millennia cal BC);
- San Domino, Cala Tramontana, settlement: Ripoli Trichrome and Scaloria ware (or Apulian Trichrome Ware) (Middle Neolithic, fifth–fourth millennia cal BC);

- San Domino, Cala Tramontana, burial site: Diana-Bellavista ware (fifth–fourth millennia cal BC, Late Neolithic graves dug in earlier settlement levels);
- San Domino, another settlement in the pine wood near Cala degli Inglesi: Serra D'Alto pottery (Middle Neolithic, fifth–fourth millennia cal BC).

Some isolated finds are also worthy of notice:

- San Nicola, few ceramics and large lithic scatter on the northeastern part, including six fragments of obsidian (Fusco 1964:194; Fumo 1980:49–50);
- Cretaccio, isolated find of a 'large flint artefact' (Fusco 1964:192); several flint tools (scrapers, blades, bulins) and three obsidian fragments (Fumo 1980:46);
- Caprara, two obsidian fragments and several flint tools (Fumo 1980:44).

In the Gargano-Tavoliere area, several offshore islets have yielded huge quantities of prehistoric material, some dated as early as the Lower Palaeolithic (when they were attached to the mainland); one such islet is the small offshore Isola di Campi, off the Gargano headland (Gambassini et al. 1971:460; Russi, 1969:376; Palma di Cesnola and Mezzena 1971:489; Jones 1987:116). The Tremiti Islands are farther away from the coast but lie within sight of the Gargano peninsula and the Lake Varano and Lake Lesina lagoons. Fusco (1965:193, 196) noted that the isolated surface finds on San Domino and Cretaccio looked very much like their mainland Upper Palaeolithic 'Gravettian' counterparts from the Gargano, and that pre-Neolithic contact could not be excluded. Jones (1987) supported this possibility, in view of a group of sites along the northern coastline of the Gargano, all of which are associated with flint extraction and which he dated to the Upper Palaeolithic. He argued that the existence of these sites along the northern littoral, and the difficulties imposed by overland travel due to the rugged interior, suggest that flint and chert products were transported by water to the northern and southeastern sides of the Tavoliere plain (Jones 1987:114; also Delano Smith 1976; 1987).

Dalmatian Islands

On the eastern coast of the Adriatic, archaeological investigation has focused on the central Dalmatian islands, mainly Hvar, Vis, Brač, Šolta, and, farther south, Korčula, Lastovo, Sušac, and Mljet (Bass 1998; Gaffney et al. 1997; 2000) (see Table 4.10 for radiocarbon dates). Far less information is available for the northern Adriatic islands, although a few impressed ware sites have been recorded between the islands of Cres and Krk (Bray 1966:100) (Fig. 4.16).

The Palaeolithic and Mesolithic periods are poorly represented in the central Dalmatian islands. As already discussed, this is likely a result of considerable land loss caused by rising sea levels between 8500 and 6000 cal BC (see Chapter 2). However, excavations by Čečuk (1981) at Kopačina on Brač have provided evidence for the Epipalaeolithic (or Mesolithic) (Bass 1998:178), and Gaffney et al. suggest that more Epipalaeolithic evidence can be expected at other cave sites (2000:186). Radiocarbon dates in the region demonstrate a south–north spread of sites from the eighth millennium cal BC onwards (Chapman and Müller 1990). Most of the larger islands display Early or Late Neolithic impressed (as well as plain) wares and monochrome ceramics (Bass 1998:173) from seventh and sixth millennia cal BC contexts; the smaller islands were colonised in either the Bronze or the Iron Age, although Palagruža, the smallest (0.3 sq km), has yielded Early Neolithic material (Bass 1998).

On the island of Palagruža, an open site has yielded impressed ware pottery and has been dated around 6000 cal BC; obsidian blades from the site, analysed by Robert Tykot, originated from Lipari (Hayes et al. 1993; Kaiser and Forenbaher 1995, 1999). The Adriatic Islands Project survey located several other places on Palagruža and nearby on the even smaller island of Mala Palagruža, with signs of Early Neolithic, Copper Age, and early Bronze Age activity (Gaffney et al. 2000:187). Mala Palagruža has an abundant source of grey-blue flint, which is easily collectible at the bases of cliffs, and there is evidence to suggest that low-intensity mining of this mineral began on Mala Palagruža in the Neolithic (Gaffney et al. 1997; 2000).

Hvar seems to have been occupied at least from the early Neolithic (Gaffney et al. 1997:11). There are no certain finds of Palaeolithic or Mesolithic date, although some claims have been made for later Palaeolithic material. The Neolithic is mainly represented in cave sites (Gaffney et al. 1997:24), most of which were investigated by Novak (1955). Of 24 known sites, Markova Špilja is the only cave that has Early Neolithic occupation (Gaffney et al. 1997:24; Bass 1998:175). Grapčeva and Markova Špilja yielded later Neolithic material, particularly the distinctive red-painted pottery (Novak 1955; 1959). In 1996, Grapčeva Cave was re-excavated by the Adriatic Islands Project. The excavation showed that the cave was used occasionally for a period lasting at least 3,500 years, from the Late Neolithic (ca. fifth millennium cal BC) to

Table 4.10. Radiocarbon dates from the Dalmatian islands

Source	Island	Site	Lab no.	Provenance	Date BP	cal BC 2 sigma
Čečuk 1986; Chapman and Müller 1990	Brač	Kopačina Cave	Z 778	Mollusc deposit above Late Mesolithic layer	7850 ± 140	7076–6441
Chapman and Müller 1990	Korčula	Vela Cave	Z 1967	A-phase EN impressed wares	7300 ± 120	6425–5984
Chapman and Müller 1990	Korčula	Vela Cave	Z 1968	B-phase EN impressed wares	7000 ± 120	6080–5646

Sources: Data from Bass 1998.

the Bronze Age. Environmental analysis revealed the presence of goat and/or sheep, marine molluscs, some minimal fish remains, and some wild resources (acorns). Occasional isolated human bones (most of them fragmented) indicate that the cave may have been used as a burial place, or for other ritual purposes requiring further investigation (Gaffney et al. 1997; 2000).

On the island of Brač, the earliest evidence comes from Mesolithic layers from the cave site of Kopačina Špilja. The material from a shell layer directly above the Late Mesolithic material has been dated to just before the first half of the seventh millennium cal BC—that is, after the island became insular owing to rising sea levels—making this 'the earliest insular evidence in the Central Adriatic basin' (Bass 1998:172). A series of open-air lithic scatters have also been identified, though there is no clear Early Neolithic evidence (Gaffney et al. 2000:187).

On the north coast of Vis, the cave of Krajicina Špilja, excavated in 1994, produced Early Bronze Age material (Gaffney et al. 1997; 2000). This layer overlies an undated deposit of mixed charcoal and shell (marine and terrestrial). The

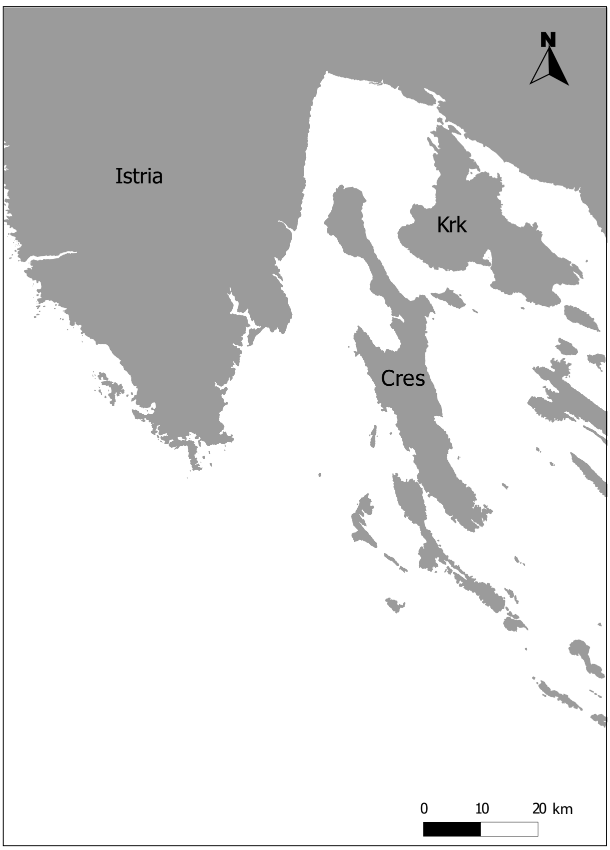

Fig. 4.16 Map of the northern Adriatic Islands.

excavators, Kaiser and Vujnović (1995), noted that shell middens, which are often found to predate the Early Neolithic layers, occur frequently in caves on the mainland, and Bass suggests that they possibly mark the Pleistocene to Holocene transition (1998:172). Isolated finds of Early Neolithic, Late Neolithic, and Iron Age pottery in the cave indicate sporadic visits to the cave over a long period of time (Gaffney et al. 1997; 2000).

The earliest known material from the island of Korčula is dated to the Early Neolithic (Vela Špilja). Bass (1998:172) mentions a layer in Vela Cave without ceramics but containing lithics, animal bones, and shells, as well as two graves, found by the excavators (Čečuk 1989) under the earliest Impressed Ware layer, which has been little investigated and may indicate earlier occupation. Another Early Neolithic open-air site was discovered at nearby Smokvica.

The island of Šolta, 16 km south of Split, was explored in 1994 by the Adriatic Islands Project survey, which identified 215 archaeological sites (until 1986, only 37 sites were known). Thirty-three of these sites were prehistoric in date and included four hillforts and several burial mounds. At Gornja Polja, several groups of such mounds were recorded, some of which dated to the Late Bronze Age (Gaffney et al. 1997; 2000).

On the island of Sušac, four Early Neolithic sites have been identified. Three contained diagnostic Impressed Ware pottery belonging to the earliest phase (Müller 1988), while one had 'severely abraded pottery of typical EN fabric' (Bass 1998:169). The earlier pottery from Sušac is similar to that found at Coppa Nevigata (Italy) and Prato Don Michele (Tremiti Islands) (Bass 1998:169).

CONCLUSIONS

It is worth restating that there remains considerable controversy surrounding our understanding of the colonisation not just of small islands (e.g., the Spanish islands) but also of some of the largest islands in the western Mediterranean (Sardinia and Corsica). As we have seen, the biggest problems concern the dating of pre-Neolithic levels, which present a greater challenge for archaeologists in view of their ephemeral nature and bad preservation. As more modern investigative techniques are employed, in tandem with more established field and excavation methods, traditional chronologies are being debunked, leading, in some cases, to a radical reassessment of colonisation dynamics. Similar trends emerge when we consider the data in the eastern Mediterranean, in the following chapter. The significance of these new discoveries will be discussed more extensively in Chapter 6.

Chapter 5

Island Colonisation in the Eastern Mediterranean

The present review continues from the previous chapter with a discussion of the earliest colonisation data in the eastern Mediterranean islands. The discovery of pre-Neolithic sites on Cyprus and on a few small islands (at a time when they were already insular), coupled with the announcement of Lower Palaeolithic evidence on Crete, have challenged long-established views on early seafaring capabilities and potential motivations for colonisation.

Ionian Islands

The Ionian group (Fig. 5.1) comprises eight main islands: Corfu, Paxos (with Antipaxos), Lefkas, Kefalonia, Ithaka, and Zakynthos; officially, it also includes Kythera and its satellite Antikythera. However, since these two islands are isolated from the rest and lie closer to the Peloponnese, they are discussed with the southwestern Aegean islands.

The islands are mountainous, with mainly limestone geology, karstic phenomena, and high rainfall (Kourtessi-Philippakis 1999:282). Kefalonia, Zakynthos, and Ithaka formed a large landmass that was insular throughout the Pleistocene, whereas Corfu and Lefkas were attached to the mainland (Ferentinos et al. 2012).

Several sites on the islands point towards a very early human presence (see Table 5.1 for specific dates). Middle Palaeolithic material, dated ca. 50,000 years BP, was identified in the north of the island of Kefalonia at Nea Skala (Kavvadias 1984). Controversial claims have been made of Moustero-Levalloisian industries at numerous sites on Corfu and at three sites on the small Diapontia Islands, northwest of Corfu (Sordinas 1969), at Fiskardo on Kefalonia (Kavvadias 1984), at Yerakas, and in other sites in the interior at Zakynthos. Most are isolated finds, or their dating is unsupported by any contextual information (Kourtessi-Philippakis 1999:284): the Yerakas site yielded a side scraper and a Mousterian point; and Aghios Nikolaos produced flake material made from local flint pebbles, as well as several cores. Kourtessi-Philippakis noted that

Mediterranean Voyages: The Archaeology of Island Colonisation and Abandonment, by Helen Dawson, pp. 123–145.

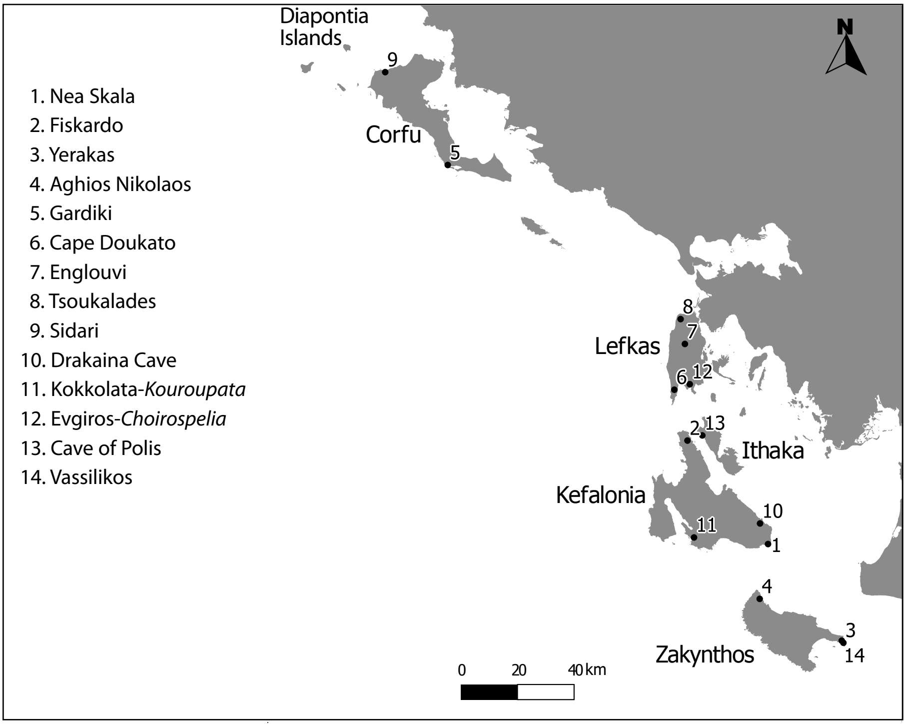

FIG. 5.1 Map of the Ionian islands with sites discussed in text.

Aghios Nikolaos shows interesting parallels with the site of Nea Skala on Kefalonia, from both the geological and the archaeological points of view: both are found on terraces formed during the Tyrrhenian transgression (ca. 190–110 kyr BP) and display lithic industries dominated by small choppers (1999:286). In southwest Corfu, at Gardiki headland, near the Korission lagoon, a pebble tool (chopper) was located by geologists in a layer dated to the beginning of the Middle Pleistocene (ca. 750 kyr BP) (Kourtessi-Philippakis 1999:283). Collectively, this evidence supports early crossing to the islands by Neanderthal hunter-gatherers who were occupying the Greek mainland at that time. Sea-crossing distance from the mainland to the islands has been estimated as less than 12 km during this period (Ferentinos et al. 2012:2175).

Dousougli (1999) and Zachos and Dousougli (2003) discuss in detail the Palaeolithic sites discovered on the island of Lefkas. Sordinas (1983) had already reported the discovery of Middle Palaeolithic material on the island, although systematic investigation began only in the late 1980s. The sites cluster especially in the Karyotes fan, while other sites are found at Cape Doukato (the southern tip of the Leukata peninsula in southwest Lefkas), Englouvi (on a high plateau of Leivadi), and Tsoukalades. The sites identified are all open-air, and there are no radiocarbon

Table 5.1 Aegean chronology

Period	Estimated duration
Lower Palaeolithic	350,000–100,000 BP
Middle Palaeolithic	100,000–35,000 BP
Upper Palaeolithic	35,000–11,000 BP
Mesolithic	9000–7000 cal BC
Aceramic Neolithic	7000–6500 cal BC
Early Neolithic (EN)	6500–5800 cal BC
Middle Neolithic (MN)	5800–5200 cal BC
Late Neolithic (LN)	5200–4200 cal BC
Final Neolithic (FN)	4200–3200 cal BC
Early Bronze Age I (EB I)	3200–2700 cal BC
Early Bronze Age II (EB II)	2700–2200 cal BC
Early Bronze Age III (EB III)	2200–2000 cal BC
1st Palace–3rd Palace	2000–1200 cal BC
Post-Palatial–Early Iron Age (EIA)	1200–800 cal BC

dates: dating is based purely on typology, and the temporal relation between the sites remains to be established (Dousougli 1999:288; Zachos and Dosougli 2003: 21–3). Such early sites could represent dryland colonisation of the island.

In Corfu, a Mesolithic site, Sidari, was also listed by Cherry (1990:173), who pointed out that the island would not have been insular at the time. Sidari was excavated by Sordinas (1969), who also identified two Early Neolithic (EN) levels. The lowest is dated 5720 ± 120 BC (= 4830–4300 cal BC, 2σ); the highest 5390 ± 180 BC (4610–3800 cal BC, 2σ). The highest level contained pottery that has been related to the impressed wares of Macedonia, (the former) Yugoslavia, and southern Italy (Weinberg 1970: 86, in Souyoudzoglou-Haywood 1999:6). Two Late Neolithic to Early Bronze Age sites, Tzarantanou and Makrou in western Corfu (Lintovois 1983), were also mentioned by Cherry (1990:173). For the rest of the Ionian islands, Cherry (1990: 171, 173) saw a pattern of Final Neolithic to Early Bronze Age colonisation, although he singled out the cave site of Evgiros (Choirospelia) in southern Lefkas for its production of Middle Neolithic–Late Neolithic material (1990:173).

Evidence for the Neolithic on Kefalonia is also recent, with sites found in the last two decades: the caves of Drakaina (LN II or Final Neolithic), Skala (in the south, where Palaeolithic material was also found), and Kokkolata-Kouroupata, which, according to Souyoudzoglou-Haywood (1999), may be Late Neolithic (or Final Neolithic) rather than Early Bronze Age in date. On Lefkas, at Choirospelia, Souyoudzoglou-Haywood points out that the black-burnished pottery suggests contacts with the Peloponnesian Neolithic, while the matt-painted and polychrome wares a possible northern, Dalmatian, connection (1999:7). On Ithaka, Neolithic pottery has been identified at the Cave of Polis, while in Zakynthos, Neolithic occupation awaits confirmation, although Sordinas (1970:124) suggested a Mesolithic date for tools he collected in the southeast of the peninsula of Vassilikos (Souyoudzoglou-Haywood 1999:7).

In summary (Table 5.2), Palaeolithic material is attested from Kefalonia, Lefkas, Zakynthos, Corfu, and neighbouring Diapontia Islands; Mesolithic material is documented from Corfu and possibly Zakynthos; and Neolithic material is attested on Corfu (EN), Kefalonia (Final Neolithic), Ithaka, Lefkas, and possibly Zakynthos. The earliest material found on Corfu and Lefkas subsequent to their insularisation (see Chapter 2) is Neolithic in date and could represent either dry-shod occupation or recolonisation. Just west of Lefkas lies the tiny island of Atokos, where the earliest known evidence is dated to the first millennium BC. This is likely the result of lack of research on the island.

Table 5.2 Ionian islands, earliest colonisation data

Island	Cherry 1981	Cherry 1990	Soyoudzoglou-Haywood 1999
Atokos	1st mill BC	Historical era	
Corfu	7th mill BC	Mesolithic 7770 ± 340 BP	(P); Mesolithic; EN
Ithaca	3rd mill BC		LN
Kalamos	1st mill BC	Historical era	
Kefalonia	3rd/2nd mill BC	MP (ca. 50,000 yrs BP); then EBA	(MP); LN
Lefkas	4th/3rd mill BC	LN late 5th mill–4th mill BC	Levallois-Mousterian, MN–LN
Meganisi	4th/3rd mill BC		
Zakynthos	2nd mill BC	EBA	Mesolithic? LN–EBA?

EBA = Early Bronze Age; EN = Early Neolithic; MP = Middle Palaeolithic; LN = Late Neolithic; P = Palaeolithic

AEGEAN ISLANDS

The Aegean islands are discussed as sub-groups depending on their geographical location. A general chronology is shown earlier (Table 5.1). The starting point for the following review is provided by Broodbank's work (1999a), which has been updated as necessary. By choice, his original review did not include pre-Neolithic evidence, which is instead presented here.

Southwestern Aegean Islands

The southwestern Aegean comprises 'an interlaced configuration of mainland and islands' (Broodbank 1999a:33), as can be seen in Figure 5.2.

While Cherry (1990) confirmed the Early Bronze Age colonisation horizon already noted in 1981 for the southwest Aegean, Broodbank (1999a) signalled two new instances of Late Neolithic evidence (see Table 5.3 for specific chronology). The Early Bronze Age horizon recorded by Cherry (1990), based on Hope Simpson and Dickinson's (1979) work, is confirmed by finds on Idra, Dokos, and Spetses by Kyrou (1990), possibly too late for Cherry (1990) to note, but picked up by Broodbank (1999a:18). In the early 1990s, no early material had yet been identified on Salamis. Late Neolithic material has now been identified, although Salamis was possibly becoming insular at this time; therefore this material might indicate dry-shod colonisation (Broodbank 1999a:22). Should this be the case, the Early Bronze Age colonisation horizon of Poros may reflect lack of research.

Fig. 5.2 Map of the southwest Aegean islands.

Table 5.3 Southwest Aegean islands, earliest colonisation data

Island	Cherry 1981	Broodbank 1999a	Other source
Aegina	FN 4th mill BC	FN 4th mill BC	
Antikythera	1st mill BC	1st mill BC	LN/FN 5th/4th mill BC (Bevan and Conolly 2013)
Dokos		EBA 3rd mill BC	
Idra	EBA 3rd mill BC	EBA 3rd mill BC	
Kythera	EBA 3rd mill BC	LN/FN 5th/4th mill BC	
Poros	EBA 3rd mill BC	EBA (L. ins.)	
Salamis	EBA 3rd mill BC	LN 5th mill BC (L. ins.)	
Spetses	EBA 3rd mill BC	EBA 3rd mill BC	

L. ins. = late insularisation

Both Kythera and Antikythera have been the focus of intensive archaeological field surveys in recent years. On Kythera, fieldwork targeted the central-eastern part of the island, covering 100 sq km (ca. 36% of the island). The Antikythera survey covered almost the entire island (just under 20 sq km, or ca. 95% of the island). The earliest identifiable evidence of human activity on Antikythera has been dated to the fifth to fourth millennia (previously thought to be first millennium) (Bevan et al. 2008:33; Bevan and Conolly 2013:62), which is compatible with the first colonisation of nearby Kythera in the fifth millennium (Broodbank 1999b). Small concentrated scatters of chert and obsidian artefacts and pottery are interpreted as the remains of seasonal visitations by hunters from the Peloponnese, Crete, and/or Kythera, with few attempts at more prolonged occupation (Bevan and Conolly 2012:62). Regular exploitation of the island may have started in the third millennium BC and was established by the second millennium BC (Bevan et al. 2008:34; Bevan and Conolly 2013:63).

The Cyclades

With the exception of the indirect evidence of Melian obsidian found in the latest Upper Palaeolithic levels at Franchthi Cave on the Greek mainland, the earliest known direct evidence for human presence on the Cyclades (Fig. 5.3) is documented at the open-air site of Maroulas on the island of Kythnos (Sampson 2002).

The earliest dates from Maroulas were reported as 8068–7688 and 8263–7911 cal BC (note that Kythnos was insular) (Trantalidou 2008:19). The excavation re-

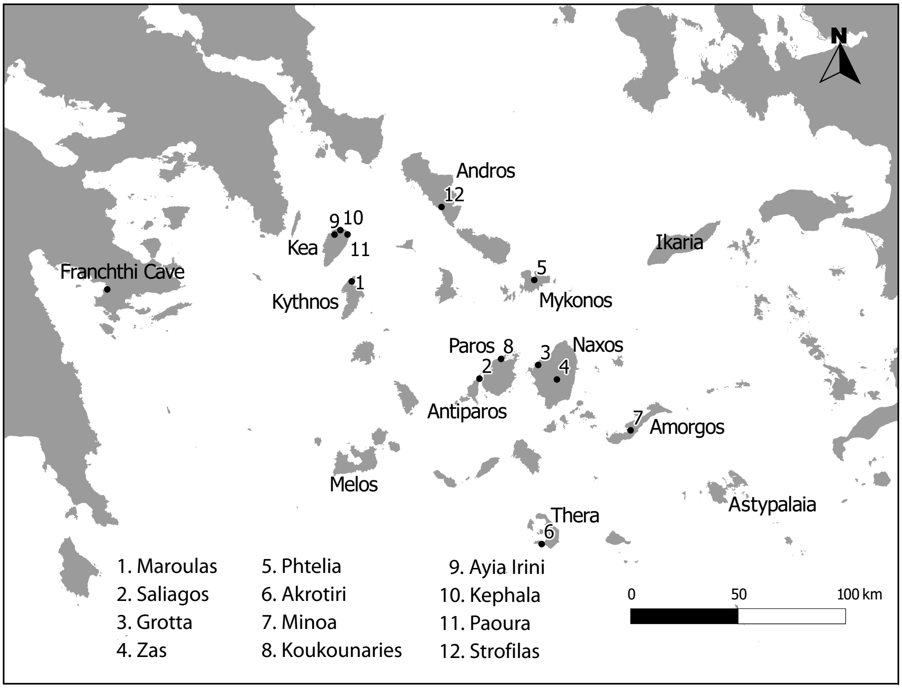

Fig. 5.3 Map of the Aegean showing location of key sites in the Cyclades.

vealed a series of human burials in rock-cut or cist tombs (Sampson 2002) and some habitation structures (a house floor and some circular constructions), which, according to Sampson, show similarities with the Preceramic phase of Shillourokambos on Cyprus. Environmental analysis at the site revealed the presence of land and marine snails, tunny, and several other fish species (Trantalidou 2008:26). Mesolithic material (possibly more recent than at Maroulas) has also been recently reported from the island of Naxos (Sampson 2010), which is not surprising given the island's size and resources. There are as yet no radiometric dates from this site. Apart from these isolated early sites, the earliest known evidence for the human occupation of the Cyclades dates to the Late Neolithic, around the end of the sixth millennium cal BC, which marks a departure from Cherry's (1990) analysis of the chronology for this archipelago.

The earliest colonisation of these islands in the Neolithic and the subsequent development of Early Bronze Age Cycladic cultures have been considered in fine detail by Broodbank in his book *An Island Archaeology of the Early Cyclades* (2000). Broodbank devised a comparative approach to understand these small island cultures, which we discussed in Chapter 3. He reviews the known evidence from these islands, starting from their earliest known Neolithic culture, referred to as Saliagos, from the eponymous site on an islet between Paros and Antiparos. Saliagos itself was a Late

Neolithic open settlement of considerable size and duration: the village population has been estimated at some 70 to 150 people, over a period of 200 to 400 years (Evans and Renfrew 1968). Broodbank observes that several of these 'substantial village communities' were widely spaced in the landscape and displayed a preference for medium to large islands, with water sources and access to bays and valleys. The environmental evidence indicates they were exploiting marine resources and that they combined farming and fishing (Broodbank 2000:148). The distribution of known sites indicates a clear focus around Naxos and the southeastern Cyclades (they include Grotta and Zas on Naxos, Phtelia on Mikonos, Akrotiri on Thera, Minoa on Amorgos, and Koukounaries on Greater Paros). There are no known Saliagos sites in the northwestern Cyclades (Broodbank 2000:125).

Broodbank envisaged that the first colonisers came from either Attica/Euboia or from the southeast Aegean. He argues in favour of the latter, singling out Ikaria and Astypalaia as likely 'jump-off' islands, emphasising the favourable spatial configuration of the area, with several contemporary sites located on a string of islands, which could conceivably have acted as a 'seafaring nursery'. Having reviewed possible triggers for the colonisation of the islands (obsidian procurement, fishing, and seasonal pasturage on the islands), he concludes that none by themselves provide a satisfactory explanation, and goes on to highlight the powerful combined effect of spatial configuration and culture (which we could perhaps refer to collectively as 'opportunity') in the development of a 'maritime colonisation ideology' (2000:127, 133, 142).

Gaps in the cultural sequence across the Cyclades following the Saliagos period mean that it is still not well understood. Broodbank explains that the following Kephala and Grotta-Pelos cultures (late Final Neolithic–Early Bronze Age) are unlikely to represent recolonisation following abandonment, although there was likely an influx of people from Attica and Euboia at this time. Instead, they could have evolved from a process of social reorganisation, resulting in small, dispersed, and short-lived farmsteads dotted around the landscape, quite distinct from the earlier large villages (2000: 154). On Melos, the earliest accepted settlement dates to the Grotta-Pelos period, with large lithic scatters taken to represent either 'failed settlements' or 'visitation sites' (Broodbank 2000:125).

The past twenty years have seen a steady increase in the number of known sites on the islands. In 1990, Cherry had observed that few islands showed signs of settlement before the start of the Early Bronze Age, but the majority had been colonised by its end (1990:164). As can be seen in Table 5.4, the majority of islands now have Late Neolithic/Final Neolithic evidence, and some have been published (e.g., Phtelia on Mykonos: Sampson 2002; at Strofilas on Andros: Televantou 2008). The number of sites with Neolithic material has, in fact, doubled over the last two decades; however, a few islands are still to be investigated, and no data at all are available for these.

Table 5.4 The Cyclades, earliest colonisation data

Island	Cherry 1981	Cherry 1990	Broodbank 1999a*
Amorgos	3rd mill BC	LN (late 5th-early 4th mill BC)	LN (5th mill BC)
Anafi	2nd mill BC		—
Andros	3rd/2nd mill BC		FN (4th mill BC)
Delos	3rd mill BC		EBA (3rd mill BC)
Despotiko	3rd mill BC		LN (5th mill BC)
Donoussa	3rd mill BC		EBA (3rd mill BC)
Heraklia	3rd mill BC		EBA (3rd mill BC)
Ios	3rd mill BC	3rd mill BC	EBA (3rd mill BC)
Kea	4th mill BC	FN (4th mill BC)	FN (4th mill BC)
Keros	3rd mill BC		EBA (3rd mill BC)
Kimolos	3rd/2nd mill BC		—
Kouphonisia	3rd mill BC		EBA (3rd mill BC)
Kythnos	3rd mill BC?	Mesolithic (8th-7th mill BC)	EBA (3rd mill BC)
Makronisos	4th/3rd mill BC		EBA (3rd mill BC)
Melos	4th/3rd mill BC	LN (late 5th-early 4th mill BC)	FN/EBA (4th–3rd mill BC)
Mykonos	5th mill BC		LN (5th mill BC)
Naxos	4th/3rd mill BC	LN (late 5th-early 4th mill BC)	LN (5th mill BC)
Paros-Antiparos	3rd mill BC		LN (5th mill BC)
Pholegandros	3rd mill BC		EBA (3rd mill BC)
Reneia	1st mill BC		EBA (3rd mill BC)
Schinoussa	3rd mill BC		EBA (3rd mill BC)
Seriphos	2nd/1st mill BC		EBA (3rd mill BC)
Sikinos	3rd mill BC		—
Siphnos	3rd mill BC		FN/EBA (4th–3rd mill BC)
Syros	3rd mill BC		LN/FN or EBA
Thera	3rd mill BC	LN (late 5th–early 4th mill BC)	LN (5th mill BC)
Therassia	2nd mill BC		2nd mill BC
Tinos	3rd mill BC		—

— indicates inadequate data
* Data included by Broodbank (1999a) are Neolithic onwards.

Southeastern Aegean Islands

Our knowledge of the southeastern Aegean has seen considerable developments in recent decades (see Fig. 5.4; Table 5.5).

In the 1980s, material of pre-Early Bronze Age date had been published only from Kalymnos, Kos, and Rhodes, and the lack of settlement on Karpathos and Ikaria (both large and within easy reach) had been singled out by Cherry (1981:52). By the early 1990s, 80 early prehistoric sites (broadly Late Neolithic–Final Neolithic) were known in the Dodecanese islands, and new developments were recorded for Karpathos, Kasos and Saria, Rhodes, Giali, Alimnia, and Leros (Cherry 1990: 70). More recently, five Mesolithic sites, dated to the first half of the ninth millennium cal BC, have been identified on Ikaria, following a systematic survey of the island (Sampson et al. 2012). A Mesolithic site (possibly slightly later than on Ikaria) is also reported from the small island of Chalki (Sampson 2010). These sites are 'the earliest known so far' in the southeastern Aegean and along the coast of Asia Minor (Sampson et al. 2012: 7). Cherry concluded that 'many of the islands of the southeast Aegean, both large and small, seem to have been settled during the later stages of the Neolithic'. Recent discoveries of Mesolithic colonisation may alter this picture yet.

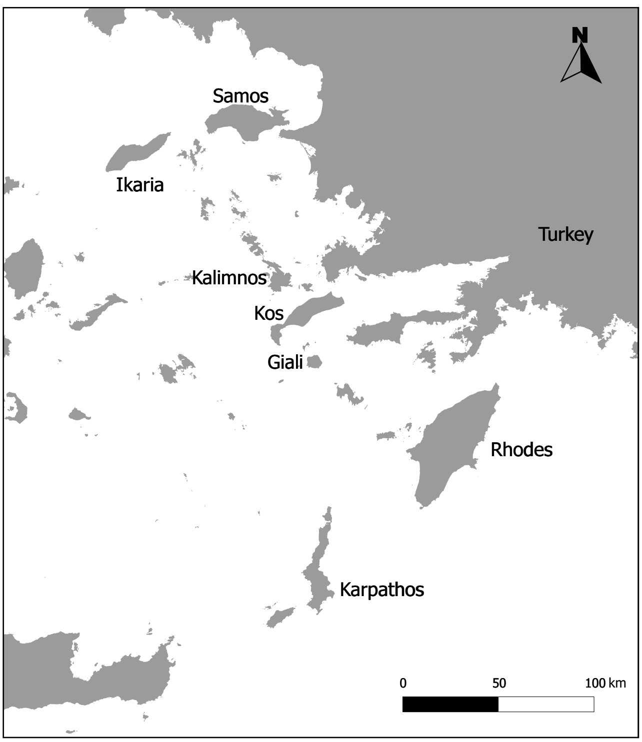

FIG. 5.4 Map of southeast Aegean islands.

Table 5.5 Southeastern Aegean islands, earliest colonisation data

Island	Cherry 1981	Cherry 1990	Broodbank 1999a	Other sources
Alimnia	1st mill BC	LN (late 5th–early 4th mill BC)	FN (4th mill BC)	
Arkos	1st mill BC	1st mill BC	—	
Astypalaia	3rd mill BC	LN (late 5th–early 4th mill BC)	LN/FN (5th–4th mill BC)	
Castellorizo	1st mill BC	1st mill BC		
Chalki	1st mill BC	LN (late 5th–early 4th mill BC)	FN (4th mill BC)	9th mill BC (Sampson 2010)
Giali	1st mill BC	LN (late 5th–early 4th mill BC)	LN/FN (5th–4th mill BC)	
Ikaria	1st mill BC	EBA (3rd mill BC)	—	9th mill BC (Sampson et al. 2012)
Kalymnos	4th mill BC	LN (late 5th–early 4th mill BC)	LN/FN (5th–4th mill BC)	
Karpathos	2nd mill BC	LN (late 5th–early 4th mill BC)	LN (5th mill BC)	
Kasos	3rd mill BC	LN (late 5th–early 4th mill BC)	LN/FN (5th–4th mill BC)	
Kinaros	—	—	—	
Kos	4th–3rd mill BC	LN (late 5th–early 4th mill BC)	LN (+earlier?) (5th mill BC)	
Leros	3rd mill BC	LN (late 5th–early 4th mill BC)	LN/FN (5th–4th mill BC)	
Levitha	—	—	—	
Lipsoi	2nd mill BC	2nd mill BC	—	
Nisyros	3rd mill BC	3rd mill BC	—	
Patmos	2nd mill BC	2nd mill BC	—	
Rhodes	4th/3rd mill BC	LN (late 5th–early 4th mill BC)	LN (+earlier?)	
Samos	4th mill BC	EBA (3rd mill BC)	LN (5th mill BC)	
Saria	3rd/2nd mill BC	LN (late 5th–early 4th mill BC)	LN/FN (5th–4th mill BC)	
Symi		LN (late 5th–early 4th mill BC)	LN/FN (5th–4th mill BC)	
Tilos		LN (late 5th–early 4th mill BC)	LN/FN (5th–4th mill BC)	

* Data included by Broodbank (1999a) are Neolithic onwards.

Northeastern Aegean Islands and Northern Sporadhes

The trend of earlier colonisation dates is confirmed in the northeastern Aegean (Fig. 5.5; Table 5.6) and Northern Sporadhes (Table 5.7).

Palaeolithic locations have been identified on Thasos, Alonnisos, Kyra Panagia, Skyros (Cherry 1990), and most recently at the site of Rodafnidia on Lesbos (Galanidou et al. 2013). Concentrations of Mesolithic tools were identified on Alonnisos and its neighbouring small islands in 1994 by the Ephorate of Palaeoanthropology-Speleology of the Hellenic Ministry of Culture. Given the lower sea levels, these sites were established through 'dry-shod colonisation' at a time when the islands were joined to the mainland along an extensive emerged coastal plain. An early date has recently been put forward for the island of Lemnos, in the northeastern Aegean, where the site of Ouriakos, near Louri beach, is being excavated by Efstratiou (University of Thessaloniki), who has interpreted it as a hunter-gatherer and fishing site dated to the twelfth millennium cal BC. Preliminary fieldwork results have been published (Efstratiou and Kiriakou 2011; see also Balaskas 2009). Palaeogeographic maps indicate that Lemnos would have been insular at this time but considerably larger and closer to the mainland (see Fig. 2.3).

Mesolithic layers were uncovered under the Early, Middle, and Late Neolithic levels at the Cyclops Cave on the island of Gioura (Northern Sporadhes), which is ca. 20 sq km in size and 4 km from Kyra Panagia (and the farthest from the mainland in its group) (Sampson 1996). Sampson (1996; 1998) also reported similar and perhaps earlier finds on neighbouring islets (Broodbank 1999a:20; Davis et al. 2001:79). The

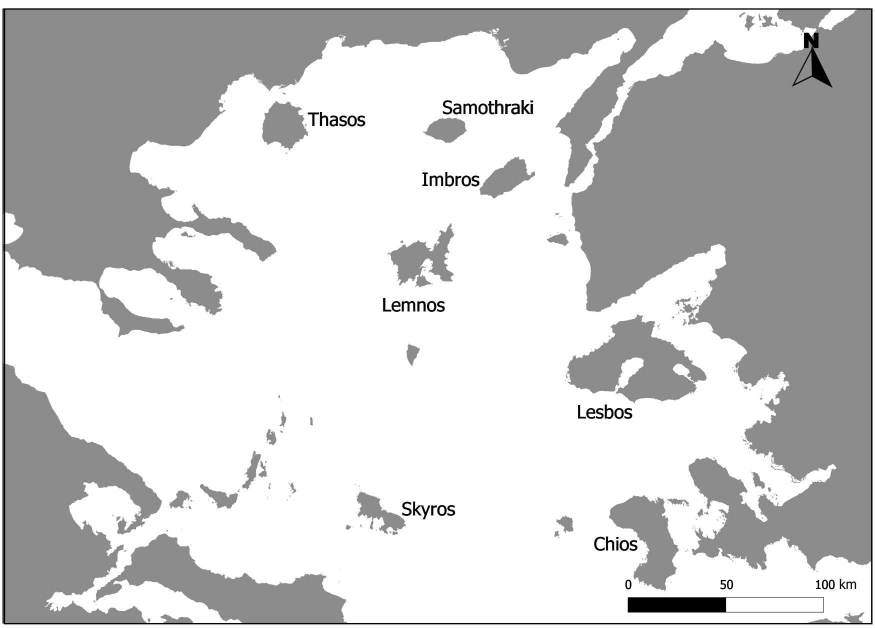

FIG. 5.5 Map of northeast Aegean islands.

Table 5.6 Northeast Aegean islands, earliest colonisation data

Island	Cherry 1981	Cherry 1990	Broodbank 1999a*	Other sources
Chios	4th mill BC	EN? LN	LN (+ earlier?) (5th mill BC)	
Imbros	—	—	EBA (+ Neol?) (3rd mill BC)	EN (6th mill BC) (Erdoğu 2011)
Lemnos	4th mill BC	Neolithic	FN (4th mill BC)	12th mill BC (Efstratiou and Kiriakou 2011)
Lesbos	3rd mill BC	EBA	LN/FN (5th–4th mill BC)	
Psara	2nd mill BC	LN	LN 5th mill BC	
Samo-thraki	3rd mill BC	FN/Chalcolithic	FN 4th mill BC	
Skyros	Mousterian, Neolithic	Mousterian; then EN (mid-6th mill BC)	EN 7th–mid-6th mill BC	
Tenedos	—	—	EBA 3rd mill BC	
Thasos	4th mill BC	End of Palaeolithic; then LN (late 5th–early 4th mill BC)	MN/LN late 6th–5th mill BC	

* Data included by Broodbank (1999a) are Neolithic onwards.

Table 5.7 Northern Sporadhes, earliest colonisation data

Island	Cherry 1981	Cherry 1990	Broodbank 1999a*	Other sources
Alonissos	Mousterian, Neolithic	Mousterian	—	
Gioura			EN 7th–mid 6th mill BC	8th mill. (Sampson 1996)
Kyra Panagia	6th–5th mill BC	Mousterian; EN (very late 6th mill BC) to MN (early 4th mill BC)	Late EN mid 6th mill BC	
Peristera	—			
Skandzoura	—			
Skiathos	1st mill BC?			
Skopelos	2nd mill BC			

* Data included by Broodbank (1999a) are Neolithic onwards.

dated sequence from the Cyclops Cave indicates intermittent occupation between 8626–8323 and ca. 6500 cal BC, and then more permanent occupation lasting until ca. 4000 cal BC (Trantalidou 2008:19). Gioura was insular at the time of this occupation, with the sea level 60 to 40 m lower than in the present day (Broodbank

1999a:16; Sampson 2001:61). Finds in the cave point to fishing-related activities (fish processing was a main activity inside the cave), with tools and the remains of 30 marine species represented in the record (thousands of fish, shellfish and mollusc remains). Other evidence suggests the hunting of marine mammals, bird catching (whose seasonality gives an important indication of when the cave might have been occupied, possibly in late spring), and the use of wild plant resources (Trantalidou 2008:23). Fiedel and Anthony (2003:154–5) have commented on the fact that the lithic industry from the cave (consisting mainly of trapezoidal and lunate microliths) is different from that found at contemporaneous Mesolithic assemblages from mainland Greek sites, and bears more similarities with Epipalaeolithic tools from southwestern Anatolia (e.g., Antalya).

A late phase of the Early Neolithic is attested on Kyra Panagia (Cherry 1990:167) and slightly earlier on Skyros (either dry-shod settlement or subsequent recolonisation). Lemnos, Thasos, and Samothrace have Neolithic settlements, as well as Early Bronze Age sites (Cherry 1990:168). Recent excavations at the site of Uğurlu on the island of Gökçeada (Imbros) produced mainly Neolithic and Chalcolithic material (Erdoğu 2011), earlier than the Early Bronze Age date reported by Broodbank (1999a). An interesting aspect of the site is the use of *Spondylus gaederopys* for making bracelets or rings. Trade in this bivalve, which is native to the Aegean, was extensive across the Balkans and Central Europe during the Neolithic and Chalcolithic periods, and Erdoğu suggests that a *Spondylus* workshop may have been located on the island, similar to those found in mainland Greece at Dimini, Sitagroi, and Stravroupolis (2011:50). The site of Uğurlu has yielded evidence for several occupation phases separated by significant periods of time. The earliest occupation of the site has been dated by a single AMS radiocarbon date to the early sixth millennium cal BC (Erdoğu 2011:65).

Crete

The recent announcement of Palaeolithic finds on Crete dated to 130,000 years BP (Strasser et al. 2010a; 2010b) is a groundbreaking discovery, providing the earliest known evidence for seafaring in the Mediterranean. Such a discovery was hotly anticipated, given recent claims of Palaeolithic material on Crete and neighbouring Gavdos (Mortensen 2008; Kopaka and Matzanas 2009) (Fig. 5.6).

Broodbank (1999a:20) had already pointed out the possibility that hunter-gatherers visited Crete (see also Rackham and Moody 1996:1–2; Runnels 1995:728). This has now been confirmed by the Plakias Survey, carried out in 2008 and 2009, which identified 28 preceramic sites associated with caves or rock-shelters on the southwestern coast of Crete. The sites have not been dated radiometrically but on technological and morphological grounds. The survey collected a sample of 2,100 tools belonging to two lithic industries: 20 sites had artefacts of Mesolithic type similar to those on the Greek mainland and islands; nine sites had evidence of Lower Palaeolithic occupation dated to at least 130,000 BP. This would push the origins of early

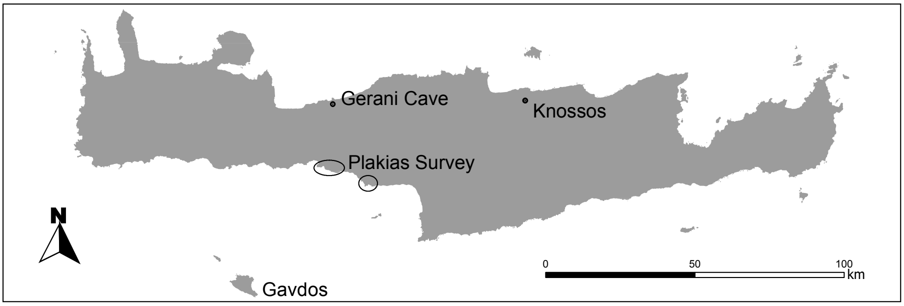

Fig. 5.6 Map of Crete with sites discussed in text.

seafaring back in time by an extraordinary 100,000 years (Strasser et al. 2010b:145). The two industries were generally found at separate sites with no overlap (i.e., no evidence for reuse of the same locations).

Similar evidence for the Mesolithic period has been found on Kythnos, Alonnisos, Ikaria, and Cyprus; by contrast, the supposed Lower Palaeolithic material found on Crete is so far unique in an island context. 'It seemed likely that evidence for the Mesolithic period would be found on the island [Crete] because it had previously been discovered on other islands in the Aegean' (Strasser et al. 2010b:151). As noted by Strasser et al. (2010b), the underlying geology has a considerable effect on the likelihood of finding archaeological remains dated to the earliest periods. In the case of Crete and the Plakias region, they noted that the location and nature of faults, surface water, and cave shelters influenced site preference, while the active tectonic and geomorphologic processes either preserved or destroyed sites. They singled out the damage to caves and rock-shelters caused by the ongoing tectonic uplift, as well as erosion, as key factors affecting preservation in a negative way; conversely, the formation of marine terraces with cemented and indurated late Pleistocene deposits has helped to preserve Palaeolithic artefacts within them; Mesolithic evidence has been sealed and preserved by the carbonate-rich runoff from the receding edges or brows of caves and rock-shelters (Strasser et al. 2010b:153). Caves and rock-shelters in coastal zones were the likely focus of prehistoric activity. The seabed along the coast of southwestern Crete drops sharply, and therefore the present coastline is likely to be located close to its position ca. 11,000–9,000 years ago. The subsequent rise in sea level would have flooded the coastal plains, creating wetlands with plentiful resources (Strasser et al. 2010b:154).

The Mesolithic sites, which were found directly in front of small caves or rock-shelters, were generally limited in extent and had small assemblages of lithics, comprising cores, debitage, and retouched tools (between 100 and 500 pieces). Strasser et al. (2010b:164) suggest that the sites represent temporary camps, which were used 'long enough to produce fresh blanks from cores and to work and rework their equipment in the form of finished tools'. As mentioned, the tools shared reduction techniques and morphological types with the Mesolithic industry from the islands—namely, Sidari (Corfu) and Maroulas (Kythnos)—and the Greek mainland, mainly Franchthi Cave (Argolid), Klissoura Cave 1 (Argolid), and Theopetra Cave (Thessaly). The largest site was Schinaria 1, where several thousand pieces were observed on the surface. They comprised almost entirely quartz artefacts, a few chert pieces, and many cores and retouched tools (notches, denticulates, geometric microliths, piercers, borers, and scrapers) (Strasser et al. 2010b:164).

The Plakias Survey also identified Palaeolithic artefacts, distinguished from Mesolithic ones based on size and technique, at nine sites. Paleosols, such as Terra Rossa, marine terraces, and debris flow fans contained the artefacts, which had also been eroded and dispersed on the surface (Strasser et al. 2010b:177). The lithic artefacts may belong to more than one Palaeolithic industry, including the Lower and Middle Palaeolithic (Strasser et al. 2010b:178). The Plakias Palaeolithic material is limited in range, making comparisons difficult, but the investigators have identified similarities with Acheulean assemblages on the Greek mainland (Strasser et al. 2010b: 183–4). The dating of the Palaeolithic sites is based on geological data and is currently being refined. The results of the Plakias Survey suggest that 'two separate human groups left traces of their existence in this region, one in the Middle to Upper Pleistocene (ca. 130,000 b.p. or earlier), and the other in the late Pleistocene–early Holocene (ca. 11,000–9000 b.p.)' (Strasser et al. 2010b:186).

The Mesolithic sites are described as 'logistical camps or local extraction sites'; it is suggested that at least one site (Schinaria 1) may have been repeatedly visited or a residential base. The Argolid in the Greek mainland is identified as the most likely origin of these early colonists. It is possible that the Palaeolithic colonists originated from Africa or the Near East; Anatolia or mainland Greece are additional possibilities (Strasser et al. 2010b:187). These early colonists exploited the coastal wetlands, and it is yet unclear whether they ventured into the mountainous interior, whether they were seasonal visitors or permanent inhabitants, and whether they had an impact on the endemic flora and fauna (Strasser et al. 2010b:187).

Moving on to the Neolithic, the earliest known site is at Knossos (until recently the earliest known site on the island), which is regarded as a clear example of purposeful settlement by Neolithic farmers because the domestic species found here have no local wild progenitors (Evans 1971a). Knossos has produced 19 radiocarbon dates for the Neolithic, which are reasonably consistent. The earliest, from aceramic layer X, is dated to the seventh millennium cal BC. The small size of the site suggests a founding population of fewer than 100 individuals (Evans 1971a:116), or a dozen families at the most (Cherry 1985:24). Evans (1971a) envisaged farmers migrating to Crete bringing with them the full Anatolian-Balkan package (sheep, goats, pigs, cattle, dogs, cereals, and legumes). Broodbank and Strasser saw this as possibly 'one of the earliest successful maritime transfers of a full farming economy', indicating a 'purposive, planned and comparatively long-range colonisation' (1991:234).

Since its beginning in 2005, the Knossos Urban Landscape Project has been providing important information regarding the growth of the site (Whitelaw et al. 2005; 2006; 2007a; 2007b; 2008). This intensive archaeological field survey of the site and its surroundings has found that, during the entire Neolithic period (ca.

7000–3200 BC) and the earliest phases of the Bronze Age (ca. 3200–2100 BC), occupation was highly nucleated, focusing around the hill where the later famous palace was constructed (Whitelaw et al. 2007b). Tomkins (2008:31) has pointed out that, given the initially low population numbers, the Neolithic community at Knossos could not have been demographically self-sufficient; thus he postulated the need for regular contacts with an 'external demographic group' and argued for a 'horizon of undiscovered earlier Neolithic settlement' on the island. Current understanding of the Neolithisation of Crete is based only on Knossos, where there is no admixture between Neolithic and Mesolithic traits. Discovery of other early sites would help refine this picture considerably. On the basis of the current state of knowledge, taking into account both the recently made early discoveries and the long-known Neolithic levels, we may envisage three separate colonisation events for Crete.

Cyprus

Understanding of Cypriot prehistoric archaeology has developed to such an extent over the last 30 years that 'earlier practitioners would barely recognise it' (Knapp 2013:xvii). Major changes include the discovery of the island's earliest colonisation sites in the Late Epipalaeolithic as well as the recognition of an Early Aceramic Neolithic phase previously unknown. In the last ten years alone, the pace of development has been remarkable, with the result that the picture is constantly evolving, both in terms of the characteristics of these cultures and of the perceived chronological gaps separating different phases. The panorama of Cypriot prehistory is therefore highly complex, and only the key sites (Fig. 5.7) are discussed in this section (for a recent and detailed study of the evidence, see Knapp 2013). A proposed chronology is shown in Table 5.8.

In the early 1990s, Cherry (1990:148, 150–1) had already noted significant discoveries concerning the earliest colonisation of Cyprus (referring to Sheen 1981; Kypri 1985; Todd 1986; Fox 1987; 1988). The excavation of the rock-shelter site at Akrotiri-*Aetokremnos*, on the south coast of the Akrotiri peninsula, was the most important of these, as it proved for the first time that Cyprus had been occupied before the Neolithic (Simmons 1989; 1991; 1999; Held 1989b:39–63). Two decades later, this site is still the focus of considerable debate among researchers, in terms of its chronology and function.

Unlike on Crete, no convincing evidence for Palaeolithic humans has been found on Cyprus, and Akrotiri-*Aetokremnos* is therefore the earliest accepted Cypriot site known so far, providing, until the recent discoveries from Crete (Strasser et al. 2010a; 2010b), the earliest secure evidence for human occupation on any island in the Mediterranean (Simmons 1989; 1991; 1999:18–21; Cherry 1990: 151; Peltenburg et al. 2001:37; Knapp 2010:95) (and excepting Sicily and the controversial early dates from Corbeddu Cave, Sardinia).

The radiocarbon dates from Akrotiri-*Aetokremnos* (Simmons 1999:195–8) suggested initially that the site was occupied for a 'short time' during the tenth millennium

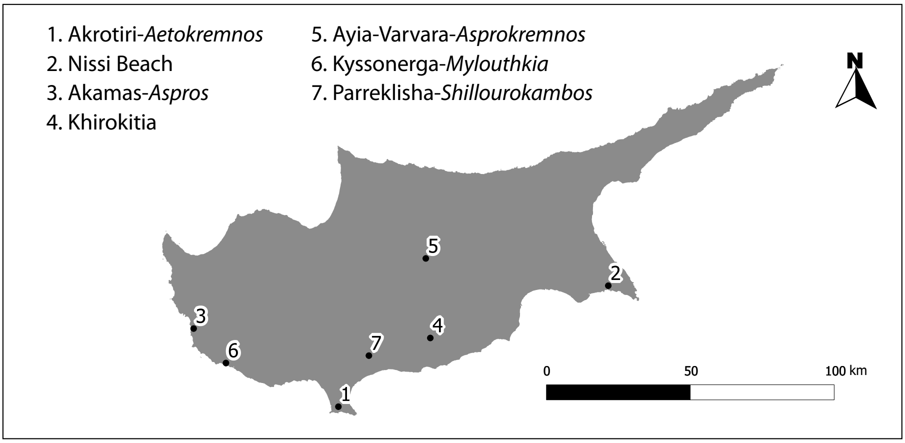

FIG. 5.7 Map of Cyprus with sites discussed in text.

Table 5.8 Chronological scheme for early prehistoric Cyprus

Periods	Phase/culture	Years cal BC	Type of activity
Late Epipalaeolithic	Akrotiri	11,000–9500/9000	Seafaring; hunter-gatherer/fisher-forager exploitation, temporary occupation
Initial Aceramic Neolithic	Cypro-PPNA	9000–8500	Recolonisation? Exploration, game-stocking
Early Aceramic Neolithic (EAN)	Cypro-EPPNB	8500–8000	First agro-pastoral communities
	Cypro-MPPNB	8000–7600	Consolidation and establishment of farmers
	Cypro-LPPNB	7600–7000	Adaptation and development of a distinctive economy
Late Aceramic Neolithic (LAN)	Khirokitian	7000–5500	Development (efflorescence of Aceramic Neolithic) ends in devolution or abandonment
Ceramic Neolithic	Sotira	4500–3800	Ceramic Neolithic

Sources: Data from Peltenburg et al. 2000:847; 2002:65; Knapp 2013:27.

cal BC (dates span 10,005–9702 cal BC, 1σ). An average date of 9825 cal BC was obtained from the 26 most reliable samples (Simmons 1999:208). A more recent reinterpretation of Akrotiri-*Aetokremnos* shows that the eight radiocarbon dates of stratum 2, when calibrated, span the eleventh millennium cal BC (10,900–10,100 cal BC) and that occupation may have lasted longer than originally believed (Ammerman 2010; Ammerman et al. 2007). This is also supported by Knapp (2013:54), who reanalysed the radiocarbon dates and suggests a potential span of ca. 2,236 calendar years (1σ). An estimated range of 11,000–9500 cal BC is adopted in this book.

According to the excavators, the *Aetokremnos* rock-shelter yielded in situ stratified cultural deposits (Held 1989b; Simmons 1999:44, 93); these included a midden area (with pits) and several 'casual hearths' (Simmons 1999:95), associated with a huge faunal assemblage of almost 300,000 remains. Of this extremely rich repertoire, ca. 250,000 belonged to the species *Phanourios minutus* (pygmy hippopotamus), and 332 were *Elephas cypriotes* (dwarf elephant) (Simmons 1999:153, 161). Other species included *Sus scrofa* (pig), *Dama mesopotamica* (fallow deer), *Genetta plesictoides* (a type of genet), *Mus macedonicus* (mouse), as well as terrestrial turtle (tortoise) (Simmons 1999:164–9, 187). More than 70,000 marine shells were found, but only one fish bone was retrieved from the whole site (Simmons 1999:187–8). In addition, the remains of several bird species were excavated, and their seasonality patterns were used to show that the site was probably occupied throughout the entire year (Simmons 1999:181). Although flotation samples were retrieved during excavation for pollen, the botanical analysis of the remains yielded no meaningful results, with only *Pinus* and another unspecified conifer identified (Simmons 1999:229).

The stratigraphy and dating of the site remain controversial, especially the interpretation of two of the four layers identified: strata 2 and 4. According to Simmons, 'the association of *Phanourios* and *Elephas* with cultural remains provides a rare example of human coexistence with Pleistocene faunal species in an island context' (1999:43, 324). Binford (2000), however, dismissed as 'puzzling' Simmons's claims that the bone assemblage at the rock-shelter proves human-induced faunal extinction. He argued that Simmons systematically ignored evidence that would challenge his views, such as the fact that none of the bones display cut-marks or signs of breakage for marrow extraction (Binford 2000:771). Binford went on to show, through simple correlation analysis, that the pygmy hippopotamus bones are inversely correlated with the lithic remains, while there is positive correlation between the lithics and the bird remains, eggshells, marine shells, charcoal, and introduced pebbles and cobbles, all of which are found in stratum 2 (i.e., the occupational level with the cultural features). Furthermore, Binford highlighted the fact that 'no documented features originate within the bone bed' (stratum 4), thus excluding any human involvement in the accumulation of the bones (2000:771).

Cherry (1990:152), who supported Simmons's view of a human-induced faunal extinction, noted that it was unclear whether Akrotiri-*Aetokremnos* was a specialised processing site or an actual occupation site, which, in any case, he took to be sporadic. Simmons (1999) saw Akrotiri-*Aetokremnos* as 'short lived and *ultimately unsuccessful*, having little impact on future development of the island' (1999:43, emphasis added). For Held (1989a) and Peltenburg et al. (2000:851–2), the occupants of the rock-shelter represent 'utilisation or exploration rather than colonisation' of the island (i.e., permanent settlement). Recent redating of the site has proved inconclusive (Simmons and Mandel 2007): direct dating of hippopotamus bones is problematic and none of the samples submitted for AMS dating was datable; only a charcoal sample, from stratum 2, yielded a date of 10,185 cal BC (OxA-15989), in line with the previous dating (Simmons and Mandel 2007: 478). In a detailed re-assessment, Knapp (2010:85–94) has weighed the evidence in support of different interpretations of the site (an accumulation of naturally dying fauna; a convenient cache of animal bones to use as fuel; an actual shelter where people lived; a place to dry and smoke meat). He argues that it is quite possible that humans encountered the last survivors of the island's endemic fauna but unlikely that they were responsible for their systematic depletion over the whole island. In his view, the site does not represent 'a single colonisation event' (2010:104), but rather periodical, short-term, visits over a period lasting up to a millennium (2010:91).

In the light of these controversies, it still remains unclear whether the inhabitants of the rock-shelter actually coexisted with the endemic species. However, the site does provide evidence of a very early human presence on the island, mainly from the sequence of radiocarbon dates derived from stratified cultural deposits (stratum 2).

There have been further claims for early colonisation, at the recently discovered sites of Nissi Beach and Akamas-*Aspros* (Ammerman and Noller 2005; Ammerman et al. 2006; 2007), two open-air sites located on 'aeolianite' (fossilised sand dunes) on the southeastern and northwestern sides of Cyprus, where I participated in small-scale excavations with Ammerman and McCartney in 2008. The sites produced microlithic, flake-based chipped stone material, which is similar to that found at Akrotiri-*Aetokremnos*, although an even earlier date (twelfth millennium BC) has been tentatively proposed on typological grounds. To complicate matters, the stratigraphy of the sites appears to be 'inverted', with the earlier lithic material lying on the surface and the Neolithic material (obsidian) found below it by the excavation. Ammerman et al. (2008:15) suggest that this is the result of tsunami action (as seen from the presence of large tsunami blocks on the surface), such that the surface material would have been redeposited from its primary location, which is now below the sea. Part of the Akamas-*Aspros* has indeed been shown to extend into the adjacent area underwater (Ammerman et al. 2011).

Nissi Beach and Akamas-*Aspros* may ultimately prove contemporary to, or even earlier than, Akrotiri-*Aetokremnos* and thus add to the growing body of evidence for early seafaring in the Mediterranean, indicating crossings to the island from Syria in the eleventh millennium cal BC. Broodbank (2006) and Ammerman (2010) have both recently linked population expansion into the eastern Mediterranean and Aegean islands to pressure on resources caused by a cold dry period known as the Younger Dryas (see below). It now appears that Akrotiri-*Aetokremnos* formed part of a large resource-procurement area, which included other sites on the island (which are now finally coming to light) and the Levantine mainland (Ammerman et al. 2006; 2007). Indeed, another key development has been the discovery of early sites in the interior of Cyprus. The sites of Vretsia-*Roudias*, Agrokipia-*Paleokamina*, Politiko-*Kelaïdhoni*, and Ayia Varvara-*Asprokremnos* have produced lithic industries in very high numbers (4,000 artefacts from Vretsia-*Roudias* alone) that show parallels with the coastal sites just discussed, as well as differences, which are likely to reflect the different locations and functions of these inland sites (Knapp 2013:64). These sites, located in the foothills of the northern and eastern Troodos Mountains, along riverine corridors, have been interpreted as seasonal camps, possibly for the quarrying of chipped stone but also to access a broader range of flora and fauna (Knapp 2013:64).

In the late 1990s, the gap between this earliest human presence and the subsequent Neolithic settlement of the island was perceived as being in the order of three millennia (Simmons 1999:323). Cherry (1990:154) believed, on the basis of the long gap between them, that the first humans on Cyprus (the *Aetokremnos* community) could not be related in any way to the aceramic Neolithic (Khirokitia) farmers. He argued that the lack of sites in the period after *Aetokremnos* and before the aceramic Neolithic could be interpreted in different ways (either as evidence that the colonists died out, or that they abandoned the island after seriously depleting its fauna) and that, whatever the case, the most likely scenario was one of cultural involution and subsequent recolonisation by a new group. Cherry also noted, however, that the other apparent gap in the island's archaeological record, between the aceramic Neolithic (Khirokitia culture) and the ceramic Neolithic (Sotira culture), could indicate an inability to recognise sites, or a temporary decrease in settlement, rather than actual abandonment (1985:25; 1990:157). Nonetheless, since the possibility of abandonment could not be entirely excluded, he hypothesised three potential colonisation events for Cyprus, which would be 'wholly unparalleled on any of the other large Mediterranean islands' (Cherry 1990:157). This remains a possibility, and one that can now also be put forward for Crete.

Recent years have refined this picture considerably. A number of sites have now been dated to the ninth millennium, indicating that settlement on Cyprus became more permanent two millennia earlier than previously believed (Guilaine et al. 1995; 1996; Peltenburg 2003; Peltenburg et al. 2000; 2001). Six aceramic Neolithic sites were identified in the 1990s, and, as a result, data from previous excavations that appeared unexpectedly 'old' have been reconsidered, such as Kalavasos-*Tenta* (Todd 1987), Akanthou-*Arkosyko*, Ayia Varvara-*Asprokremnos*, and Troulli I (Peltenburg et al. 2001: 42; 2002:62). In the mid-1980s, Todd published a series of radiocarbon dates from aceramic Neolithic deposits from Kalavasos-*Tenta*: among these was an early date (tenth millennium BP, or late ninth millennium cal BC) (1987: 173–8). The site appeared to be earlier than Khirokitia (Cyprus's eponymous Neolithic site and the earliest then known), but Todd viewed the results with great caution (Cherry 1990: 161; Peltenburg et al. 2001:37). In the light of the new discoveries, Peltenburg et al. (2001: 41) suggested that Todd's original dating should be reconsidered. A revised date for the site has since been published as 8608–7336 cal BC (1σ) (Todd 2001; see Knapp 2013:104), which indicates that Kalavasos-*Tenta* is partly contemporary with the more recently discovered sites (Kissonerga-*Mylouthkia* 1B and *Shillourokambos* Middle Phase) (see Knapp 2013:104 for discussion). A recent radiocarbon determination from Akanthou-*Arkosyko* was reported as 8010–7740 cal BC (see Knapp 2013:114)

The more recently discovered sites, Kissonerga-*Mylouthkia* and Parekklisha-*Shillourokambos*, were founded in the second half of the ninth millennium cal BC and span a period of ca. 1,500 years (Peltenburg et al. 2000:844; 2001:40). Radiocarbon determinations for *Shillourokambos* fall between 8400 and 7000/6900 cal BC (Briois 2003; Guilaine and Briois 2006); and for *Mylouthkia* between 8517 and 6836 cal BC (Peltenburg 2003). Peltenburg has suggested that *Mylouthkia* 1A and *Shillourokambos* Early Phase A must be close to original landfalls, both temporally and spatially (2000:852), and that the location of *Mylouthkia* 1A, in the southwest of the island, 'should prompt a reconsideration of colonisation paths and dispersal rates' (see Held 1992:120, 126). The sites display a high degree of cultural similarity to that of the southwestern Asiatic mainland. These include parallels in the chipped stone tradition, in the manufacture of mudbricks, and in the domestic architecture (Peltenburg et al. 2002), as well as in the symbolic realm, with parallels in the maceheads, engraved pebbles, figurative artwork, and in skull treatment (Peltenburg et al. 2000:845; 2001:54).

Another important parallel with the mainland is the tradition of well digging. Five water wells were excavated at Kissonerga-*Mylouthkia*, and dated between the late ninth and eighth millennia cal BC, which means that they are among the earliest known wells in the world (Peltenburg et al. 2001:54). Peltenburg et al. have defined well digging as 'a particular adaptive strategy for sustainable sedentism', a specialised activity essential to island life (2001:39, 47, 48). Although springs are present on the island, the wells are likely to have offered a buffer against severe drought (Peltenburg et al. 2002:89, 92). Vigne et al. have claimed that all these parallels imply maintained contacts with the Levantine mainland after the original migration (2000:83, 98). Peltenburg et al. support this view and also point out that both the arrowheads (Bar-Yosef and Belfer-Cohen 1989:64) and the blade-based lithic industry suggest the early transmission of 'know-how' to the island from the north Levant mainland (2001:51), and that this is particularly evident at *Mylouthkia* 1 (Peltenburg et al. 2002:78). The Cypriot farmers started to adapt their lithic industry (adopted from the mainland) to their environment only about a thousand years after they had reached the island (around the late seventh millennium cal BC, as evident from *Mylouthkia* 1B and *Shillourokambos* Middle Phase) (Peltenburg et al. 2001:52).

Another recent twist has been the discovery of early Neolithic material (contemporary with late Pre-Pottery Neolithic A [PPNA] to early PPNB on the Levantine mainland) at the inland sites already discussed (Vretsia-*Roudias*, Agrokipia-*Paleokamina*, Politiko-*Kelaïdhoni*, and Ayia Varvara-*Asprokremnos*). Cultural features at Ayia Varvara-*Asprokremnos* represent three phases of early Neolithic activity. They include large artefact dumps, midden deposits, possible channels, a small stone feature, a stake hole, and a simple shelter, possibly the 'earliest residential feature known in Neolithic Cyprus' (McCartney et al. 2009:6). The site also yielded a large proportion of pig remains and some bird and freshwater crab remains (Knapp 2013:86). Another site where PPNA material has now been found is Ayios Tychonas-*Klimonas* (Vigne et al. 2011; see Knapp 2013:68 for a summary). The differences between the inland lithic assemblages and the material from the coastal sites (Kissonerga-*Mylouthkia* and Parekklisha-*Shillourokambos*) appear to be chronological rather than just spatial or functional. Recent radiocarbon determinations place Ayia Varvara-

Asprokremnos at around 9000–8500 cal BC (Manning et al. 2010). Knapp (2013:69) points out that, as a result, the early Neolithic phase at the inland sites (Early Aceramic Neolithic [EAN]) is ca. 1,000 years later than *Aetokremnos* but also some 500 years earlier than Kissonerga-*Mylouthkia* and Parekklisha-*Shillourokambos* (Late Aceramic Neolithic [LAN]). These issues are discussed further in Chapter 7.

Collectively, the EAN and LAN sites support the 'antecedent development' hypothesis for Cyprus's Khirokitian culture. According to Peltenburg et al., they provide evidence that immigrants from the mainland (who may have come either from west Syria [Peltenburg et al. 2001:37] or the Upper/Middle Euphrates River area [Guilaine et al. 2000]) colonised Cyprus much earlier than previously believed (Peltenburg et al. 2002:61). Peltenburg et al. believed that the early aceramic sites represented 'the elusive ancestry for the Khirokitian and an extension of the Levantine mainland Pre-Pottery Neolithic' (2000:844), thus eliminating a chronological gap that had been postulated in Cypriot prehistory since the 1980s. The antecedent development hypothesis is supported by the fact that all the species previously attested from the Khirokitia phase have been found at these early aceramic sites, indicating that they were present on Cyprus as early as the end of the ninth millennium cal BC (Guilaine et al. 2000). This has the striking implication that domesticated animals (sheep and goat) were imported to the island more than a thousand years earlier than believed until recently, and that cattle (which were present at *Shillourokambos* but not at *Mylouthkia*) were also a very early introduction (Peltenburg et al. 2001:46). These facts place these among the 'earliest known anthropogenic introduction of animals to a Mediterranean island' (Vigne et al. 2000:96; see Chapter 2).

Conclusions

What preliminary conclusions can be drawn from these far-reaching voyages in time and space? The tables accompanying the text are intended as an *aide-mémoire*: tellingly, this review started with a group of islands in the far western Mediterranean, which are considered among the last to have been colonised, and ended in the far eastern corner of the Mediterranean, where the earliest known evidence for colonisation is found. What happened in between, though, is not easily predictable. We are still far from having an exhaustive picture, both because there are several islands that have yet to be properly investigated, and because of the different research agendas and methods underlying archaeological investigations over the decades. In respect of the latter, we should bear in mind that even when an island is the focus of an intensive field survey, only rarely can it be explored in its totality (as is the case for Antikythera). Nonetheless, even if limited to an area, surveys provide valuable samples from which to extrapolate the fuller picture. The evidence reviewed highlights the difficulties in correlating diagnostic artefacts and colonisation activities, but also that settlement is but one type of colonisation. These issues are explored further in the following chapter, where the colonisation data just reviewed will be analysed at different spatial and temporal levels.

Chapter 6

Redefining Island Colonisation

Understanding the interplay between spatial and cultural variables is essential if we are to redefine the earliest colonisation of the islands in a meaningful way. Cherry's work focused on biogeographical and cultural variables in the Mediterranean islands and highlighted some useful correlations with other island regions. His work on island colonisation has been very influential on subsequent studies (e.g., Patton 1996; Broodbank 2000), with good reason, given the accuracy and breadth of his analysis. Cherry divided his study into two Mediterranean regions, eastern and western, and initially this chapter follows this classification for ease of comparison (a line perpendicular to the heel of Italy providing an imaginary boundary). His original dataset (1981) was predominantly eastern Mediterranean (79 islands investigated in the eastern Mediterranean, 35 in the western Mediterranean). The database in the present review includes 147 islands, 65 in the western Mediterranean (Table 6.1) and 82 in the eastern Mediterranean (Table 6.2). The sample of western Mediterranean islands has increased because it incorporates data from the North African islands (Vuillemot 1954; Balout 1955; Souville 1958; Bourain et al. 1992; Rojo Guerra et al. 2010; Gibaja et al. 2012), the French islands (Brun et al. 1997), and the central Adriatic islands (Gaffney et al. 1997; 2000; Bass 1998).

Given the broad range of recent archaeological discoveries, we have the opportunity to test different theories, including biogeography, on an up-to-date island dataset. We can also attempt to identify cultural variables for comparative study, focusing on sites which provide good evidence for certain cultural features (diagnostics or correlates) or illustrate particular cultural processes, such as island visitation/utilisation, permanent settlement, and establishment. Initial colonisation data have been used predominantly in this chapter: these data were obtainable for all 147 islands, whereas long-term occupation data are less available (because of differential archaeological investigation) and will be discussed through case studies in Chapter 8.

Mediterranean Voyages: The Archaeology of Island Colonisation and Abandonment, by Helen Dawson, pp. 146–179.

Table 6.1 Western Mediterranean islands: geographical and earliest colonisation data

Island	Mill 1st col	Dist NM	Size (sq km)
1 Sicily	<10	3	25,708
2 Sardinia	<10	205	24,089
3 Corsica	9	87	8,722
4 Brač	8	5.5	395
5 San Domino	6	20	2
6 Palagruža	6	130	0.3
7 Korčula	6	34.5	276
8 Lipari	6	30.2	37.6
9 Salina	6	42.9	26.8
10 Filicudi	6	46.6	9.5
11 Hvar	6	4.1	300
12 Sušac	6	80	4.6
13 Vis	6	23.6	90.3
14 Malta	6	85	246
15 Gozo	6	65	67
16 Capri	5	5	10
17 Ustica	5	53	8
18 Elba	5	10	220
19 Lampedusa	5	210	20.2
20 Giglio	5	22	15
21 Giannutri	5	14	3
22 Šolta	5	7.7	588
23 Pianosa	5	50	0
24 Îles Planes	5	5	0.1
25 Habibas	5	11	0.4
26 Rachgoun	5	2	0.1
27 Île du Roi (Chafarinas)	5	11	0.1
28 Île d'Isabelle (Chafarinas)	5	11	0.1
29 Île du Congrès (Chafarinas)	5	11	0.25
30 Zembra	5	10	3.9
31 Kuriate	5	16	12
32 Panarea	5	42	3.4
33 Levanzo	4	15	7
34 Favignana	4	17	19.4
35 Marettimo	4	30	12
36 Ischia	4	11	46
37 Lastovo	4	25	49
38 Palmarola	4	1.4	32
39 Ponza	4	33	12
40 Zannone	4	27	4
41 Pianosa (Tremiti)	4	35	0.11
42 Porquerolles	4	3	12.5
43 Île du Levant	4	10	9
44 Stromboli	4	56.2	12.6
45 Pantelleria	3	102	83
46 Sv Klemnent	3	5.6	3
47 Šćedro	3	6.7	7.5
48 Svetac	3	47.6	4.3
49 Alicudi	3	87.5	5.2
50 Majorca	3	167	3740
51 Menorca	3	200	702
52 Ibiza	2	92	572
53 Formentera	2	95	82
54 San Nicola	1	20	0.5
55 Kopište	1	87	1
56 Mljet	1	18	98.6
57 Comino	1	70	2.6
58 Bisevo	1	27.8	5.8
59 Cabrera	1	175	13
60 Conejera	1	178	18
61 Linosa	1	19	5.4
62 Montecristo	1 (5?)	10	63
63 Jerba	1	2.5	568
64 Chergui (Îles Kerkennah)	1	25	69
65 Gharbi (Îles Kerkennah)	1	25	100

Mill 1st col: Millennium of first colonisation
Dist NM: Distance to nearest mainland (km)

Table 6.2 Eastern Mediterranean islands: geographical and earliest colonisation data

Island	Mill 1st col	Dist NM	Size (sq km)	Island	Mill 1st col	Dist NM	Size (sq km)
1 Cyprus	<10	60	9,251	34 Symi	5	8	38
2 Crete	<10	102	8,259	35 Thera	5	180	76
3 Ikaria	9	47	256	36 Tilos	5	20	63
4 Gioura	8	70	20	37 Ithaca	5	30	96
5 Kythnos	8	39	100	38 Kephalonia	5	38	781
6 Chalki	8	47	28	39 Despotiko	5	112	8
7 Alonissos	6	43	65	40 Aegina	4	21	83
8 Imbros (Gökçeada)	6	16	280	41 Alimnia	4	40	7
9 Kyra Panagia	6	59	25	42 Antikythera	4	63	20
10 Skyros	6	33	210	43 Gavdos	4	192	30
11 Thasos	6	7	380	44 Kea	4	22	131
12 Lefkas	6	0.5	303	45 Lemnos	4	62	478
13 Corfu	5	5	593	46 Melos	4	105	151
14 Amorgos	5	105	124	47 Samothraki	4	37	178
15 Andros	5	55	380	48 Meganisi	4	9	20
16 Astypalaia	5	79	97	49 Siphnos	4	85	74
17 Chios	5	11	842	50 Syros	4	75	85
18 Giali	5	18	9	51 Zakynthos	4	18	402
19 Kalymnos	5	18	93	52 Delos	3	112	3
20 Karpathos	5	93	301	53 Dokos	3	2	20
21 Kasos	5	140	69	54 Idra	3	6	50
22 Kos	5	5	290	55 Ios	3	147	109
23 Kythera	5	15	280	56 Keros	3	145	15
24 Leros	5	32	53	57 Kimolos	3	106	36
25 Lesbos	5	12	1,633	58 Kouphonisia	3	160	6
26 Mykonos	5	112	86	59 Makronisos	3	3	18
27 Naxos	5 (8?)	132	430	60 Pholegandros	3	131	32
28 Paros/Antiparos	5	115	196	61 Poros	3	0.5	23
29 Psara	5	67	40	62 Sikinos	3	140	35
30 Rhodes	5	19	1,400	63 Spetses	3	2	22
31 Salamis	5	0.5	96	64 Tenedos (Bozcaada)	3	19	42
32 Samos	5	5	477	65 Donoussa	3	140	14
33 Saria	5	85	21	66 Heraklia	3	155	18

Table 6.2 (*continued*)

Island	Mill 1st col	Dist NM	Size (sq km)
67 Schinoussa	3	157	9
68 Tinos	3	82	195
69 Nysiros	3	17	37
70 Reneia	3	105	14
71 Seriphos	3	62	75
72 Anafi	2	152	40
73 Lipsoi	2	37	17
74 Patmos	2	48	34
75 Skopelos	2	22	97
76 Therassia	2	178	9
77 Marsa Island	2	1	7
78 Arkos	1	10	5
79 Atokos	1	8	5
80 Castellorizo	1	5	10
81 Kalamos	1	2	25
82 Skiathos	1	4	50

Mill 1st col: Millennium of first colonisation
Dist NM: Distance to nearest mainland (km)

New Data, New Patterns?

In 1981, Cherry created a plot of cumulative percentage of the islands in the eastern and western Mediterranean with evidence of occupation by a given millennium bc (uncalibrated) (Cherry 1981:62). The graph depicted colonisation as a linear or cumulative process (see Fig. 3.2, Chapter 3). In 1990, Cherry synthesised some significant developments that had taken place since 1981 but did not update the graph in the light of these new discoveries. Cherry's work influenced several subsequent studies (e.g., Vigne 1996), most notably Patton's 'island sociogeography' (1996). Patton discussed the colonisation of the islands vis-à-vis three visibility categories (rather than the western and eastern Mediterranean distinction). He concluded that the timing of colonisation did not follow biogeographical predictions based on the islands' visibility, and he hypothesised that this might imply that the rate of colonisation did not correspond to the rate of discovery (1996:54–5).

In this chapter, we will check the key results from these earlier studies in light of the new data, starting with a revision of Cherry's 1981 colonisation cumulative plot for the whole Mediterranean, and compare rates of island colonisation per period and area. The chapter incorporates earlier work (Dawson 2008, 2011), which is broadly confirmed but has been revised to include data that have become available in the intervening period. The analysis will explore variations and similarities within and between regions, and their links to configuration, with islands assigned to different categories based on their size and distance to the nearest mainland. The following criteria have been used: 'near' is defined as less than 20 km from the nearest mainland (or a day of voyaging using a canoe), and 'large' as more than 50 sq km. The potential role of inter-island configuration is also discussed through further case studies in Chapter 8, where inter-island distance is investigated as a potential factor affecting abandonment.

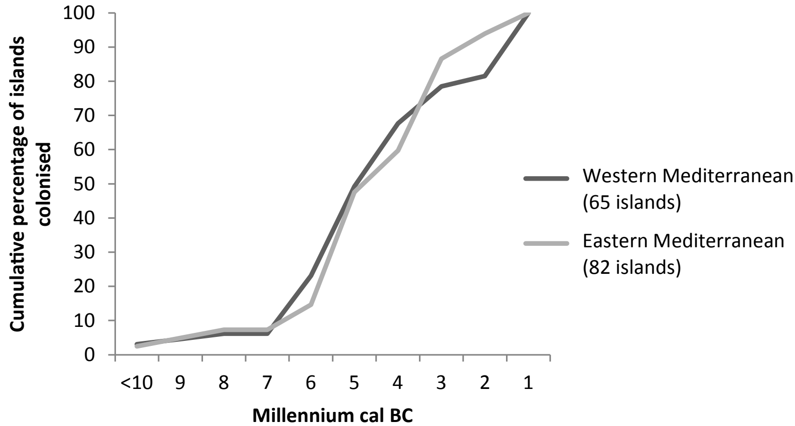

Fig. 6.1 Revised cumulative colonisation plot for the eastern and western Mediterranean islands.

Overall, the revised cumulative plot (Fig. 6.1) confirms the general trends noted by Cherry: islands were colonised incrementally, apparently confirming a gradual and continuous 'infilling' of available land, which, generally speaking, was faster in the western than in the eastern Mediterranean, at least until the late fourth or early third millennium cal BC. The most notable difference from Cherry's original graph (apart from the fact that the temporal 'origins' of colonisation have been pushed back in both east and west) is the reduction in the colonisation time lag first noticed between the two areas (between the seventh/sixth and the early third millennia cal BC), which is mainly the result of a set of earlier dates that have become available from the eastern Mediterranean (especially the Aegean).

In the west, Cherry (1981) had noticed a lack of spatial patterning in the islands being colonised. When more recent data are brought into the picture, some observations related to size and distance can be made, and their relevance will be discussed in due course. The data summarised in Table 6.1 show that, excluding the islands that were colonised at low sea levels, when landbridges probably existed (e.g., Sicily), the first western islands to be colonised are the larger islands (Sardinia and Corsica). There is evidence of human presence on the island of San Domino (Tremiti) from the seventh or sixth millennium cal BC, when the other Tremiti Islands were perhaps frequented (this chronology depends on traditional pottery typology, Early Impressed Ware). The Tremiti Islands are very small (in the order of 1 sq km) and less than 30 km from the nearest mainland (southeast Italy). However, colonisers also ventured farther away at this time, up to ca. 130 km in the case of Palagruža (although this journey could be broken up into two 50 km stretches, ensuring line-of-sight navigation in good conditions, from either the Italian or Croatian side, via

Pianosa or Sušac). All the other islands colonised during this millennium lie less than 80 km from the nearest mainland, and most belong in the 10–100 sq km bracket (with a few smaller and larger exceptions).

The western islands colonised in the fifth millennium are generally close to the nearest mainland (< 60 km), with one remote exception (Lampedusa). A range of sizes is represented (ca. <1 to 600 sq km). In the fourth millennium, the islands are all smaller than 100 sq km and less than 40 km from the nearest mainland. In the third millennium, most islands colonised are very small (smaller than 10 sq km), and between 10 and 100 km from the nearest mainland (with the notable exception of the two Balearics). A number of islands were colonised in the second and the first millennia, when there appears to be no spatial patterning in the islands occupied, although the islands are generally small (< 20 sq km), and, particularly in the first millennium, some lie close to larger, previously occupied islands (e.g., Comino, Kopište, Conejera, Cabrera), perhaps reflecting the filling-up of remaining empty space or possibly requirements linked to specific functional uses (e.g., ritual spaces; cf. Palagruža; see Kirigin and Čače 1998).

For the eastern Mediterranean, some of the overall processes and patterns first noted by Cherry can still be recognised, but the new data indicate a much stronger increase in colonisation after the sixth millennium (particularly in the fifth and fourth millennia) than previously seen (Table 6.2). The earliest occupation is documented on the largest of the islands, Cyprus (in the tenth millennium cal BC, at Akrotiri-*Aetokremnos*—although it became more permanent in the ninth). Evidence suggests that Crete was also recolonised by modern humans during this time (11,000–9,000 BP), following a much earlier colonisation by hominins (ca. 130,000 BP) (Strasser et al. 2010b:186). Recent discoveries place the earliest colonisation of Ikaria and Chalki, in the southeastern Aegean, in the 9th millennium BC. In the eighth millennium, Gioura and Kythnos (two small islands in the Northern Sporadhes and Cyclades, respectively, to which we may soon add Naxos) were also occupied for the first time. Further evidence has been found on several islets around Gioura (Davis et al. 2001:79). In the seventh millennium cal BC, and especially in the sixth, a few larger islands were colonised, all of which lie less than 60 km from the nearest mainland—apart from Crete, which is farther away and was recolonised at this time. Neolithic colonisation in the fifth millennium seems to be all-pervasive, with islands colonised regardless of distance (up to 180 km from the nearest mainland, e.g., Thera, which is accessible via other islands). The same pattern holds roughly for the fourth millennium (e.g., Gavdos, which is close to Crete), while for the third and second millennia, most islands colonised fall below the 100 sq km threshold, with the exception of Tinos, and again distance appears not to be a hindrance to their colonisation (up to ca. 150 km away via intervening stepping-stone islands). There is little spatial patterning of note for the first millennium, but the islands colonised are at the lower end of the size scale.

Some interesting conclusions for the whole Mediterranean can be made based on the above discussion:

1. There is increasing evidence for pre-Neolithic occupation of islands. Cyprus and Crete are the most notable cases, but some small (true) islands in the Adriatic and the Aegean were occupied as early as the Mesolithic.

2. Overall, island colonisation in the western Mediterranean took place at a steadier and faster pace than in the eastern Mediterranean, at least initially, though the time lag noticed by Cherry in 1981 has been considerably reduced, with colonisation in the east following that in the west closely in the Middle (MN) to Late Neolithic (LN) and surpassing it during the Final Neolithic (FN) to Early Bronze Age (EBA) transition.

3. There is a higher number of islands colonised in the Early and Middle Neolithic, or between the seventh and fourth millennia, than previously seen. The Neolithic is overall the key period for island colonisation.

4. Overall, spatial patterning appears to be more prominent in the west than in the east. This may be due to geographical differences already noted by Cherry (1981:63) (e.g., large islands in the west acting as 'mainlands'). Distance to the mainland may be less significant in the east than in the west because of the more frequent occurrence of stepping-stone islands.

WAVE OF ADVANCE OR RIPPLES IN A POND?

Cherry conceived of island colonisation in terms of permanent settlement (1981: 49). Certain types of evidence, especially surface lithic finds, were discounted, since they proved human presence but not settlement (Cherry 1981:48). Given that Cherry could identify archaeological correlates to colonisation only in the Neolithic and the Bronze Age, he claimed that island colonisation was, on the whole, a product of such phases. Cherry counted how many islands were colonised at least once during each millennium, and then added this number to those colonised during the preceding millennium. The resulting cumulative plot portrays a sense of long-term continuity.

Patton's 1996 review marked an initial departure from Cherry's cumulative approach, by presenting a histogram of colonisation data which he used to identify distinct waves of colonisation (Patton 1996:59, 62). This was an important move away from the cumulative or linear representation of colonisation. However, Patton used the graph only to make some very general points about pan-Mediterranean patterns of colonisation and did not explore the implications of his observations on a regional scale. In this section, the idea of a non-linear, non-cumulative colonisation graph is developed further, as it has the potential to illustrate variations at a micro-scale which offer a counterpart to both eastern vs. western (Cherry 1981) and pan-Mediterranean (Patton 1996) patterns.

Unlike cumulative plots, non-cumulative plots do not add the number of islands colonised in the previous millennium to those in the following one, but only account for how many new colonisation events take place during each millennium (the data are represented graphically as a bar chart rather than a curve). These new colonisation events relate to first-time colonisation. Non-cumulative plots allow us to compare rates of colonisation between millennia and to identify distinct waves of colonisation (Fig. 6.2). When viewed this way, the colonisation pattern for the eastern Mediterranean displays two distinct peaks, one during the fifth and the other during the third millennium cal BC. In the western Mediterranean, there is also a peak in the fifth millennium and a minor peak in the first.

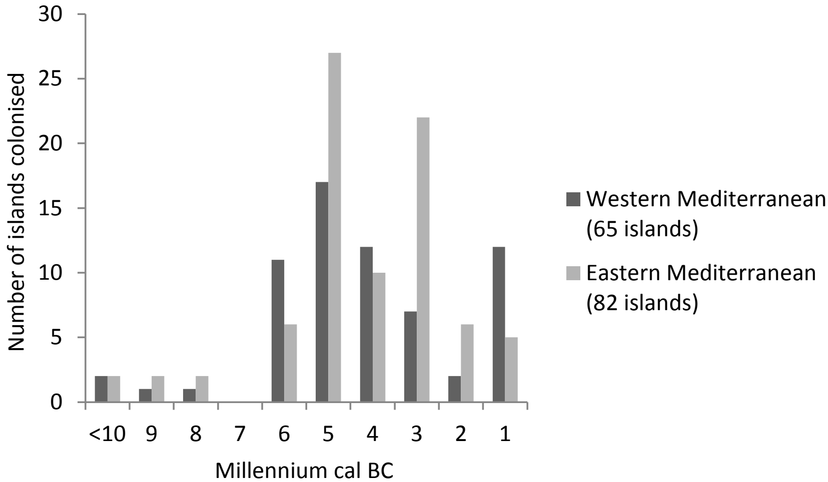

FIG. 6.2 Rates of colonisation in the eastern and western Mediterranean islands.

To what extent did biogeographical variables (specifically island size and distance to mainland) affect the colonisation of the islands? When we sort the islands according to distance and size, some interesting observations can be made. For example, in the west, distance was not a prominent factor overall, with faraway islands colonised both in early (eighth–sixth millennia cal BC) and late (third–first millennia cal BC) periods (Fig. 6.3).

In the east, among the islands with a distance to mainland greater than 100 km, only Crete was colonised before the sixth millennium (Fig. 6.4). Most western islands colonised in the fifth millennium are close to the mainland (< 20 km), whereas in the east, this number is balanced out by a similar number of colonised islands that lie over 20 km away. Among the distant islands (> 100 km), the greatest number were colonised in the eastern Mediterranean in the third millennium (Early Bronze Age), usually via stepping-stone islands.

Turning to size, it emerges that, in the west (Fig. 6.5), small islands (1–10 sq km) were colonised at different times, mainly in the fifth millennium (when we saw that

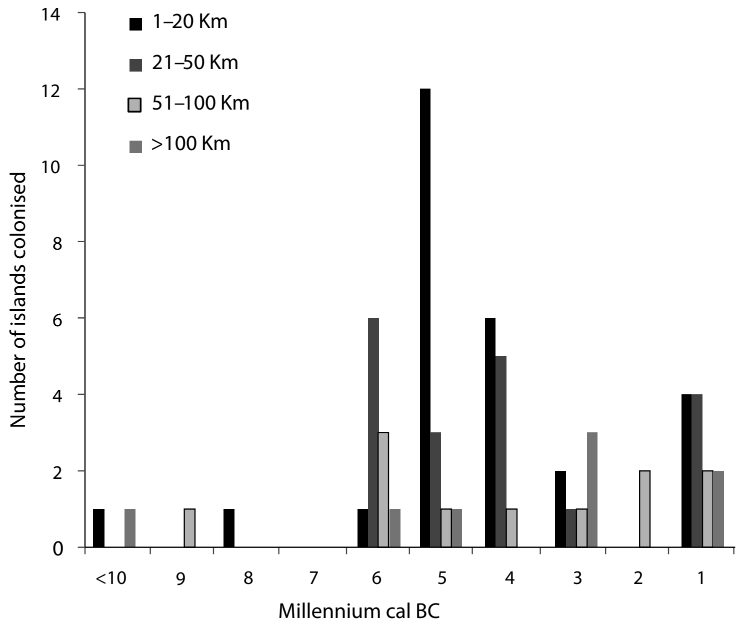

FIG. 6.3 The effect of distance in the colonisation of the western Mediterranean islands.

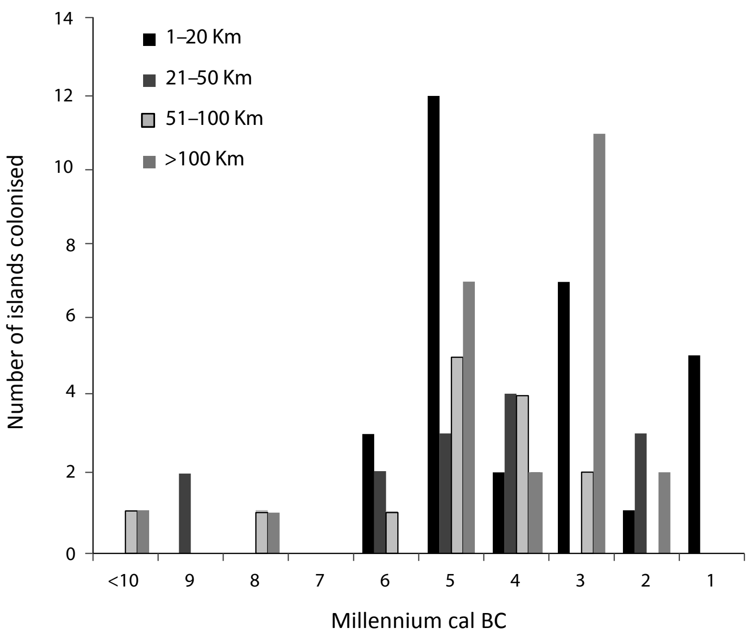

FIG. 6.4 The effect of distance in the colonisation of the eastern Mediterranean islands.

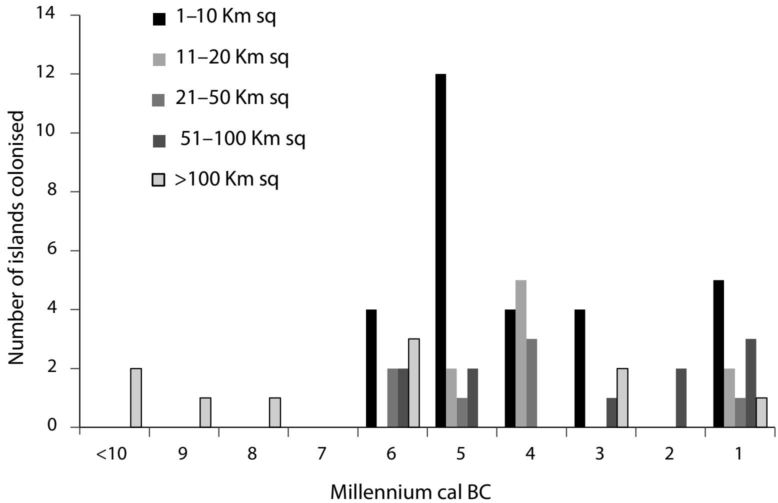

FIG. 6.5 The effect of size in the colonisation of the western Mediterranean islands.

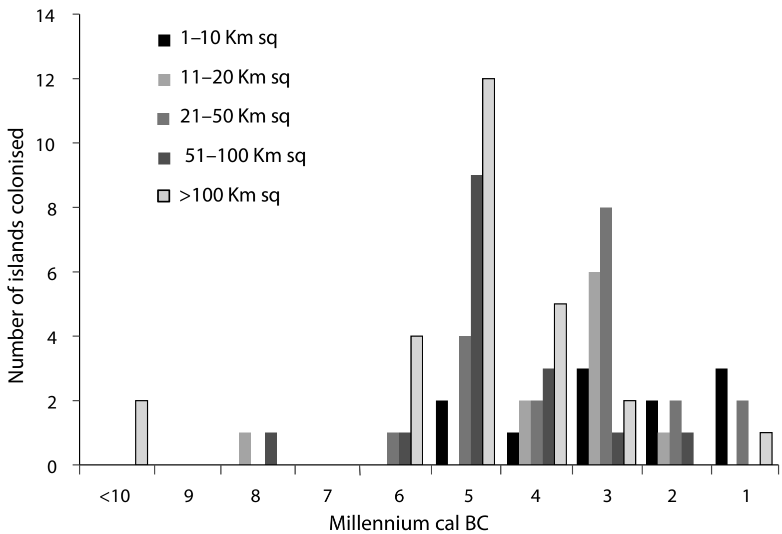

FIG. 6.6 The effect of size in the colonisation of the eastern Mediterranean islands.

most islands targeted are also < 20 km away), whereas no large ones (> 50 sq km) were colonised in the fourth millennium and only a couple in the fifth.

In the east, on the other hand, most larger islands (> 50 sq km) were targeted in the fifth millennium (Fig. 6.6).

Further analysis of these data shows that in the western Mediterranean, most large (> 20 sq km) and distant islands (> 50 km) were colonised either before or after the Neolithic (none in the fifth or fourth millennium cal BC), whereas most small nearby islands were colonised during the Neolithic. As one would expect, the colonisation of small nearby islands followed roughly the same pattern as that of large nearby islands (i.e., Neolithic colonisation, with the ninth millennium exception of Corsica). Small faraway islands were mainly colonised from the Bronze Age onwards (with the exception of Sušac and Filicudi, both of which were colonised earlier and were easily reached via stepping-stone islands colonised at roughly the same time).

For the eastern Mediterranean, most large islands (> 20 sq km) were colonised between the Neolithic and Bronze Age (fifth–third millennia) regardless of distance. Most small and faraway islands were colonised from the Early Bronze Age onwards, whereas the colonisation of small nearby islands took place gradually from the fifth millennium cal BC onwards. Overall, the colonisation of small faraway islands (those less favoured by biogeography) in the eastern Mediterranean seems to take place from the Bronze Age onwards, whereas in the western Mediterranean it is more evenly spread out. For the eastern Mediterranean, the lack of colonisation of larger islands in later periods (third millennium) is likely to reflect the fact that most of these had already been occupied by then; thus, the pattern appears to date expansion into the smaller islands.

Similarities and differences between colonisation rates at this vast geographical scale (east vs. west) are necessarily of a general nature. Modelling colonisation should not stop at this level, but rather focus on patterns of regional and even local development if the relative importance of different factors is to be established. What emerges from this part of the study is that colonisation was not a smooth 'wave of advance' type of process. The following sections will analyse the colonisation trajectories at a regional scale, focusing on archipelagos that display either similar or different geographical configurations, as a key to understanding patterns in greater detail. In Chapter 8, the study will zoom in even further on individual islands.

REGIONAL PATTERNS OF ISLAND COLONISATION

A number of Mediterranean archipelagos have been thoroughly investigated, thus providing us with the opportunity to study colonisation (and, later in this book, abandonment) on a comparative basis. This kind of comparative analysis allows us to single out factors that may have been prominent at both a general and a local level. In this section, the colonisation data from individual island regions are incorporated into graphs and then compared against one another. By applying this methodological framework to island groups from different parts of the Mediterranean, anomalies and patterns can be described and assessed.

Depending on the data available, the graphs show either how many islands were colonised during each millennium or, by incorporating instances of abandonment, how many were actually inhabited during each millennium (these will be reviewed in more detail in Chapter 8). Needless to say, these graphs respect the current state of knowledge; future finds, therefore, may alter the patterns observed here. The recent discovery of pre-Neolithic evidence for human occupation on the islands of Crete, Cyprus, Lemnos, Kythnos, Ikaria, Chalki, and Naxos is a strong reminder of problems relating to archaeological visibility, caused, for example, by soil erosion or changes in sea levels, or by potential research biases. With this caveat in mind, it is possible to delineate a picture of which islands were colonised when, combining the graphic information contained in the plots with the data in the tables. The graphs also underscore the fact that, while there is evidence of human presence in most of these islands from the early Neolithic to the Iron Age, this occupation was not continuous.

Spanish Islands

Total: 6; average size 850 sq km; average distance from nearest mainland 150 km

As shown in Figure 6.7, the Spanish islands were colonised in three phases: Mallorca and Menorca during the third millennium, Ibiza and Formentera in the second millennium cal BC, and the remaining two smaller islands (Cabrera and Conejera) in the Phoenician/Punic period, between the seventh and the first centuries BC. At that time, Ibiza and Formentera were recolonised after being abandoned.

Taking abandonment into consideration (Fig. 6.8), we are able to show how many islands were actually occupied during each period, and the result is a more accurate graphical representation of the alternating nature of occupation, as we will see in Chapter 8.

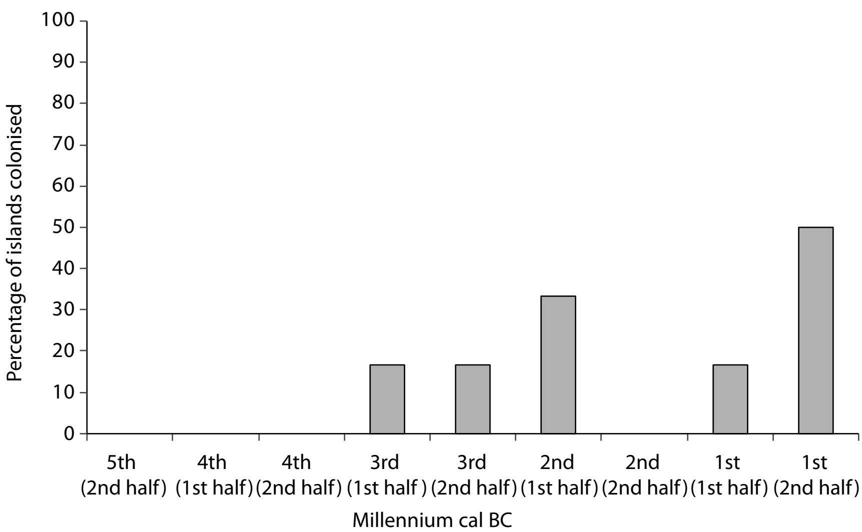

FIG. 6.7 Rates of colonisation in the Spanish islands.

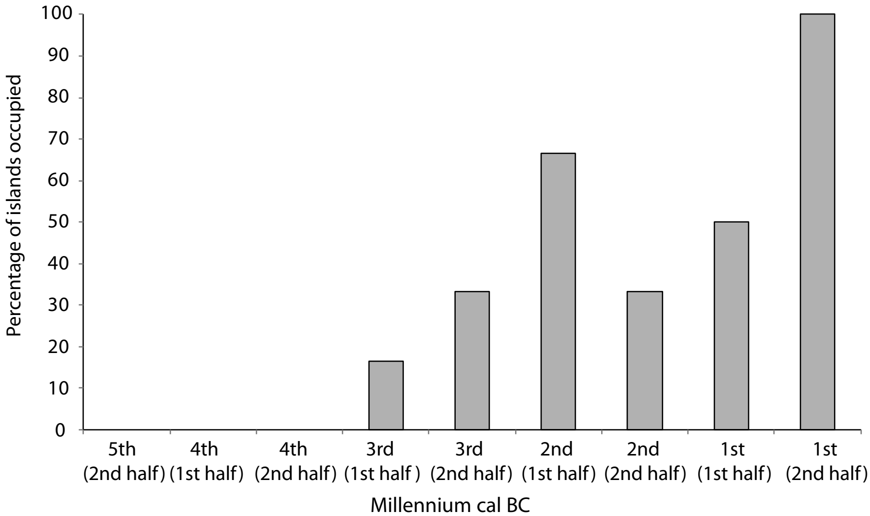

FIG. 6.8 Phases of occupation in the Spanish islands.

Northern and Central Tyrrhenian Islands

> Total: 12 (includes two French islands; 14 with Sardinia and Corsica); average size for the smaller islands 19.4 sq km; average distance from nearest mainland 39.5 km; Sardinia + Corsica: average size 16,400 sq km; average distance from nearest mainland 146 km

These islands were settled mainly from the Middle Neolithic, and again in the Late Bronze Age/Early Iron Age (Fig. 6.9). Note the significant temporal gap between the colonisation of the larger islands, Sardinia and Corsica, and the remaining 10 small islands (no islands were colonised between the eighth and fifth millennia cal BC), indicating that, overall, colonisation was not continuous. No islands were colonised in the third millennium, but there were further colonisation episodes in the second and first millennia involving the smallest islands in the group.

Southern Tyrrhenian: Aeolian Islands

> Total: 7; average size 16.6 sq km; average distance from nearest mainland 47 km

These seven islands were not all settled at the same time. Initial colonisation involved the three islands of Lipari, Salina, and possibly Filicudi (with Lipari slightly earlier than the others) (Fig. 6.10).

Here too we can get a better idea of how many of the seven islands were actually occupied at the same time by looking at Figure 6.11, which shows different phases of actual human occupation and incorporates both abandonment and recolonisation data.

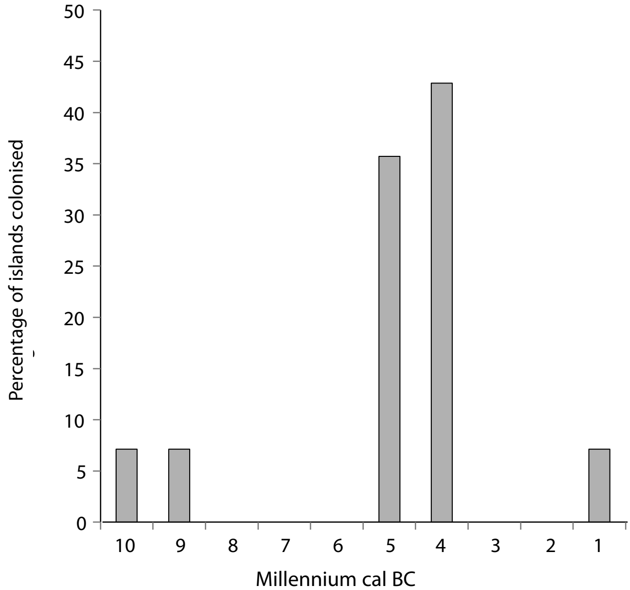

FIG. 6.9 Rates of colonisation in the northern and central Tyrrhenian islands.

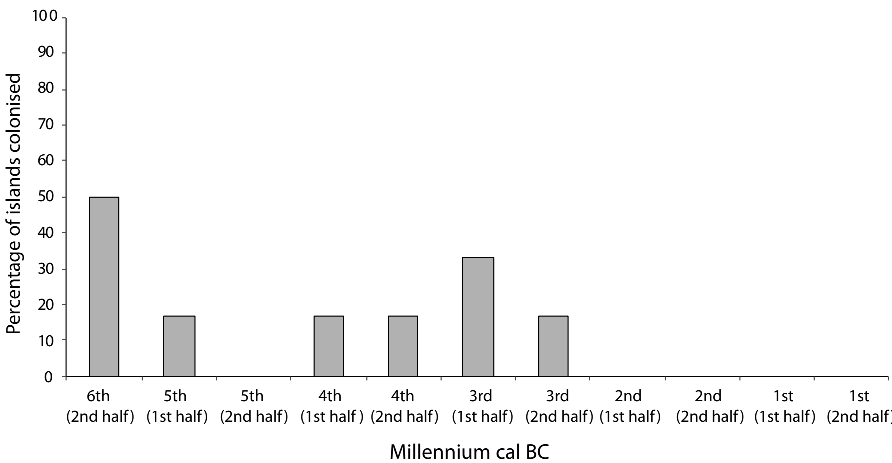

FIG. 6.10 Rates of colonisation in the Aeolian Islands.

Lipari was the only island to be continuously occupied, while the others were abandoned at different times. There was a reduction in the overall occupation in the archipelago during the Copper Age (fourth millennium cal BC), an increase in the

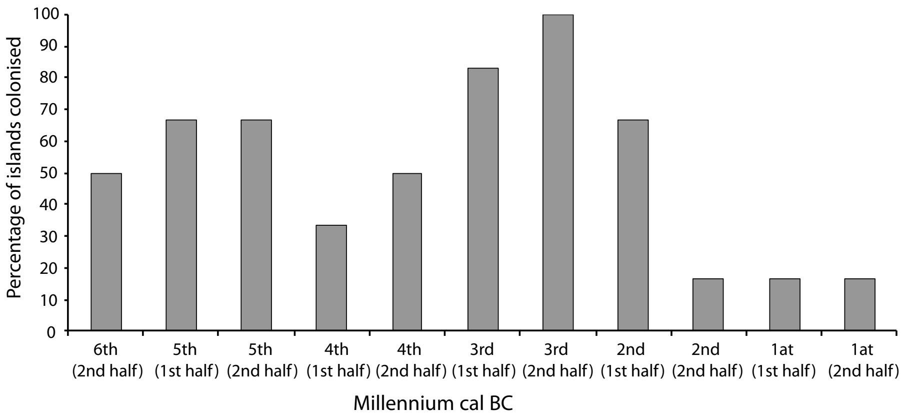

FIG. 6.11 Phases of occupation in the Aeolian islands.

third millennium, and drastic nucleation in the Iron Age (first millennium cal BC), when the Lipari acropolis was the only inhabited place in the entire archipelago.

North African Islands

Total: 11; average size 70 sq km; average distance from nearest mainland 12 km

The earliest evidence for the North African islands comes from a series of observations written by French archaeologists in the 1950s. All the assemblages described were surface scatters of lithics, with little (if any) associated pottery, and no structural remains were mentioned. Together, these indications should perhaps not be taken to represent permanent occupation. The evidence reviewed in Chapter 4, and summarised here in graphic form (Fig. 6.12), shows two phases when activity in these islands appears to have peaked, the Neolithic (fifth millennium cal BC) and the Punic period (first millennium cal BC).

Dalmatian (Eastern-Central Adriatic) Islands

Total: 14; average size 130 sq km; average distance from nearest mainland 40.5 km

The data indicate a steady increase in numbers of islands colonised from the eighth to the sixth millennia, with a slight drop in the fifth and fourth millennia cal BC (Fig. 6.13). The Middle Bronze Age (second millennium cal BC) saw no islands being colonised. This is perhaps paralleled by processes on the mainland during the Middle Bronze Age Cetina period (reviewed in more detail in Chapter 8). Colonisation resumed in the first millennium BC.

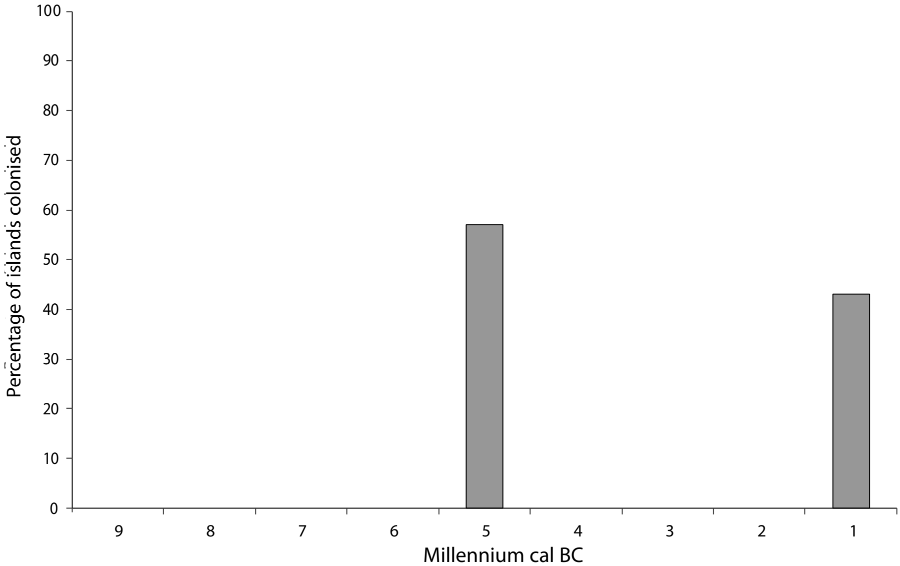

FIG. 6.12 Rates of colonisation in the North African islands.

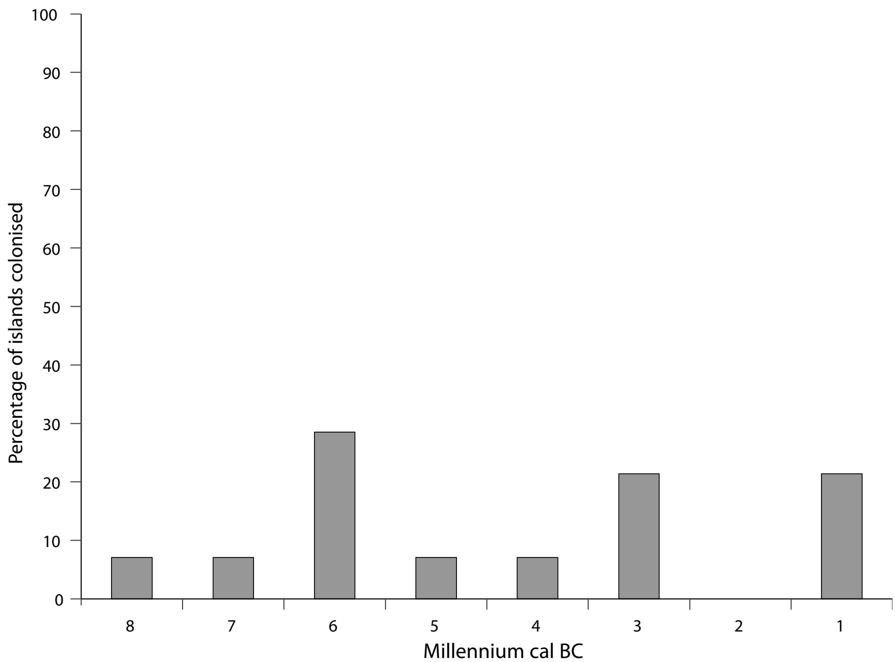

FIG. 6.13 Rates of colonisation in the Dalmatian islands.

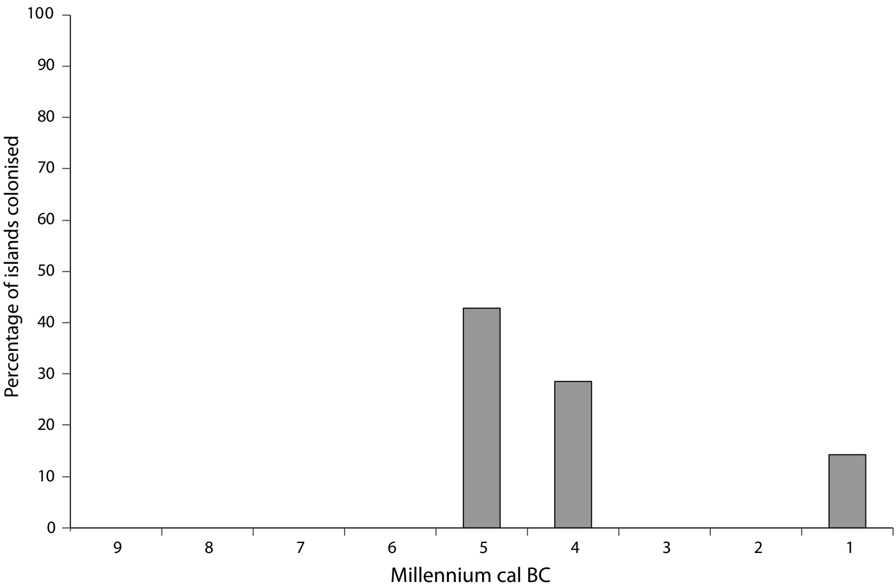

FIG. 6.14 Rates of colonisation in the Ionian islands.

Ionian Islands (Southeastern Adriatic)

Total: 7; average size 317 sq km; average distance from nearest mainland 15 km

The colonisation pattern for the seven Ionian islands is seemingly one of regular increase throughout the Neolithic and the Bronze Age. The Ionian islands lie close to the mainland (between 0.5 and 40 km), which may be why most islands had been colonised by the fourth millennium cal BC (for earlier, possibly overland colonisation, see Chapter 5). The early overland colonisation of Corfu may be responsible for absorbing the initial colonisation impetus and for the lack of colonisation in the following period (Fig. 6.14).

Southwest Aegean Islands

Total: 9; average size 66.5 sq km; average distance from nearest mainland 13 km

The colonisation of the nine southwest Aegean islands considered (Fig. 6.15) began in the fifth millennium, dropped in the fourth, and resumed strongly in the third.

Northern Sporadhes

Total: 6; average size 78 sq km; average distance from nearest mainland 38.5 km

The Northern Sporadhes show a rather atypical colonisation pattern when compared to other Aegean groups, displaying substantial temporal gaps between colonisation events (Fig. 6.16). Most of the islands had been colonised by the sixth millen-

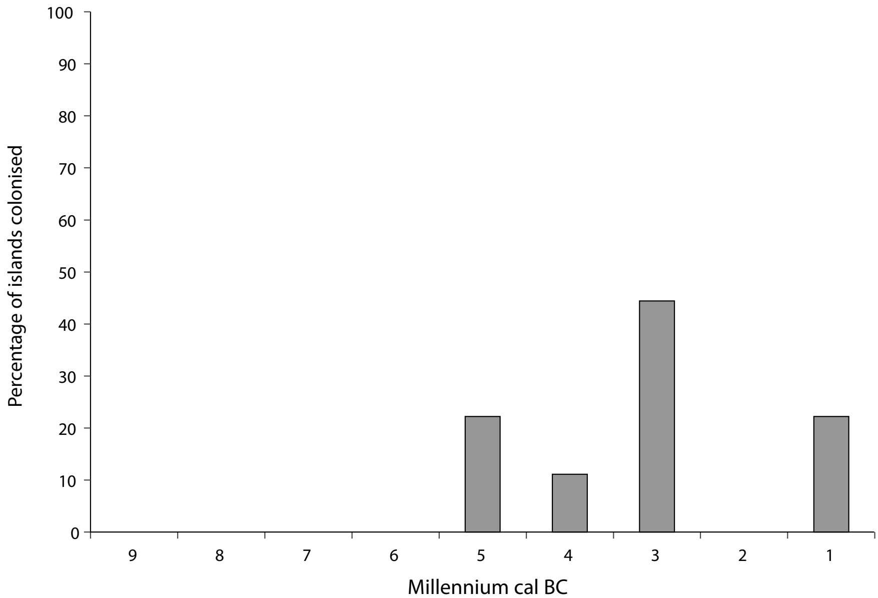

FIG. 6.15 Rates of colonisation in the southwest Aegean islands.

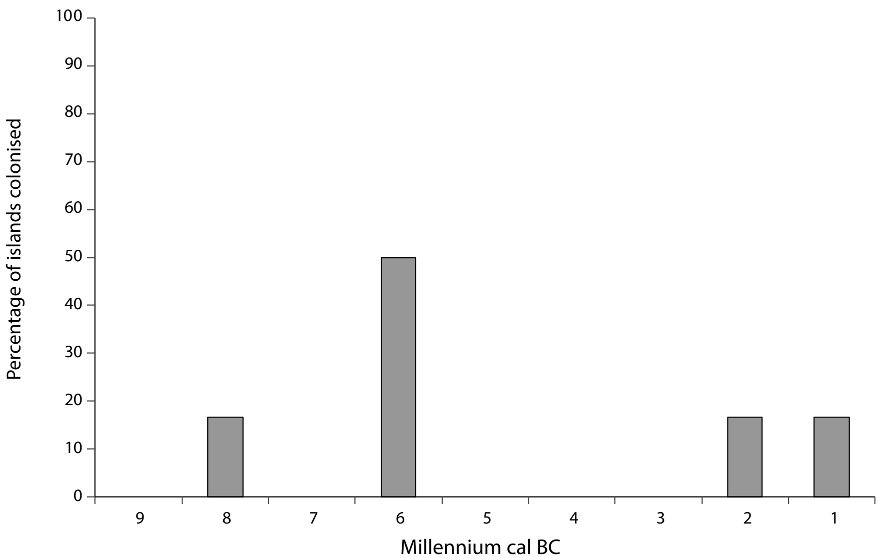

FIG. 6.16 Rates of colonisation in the Northern Sporadhes.

nium, while in the second and first millennia, two separate colonisation events involved the islands of Skopelos and Skiathos. This could reflect lack of resources.

Northeastern Aegean Islands

Total: 8; average size 374 sq km; average distance from nearest mainland 29 km

The colonisation of the eight northeastern Aegean islands began in the sixth millennium, and the pattern (Fig. 6.17) was one of steady increase throughout the Neolithic. The first islands to be colonised (Thasos and Lesbos) are both large and close to the mainland (possible dry-shod colonisation).

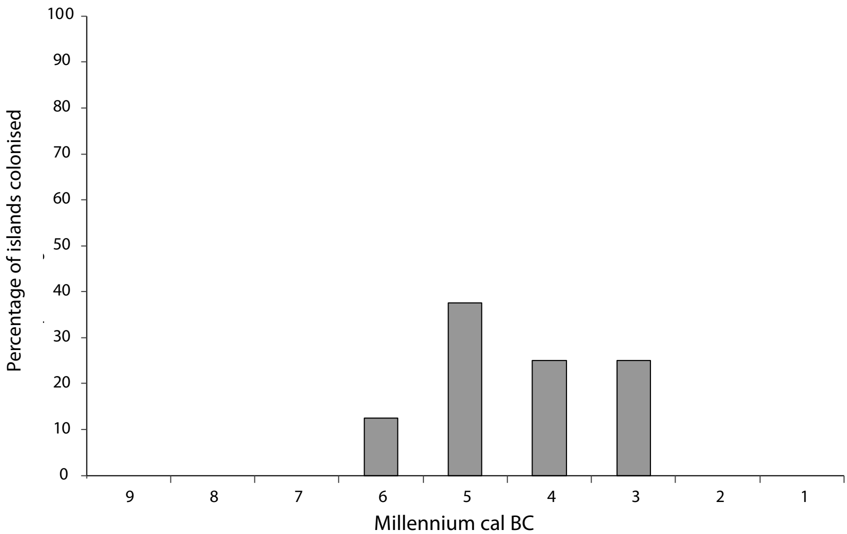

FIG. 6.17 Rates of colonisation in the northeast Aegean islands.

Southeastern Aegean Islands

Total: 20; average size 165 sq km; average distance from nearest mainland 39 km

The pre-Neolithic colonisation of Ikaria and Chalki suggests that equally early evidence might be found on some of the other islands once surveyed. The main colonisation period for the southeastern Aegean islands was the fifth millennium cal BC, when 12 (or 60%) of the islands were occupied (Fig. 6.18). Islands were colonised at a steady pace in the following millennia.

The Cyclades

Total: 29; average size 85 sq km; average distance from nearest mainland 107 km

Notwithstanding the early and short-lived colonisation of Kythnos, the colonisation of the Cyclades (29 are considered here) started in the fifth millennium and in-

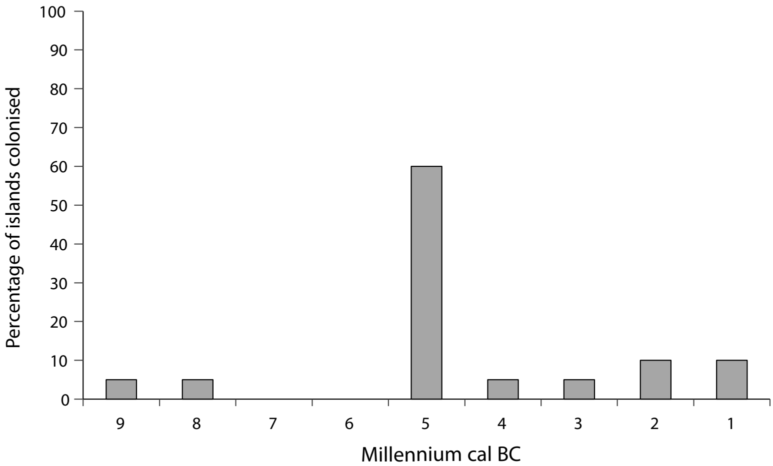

FIG. 6.18 Rates of colonisation in the southeast Aegean islands.

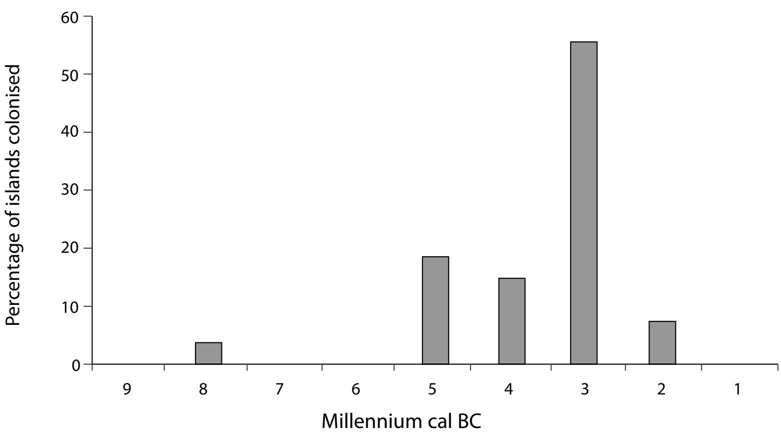

FIG. 6.19 Rates of colonisation in the Cyclades.

volved some of the largest islands in the archipelago. The main period for colonisation was, however, the third millennium cal BC, when 17 (ca. 60%) of the islands were colonised for the first time. Colonisation continued, at lower rates, up to the first millennium BC (Fig. 6.19).

The late colonisation of the Cyclades is striking when the geography of the islands is considered: among the Cycladic islands colonised in the Early Bronze Age are some large islands, such as Ios (109 sq km), Kythnos (100 sq km), and Pholegandros (32 sq km). It is also striking that there is no evidence of human presence on Kythnos from the eighth to the third millennia cal BC, when the island was recolonised. Kythnos falls within the category of Cherry's (1981:52) 'larger littoral islands' at a mere 39 km from the mainland. Only Pholegandros, in this respect, satisfies biogeographical expectations, being both in the lower size range and farther away from the mainland (131 km), though this distance was reduced by stepping-stone islands.

THE ROLE OF CONFIGURATION

Might we expect islands with similar geographic configurations to show parallels in their colonisation trajectories as described above? Geographically speaking, similarities may relate to groups with a comparable total number of islands, total area, distance to mainland, and layout—for example, 'isolated' clusters of islands (e.g., Spanish and Pelagie Islands and Pantelleria) versus island chains strung off at an angle or parallel to a mainland (e.g., Northern Sporadhes and Tremiti Islands and Pianosa, Ègadi, Dalmatian islands); island chains close to a large island ('super-attractor' island) (e.g., northern Tyrrhenian islands); or closely clustered islands (Cyclades) ('sea nurseries'). These characteristics and the islands' biogeographical rankings are summarised in Tables 6.3 and 6.4 for the western and eastern Mediterranean, respectively.

When such comparisons are made, only in a few cases can similar colonisation trajectories between island groups be explained by simple biogeographical variables; in most cases, this kind of explanation is not sufficient. While some subtle similarities can be noted in the colonisation processes in different parts of the Mediterranean (e.g., Spanish and Aeolian islands), the most striking variations take place within archipelagos themselves, particularly among small islands that are close to the largest islands. These include the differing trajectories of islands off the coasts of Sicily and of the smaller Tyrrhenian islands, some of which lie in sight of Sardinia and Corsica. Once again, small-scale variations, in terms of the islands' local geography and resources, may be responsible for these discrepancies, which also indicate the complex role of the 'stepping-stone' effect (or the presence of intervening islands). In order to understand the effect fully, further detailed study of selected islands would be necessary (e.g., following Broodbank's study of the Cyclades).

The analysis shows that island colonisation emerged as a pan-Mediterranean phenomenon in the Neolithic; however, the Neolithic itself should not be viewed as a monolithic block, as it clear that colonisation rates varied over such a long period (Fig. 6.20) (see also Dawson 2011). This is evident both in the eastern and western Mediterranean from the fifth millennium cal BC onwards. The Neolithic phase tends to be favoured in discussions of island colonisation in view of its pan-Mediterranean dimension. However, some islands, especially in the western Mediterranean,

Table 6.3 Western Mediterranean islands: biogeographical characteristics

North-Central Tyrrhenian	Size (sq km)	Dist NM
Sardinia	24,089	205
Corsica	8,722	87
Porquerolles	12.5	3
Île du Levant	9	10
Elba	220	10
Giglio	15	22
Pianosa	10	50
Capri	10	5
Giannutri	3	14
Ischia	46	11
Palmarola	12	12
Ponza	12	33
Zannone	4	27
Montecristo	63	10
Average	2,373	35.6
BGR	66.65	

Southern Tyrrhenian		
Lipari	37.6	30.2
Salina	26.8	42.9
Filicudi	9.5	46.6
Panarea	3.4	42
Ustica	8	53
Favignana	19.4	17
Marettimo	12	30
Levanzo	7	15
Stromboli	12.6	56.2
Alicudi	5.2	87.5
Average	14	42
BGR	0.3	

Pelagie + Maltese + North African	Size (sq km)	Dist NM
Malta	246	85
Gozo	67	65
Lampedusa	20.2	210
Kuriate	12	16
Zembra	3.9	10
Habibas	0.4	11
Iles Planes	0.1	5
Rachgoun	0.1	2
Île du Roi (Chafarinas)	0.1	11
Île d'Isabelle (Chafarinas)	0.1	11
Île du Congres (Chafarinas)	0.25	11
Pantelleria	83	102
Linosa	5.4	19
Comino	2.6	70
Average	31	47
BGR	0.70	

Central Dalmatian		
Brač	395	5.5
Palagruža	0.3	130
Korčula	276	34.5
Hvar	300	4.1
Sušac	4.6	80
Vis	90.3	23.6
Šolta	588	7.7
Lastovo	49	25
Sv Klemnent	3	5.6
Šćedro	7.5	6.7
Svetac	4.3	47.6
Kopište	1	87
Mljet	98.6	18
BGR	3.82	

* Average distance to nearest mainland (km)

** Overall BGR: Biogeographical ranking = average size/average distance (without stepping-stone effect).

NOTES: Islands with higher BGR should be colonised earlier. The very low value for the southern Mediterranean islands implies they should be colonised considerably later than the others but this is not the case. Note that Sicily is excluded and considered a false island owing to its size and close proximity to the Italian mainland.

Table 6.4 Eastern Mediterranean islands: biogeographical characteristics

Ionian	Size (sq km)	Dist NM
Atokos	5	8
Corfu	593	5
Ithaca	96	30
Kalamos	25	2
Kephalonia	781	38
Lefkas	303	0.5
Meganisi	20	9
Zakynthos	402	18
Average	278	14
BGR	19.85	
Southwest Aegean		
Aegina	83	21
Poros	23	0.5
Salamis	96	0.5
Idra	50	6
Dokos	20	2
Spetses	22	2
Kythera	280	15
Antikythera	20	63
Average	74	14
BGR	5.28	
Northern Sporadhes		
Skiathos	50	4
Skopelos	97	22
Alonissos	65	43
Kyra Panagia	25	59
Gioura	20	70
Skyros	210	33
Average	78	38.5
BGR	2.02	

Cyclades	Size (sq km)	Dist NM
Andros	380	55
Tinos	195	82
Mykonos	86	112
Reneia	14	105
Schinoussa	9	157
Delos	3	112
Despotiko	8	112
Donoussa	14	140
Heraklia	18	155
Syros	85	75
Makronisos	18	3
Kea	131	22
Keros	15	145
Kimolos	36	106
Kouphonisia	6	160
Kythnos	100	39
Seriphos	75	62
Siphnos	74	85
Melos	151	105
Paros	196	115
Naxos	430	132
Amorgos	124	105
Ios	109	147
Sikinos	35	140
Pholegandros	32	131
Thera	76	180
Therassia	9	178
Anafi	40	152
Average	85	107
BGR	0.79	

Table 6.4 (*continued*)

Southeast Aegean	Size (sq km)	Dist NM
Samos	477	5
Ikaria	256	47
Patmos	34	48
Arkos	5	10
Lipsoi	17	37
Leros	53	32
Kalymnos	93	18
Kos	290	5
Astypalaia	97	80
Castellorizo	10	5
Giali	9	18
Nysiros	37	17
Tilos	63	20
Symi	38	8
Rhodes	1,400	19
Chalki	28	47
Alimnia	7	40
Saria	21	85
Karpathos	301	93
Kasos	69	140
Average	165	39
BGR	4.23	

Northeast Aegean	Size (sq km)	Dist NM
Thasos	380	7
Samothraki	178	37
Imbros	280	16
Tenedos	42	19
Lemnos	478	62
Lesbos	1,633	12
Psara	40	67
Chios	842	11
Average	374	29
BGR	12.89	

* Average distance to nearest mainland (km)

** Overall BGR: Biogeographical ranking = average size/ average distance (without stepping-stone effect).

NOTES:

Islands with higher BGR should be colonised earlier. This fits well with the early evidence from the Ionian islands, but not for the remaining groups (e.g., the Northern Sporadhes or the Cyclades). In these cases, the presence of intervening stepping-stones reduces the distance to the nearest mainland (Dist NM), increasing the BGR.

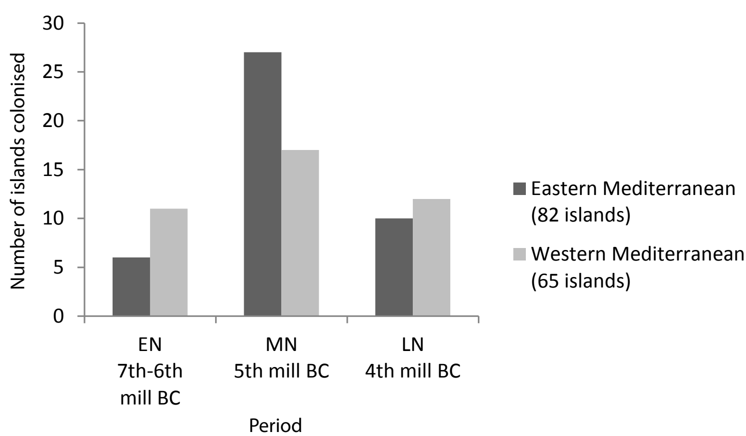

FIG. 6.20 Rates of colonisation for the entire Mediterranean during the Neolithic.

were settled for the first time in the Iron Age, defying the models analysed in Chapter 3. In fact, most island colonisation models fail to take into account important exceptions. Although simplification is inherent in modelling, some explanations are in need of urgent review. The colonisation data (see Fig. 6.2) show no break in the early sequences for either the western or the eastern Mediterranean (from the eighth millennium onwards); however, there may be some significant differences. In the west, the higher rate of islands colonised in the sixth millennium (when compared to the east) indicates that, on the whole, island life became consolidated earlier there than in the east. Several colonisation models support the idea that island settlement increased with the spread of agriculture, which, by the fifth millennium, would have been a rather more established practice. However, the rates of colonisation of Sicily's satellite islands and of the Dalmatian islands do not appear to conform to this general model, displaying a slight reduction in islands colonised in the fifth millennium, when one would perhaps expect a surge based on the pan-Mediterranean trends reviewed so far. Other island groups were colonised altogether much later than the inception of farming on nearby mainlands (e.g., the Spanish islands), whereas others (e.g., the North African islands) appear to have been colonised mainly in the early Neolithic and thus conform more to the general pattern.

It is worth restating that there has been an increase in the evidence for pre-Neolithic human presence on islands compared to the late 1980s (Fig. 6.21). Widespread maritime movement, involving islands but not necessarily their long-term settlement, is evident in the Upper Palaeolithic and Mesolithic, when a few true islands are known to have been colonised, thus raising the question as to whether we can speak of different types of colonisation. Acknowledging this variation will contribute greatly to recognising sites such as Akrotiri-*Aetokremnos* in the archaeological record, and to according them the correct significance. The intermittent nature

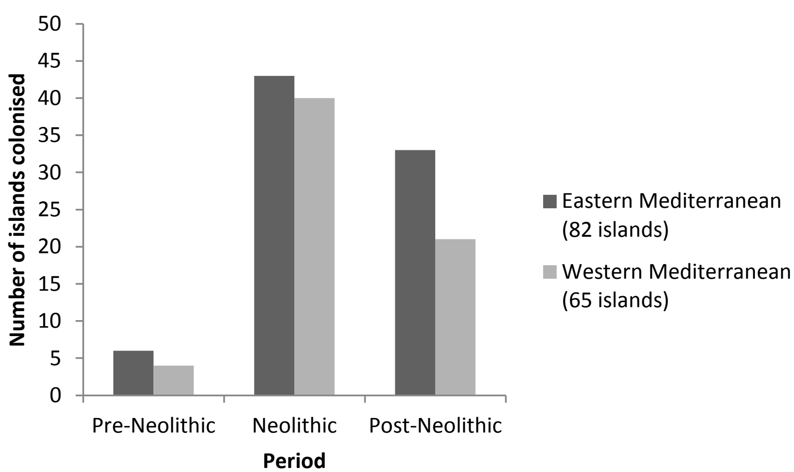

FIG. 6.21 Rates of pre-Neolithic, Neolithic, and post-Neolithic colonisation.

of human presence at different times (as variations in colonisation rates seem to imply) will be discussed further in Chapter 8.

COLONISATION STRATEGIES

In this section, through a focus on select archaeological sites, we will examine the validity of the theories discussed in the previous chapter and explore how well, or whether, various material assemblages can serve as diagnostics or correlates for cultural activities (such as exploration, utilisation, and settlement). In looking at the different kinds of colonisation activities and strategies for using islands—from seasonal resource acquisition to permanent inhabitation—I reject a teleological view of colonisation, in which any such activities are viewed as necessary steps towards settlement or as evidence of failed colonisation when settlement does not occur. Such unilinear views of colonisation are detrimental to a correct understanding of colonisation as a whole; links between these colonisation activities should be substantiated archaeologically (this point is followed up in Chapter 8).

Colonies can be seen broadly as 'activity sites', with settlement and resource procurement both qualifying as activities. The sites discussed here have been chosen as illustrating island colonisation in pre-Neolithic and post-Neolithic contexts and as showing parallels and differences between these and Neolithic colonisation activities, specifically their settlement, which—as we have already seen—is the better known or more frequently acknowledged colonisation activity.

Human–Island Interaction Reconsidered

Few islands were continuously occupied following their initial colonisation. At least one colonisation experiment appears to have 'failed' on Cyprus. However, whether or not the foragers at Akrotiri-*Aetokremnos* had occupation or seasonal resource exploitation in mind (or if the two were at all different to them) is open to discussion. If we take the latter as being the more likely option, the fact that they eventually left does not equate to failure, since it may never have been their intention to settle permanently. Living on the island may have been part of a strategy involving resource exploitation in several places at different times. Broodbank (1999a:20) has suggested that the repeated changes in coastal environments may have prompted late Pleistocene and early Holocene island visitation. This would imply that the *Aetokremnos* foragers were moving to and between a number of places, both within Cyprus and beyond. Therefore, place-focused residence or repeated visitation of an island (and not just permanent residence) should also be taken to represent 'colonisation', albeit of a different kind.

The data confirm the fact that the Neolithic was a key period for (a certain type of) colonisation. However, there is also evidence that humans were present on islands before the Neolithic and that wild species were introduced to the islands, suggesting an effective broadening of resources. Therefore, the idea that pre-Neolithic people could not colonise islands successfully should be set aside. At the same time, the fragmented record of human presence on the islands offers a strong counterargument to anyone in favour of a long-term trajectory in island colonisation or of the ease of living on islands. While the long-term impression of island colonisation is that of a continuous filling of space, short-term processes differed greatly on the local scale. In the initial stages of colonisation, geographic variables played a role in the discovery of the islands and in their initial use/settlement. Cultural strategies, developed in order to interact with different island environments, may have more to do with island colonisation and abandonment than biogeography by itself can account for.

Human activity on islands has traditionally been characterised as visitation, utilisation, occupation, and establishment (see Chapter 3). The archaeological data reviewed here show that there are difficulties in correlating material data with specific types of activity, much less purpose or intention, and that there is a pressing need to come up with alternatives to this classification. Abandonment and recolonisation, in particular, have so far received little systematic attention in island-related literature. This is partly because colonisation (generally intended as permanent settlement) is often considered the ultimate goal of human activity on islands. The underlying assumption of such views is that reaching an island is harder than living there or that, once established, social coping mechanisms ensured the survival of colonies. However, unless we explore what these mechanisms were and how they came about, we might just as well say that colonists survived by some form of inertia.

In the following, different sites will be reviewed in detail to discuss different types of activities. These should not be viewed necessarily as chronological stages leading to settlement but rather as embodying different types of 'activity sites'. In some cases, the development of a site will go through a series of phases, and where possible this will be explored further. The review will focus on three such activities or phases (visitation, settlement, and establishment), while abandonment and recolonisation will be addressed in Chapter 8. The examples will show that archaeological correlates for these activities are context-specific, and there would be little point in attempting a classification exercise, as categories of remains may represent different or similar activities. There is a great deal of overlapping between these categories, and what may in some cases qualify as 'repeated visitation' in one period or area may amount to 'occupation' in others. Indeed, it seems that human activity on islands has been excessively polarised between these extremes. The fact that people went to islands for different purposes, or at least carried out a variety of different activities once they got there, suggests that, whatever they may be, these reasons largely warranted the efforts and risks involved in island colonisation.

Visitation/Utilisation

One of the classic reasons for visitation is the utilisation of a resource. Five Mediterranean islands produced the bulk of obsidian used in prehistoric times (Melos, Lipari, Palmarola, Pantelleria, and Sardinia), while Palagruža and the Tremiti Islands had good-quality chert sources. Other islands had metal resources; Kythnos and Siphnos in the Cyclades, for example, produced copper, silver, and lead, which were exploited in the Early Bronze Age and possibly in the Final Neolithic (Broodbank 2000:79–80, fig. 19). Evidence for mineral exploitation activity appears as extensive chipping floors or other signs that mining took place on the islands, or as indirect evidence (i.e., material found elsewhere that can be traced back to the islands). As discussed by Cherry and Torrence (1982) for Melos, permanent settlement is not necessary to carry out extractive activities, but because these were likely to require time, shelter and food would also be needed.

There are no known built structures to go with the Palaeolithic or Mesolithic exploitation of obsidian from Melos, the Mesolithic exploitation of Lipari, or the Neolithic exploitation of Pantelleria and Palagruža. The Mesolithic exploitation of Lipari obsidian does not seem to be related to its later Neolithic settlement. Only a single fragment of Lipari obsidian has been found so far in Mesolithic contexts in Sicily (at Perriere Sottano) (Aranguren and Revedin 1996:35), suggesting that exploitation was then unsystematic (Nicoletti 1997:260). Bernabò Brea and Cavalier noted that the settlement of the island at Castellaro Vecchio seems to coincide with the beginning of systematic obsidian exploitation (1980:653), which by then was carried out on a much greater scale than before. It seems unlikely that the same people were involved as in the earlier phase.

Similarly, there appears to be no relation between visitation for obsidian extraction (from the eleventh millennium cal BC) and subsequent permanent settlement on Melos seven millennia later (fourth millennium cal BC), despite the fact that Melian obsidian was found in Mesolithic and Early Neolithic layers on the Greek mainland (Broodbank 2000:110). The village of Mursia was founded on Pantelleria after the island's obsidian disappeared from circulation (Nicoletti 1997: 268), suggesting that here too permanent settlement and initial visitation were not directly related. Three locations on the island have been interpreted as obsidian processing sites: near the modern cemetery, at Punta Fram, and at Salto la Vecchia. Interestingly, these sites lie along the southern coast, far from the obsidian sources, suggesting that during the utilisation phase different parts of the island were in use (Nicoletti 1997:262). Palagruža was never permanently settled (reasons for this will be addressed in Chapter 8), even though its mineral resources were extensively mined (Bass 1998).

It is, of course, highly likely that resources other than minerals were sought and exchanged but, being perishable, would not have left their mark in the archaeological record. Consequently, quite a few more islands may have been visited for extractive purposes than our research can attest. Only in a few cases—for example, when cultural deposits have been protected by taphonomy, such as in caves—is evidence for human visitation preserved, but then it is either scant or has received minimal attention. For example, Kopačina Cave, on Brač (central Dalmatian islands), has produced a Late Mesolithic 'cultural deposit' which was taken to indicate 'occupation' around 7000 cal BC (Bass 1998:172). There is as yet no known Early Neolithic evidence on Brač, and it seems that occupation at Kopačina Cave was short lived.

On the islands of Kythnos (Cyclades) (Sampson et al. 2002) and Korčula (central Dalmatian islands) (Čečuk and Radič 1995, in Bass 1998), two sites have produced early evidence for human occupation in the form of both burial and habitation. Mesolithic evidence from Vela Cave on Korčula comprised two juvenile burials, lithics, animal bones, and shells (Bass 1998:173–4). Occupation at this site continued into the Early Neolithic, and therefore it would perhaps be better placed in the following 'settlement' section. The site of Maroulas on Kythnos also spanned the Late Mesolithic to Early Neolithic transition (Kythnos had by then achieved insular status) (Trantalidou 2008). The site excavation revealed a series of human burials, a house floor, and some circular constructions, with the remains of land and marine snails, tunny, and several other fish species (Honea 1975; Sampson et al. 2002; Trantalidou 2008).

A further example of visitation in a pre-Neolithic context comes from a site (Cyclops Cave) found on the island of Gioura (Northern Sporadhes), which was also insular at the time. Mesolithic occupation was unearthed at Cyclops Cave under Early, Middle, and Late Neolithic levels (Sampson 1996), indicating that initial visitation to the cave (perhaps centred around late spring) was followed by a more regular use of the cave (dates span from 8400 to 3500 cal BC) (Davis et al. 2001:79; Trantalidou 2008). Evidence for the initial seasonal occupation of the cave was in the form of fish processing and hunting remains (tools, fish, and animal bones), but there was also the deliberate introduction of wild pigs already in the ninth millennium cal BC (Trantalidou 2008:23). Trantalidou also suggests that the hunting strategies of the Mesolithic and Neolithic occupiers of the cave were very similar and that, during the Neolithic, people engaged in fishing continued to frequent the cave in much the same way as before, although the resources exploited by then also included a range of domesticated species (Trantalidou 2008: 26–7).

Another form of visitation is for burial or ritual. The site of Calcara on the island of Panarea was interpreted as being the focus of ritual activity centred around secondary volcanic activity ('fumaroles' and bubbling water) (Bernabò Brea 1957). The material found there, in a series of pits, included Late Neolithic fine red monochrome Diana ware, obsidian and flint blades, as well as Greek (fourth–first century BC) and Roman (first–second century BC) common pottery, glass, and oil lamps. On the island of Vulcano, a number of possible prehistoric burials, dated to the first half of the second millennium cal BC, were located in the area of Porto Levante, near the Faraglione Grande, and in the area of the Piano. As a result of this high concentration of burials, the island has been nicknamed *l'isola funebre* ('funerary island') (Giustolisi 1995:10). In classical sources, the island is referred to as *Hiera*, the sacred one, and as the entrance to the underworld. As a burial ground, Vulcano would have been visited by surrounding islanders, and as a 'place' it acquired some prominence without ever being settled.

The evidence reviewed indicates that the islands were visited during different periods. Melos was visited from the Upper Palaeolithic (Perlès 1987), Lipari in the Late Mesolithic (Bernabò Brea 1957), Pantelleria in the Neolithic (Tusa 1997), and Palmarola in the Chalcolithic (Tykot 1996). In addition to the purpose of burial, Vulcano evidently was visited for the exploitation of sulphur and possibly alum, in the Middle and Late Bronze Ages, as part of Mycenaean trading interests in Sicily and the Aeolian Islands (Bernabò Brea 1957:120; Giustolisi 1995:52; Castellana 1998; Leighton 1999:132, 157, 181). Visitation (particularly for exploitation purposes) in these cases should not be seen as an exploratory activity ('scouting') leading to settlement, as it may have been an established practice in its own right. On the other hand, the Mesolithic human occupation at Maroulas, Cyclops, and Vela caves could be seen either as preliminary to more permanent settlement in the Early Neolithic or as representing actual 'settlement' in a Mesolithic context (or both).

Permanent Settlement

Environmental analysis has demonstrated that the rock-shelter of Akrotiri-*Aetokremnos* (Cyprus) was used year-round, though it is unclear how long this occupation lasted overall (Simmons 1999:208; note, however, Binford's [2000] reservations; see Chapter 5). Since some degree of permanence has been inferred by its excavators, the site is included here as representing settlement in a pre-Neolithic context. The site lacks built structures (being a rock-shelter, its natural features were exploited as a dwelling), but has yielded a number of cultural features (11 'casual hearths') (Simmons 1999:95). Radiocarbon dates were obtained from only two of these, but, together with other radiocarbon determinations from other areas of the site, they indicate two briefly separated periods of 'primary occupation' (Simmons 1999:112). The spatial patterning of the hearths and the small size of the shelter suggest some degree of contemporaneity between certain features, while their contents indicate different uses and changes in the intensity of their use over time (Simmons 1999: 115).

During the aceramic Neolithic, permanent settlement, dated to the second half of the ninth millennium cal BC, is found on Cyprus at a number of locations (e.g., Kissonerga-*Mylouthkia* and Parekklisha-*Shillourokambos*, but not Akrotiri-*Aetokremnos*—see Chapters 5 and 8). At these sites, few structural remains and mainly negative features (pits and water wells) have produced ample evidence for craft specialisation (stone-working) and the use of domesticated animals and plants (Peltenburg et al. 2002).

Settlement becomes more visible/recognisable in many other islands during the Neolithic, through the large numbers of huts (villages) or cemeteries (which can imply occupational longevity). Phtelia (Mikonos) (Sampson 2002), Grotta (Naxos) (Hadjanastasiou 1989), Strofilas (Andros) (Televantou 2008), Kephala (Keos) (Cherry et al., eds. 1991), Knossos (Crete) (Evans 1964), Saliagos (Paros) (Evans and Renfrew 1968), Castellaro Vecchio, the Lipari acropolis, Contrada Diana (Lipari), and Rinicedda (Salina) (Bernabò Brea and Cavalier 1960; 1968; 1977; 1980), Prato

Don Michele (San Domino, Tremiti) (Zorzi 1950; 1954; 1955a; 1955b; 1958; 1959; 1960; Palma di Cesnola 1965; 1967), and several other villages were founded at this time all over the Mediterranean. Most display a selection of the classic settlement indicators listed by Vigne (1989), Cherry (1990), and Vigne and Desse-Berset (1995), already discussed in Chapter 3, such as extensive ceramic and lithic surface scatters, post-holes, hut floors and hearths, walls, burials, fortifications, evidence for craft specialisation, and evidence for food processing.

Examples of permanent settlement in the Bronze Age come from, among others, the Balearic Islands, Pantelleria, several of the Cyclades, Marsa Island, and Vivara. The permanent settlement of the Balearics (discussed at length in Chapter 4) may have been preceded by initial visits, but evidence for this is controversial. There is perhaps evidence of human presence on Pantelleria before Mursia was founded, but, as mentioned, the two phases appear to be unrelated. Mursia is a fortified village with a megalithic cemetery dated to the start of the second millennium BC (Tozzi 1968; 1978; Tusa 1996:389). The monumental burial chambers ('Sesi') suggest that Mursia was a well-'established' settlement (see below). There is also surface evidence (pottery) from elsewhere on the island, suggesting that other areas of Pantelleria may have been occupied at the same time as Mursia (Tusa 1996:394).

Marsa Island and Vivara are both examples of permanent settlements established for trading during the Bronze Age (neither has valuable mineral resources, but their strategic location along trading routes is clear). On Marsa Island, structural and material remains ('walls and artefacts') spanned a period of three centuries (fifteenth–thirteenth centuries BC), followed by five centuries of abandonment (White 2002:16). Sporadic occupation (based on pottery finds) resumed in the late eighth to sixth centuries BC, and from then on it intensified and was continuous up to the first half of the fifth century AD, when the island was abandoned again until the seventeenth century (White 2002:16). Vivara was settled continuously from the early sixteenth century to the late fifteenth century BC, as part of the Mycenaean trading network (Buchner 1938; Tusa 1991:11; Pacciarelli 1991; Cazzella and Damiani 1991; Marazzi and Tusa 1994; Giardino 1994:69–70). Subsequently, the island was abandoned until the sixth century BC (Tusa 1991:11) and may never have been permanently occupied again (it is unoccupied in the present day). Fragments of Roman pottery dated to the first century AD have been found on the island, but no architectural remains. The island's toponym first appears in documents dated to the fourteenth century and refers to its use as a *vivaio* or fishery (Tusa 1991:12).

A few of the smaller Tyrrhenian (e.g., Montecristo) and Aegean islands (e.g., Reneia, Cyclades) were settled in the Iron Age for the first time, but in some cases there is a likely investigation bias (e.g., Skiathos, in the Northern Sporadhes, which is on the route to most of the others in that group). In most cases, there are no documented signs of prior visitation or utilisation. The Iron Age Phoenician settlement of Motya (Mozia) is unrelated to its previous Bronze Age occupation and may reflect a Phoenician trend to occupy previously unsettled areas (Bourain et al. 1992:301).

Establishment

While visitation and settlement are activities that may or may not be distinct from each other (see above), establishment is best viewed as a *phase* (both a trading network and a settlement can become 'established' over time). However, establishment cannot be assessed based on longevity alone. Even if good dating is available, it is clearly impossible to choose a time span (or degree of longevity) that is applicable to all areas, cultures, and periods covered in this study (cf. a few centuries at Marsa Island and Vivara vs. 1,500 years at *Mylouthkia*). Establishment can be inferred through an increase in activity intensity, which should be reflected in archaeological remains (e.g., material wealth or evidence for good health). A long-term record of change is thus usually necessary if 'establishment' is to be distinguished from 'pioneering' (or the initial phases of colonisation), even in the case of well-planned colonisation, such as Crete. Peltenburg et al. have pointed out that, unless tighter chronological control is available, it is preferable to 'refer to trends of island adaptation, greater elaboration and diversification' (2002:84). A criterion they explore, which is useful when investigating 'establishment', is the development of an island 'way of life', or the elaboration of insular cultural traits distinguishable from mainland ones, implemented as a way of overcoming specific problems.

Peltenburg et al. (2002) defined the occupants of *Mylouthkia* (Cyprus) as 'well established colonists'. The site was founded in the second half of the ninth millennium cal BC and was occupied over a period of ca. 1,500 years (Peltenburg et al. 2000:844; 2001:40, fig. 3). *Mylouthkia* initially displayed several cultural similarities with the Levantine mainland (e.g., chipped stone tradition, domestic architecture, well digging, art) (Peltenburg et al. 2000:845; 2001:54). The persistence of these parallels has been interpreted as the result of maintained contacts with the mainland (Vigne et al. 2000:83, 98; Peltenburg et al. 2001:51; 2002:78, 84). Only about a thousand years after initial settlement (around the late seventh millennium cal BC) did the Cypriot colonists start to adapt this transported/inherited cultural baggage to their island environment, by developing distinctive 'insular' cultural traits (*Mylouthkia* 1B). According to Peltenburg et al., these traits or 'success benchmarks' are particularly evident in the lithic industry (both in the utilitarian and artistic repertoire) and in the house forms (2001:52; 2002:84).

The study of island identities has become a prominent field in recent years, concentrating on the ways in which material culture and cultural connections can shed light on islanders' views of themselves and their worlds (e.g., Grima 2001; 2008; Knapp 2007; Robb 2001; Van Dommelen and Knapp 2010). Thought-provoking hypotheses have been put forward to explain the development of idiosyncratic island cultures, especially the phenomenon of megalithic architecture, theorising island monumentality (as seen on a selected few islands: Malta, Mallorca, Pantelleria, Sardinia, and Crete) as the result of changing social manipulations of insularity (cf. Patton 1996:88; Robb 2001). Alcover has suggested that the Balearic Islands were among the most 'encapsulated worlds' (Anderson 2004) in the Mediterranean region', a 'maritime desert cul de sac, only sporadically visited from outside' (2008: 74). In contrast, Gili et al. (2006) view Balearic prehistory as a succession of periods of 'intense communication and exchange' and 'decided isolation', and link the late development of monumental construction to the islanders' 'conscious assessment of the internal situation in the face of external challenges, rather than the inevitable result of their geographic situation' (2006:830).

There have been attempts to explain island megalithism using biogeographical reasoning (Patton 1996), which have been revived in recent years (Kolb 2005), linking the phenomenon to an island's size, remoteness, and length of occupation ('establishment'). Given that such monuments are present on but a handful of islands and that, on close inspection, they are very different from one another, it is problematic to seek a unifying model to explain 'cultural insularity', a condition which resulted both from periods of internal reorganisation and introspection and periods focusing on establishing external connections. Biogeographical reasoning alone (especially the issue of physical isolation) fails to provide satisfactory explanations for the development of these cultures. The important issues of island identity highlighted here merit their own specialist study, which is beyond the scope of this book. However, an interesting aspect of this area of study is that these phenomena contributed to the process of place-making, which (as we saw in Chapter 3) can be considered a key component of colonisation. We should also investigate not just the genesis but also the demise of these conspicuous cultural phenomena, especially in relation to issues of abandonment, as we will see in Chapter 8.

CONCLUSIONS

Overall, it appears that biogeography has little predictive power in the Mediterranean, but it is still useful as an *exploratory* tool, illustratrating as it does the broad range of variation in colonisation trends. Although increasingly unfashionable, island biogeography can still explain colonisation trends in earlier periods, or up to the point when communities were sufficiently established to overcome geographical obstacles and secure survival through cultural ties. Variability in archaeological remains can represent distinct phases leading to permanent settlement (when substantiated by a long-term record), but also embody different activities or types of island colonisation. This seems a more viable approach in view of the problems inherent in tying archaeological remains (or lack thereof) to temporal phases. Different groups of people have been traditionally associated with specific types of activities, as hunter-gatherers, farmers, or traders, but several examples in the archaeological record show substantial overlap between these categories and the benefits of composite resource strategies (cf. different kinds of sedentism and mobility). These different types of colonisation require attention, particularly in terms of the conditions that may have stimulated their development. The study of visitation and settlement shows that these activities were carried out throughout different periods but with different outcomes and for different reasons. Ultimately, it appears more productive to study colonisation by comparing these 'types' across geographical areas and periods.

Island studies have been conducted at two levels, which are on parallel but separate tracks: while in some cases the models drawn from statistical analyses have tended to be too abstract, individual island histories have privileged the detail at the expense of the wider picture. The real depth of the similarities and anomalies highlighted by a statistical approach can be understood only by addressing them through detailed island histories and geographies, since locally contingent factors may be responsible for different/similar patterns. Comparing the results of archaeological surveys has enormous potential in this respect, since this 'side-by-side' approach can provide (in spite of certain difficulties) both a synchronous and a diachronic image of human land use and occupation (Alcock and Cherry 2004:4–5; Osborne 2004). More importantly, surveys can sometimes pick out subtle nuances that characterise different types of human activities on islands, highlighting the fact that settlement should not be favoured when studying colonisation or abandonment.

There is, therefore, a need to conduct island studies at several connected levels. A statistical approach has both strengths and weaknesses; we need to test any patterns we may see arising from the data against studies of real islands. Accepting that there can be different types of colonisation (each with its own prerequisites, aspirations, and outcomes) also provides us with a framework for studying abandonment more effectively. The two are clearly connected. Since abandonment data may illustrate what conditions resulted in the demise of island activities, they can also shed light on what may have prompted them in the first place. However, far from merely taking abandonment as a failed colonisation experiment, we should view it as part of an integral strategy for using landscapes. Between these two extremes lies an array of processes to be addressed, and this can be done all the more effectively if colonisation and abandonment are considered in parallel.

Chapter 7

Theories of Abandonment

Even more than colonisation, 'abandonment' defies a simple definition: absence of evidence is not necessarily evidence of absence. In some cases, discontinuity in the archaeological record may reflect actual abandonment; in others, it may result from preservation biases or lack of research. A common-sense characterisation of abandonment refers to the absence of people where previously they had existed. However, this is not as straightforward as it might seem at first sight. Abandonment entails not just leaving but also surrendering one's claims, giving up entirely, not anticipating a return. Synonyms for abandonment include 'deserting' and 'forsaking'. Some scholars propose to use alternative terms, such as 'episodic occupation' and 'depopulation', to avoid ambiguity (Cordell and McBrinn 2012). Identifying abandonment in the context of permanently settled communities should be less complicated than in the case of mobile populations. But even when site abandonment can be demonstrated, it does not necessarily equate to regional (in our case, island-wide) abandonment. For the earliest periods, we are often missing useful evidence, such as mortuary data and direct evidence for boats. The study of human remains could tell us if the initial colonists suffered from disease or from other forms of deprivation; similarly, boat remains could shed light on the dynamics of abandonment. Was it 'passive' (did people die out on the islands) or 'active' abandonment (did people leave in boats)? Clearly we cannot take the absence of mortuary data to indicate that everyone left the islands (whether willingly or not).

Researchers have developed a range of explanations for island abandonment; the basic ones are either non-cultural—environmental ('deterministic') causes—or cultural—that is, political, social, and economic ('agency-based') accounts. As this review will show, the most compelling explanations are multi-causal. Abandonment studies enjoyed their heyday in the 1970s and 1980s with the so-called New Archaeology, but there has been a distinct lack of theorisation since then. Island biogeography can explain why certain islands were more favourable for long-term settlement, but it cannot explain why some of these were abandoned. Therefore, we must cast

Mediterranean Voyages: The Archaeology of Island Colonisation and Abandonment, by Helen Dawson, pp. 180–208.

our net more widely if we are to understand the causes of abandonment. Culture-specific factors may be highly relevant to this discussion. Explanations may favour either long- or short-term processes, even though processes that appear to be acting on the short term may have long-term origins (e.g., 'catastrophe theory' and 'systems collapse': Renfrew 1978a; Thom 1975). Although studies of 'collapse', particularly of complex societies, are not directly applicable to the abandonment of early farming societies, some of the mechanisms they explore are worth pursuing. Knapp (1989) reviewed a series of collapse studies focusing on Mesopotamia (Yoffee 1979; Yoffee and Cowgill 1988), the Maya (Culbert 1988), Rome (Bowersock 1988), Han China (Hsu 1988), and South/Southeast Asia (Bronson 1988). He pointed out that the authors of these studies contended that 'no "civilization" ever collapses rapidly, or equally in all its subdivisions' (Yoffee 1988:18; Adams 1988:21), with the possible exception of collapse induced by natural disaster. Tainter (1988:198) also pointed out that societies collapse not because they cannot adapt to change, but because they select collapse as the most viable solution to adversities. In other words, Tainter argues that collapse is *adaptive*. It would certainly be interesting to explore some of these ideas in the context of the collapse of the Maltese Temple culture.

In previous chapters, we saw that Cyprus, Crete, the Aeolian Islands, the smaller Tyrrhenian islands, the Adriatic islands, and the Pitiussae Islands were all abandoned and, in a few cases, recolonised. The archaeological record of the smaller Tyrrhenian islands reveals multiple gaps, which, even taking into account problems with typology-based chronology and gaps in investigation coverage, indicate that island life was neither contiguous nor continuous. For Cyprus and Crete, it might be necessary to hypothesise three widely separated colonisation events during the early prehistoric period. As mentioned, Cherry saw this scenario on Cyprus as 'wholly unparalleled on any of the other large Mediterranean islands' (1990:157). On closer inspection, abandonment may be the norm rather than the exception, at least on many islands smaller than Cyprus and Crete. Bevan and Conolly's work on Antikythera (2013) describes the challenges in drawing detailed timelines for a single island, even when the island's entire extent is surveyed. These uncertainties arise from issues of sampling, visibility, and artefact diagnosticity. Notwithstanding these difficulties, they are able to provide a chronological model of the island's occupation history.

I have already hinted at the considerable challenges in defining abandonment. 'Abandonment creates a good mystery' (Nelson and Hegmon 2001:231). How, then, are we to study it? Given that island life was a punctuated process, it makes sense to study colonisation and abandonment as complementary processes. Indeed, colonisation usually involves abandonment at some level, even if just at the local household level, when communities fission and members of a community move away. But while a substantial body of studies deals explicitly with island colonisation, there is a distinct shortage of studies relating to abandonment, at least in the Mediterranean. The exception to this is Malta, where the demise of the island's distinctive megalithic temple culture provides a suitable 'mystery' and therefore has drawn the focus of much debate. Certain themes already discussed in relation to colonisation are also relevant to abandonment; we just need to shift the emphasis to what may have gone wrong. Discussions of human resilience, landscape learning, cultural perceptions of the environment, connectivity, and the ability to sustain demographically viable communities on islands are all relevant topics.

There are many possible reasons for the general lack of literature about abandonment. Those who attribute island colonisation to the spread of agriculture, for example, tend to assume that once people reached the islands (which is seen as the difficult part), they simply 'got on with it'. In this context, abandonment is generally viewed as a failed colonisation experiment.

A great deal of what we know about abandonment derives from ethnographic studies. Of course, there are problems with identifying meaningful parallels between prehistoric and historic societies (Broodbank 2000:363). This concern was expressed by Schiffer (1976) and Wobst (1978); both alerted us to the dangers of using ethnographic parallels to understand prehistoric cultural processes. Schiffer pointed out that 'the ethnographic literature used to explain abandonment consists of scattered observations: such information remains to be synthesized, systematized and tested' (1976:33), and Wobst (1978) cautioned us about the 'tyranny of the ethnographic record'. His point was followed by Bar-Yosef and Rocek (1998:2), who also warned against imposing the patterns drawn from ethnography on processes observed in the archaeological record. Nonetheless, it is argued here that, while they cannot provide close parallels, these studies provide a valid and possibly the only starting point for investigating abandonment in the Mediterranean. Using a cross-cultural analysis, Schwartz identified a 'pioneering' phase, a 'consolidation' phase, and a 'stabilization' phase in the development of 'the postmigration community' (1970:193), while Graves and Longacre observed, on the basis of ethnographic evidence, that migrant groups are usually composed of members of a community (mostly young couples) who have less access to resources, so that movement represents a reasonable alternative (1982:201). Historical and even present 'comings and goings' to islands may provide important clues to understanding the timing involved in the success or decline of island life, and the range of potential causes behind these, and may illustrate different kinds of human responses to these processes (see Sheets and Cooper 2012).

By drawing on abandonment models developed in other parts of the world (including the prehistoric Near East, the historic American Southwest, and the southern Pacific and Aleutian islands), this chapter aims to test the applicability of both environmental and sociocultural explanations of abandonment to Mediterranean islands. Throughout this discussion, major tasks will be to clarify the links between site abandonment and regional (island-wide) occupation patterns, to examine demography in terms of viable population thresholds, and to explore whether the abandonment of islands is in any way different from the abandonment of other types of environment. Even when individual sites were abandoned, how can we tell if the whole region was abandoned? How can we be sure that abandonment was island-wide? Indeed, at what scale should we focus our investigation: site, island, or archipelago?

A Review of Different Approaches to Abandonment

Several abandonment studies (not developed specifically with islands in mind) fall within the scope of the 'processual' (mainly behavioural) tradition. These deal primarily with issues of site formation processes and focus on the type of abandonment activities (was it sudden or gradual, was return anticipated or not). These approaches tend to view abandonment as a 'failure'. While also drawing on the behavioural tradition, another approach considers abandonment as 'a strategy for using landscapes' (Nelson 2000:52, 57). Both concepts should be kept in mind when considering island abandonment and will be reviewed in this chapter. A third approach, one that has received limited attention in archaeology, has to do with cultural perceptions of the environment and how these affect a community's threshold of resistance. This will be discussed in detail through island case-studies in the next chapter.

Abandonment as Failure

Schiffer (1976:30) defined abandonment as 'a type of cultural deposition process belonging to the S-A type'—that is, a kind of transformation from the Systemic ('in use'), to the Archaeological realm ('not in use'). S-A processes (or behaviours), he claimed, take place once sites are abandoned. He defined '*de facto* refuse' production as being the most important, consisting of material that, although still usable, is left behind when a site is abandoned. It provides an indication of what was being used but also of the conditions under which a site was abandoned, including such variables as availability of transport, distance to the nearest occupied site, and whether or not return was anticipated. 'Curate behaviour', on the other hand, is defined as the relocation of material from the old to the new site. Schiffer noted that curated objects tend to be 'portable, highly valued, and still usable' (1976:33). The archaeological record can be further modified by the scavenging of material left behind and the takeover of abandoned sites by different individuals (thus returning from the 'not in use' back to the 'in use') (Schiffer 1976:33).

Schiffer explains how S-A behaviours shed light on abandonment and its causes (e.g., LaMotta and Schiffer 1999:23) and are linked to 'events' (Graves and Longacre 1982). In a study originally reviewed by Cameron (1993:4), Stevenson (1982) systematically examined the effect of a set of variables (e.g., speed of abandonment and anticipation of return) on several sites within the context of the gold rush in the Yukon. He discovered that, in the case of sites that were left rapidly, some structures were abandoned while still under construction. By contrast, where abandonment was planned and return anticipated, artefacts might be hoarded or stored. These hypotheses rely on a set of least-effort expectations and are based on the assumption that the composition of abandoned sites is an accurate reflection of the processes that acted upon them: 'the patterned distribution of cultural items and features suggested that the site had a structure which might reflect aspects of the behaviour and organisation of the people who occupied it' (Longacre and Ayres 1968:151). This, however, is highly problematic (cf. Binford 1973): 'human behaviour is not always . . . packageable into type units' (Green and Perlman 1985:6). Pettegrew, for example, pointed out a problem with the interpretation of surface assemblages (a recurrent set of data on many Mediterranean islands) and the distinction between abandonment and waste assemblages (2001:205). This point was also raised by Murray (1980), in her cross-cultural study of mobile and sedentary societies (see Cameron 1999:4).

Schiffer subsequently explained the dangers of falling prey to a 'Pompeii Premise' in archaeology (1985), or the risk of treating 'housefloor assemblages at any site as if they were Pompeii-like systemic inventories' (1985:18). Allison pointed out that even Pompeii itself does not conform to the 'Pompeii Premise', since, far from representing a snapshot at the time of the eruption, the city underwent hoarding, looting, and social disorder in the aftermath (1992:49, 56). Kent (1993) introduced important cultural variables, observing that the nature of the objects found at a site has more to do with the length of time people plan to stay than with how long they actually stay (this is also relevant to colonisation). This is because people who anticipate short-lived occupation tend to have fewer, smaller, and less durable belongings than people who plan to stay for longer (Kent 1993:66). These issues are explored further below.

In fact, abandonment behaviours can be contrary to strictly functionalist expectations, and abandonment assemblages can be misleading. LaMotta and Schiffer's (1999) discussion of 'ritual formation processes' in the American Southwest and North America is a case in point: in the ritual processes they studied, houses and possessions (including valuables) were destroyed upon the death of their owners, leaving a record different from the one that would have obtained during the life of their owners. Tomka and Stevenson (1993) identified a similar case. In their study of contemporary hunting societies in the Northern Hemisphere, they noted that resource stress often leads to social tension in the domestic sphere between the sexes, and that this 'resource-induced gender stress' appears linked to male mobility. As a result, the material assemblage of an abandoned household (accumulated during the later periods of its occupation) would reflect this gender stress, rather than typical gender relations. LaMotta and Schiffer concluded that there is no necessary 'one-to-one relationship' between objects found in a structure and prehistoric activities that took place there, and that the archaeological record should be viewed as a 'palimpsest of deposits related to different phases of that structure's life history' (1999:21).

Initial studies of abandonment focused on individual households. Where possible, experiments were carried out and the former occupants subsequently interviewed to verify the accuracy of the hypotheses (Lange and Rydberg 1972:432). These studies provided 'cautionary tales in which the disparities between archaeological interpretations and systemic reality were demonstrated' (Cameron 1993:4).

Indeed, these initial studies may have been primarily concerned with reconstructing behavioural processes taking place inside individual households and in their surroundings, but, more importantly, they questioned the actual causes of abandonment. This was achieved most effectively by broadening the scale of enquiry from the household to the regional scale.

Eidt (1984:5) argued in favour of viewing the landscape at different levels and concluded that 'when depredation of the landscape reaches a threshold beyond which there is no adequate repair, then parts of settlements, later whole settlements, and ultimately settlement networks may fail'. Graves and Longacre (1982) investigated the abandonment of small and dispersed 'pueblos' and the processes leading to their replacement by large nucleated pueblos on a regional scale (the Grasshopper region of east-central Arizona shortly after AD 1300). Grasshopper was interpreted as representing 'the collapse of an entire system of interdependent communities, a trend of regional depopulation, where distance prevented transport of large replaceable goods, which were simply left behind' (Graves and Longacre 1982:201). Initially, increased agricultural productivity and the development of a far-reaching exchange network led to nucleation in the region. This was a convenient solution for isolated settlements, since by coming together, people could benefit from mutual help (Eidt 1984:14–7). The Grasshopper network was initially successful, but in the long term, intensified agricultural production was not maintained through technological improvements, and increased social complexity was not supported by necessary changes in the sociopolitical sphere, so that the whole system became vulnerable even to short-term variations and was ultimately abandoned (Graves and Longacre 1982:201). Graves and Longacre used this argument to reject a monocausal explanation of abandonment of this area (climate change).

Abandonment as Strategy

Nelson has claimed that 'abandonment is a process, not an event . . . an aspect of ongoing social change and reorganisation' (2000:55). Although it is tempting to explain abandonment as an instinctive response to a crisis, there are several cases that challenge this model. With the exception of extreme natural disasters, 'societies adjust to environmental changes with little difficulty, as flexibility is built into adaptation' (Sheets and Cooper 2012:1). These approaches view abandonment as a form of 'successful mitigation'.

The work by Nelson and Hegmon (2001) has demonstrated that population movement (resulting in the abandonment of certain sites) was an effective strategy used by farmers to maintain their presence in the arid landscapes of the North American Southwest in the mid-twelfth century AD. Following the abandonment of the larger villages, which could no longer be sustained, the Mimbres people did not leave their region altogether but favoured a more dispersed settlement pattern clustering in smaller farmsteads. Continuity of regional occupation in the context of localised abandonment showed 'considerable social and economic flexibility' by those involved (Nelson and Hegmon 2001:230). Abandonment in this case was a strategy, as opposed to a failure. Nelson and Hegmon (2001) noted that 'sites no longer used as residences are by no means "abandoned" as important places' (2001:214). As we will see in the following chapter, this argument seems applicable to the island of Malta, given the evidence that the Maltese temples continued to be used (and were perhaps squatted) after their 'abandonment'. A culture does not come to an end simply because people leave, though movement entails cultural adaptation (cf. Nelson and Hegmon 2001:231). Graves and Longacre also pointed out that 'the process of abandonment may involve a number of complexly related events including *movement* by individuals, households, and larger social groups, and *changes* in birth and death rates; these processes may act differentially upon groups that comprise a community' (1982:201, emphasis added). If we are to understand abandonment correctly, we must have a good grasp of the events acting within or upon a community and its surroundings. As we will see in Chapter 8, this scenario provides an attractive model to explain the abandonment of individual islands within an archipelago (for example, the supposed widespread abandonment in the Cyclades, around 2200–1900 BC).

This particular approach to abandonment also offers a critique of processual studies and their emphasis on environmental models. Cameron (1993:3) pointed out that abandonment has been generally interpreted with the 'disaster movie mind set, either in terms of regional exodus or rapid abandonment caused by natural catastrophes'. However, human history is more complex than a simplistic succession of 'don't worry, be happy' and 'run for your life' periods (Schlanger and Wilhusen 1993: 90). Fish and Fish (1993:108) noted that abandonment in the Tucson Basin took place at a time when nucleation introduced new alternatives for organisational and productive expansion (Classic period). Indeed, abandonment can be seen as much as 'a strategy for using landscapes, guided by the availability and perception of alternatives, as the failure of a particular structure or adaptation' (Nelson 2000:52, 57). Abandonment processes span these two extremes.

Horne (1993) made a useful distinction between 'occupational' and 'locational' instability. Occupational stability is a temporal concept and relates to how long people stay in the same place without interruption. Locational stability, on the other hand, is a spatial concept and refers to the degree to which people tend to settle in the same type of place (e.g., around water sources). Thus, 'an occupationally unstable area may present a shifting scene of people and activities against a backdrop of continuity of location' (Horne 1993:43). Does an occupationally unstable area qualify for abandonment? In other words, does it make sense to discuss abandonment in the context of highly mobile societies, as in the case of roaming hunter-gatherers displaying a preference for island territories? Papers by Tomka (1993) and Graham (1993) explored the composition of sites 'abandoned' by groups who rotate among a series of settlements throughout the year. Cameron has pointed out that 'settlement abandonment is "built into" the land-use patterns of many subsistence systems', both mobile and sedentary (1993:5).

A regional study conducted in the Famorca, Alacant Province (Spain), by Creighton and Segui (1998), concluded that that the abandonment of small seasonal pastoral sites in recent times was the product of broad changes in landscape exploitation. This study therefore also pursues the idea of abandonment as a strategy but draws on Schiffer's approach in order to analyse the archaeological evidence. Changes in landscape use, which had led to the decline of traditional herding systems, could be traced back to the early 1900s and were investigated at both the inter- and intra-site levels (or at the level of the wider landscape, individual structures, and portable material culture) (1998:49). Creighton and Segui distinguished between patterns and processes of abandonment, and noted that focusing on the latter emphasises usefully the 'stratigraphy' of abandonment or the diachronic distribution patterns of material remains (1998:33). Their study observed that several pastoral structures in the region were on the 'threshold' of the 'systemic' and 'archaeological' contexts defined by Schiffer (1972; 1976), and that their abandonment and reuse embodied a 'perpetual, to some extent cyclical, aspect of agro-pastoral land-management' (Creighton and Segui 1998:42).

Not surprisingly, abandonment studies have been shaped by developments within archaeology itself. Approaches have changed from viewing abandonment as an event (usually a catastrophe) to treating it as a category transcending cultural boundaries, or as a process, generally in response to factors acting on the long-term or regional scale. For a while, abandonment in the latter two senses became a 'hot topic' of the New Archaeology. Of course, abandonment sometimes does arise from catastrophic events. The cataclysmic eruption of Thera (ca. 1650 BC) was so devastating that, although the population was able to flee, it prompted the abandonment of the island for some eight centuries (McCoy and Heiken 2000). Yet this extreme case is not representative of island abandonment overall, and this book is not concerned with such cases. Rather, the focus here is on abandonment as an integral part of colonisation processes. The role of culture-specific variables in determining abandonment has only recently been recognised and will be discussed further in the next chapter.

Once we identify abandonment, we raise a whole suite of questions. For example, is the abandonment in question permanent or temporary? Seasonal occupation necessarily entails periodic abandonment, which differs from permanent abandonment because people expect to return, which has social implications. Graham refers to this as 'punctuated abandonment' (1993:31). As discussed in previous chapters, Mesolithic settlement patterns could be place-focused, while Neolithic people were often mobile. 'The fact is that *all* societies have a mobility component; the issue is what the form of that mobility is, not whether it exists. Thus analysis of mobility is . . . a critical variable in the study of any society' (Bar-Yosef and Rocek 1998:1, emphasis in original). Abandonment is a recurrent feature in human social history: even 'the Greek house in both town and country was portable . . . [it] was never a fully settled unit, but moved in accordance with political, economic, and social phenomena' (Pettegrew 2001:197–9; see also Gallant 1991). Kent (1993) proposed that we need separate models of abandonment behaviours for nomadic, semi-sedentary, and sedentary groups. The underlying element common to all such strategies is movement. Ideologically, movement is a cultural choice, which can be implemented in reaction or anticipation of different types of events (e.g., Anthony 1997; Burmeister 2000; Barkan and Shelton 1998).

How can these general theories of abandonment be adapted to our discussion of islands? Different potential avenues are explored in the next section, where approaches devised for islands across the world are discussed in relation to the Mediterranean, and conclusions are drawn both on general theories of abandonment and of island abandonment specifically.

UNDERSTANDING ISLAND ABANDONMENT

Does island abandonment differ from other forms of regional abandonment? Evidently, island abandonment entails maritime crossing; but are there other features specific to islands that make their abandonment different from that of other landforms? A number of abandonment theories have been developed for the islands in the Pacific and elsewhere, so that it is possible to assess their degree of applicability to the Mediterranean islands. Several studies on the Pacific islands have dismissed the idea that isolation was a crucial problem of island cultural development in that region. Anderson (2001) has pointed out that spatial isolation (unless extreme) was not an obstacle per se to colonisation in the Pacific, but rather a feature of the environment that could be overcome. Isolation is a relative concept, and 'community isolation' had more serious consequences and could result in abandonment (Anderson 2001).

Various explanations have been put forward for the prehistoric abandonment of the Pacific 'mystery islands', which, although previously inhabited, were found empty upon European arrival (Diamond 1985; Terrell 1986; Kirch 1988; Irwin 1992; Weisler 1996). These range from environmental catastrophe to social deprivation, and Anderson (2001) has suggested that each island represents a distinct case. At the same time, he noted that some factors may have had a broader relevance, particularly differences in availability of marine resources, which act as a buffer (Anderson 2001:14). It is on this broad spectrum of elements (environmental and cultural) that we should focus in order to understand why islands were abandoned. It is worth exploring why such elements were singled out in the Pacific or elsewhere, while bearing in mind that these may have to do with local dynamics. In the Pacific islands, most studies focus on environmental factors, such as island size, altitude, rainfall, soil type, water sources, and marine resources, as well as exceptional climatic events.

There remain considerable difficulties in identifying abandonment, even when gaps in the evidence appear to support such a scenario. For example, the recent review of the available evidence from the Balearic Islands (Alcover 2008; see Chapter 4) has led to the acceptance of a later colonisation horizon than previously believed (as opposed to abandonment following earlier colonisation). Alcover has rejected the idea that 'Mallorca and Menorca could have been 'mystery islands'—that is, that

Chalcolithic people had been preceded by earlier colonisers in the Middle or Late Neolithic who had eventually abandoned the islands (2008:57). Although the Balearics are often regarded as the most isolated islands in the Mediterranean, Alcover claims that 'none of the characteristics shared by the Pacific "mystery islands" (small size, remoteness, absence of areas suitable for horticulture) is relevant for the Balearic Islands' (2008:57). On the other hand, islands such as Pantelleria and Lampedusa are potential mystery islands in the Mediterranean, since there is evidence that they were either visited or settled, abandoned, and subsequently recolonised.

As noted earlier, there is a tendency in the literature to interpret abandonment as a settlement failure, usually in response to ecological stress, whether induced by climatic change or human action (see Bintliff 2002). However, human impact on island environments is being reevaluated, in particular on small islands (those usually considered the most vulnerable), where activities such as farming were carried out on a small scale and are unlikely to have caused much environmental damage (Butzer 1982; Robb and Van Hove 2003:251, Phoca-Cosmetatou 2011). Approaches based on ecological explanations must be investigated; however, a multi-causal explanation is generally preferable.

Several abandonment studies base their explanations on 'push' and 'pull' factors (Anthony 1997), such as the difficulties encountered at home and the attraction of mainlands or bigger islands. The pull of the mainland could have been a powerful reason for people to leave islands. 'There is always a mainland' (Renfrew 2004:283); humans tend to mentally and physically scan their surroundings and identify 'mainlands' at different scales, be they real, another large island, or another land that satisfies some criteria desired at the time. However, with few exceptions, push and pull factors are still framed in biogeographical rather than cultural terms. In their study of the American Southwest, Cordell and McBrinn (2012:229–42) listed different push and pull factors, including cultural elements. Push factors included warfare, factionalism (within villages), disease, and environmental factors (drought and cold weather); pull factors, water (precipitation, irrigation), social relationships (moving to places where people have existing links), and the attraction of larger settlements. Bowdler's (1995) work on the colonisation of the Australian islands also put forward some hypotheses regarding their abandonment, characterised by a combination of environmental and cultural factors. Bowdler discussed the 'phenomenon of islands becoming islands' and linked the initial abandonment of the islands to their insularisation at the end of the Pleistocene (1995:945). Rising sea levels meant that coastal mainland territories became islands and that people found themselves stranded there (cf. Broodbank's [1999a] 'dry-shod' colonisation). Increased isolation and pressure on resources may have caused people to either move away or die out (because of a loss of maritime skills) (Bowdler 1995:945).

Bowdler (1995) also considered recolonisation and subsequent abandonment on some of the islands. Certain Australian islands were not occupied or visited by Aborigines at the time of European contact (e.g., Kangaroo Island), but others were.

Among the latter, Tasmania has been occupied continuously since ca. 35,000 BP; while others, such as Hunter Island (northeast of the Tasmanian coast), evidently had a punctuated settlement history: the island was occupied during the Pleistocene and then abandoned, only to be reoccupied ca. 6000 BP, reabandoned ca. 4000 BP, and then reoccupied or visited from ca. 2500 BP (Bowdler 1995:950). Bruny Island, off Tasmania's eastern coast and slightly easier to access than Hunter Island, followed a similar occupational trajectory, although Bowdler points out that these parallels may be purely coincidental and that there is a general lack of patterning. In both cases, however, Bowdler explained initial abandonment by insularisation, and subsequent abandonment by cultural and environmental factors: increased physical isolation from the mainland (and Tasmania), the 'abandonment' of watercraft technology, and decreased reliance on marine resources (1995:954–6). More islands appear to have been brought into use from ca. 3000 BP and again from 1000 BP, when maritime skills appear to have been 'rediscovered' and intensified (Bowdler 1995:955).

Cherry claimed that islands are 'fragile environments' (1981:59). However, there are several examples (past and present) which show that island communities were able to cope with environmental fragility. The prehistoric inhabitants of the Aleutian Islands are a case in point. The islands, which stretch northward for 1,600 km beyond the Alaska peninsula, separating the Bering Sea from the North Pacific Ocean, are among 'the most isolated islands in the world' (McCartney and Veltre 1999:507). They comprise a group of about 100 islands, which, despite their lack of any large terrestrial fauna, have been occupied for at least the last 8,000 years. Aleuts rely on a wholly marine diet in extreme environmental conditions, including 'extreme isolation, volcanic eruptions, seismic activity, tsunamis, frequent storms, rough seas, gale-force winds, frequent fog and precipitation' (McCartney and Veltre 1999: 507). Despite all this, some 12,000 to 15,000 people inhabited the islands during late prehistoric times (McCartney and Veltre 1999:503). This was made possible by a complex strategy for coping with the harsh environment. The rich coastal environment led to the 'development of large coastal sites, semi-subterranean houses, tailored warm and waterproof clothing, sophisticated skin boats, utilisation of a broad set of marine foods and raw materials, food storage, fuel for heating and cooking, and refuge islets or rocks for protection against raids' (McCartney and Veltre 1999:503). McCartney and Veltre also point out that because the archipelago is 1,600 km long, even if one or more villages were abandoned, settlement continued elsewhere along the island chain, thus ensuring overall community survival (1999:512). Similarly, in his study of hunter-gatherer settlements in the Kuril Islands (northeast Asia), Fitzhugh concluded that their vulnerability was more social than environmental. Their weakness stemmed from their social interdependence with the outside world and from outside competition for acquisition of their resources (2012:36).

Vernicos (1987) identified three 'fragilities' corresponding to three subsystems within the insular system: ecological, economic, and social. These were explored for historic societies within a world-system context, with islands viewed as vulnerable because of their 'openness'. In contrast, in prehistory, the very 'openness' of islands may have had a positive effect. The three fragilities provide us with parallel avenues for the discussion of prehistoric abandonment, although in the present discussion of prehistoric abandonment, the three factors considered will be ecological, demographic, and cultural.

The Ecological Factor

The scale of modern human damage to the environment is a current debate of considerable concern, but it is unclear to what extent prehistoric populations affected their environment. Simmons (2011:65) suggests that the first inhabitants of Cyprus had a considerable impact on the island's ecology and were directly responsible for the demise of the pygmy hippos, which ultimately may have led to the island's abandonment; this argument has been met with considerable criticism (Binford 2000). In the Cyclades, did 'well-established' Neolithic colonists deplete the islands' resources to the point that it was necessary to abandon sites or even whole islands? Phoca-Cosmetatou (2011:91) argues this was not the case. The evidence she reviewed suggests few changes in the economy and herding strategies of the Neolithic inhabitants of Phtelia on Mykonos over a period of some 300 years. She suggests that their existence was 'stable' for as long as they lived there, indicating that adaptation to the island's environment took place fairly rapidly at the time of the initial settlement, rather than being an ongoing process. She points out that it is hard to assess whether this cultural conservatism or 'unwillingness to change' was responsible for the decline of the settlement.

Butzer has claimed that 'the history of land use and landscape ecology in the Mediterranean basin was a checkered one, with punctuated changes, long intervals of stability, and shorter episodes of mismanagement, periodically interrupted by ecological recovery' (1996:145). Bintliff (2002) has reviewed approaches to the causes and effects of Holocene erosion and alluviation in the lands around the Mediterranean. He noted that, while overall detailed regional studies seem to support Vita-Finzi's (1969) punctuated-equilibrium perspective, they also indicate the need to modify its chronology on the local scale (2002:418). Vita-Finzi (1969) viewed erosion as being rather limited, in spite of intense settlement and use, and restricted to two periods, the Older Fill (during the Last Glacial Maximum) and the Younger Fill (in late Roman times and the Middle Ages). Bintliff, however, identified additional erosional phases, such as in Greece during the Early Bronze Age (which he linked to the spread of farming sites) and in the late Classical to early Hellenistic periods (which he linked to higher population densities) (2002:418–9). He suggested that phases of erosion and alluviation on the island of Melos (Renfrew and Wagstaff 1982), in eastern Attica (Paepe et al. 1980), and in the Argolid (Pope and Van Andel 1984; Jameson et al. 1994) were also linked to periods of prosperity and decline in human occupation (Bintliff 2002:419). Van Andel et al. (1986) also explained that while the Older Fill had been caused mainly by a climatic event, human action was likely responsible for later erosion events.

Wood clearance resulting from rapid settlement expansion would cause soil erosion and stream alluviation; and if a heavily populated countryside area were abandoned, lack of terrace maintenance would cause slopes to collapse (Bintliff 2002:419).

Bintliff, however, also pointed out some important exceptions to these explanations: lack of erosion was explained by good soil management practices in the highly populated Late Bronze Age, and by rapid reforestation of abandoned land during the post-Mycenaean Dark Ages, when population levels dropped dramatically (2002:419). Van Andel et al. (1990) linked major sedimentary series to a parallel set of human actions on Thessaly's landscape. Bintliff, however, mentions that further studies in the Thessalian plain seem to confirm that erosion there started before the founding of the first farming settlements. This indicates that soil changes tend to have remote underlying causes, and that investigation should not stop at the first possible cause, if such processes are to be understood fully and correctly (cf. Ballais 1991; 1992; 1995).

Anderson raised the question as to whether human-induced changes in the landscape (e.g., irreversible deforestation) could be linked to differences in settlement history among Remote Oceanic islands. Most of these were inhabited continuously, but settlement is thought to have declined or disappeared on several islands in East Polynesia, where only the larger high islands were continuously inhabited. This, however, could not be related to anthropogenic changes, which, according to Anderson, can be regarded as normal, or 'constants of the settlement process' (2002: 375). In his view, human-induced changes to the landscape, and even mismanagement, would have only a limited impact on the islands overall. He claims instead that late Holocene climatic patterns, ecological complexity, and isolation may have been more influential variables. Several Polynesian islands were very isolated but continuously occupied up to the present (e.g., Niue and the Chatham Islands). Occupation has continued to the present on Easter Island, which suffered the same level of degradation as Pitcairn (where abandonment has been linked to soil erosion). In addition, pollen analysis shows that some abandoned islands, such as Raoul, Norfolk, and Henderson, were never severely deforested in the prehistoric era (Flenley 1993; Anderson 1997).

In the Pacific, access to non-marine faunal resources does not appear to be a significant factor either, since settlement was continuous on islands that had only one domestic species or none at all, even after entire bird colonies were killed (Anderson 2001:16–7). Anderson argues that the main differences between islands that were inhabited constantly and those that were abandoned lie in their coastal morphology: four abandoned islands (Henderson, Pitcairn, Raoul, and Norfolk) have a narrow fringing coral reef or subtidal coral, and thus lack several marine species of inshore fish which are coral-dependent. This is in contrast to continuously occupied islands that have better conditions for fishing and shellfish collecting. Although agriculture offered a buffer against failure on all of the islands, Anderson believes that reliance on crops rendered the populations even more vulnerable to drought and hurricanes, since naturally occurring resources were being depleted, especially on small islands (2001:22).

Ultimately, views differ greatly on how humans impacted their environment. Some argue that humans were 'mismanaging' the environment by actively depleting resources (e.g., Köhler-Rollefson and Rollefson 1990; Bahn and Flenley 1992), and others that they were ultimately 'improving' it (e.g., Spriggs 1985; Anderson 2002). Clearly, the solution to this issue must remain context-specific. Köhler-Rollefson and Rollefson (1990) claimed that substantial ecological damage could occur over fairly brief periods; they cite very small groups of southern Levantine Neolithic people who induced the abandonment of their settlements by the end of the seventh millennium by practising excessive deforestation (which led to erosion and decline in soil fertility) (Rollefson and Köhler-Rollefson 1989). In a similar vein, Waldren (2002) argued that human mismanagement of resources was largely responsible for the demise of settlement at So'n Olesa on the island of Mallorca. There was evidence for good water management at this site, in the form of an effective hydraulic system (reservoir, channel, and catch basin), indicating that lack of water (or at least water mismanagement) was not a factor in the abandonment of this settlement (Waldren 2002:306–7). Instead, Waldren suggested that the initial group of settlers (12 to 16 individuals) began a process of severe soil erosion by slashing and burning the *Quercus* oak forest, and that by 1300 BC, soil loss was such that the area had to be abandoned (2002:305). In this model, anthropogenic change is seen as causing severe damage and ultimately the abandonment of the area.

Butzer claimed that 'prior environmental experience cannot be transplanted onto new ecologies without initial damage' (1996:146), but also that it is unclear whether such initial damage, similar to that described by Waldren (2002), can be related to local abandonment and settlement dispersal into new areas (also Butzer 1990). Nonetheless, Butzer observed that settlement surveys in some regions had picked on areas of very low archaeological visibility during the Early Neolithic/Early Bronze Age period, which could represent instances of 'real abandonment' lasting roughly 500 to 1,000 years (1996:146). In spite of localised episodes of abandonment, initial damage may have been followed by a general enhancement of the environment. Similarly, Anderson has highlighted the need to view episodes of 'ecodisaster' against the long-term 'ecotriumph' of the human colonisation of Polynesia (2002:376). He concluded that, without such initial damage, it would have been impossible for people to inhabit Remote Oceania. Rainbird (2002) indicated that, in the Pacific region, there is environmental evidence (Spriggs 1985:429) that humans were enhancing rather than degrading the environment: in some cases, the islands were physically 'extended' by the intentional creation of artificial platforms and islets, by controlling coastal progradation, and by valley infilling (e.g., at the site of Nan Madol) (Rainbird 2002:445). In the Aegean, the introduction of slope terracing can be considered another form of human enhancement of the environment (Frederick and Krahtopoulou 2000).

The studies reviewed so far raise two important issues: one relates to the nature of climate and ecological processes (and their potential causes), the other to their time scales. Broodbank (2000), for example, raised the question as to whether long-term medium to poor conditions were more or less detrimental to human survival than sudden disasters (e.g., hurricanes or severe droughts). The answer has to do with the sorts of strategies that people implement. Butzer suggested that the overall longevity of human occupation around the Mediterranean basin was partly the result of the efficiency of the basic Mediterranean agricultural system, which relied on 'risk-minimisation by a sequence of activities' (1996:145). Another successful strategy involved seasonal transhumance between lowlands and adjacent highlands. This would not have been practical in many small islands (which lacked the highlands); however, Broodbank has pointed out that the movement of flocks to Mediterranean islands during the summer is known from ethnographic evidence (2000:127). According to Butzer, transhumance both complemented agriculture and provided a long-term way of using marginal lands, and in some cases played a role in the resettlement of abandoned areas (1996:143).

Other researchers have followed up this point. Robb and Van Hove argue that most Neolithic communities had a variety of subsistence strategies at their disposal, and that elements of choice were partly responsible in shaping Neolithic land use (2003:251). They claim that 'acceptable levels of landscape occupation' may have been determined by a 'feeling of crowding', and that land use was a 'social and cultural decision, not a simple response to need' (2003:251). Mannino and Thomas (2002) have also emphasised the advantages of a mixed economy. They suggest that, in many cases, human settlement and subsistence in coastal environments would have been preferable to more fully terrestrial environments and economies (2002: 452). They also tie human mobility in coastal environments (partly linked to shellfish exploitation) to the colonisation of new territories, which were likely to be reached through coastal and riverine courses (Mannino and Thomas 2002:468).

The review so far indicates that an approach that is environmentally deterministic is inadequate. Bahn and Flenley's study of Easter Island (Rapa Nui), in which excessive deforestation is the key element, succumbs to this tendency (1992) (see Hunter-Anderson 1998 and Hunt and Lipo 2009 for alternative views), although, in view of its extreme isolation, Easter Island may indeed be the exception. Weisler, on the other hand, interpreted the abandonment of the isolated island of Henderson, after it had been occupied continuously for 600 years, as the result of multiple factors, but particularly caused by the non-reciprocal nature of the relations between outlier islands, with some islands more reliant on others for survival (1995:380). Weisler claims that sustained human occupation of the marginal islands required regular contact with islands that had more resources (also for human reproduction) (1995:380). In spite of its geographic isolation, throughout its prehistory, the Pitcairn group (which includes Henderson) was part of a larger interaction sphere that included Mangareva (ca. 400 km to the west). Events on Mangareva caused these contacts to cease (after AD 1450), and soon the few Henderson inhabitants suffered the effects of isolation, including inbreeding and disease (Weisler 1995:402).

In the case discussed, geographic isolation was not an immediate cause of the island's abandonment, although anthropogenic damage on Mangareva (depleted resource base, massive deforestation, and erosion) is singled out as causing the demise of ocean-going voyages (Weisler 1995:402). According to Anderson, cultural rather than geographical factors of isolation were prominent in the abandonment of certain Pacific islands, even if physical isolation is likely to have induced social pressures to abandon very isolated islands, especially once the easily accessible resources were severely depleted (2002:385).

It seems safe to say that only extreme geographical characteristics had a major impact on the settlement history of the Pacific islands (very small, low, or distant islands were either abandoned or never colonised). Such extreme geographical characteristics are an exception in the Mediterranean; however, their relative effect could be significant in that setting and will be assessed in the following chapter. Cruz et al. classified islands into 'dominantly emigrant islands' and 'dominantly immigrant islands' (1987). King and Kolodny singled out Corsica as being the only large Mediterranean island whose demographic history is one of long-term decline, more in line with that of the smaller islands in the Mediterranean, such as the Dalmatian islands or the Cyclades (2001:248). In the Pacific islands, humans managed to manipulate resources effectively and as long as possible, in some cases sustaining populations against all odds. The next section focuses on this ability, dealing with both expected and observed demographic development in both mainland and island contexts. The following section also foregrounds the discussion of culture-specific elements, such as perceptions of the landscape and of sustainable populations.

The Demographic Factor

To what degree are fluctuations in the size and composition of human island populations related to abandonment? Demographic studies 'provide numerical answers', making them very enticing to archaeologists (Black 1978:73). However, before we can model island demography appropriately, we must first understand some of the mechanisms underlying demographic estimations, as well as how island–human networks operated in prehistory. With respect to the latter, we may even think of people as a 'scarce resource', a definition offered by Broodbank (2000:88) in the context of the Early Bronze Age Cyclades but which, as this section will demonstrate, holds a broader relevance to islands in general. Cruz et al. argue that, in history, 'population is related to economic, social, geographic, and other opportunities, whose variability is responsible for the "zig-zag" pattern of demography' (1987:110). Paine, on the other hand, questions whether population growth should be viewed as 'an independent, constant process that promotes culture change . . . or a dependent variable controlled by available resources' (1997:1–2). The important question to ask, in my view, is whether or not population fluctuations, which can be considered a constant feature of human development, had any effect on cultural processes, overall and/or locally.

To address this question, let us first look at the mechanisms that regulate population fluctuations. In the case of islands, maximum carrying capacity needs careful consideration, and we also require an estimate of island minimum populations and how these may have evolved. A dwindling population will either die out or develop an alternative strategy to ensure its survival. If population numbers are growing out of proportion (actual or perceived), a different set of social mechanisms affecting reproduction (e.g., marriage rules, birth control practices) may be adopted by a community, affecting its composition in the long run. If this fails, a group of people might decide to move to another island or return to the mainland. Different circumstances will lead to different survival strategies, in turn creating a new set of circumstances. In this respect, although intuitively both very small and very large population numbers may be considered to cause abandonment, this is not always the case. Therefore, population numbers should not be taken at face value and out of context, since several other factors will certainly be in play. King and Kolodny (2001:245) pointed out that island demography is complicated by internal and external interactions, such as fertility, mortality, migrations, famine, epidemics, piracy, wars, storms, eruptions, earthquakes, and so on.

'Social networks are easier to maintain when population densities are higher and settlements are closer together' (Fitzhugh 2012:33). Consequently, 'any isolated or local population runs a finite risk of extinction' (Diamond 1977:256). That is, island human populations, especially if small and extremely isolated, are more vulnerable to random variations and eventually to extinction (e.g., all offspring of the same sex, or total death of members of one sex). Diamond also pointed out that extinction depends on the 'frequency and magnitude of population crashes', and that population turnover tends to be more rapid on small islands (where extinction rates are high) (1977:257). In the Mediterranean, Broodbank and Strasser (1991:241) note that the mean size of the islands is larger than 10 sq km in area, below which extinction risk is considered to be greater (Keegan and Diamond 1987:65). In addition, lack of isolation also puts this explanation in question (Broodbank and Strasser 1991: 238). Diamond identified two strategies used by animals to offset extinction: 'prevention and reversal through recolonisation'. Old colonists favour stable or extensive habitats where extinction is unlikely to occur (prevention). Expanding colonists, which have high dispersal rates, tend to occupy small and unstable habitats, 'recolonising as extinctions occur' (1977:257).

It is not hard to see how human colonisers may have developed similar strategies, although in the case of 'social species', different elements come into play. For example, 'the mechanism of local extinction may not be the death of the last individual but instead a conscious abandonment of a territory when the territory or the population is perceived as too small' (Diamond 1977:257). Teitelbaum and Winter (1985) make a similar distinction between objective and subjective population decline: 'population decline may range from an objective decline in the aggregate size of a population, in growth and fertility, to a decline in the desired or expected family size, in certain age groups or cohorts' (e.g., young to old people ratio) (1985:11). They also defined population decline in terms of a drop in attributes associated with a growing population (such as innovation, mobility, risk-taking, and optimism) (cf. Diamond's 'expanding colonists'), as opposed to those associated with an ageing population (such as conservatism, immobility, risk-aversion, and pessimism) (cf. Diamond's 'old colonists') (1985:11). Demographic studies should thus take into account ethnographic evidence, since this is likely to shed light on culture-specific relationships between community perception of stability and actual population size. These issues are discussed further in the following section on cultural factors.

A brief overview of some classic demographic studies illustrates the difficulties encountered by palaeodemographers, which are due to the wide range of variables that need attention. Morgan (1974) calculated that, under closed conditions and with no incest prohibition, large founding populations (n = 200) survive almost twice as long as small ones (n = 100). Cultural aspects, however, make calculating minimum population sizes, or population growth (in terms of time required to achieve a certain size), harder, particularly for prehistoric populations. Risk of extinction, for example, seems to be more related to high mortality and high fertility levels than to the opposite (Morgan 1974), and to be increased by certain cultural variables (e.g., incest prohibition and monogamy) only with decreasing size of the founding groups (McArthur et al. 1976:314). Zubrow's (1975) model has four components: a 'population growth function', a 'population resource check' (which matches population growth to resource availability), a 'settlement locator' (which determines where a new settlement will exist), and a 'longevity function' (which takes into account reasons other than resources). Black's study considered the child dependency ratio, the juvenile/adult ratio, and divergence from stable population (comparing observed and expected age distributions in a stable population) (1978:70). Black calculated these indices for the communities of the Pacific outlier islands, and his results suggested that local extinction there would be a rare event, since population could be replenished (1978:70).

Teitelbaum and Winter (1985:3–4) considered the combined impacts of births, deaths, immigration, and outmigration, and concluded that discussions of population trends should be based not just on fertility decline but also on mortality trends and net immigration (1985:5). Williamson and Sabath (1984) explained demographic extinction by fluctuations in age structure and sex ratio. While fluctuations are normal, they tend to affect fertility levels more as population size decreases (1984:23). At the same time, other factors (especially social ties) have an effect: in the case of shortage of resources, extinction probability can be lowered by contact, by abandonment of islands that lack resources, and by migration. These interactions, however, can reduce extinction probabilities only if the source and target populations have access to different resources, as well as different age and sex structures (Williamson and Sabath 1984:23).

Prehistoric Demography

Studies of prehistoric demography have focused on two general bodies of data: evidence from human skeletons and studies of prehistoric settlements. Dumond (1997) claims that, although skeletons provide a good indication of fertility, population growth is mainly affected by mortality and migration and that, accordingly, cemetery studies and regional settlement studies must be combined (e.g., Belfer-Cohen et al. 1991). Settlement studies have attempted to identify cross-cultural patterns in ratios of 'population to roofed-over space' (Naroll 1962) or 'floor space *per capita*' (Longacre 1976). However, Paine points out that such ratios are highly culture-specific and should thus be estimated through ethnographic analogy (1997:5). In dealing with settlements, we are also confronted with the problem of establishing contemporaneity. In his study of the Cyclades, Broodbank mentions that 'even the most general trends probably did not operate synchronously or at the same rate throughout the islands' (2000:88). Archaeologists are often forced to rely on ceramic phasing for establishing chronology, but Paine cautions that 'such phases may exceed the life of the structures . . . used to estimate demographic parameters' (1997:6). Detailed chronologies, on the other hand, are necessary, since they can reveal a complex pattern of human spatial distribution, highlighting the fact that demographic collapse is not always sudden or rapid but closely related to the 'heterogeneity of abandonment risk', which is based on local conditions (Paine 1997:3).

Most working hypotheses used by demographers are based on simplified models of reality (e.g., Graber 1997:263), and even age and sex determinations may be inaccurate, as they often rely on identifications made by different researchers, or, as noted by Belfer-Cohen et al., can be affected by biases in the investigation (1991: 412). These generalisations should always be checked, and in our case we should ask whether islands in fact provide representative case studies for the development of human populations, as has been suggested. Demographic studies of contemporary societies are riddled with difficulties, but palaeodemography has the obvious added difficulty of dealing with the past. However, at a higher level of generality, useful predictions can be made about some processes replicated on different islands, as can be seen from the following studies.

Alesan et al. (1999) reconstructed the mortality pattern of the population buried in the Iron Age cemetery of S'Illot des Porros (Mallorca, Spain). Low life expectancy, high infant mortality, and hard life conditions were inferred from the data (Alesan et al. 1999:285). Some assumptions were necessary to carry out the study, in order to take the skeletal population as representative of the living community: it was assumed that the cemetery was used just by one group, that there was no other cemetery in use at the same time, that all the members of the community were buried there, that the record was complete, and, finally, that births balanced deaths, meaning that throughout the use of the cemetery, the population was characterised by zero growth (which Acsádi and Nemeskéri [1970] consider typical for ancient populations) (Alesan et al. 1999:288). The mortality data were then compared with three population models, as postulated by Ledermann (1969), Coale and Demeny (1966), and Weiss (1973). After comparison of the cemetery with these three models, three biases were observed in the data: first, in the underrepresentation of infants under the age of 5; second, in the excess of sub-adults between the ages of 5 and 20; and third, in the deficit in old age people (Alesan et al.1999:292–3). However, the mortality pattern conformed to all the models consulted: infant mortality was particularly high between birth and 5, it was low between the ages of 5 and 15 (and minimum at 10–14), and it increased again from 15 onwards (Alesan et al. 1999:296). Average life expectancy was close to 23 years (1999:300). Alesan et al. were able to conclude that this was a 'young population under hard life conditions' (1999:300).

There are two main problems in the reconstruction of past populations: the representativeness of archaeological samples, and sex and age attribution (Alesan et al. 1999:286). Both Paine (1997) and Keckler (1997) have pointed out that, while many palaeodemographers assume that the long-term population growth rate in the past must have been very close to zero (Hassan 1975), the mortuary data of archaeological populations seem to contradict this. Keckler proposed an alternative explanation: that 'long periods of growth were interspersed by acute crashes' (1997:205). On the basis of the work of Malthus (1960 [1798]), Kunstadter also claimed that the normal condition is population growth (1972:348). Leigh (1981) suggested that, given static technology and culture, an island's carrying capacity fluctuates around average values for a long time. Leigh calculated that, while catastrophes do cause short-term fluctuations, carrying capacity should return to pre-catastrophe mean levels unless large land areas are lost (1981:235), and concluded that populations appear to fluctuate primarily in response to environmental change (1981:234).

Modelling past population growth is not straightforward, as several factors may have a delayed effect. For example, populations tend to continue growing long after fertility levels have declined (Teitelbaum and Winter 1985:8). This effect, called 'demographic momentum', results from the fact that several young females will be reaching reproductive age for a long time after the fertility decline (Teitelbaum and Winter 1985:8). This means that population fluctuations can be diluted over long time periods, with the important implication that populations may have enough time to recover. Indeed, historical data from Pitcairn and Norfolk indicate that some families managed to survive in the long term (Anderson 2001:21).

Estimating Minimum Populations

McArthur et al. (1976) attempted to calculate the minimum number of people involved in the settlement of Polynesia by modelling the dynamics of three population categories: those heading for extinction, those with presumed success, and 'doubtfuls'. The study observed that the probability of extinction increased with the age of the initial group and as its size diminished. Even though a constant cultural pattern of monogamy and marriage was assumed, and no incest permitted, the model still indicated such variability in growth patterns (1976:318) that the researchers concluded that 'there can be no universal minimum size for small population isolates' (1976:324–5). They also determined that the time required to reach a specified size or the time people actually survive before they die out is also highly variable. They concluded that variation was such that 'extrapolation backwards from some particular number to try to establish either the size of the initial group, or the time depth of settlement, would clearly be futile' (McArthur et al. 1976:322).

Faced with these conclusions, it would seem at first sight difficult if not impossible to draw any conclusions from population data, since so many factors can affect both objective numbers and their perception. However, some valid generalisations are still possible. Broodbank and Strasser (1991) estimated the minimum number of early farmers and their domesticates involved in a single planned (and successful) colonisation event (in this case, the island of Crete). They also pointed out that these estimates would depend on the 'safe size' perceived by Neolithic colonists (Broodbank and Strasser 1991:240). Survey data indicate that the basic settlement unit in the Aegean Early Neolithic is 'the small village of between 40 and 200+ inhabitants', and it therefore seems reasonable that this figure (a minimum group size of 40) reflects this 'safe size' (Broodbank and Strasser 1991:240). Williamson and Sabath also claimed that, in the Marshall Islands (though not in the whole of the Pacific islands), atoll colonisation would include an 'organised procedure' (1984:32). This organisation would involve 'many settlers' using horticulture and possessing a maritime technology that would ensure contact with another population source (1984:32).

In general, studies on minimum island population sizes (e.g., McArthur et al. 1976; Broodbank 2000:86) tend to emphasise that numbers would have been small. In the case of islands, this would partly be due to the difficulties posed by maritime crossing. This smallness, as we saw, carries several implications and consequences, since chances of extinction increase as population size diminishes (Pielou 1969). Williamson and Sabath (1984) have argued that communication and exchange would have been fundamental means of survival for oceanic cultures characterised by small population sizes. Communication and exchange can be considered cultural variants of the 'commuter' and 'rescue' effects of island biogeography (i.e., the replenishing effect of immigration on extinction), which tend to privilege islands that are close to sources of dispersing species (Brown and Kodric-Brown 1977:445–6).

Within the context of early Cycladic prehistory, Broodbank also pointed out that 'variability in settlement size is about degrees of smallness' (2000:86). Typical values for Early Bronze Age settlement density were calculated by Cherry (1979:37–43; Wagstaff and Cherry 1982a:137–8) as 0.5 to 1.5 people per sq km and double that in EB II (1.5–3.0 per sq km). On the basis of these densities, Broodbank tabulated the population for each Cycladic island (2000:90) and observed that, while overall Cycladic population reached a few thousands, only a few islands had populations of 300 to 500 people at any one time. Populations below this figure cannot exist as closed communities (i.e., under endogamy) (Adams and Kasakoff 1976; Williamson and Sabath 1984; Wobst 1974). Broodbank noted that at the lowest density levels (0.5 per sq km), no island could support a self-sufficient population and therefore that 'a virtually ceaseless movement between individuals, communities and islands' would have been necessary to ensure the survival of these island communities (Broodbank 2000:

89). Exogamy and exchange could protect these communities, but not every community would benefit from the Cycladic interaction network to the same degree (Broodbank 2000:87), with the effect that the smaller settlements (particularly those between 5 and 50 people) would have a tendency 'to wink on and off in the landscape' (2000:86).

Small population sizes have another important effect, with regard to the resources used up by individual communities: small numbers of people can subsist on fewer resources and on limited amounts of arable land. On the basis of data from Halstead (1981:317–8) and Gallant (1991:82–7), Broodbank indicates that an individual family could live on 3 to 6 hectares of land, and by extension, that a large village would require a few square kilometres (2000:86). This confirms the view that people's impact on the environment would have been low, and if local resources were ever exhausted, sites could be relocated without too much difficulty. On the other hand, if a community occupied a favourable location, this might lead to population build-up (Broodbank 2000:87). A good understanding of the palaeoenvironment is therefore necessary to identify what options would have been available to early settlers. Graber maintains that growing populations tend to 'expand rather than intensify, intensify rather than import, and import rather than suffer nutritional decline' (1997:263–7). In the Cyclades, Broodbank also highlights a general tendency to fission rather than nucleate, as demonstrated through the data from both cemeteries and settlements (particularly on Melos, Naxos and its smaller satellites, Amorgos, Ios, and Syros) (2000:87). Fissioning and dispersal can protect the overall population in the long term but expose individual groups relocating to new areas to several risks, particularly if they are far away from the founding population (Broodbank 2000:87). Therefore, while dispersal remains a possibility, risk can be mitigated in different ways, also depending on people's subsistence strategies and their location. In the case of farming communities, these strategies include not just increased mobility but also changes in crops, using wild resources, increasing reserves for times of hardship, and developing exchange networks (Cherry 1981:60; 1985:20) (in Broodbank 2000:81).

Estimating Island Carrying Capacity

Sanders defined carrying capacity as 'simply the amount of land necessary to maintain a given economy, under specified environmental conditions, with a particular strategy of land use' (1997:383). Carrying capacity is thus not an absolute value but rather a 'shifting scale' (Sanders 1997:383; cf. Robb and Van Hove 2003). Kunstadter has pointed out that while resources are often thought to pose limits on settlement size and density, in reality they do not automatically limit population growth, which can expand beyond 'the maximum supported by food production' (1972:322). However, Williamson and Sabath argue that there is a maximum sustainable density for any human population, which ultimately depends on maternal age at time of giving birth, death, immigration, and emigration rates, as well as social mechanisms (1984:32).

Calculating carrying capacity is useful for explaining why groups select different strategies and then modify these, either by changing location or by intensifying land production when moving is impossible (Graber 1997; Sanders 1997). Hence, perhaps optimistically, Sanders claims that 'the calculation of carrying capacity does provide us with a model to predict *future* changes' (1997:383, emphasis added). For the purposes of this study, it would be useful if estimating carrying capacity could give us at least an indication of *past* changes. A good starting point is to consider different land-use strategies that are used to calculate carrying capacity. In the case of hunter-gatherers, resources are usually considered determinant of the size and location of camps. Perlman, however, points out that this approach treats foraging groups as 'closed systems' and ignores external and cultural factors (1985:33). He argues that hunter-gatherer behaviour should be studied instead in both stable and changing environments, since mobility and sedentism are determined by different variables (resources, yes, but also catchment shape and, more importantly, the availability of mates for reproduction) (1985:40). According to Wobst (1976), a group of 100 people can provide 80% of its own mates, while to reach 100% (complete endogamy), numbers must be in the 300 to 500 region. These numbers are very high even for extant hunter-gatherers: at the highest documented population densities (e.g., 1 person per square mile or ca. 2 persons per 5 sq km), groups would range between 100 and 300 people, meaning that completely closed mating systems are highly unlikely (Perlman 1985:42).

Williamson and Sabath (1984) also developed a model based on carrying capacity and linked it to settlement. Their study drew upon previous work by Hainline (1964; 1965) in the Mariana, Caroline, Gilbert, and Marshall islands. Hainline noted a significant relationship between island area and population size, and between land area and population size for islands experiencing drought. In simple terms, Williamson and Sabath devised a method for estimating an island's carrying capacity from quantifiable variables, and predicted settlement of all islands with high carrying capacity. The conditions necessary to test the hypothesis were to ensure that extinction probabilities could be linked only to variations in the island carrying capacity. On the basis of some important prerequisites, they selected the Marshall Islands (29 atolls and 5 coral islands), of which 10 were traditionally unsettled (Williamson and Sabath 1982; 1984): all had a unitary culture, which had remained unchanged for many generations; they included both settled and unsettled islands, with similar resource fluctuations; and inter-island contact costs were considered to be the same for all the islands and atolls in the group (1984:25). They claimed that differences in island settlement were unrelated to geographic isolation or differences in resources, as both inter-island contact cost and resource fluctuation throughout the archipelago were considered to be equivalent. In contrast, they found a strong statistical association between Marshall atoll population size and atoll 'Mesophytic Index' (MI = mean annual rainfall × atoll land area) (1984:27). This is because of the strong relationship between MI and staple crop production area, which in turn supports increasing population sizes. The MIs of inhabited and uninhabited atolls were thus compared in order to establish if there is a threshold MI value that determines settlement. The conclusion was that, overall, all uninhabited atolls have either low rainfall or small land area, or both (1984:28).

Robb and Van Hove (2003) carried out a study to estimate Early Neolithic population levels in southern Italy. They analysed different types of Neolithic subsistence strategies and concluded that it was impossible to come up with a 'single-best fitting model for Neolithic economies' owing to the variety of strategies used (2003: 250). They began by estimating the resources needed annually by a group of 50 people relying mainly on grain. These were calculated as being in the order of 10 to 15 hectares of active grain plots, plus some fallow fields and small gardens (2003:246). The calculations were based on Gregg's (1988) estimate of the requirements of a family (4–6 people) living on grain (calculated as ca. 1000 kg/yr), and on a combination of Jarman and Webley's (1975), Halstead's (1981), Barker's (1985), and Gregg's (1988) estimates of Neolithic grain yields (which averaged between 500 and 1000 kg/ha). Robb and Van Hove's estimate of 10 to 15 hectares for southern Italy (2003:246) compares positively with that of Broodbank's for the Cyclades (2000:86), since Robb and Van Hove's slightly higher figures include additional fields and fallow lands.

Robb and Van Hove also estimated population and land figures for 20 other types of subsistence, both for their study area and for other regions (2003:247–8). According to their analysis, Lipari seldom achieved demographic self-sufficiency, and it is unlikely that Malta had more than a few thousand inhabitants in the Neolithic (2003:252). Nonetheless, they calculated that sufficient land was available on these islands for different purposes, even if subsistence was solely based on agriculture, as plots could be scattered (particularly in hilly environments) (2003:250). This would also reduce the effects on soil depletion and erosion (2003:251), a point supported by Grove and Rackham, who claim that Mediterranean ploughing started to pose a real problem (in terms of causing erosion) only in the nineteenth century AD (2001:290). The resulting conclusion is that since small populations can subsist on small amounts of land (e.g., islands), provided that they are in contact with other communities, low population numbers (unless very low) should not cause land abandonment. Other explanations should therefore be sought to account for it.

Robb and Van Hove (2003) point out that Italian Final Neolithic and Copper Age communities, *contra* earlier Neolithic ones, are often thought to have relied increasingly on pastoralism. As animal herding requires more space than agriculture, they explain that this would result in a decrease in overall population density (unless there was a contemporary increase in population, which they discount) (2003: 252). Robb and Van Hove suggest that the apparent late Neolithic 'abandonment' of the Tavoliere plain in southeast Italy (Tinè 1983) may, in fact, result from such a decrease and from population movement away from the Tavoliere plain towards the mountainous Gargano area, where slopes could be used for herding. This shift would be the 'result of social choice' rather than demographic pressure, which they claim would lead to intensifying the existing grain agriculture rather than to increasing the range of herding (2003:252). In Robb and Van Hove's (2003) model, areas were abandoned as a result of a change within an established practice (within farming, a shift from crops to small-scale pastoralism). However, it is also possible that this 'social choice' was partially a response to environmental change, as the area became arid in the Late Neolithic (Caldara et al. 2002:127) (see Chapter 2), possibly preventing the intensification of agriculture. The next section looks at the role of cultural factors in determining the likelihood of abandonment.

The Cultural Factor

The previous discussion has already highlighted that, even in the light of rigorous demographic modelling, environmental fluctuations and population levels appear to be affected by cultural factors. Abandonment is not just physical absence; it has social and cultural implications and effects. Cultural perceptions of the island are important when considering not just the causes but also the potential effects of abandonment on those involved, while elements of perception can be seen to affect the choices and strategies of different communities.

Cultures of Response

The fact that 'small populations do not behave in the same way as large statistical aggregates' (Kunstadter 1972:315) may result from the contrast between objective conditions and their subjective interpretation. Robb and Van Hove (2003:241) have pointed out that humans' decisions are influenced by 'perception, symbolism, and social relations', which in turn affect the 'objective conditions of existence (Bourdieu 1977)'.

Both the minimum size of initial founding groups and the carrying capacity of an island are, at least to an extent, culturally specific. Williamson and Sabath pointed out that islanders are likely to be aware of the fact that very small populations are unstable, and this may affect their settlement choices—for instance, leading them to avoid islands that can support only small populations (1984:22). They noted that the people of the Marshall Islands decided not to maintain permanent settlement on 'islands that would support less than 40–80 people' (1984:28). They also observed that this value is much lower than that chosen by Bass Strait islanders, who decided to abandon areas too small to support populations of fewer than 300 to 450 people (Jones 1977; Lampert 1977; 1982) (i.e., more or less an endogamous unit), and suggested that these differences could be due to variation in maritime technology (Williamson and Sabath 1984:31).

In another case study, Cawte (1978) discussed the psychological aspects of extinction and survival within two Aboriginal societies living on small adjacent islands off the coast of Australia. The inhabitants of one of the islands were 'gripped by Malthusian forces of famine, disease, and warfare' and were forcibly evacuated to the larger island (Cawte 1978:99). What emerged from interviews with the survivors revealed some interesting differences between the ways the people themselves defined the problem and the way outside observers saw it. The former defined the problem in terms of a shortage of sexual partners, which had led to a state of chronic warfare on the island ('cognised' stress factors), whereas the observers saw the stress as the result of famine, caused by prolonged drought ('operational' factors)

(Cawte 1978:117). Cawte noted that risk can be aggravated when 'institutionalised buffers', which people rely on as coping responses, are mistakenly perceived as adequate to deal with problems (1978:95). It is only when these buffers are no longer perceived as adequate that operational (e.g., ecological) stress becomes psychological stress, and decisions are finally taken.

In a third case study, Graves and Graves (1976) spent time studying the contemporary island community of Aitutaki in the Cook Islands. The inhabitants unanimously claimed that life on the island had become 'less rewarding and less fun', mainly because the amount of work required to provide for an average family had increased (1976:448). The inhabitants attributed this to outmigration and consequent increased workload. However, the study revealed how the demographic structure of the population had remained the same. The externally observed cause for unhappiness appeared to be that people had become increasingly involved in wage-labour employment. This had reduced the time available for other traditional activities, such as fishing, planting, and cooperative community activities, and increased dependence on expensive imported foods, so that the financial burden of maintaining children and the elderly was growing (Graves and Graves 1976:459).

The three examples discussed illustrate that abandonment has a strong cultural component. As a common response to extreme conditions, it can be implemented as a strategy or in a preventative manner. Vernicos (1987) noted that present-day islanders in the Mediterranean appear to concentrate their efforts on maximising short-term benefits and on minimising the effects of catastrophic disruptions in the long term. Unfortunately, such a strategy, inevitably based on a subjective and pessimist interpretation of reality, acts as a 'self-fulfilling forecast', with short-term gain undermining the capacity to overcome long-term adversity (Vernicos 1987:103).

The first part of this chapter exposed the functionalist emphasis prevalent in abandonment studies. Although many researchers admit that past communities culturally mediated environmental factors and demographic processes, in reality limited scholarly attention has been paid to the cultural mechanisms that people use to negotiate their environments. Anthropologists have first-hand access to living communities and are thus able to investigate the role of cultural and social factors in causing abandonment. They explain people's responses to the environment in terms of different cultural strategies (e.g., prevention, reversal, innovation, but also optimism, pessimism, apathy, resilience, traditionalism, popular wisdom, conservativism, and so on). These can be studied at both a local and comparative level because they display a degree of regularity, as people establish routines, traditions, and strategies (Hoffman and Oliver-Smith 1999:3) or, in modern terms, 'cultures of response' (Hoffman 1999:134; Dyer and McGoodwin 1999:226; Dyer 1999:278).

Sense of Place

In Chapter 3, we discussed the validity of the island as a discrete unit of study. We argued that there were both advantages and drawbacks in this approach, especially when considering their colonisation, and concluded that their subsequent cultural development could be better understood by considering the island within its broader context (islandscape). Insularity was seen to foster cultural networks rather than cultural isolation, resulting in cultural connections stretching beyond geographical boundaries. In the present discussion, this has the important consequence that the abandonment of an island within an archipelago does not necessarily entail the end of that culture, as its survival can be ensured by people's mobility. Nonetheless, it would be simplistic to assume that there would be no changes at all.

In fact, this approach runs the risk of dispensing with the individual island altogether. Instead, let us consider that there exists a powerful relation between an island's physical distinctiveness or 'sense of place' and its community's identity, and that these influence decisions of abandonment. The opposite question is also interesting: how did abandonment affect identity?

Given our earlier discussion on culturally mediated geography in Chapters 2 and 3, it seems appropriate to view sense of place as being dynamic rather than fixed in time. The extensive literature on sense of place reflects its complexity. Classic studies (e.g., Relph 1976; Tuan 1974) discuss its many facets, which include place distinctiveness, place continuity, place dependency, place attachment, loyalty, identification, and feelings of 'insiderness' and 'outsidedness'. Relph (1976) defined 'insiderness' as a feeling of belonging to a place, leading to a person's identification with that place. The opposite, 'outsidedness', is a feeling of separation from a place—for example, homesickness in a new place, or a feeling of alienation or estrangement from one's home after a long absence. The nature of the relationships between people within a place also contributes to sense of place (Seamon and Sowers 2008). Barrett relates sense of place and identity to Pierre Bourdieu's concept (1977) of 'habitus', stating that 'staking a claim upon a place in the world is also staking a claim upon [their] identity' (2005:136).

'A sense of place is formed through the sedimentation of symbolic and emotional meanings, memories and the attachments to people and things, which arise out of past practices and their underlying power relations' (Erdoğu 2005:99). It is integral to social memory, ancestry, and allegiance. In this respect, it is important to establish the geographical scale of identity: are people connected to a specific village, island, island group, or wider archipelago/mainland region? Costantakopoulou's (2005) work on the Greek islands shows that, in the Classical and Hellenistic periods, the inhabitants of islands with more than one *polis* (city-state) identified with their islands rather than with their individual cities; moreover, this island identity enabled islanders to overcome political fragmentation. This relation is likely to have changed over time. Rennell (2010) addressed similar questions in the context of the Iron Age of the Outer Hebrides, combining GIS analysis and experiential fieldwork to discuss the potential significance of different scales of place. Within Malta, the iconography and distribution of the megalithic temples appear to reflect their insular location, in terms of access to the sea and agricultural land (Grima 2001; 2008). Push and pull factors have already been discussed, but we can introduce a third category at this point, sense of place, as a powerful 'stay put' factor. The stronger this feeling and the greater the threshold of resistance to push or pull factors, the less likely abandonment is to occur.

Factors of a contingent nature can complicate matters even further, as shown vividly by the abandonment of many Mediterranean islands in the historic period, often as a result of both 'pirates and parasites' (Cruz et al. 1987:111). Braudel wrote that 'the fate of many Mediterranean islands was a precarious, restricted, and threatened life' (1972:154). The historical period was often bleak for the islands, which suffered famines, epidemics, the failure of monocrop plantations, pirate incursions, war, and interference of political and religious powers (Hionidou 1996; 2002; Kolodny 1974; King and Kolodny 2001; Starc 1987; Vernicos 1987). However, we should reject the hypothesis of 'insular fatality', since, as King and Kolodny claim, 'islands in the Mediterranean are not subject to deterministic fates just because of their island status' (2001:257). We should not seek exact parallels between historic and prehistoric abandonment, but the previous examples show that there are factors of a contingent and opportunistic nature, which could potentially prove very difficult to identify in the archaeological record and yet could be critical, even if we simply cannot know about them. In the case of the prehistoric Mediterranean islands, it is tempting to generalise and to single out ecological and demographic factors as being more dominant factors in determining abandonment in early island life, and to assign growing prominence to cultural/social factors by the Bronze and Iron Ages. In fact, we should consider that different cultural factors would have acted at different times and that cultural factors were a 'constant variable' in respect of abandonment. Nonetheless, when opportunity and changes in seafaring technology made population mobility and the pursuit of alternative ways of life more feasible, people's sense of place would have been affected and their 'threshold of resistance' (to population pressure, disease, social inequality, and so on) may have been lowered, resulting in more frequent abandonment (Rockman 2003:9). The Middle Bronze Age, as we will see in the next chapter, corresponded to greater island abandonment in the Mediterranean. This increased mobility also led to some of the islands' subsequent recolonisation and, combined with shorter distances between islands in the Mediterranean, meant that permanent abandonment was less frequent than in the Pacific. Social and cultural choices, and not just geographical parameters, had an effect on the decision to abandon certain Mediterranean islands and to remain on others (see Dawson 2008; 2010). The study of a selected group of islands in the following chapter attempts a reading of their occupational histories in different keys, by reviewing the various factors presented here.

Conclusions

There is no simple answer to the questions 'what is abandonment?' and 'is island abandonment different?' (but more on this in the next chapter). The review of theories and case studies emphasises that abandonment is to be understood as an aspect of a process. Mobility is inherent in most cultural systems, and therefore abandonment is 'a *normal* process of settlement' (Cameron 1993:3, emphasis added). Understanding abandonment ultimately clarifies aspects of colonisation, and vice versa, as both are fundamental components of a cyclical process. The studies reviewed, as we saw, share some common concerns: environmental changes can be considered as a constant in the long run (both geographical and temporal), but localised changes had a considerable effect in the short term. Regional archaeological studies have tended to link abandonment to broad environmental and sometimes social processes. In some cases, abandonment has been interpreted effectively by using a core-periphery model or highlighting asymmetrical relationships (e.g., Weisler 1995). Important factors to consider include subtle differences in the non-reciprocal nature of the dependence of communities (with some more reliant on others) or the fact that peripheries can suffer the effects of centre decline. Demographic studies can sometimes pick out these factors. However, such a large-scale approach can be misleading, and risks remain in 'an immature phase of prime-mover models' (Lillios 1993:118). Stone has claimed that these grand models are 'built on perfectly isotropic, ahistorical plains populated by perfectly rational, knowledgeable people' (1993:75). Tomka and Stevenson have attempted to address the imbalance between different scales of enquiry in abandonment studies, by claiming that, although several studies reveal cross-cultural similarities indicating that 'processes of abandonment are not culture or region specific', the local context provides the key to identifying the factors which characterise different abandonment processes (1993:191).

In some ways, abandonment is a strategy of survival, a peripatetic and opportunistic strategy. In the next chapter, we will focus on the local scale and assess the role of different factors in determining abandonment.

Chapter 8

Islands in Time

Island biogeography has placed excessive emphasis on physical space as a fixed parameter determining colonisation. While geographical characteristics are important, it should be evident at this point in our discussion that we must consider islands not just in space but also in time. Placing islands 'in time' (à la Patton 1996) enables us to follow and understand more fully the mutual interactions between communities and their island worlds. In practical terms, this entails piecing together the evidence for initial colonisation, abandonment, and recolonisation from the islands and interpreting it in light of the theories we have discussed. This is clearly not possible for all the islands of the Mediterranean, so instead we focus here on a selection of islands and, where possible, follow the development of their communities from prehistory up to the recent past.

A well-established archaeological record is fundamental, as only in such a dataset can breaks in the evidence be securely attributed to instances of abandonment rather than to lack of research. Therefore, a key criterion for inclusion in the present discussion is extensive archaeological investigation, defined as 'the excavation of a multi-period site and/or field survey of a considerable part of the island' (corresponding to Broodbank's 'good' level of exploration category [2000:52]). There is a clear imbalance in the amount of work carried out on islands in the past fifty years—for example, some of the Aegean islands have been more thoroughly surveyed than most of the western Mediterranean islands. However, in recent times, a better balance is starting to be achieved, particularly through the efforts of joint international survey teams. Another criterion for inclusion in the study is physical diversity across the sample, defined here in terms of a wide range of geographical characteristics (size, distance, altitude, geology, resources, water availability, etc.). The inclusion of physical attributes is not biased towards islands that are expected to support continuous inhabitation or otherwise.

As a first step, each island is regarded as a distinct unit of study: this is done through a brief description of the island's physical characteristics and a reconstruction

Mediterranean Voyages: The Archaeology of Island Colonisation and Abandonment, by Helen Dawson, pp. 209–259.

of its settlement chronology taking a long-term temporal perspective. The presence of gaps in the chronology is then assessed and investigated by questioning whether the breaks can be taken to represent abandonment. Where this is the case, the study explores the nature of the abandonment further: was it at an individual settlement level or was the whole island abandoned? Subsequently, possible causes for abandonment are reconstructed by looking at the factors singled out in Chapter 7. The next step in the investigation is to look at abandonment on a comparative scale, in order to ascertain the relative versus absolute importance of key variables (e.g., size, distance, and resources) at different times. The islands' occupational trajectories are then addressed in the light of physical similarities and differences (whether there are meaningful associations between certain biogeographical characteristics, on the one hand, and settlement continuity and abandonment, on the other). Previous observations (Dawson 2008, 2010) have been revised and incorporated into this chapter.

The islands selected to put all this into practice are Kythera (south of the Peloponnese); Melos, Kea, and Naxos (Cyclades); Cyprus; Palagruža and Hvar (central Dalmatian islands); Ibiza and Formentera (the Pitiussae Islands); the Aeolian Islands; Malta; Jerba; Pantelleria; Palmarola; and the Tremiti Islands (Fig. 8.1). Alas, the Antikythera survey (a rare case of a complete island survey) was published just after I completed the book. The islands range in size from 0.3 sq km (Palagruža) to 9,251 sq km (Cyprus). Seven are smaller than 10 sq km, which, in the Pacific, is considered to be the minimum size required for ensuring population survival (Keegan and Diamond 1987:65). In the Mediterranean, it has been suggested that this threshold may be lower (or even irrelevant), because of reduced inter-island distances (Broodbank and Strasser 1991:238); this value therefore will be tested.

Four islands fall in the 10 to 50 sq km range, two are between 50 and 100 sq km, and nine are larger than 100 sq km. Cyprus is much larger than any other island in the sample, and in its case, size, in terms of smallness, can be excluded a priori as a variable determining its abandonment. Population estimates, in relation to island size and different settlement densities discussed in Chapter 7 (cf. Broodbank 2000: 90), were calculated and tabulated (Table 8.1).

These data show that fewer than half the islands could support endogamous populations (ca. 300–500 people) (Wobst 1974; Adams and Kasakoff 1976; MacCluer and Dyke 1976; Williamson and Sabath 1984; Broodbank 2000). When population estimates are translated into requirements for arable land (using figures from Broodbank [2000:86] and Robb and Van Hove [2003:246]), it emerges that most islands in the sample would have had sufficient agricultural land: a community of ca. 300 to 500 people would have required between 50 and 60 ha of (not necessarily contiguous) arable land, or 0.6 to 1.5 sq km, which most islands in the sample could offer (though see discussion of terracing, below). These figures indicate that communities on most of these islands would have been able to survive, in view either of the island's actual size and/or its proximity to other land. However, as the case studies will demonstrate, this was not always the case.

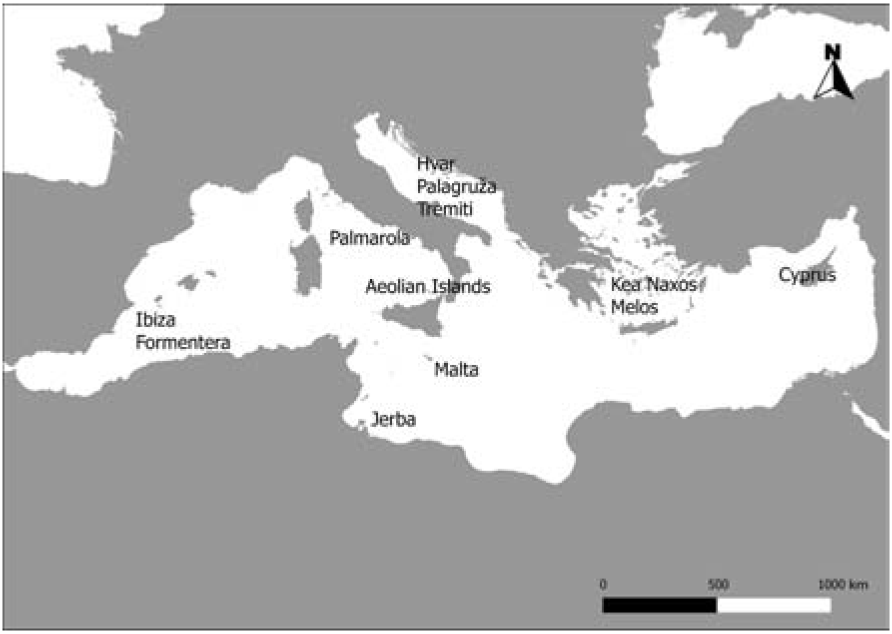

FIG. 8.1 Map with location of abandonment case studies.

In the previous chapter, we identified certain factors as playing a role in abandonment, both in general terms and specifically on islands: size, distance, configuration, geology, rainfall, water sources, agricultural land, biodiversity, resources, and catchment areas. By singling out some basic requirements for human survival, we can look at different levels of vulnerability, which in turn lead to assessing degrees of abandonment risk. For example, Wagstaff and Gamble suggest that islanders' minimum needs would involve food, water, shelter, clothing, fuel, and tools, as well as material for constructing seagoing vessels (1982:98); therefore access to these resources (on the island or through a network) would have been necessary to ensure survival.

This picture is not always straightforward, however. Broodbank explains that, because of their mountainous nature, there is no direct relationship between island size and arable land in the Cyclades, and terracing is necessary to farm slopes steeper than 10 to 15 degrees (2000:76–7). Evidence from the island of Amorgos and from northwest Kea suggests that terracing was introduced after the end of the Early Bronze Age (Whitelaw 1998; French and Whitelaw 1999:173–5). This, in turn, indicates that agricultural exploitation of the islands would have been much more limited in scope before then. There are, thankfully, also some regularities useful to this study. In the Cyclades, altitude and ecological zoning are related, as are island area, altitude, and rainfall (mountain rain begins at elevations of ca. 600–700 m asl) (Watson 1964:16, in Broodbank 2000:78). These relationships illustrate that island

Table 8.1 Geographical characteristics and population estimates for sample islands

	Island	Size (sq km)	Max altitude (m asl)	Dist to nearest mainland	Fresh water springs	Rain (mm/ year)	Mineral resources	Pop 0.5	Pop 1	Pop 2	Pop 3
1	Palmarola	1.4	262	32	No	600	Yes	<1	1.4	2.8	4.2
2	San Domino	2	116	20	No	500	No	1	2	4	6
3	Panarea	3.4	421	42	No	500	No	1.7	3.4	6.8	10.2
4	Alicudi	5.2	675	87	No	500	No	2.6	5.2	10.4	15.6
5	Filicudi	9.5	774	47	No	500	No	4.75	9.5	19	37.8
6	Stromboli	12.6	924	56	No	500	No	6.3	12.6	24.6	37.8
7	Vulcano	21	500	22	No	500	Yes	10.5	21	42	63
8	Salina	26.8	962	43	No	500	No	13.4	26.8	53.6	80.4
9	Lipari	37.6	602	30	Yes	500	Yes	18.8	37.6	75.2	112.8
10	Formentera	82	202	95	No	350	No	41	82	164	246
11	Pantelleria	83	836	102	No	350	Yes	41.5	83	166	249
12	Kea	130.6	568	12	Yes	500	No	51.8	103.6	207.2	391.8
13	Melos	150.6	751	105	Yes	400	Yes	75.3	150.6	301.2	451.8
14	Malta	246	253	85	Yes	500	No	123	246	492	738
15	Kythera	280	507	15	Yes	600	No	140	280	560	840
16	Hvar	312	626	4	Yes	800	No	156	312	624	936
17	Naxos	428	1,000	132	Yes	400	Yes	214	428	856	1,284
18	Jerba	568	40	2	No	200	No	284	568	1,136	1,704
19	Ibiza	572	475	92	Yes	400	No	286	572	1,144	1,716
Average		**155.3**	**520.9**	**59**	**Yes: 8/19**	**470**	**Yes: 6/19**	**82**	**164**	**327**	**442**
20	Cyprus	9,251	1,950	69	Yes	500	Yes	4,626	9,251	18,502	27,753

Pop: Population estimates at 0.5 person/sq km; 1 person/sq km; 2 persons/sq km; 3 persons/sq km.

ecological biodiversity (and, indirectly, their potential for sustaining human populations) can be inferred in part by looking at simple variables (such as size and altitude).

Mediterranean islands comprise both volcanic and non-volcanic soils. As noted in Chapter 2, soil type is an important variable in terms of moisture retention potential and the types of vegetation it can sustain (e.g., whether the type of soil allows the roots to access this moisture) (Blondel and Aronson 1999; Grove and Rackham 2001). Semple observed at the start of the twentieth century that in the Mediterranean, 'the small islands of volcanic origin show the greatest production and hence marked density of population', whereas in the non-volcanic islands, 'geology made life harsher' (1911:450–1). The Cyclades have mainly non-volcanic soils, with only Thera and Melos being volcanic (Broodbank 2000:79–80). The Dalmatian islands have limestone soils, or are made of other porous rocks, meaning that they are thin and rocky and therefore hard to irrigate and plough (King and Kolodny 2001:240). In historic times, their economy has relied on small-scale cereal and vegetable cultivation (including small olive groves and vineyards), on the grazing of sheep and goats, and on maritime activity. By contrast, the Aeolian Islands are all volcanic and benefit from fertile soils, which in historic times have supported a flourishing wine industry (King and Kolodny 2001:244).

There are other characteristics which affect all Mediterranean islands, regardless of their size, although size mitigates their effects. The effects of drought, heavy rainfall, and fire, for example, were discussed in Chapter 2. Human adaptation (e.g., the decision to select animals and plants that require less water) can partially alleviate the harsh conditions induced by these features. There are also physical characteristics that have a beneficial effect on the settlement of islands, among them size and altitude (which, as mentioned, may affect biodiversity and attract mountain rain), the presence of plains and mineral resources, and proximity to other lands. As we shall see, it is likely that the people of Kea (Cyclades) took advantage of their proximity to the mainland and the metal resources of Lavrion, which were exploited as early as the Early Bronze Age (Broodbank 2000:80). Naxos is not just a large island; it also has mineral resources (emery and marble) (Broodbank 2000: 79, 80). Broodbank observed that 'though climatically and environmentally marginal, the Cyclades are central in terms of their lithic and metallic resources' (2000: 76). The following sections show that certain characteristics (and resources, in particular) played an important role in the islands' settlement history at different times.

Finally, the effects of cultural factors in determining abandonment (e.g., different perceptions of landscape, carrying capacity, survival potential, and contingent historical events) prevent a 'ticking the box' approach. Therefore, the study proceeds from an initial exploration of environmental factors to a comprehensive discussion of the islands' long-term histories. The case studies, and the comparative discussion that follows, will tease out both patterns and differences in the histories of these Mediterranean islands and shed some light on their communities.

KYTHERA

Kythera is a large island (280 sq km) located very close to the Greek mainland (ca. 15 km). It has a coastal length of 52 km and a maximum altitude of 508 m asl. The island has freshwater springs and a rainfall regime of ca. 600 mm per year, but no desirable mineral resources. Population estimates for the island (Table 8.1) show that the island could sustain an endogamous population at a density of just over 1 person per sq km. The island has been the focus of an intensive survey and interdisciplinary project directed by Broodbank and Kiriatzi (Kythera Island Project; henceforth KIP). The KIP survey, which covered 100 sq km of the island (ca. one-third), highlighted different phases of human development on the island, from its initial settlement during the later Neolithic (fifth millennium cal BC) to the present day (Broodbank 1999b).

Kythera offers several areas suitable for settlement; nonetheless the KIP survey showed that occupation was not always continuous at individual sites. The Aghia Sophia Cave, near the village of Kalamos (southeast coast), excavated by Tsaravopoulos in the 1990s, is thought to provide the earliest evidence of human occupation on the island (Papatsaroucha 2000:11). Finds include a number of Late Neolithic sherds (fifth millennium cal BC, contemporary with Saliagos), some with painted decoration (Papatsaroucha 2000:12). The earliest material (lithics) found by the KIP survey also dates to the Late Neolithic, whereas human occupation became more established from the Final Neolithic. Choustis Cave, close to Diakofti harbour (one of the few good harbours on the island), has yielded material dating to this period (Final Neolithic/Early Bronze Age) (Papatsaroucha 2000:12). Occupation lasted until 1100 cal BC (Post-palatial period) with no material found in the KIP survey area until the seventh century BC. Material spanning from the Geometric period (eighth century BC) to Roman times was identified by another survey team in the area of the polis (Petrocheilos 2003). According to Herrin, there is evidence (coins and pottery sherds) that the area around Kastri was occupied in the sixth and seventh centuries AD, although 'it is impossible to prove continuous settlement from the fourth onwards' (1972:43). Kastri was abandoned in the mid-seventh century AD (possibly because of Slav incursions) (Herrin 1972:44). There is no evidence of either Slav or Arab pirates settling for any length of time, and the island was used again in the tenth century AD as a hunting ground by mainland inhabitants (Herrin 1972:45). Settlement on the island resumed ca. AD 1100, at the time of Byzantine colonisation (Herrin 1972:46).

In summary, the settlement evidence from Kythera reveals two gaps:

1. between ca. 1100 and 800 BC (Polis) or ca. 700 BC (elsewhere);
2. between AD 650 and 1100.

The first gap falls after the demise of the Mycenaean palaces on the Greek mainland (Post-palatial period, ca. 1200 BC) and before the rise of Archaic Greece in the Early Iron Age, which saw widespread abandonment in the region and will be discussed in due course (see Kea). With regard to the second gap, the KIP survey found no material dated after the end of the Roman period, or relating to the Early Byzantine period (ca. late seventh to tenth centuries AD). This lack of material is supported by Byzantine texts, which briefly mention that the island was practically abandoned (Herrin 1972; Vroom 2003) and that its soils were very poor in the tenth century AD (Hetherington 2001:174). Hetherington explains this general abandonment, and possible population retreat into the fortified citadel (cf. Lipari, see below), as being the result of the eighth-century Arab conquest of Crete, which was used as a base to launch raids on the surrounding islands (2001:xvi). Following this, there is some pottery from coastal and inland sites dated to the Middle Byzantine period (eleventh–twelfth centuries) (Hetherington 2001:174). The dearth of material found for the Early and Middle Venetian periods (or Late Byzantine, i.e., thirteenth–fourteenth and fifteenth–sixteenth centuries) suggests low population numbers, which only picked up in the Late Venetian and recent periods (seventeenth–eighteenth and nineteenth–twentieth centuries, respectively) (Vroom 2003, in *http://www.ucl.ac.uk/kip/byzmodceramics.php*).

NAXOS

Naxos is the largest (428 sq km) and highest of the Cyclades (1,000 m asl). Situated at the centre of the archipelago, the island has major valley systems with abundant arable land and springs (Broodbank 2000:77). Because of its size, location, and resources, it could support a demographically self-sufficient population (Broodbank 2000:88; see also Table 8.1). Human occupation here is documented from ca. 5200 cal BC. Until the early 1980s, the Neolithic finds from Naxos were few, amounting to a figurine from Sangri, bone spatulae from Zas, and unconfirmed pre–Bronze Age finds at Grotta. According to Broodbank, these were 'all promising signs, but insufficient to affirm colonisation by Cherry's criteria' (2000:125). Twenty years of archaeological investigation have resulted in the identification of two Saliagos (Late Neolithic) culture settlements at Grotta (Hadjanastasiou 1988) and Zas (Zachos 1990; 1996; 1999), three lithic sites, and two other scatters of Neolithic material (Broodbank 2000:122, 125; Davis, J.L. 2001:59). To this we may now add the recent discovery of Mesolithic material from the island (Sampson et al. 2012). The evidence from both Grotta and Zas shows that the sites were occupied during different periods (Zachos 1990; 1996; 1999): the basal layer at Zas (which contained Saliagos culture material) was covered by two Final Neolithic layers (contemporary with Kephala and Grotta-Pelos cultures), and then by an EB I and a late EB II layer, the latter two separated by a stratigraphic gap.

The settlement pattern during the Grotta-Pelos (3500–2700 BC) and EB II (2700–2200 BC) periods featured small settlements (just a few families) scattered throughout the island (Broodbank 2000:177). During EB II, through a process of site nucleation, three large settlements came into being: Grotta, Mikri Vigla, and Rizokastellia. At the same time, this period saw a reduction in population on other

Cycladic islands (Broodbank 2000:178). Subsequently, in the Late Bronze Age, most of the population clustered at Grotta, while there is no evidence at the other sites for occupation until the Iron Age (ninth century BC) (Hadjanastasiou 1989; 1993; Barber and Hadjanastasiou 1989), when we know that the island was inhabited (Hetherington 2001). The only site where there is possible evidence of settlement continuity during this period is Grotta. According to Snodgrass, these were 'Mycenaean-type communities', refugees who were fleeing the 'great wave of disasters' of this period (1971:63). Although Snodgrass claims that the settlement at Grotta survived throughout the Mycenaean IIIC, Protogeometric, and Geometric periods (1971:361–5), Lemos has since argued that the area had become a burial ground and that the settlement must have been located elsewhere, possibly on the acropolis (2002:147). She concludes that Naxos was probably continuously occupied from the Bronze to the Iron Age, although there was perhaps a 'short gap' before the Early Protogeometric period (2002:208). This possibility relies on a stratigraphic discontinuity at Grotta which was first noted by Condoleon (1949), the original excavator of this site. As noted by Desborough, Condoleon's original site report is not sufficiently detailed to either prove or disprove the existence of this gap, which is largely based on the different orientations of the foundation structures belonging to the LH IIIC and Protogeometric periods (Desborough 1964: 150). However, on the whole, Desborough (1964:152) believed that the evidence from Naxos showed no interruption of habitation at the end of LH IIIC, but rather settlement dislocation (cf. Lemos 2002). Occupation on the island was then continuous from the Protogeometric period to the present day. Rome conquered Naxos in 41 BC and held it until AD 326; subsequently the island became part of the Byzantine Empire (AD 362–1204) (Hetherington 2001:xix). In 1204, Venice took it over from Genoa and created the Duchy of Naxos, a dukedom which had control over most of the Cycladic islands. Overall, the data from Naxos indicate that the island experienced drastic settlement contraction at the end of the second millennium cal BC, when a single known site, Grotta, seems to have survived a phase of generalised abandonment.

Settlement history on Naxos was on the whole more successful than on most of the other Cycladic islands: as we saw, in the second millennium cal BC the island had three large settlements, when population on most other islands was concentrated at a single site (Hadjanastasiou 1989; 1993; Barber and Hadjanastasiou 1989). The obvious explanation for this is that Naxos lies in a central position within the Cyclades and benefits from abundant resources. These favourable biogeographic characteristics allowed the island's initial settlement to be followed by the establishment and consolidation of its population, which could be sustained in the long term. Nonetheless, like several other Cycladic islands, Naxos suffered periods of decline despite its biogeographical position. It is possible that, in this case, the increased involvement of the people of Naxos in broader networks made them more vulnerable than in the Neolithic, when they were not yet tied into such networks (Broodbank 2000:320).

MELOS

With an area of 151 sq km and a maximum altitude of 750 m asl, Melos is a 'medium-large island by Cycladic standards' (Renfrew 1982b:279). It is the first landfall from the southern Peloponnese towards the east and benefits from a large bay. It is a volcanic island endowed with extensive arable land (one-fifth of the total area, ca. 3000 ha), and with a few wells in areas of lowland alluvium (e.g., at Phylakopi and in the Chora plain) (Wagstaff and Gamble 1982:98). Whole drought years are known to have occurred two or three times a century (Wagstaff and Gamble 1982: 101). The volcanic soils are fertile, resulting in high agricultural productivity, which continues to the present day (Davidson and Tasker 1982:82; Wagstaff and Augustson 1982:132; Wagstaff and Gamble 1982:98). The island offered several other resources: migratory birds, hares, and rabbits, which inhabited the island from at least the Late Bronze Age (Wagstaff and Gamble 1982: 98). The island forest cover comprised oak and Aleppo pine, which may have been used for building boats. The island is famous for being the source of the only high-quality obsidian in the Aegean (Cherry and Torrence 1982:24). As is well known, Melian obsidian has been found at Franchthi Cave on the Greek mainland, which provides undisputable evidence that people were travelling by sea to Melos in the Upper Palaeolithic (Perlès 1987:142). There is as yet no evidence for permanent occupation on the island during this period.

Permanent occupation is attested in the Late Neolithic, when Cherry and Torrence (1982) estimate as many as two to three dozen sites on the island (which they link to the exploitation of the obsidian sources rather than to settlement). Broodbank took this much later horizon to indicate that Late Neolithic settlement was unrelated to the early phase of obsidian exploitation in the Upper Palaeolithic (2000: 128, 157). With one exception, occupation was continuous after this initial colonisation up to the Late Roman period, a fact that can be explained by some of the factors already mentioned (resources, soil fertility) (see Table 8.2 for detailed chronology). There is, in spite of intensive survey, a conspicuous lack of finds for the period from ca. 1100 to 800 BC (Sparkes 1982:45), which is paralleled on Kythera and Naxos (with the exception of Grotta). This may indicate widespread abandonment during this period. Assuming the island was abandoned (1100–800 BC), it appears the process was not sudden. Phylakopi, on the northeastern coast of Melos, emerged as the island's single dominant centre during the second millennium cal BC, indicating that the many settlements known during the Neolithic and Early Bronze Age had gradually extinguished by then (Wagstaff and Cherry 1982b:251). Phylakopi may have been the only site on the island to be permanently inhabited throughout the second millennium (although another potential IIIB/C site is Agios Spyridou), when it was eventually abandoned ca. 1100 cal BC (Sparkes 1982:45). Potential causes for this period of abandonment are discussed below (see island of Kea).

A second 'primate' or key settlement was founded in late Geometric times near the bay, ca. 8 km away from Phylakopi, by a new group of inhabitants who settled

Table 8.2 Political status of Melos through time

Date	Period	Status
ca. 4500–3300 BC	Neolithic	Exploitation, perhaps sporadically occupied
ca. 3300–2300 BC	Grotta-Pelos and Keros-Syros cultures	Dispersed, probably autonomous homesteads; local autonomy
ca. 2300–2000 BC	Phylakopi I	Trend towards nucleated settlements, some ranking, island autonomy
ca. 2000–1600 BC	Phylakopi II	Nucleated settlement; possible state formation, island autonomy
ca. 1600–1400 BC	Phylakopi III	Possible Cretan assimilation
ca. 1400–1100 BC	Phylakopi IV	Possibly independent Melian state
ca. 1100–700 BC	Iron Age	Initial fragmentation (or abandonment), perhaps homesteads, early settlement at Ancient Melos
ca. 700–416/415 BC	Archaic and Classical	Independent state of Melos
416/415–405 BC	Late Classical	Athenian colony
405–338 BC	Late Classical	Spartan domination
ca. 338–150 BC	Hellenistic	Macedonian domination
ca. 150 BC–AD 300	Roman	Roman domination
ca. AD 300–650	Later Roman/Byzantine	Melos dominated by Nicomedia, then Costantinople; Ancient Melos abandoned in the 5th century AD: settlement dispersal
ca. AD 650–960	Byzantine	Arab–Byzantine conflict
ca. AD 960–1207	Late Byzantine	Lack of effective control from Constantinople; quasi-autonomy; used as a pirate base
AD 1207–1564	Frankish (Duchy of Naxos)	Venetian domination; autonomy of the Duchy
AD 1564–1820	Ottoman	Domination of Istanbul
AD 1821–present	Greek independence	Governed initially from Nauplia, then from Athens

Source: Adapted from Renfrew 1982b:265, table 20.1, with the permission of Cambridge University Press.

what later became the classical site of Ancient Melos (Renfrew 1982a:35 ff). Ancient Melos was occupied continuously throughout the Classical, Hellenistic, and Roman periods, before it was abandoned around the sixth century AD (Wagstaff and Cherry 1982b:251). Occupation resumed in the eighth century AD, when great demographic expansion is documented (Sparkes 1982:47).

The apparent fall and rise in population raises anew the question of 'archaeological visibility'. It has been suggested that once Ancient Melos was abandoned, it was succeeded by a few scattered sites that were much smaller, and thus much less archaeologically visible, even if their location may still be indicated by the remains of a few early churches (Wagstaff and Cherry 1982b:254). The island may have been abandoned again between the late ninth and eleventh to twelfth centuries, perhaps because of Arab raids during the late eighth and ninth centuries, and was partly resettled at the end of the eleventh century (ca. 1080) by small monastic communities, with a population at the end of the twelfth century estimated at only a few hundred individuals (Sanders 1996:148). In spite of this, according to Wagstaff, the island may have prospered under the Byzantine Empire, to which it belonged until 1204 (1982:58). After the Fourth Crusade, Melos became part of the Duchy of Naxos. Chora emerged as the dominant centre by the late seventeenth century AD but was replaced by the site of Kastro before the nineteenth century (Hetherington 2001:204).

KEA

Kea (130 sq km) is separated from mainland Greece by a narrow channel (ca. 20 km), with an intervening stepping-stone island (Makronisos) (Cherry et al. 1991b:57). The island is hilly and has good water sources; it has steep coasts but good anchorage. The northwest of the island was the area targeted by an intensive survey (Cherry et al., eds. 1991), which defined various phases of human occupation and abandonment for the island (Table 8.3). The earliest evidence for occupation found in the survey area dates to the Final Neolithic, from which three sites are known: Kephala, Paoura, and Ayia Irini Period I (fourth millennium cal BC) (Cherry et al. 1991c: 225). The Neolithic material found on the island is very similar to that on the mainland, particularly Attica (to which, as mentioned, Kea lies very close).

Kephala, which has yielded evidence of a mixed farming economy, has been interpreted as a permanent settlement (based on its size, 2–3 ha, the density of material found there, and an associated cemetery which was used for over two or three centuries) (Cherry et al. 1991c:225). Paoura, which so far lacks a cemetery, was larger and supported a community estimated at between 75 and 130 individuals. Coleman (1977:111) suggests that Ayia Irini (Period I) was settled once Kephala was abandoned. To the three main sites, Cherry et al. added the sites of Sykamia and two 'special-purpose' lithic scatters close to Kephala (1991c:225–6). All of the Late Neolithic sites (except Ayia Irini) were short-lived and were abandoned before the start of the Early Bronze Age. A stratigraphic gap after Period I indicates that Ayia Irini Period II may have been reoccupied following a period of abandonment. This possibility is supported by J.L. Davis (2001:27), who notes that Period II is a 'fully developed EBII phase of occupation'. By the Early Bronze Age, Cherry et al. refer to Ayia

Table 8.3 Kea chronology

Period	Sites	Population of Kea	External control	Comment
Neolithic (later 5th–4th millennium cal BC)	Few settlements; none dominant	Low; largest settlement probably < 100	None	Island colonised for first time
ECyc (late 4th–3rd millennium cal BC)	Single primate centre at Ayia Irini, almost total nucleation	Max 780–1,250 at Ayia Irini	None	Recolonisation after abandonment?
MCyc–LCyc II 2nd millennium–ca. 1450 cal BC	Same	Same	None?	Recolonisation after abandonment?
LCyc III ca. 1450–ca. 1100 cal BC	Same	Considerably reduced	None?	—
PG–G 1050–700 cal BC	Specialised religious facility at Ayia Irini, no evidence for central places.	Very low	None? Euboea?	Northern Keos largely abandoned?
A–Early HL 7th–4th centuries BC	Primate centres at Koressos and Ioulis; considerable settlement in rural hinterland	High; over 4,000 on the island, over 1,000 in Koressos	Athenian Leagues; Ptolemaic Egypt	No evidence that either centre formed through aggregation of smaller dispersed communities
Late HL–ER 1st century BC–AD 3rd century	Primate centre at Ioulis; almost total nucleation	?	Athens; Rome	Polis of Koressos has collapsed and centre is deserted
LR 4th–7th centuries AD	Primate centre at Ioulis; some rural settlement	?	Athens? Rome	—
EByz mid-8th–10th centuries AD	Primate centre at Ioulis, total nucleation?	?	Byzantine Empire	Ioulis now becomes Chora —only settlement on island?
MByz 10th–early 13th centuries AD	?	?	Byzantine Empire	Same
LByz–Venetian mid 13th–mid 16th centuries AD	Primate centre at Ioulis; little or no rural settlement	Low? ca. 1,500?	Byzantine Empire, Venice and dependencies	Same

Table 8.3 (*continued*)

Period	Sites	Population of Kea	External control	Comment
Turkish mid-16th century–1833 AD	Same	ca. 4,000–5,000 in later 17th to early 19th century	Turkish Empire	Same
Modern	Considerable rural settlement, primate function of Ioulis eroding, establishment of weak settlement hierarchy	ca. 3,200 in 1828; peaks at ca. 4,900 in 1896; falls to less than 1,700 at present	Modern Greek state	Several permanent settlements other than Ioulis

Source: Adapted from Cherry et al. 1991e:466, table 22.2, with the permission of UCLA Institute of Archaeology.

ECyc, MCyc, LCyc = Early, Middle, Late Cycladic;
PG, G = Protogeometric, Geometric;
HL = Hellenistic;
ER, MR, LR = Early, Middle, Late Roman;
EByz, MByz, LByz = Early, Middle, Late Byzantine

Irini as 'a significant settlement integrated into regional exchange networks' (1991c: 226), experiencing prosperity during Periods II and III (2700–2200 BC). Ayia Irini was then abandoned once more in EB III (there is another gap in the sequence of the site), only to be reoccupied in the Middle Cycladic period or early Middle Bronze Age (Ayia Irini Period IV, ca. 1900 BC), when it was the only settlement on the island (Wilson and Eliot 1984:78; Cherry et al. 1991c:230; Davis, J.L. 2001:29). This period has been interpreted by some as a phase of generalised abandonment and decline in the Cyclades, although, as we shall see, this view has been challenged (Rutter 1983; 1984; Manning 1997; Broodbank 2000).

Broodbank (2000:336–49) put forward a potential explanation for the general decline of this period, which involved sociopolitical and environmental factors on a large scale. The late third millennium cal BC witnessed the collapse of the Akkadian Empire, Old Kingdom Egypt, and Levantine urbanism (Broodbank 2000:325). These processes of decline may have reverberated across considerable distances. He also draws on evidence for increased aridity, land degradation, demographic changes, internal competition, conflict, and improved seafaring, which may have provided the *coup de grâce* to island societies already stretched beyond their carrying capacity. Conversely, the early second millennium saw the emergence of the Minoan Palace-states, with the result that small island communities came under the influence of a new political system (Broodbank 2000:350). Although the data from Kea support the hypothesis that this island was abandoned at this time, there is not sufficient evidence in other areas to substantiate the idea of a more generalised

Cycladic abandonment or gap. Broodbank (2000:320) has argued that the archaeological evidence indicates 'a change in the islanders' way of life' and not necessarily overall abandonment. Rutter (1984) had already rejected the idea of total abandonment of the islands, since it is based on just a few sites. Ayia Irini on Kea provides the only indisputable evidence for abandonment (between Periods III and IV).

On Kea, Ayia Irini Period IV saw the building of fortifications, which were destroyed and rebuilt at the start of Period V (corresponding to the MM IIB/MM IIIA period). There is some material for the latest phases of the Bronze Age at Ayia Irini (Periods VI, VII, and VIII), but the rest of the island seems to have been abandoned. Occupation seems to have gradually resumed in the Protogeometric and Geometric periods (mid-eleventh to eighth centuries BC), although it is possible that most of Kea was still abandoned, since high densities of pottery are dated only between 700 and ca. 200 BC (Archaic to Hellenistic periods), when four Archaic *poleis* were founded (Cherry et al. 1991e:474–5).

Kythera, Melos, and Kea appear to have been abandoned between ca. 1100 and 700 BC, while only Grotta seems to have been occupied on Naxos during this same phase. This period falls between the end of the Mycenaean palaces (start of the Postpalatial period) and the rise of Archaic Greece. It has traditionally been seen as a phase of cultural involution leading to a 'dark' age, arguably linked to the arrival of new populations. According to Snodgrass and other researchers, this phase saw a drop in demography, a decline in material skills and arts (writing, in particular), and 'a general fall in living standards' (Snodgrass 1971:2; Osborne 1996:30–1; Whitley 2001:77). Osborne distinguishes between 'the decline of the Palaces and of the people' and emphasises the survival of Mycenaean traditions for another millennium (LH IIIC or Late Minoan IIIC period) (as seen at Perati in Attica, Ialysos on Rhodes, and Emborio on Chios) (Snodgrass 1989:23; Osborne 1996:21; Whitley 2001:77, 79). Although Osborne excludes wide-scale abandonment in the Greek peninsula, he points to a dearth of sites ca. 1200 BC, as compared to the immediately preceding period (1996:19). According to Whitley (2001:79), survey data since the early 1970s support the figures from Snodgrass (1971) and a dramatic reduction in the number of occupied sites in the Aegean area, which in turn has been taken to indicate an overall fall in population (inferred from both the lack of sites and cemetery data) lasting until ca. 800 BC (Snodgrass 1971:364–5; Osborne 1996:23; Whitley 2001:80). Snodgrass explains that, in most cases, decline occurred in the later part of the twelfth century BC, while abandonment may have lasted into the eleventh and tenth centuries BC (Snodgrass 1971:364–5), which corresponds well with the data from Kythera, Melos, and Kea. At the same time, however, several sites (e.g., Lefkandi, Tiryns, Argos, Athens, Grotta on Naxos, and Mycenae itself) indicate that Mycenaean communities survived (Snodgrass 1971:368; Osborne 1996:20–1). Many 'refugee' sites were founded from 1250 BC onwards in remote defensible places on islands, mostly to be abandoned by ca. 1000 BC (Osborne 1996:49; Whitley 2001:78).

From then on, occupation on Kea was continuous for some time (Sutton 1991:245), although the island's main Roman centres produced little material after the seventh century AD, when there is very little material from the Kea survey area overall up to the nineteenth century, with the exception of the Middle Byzantine period (eleventh to ca. early thirteenth century AD) (Cherry et al. 1991d:352, 354). Only 15 sherds from nine locations have been identified as belonging to the period from the later thirteenth to mid-sixteenth centuries; finds of the Turkish period (sixteenth to early nineteenth centuries) are also missing, and artefacts either increase or become more easily recognised after the Greek revolution (Cherry et al. 1991d:352, 354).

Cherry et al. (eds. 1991), who discussed in detail the diverging cultural trajectories of Kea and Melos, noted that although the two islands have comparable sizes and environments, their settlement histories are different. They explained this partly by the fact that Kea lies very close to Attica. The Kea survey was able to establish that central places were created in northern Kea three or four times, often as new foundations. Cherry et al. (1991a:7) have suggested that the island's proximity to Attica may have prevented continuous development at Ayia Irini and on Kea generally.

CYPRUS

Cyprus, the third largest island in the Mediterranean (after Sicily and Sardinia), with a surface of 9,240 sq km and a 648 km long coastline, lies 97 km west of Syria and 64 km west of Turkey. The main topographic features are a central plain (Mesaoria), surrounded by mountains both to the north (Kyrenia Mountains) and to the south (Troodos Mountains) (maximum altitude 1,951 m asl), and several other plains scattered along the south coast. Cyprus enjoys a typically Mediterranean climate (hot, dry summers and cool, wet winters) and suffers moderate earthquake activity. The island has several resources, including small amounts of copper, pyrite, gypsum, timber, salt, and marble. Most freshwater sources are clustered in the north (*http://www.britannica.com/*).

Early Cypriot chronology has been divided into the following phases (from Peltenburg 2003:86, table 11.2):

1. Akrotiri-*Aetokremnos*: eleventh millennium cal BC–?
2. Pre-Khirokitia: ninth–eighth millennia cal BC
3. Khirokitia: seventh–sixth millennia cal BC
4. Sotira: fifth–fourth millennia cal BC

Much debate surrounds issues of occupational continuity at the end of the first and third phases, while, as mentioned in Chapter 5, the discovery of Early Aceramic Neolithic (EAN) sites have eliminated the 'awkward' gap between phases 2 and 3. While it is possible that further research on Cyprus will also result in dismissing the remaining two occupational gaps, these still remain for the present and are thus investigated further in the next two sections. The later history of Cyprus is not dealt with in this study, as the island's subsequent occupation record was continuous.

The Akrotiri–Pre-Khirokitia 'Gap'

There appears to be a millennium-long gap between the occupation of Akrotiri-*Aetokremnos* (late eleventh/early to mid-tenth millennium cal BC) and Ayia Varvara-*Asprokremnos* (9000–8500 cal BC) and other EAN sites (see Table 5.8). As we saw in Chapter 5, radiocarbon determinations for stratum 2 at Akrotiri-*Aetokremnos* span some 800 years; however, there are difficulties in establishing how long this occupation actually lasted and whether or not it was continuous. A question that is now being answered relates to whether several other parts of the island were occupied at this stage (as seems to be the case); still unresolved is whether the island was eventually abandoned or colonisers retreated to as yet undiscovered locations.

As we have seen (Chapter 7), populations below 300 to 500 people cannot be sustained as closed communities (Adams and Kasakoff 1976; Williamson and Sabath 1984; Wobst 1974). Therefore, several camps should have existed on the island to reach these numbers. It is possible, as suggested by Simmons (1999:323; *contra* Binford 2000), that once the island's megafauna were killed, other resources were exploited (e.g., birds and shellfish) until the island was abandoned. However, Peltenburg et al. (2001:46) argue that resource exhaustion would not have been an obstacle, since visits to the mainland (and, indeed, vice versa) were possible, and animals could be reintroduced to the island. The possibility of movement also meant that the existence of several contemporary camps, although helpful, was not strictly necessary.

The evidence from Nissi Beach and Akamas-*Aspros* (Ammerman and Noller 2005; Ammerman et al. 2006, 2007) would, if confirmed, substantiate a longer phase of island exploitation by early colonists using different locations within the island. The data are still not sufficient to establish whether a population survived elsewhere in Cyprus after the sites were abandoned, or whether its inhabitants lived more regularly on the island or on the mainland. Seasonality patterns from Akrotiri-*Aetokremnos*, however, do indicate that the shelter was probably occupied all year round (Simmons 1999:181). An alternative view is that these discontinuities represent not a real hiatus but 'regular return visits' of seafaring foragers to the Levantine mainland (McCartney 2010:188). Either way, we may think of these discontinuities as being the result of mobility rather than abandonment (where no return is anticipated).

In light of these recent discoveries, and of the increasingly earlier EAN sites now known on the island, it seems to me only a matter of time before this gap is reduced even further and a transitional phase is identified between the Late Epipalaeolithic and EAN sites. At present, though, it is still not possible to say with certainty whether Cyprus was continuously occupied between and even throughout these periods. Given that there is as yet no evidence during a period of approximately 500 years, it can be hypothesised that the island was in fact abandoned and subsequently recolonised by farmers from the mainland.

The Khirokitia–Sotira 'Gap'

Another occupational gap sits rather conspicuously between the end of the Khirokitia aceramic Neolithic and the start of the ceramic Neolithic, or Sotira period. The gap is again in the order of a thousand years (Peltenburg 2004:84). In strong contrast to the situation for the earlier Neolithic, the state of affairs has not changed greatly since the early 1990s, when Cherry made the point that 'to envisage uninterrupted expansion . . . after the Khirokitia Culture, despite the absence of sites, presupposes a massive inability to recognize relevant evidence' (1990:157). There is no later aceramic Neolithic evidence at Mylouthkia, and Peltenburg et al. have made the suggestion that occupants left the site and moved inland to Kissonerga, which, they note, is almost a thousand years later (2002:93). This gap in the evidence prompts the question as to what happened during this period.

Held (1989b:171–208) originally explained the absence of sites as a form of involution and decrease in settlement, rather than actual abandonment. Cherry, on the other hand, postulated that the disappearance of so many long-lived sites points towards an 'extinction model' (1990:157). The longevity of the Khirokitia phase is striking (it lasted for up to two millennia, according to Held [1989b:211–84] and Knapp [1990: table 1]), with more than 20 sites known in 1990 (Cherry 1990:155), possibly even exceeding 50—although only 17 or 18 are considered as actual settlements (Held 1986:10).

Knapp (2013:154) also considers this gap, which he estimates as being somewhat shorter, in the order of 300 to 700 years. He points out that there is no evidence of destruction, but 'discontinuities in the stratigraphic records of the best-known sites' could indicate their abandonment. Ultimately, he believes that the gap is a product of the radiocarbon dates, and that, rather than wholesale abandonment, it may represent changes in settlement practices and a return to mobility (perhaps caused by warmer and drier climatic conditions), leading again to issues of archaeological visibility. Similarities between the two periods in certain material features, such as the bone tool industry, also suggest some degree of continuity; and perceived differences, such as the introduction of pottery, may have been the result not of recolonisation but of a 'booster population' from the mainland (Knapp 2013:156).

While total abandonment remains a possibility, it is hard to see what triggered such a wholesale depopulation of the island at this stage. It seems reasonable to support Held's original view (1989b), revived by Knapp (2013), and argue in favour of changes in settlement patterns, as discussed by Broodbank (2000) for the Neolithic Cyclades, with a pattern of larger settlements replaced by a more dispersed set of much smaller and less archaeologically visible sites.

PALAGRUŽA

Palagruža is a tiny island (0.3 sq km) in the middle of the Adriatic (130 km from the nearest mainland). The main topographical features are a promontory (90 m asl) at the western end of the island and a ridge to the east broken by two small plateaux (Kaiser and Forenbaher 1999:321). Because of its limited size and relief, the island has little arable land, although in medieval times, ca. 7 ha (= 0.07 sq km) were terraced and grain was grown. Palagruža has no source of freshwater, but rainfall throughout the year is enough to support some vegetation and small-scale dry farming (Kaiser and Forenbaher 1999:313). Table 8.1 indicates that the island, being so small, could not sustain an endogamous population at prehistoric densities.

In spite of this limited biogeographic potential, the island has revealed, remarkably, six archaeological sites, dated to the Early Neolithic (sixth millennium cal BC), Late Copper/Early Bronze Age (Cetina culture, ca. 2500–1800 cal BC), Classical and Hellenistic Greek, and Roman times (Kaiser and Forenbaher 1999:314). While it is likely that people still went to the island (or stopped over) after the Early Neolithic, there are no traces of regular human presence in the Middle and Late Neolithic (fifth–fourth millennia cal BC) (Kaiser and Forenbaher 1999:321), and, according to Johnston (2002:28), there is no evidence of occupation after the Early Bronze Age until the sixth century BC.

As mentioned, the lack of biogeographical resources is in stark contrast with the rich archaeological record of the island, although in the context of this discussion, it may account for its discontinuity. A chert source on neighbouring Mala Palagruža (an islet just 200 m away) may have provided the motive for initial visits to both islands (since they lie in such close proximity); and their role as stopovers, positioned in the middle of the Adriatic, is another obvious reason. There is evidence that chert was widely processed: on Palagruža, there is an extensive surface scatter of worked chert debris (over an area of more than 6,000 sq m) (Kaiser and Forenbaher 1999:319). The repertoire is limited (mainly blade segments and arrowheads) and not typically domestic, which Kaiser and Forenbaher took to indicate craft specialism, with items made for exchange rather than for local consumption, and the occupants of Palagruža being 'part-time residents' (1999:321). Evidence for exchange comes from finds of (possible) Palagruža chert on the Dalmatian islands of Hvar and Vis, and bladelets of Lipari obsidian found on Palagruža (Kaiser and Forenbaher 1999:321). Clearly, the island's location at the centre of the Adriatic (emphasised by the island's Greek name, *Pelagosa*, i.e., 'of the sea') was a powerful incentive to colonise it.

Kaiser and Forenbaher (1999:321) believe that people began to stay longer on Palagruža from the end of the Copper Age/Early Bronze Age, which is when deep-sea fishing is thought to have started in the area. This is supported by Chapman et al. (1996:283–6), who place the first permanent occupation of Palagruža in the Cetina period, which on the mainland is characterised by cairn burials, some of which have produced chert products from Palagruža, indicating that the island was part of the Cetina cultural network (Kaiser and Forenbaher 1999:322). When the mainland elites began to use bronze, it is likely that interest in Palagruža's chert declined rapidly, but the island was still visited as a convenient stopover (Kaiser and Forenbaher 1999:323), which has remained the main role of the island up to the present day. There are just a few sherds to indicate a Greek presence on the island from the Archaic until the Hellenistic period (Johnston 2002:28). Johnston suggests that during the earliest period, dedications to Diomedes (who is linked with maritime trade and travel) on the sherds indicate that the island was used occasionally by mariners for ritual purposes (the sailing season is from April to October); while between the third and first centuries BC, Palagruža's position caused its involvement in conflicts between the Romans and Illyrian pirates, and then its takeover by the Romans (Johnston 2002:28). Since the Second World War, the island has been uninhabited but for the lighthouse keeper.

Hvar

Hvar, with a surface area of 312 sq km and a maximum altitude of 626 m asl, lies, with its smaller satellite islets, very close to the Croatian mainland (ca. 2 km). The island has good arable land and benefits from a rainfall regime of ca. 800 mm per year evenly spread throughout the year.

The island has been the subject of an extensive archaeological survey (Adriatic Islands Project, AIP), results of which have defined a series of phases of occupation (Gaffney et al. 2000:186–7). The evidence for the earliest occupation of the island is Early Neolithic impressed ware found in a cave site (Markova Špilja). Occupation continued in the Middle Neolithic (ca. 6750–6500 cal BC) (Danilo culture) and into the Late Neolithic, when the main culture for this period in Croatia is named after the island itself, Hvar culture (Novak 1955).

The island's settlement record as a whole can be contrasted with the history of individual sites. Excavations at the Grapčeva Cave (Novak 1955; Gaffney et al. 2000) have produced evidence of 3,500 years of occasional occupation, spanning the periods from the Late Neolithic to the Bronze Age. Material evidence shows that people visited the cave repeatedly during the fifth millennium cal BC (Late Neolithic), and that occupation continued during the Late Copper/Early Bronze Age. The first archaeological discontinuity in the island's record occurs in the Middle Bronze Age (MBA) (cf. Palagruža), with very little evidence for settlement and land use in the AIP survey area. The same period is also poorly known on the mainland (central Dalmatia) (Gaffney et al. 2000:187). Gaffney et al. speculate that this decrease in evidence could be interpreted as a real pattern of depopulation, although MBA pottery was found associated with a large enclosure above the town of Hvar, suggesting perhaps a change from a more dispersed to a more nucleated settlement pattern on the island at this stage.

Settlement increased again both on the mainland and on Hvar during the Late Bronze Age and throughout the Iron Age (ca. eleventh–tenth centuries BC), both in defended hilltop enclosures and in non-defended locations (e.g., Stari Grad) (Gaffney et al. 2000:188). There are signs of increased exchange between the Dalmatian and Apulian coasts during this period (finds of Liburnian manufacture in Italy, and Apulian Geometric pottery in Dalmatia) (Gaffney et al. 2000:188).

When the Greeks reached Hvar, they probably first settled at Pharos, at Stari Grad, which was founded in 385–4 BC (Gaffney et al. 2000:192). The colony and its agricultural hinterland supported a population of ca. 1,100 people, and it is estimated that, in the fourth to third centuries BC, up to 1,000 people lived in the town itself, before the colony was destroyed in 219 BC and suffered a long decline during the Hellenistic period (second Illyrian war) (Gaffney et al. 2000:193). Following this, Pharos became a Roman possession (it was a colony by the late first century BC), from which point several rural settlements prospered on the island, both in the Stari Grad plain and elsewhere, if fertile land was available (Gaffney et al. 2000:194). Wilkes has linked this period of prosperity to immigration from the Italian penisula (1969:230–5). The locations of the main Roman sites seem to respect those of pre-Roman Illyrian communities, but, according to Gaffney et al. (2000: 195), the introduction of water-resistant concrete for building water cisterns allowed new foundations in arid areas, such as the southern coast of the island, which was settled at this time, but not again until the fifteenth century AD.

Most Roman villa sites were abandoned in the third century AD, when substantial land clearance suggests that the island became a single estate centred on a single villa (as on the nearby island of Šćedro), controlled by Salona, the main colony on the Dalmatian coast, up to the sixth century AD (Gaffney et al. 2000: 196). The sixth century AD on Hvar saw a period of massive fortification building, such as that at Gradina, which protected the small peninsula near Jelsa. Hvar suffered the consequences of the fall of Salona in the seventh century AD, which cut off the island communities that had relied on the capital. Only one villa (Carevac), located in the middle of the plain, may have lasted into the sixth and seventh centuries, but other large villa sites disappeared one or two centuries earlier (Gaffney et al. 2000:197).

Pitiussae Islands

The two Pitiussae Islands lie very close to each other (less than 1 km apart) and are ca. 90 km from the Spanish mainland and ca. 50 km from the Balearics. They also have very different geological and topographical characteristics (Bellard 1995:442): Ibiza, which is the larger of the two, has small fertile plains with springs in areas of underlying clay. The annual rainfall (400 mm/year) is sufficient to support farming, but otherwise the island lacks food resources: it has very few large mammals (only the rabbit and the genet survive, and there is no evidence that *Myotragus balearicus* ever inhabited the island), although birds are abundant. Formentera is flatter (maximum altitude ca. 200 m asl). The current annual precipitation (370 mm) is slightly lower than Ibiza's, but its different geology (which is mainly calcareous) does not retain water, so vegetation is scarce (Bellard 1995).

Human presence on both these islands—which, as discussed in Chapter 4, began around 2000 cal BC (Bellard 1995:447; Costa and Guerrero 2002:489)—does not seem to continue after 1300–1200 cal BC (EBA–MBA), when the rapid disappearance of open-air habitation sites, caves, and megalithic tombs indicates that the islands may have lacked a permanent population and experienced prolonged periods of abandonment. This was documented through a systematic survey of the island in the late 1980s (Bellard 1995). Ibiza seems to have been practically deserted between 1300 and 650 BC, when it was reoccupied by the Phoenicians/Carthaginians, who also occupied Formentera in the fourth century BC (Bellard 1995:451, 453; González and Díes 1993:348–53).

According to Costa and Guerrero, the latest available evidence from the Early and Middle Bronze Age periods on Ibiza comes from sites excavated before the mid-1980s (which are largely unpublished), such as Puig de ses Torretes, Cueva Xives, and Cueva des Culleram (2002:491–2). On Formentera, this period is better documented (Ca na Costa and another 21 sites on Cap de Barbaria, Can Marroig, Punta Prima, etc.). They argue that renewed attention to these sites may begin to disprove, or at least reduce, the occupational gap on the two islands (2002:495). Their revision relies on two sets of evidence: the burials from Can Sargent (Sant Josep, Ibiza) and a set of hoards of metal objects.

Can Sargent was originally interpreted as a megalithic burial ground, but Costa and Guerrero (2002) view it as an enclosed dwelling. They believe that only subsequently was the site used as a burial ground (on either side of the enclosure) by a small community. An external burial was dated to 720 BC, an inside one to 550 BC. Bellard (1995) gives a different interpretation of Can Sargent: the corridor and part of the chamber, Can Sargent I, which he interprets as a megalithic tomb, produced little material, but a small dagger of Argaric tradition was dated to 1700–1300 cal BC (Topp et al. 1979; Fernández and Topp 1984). According to Bellard, the later dates obtained from the human bones indicate that the tomb was later reutilised or that the sample was contaminated (1995:446). On the basis of this evidence, Can Sargent cannot be taken to represent continuous occupation.

Several hoards of axes and bronze ingots found scattered in six different areas of the islands were described by Delibes and Fernández Miranda (1988:84–101) as possibly belonging to the period falling in this chronological gap. Bellard, however, notes that most objects in these groups are dated to the eighth to sixth centuries BC (and therefore are probably related to a passing Phoenician presence), and only a few objects are older (prior to 1200 cal BC). Costa and Fernández (1992:325–6) have argued that the hoards are atypical of the Phoenicians and so suggest that an indigenous population was present on the island before the Phoenicians settled permanently around 650 BC. This point is dismissed by Bellard (1995:450), because there are no other signs, apart from the hoards themselves, of this presence. Instead, Bellard (1995:451) argues that abandonment is the likely scenario, and that this may have been caused by limited food resources and adverse climatic and environmental conditions.

While the two islands lack resources such as large fauna, their climate and vegetation allow them to sustain settlement; therefore, Bellard's (1995) argument may not be sufficient to explain the abandonment of the Pitiussae (he used the same argument to explain their late colonisation). Lull et al. (2002:122–3) have noted that material evidence from a number of sites on the Balearic Islands indicate important changes ca. 1200 cal BC, particularly in the so-called naviform settlements, which became larger and accommodated more complex structures. The sites of Cova des Carritx and Cova des Mussol on Menorca indicate contacts between the Balearic Islands and parts of central Europe, North Africa, southwest Spain, and possibly Sardinia, which increasingly intensified during the Proto-Talayotic (roughly equivalent to the Pre-Talayotic) period. According to Gili et al. (2006:834), the Proto-Talayotic period saw the development of defensive constructions and increased social conflict, as evidenced by the introduction of swords, rapiers, machetes, and spears. They also point out that the data from the Balearics indicate a steady demographic increase during the second millennium BC. It is unclear if this was the result of demographic immigration, since there is also a high degree of cultural continuity (Gili et al. 2006:839).

Despite a surface of some size and a position in sight of the mainland, the Pitiussae settlements seem both late and intermittent. Food and water resources were important factors in deciding where to settle, particularly if some choice was available (Mallorca, being rich in water and mammals, may have been favoured). Ibiza also has water sources, which were no doubt valued and used; however, it is possible that the general lack of other resources ultimately led to its abandonment (equally for Formentera). This may seem contradictory given the likelihood of island networks of mutual assistance and movement of goods, which were aimed at ensuring the livelihood of islands with fewer resources (although distances between the Balearic and the Pitiussae islands are greater than those between most Cycladic or Aeolian islands). However, the 'pull' of the larger nearby islands may ultimately have proved irresistible and resulted in the abandonment of Ibiza and Formentera (for the 'pull' or 'mainland' factor, see Chapter 7).

Similar processes of occupation, expansion, and contraction within an archipelago are paralleled on the Aeolian Islands and will be explored further in the next section. But for now, it is worth remembering that other, more contingent factors may also have contributed to settlement contraction, and that these may be harder to identify in the archaeological record. The recent past illustrates this possibility: Formentera was abandoned between the fourteenth and seventeenth centuries AD because of raids by Berber pirates (Marí Cardona 1983:9, Gordillo 1981:213–5); and in 1348 the plague hit the islands, devastating the population of Ibiza (Vallès 1993:60–1).

AEOLIAN ISLANDS

The seven Aeolian Islands are all volcanic (their average maximum altitude is 700 m asl), and they range in size from 3.4 sq km (Panarea) to 37.6 sq km (Lipari). Volcanic activity is most evident on Vulcano and Stromboli (which is permanently in eruption). None of the islands could support an endogamous population at low densities; however, the archipelago as a whole would have been demographically self-sufficient (see Table 8.1).

The amount of work carried out on the islands allows us to investigate abandonment processes at the level of the entire archipelago as well as that of the individual islands and sites. Lipari was the first island to be settled and has been almost continuously occupied to the present day, unlike the other islands. Overall, the archipelago experienced phases of both settlement expansion and contraction, with some (but not all) islands showing parallels in their archaeological records, suggesting that certain communities behaved in rough synchrony at certain temporal junctures. This prompts reflection on whether we can ascribe specific communities to individual islands or whether we should envisage an 'Aeolian' population, associated with more than one island at a time within the archipelago. Filicudi and Salina, among the first islands to be colonised, were both abandoned in the Early and Late Copper Ages (it is disputable whether there was an earlier abandonment horizon in the Middle Neolithic followed by reoccupation in the Late Neolithic; see below). They were then reoccupied in the Early Bronze Age and subsequently abandoned again in the Early Iron Age. Panarea and Stromboli, to the east of Lipari, which were occupied at times when Salina and Filicudi were uninhabited, also appear to have functioned in unison at this stage. Alicudi, the farthest island to the west, was occupied for a short period during the Early Bronze Age, which is the only time when the whole archipelago (apart from Vulcano, as far as is known) was occupied.

Phases of expansion and contraction are identified by combining evidence from all the islands (summarised in Balistreri et al.'s archaeological map of the islands [1997:643]; see also Chapter 4). This chronology is based on long phases, dated on the basis of pottery typologies spanning periods of 1,000 or 500 years. The limited number of radiocarbon dates from the islands precludes our dating the actual site occupations more accurately. However, it is rather striking that occupational gaps appear to have been the norm for all the islands except Lipari.

Expansion

Human occupation began in Lipari in the mid-sixth millennium cal BC and appeared soon after on nearby Salina and Filicudi. Abandonment has been hypothesised for Salina and Filicudi to account for the lack of later Neolithic painted wares (Balistreri et al., eds. 1997:642). However, it is likely that the site of Rinicedda continued to be used up to the Diana period (Late Neolithic), since painted wares tend to be found in ritual contexts, such as caves, rather than domestic ones (Whitehouse, pers. comm.). In addition, while intuitively we can assume that the people on Filicudi would be heavily dependent on Salina, the closest and largest island to its east, it is less obvious why the Early Neolithic village of Rinicedda, with its good agricultural land, would have been abandoned and never reoccupied. Evidence for expansion at this time within nearby Lipari lends support to this interpretation: Stoddart (1999a: 65) notes that there was a shift in the mid-fifth millennium cal BC from a centralised pattern based on defensive sites (e.g., the acropolis) to a more dispersed pattern of unfortified locations on plains (such as Contrada Diana and Piano Conte) and occasionally uphill (Piazza Monfalcone). During this period (Diana culture)—which is, importantly, also the period of maximum expansion of obsidian exploitation on the islands—additional sites are found on the other islands, at Fossa delle Felci and Serro del Brigadiere on Salina, at Calcara on Panarea, and at Capo Graziano on Filicudi (Balistreri et al., eds. 1997:643).

By the end of the Diana phase, the villages on Salina and Filicudi were abandoned. During the Neolithic, then, Sicily, the Aeolian Islands, and southern Italy seem to have been culturally synchronised; by contrast, during the following Copper Age, as Bernabò Brea (1957:61) argues, they began to show more marked regional differences. At the same time, the decline in obsidian and rise in metal trade affected the sea routes between east and west (particularly Sardinia, Spain, and France), with the Sicilian channel (between Sicily and Tunisia) and Malta now preferred over the Strait of Messina (Bernabò Brea 1957:69; 1997:415). This damaged the economy of the Aeolian Islands, with the obsidian trade almost disappearing by the Middle Bronze Age (Bernabò Brea 1957:48; 1966:99; 1977; Bernabò Brea and Cavalier 1980).

Contraction

Two distinct, successive Copper Age stages have been identified in the Aeolian islands: Piano Conte (named after the site in the uplands of Lipari) and Piano Quartara (identified for the first time on Panarea). Overall, both are considered to represent periods of demographic and economic decline (Bernabò Brea 1957:21). In the first phase (3500–2600 BC), only the Piano Conte and the acropolis sites on Lipari continued to be occupied, and Stromboli was occupied at Serra Fareddu. During the second phase of the Copper Age (2600–2200 BC), the site of Piana Quartara on Panarea, already occupied in the Diana phase and then abandoned, was reoccupied, and another site was founded on the island, at Drauto, while a new site at Pianicelli was founded after the abandonment of Serra Fareddu on Stromboli. The site of Piano Conte on Lipari was also abandoned, and only the acropolis was occupied at this stage (Bernabò Brea and Cavalier 1968; 1980).

Another Expansion

Contraction during the Copper Age was followed by a great deal of expansion and revival in the succeeding Early Bronze Age, when some 15 sites are known throughout the islands. As mentioned, the obsidian industry had practically disappeared by the beginning of the Middle Bronze Age and was gradually declining throughout the Early Bronze Age. The phase, Capo Graziano, is named after a village on Filicudi (Bernabò Brea 1957:104; Bernabò Brea and Cavalier 1991) (Figs. 8.2, 8.3).

On Filicudi, Piano del Porto was reoccupied following a ca. 1,000-year break. Recent excavations at Filo Braccio indicate it was inhabited for some five centuries

(2400–2100 BC) (Martinelli et al. 2010:307) before settlement moved to the more protected upland area of the Montagnola di Capo Graziano.

FIG. 8.2 View of Filicudi from Capo Graziano towards Piano del Porto (*photo by the author*).

FIG. 8.3 Filicudi, Capo Graziano (EBA) hut (*photo by the author*).

To the west of the archipelago, Alicudi was settled for the first and only time (the site of Fucile). On Salina, two unfortified new villages were founded at Malfa and Serro dei Cianfi. On Lipari, three other unfortified villages were founded at Contrada Diana, Castellaro Vecchio, and Predio Megna. These areas were all reoccupied after being abandoned for roughly a millennium during the Copper Age, and a new site was founded at Pignatara. While settlement continued on the acropolis, Piano Conte was abandoned and not subsequently reoccupied. On Panarea, there was a new foundation at Punta di Peppa Maria, and occupation resumed at Calcara, Piano Quartara, and Punta Milazzese. On Stromboli, occupation continued at San Vincenzo (Balistreri et al., eds. 1997:643).

Bernabò Brea (1997:415) linked the increase in settlement and the shift to coastal locations to the fact that the Strait of Messina had become a major trade route again; but he also credited the 'Eoli'—a new group of people who had arrived in the Aeolian Islands—for the cultural differences now visible between the islands' Capo Graziano pottery and the contemporary Castelluccio culture on Sicily and southern Italy (1957:106; 1985, 1997). Population replacement is difficult to substantiate, but Malone et al. (1994:186) and Giannitrapani (1997:433, 438) have also suggested that the islands' Early Bronze Age culture combined Aegean and Anatolian cultural elements with local Copper Age features. Bietti Sestieri (1997:474) is also in favour of integration rather than of a new people replacing the indigenous population. In her view, Aegean travel to Sicily and the Aeolian islands increased at this time, resulting in the similarities noted in the archaeological record.

Another Contraction

Six villages are known from the islands during the Middle Bronze Age (Milazzese period). On the Lipari acropolis, there is evidence for settlement continuity during this period, while a new site was founded in the south of the island, at Urnezzo. The Milazzese village, which gives its name to the whole period, lay in a fortified promontory on Panarea, and had up to 50 huts and 200 people (Bernabò Brea and Cavalier 1968) (Figs. 8.4–8.5).

Another naturally defended village was founded at Portella, Salina. Both Milazzese and Portella were destroyed by fire (Bernabò Brea 1957; Bernabò Brea and Cavalier 1968:144; Martinelli 2005). The village of Capo Graziano in Filicudi was still in use during this period. There are no cemeteries on the islands for this period, but a substantial contemporary cemetery was excavated at Milazzo (in Sicily) (Bernabò Brea 1957:124; Bietti Sestieri 1997:475, 481; Di Gennaro 1997:427).

According to Bietti Sestieri (1996; 1997:475) and Tusa (1992), the Milazzese inhabitants continued to have contacts with people from the Italian mainland during this period, although perhaps they also began to fear them, which is why fortified locations were selected. The islands were also in contact with the west via Ustica, which flourished during this time (Marazzi 1997:371; Holloway and Lukesh 1995; D'Agata 1997:447). During this period, Mycenaean contacts were highly intensified

FIG. 8.4 Panarea, the MBA village at Punta Milazzese (*photo by the author*).

FIG. 8.5 Panarea, Punta Milazzese hut (*photo by the author*).

(Harding 1984; Vagnetti 1993). However, in spite of these increased contacts and prosperity, there was a marked reduction in the number of settlements occupied (from 15 EBA villages to 6 in the MBA), a marked shift to defended locations, and eventually the violent destruction of Middle Bronze Age settlements on the Aeolian Islands and the temporary abandonment of coastal sites in Sicily, all of which Bietti Sestieri (1988) has explained by the increased competition and tension introduced by contact with the outside world.

Bernabò Brea described this period as the beginning of a 'Dark Age', which ended only with the Greek colonisation of Sicily and southern Italy five centuries later (1957:136). He argued that the islands' culture was wiped out by the arrival of new people, the so-called Ausonian groups, from Italy into Sicily in the Late Bronze Age (Bernabò Brea and Cavalier 1980:705 ff; Tusa 1992:533 ff; Leighton 1996:100; Procelli 1996:100; Bietti Sestieri 1997:479; Nicoletti 1997:527). Two phases can be distinguished in the Ausonian culture. Ausonian I pottery (which spans a period of 200 years) has been found only on the Lipari acropolis, while everywhere else villages of the Milazzese culture were destroyed. This Ausonian I site was also destroyed at the end of the twelfth century BC (Bernabò Brea 1957; Bietti Sestieri 1997). Bietti Sestieri (1997:485, 489–90) notes that there is no evidence to explain this destruction, but during Ausonian II (which lasted at least three centuries, ca. 1150–850 BC), links with the Aegean ceased and contacts with Sardinia became more frequent. Ausonian II material is found at Milazzo (Sicily), but not on any of the smaller Aeolian Islands, which were most probably uninhabited at this time (Bietti Sestieri 1997:485, 489–90).

Further Contraction/Final Expansion

The processes reviewed so far appear to speed up dramatically during the last two thousand years, as the resolution offered by history allows us to define phases of cultural development on a much finer chronological scale than in prehistory. The archipelago's population was concentrated in the Lipari acropolis for at least five hundred years, while the rest of the island was empty, until, as Stoddart points out, the island became involved with state-organised societies (1999b:69). From then on, the islands witnessed phases of growth and involution, lasting centuries or sometimes just decades. However, Lipari remained the focus of human occupation throughout the historical period, and it is only in recent decades that the islands have started to 'behave' more like an archipelago again.

Meligunís, also known as Lipàra, was founded by Greek colonists on Lipari in 580 BC, partly to control the Etruscan expansion (La Rosa 1996:153). Castagnino Berlinghieri points out that Lipari may have been uninhabited from ca. 800 BC to this time, even though there is some evidence on the island of contact with the Greek world in the seventh century BC (Cavalier 1985:31; Castagnino Berlinghieri 2003:79). Lipari then became an ally of Syracuse in the Peloponnesian War and was repeatedly attacked by the Athenians. During the first Punic war, Lipari was allied with Carthage and was completely destroyed by the Romans (252 BC), after which it suffered a long decline (Bernabò Brea and Cavalier 1998:191–6). Medieval Lipari (sixth century AD) was a fortified town which orbited around its cathedral. Its inhabitants were deported by Arab pirates in the eighth century AD. The Normans restored some prosperity, and a group of Benedictine monks founded a monastery and an abbey in the town, but in 1544 Barbarossa burnt Lipari down and deported all the inhabitants. The citadel was immediately reconstructed by order of the Spanish viceroy, who also ensured it was resettled. Finally, in 1783 a major earthquake claimed most of the population but also prompted steady reconstruction (La Rosa 1996:153).

Malta

Malta is the largest island in the Maltese archipelago (which also includes Gozo and the islet of Comino). The island, which lies ca. 95 km south of Sicily (and ca. 280 km north of Tunisia), has a surface of 246 sq km, a 136 km long coastline (nearby Gozo has a coastline of 43 km), and a maximum altitude of 253 m asl. Under fine weather conditions, Mount Etna on Sicily is visible from Malta, but not vice versa. Malta is a rocky island with indented coastal cliffs but also offers some good harbours. Arable land in the present occupies ca. 38% of the total surface, which is much more than most Mediterranean islands of its size, and the island is one of the most densely inhabited regions in the world. The average annual rainfall is ca. 500 mm (Trump 2002:19), and there are no permanent water sources on the archipelago, although there are seasonal springs and rock pools (Hunt and Schembri 1999:41). Neolithic and Bronze Age water cisterns are known at several locations (Hal Saflieni, Misqa, and Mnajdra) (Trump 2002:19). The islands currently suffer from near-drought every ten years and from extended drought every few centuries; in spite of this, the islands were 'well suited to human inhabitation' (Trump 2002:19) and may have supported a prehistoric population of up to 10,000 people (Trump 2002:21).

Maltese chronology is relatively well understood; however, there remains considerable uncertainty over issues of continuity and potential abandonment between different cultural phases. Although Malta's first colonists almost certainly came from Sicily, they went on to develop a very distinctive culture of their own which, as is well known, culminated in the construction of megalithic structures commonly referred to as 'temples'. The buildings lend their name to a cultural phase in Maltese chronology which lasted some 1,000 years (ca. 3600–2500 cal BC). The transition from the Tarxien Temple to the following Tarxien Cemetery phase has attracted great attention and a variety of explanations, ranging from natural events (Hughes-Clarke 2002) to the rise of internal factionalism (Dixon 1998). Recent excavations in Malta (Recchia 2004–2005) and Gozo (Malone et al. 2009) are starting to shed some light on these issues, though, as we shall see, their results support opposing theories.

Anati (1988) argued that the Maltese islands went through several phases of abandonment in prehistory. Trump (2002) also suggested that population replacement could account for stylistic differences between periods. Both these models seem unlikely in light of the evidence. As explained by Stoddart (1999b:138), since

FIG. 8.6 Malta, Ħaġar Qim Temple (*photo by the author*).

the islands are agriculturally self-sustainable, even in the event of a bad crop, out-migration would not be a necessity. Ecological and economic decline were thus rejected as explanations for cultural discontinuity (such as the end of the Temple phase) (Stoddart 1999b:138; 1999b:69). Instead, changes in material culture could be explained by increased/reduced contacts with the outside world and the development of local styles (Robb 2001:188). Nonetheless, the environmental explanation has recently been revived (Malone et al. 2009). The result is an ongoing debate relating to the nature of Maltese societies and their contact with the outside world during this period, in particular concerning ideas of physical versus cultural insularity (Fig. 8.6). The following section provides a brief summary of the key positions in this debate.

Evans (1971b:224) first interpreted the end of the Temple phase as a collapse of the island's political organisation and claimed that the only explanation for this change was population replacement. He stated that 'nothing in the later prehistoric material warrants the assumption that any of the original people survived. If they did, they left no trace of themselves in the material remains of the new period' (Evans 1959:168). Trump also argued against continuity but alluded to the possibility that the Tarxien Cemetery phase represented a 'rejection of the preceding cultural expression', rather than actual population replacement (1980:144). Stoddart (1999a; 1999b) claimed that Temple phase construction ceased as a result of ideological and political changes, rather than because of some catastrophic event or an invasion. Bonanno (1990) and Dixon thought along similar lines—that the change was the result of an 'internal reorganisation of the existing culture' (Dixon 1998:38).

A significant problem arises from the near complete absence of settlement data from the islands: the evidence for discontinuity comes from the temples and cemeteries. Only three habitation sites are known from the Temple period: two huts from

Skorba, and a hut and a stone wall from two separate locations on Gozo (Malone et al. 1988; Trump 2002:205). There is no evidence of warfare in the Temple period, but daggers become very abundant in the Tarxien Cemetery phase (Trump 2002: 239), and the settlement record for the period following it (later in the second millennium, Borg-in-Nadur/Bahrija phase) betrays a preference for naturally defended positions and possibly a demographic decline (Stoddart 1999a:70; 1999b:142).

The only real evidence for abandonment comes from the site of Tarxien Temple itself, where a 50 cm thick layer of sterile silt was originally found between the Temple and Cemetery layers (Trump 2002:286). Trump himself pointed out that this could be the result of natural accumulation following a heavy rainstorm. Other possible hints come from the Xaghra hypogaeum, where the Tarxien Temple phase appears to be 'sealed off' (Trump 2002:239), and from Skorba, where the 2 m thick stratigraphy of continuous occupation lasting ca. 2,500 years from about 5000 cal BC appears to stop abruptly (Trump 2002:58). Dixon, however, claims that evidence from other sites (e.g., Borg-in-Nadur) and from Skorba itself points towards their continuous use, with material from both periods found together and at least once in a sealed deposit (1998:48). Stoddart also supports the idea of continuity with evidence from all the Tarxien temples, which demonstrates that the sites were 'transformed or re-interpreted rather than forgotten or destroyed' (Trump 2002:238), as can be seen from the fact that Tarxien itself became a cemetery, and that the Xaghra hypogaeum, the temple at Borg-in-Nadur, and Skorba all became domestic sites (Stoddart 1999a:70; 1999b:141; Trump 2002:239). Dixon believes that, in spite of clear differences, there is evidence for population continuity between the two periods but also of 'a religious and perhaps political metamorphosis' (1998:47). Similarly, evidence from Tas-Silg temple (Cazzella and Recchia 2006–2007:269; Recchia 2004–2005:67) supports 'a continued occupation of the Late Neolithic Temples with different modalities' (Copat et al. 2010:52).

Leighton (1999) and Trump (2002) both argued in favour of the population replacement theory. In the Tarxien Cemetery phase, Malta displays close cultural parallels to Sicily once again (evident in the appearance of cremation, the use of monochrome incised ware, the first clear evidence for copper alloys, and the demise of temple construction itself) (Stoddart 1999b:141; Trump 2002:242). Leighton and Trump explained these changes, which occurred in both the mortuary and the daily sphere, by the arrival of new people, who, in view of the dolmens introduced to the island at this time and other cultural parallels, may have come from either southern Italy and southern Sicily (Leighton 1999:137), or from Sicily, western Greece, or Dalmatia (Trump 2002:248). Trump suggests that tensions between the priesthood responsible for the temples and an overworked population (combined with pressure on resources) may have caused the collapse of the Temple rituals, and concludes, on the basis of the much lower pottery densities for this period (2002:252), that 'improbable as it may seem, it is as if the islands were abandoned utterly and stood empty as when the first intrepid seafarers came ashore 2,500 years earlier' (Trump 2002:245).

Evidence from the nearby island of Gozo is shedding new light on this issue. The excavations at the Xaghra hypogaeum (1987–1994) (also known as the Brochtorff Circle), a site interpreted as a cemetery and shrine to the ancestors (Malone and Stoddart 2009:365), revealed considerable cultural change from the Tarxien Temple to the Tarxien Cemetery phase; however, the authors do not envisage an abandonment phase between the two periods, although they go as far as suggesting 'possible depopulation' (2009:384). The mortuary evidence from the hypogaeum supports a 'peaceful (or at least non-violent) existence' on the island, with most individuals perishing because of infection, not trauma (Malone and Stoddart 2009: 370). However, the stable isotope analysis from the latest burials showed that the diet was more restricted, which may indicate increasing pressure on resources. The Tarxien Cemetery phase saw a radical change in the use of the burial circle, which was no longer used as a cemetery (only one burial has been identified, which could belong to the earlier phase, which produced at least 350–450 individual burials). This phase is characterised by lack of human bone, lack of clear structure (e.g., hearths or buildings), the use instead of 'broken down mud brick' or *pisé* (rammed earth) mixed with domestic rubbish, and a high incidence of Pantelleria obsidian, flat discs, and copper weapons, which are associated with the Mycenaean world. The evidence suggests a domestic activity at the site, which was no longer used as a cemetery; the earlier ritual symbols were destroyed, but some ritual activity still focused around the threshold and the lip of the caves, where figurines and offering bowls of a new type were found. Malone and Stoddart (2009) have put forward a possible explanation for these changes, invoking climatic and environmental changes (pollen diagrams indicate deforestation) around 2400–2300 BC, involving floods and droughts combined with overpopulation. They suggest that, at this time, Maltese communities invested greater energy in maritime contacts with the outside world (there are more imports than before) as a buffer against vulnerability, which also resulted in cultural diversification (Malone and Stoddart 2009:384).

The evidence just discussed supports some striking cultural changes—even the possibility of an influx of new people at this time cannot be entirely ruled out—but it is not sufficient to sustain the idea that the islands were completely abandoned and subsequently recolonised. However, the explanation advanced by Malone and Stoddart (2009) implies that the inhabitants of Malta were culturally isolated from Sicily and were unable or unwilling to obtain resources from their neighbours, which would amplify the effects of the environmental stress on their culture and lead to change. There is still considerable disagreement over the extent of cultural contact between Malta and Sicily during the Temple period, with Malone and Stoddart (2009) arguing it was minimal and Robb (2001) claiming it was more extensive. Robb (2001) has provided an alternative framework in which to place and explain these transformations in Maltese society, which he believes are likely to have stemmed not from environmental constraints but from the islanders' changing attitudes to insularity itself and from the development of 'cultural difference' (2001: 192), evident in the increasing regionalism of the island's material culture. Robb argues that the development of the temples was a gradual and continuous process, which went through several phases of 'remodelling' (2001:181), and he notes that even during the Temple phase there is evidence of frequent contacts between Malta and Sicily (2001:186–8). Trump also mentions that relations with Sicily continued throughout this time, as is evident from the importation of raw materials but also of exotic goods (2002:210–2). Unfortunately, there is clearly a problem regarding the context in which these items were found: most Maltese temples were excavated at the start of the last century, with very little care given to the appropriate recording of archaeological features, so that interpreting the significance of these imports is very difficult. Nonetheless, I believe that their presence indicates that the two islands were indeed connected via trading networks. Overall, the fact that imports were reaching Malta during the Temple period negates the migration model as a possible explanation for cultural change in the following Tarxien Cemetery phase, since it would appear that this exchange never ceased. In fact, there is no indisputable evidence of a complete abandonment of the island, but a certain way of living came to an end or was perhaps reshaped and incorporated within a changed social order. It is possible that environmental changes were an important contributing factor, but given that cultural factors were primarily responsible for the construction of the temples in the first place, it is also possible to pursue a similar line of argument to explain their demise.

Another possible gap in Malta's archaeological record, one based on stratigraphic discontinuity at Tas-Silg, comes just before the island was occupied by the Phoenicians (Brusasco 1993). Stoddart again claims that this by itself cannot support an abandonment scenario, but a change in settlement patterns at this stage seems confirmed by the emergence of single centres on both Malta and Gozo, indicating that population levels were low, which facilitated the Phoenician takeover of the islands (1999b:142). Subsequently, Malta has been occupied continuously, while experiencing a similar series of events as those described for the Aeolian Islands: it suffered destruction by the Romans in the first Punic war (ca. 255 BC) and was incorporated by Rome in 218 BC, though it kept a strong Punic culture for ca. two centuries (Stoddart 1999b:143, 145). The island was conquered by the Arabs at the end of the ninth century AD, when population levels dropped to less than 10,000 (Stoddart 1999b:144). By the fifteenth century AD, population had reached ca. 20,000 (Blouet 1984:39; Fiorini 1993), and from then on it has continued to grow, in spite of famines, epidemics, and raids. In the light of this review, it would appear that Malta displays a remarkably continuous occupation record.

JERBA

Jerba is a large island lying just off the coast of southeastern Tunisia. It has a surface of 568 sq km and a maximum altitude of 40 m asl. The annual rainfall regime is among the lowest in the whole Mediterranean basin (200 mm). The island has no springs, but the water table is reached through wells (particularly in the northeast), and several cisterns are used to collect rain. Soils are very fertile (the island is known for its olive groves), especially in the plains along the southeastern and southwestern coasts (Fentress 2000; 2001).

The island has been the object of intensive survey directed by Drine, Fentress, and Holod (Drine et al. 2009). The survey covered 78 sq km. The earliest identifiable pottery on the island (from three coastal sites/ports and one inland site, the largest) dates to the fourth century BC, from which time Jerba appears to have been inhabited continuously. Interest in the island may be related to the fact that people could easily reach the mainland from there while maintaining a naturally protected position, which is typical of Punic settlement (cf. the islands of Arwad, Tyre, Motya, and Mogador) (Fentress 2001). The absence of earlier pottery is surprising, although, according to Fentress, this can be explained by the absolute lack of surface water and the difficulties of making the short crossing (tides here are the highest in the Mediterranean; see Chapter 2).

Continuous occupation can be explained by the fact that in historical times the island provided a useful stopover in the sea trade routes from Leptis Magna (Libya) to northern Tunisia, a role which continued throughout the Middle Ages (Fentress 2001). The Kharejites, or Ibadis, settled on the island from the ninth century AD onwards, and Berbers from this Islamic sect still form the main population, while until 1967, a substantial Jewish community (claiming to have arrived after the first Diaspora) lived in two villages (Fentress 2001).

PANTELLERIA

The volcanic island of Pantelleria lies ca. 100 km southeast of Sicily. It has a surface of 83 sq km and a maximum altitude of 836 m asl; the coast is 50 km long, and annual rainfall is 350 mm. The island lacks water sources, which is, however, compensated for by the fertility of its volcanic soils, allowing the cultivation of wheat, vines, and olives.

Tusa (1997:389) argues, on the basis of obsidian found in Neolithic contexts in Malta and Sicily (Camps 1988:47; Cherry 1990:191), that Pantelleria was already populated in the fifth millennium cal BC. However, this phase appears unrelated to the island's later settlement, and these indications are more likely to reflect a phase of island utilisation without the need for permanent occupation (which parallels what has been said for Melos). The earliest known remains of permanent settlement on Pantelleria are the village of Mursia and its adjacent megalithic cemetery, which were in use between ca. 2000 and 1400 cal BC (Tozzi 1968, 1978) and thus dated to the Early Bronze Age. The above-ground burial structures have been interpreted as a local insular adaptation of the contemporary culture on Sicily, where the prevailing burial custom at the time was to use underground rock-cut tombs (Fig. 8.7). On Pantelleria, the local volcanic geology was not suitable for rock-cuttings, and the islanders opted for prominent stone cairns of large volcanic blocks, which enclosed small burial chambers (Tusa 1997:391; Leighton 1999:136).

FIG. 8.7 The Sese Grande (EBA megalithic burial) on Pantelleria (*photo by the author*).

The next known remains from the island are Punic in date (seventh century BC), and no evidence has been found for the Middle Bronze, Late Bronze, and Early Iron Ages, in spite of intensive survey in the past few years. This is striking in view of the island's location along important sea routes, and of the evidence for contacts with Sicily and the Aeolian Islands in the previous Early Bronze Age (Tusa 1983: 276), although, in the light of current knowledge, there may not have been a permanent population on the island for ca. 700 years, after which continuous occupation resumed to the present day (Tusa 1997).

PALMAROLA

The small island of Palmarola covers an area of ca. 1.4 sq km and has a maximum altitude of 250 m asl. The island lies close to the Italian mainland (30 km) and is part of the Ponziane archipelago. It lacks groundwater, but rainfall is sufficient to support vegetation. More importantly, it is one of the four obsidian sources in the western Mediterranean. The presence of obsidian is the key reason for its inclusion in this study. However, Palmarola falls short of the criteria for inclusion (a well-established archaeological record), and from the point of view of categorising its settlement history, the island is problematic. There is indirect evidence that humans visited the island sporadically starting in the fourth millennium cal BC, in the form of obsidian from Palmarola found in northern, central, and southeastern peninsular Italy (Tykot 1996:43, 57). Obsidian procurement peaked in the Middle to Late Neolithic (Tykot 1996:61). The obsidian sources are located at Punta Vardella (in the southeast) and to the south of Monte Tramontana (Tykot 1996:43). Most obsidian found in the Tuscan archipelago is actually from Sardinia; however, Tykot believes that the obsidian found on the island of Giglio is from Palmarola (1996: 54). In the twelfth and eleventh centuries BC, the island was used as a stopover by the Phoenicians. In the 1700s AD, the island was used as a pirate base. It is uninhabited in the present day (De Rossi 1993; Mazzoli 1998). Overall, continuity cannot be established between phases; therefore, for the purposes of this study, the island is considered to have had sporadic occupation.

Tremiti Islands

The Tremiti Islands lie in the southeast Adriatic ca. 20 km off the Italian coast. The largest, San Domino, covers an area of just over 2 sq km and has a maximum elevation of 116 m asl, while San Nicola is less than half a square kilometre in size (75 m asl). Two smaller islets (Cretaccio and Capraia) are part of the group. The islands lack groundwater, and the vegetation has adapted to the saline geology and to being often submerged at high tide. San Domino has a dense Aleppo pinewood (*Pinus halepensis*) and also mixed holm-oak woods (*Quercus ilex*). The current land use of the two main islands has changed since the 1950s, when the entire population resided in San Nicola and went to San Domino only during the day for farming and herding (*http://tremiti.planetek.it/home_en.htm*).

The islands have a remarkable settlement record despite their low biogeographic potential. A few isolated finds possibly indicate early sporadic human presence: a possible Early Neolithic ceramic and lithic scatter on the northeastern part San Nicola (Fusco 1964:194) and a large flint artefact (whose pre-Neolithic status is debated) on the islet of Cretaccio (Fusco 1964:192). Permanent settlement began on San Domino in the Early Neolithic (Prato Don Michele) and appears to have continued in the Middle and Late Neolithic (Zorzi 1950; 1954; 1955a; 1955b; 1958; 1959; 1960). An amateur archaeologist also mentions the presence of a Copper Age hypogaeum (Fumo 1980:14). No further finds are known from the island.

The earliest signs of permanent occupation on San Nicola are the remains of a settlement dated to the Iron Age (ninth–seventh centuries BC). Following this, there is a group of graves, one of which was dated to the Classical and Hellenistic Age (fifth–fourth centuries BC), and the remains of a Hellenistic settlement and of two Roman houses. From the eleventh century AD on, the island was settled by monks, who suffered several incursions by Slav pirates and were massacred in a raid in 1334, after which the island was uninhabited for some time, to be resettled only in 1412 (Fig. 8.8).

The initial occupation of the Tremiti archipelago therefore focused on the island of San Domino, which is the only island in this group to produce evidence for permanent settlement, in the form of hut and burial remains dated to different phases of the Neolithic. No radiocarbon dates are available for these sites, so the chronol-

FIG. 8.8 San Nicola, view of the medieval fortifications (*photo by the author*).

ogy is based on pottery typology only. Because these pottery phases can last up to a thousand years, it is hard to establish how continuous occupation actually was. However, a general impression of continuity can be sketched: the village of Prato Don Michele yielded Impressed Ware, which is generally dated to the seventh–sixth millennia cal BC; the Cala Tramontana settlement produced Ripoli Trichrome and Scaloria Ware (or Apulian Trichrome Ware) (usually dated to the fifth–fourth millennia cal BC); another settlement in the pine wood near Cala degli Inglesi produced Serra D'Alto pottery (also fifth–fourth millennia cal BC); and the Cala Tramontana burial site (dug into earlier settlement levels) revealed Diana-Bellavista ware (fourth millennium cal BC). Collectively, the sites can be taken to indicate sustained occupation on the island until the fourth and perhaps into the third millennium cal BC, if the report of the Copper Age hypogaeum is considered. In the first millennium cal BC, occupation shifted to the nearby island of San Nicola, following a gap lasting between two and three thousand years (if the surface scatter is considered). Interestingly, this situation changed again as recently as 1950, when population moved back to San Domino: people now live on both islands, on a more permanent basis in San Nicola and on a more seasonal basis in San Domino (linked to the tourist industry).

COMPARING ABANDONMENT HORIZONS

Can we detect any overall patterns or significant variation in the islands' occupational histories? Can these be explained by similarities in the islands' physical characteristics, such as biogeographical factors relating to island size and distance to nearest mainland? If not, what other causes may have been responsible for convergence and divergence? Could these include the availability of resources? To explore these issues, we will follow the histories of four islands that are also obsidian sources in the Mediterranean; the development of islands smaller than 10 sq km is also investigated, in order to assess whether or not, in the Mediterranean, small size and abandonment are related; finally, we compare the occupation patterns of islands that are relatively close to the nearest mainland (NM)—less than 50 km away—to those of farther islands.

Timelines

For ease of comparison, different periods of human use of the islands have been marked as accurately as possible on a horizontal axis (the numbers indicate millennia BC and AD), through either a continuous line (= definite occupation) or a dotted line (= sporadic occupation) (Figs. 8.9–8.14). A gap represents a period of abandonment; question marks denote greater uncertainty. Despite difficulties in establishing breaks in the evidence as real periods of abandonment, an attempt has been made to include all the data in Table 8.4. The table also contains information regarding the islands' size, maximum altitude, distance to nearest mainland, distance to the nearest other island, presence of water sources and mineral resources, annual rainfall, and population estimates at selected minimum densities.

The following initial observations can be made based on the diagrams:

1. The islands of Kythera, Melos, and Kea were abandoned between ca. 1100 and 800–700 BC; occupation on Naxos was drastically reduced to a single site during the same period; northwest Kea appears to have been abandoned between about 2200 and 1900 cal BC. The other islands were occupied at this time (overall), but some sites were destroyed at this time (Fig. 8.9).

2. Kythera and Kea were also abandoned during AD 650–1100 and AD 800–1100, respectively. These two islands lie very close to mainland Greece (15 km and 22 km), which probably exposed them to events on the mainland (Fig. 8.9).

3. In the central Adriatic, Palagruža and Hvar were both abandoned after ca. 1800 BC (Fig. 8.10); abandonment lasted longer on smaller and more distant Palagruža.

4. In the Pitiussae islands, Ibiza and Formentera were abandoned after ca. 1300 BC; abandonment lasted longer on Formentera (Fig. 8.11).

5. In the Aeolian Islands, Panarea, Salina, and Filicudi were all abandoned after ca. 3500 BC. Abandonment lasted ca. 500 years on Panarea, and up to 1,000 years on Salina and Filicudi; these three islands and Stromboli were abandoned between ca. 1500–1200 BC and the mid-first millennium AD (Fig. 8.12).

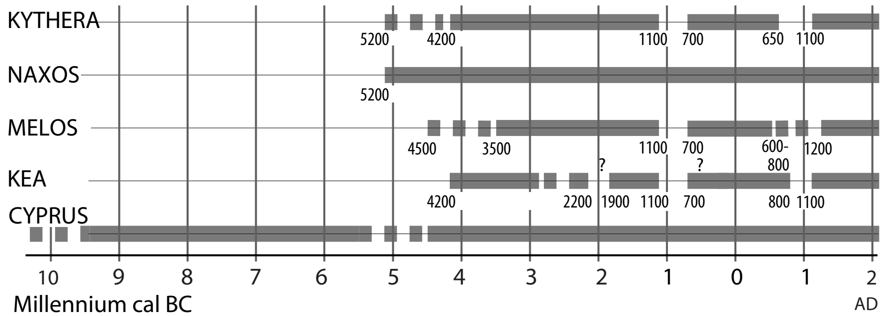

FIG. 8.9 Timelines for Kythera, Naxos, Kea, Melos, and Cyprus (*drawn by J.J. Fuldain*).

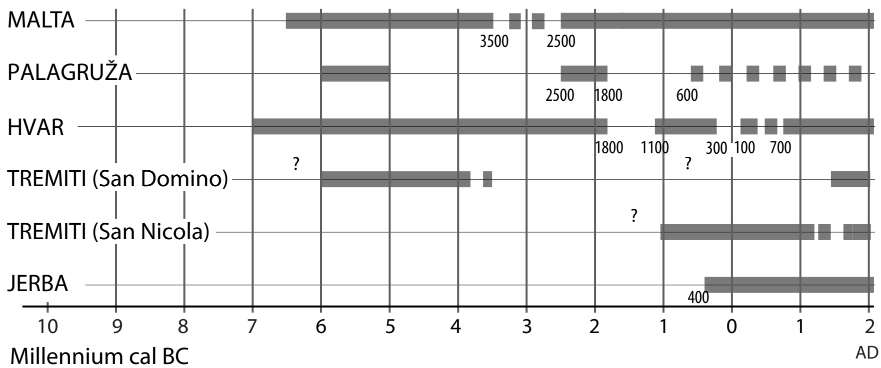

FIG. 8.10 Timelines for Malta, Palagruža, Hvar, Jerba, and Tremiti Islands (*drawn by J.J. Fuldain*).

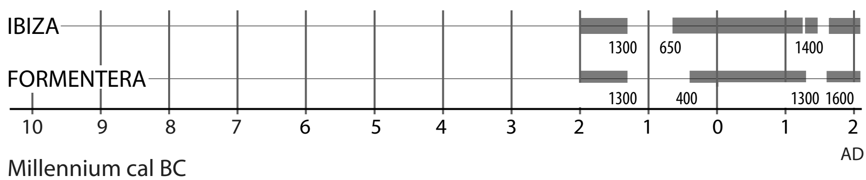

FIG. 8.11 Timelines for Ibiza and Formentera (*drawn by J.J. Fuldain*).

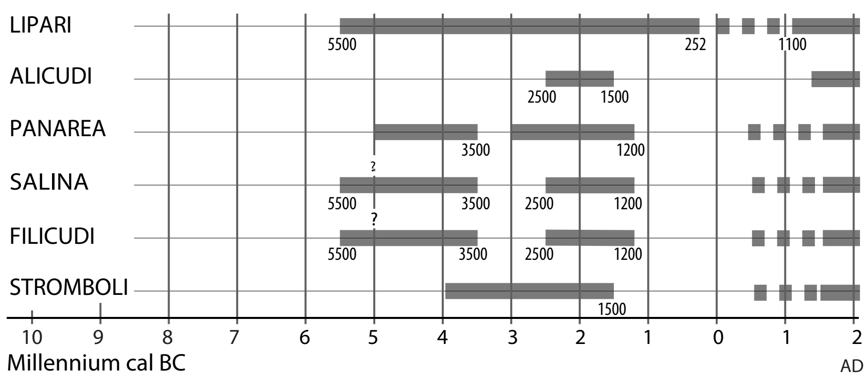

FIG. 8.12 Timelines for the Aeolian Islands (*drawn by J.J. Fuldain*).

Table 8.4 Patterns of occupation for the entire island sample

	Island	Size (sq km)	Maximun altitude (m)	Dist to nearest mainland (km)	Dist to nearest landfall (km)	Fresh-water springs	Rain (mm/year)	Mineral resources	Millennium of 1st colonisation	Millennium of 1st abandonment	Estimated periods of occupation in years	Estimated periods of abandonment in years
1	Palagruža	0.3	90	130	0.2	No	300	Yes	6 BC	5 BC	1000 + 700 + 2600	2500 + 1200
2	San Nicola	0.4	75	20	0.2	No	500	No	1 BC	1 AD	3000	200?
3	San Domino	2	116	20	0.2	No	500	No	6 BC	4 BC	2000 + 500	5000?
4	Panarea	3.4	421	42	14	No	500	No	5 BC	4 BC	1500 + 1800 + 1500	500 + 1700
5	Alicudi	5.2	675	87	15.5	No	500	No	3 BC	2 BC	1000 + 500	3000
6	Filicudi	9.5	774	47	15.5	No	500	No	6 BC	4 BC	2000? + 1300 + 1500	1000 + 1700
7	Stromboli	12.6	924	56	18.25	No	500	No	4 BC	2 BC	2500 + 1500	2000
8	Salina	26.8	962	43	4.25	No	500	No	6 BC	4 BC	2000? + 1300 + 1500	1000 + 1700
9	Lipari	37.6	602	30	0.875	Yes	500	Yes	6 BC	1 BC	5250 + 200 + 900	350 + 300
10	Formentera	82	202	95	3.7	No	350	No	2 BC	2 BC	700 + 1700 + 400	900 + 300
11	Pantelleria	83	836	102	70	Yes	350	Yes	3 BC	2 BC	1000 + 2500	1000
12	Kea	130.6	568	22	9	Yes	500	No	4 BC	3 BC	1800 + 800 + 1500 + 700	300 + 400 + 300
13	Melos	150.6	751	105	2.5	Yes	400	Yes	4 BC	2 BC	3400 + 1500 + 800	400 + 400

Table 8.4 (*continued*)

	Island	Size (sq km)	Maximum altitude (m)	Dist to nearest mainland (km)	Dist to nearest landfall (km)	Fresh-water springs	Rain (mm/year)	Mineral resources	Millennium of 1st colonisation	Millennium of 1st abandonment	Estimated periods of occupation in years	Estimated periods of abandonment in years
14	Malta	246	253	85	10	Yes	500	No	6 BC	—	7500	-
15	Kythera	280	507	15	15	Yes	600	No	5 BC	2 BC	3900 + 1350 + 900	400 + 450
16	Hvar	300	626	4	2	Yes	800	No	6 BC	2 BC	4200 + 800 + 1900	700 + 400
17	Naxos	428	1000	132	7	Yes	400	Yes	5 BC	—	7200	—
18	Jerba	568	40	2	2	No	200	No	1 BC	—	2400	—
19	Ibiza	572	475	92	3.7	Yes	400	No	2 BC	2 BC	700 + 2650	650
	Average (without Cyprus)	155	521	59	10	Yes = 9/19	450	Yes = 5/19			4550 (ca. 1920 yrs/ period)	1500 (ca. 1060 yrs/ period)
20	Cyprus	9251	1950	69	69	Yes	500	Yes	11 BC	10 BC	800? + 3500 + 6500	500? + 1000
	Average (with Cyprus)	610	592	60	13	Yes = 1/2	450	Yes = 3/10			4860 (ca. 2020 yrs/ period)	1510 (ca. 1050 yrs/ period)

Notes:
Total occupation: 97,150 years (without Cyprus: 86,350)
Average overall occupation: Total occupation/n islands = 97,150/20 = 4857 years (without Cyprus: 86,350/19 = 4544)
Average occupation period: Total occupation/n periods = 97,150/48 = 2023 years (without Cyprus 86,350/45 = 1918) (n periods = 48; n periods without Cyprus: 45)
Total abandonment: 30,250 years (without Cyprus: 28,750)
Average overall abandonment: Total years/n islands = 30250/20 = 1512 years (without Cyprus 28,750/19 = 1513)
Average abandonment period: Total years/n periods = 30,250/29 = 1043 years (without Cyprus 28,750/27 = 1064) (n periods = 29; n periods without Cyprus: 27)

Overall Patterns

Further information can be drawn from tables relating to this study (Tables 8.4–8.5), where an attempt has been made to estimate the relative length of occupation and abandonment periods. The following observations are very likely to change as new evidence becomes available, but quantifying and comparing periods of abandonment helps us reflect more closely on the nature of the process. Table 8.4 shows that, on average, occupation lasted longer than abandonment periods (approximately 5,000 years vs. 1,500 years per island, respectively). The average occupation period was in the order of 2,000 years, while the average abandonment period lasted about 1,000 years. The first occupation period for most of the islands was usually long (more than 1,000 years), except in three cases: Formentera, Ibiza, and Cyprus. For Cyprus, the initial occupation of Akrotiri-*Aetokremnos* has been estimated as lasting 800 years. If we exclude this initial phase (given problems with the dating), then the initial occupation period on Cyprus lasted much longer (3,500 years), which is what one would expect on such a large island. It is striking that the initial occupation of the Pitiussae Islands was so short, although estimates for Alicudi and Pantelleria (both 1,000 years) may also be too high.

Abandonment periods varied considerably, between 5,000 years (San Domino) (which may reflect an anomaly in the island's study), or perhaps more likely 2,000 years (the average for Palagruža, Stromboli, and Alicudi), and 200 years (San Nicola).

Table 8.5 lists the islands chronologically according to the millennium of initial colonisation. The data indicate that, on average, prehistoric abandonment lasted ca. 1,000 years. This figure is on the upper limit of Butzer's (1996:146) range of occupational gaps from Mediterranean regional settlement surveys, which last between 500 and 1,000 years. Taking the year zero as an arbitrary threshold, the estimated average length of prehistoric abandonment periods is much longer (generally lasting ca. 1,000 years) than in the historic period (average 500 years).

We can see from Table 8.5 that islands colonised early (sixth–fourth millennia cal BC) generally had longer initial occupation periods than those colonised later (third–second millennia cal BC). For the latter, initial occupation periods ranged between ca. 1,000 (San Nicola, Alicudi, Pantelleria) and 700 years (Ibiza and Formentera), whereas for islands colonised earlier, initial occupation periods varied between ca. 5,000 (Lipari) and 1,000 years (Palagruža). Abandonment periods also appear to become progressively shorter over time. Cyprus, for example, colonised early, underwent longer abandonment periods than a much smaller island such as Lipari, though perhaps future research will modify this. The fact that islands settled later were occupied for shorter periods requires explanation. Logically, of course, islands first occupied in the sixth millennium BC can have longer timelines than islands first occupied in the third, but the fact remains that the latter were actually abandoned sooner. That islands colonised later were abandoned sooner may reflect the fact that these tended to be smaller or less favourable to prolonged occupation

Table 8.5 Phases of prehistoric and historic occupation and abandonment

	Island	Millennium of 1st colonisation	Millennium of 1st abandonment	Est. periods of prehistoric occupation in years (n of periods: 35)	Est. periods of historic occupation in years (n of periods: 24)	Est. periods of prehistoric abandonment in years (n of periods: 22)	Est. periods of historic abandonment in years (n of periods: 14)
1	Cyprus	11 BC	10 BC	800? + 3500 + 4500	2000	500? + 1000	—
2	Palagruža	6 BC	5 BC	1000 + 700 + 600	2000	2500 + 1200	—
3	Malta	6 BC	—	5500	2000	—	—
4	San Domino	6 BC	4 BC	2000	500	3500?	1500?
5	Lipari	6 BC	1 BC	5250	200 + 900	—	350 + 300
6	Filicudi	6 BC	4 BC	2000? + 1300	1500	1000 + 1200	500
7	Salina	6 BC	4 BC	2000? + 1300	1500	1000 + 1200	500
8	Hvar	6 BC	2 BC	4200 + 800	1900	700 + 200	200
9	Kythera	5 BC	2 BC	3900 + 700	650 + 900	400	450
10	Naxos	5 BC		5200	2000	—	—
11	Panarea	5 BC	4 BC	1500 + 1800	1500	500 + 1200	500
12	Stromboli	4 BC	2 BC	2500	1500	1500	500
13	Kea	4 BC	3 BC	1800 + 800 + 700	800 + 700	300 + 400	300
14	Melos	4 BC	2 BC	3400 + 700	800 + 800	400	400
15	Alicudi	3 BC	2 BC	1000	500	1500	1500?
16	Ibiza	2 BC	2 BC	700 + 650	2000	650	—
17	Formentera	2 BC	2 BC	700 + 400	1300 + 400	900	300
18	Pantelleria	3 BC	2 BC	1000 + 500	2000	1000	—
19	Jerba	1 BC	—	400	2000	—	—
20	San Nicola	1 BC	1 AD	1000	2000	—	200?
Average by island				64,800/20 = **3240**	32,350/20 = **1617**	22,750/20 = **1137**	75,00/20 = **375**
Average by period				64,800/35 = **1851**	32,350/24 = **1294**	22,750/22 = **1034**	75,00/14 = **535**

than those occupied in earlier periods. Chronological phasing using diagnostic artefacts also improves over time, so that earlier periods defined on the basis of pottery typologies may tend to be too long. Nonetheless, the trend may echo changes in the use of the islands over time—use that, by the Bronze and Iron Ages, had become increasingly specialised and thus tied in with sociocultural processes of a more contingent nature than before (Dawson 2004–6). Importantly, as we saw in Chapter 2, it was at this time that maritime transportation became easier, thanks to the introduction of sail technology at the end of the third millennium BC. This may have made abandonment a more viable settlement strategy in the long term.

The Role of Resources: The Case of Obsidian

The four obsidian islands are, in order of increasing size, Palmarola, Lipari, Pantelleria, and Melos. Their timeline (Figure 8.13) shows remarkable similarities in occupational history: Lipari and Palmarola (which share the same distance from their nearest mainland and are both part of archipelagos) both have a continuous human record (actual settlement in the case of Lipari, and sporadic settlement and visitation in the case of Palmarola), in spite of the fact that obsidian had practically gone out of use by the end of the Middle Bronze Age. Both islands experienced a period of instability in the early historic period (related to pirate incursions). Pantelleria and Melos also show some similarities: both islands are quite large and far from the mainland, but Melos is part of an island group, whereas Pantelleria is isolated. They both experienced a period of abandonment in the mid- to late second millennium cal BC, when the two primate sites on the islands (the Bronze Age villages of Mursia and Phylakopi) were abandoned, a period lasting until ca. 700 BC. Melos also experienced a partial abandonment/decline around 600–800 AD, much as Lipari did (caused by widespread pirate raids in the Mediterranean).

In the table for this study (Table 8.6), we can see that, on average, occupation periods on the islands (ca. 2,280 years) were much longer than abandonment periods (ca. 500 years). This is true even if Palmarola is excluded, as its occupation

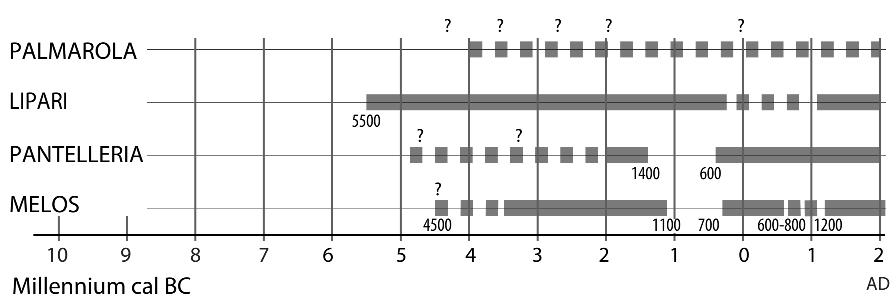

FIG. 8.13 Timelines for islands with obsidian (*drawn by J.J. Fuldain*).

record does not relate to permanent settlement. The two smaller islands (Lipari and Palmarola) experienced slightly longer occupation (ca. 2,800 years) and shorter abandonment (350 years) periods (they are also the closest to their respective mainlands). Contrary to what one might expect, Pantelleria and Melos, which are the largest, experienced shorter periods of occupation than the smaller ones (ca. 2,000 years), and their abandonment periods were twice as long (ca. 700 years). This is because the figure for Palmarola is probably greatly overestimated, given that it reflects an intermittent settlement record over 5,000 years. If we exclude it, the two larger islands, Pantelleria and Melos, have longer occupation periods than the smaller ones, which follows biogeographical predictions.

The Effect of Size: Abandonment of Small Islands

Moving on to analysing the islands in the sample that are smaller than 10 sq km, the following observations can be derived from the timelines (Fig. 8.14): the only island that shows continuous occupation is Palmarola, but this is an anomaly, explained by the fact that its record relates to a palimpsest of sporadic occupation, as opposed to continuous settlement, and by the fact that it is the only island in the sample with a valuable mineral resource. The similarities already noted between Panarea and Filicudi were explained by the islands' configuration and reliance on nearby Salina. The island with the shortest occupation is Alicudi, which is not the smallest in the sample but the farthest from the nearest mainland, and has very little land suitable for settlement (it is an ancient volcano): in this case, it seems that the network of assistance within the Aeolian archipelago may have become weaker as it moved away from Lipari to its periphery, Alicudi, via Salina and Filicudi.

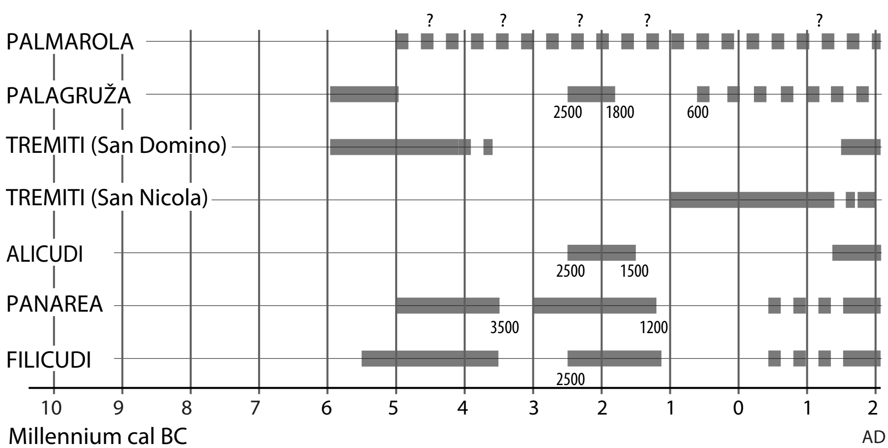

FIG. 8.14 Timelines for islands smaller than 10 sq km (*drawn by J.J. Fuldain*).

Table 8.6 The effect of resources on abandonment: obsidian islands

Island	Size (sq km)	Maximum altitude (m)	Distance to nearest mainland (km)	Distance to nearest landfall (km)	Fresh-water springs	Rain (mm/yr)	Mineral resources	Millennium of 1st colonisation	Millennium of 1st abandonment	Estimated periods of occupation in years (n of periods: 9)	Estimated periods of abandonment in years (n of periods: 5)
1 Palmarola	1.4	262	32	11	No	600	Yes	4 BC	—	5000?*	?
2 Lipari	37.6	602	30	0.9	Yes	500	Yes	6 BC	1 BC	5250 + 200 + 900	350 + 350
3 Pantelleria	83	836	102	70	Yes	350	Yes	3 BC	2 BC	1000 + 2500	1000
4 Melos	151	751	105	2.5	Yes	435	Yes	4 BC	2 BC	3400 + 1500 + 800	400 + 400
Average	68	613	67	21	Yes:3/4	430	Yes			2283**	500**

*Sporadic occupation? ** Average period

Table 8.7 The effect of island size on abandonment: islands smaller than 10 sq km

Island	Size (sq km)	Maximum altitude (m)	Distance to nearest mainland (km)	Distance to nearest landfall (km)	Fresh-water springs	Rain (mm/yr)	Mineral resources	Millennium of 1st colonisation	Millennium of 1st abandonment	Estimated periods of occupation in years (n of periods: 15)	Estimated periods of abandonment in years (n of periods: 9)
1 Palagruža	0.3	90	130	0.2	No	300	Yes	6 BC	5 BC	1000 + 700 + 2600	2500 + 1200
2 San Nicola	0.4	75	20	0.2	No	500	No	1 BC	1 AD	3000	200?
3 Palmarola	1.4	262	32	11	No	600	Yes	4 BC	-	5000?*	-
4 San Domino	2	116	20	0.2	No	500	No	6 BC	4 BC	2000 + 500	5000?
5 Panarea	3.4	421	42	14	No	500	Yes	5 BC	4 BC	1500 + 1800 + 1500	500 + 1700
6 Alicudi	5.2	675	87	15.5	No	500	No	3 BC	2 BC	1000 + 500	3000
7 Filicudi	9.5	774	47	15.5	No	500	No	6 BC	4 BC	2000? + 1300 + 1500	1000 + 1700
Average	3	345	54	8	No: 7/7	485	Yes = 3/7			1727**	1867**

* Sporadic occupation? ** Average period

Looking at the table for this study of small islands (Table 8.7), it is clear that their average occupation period is ca. 1,700 years, whereas the average abandonment period is ca. 1,800 years. This means that, unlike what happens when *all* the islands are considered (Table 8.4), on average, occupation periods were shorter (ca. 1,700 vs. 2,000 years) and abandonment periods were longer (ca. 1,800 vs. 1,000 years) on the smaller islands. Abandonment periods lasted slightly longer than occupation on these islands, which is the opposite to the general trend noted for the islands in the overall sample. This may be because size has an effect on other environmental factors: although rainfall is adequate and a few have fertile soils, none of the small islands in question has water sources.

The Role of Distance in the Abandonment of Islands

Finally, this section focuses on the effect of distance on the islands. Fifty km represented a convenient break in the sample, and when translated into days of maritime travel (in favourable conditions), this distance is equivalent to two and a half canoe days or one longboat day (Broodbank 2000:287). With 20 km being the distance a canoe can cover in one day, it becomes clear than any journey beyond 50 km would have involved planning and exposed travellers to increased danger. Stromboli and Alicudi have been included in this group, although they are more than 50 km from the nearest mainland. This is because they are the only islands in the sample with the characteristic of lying less than a day away from nearby islands (Panarea and Filicudi, respectively) which in turn lie less than 20 km from the nearest mainland ('stepping-stone' effect). Although most of the islands excluded from this group lie close to other islands (generally much less than 20 km), apart from Pantelleria and Cyprus (ca. 70 km), all the islands in Table 8.8 lie close to islands that in turn are distant (> 20 km) from their nearest mainland.

The following observations can be drawn from Tables 8.8 and 8.9. On average, for the first group of islands (distance to nearest mainland ≤ 50 km), occupation periods lasted longer than abandonment (ca. 1,700 vs. 1,100 years). The same applies to the second group (distance to nearest mainland > 50 km), but here occupation actually lasted longer (on average ca. 2,700 years), and abandonment periods were shorter (ca. 650 years). On average, the islands in the second group are by far larger than those in the first group, and most have water sources or mineral resources (or both). This combination of factors may have been more influential than distance alone and thus may explain why these islands experienced longer occupation and shorter abandonment periods.

Conclusions

There are considerable difficulties in establishing and comparing periods of abandonment. The pace of archaeological investigations is such that these gaps are continuously being reduced (Cyprus and Crete are the best examples). At the same time,

Table 8.8 The effect of distance on abandonment: islands with distance to nearest mainland (NM) ≤ 50 km

	Island	Size (sq km)	Maximum altitude (m)	Distance to nearest mainland (km)	Distance to nearest landfall (km)	Fresh-water springs	Rain (mm/yr)	Mineral resources	Millennium of 1st colonisation	Millennium of 1st abandonment	Estimated periods of occupation in years (n of periods: 30)	Estimated periods of abandonment in years (n of periods: 19)
1	Jerba	568	40	2	2	No	200	No	1 BC	—	2400	—
2	Hvar	300	626	4	2	Yes	800	No	6 BC	2 BC	4200 + 800 + 1900	700 + 400
3	Kea	130.6	568	22	9	Yes	492	No	4 BC	3 BC	1800 + 800 + 1500 + 700	300 + 400 + 300
4	Kythera	280	507	15	15	Yes	662	No	5 BC	2 BC	3900 + 1350 + 900	400 + 450
5	San Nicola	0.4	75	20	0.2	No	500	No	1 BC	1 AD	3000	200?
6	San Domino	2	116	20	0.2	No	500	No	6 BC	4 BC	2000 + 500	5000?
7	Lipari	37.6	602	30	0.9	Yes	500	Yes	6 BC	1 BC	5250 + 200 + 900	350 + 300
8	Panarea	3.4	421	42	14	No	500	No	5 BC	4 BC	1500 + 1800 + 1500	500 + 1700
9	Salina	26.8	962	43	4.3	No	500	No	6 BC	4 BC	2000? + 1300 + 1500	1000 + 1700
10	Filicudi	9.5	774	47	15.5	No	500	No	6 BC	4 BC	2000? + 1300 + 1500	1000 + 1700
11	Strom-boli*	12.6	924	56	18.3	No	500	Yes	4 BC	2 BC	2500 + 1500	2000
12	Alicudi*	5.2	675	87	15.5	No	500	No	3 BC	2 BC	1000 + 500	3000
	Average	115	524	33	8	N = 4/3	500	N = 5/6			1733**	1126**

* 'Stepping-stone' effect: These islands have been included as they are < 20 km away from islands that are < 50 km away from NM.
** Average period

Table 8.9 The effect of distance on abandonment: islands with distance to nearest mainland (NM) > 50 km

	Island	Size (sq km)	Maximum altitude (m)	Distance to nearest mainland (km)	Distance to nearest landfall (km)	Fresh-water springs	Rain (mm/yr)	Mineral resources	Millennium of 1st colonisation	Millennium of 1st abandonment	Estimated periods of occupation in years (n of periods: 15)	Estimated periods of abandonment in years (n of periods: 8)
1	Cyprus	9251	1950	69	69	Yes	500	Yes	11 BC	10 BC	800? + 3500 + 6500	500? + 1000
2	Malta	246	253	85	10	Yes	500	No	6 BC	–	7500	–
3	Ibiza	572	475	92	3.7	Yes	400	No	2 BC	2 BC	700 + 2650	650
4	Formentera	82	202	95	3.7	No	370	No	2 BC	2 BC	700 + 1700 + 400	900 + 300
5	Pantelleria	83	836	102	70	Yes	350	Yes	3 BC	2 BC	1000 + 2500	1000
6	Melos	150.6	751	105	2.5	Yes	435	Yes	4 BC	2 BC	3400 + 1500 + 800	400 + 400
7	Naxos	428	1000	132	7	Yes	384	Yes	5 BC	–	7200	–
Average		1545	781	97	24	Yes = 6/7	420	Yes = 4/7			2723**	643**

** Average is by period.

comparing the timelines helps identify potential anomalies (an unusually long abandonment period, for example), which may direct future investigations. While knowledge about islands and itineraries could have been accumulated by colonisers, island life was apparently not always continuous. Knowledge, as constructed through visits over time, and settlement history were not always positively correlated.

Abandonment has been descriptively oversimplified by scholars, and it has not drawn the same level of systematic quantitative attention as colonisation. The subject has been largely overlooked in Mediterranean island studies, particularly on a comparative level. Malta and Thera continue to capture our imagination in this respect, but this may have been detrimental to our understanding of abandonment. Considering that humans can adapt to a wide range of harsh environments, the fact that abandonment was sometimes selected as a response to environmental pressure indicates that islands were used and/or regarded by humans in similar ways to other territories that were abandoned, and that island abandonment shares some similarities with other forms of regional abandonment.

There are both advantages and disadvantages to viewing islands as discrete study units. The study of individual islands can provide incredible detail, but this level of attention would be wasted unless the information gained from the unitary island were matched against that from other islands. Focusing on individual islands shows that there are difficulties with establishing whether gaps in the data correspond to actual instances of island-wide abandonment. When a sufficiently complete archaeological record is viewed together with evidence from neighbouring islands, certain conclusions can be drawn with a higher degree of confidence. When viewed in this way, it becomes impossible to dismiss all gaps in the archaeological record as the result of lack of research; rather, there are 'real' abandonment horizons. Are islands, then, places where people simply come and go? It is tempting to give in to such a romantic notion and to a certain rhetoric about islands, but is this the result of islands' more recent history? From an archaeological standpoint, our challenge is to recognise links between phases, identify both continuity and change, and then make an assessment.

Some interesting observations emerge from this study. Overall, environmental factors per se were not an obstacle to island life (occupation appears to have been more continuous on Lipari than on the much larger Cyprus): colonisers made the most of what they had. Lipari was unusual in view of its continuous occupation and confirms that islanders could develop successful survival strategies when tied into networks. On the other hand, excessive involvement in networks and in non-reciprocal relations may also have had negative effects, exposing islanders to fluctuations in the networks themselves, as was perhaps the case for Naxos.

The islands underwent different types of abandonment, requiring different kinds of analysis. In the case of the Greek islands, the abandonment of large nucleated villages or small towns, sometimes occurring in parallel, was related to wider processes of sociopolitical change occurring on the Greek mainland, although these processes affected the islands (and even individual sites) in different ways. For

Cyprus, in the case of the Akrotiri inhabitants, abandonment of the rock-shelter seems to have been part of a strategy of land use. For both Palagruža and Pantelleria, abandonment was related to the changing roles of the island, as providers of mineral resources and as maritime stopovers; while on Hvar (as on the Greek islands), abandonment was again connected to processes on the mainland. Some important parallels were identified between the Pitiussae/Balearics and the Lipari and Tremiti islands, in terms of expansion and contraction strategies within an archipelago, and the effects of contingent factors (e.g., invasion and piracy). The abandonment of Malta after the Temple phase was rejected as an explanation for cultural transformation, and for Jerba it was noted that the island was inhabited continuously in spite of its low biogeographic appeal but thanks to its favourable location; in the case of Palmarola, obsidian had a similar effect. These distinctions between abandonment types are obviously not clear-cut, but their study managed to highlight at least some prominent factors.

Resources played a more prominent role than distance and size in determining overall occupation and abandonment periods, with the presence of obsidian considerably reducing the length of abandonment periods experienced. On the other hand, islands smaller than 10 sq km underwent slightly longer periods of abandonment, which can be related, albeit not exclusively, to their size.

Finally, there appears to be a relationship between islands being visited and/or settled early (sixth–fourth millennia cal BC) and initial settlement continuity, a trend which changed in later periods (third–first millennia cal BC), when there were large-scale changes in the Mediterranean (ranging from the development of sail technology to substantial political and economic transformations).

A number of different survival strategies were available to island communities. In the long run, some of these may even have been implemented as pre-emptive measures, if such difficulties could be anticipated and if alternatives, whether real or perceived, were available. Risk can be mitigated in different ways, and in that respect, abandonment should thus be seen as a last resort. However, the abandonment of several islands in the recent past and in the present demonstrates that people abandon islands long before survival itself is at stake. The settlement evidence reviewed supports the idea that prehistoric communities had developed effective ways of capitalising on what little individual islands had to offer and that not all abandonment resulted from catastrophic scenarios. This strategy may have been effective in the long run, even if abandonment was never an easy option. With obvious caveats, it would seem that the general trend towards depopulation of the small Mediterranean islands in the present (Baggioni and Hache 2000) offers a parallel to what happened in prehistory, when the islands, including some large ones, were repeatedly abandoned and recolonised—before, during, and particularly after the Neolithic.

Chapter 9

Mediterranean Voyages

What are the key conclusions that can be drawn from this study? Theories and data can now be brought together to gain a better understanding of the complexities of colonisation and abandonment in the Mediterranean islands, in terms of causes, processes, and effects. Regularity and variation seen in the development of island cultures over long time periods contribute equally to our grasp of these processes. Many researchers have followed Cherry's lead in claiming that island colonisation was an irregular process, one that displayed a high level of 'noise', which was generally put down to either uneven exploration or to the fact that chance had contaminated the more regular pattern of human presence on islands as predicted on the basis of biogeographical variables (or both). As this study moved from the pan-Mediterranean and east–west level of analysis towards a regional and island-based scale of enquiry, the relative importance of these factors started to emerge. We began to discern, for example, the islands that had not received sufficient research and where this lack of study was likely to be responsible for the uneven patterns; where biogeographical factors were really prominent; and where elements of a more contingent nature, such as specific historical conditions, were likely to have been involved in shaping the patterns of prehistoric island colonisation.

It is as much in the later as in the initial history of island colonisation that we see what factors were critical in the establishment of a human presence on the islands, and it is by looking at this long-term island history across a broad geographical spectrum that the actual nature of living on an island can be more fully gauged. Islands evoke a strong sense of place or a feeling of belonging: this has to do with islands providing a contained, but not necessarily cut-off, living space. Periods of interaction, movement, but also isolation characterise islanders' lives in different measures. Colonisation and abandonment would have affected the islanders' cultural identity, their social memory and traditions, since settlement continuity, sense of place, and identity are all closely linked. The movement of people encouraged the exchange of cultural traits, a sort of creolisation of the Mediterranean, or, as Horden and Purcell (2000) have put it, the 'corruption' of culture. Superficially, this exchange would have had a homogenising effect on culture, resulting in multiple layers of identity. At the same time, however, certain traits would have been maintained, resulting in diversity, reflecting people's sense of place and community affiliation.

After approximately a hundred years of archaeological fieldwork in the Mediterranean, a number of recently published works, and others planned or in preparation, appear to be making an assessment of the main achievements of the discipline to date. Talking about 'Theory and practice in Mediterranean archaeology', Renfrew (2003:316) noted that 'the lack of any useful comparative framework has made the quality of theory in our field rather poorer recently than it was thirty years ago'; and he went on to single out island archaeology as one of the few areas where fruitful comparison is being carried out in Mediterranean studies. However, this is not so straightforward, as island studies are still in a phase of self-definition and acceptance by the wider academic discourse (cf. Fitzpatrick 2004). McKechnie has argued that 'despite their objective physical nature, islands are conceptually vague', a fact which makes it difficult to analyse them (2002:127–8; cf. Anderson's islands of 'ambivalence' [2004]). In fact, islands are not 'vague' per se: it is rather the contrasting conceptualisations of islands and of what happens there, as seen by islanders and non-islanders, that confounds the issues. Island archaeologists can attempt to bring some order by introducing useful categories (be they spatial or cultural) to their studies. Mandryk (2003:xiv) has recently stated that 'colonization is a process, not an event' (as is abandonment; cf. Nelson [2000:55]): thus, the categories or variables in question depend on which aspect of the process we are interested in. For example, Cherry has recently underpinned the idea that 'worldwide correlations' indicate that biogeographical and cultural variables can provide a useful category for the study of islands in the Mediterranean (2004:244). Any study of islands should make explicit what categories it selects, if it is to be widely useful and effectively explore the complexities posed by islands.

These complexities are reflected in the archaeological record and call for distinctions (and, admittedly, overlaps) between different types of activities and interaction (such as visitation, utilisation, seasonal occupation, permanent settlement, establishment, abandonment, and recolonisation), which can usefully oppose monolithic categories such as 'colonisation'. Gosden's definition of colonisation as a 'rearrangement of time and space as people re-order themselves and their world' (1993:24; cf. Broodbank 2000:110) captures well the complex nature of this process. Abandonment is an integral component of this process of reordering, as it involves, at a general level, success and vulnerability in island life but, more specifically, also the transformation of networks, through the interruption, transferral, and transformation of established activities and the movement of people involved in them.

Island archaeological theory has the potential to be improved through a practice of comparison, in which, as we have seen, the categories being compared depend on the questions being asked. On a more general level, Knapp has pointed out that cultural variability can be investigated through 'intercultural comparison of differences (in a context of similarities) and similarities (in a context of differences)' (1989:189). The comparison of different island cultures has become increasingly popular, a trend that is apparent in recent archaeological symposia and literature, where not just regional but worldwide perspectives are being discussed (e.g., Waldren 2002; Fitzpatrick 2004). These global perspectives bring together not only island cultures that are thousands of miles apart but also archaeologists whose backgrounds are often very disparate. Through their different approaches, researchers tend to either present their islands as being representative of a wider phenomenon or as being intrinsically different. Some view islands as closed geographical and social laboratories, in which ecological variables are the determinant force in a functionalist culture evolutionary paradigm (the 'phylogenetic' approach) (e.g., Kennett and Clifford 2004; Erlandson et al. 2004), while others temper environmental determinism by blending together cultural and natural factors and locating islands within networks of interaction (the 'reticulate' approach) (e.g., Broodbank 2000; Fitzpatrick and Diveley 2004; Knappett 2011; Terrell 2004; White 2004).

This study belongs more in the reticulate or entangled school of thought (cf. Hodder 2012), but it recognises the usefulness of other approaches. It treats islands as a basic unit of study but goes on to examine different combinations of more complex units (site-island, island-island, island-mainland), initially by gauging the role of biogeographical variables (island size, distance, resources, and configuration) and subsequently by reviewing other factors. The latter include people's perceptions of the environment and of demographic sustainability, or the potential allure or 'pull' (Anthony 1997) of other islands and mainlands. The resulting observation is that different (though occasionally recurrent) combinations of factors—some more constant, others contingent; some measurable, others ephemeral; some archaeologically visible, others not—contribute to the making of human histories on islands and to a Mediterranean way of life.

Colonisation includes a number of complexly related activities, not a mere sequence of arrivals and departures. As Broodbank has pointed out, colonisation is a 'convenient short-hand term as long as we remain alert to the range of things that it can signify, and the variety of antecedent and subsequent activities that bracket it' (2000:110; cf. Mandryk 2003:xiii). It is easy to see how these words are equally applicable to 'abandonment'. One of the aims of this book was to capture these activities and to explore, as far as possible, how they are articulated as a whole, but also to theorise colonisation and abandonment by analysing the data in the light of past and present ideas developed both within and outside the Mediterranean.

Colonisation, abandonment, and recolonisation histories cannot be studied in isolation. Horden and Purcell (2000:5) have stated that 'the distinctiveness of Mediterranean history results . . . from the paradoxical coexistence of a milieu of relatively easy seaborne communications with a quite unusual fragmented topography of microregions in the sea's coastlands and islands'. While the outcome of this may be that Mediterranean history appears to be largely unpredictable, reflecting as it does a number of hidden causes for people's 'coming and goings' to islands, some elements are recurrent and can be investigated. Starting from empirical observation, an island's geographical features can be used to map the search for territories and resources and to mark how these changed across time. Moving on from the empirical level, there is scope for theorising about less tangible categories, such as the role of knowledge (e.g., its acquisition and sharing) and the enculturation of space, and about these processes, by drawing upon interpretations and accounts of both prehistoric and historical colonisation and abandonment from a variety of spatial backgrounds.

ISSUES AND THEMES

This book can be broadly divided into three parts: a theoretical evaluation (the review of past and current colonisation and abandonment theories), an empirical study (the biogeographical and archaeological data analysis), and a final proposal (the formulation of suggestions for Mediterranean island archaeological practice and theory). Throughout this study, the all-important question has been whether any specific factors can be seen to have resulted in similar activities at different times, which may in turn lead us to understand whether colonisation and abandonment of different islands (and island regions) are interconnected, either directly (historically linked) or indirectly (causally linked by similar factors). This issue, it is argued, can be addressed effectively through a comparative approach. This comparison has led to the identification of a series of spatial patterns whose significance can be evaluated. For example, reasons behind chronological variation can be addressed in terms of both absolute and relative dating (e.g., the study compared both very early and very late initial colonisation vs. abandonment dates and relative lengths of occupation and abandonment periods). The investigation of these patterns demonstrates that, in general, there is some regularity in the colonisation trajectories when the islands are viewed collectively, but that a number of exceptions can be singled out when the analysis zooms in to specific island groups. The Aegean basin is a good example, as it is host to islands in close proximity to one another, which reveal synchronously important differences in their human use, both within the island groups themselves and between groups. Although there is some correspondence between biogeographical variables and the islands' occupational histories, elements of human choice formed under a variety of cultural conditions played an increasingly important role in the shaping of island life, both in the Aegean and elsewhere in the Mediterranean. We should also bear in mind the significance of recent discoveries for very early colonisation horizons, such as can now be seen on Crete and Cyprus, where the strong earlier scepticism of the academic community has been proved wrong. This might mean that future work will lead to revising similar early claims for Corsica and Sardinia.

There are differences in the colonisation and abandonment trajectories of islands that shared geographical similarities, while similarities in the unfolding of such trajectories exist among islands that could be considered physically rather different. The differences in both colonisation and abandonment sequences, rather than the similarities, proved to be more informative, as they demonstrated that biogeography cannot by itself account for cultural divergence in the Mediterranean island context. As we saw in Chapter 3, island biogeography in the Mediterranean has a certain explanatory power but cannot generally be used in a predictive fashion, as it can in the Pacific. Nonetheless, it holds strong exploratory potential: in viewing the different geometric properties of islands, particularly their configuration, it reveals the richness and variety of island–human encounters and highlights both choices and restrictions.

For example, the fact that, in the western Mediterranean, most islands colonised during the Neolithic were generally visible from the mainland or another large island (lying less than 50 km from the nearest mainland—e.g., the Aeolian Islands and Malta) (Chapter 6) is likely to reflect some element of human choice and not just availability. Alternative islands were present, but these were either generally avoided or not known (being farther away), suggesting that these 'intrepid pioneers' (as they are often portrayed) were actually reluctant to brave the open sea. The fact that most distant islands (lying more than 50 km from the nearest mainland) were colonised either before or after the Neolithic (with small, faraway islands colonised for the first time mainly from the Bronze Age onwards) reinforces this possibility and seems consistent with evidence from Lipari, where the lack of evidence for deep-sea forays has been taken to indicate that its Neolithic colonisers were concerned more with the resources offered by the land (obsidian and farming) than with exploiting the sea.

The exception to the explanation above is, of course, Lampedusa, which, in view of its physical isolation, demonstrates that Neolithic people did engage in both land- and sea-focused activities—though it is noteworthy that this settlement was short-lived, most likely because of the island's remoteness. Elements of human choice are further illustrated by evidence from the eastern Mediterranean, where the overall analysis of colonisation data indicates that, during the Neolithic and Bronze Ages, islands seem to have been selected on the basis of their size rather than their distance. Islands targeted in the Neolithic were colonised regardless of distance but tend to be large (more than 20 sq km), although small close-by islands were also taken over from the fifth millennium cal BC onwards.

These overall observations reflect a palimpsest of trends, whereas specific decisions as to which islands to go to (either for settlement or for other activities) are likely to have been influenced by factors operating at the local level. For this reason, there is a need to focus on individual islands, since these illustrate better how cultural elements intersect with environmental factors. What was happening in surrounding islands (or mainlands) is also important in order to understand why individual islands were colonised and abandoned. As discussed in Chapter 8, there are no obvious similarities in the occupation histories among the islands in the case studies when viewed together; however, distance, size, resources, and different degrees of interaction had a number of effects. Some observations on these effects were made when looking at the islands in specific combinations and were synthesised in the previous chapter, but it is worth emphasising a few points here.

On a general level, with regard to settlement, the fact that islands settled earlier (sixth–fourth millennia cal BC) experienced initial occupation periods that lasted, on average, longer than those colonised later (third–second millennia cal BC) (i.e., islands settled later were often abandoned sooner) may have to do with why they were settled in the first place. Rockman and Steele (2003:xx) have claimed that 'colonization underlies every subsequent occupation', and in this respect it is tempting to connect the temporal pattern noted above with the fact that some islands may have been colonised for farming and others for trade. However, this explanation is not fully satisfying, as it relies on viewing the former as a more permanent activity or less prone to fluctuations than the latter. On the other hand, the pattern may be a distant reflection of changes in the sociopolitical environment that are only slowly becoming clearer. The introduction of sail technology at the end of the third millennium cal BC (in the Aegean, and later in the western Mediterranean) is more than likely to have played a prominent role in this: in general, it made moving between islands and mainlands a much more viable option than before, when transport relied solely on canoes, but it also offered a buffer against community vulnerability and opened up further opportunities for development.

Moving to more specific causes, distinct phases of instability on Kythera, Naxos, Melos, and Kea are likely to have been related to political factors operating on the Greek mainland. However, these events affected them differently, regardless of the timing of initial human occupation, which took place approximately at the same time, towards the end of the fifth/beginning of the fourth millennium cal BC. Differences in the islands' sizes (Naxos being the largest), distance to the mainland (Kea and Kythera being the closest), and availability of resources (Melos being a primary source of obsidian) affected the inhabitants' responses to these events (as discussed in Chapter 8). Of these islands, only Naxos was inhabited continuously (although there were adaptations in its settlement record), and the most convincing (and parsimonious) explanation for this is its large size and availability of resources.

Looking beyond the Aegean basin, there are other islands, such as Lipari and Mallorca, which, once colonised, had trajectories comparable to that of Naxos. These islands, which can be assigned to Broodbank's category of 'super-attractors' (1999a:27), provided a focus for long-term human presence, while occupation often dwindled on islands nearby. Indeed, islands with lower biogeographical appeal were often not permanently occupied if there were nearby islands with higher ranking (e.g., Ibiza and Mallorca, Salina and Lipari). This tendency reinforces the idea that humans ascribe a relative value to geographical variables: had Ibiza and Salina stood either alone or adjacent to only smaller islands, they might have been perceived as super-attractors worth the investment in their own right. Instead, while on average the islands in the case studies were occupied for periods lasting more than twice as long as the time they were abandoned, abandonment lasted as long as, and sometimes longer than, occupation periods on islands close to super-attractors (e.g., Naxos), and generally on all small islands, unless specific resources were present (note the similarities in the obsidian islands' occupational history).

Although it may be impossible to reconstruct the exact conditions that led to colonisation and abandonment processes unfolding in prehistory, this book puts forward a number of hypotheses. A fruitful avenue of enquiry for the future would be to shift the emphasis even more from the islands to the people and to attempt to 'map the worldview of the islanders' (Renfrew 2004:287). For instance, approaching colonisation as a form of 'place-making' opens up a new range of questions and methodologies, such as experiential and phenomenological techniques, which can be successfully integrated into tried and tested field surveys and GIS-led studies (e.g., Rennell 2010).

It is no easy task to pitch the scale of enquiry correctly for gauging the islanders' worldview. In the context of the Cyclades, Broodbank (2000:110) has explained that networks, rather than individual island communities, were more important to the long-term continuity of island life. 'Networks install a series of two-way relations, so that both newly occupied areas and homelands should bear the marks of this interaction' (Gosden 1993:24). The extent of this interaction can be measured physically at any given point—for example, by mapping locations of settlement sites and of resources in use contemporaneously; however, networks did not stay fixed over time. Changes in maritime technology were crucial: distances would have been perceived differently depending on whether canoes or sailing vessels were available, as days of travel could be reduced accordingly. In turn, distance (in terms of time of travel) may have had an effect on the value ascribed to resources. As these cultural factors were fed back into the networks, the nature of interaction also would have changed.

Cultural connotations are likely to have affected the way that distance, contact, and the acquisition of resources and knowledge were perceived (Helms 1988:4; Broodbank 2000:94, 258; Strasser 2003). Thus, Anderson has stated that technological seafaring innovation should not be taken for granted or as 'a passive platform' for the transport of people and goods; instead, boats were 'decisive agents in the creation of insular isolation and interaction' (2004:264; cf. Broodbank 2000:96). For example, Broodbank has explained that, while canoes were in use in the prehistoric Aegean, only small loads of goods could be transported, and this would have resulted in 'a dispersed rather than centralised storage practice', the latter coming into place partly as a result of increased cargo capacity (2000:101). It is this alternating character of the sea, as a connecting and isolating element, both at the natural and cultural levels, that island cultures illustrate so well.

In conclusion, the general lack of colonisation patterning at the micro-scale does not mean that geographical features did not play a relevant role in the process, as the macro-regional scale amply demonstrates. At the lower end of the spectrum, choices affected the decision of which islands to go to, exploit, or settle, as physical constraints and resource limitations were overcome and opportunities created at different times. On a regional scale, processes such as 'autocatalysis' (Broodbank 1999a; see Chapter 3) brought on the colonisation of islands lying close to one another (e.g., the southwest Aegean, the Ègadi Islands, and the Ionian and Dalmatian islands). However, this was not always the case, as temporal gaps in colonisation sequences at the micro-scale clearly indicate. In some instances, these gaps could simply reflect a lack of systematic research (as may be the case for the Northern Sporadhes and the Tremiti Islands), or caused by difficulties arising from low site-visibility. However, with few exceptions, they seem to reflect some reality in the past. Choices and opportunities depended on local conditions, which were clearly responsible for some of the irregularities or 'noise' displayed in most Mediterranean island histories (Cherry 1981; 2004). For this reason, it is important that studies of islands consider the physical and cultural make-up of both island 'units' and 'islandscapes'.

The Study of Islands and Mediterranean Prehistory

Detailed reconstructions based on material evidence can tell us about what happened on individual islands; however, these fragments must then be reassembled in a meaningful way and located within the long-term history of the Mediterranean as a whole. A useful distinction to make is whether studies should focus on investigating history *in* the islands or *of* the islands. Horden and Purcell made this point in their study of the Mediterranean, in which they viewed history 'in' as 'contingent history', which is 'not related directly to its geographical setting', and history 'of' as 'an understanding of the whole environment', intended as 'the interaction of human and physical factors' (2000:9). This approach finds a good parallel in work by Rockman, who envisages colonisation as a process of 'landscape learning', in which the acquisition of knowledge is 'a consistent process that draws on contingent situations' (2003: 12). Some generalisation (not necessarily a negative feature) is required when seeking to explain a history *of*, since contemplating the detail afforded by histories *in* is of only limited value if not employed in any broader analysis.

The occupational record of the islands is an essential component of the history *of* the Mediterranean. A history of islands can be written by focusing on elements found recurrently in their record, starting, for example, with those that characterise their physical make-up. The relative weight of these elements can then be gauged by comparing the histories *of* the island, island group, island vis-à-vis mainland, and different Mediterranean regions. These offer a counterpoint to the palimpsest of trends that emerge from analyses of eastern versus western Mediterranean islands, as only an awareness of processes acting at smaller scales can justify the use of more general models.

In exploring the occupational history of the islands, this study set out to investigate when islands, and which islands, were colonised and abandoned in Mediterranean prehistory, and why. It investigated configuration (i.e., do geometrical properties lead to parallel trajectories?), resources (i.e., do islands with coveted resources share similar colonisation histories?), time (i.e., can we distinguish between Palaeolithic, Mesolithic, Neolithic, Bronze and Iron Age colonisation/abandonment?), and finally activity (i.e., what do the material remains tell us about variations in human action?). Considering the difficulties with relating types of material found on islands to activities, it would seem more viable to study human–island interaction by period or geographical area, which is largely how colonisation has been approached in the past (while, as mentioned, abandonment has rarely entered the picture). However, in the first case, increasingly fine chronological resolution is necessary if synchronisation between processes is to be demonstrated rather than assumed, and specific models have to be developed for colonisation and abandonment in those periods. In the second case, spatial models have to be fine-tuned, by taking configuration differences into account, and cultural variables need to be factored in.

Addressing interaction by type has the benefit that activities can be explored through time and space, making the most of the previous two approaches. Obviously, a balance must be achieved between speculation and useful comparison. In that respect, studying colonisation and abandonment activities by type is a valid avenue for investigation as long as the right weight is given to the temporal context of cultural development, lest we place the islands 'out of time' (Renfrew 1978b; 2004). This 'time' includes both the prehistoric context of what is being compared and the present context of academic discourse, as this is likely to influence the conditions surrounding the comparison and its outcome.

Previous studies of colonisation have sought to provide a touchstone for identifying different activities in the archaeological record. This has remained elusive, as its search has relied traditionally on a teleological view of colonisation and abandonment (treating activities on islands as largely geared towards their permanent settlement), which at best could accommodate a rigid relationship between archaeological correlates and past human activities. Rather than producing a list unlikely to survive a single year of fieldwork, in this study I have advanced hypotheses as to which correlates can be taken as diagnostic of different types of colonisation and abandonment activities in a variety of geographical and temporal contexts.

Interaction is a key issue; however, its understanding is made more complex by the fact that contact took place within settings that changed over time. 'Islands, and especially island clusters […] are commonly *places* that amplify and polarize isolation and interaction (Braudel 1972:150)' (in Broodbank 1993:316, my emphasis). Nonetheless, it may prove over-reductive to explain colonisation and abandonment issues through this dialectic (cf. Anderson 2004:255). In the Mediterranean, isolation was never a prominent factor (social isolation is also rare). While interaction may have been the norm, it is an all-encompassing term whose components require detailed analysis. Before and during the Neolithic, links between different parts of the Mediterranean are present but not always obvious, as they involved assumed symmetrical relationships of interaction (e.g., exchanging obsidian for perishable goods). From the Bronze Age onwards, partnerships of interaction become increasingly clear as social differences became sharper. The 'pull' or allure of potential alternatives became more marked in the Bronze and Iron Ages, and changes in technology made it easier to pursue these alternatives further, while increased knowledge of such possibilities lowered the 'threshold of resistance' to 'push' factors at home (such as population pressure, disease, social inequality, and so on), encouraging people to move (Rockman 2003:9). Thus, when thinking of abandonment, it is worth remembering that the pull of the mainland may be responsible for people's decision to leave islands, as human perception and sense of scale tend to scan and identify desirable 'places', be they mainlands or other attractive large islands.

As mentioned, Mediterranean island archaeology cannot be articulated satisfactorily as a single dichotomy, as the entities involved are unlikely to have remained fixed over time. While the Mediterranean physical environment had, by and large, settled down at the time when islands became stably occupied, the social environment was in a state of flux. Renfrew's explanation of culture change in islands (2004) and Broodbank's mechanisms for explaining initial colonisation (1999a) share a common concern for understanding the '*topology* of isolation and interrelatedness' (Terrell 2004:219, emphasis in original), as well as their tempo—that is, not just where, but also when, how, and why islanders become isolated or engaged in networks of interaction.

This study has sought to move beyond geographical and academic divisions inherent in Mediterranean studies and to show the potential of bringing an island archaeological framework to the fore in Mediterranean prehistory by focusing on two interrelated processes: colonisation and abandonment. Inevitably, as further evidence becomes available, the colonisation and abandonment patterns observed through archaeological data will change, at least in part. As more fieldwork eventually substantiates or negates previous finds, the observations made here will come under close scrutiny, in the same way that previous studies have been examined in this survey. On the other hand, the framework expounded by this work, in terms of how colonisation and abandonment are conceptualised, is capable of incorporating instances of earlier or later colonisation and the filling of gaps in the archaeological record. In seeking to explore how the geographical and temporal data combine together, several trends have emerged, which can be related to different kinds of colonisation and abandonment activities. The study has addressed the question of whether the colonisation and abandonment of islands is different from that of other landforms, and in doing so, it has endeavoured to build bridges between Mediterranean prehistory and island archaeology by enquiring into the role of islands in broader prehistoric processes.

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About the Author

Helen **Dawson** is Research Fellow at the Freie Universität in Berlin (Topoi Excellence Cluster), where she is carrying out a project on sense of place and identities within Sicily's minor islands during the Neolithic and Bronze Age. She studied at the Institute of Archaeology, UCL, for her BA and PhD, and at the University of Cambridge for her MPhil. Her research covers the whole Mediterranean, from the Balearics to Cyprus, and chronologically spans a period of over 10,000 years, from the earliest visits to the islands to the establishment of complex societies. Helen is a long-standing Honorary Research Fellow at the University of Kent, where she was an Associate Lecturer in Archaeology from 2006 to 2013. Over the years, she has supervised archaeological investigations in Italy, Greece, Morocco, and Cyprus. She has professional experience as Senior Archaeologist with Museum of London Archaeology, both in rescue excavation and heritage assessment, and is a member of the Institute for Archaeologists in the United Kingdom.