THE QUATERNARY PERIOD

Edited by:

Leonardo D. Fernández

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Table of Contents

Human Peopling of Sicily During Quaternary

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ABSTRACT

The early human peopling of Sicily and Western Mediterranean shores is one of the debated topic in the archaeological and anthropological literature over the twentieth century. This discussion involves not only the specific issue of the peopling of the continental island, but fundamentally the reconstruction of human migration routes and dispersals across the Mediterranean area during Early and Middle Pleistocene. Even if the common route of faunal and human movement is considered from North, and relative to the Messina strait crossing, several authors, on the base of archaeological evidences, hypothesized an early peopling and an African provenance through the Sicilian Channel. This hypothesis has been mostly rejected even if diverse palaeontological and especially archaeological findings of Modus 1 and 2 artifacts from Southern Sicily renewed the attention to this issue. However most Sicilian archaeological evidences are spotty and frequently dubitative, as they lack of stratigraphic context. Direct anthropological data are scarce and relative only to the Upper Palaeolithic and indicate a *H. sapiens* migration from Italian mainland. Nevertheless, palaeontological and palaeogeographic data do not exclude the possibility of a Middle Pleistocene human peopling at least.

Our different research fields helped us to face the problem through diverse perspectives, on the main intent of a critical revision of all the available data from palaeontology, archaeology, palaeogeography and physical anthropology. We propose a critic discussion of the industrial evidences, the georeference of

lithic and faunal retrieval sites during Early and Middle Pleistocene and a tentative palaeogeographic reconstruction of Middle Pleistocene coastal lines of Sicily on the base of the georeferred sites. Furthermore, using cranial morphometry in a wide comparative analysis between Upper Palaeolithic Sicilian, European and African samples, we indicate the probable population relationship in Upper Palaeolithic and Mesolithic transition periods. Our results do not exclude the possibility of several sporadic human peopling related to the Messina Strait accessibility since the Middle Pleistocene. A pulsating trend of dispersal and extinction characterized humans in Sicily at least until Mesolithic transition.

INTRODUCTION

The main intent of this chapter is a critic approach to the human peopling of Sicily during Quaternary. This is a controversial issue that starts from the discussion of the possible migration routes followed by humans trying to hypothesize the timing and the mode of this spread. Nevertheless the question is in close conjunction with land mammals movements, whose area expansion or shrinkage is linked to the distribution of land and seas. At such purpose has also its importance the reconstruction of the geokinematic events – extensive marine transgressive and regressive cycles visible on seismic profiles - that create or destroy seaways and mountain ranges thus providing sweepstake routes, filter-bridges, land bridges and corridors both for animals and humans.

The history of the earliest peopling of Sicily is a topic that has long stimulated anthropological and palaeoethnological research; in recent years the number of archaeological excavations has increased enormously, but few excavators in the past were fully aware of the utility of recovering human remains, and therefore osteological studies by comparison remained relatively scarce (Becker, 2002). This bias is probably the reason why there are gaps in the archaeological record of Sicily, even if the potential record is extensive.

The presence of ancient representatives of *Homo* in the Mediterranean basin during Early and Middle Pleistocene is demonstrated by several evidences, mostly of cultural type, spotted all around the border of the basin or along continental routes towards reservoir areas presumably important for their accessibility and carrying capacity, or limited presence of competitors *sensu lato*. The dispersal of early *Homo* towards new African and Eurasian landscapes sees, in any case, the movement of small numbers, bands of primordial hunter-gatherers that presumably have left very sporadic traces of their passage, of their existence in a place. We are obliged to ongoing comparisons with modern hunter-gatherers when we want to define a behaviour or a probable game area of a hunter of the past (presumably around 70 squared km for a modern hunter gatherers, but nowadays they do not perform anymore big game hunting; Gattini, 2004). If the reconstruction of modern hunters' lifestyle and life history is full of uncertainties the definition of an Early – Middle Pleistocene humanity on the base of an archaeological repertoire appears even a harder purpose.

Homo ergaster (erectus) appears on the Mediterranean shores presumably not so long before its dispersal from Eastern Africa (Lahr, 2010). Numerous spotted heterochronous human evidences (mostly cultural ones) can be found both on the African and on the European side of the basin: Casablanca – Thomas Quarry 1 (Raynal et al., 2001), Ain Hanech (Sahnouni et al., 2010), Atapuerca (Rodríguez et al., 2010) and Dmanisi (Ferring et al., 2011). The sites and samples demonstrate a random movement of these bands. The first European evidences in Atapuerca and Dmanisi, on the western and eastern side of the continent respectively, could justify a double route of approaches to the boreal Europe. Unlike their modes are inadequately reconstructed on the base of too scarce, and short in time, evidences.

These findings open the proposal of different scenarios regarding the dispersal routes followed by early humans. In the reconstruction of such scenarios play an important role the data regarding the paleo-climates and the palaeogeography of emerged lands. Eventually also the route followed by big games can be of aid for the discussion.

In this review we intend to re-open the debate using all the available data on ancient Sicily such as palaeontological, geological, and archaeological ones. This multidisciplinary approach aid at the purpose of an ancient reconstruction of Sicily island and of its accessibility. The archaeological evidences fuel the hypothesis of an early human peopling of the island in the absence of Early Pleistocene human fossils. In order to overcame this objective lack, we propose a morphological and morphometric comparative analysis of the available Late Pleistocene cranial evidences. In fact, it is generally agreed that cranial morphometric variation reflects mainly genetic variation, being modified by mutation, migration and drift, with bio-cultural factors having a minor effect in all but extreme cases (e.g. cranial deformation). Therefore cranial morphometric variation can be used as a reliable source of information about past populations history. Such comparative analysis is temporally limited and chronologically close to the extant humans but, starting from the consideration that cranial and facial morphologies can describe the provenance and the possible phylogenetic relationships (D'Amore et al., 2009), we can nevertheless reconstruct a scenario of *Homo sapiens* Late Pleistocene arrival in respect to African and/or European forerunners.

HISTORY OF THE RESEARCHES

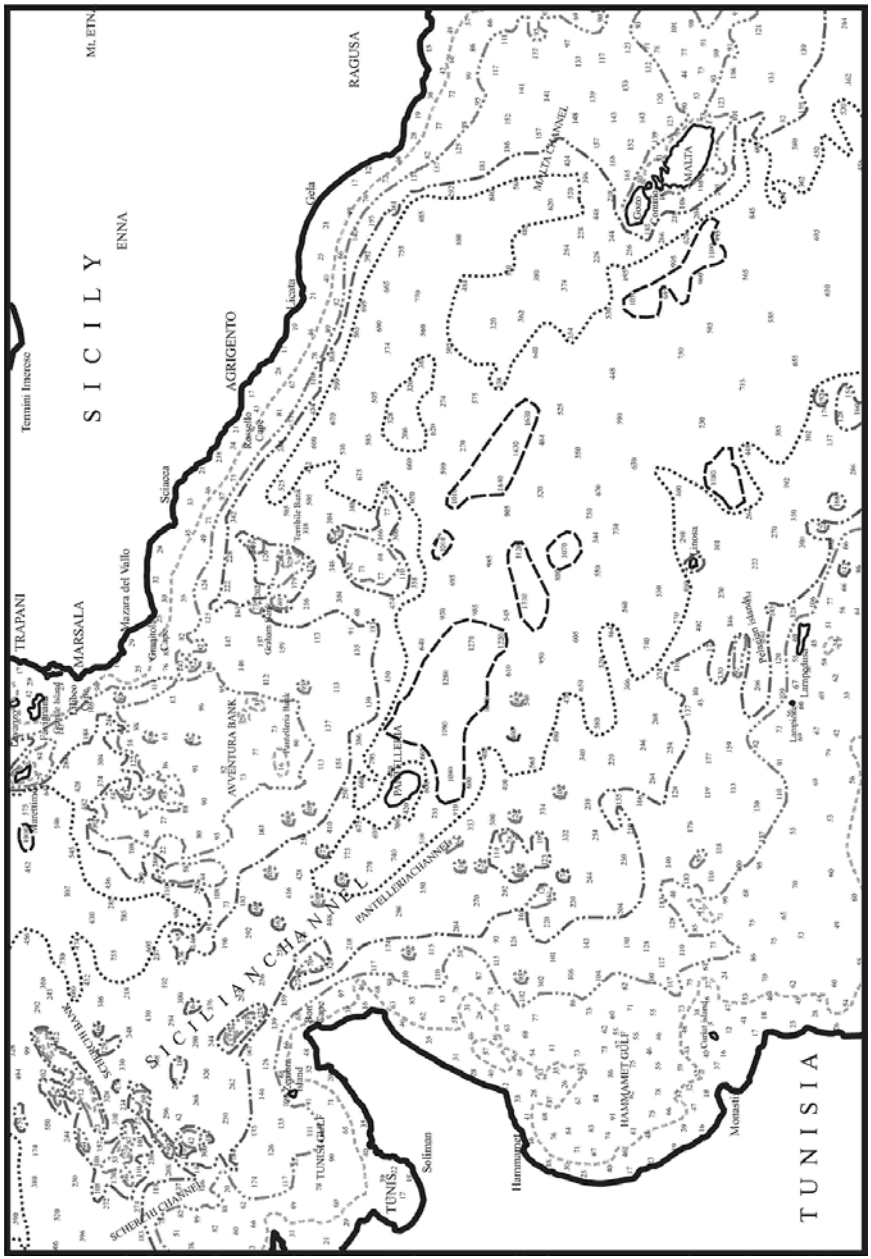
The centrality of Sicily in the Mediterranean basin and its closeness to the Italian Peninsula and to the northern Africa, at least during low stand sea level episodes, may indicate an important role in such early colonization. For this reason the island has been considered a land of passage for an early human peopling coming from Africa into Europe (Alimen, 1975). Nevertheless numerous questions still opened and unsolved are matter of discussion among palaeontologists and anthropologists. Did Sicilian fauna come from Africa following the so called Siculo-Tunisian isthmus and/or used the Northern route from Calabria ? And was the route used by humans the same ? Moreover when did the human colonization occurred ? How many times the migration event happened ?

The question of the existence of an isthmus between Sicily and Tunisia that could permit the passage of humans and big games has been raised since "Grimaldi people" theory (Boule, 1911; Keith, 1911) and has been fuelled by Despott's discovery in 1917 on Malta island. In particular the excavation of a Neolithic site (Ghar Dalam cave) permitted to find two very encrusted human molars of big size that Despott depicted in his report (1918) in an unclear photo. The eminent anthropologist Sir Arthur Keith got the occasion to fuel his negroid hypothesis and not considering the typological attribution of the accompanying artifacts, published on Nature in 1918 a sensational article titled "Discovery of Neanderthal man in Malta !". In 1924 to stop the uproar raised he justified his statement with the fact that he misinterpreted the taurodont molars found by Despott as they were typical of Neanderthals but could also appear in few modern men. Vaufrey's journey on Sicily and Malta islands during the biennium 1926-27, proposed by his mentor Marcellin Boule, was connected to the same question: verify the possibility of the existence of the predicted Sicilian-Tunisian isthmus being Malta archipelago a sort of land of passage. Vaufrey (1929) published his conclusions in a famous monograph, where he declared the inexistence of such isthmus. To arrive at such conclusion he took in consideration Spratt's bathymetric maps (1867) of Sicily, Malta and Northern Africa coasts, the archaeological evidences and the common fauna shared between Sicily and Malta (especially the elephants whose forerunner may come from Africa). Spratt (1867) claimed that the submarine ridge between Ragusa Platform and Maltese archipelago was an epicontinental land bridge during the Pleistocene and facilitated the migration both northwards and southwards of exotic fauna. Unfortunately the sea level had to lower at a too greater extent to permit the existence of such intercontinental land-bridge. For what concern the fauna, Vaufrey argued that Sicilian and Maltese elephants were different with no common forerunner. Finally he personally testified that during his surveys in Sicily he did not recover any artifact either in deposits or on the ground surface that could belong to a lithic culture earlier than the Upper Palaeolithic one. In response to Bianchini (1973) *hacheraux* discovery's in Southern Sicily, Marie Henriette Alimen (1975) launched again the hypothesis of the predicted isthmus showing in a bathymetric map that the lowering of sea level occurred during glaciations, would greatly reduce the distance between Africa and Sicily during Early Pleistocene and permit the existence of an intermittent land bridge on the western edge of the pelagian region. Schackleton et al. (1984) argued in particular that during the last glaciation acme (late Wechselian) the sea level drown of about -120 meters so that in the Sicilian Channel the distance between Cape Bon and south-western Sicily was reduced at about 60 km (Figs. 1, 3), while a narrow land bridge would have formed in the area of Messina Strait (whose depth is actually about 90 km). Moreover even the Maltese islands whose distance from Sicilian coast is about 90 km would have been connected by another land bridge (Villa, 2001). Even though the proximity of Sicily with the African coast during Late Pleistocene is confidently attested, cultural exchanges between Sicilian and African peoples are not considered possible by Zampetti (1989). Nevertheless Straus (2001) do not exclude the possibility of human exchanges during Pleistocene times between Iberian Peninsula and Maghreb through the Strait of Gibraltar. Unfortunately the equation glaciation means lowering of the sea may appear too simplistic as the forces involved are many. Moreover the Holocene and Late Pleistocene palaeogeograhic data has to be used with much caution to infer the land

configurations during older periods as the geodynamic was very active in Western Mediterranean area.

To understand the extent of the tectonic activity in the Sicilian Channel it is worth to remember the “Ferdinandea island” episode; an island appeared from the sea in 1831 during a submarine basaltic eruption that formed a debris high 65 m above sea level and with a perimeter of 3.700 m demolished by the sea in about six months.

Fig. 1. Palaeobatimetric map of Sicilian Channel (Modified from bathymetric map 1:250.000).



STRUCTURAL OUTLINES AND LAND CONFIGURATION OF WESTERN MEDITERRANEAN DURING NEOGENE-QUATERNARY

Since the late Cenozoic the western Mediterranean area has been characterized by very active geodynamics due to the fact that this area is crossed by the collisional front of African and Eurasian plates. Sicily represents nowadays the emerged area where the two plates had collided together in the period spanning from the early Miocene to the early Pliocene and its structure, made up of three units (northern chain, foredeep of Gela and Caltanissetta and Hyblean foreland), is the result of this convergent tectonics. Of these structural units the Hyblean carbonate plateau, the south eastern sector of the island, that continues undersea remerging to form Malta archipelago, represents the northern margin of the African plate and the foreland region (the so-called Hyblean – Maltese platform). The submarine platform reaches a maximum depth of 200 m below the present sea level and is mostly less than 90 m deep. To the west, beyond the Sicilian Channel, the Miocenic carbonatic rocks continue in the Tunisian Platform. The sea depth between the Maltese archipelago and North Africa is much deeper, sometimes reaching more than 1000 meters below the present sea level (Fig. 1). The two twin platforms form the Pelagian region in between Sicily and Tunisia truncated to the east by the very steep Syracuse – Maltese abyssal scarp, along the eastern coast of Sicily in the Ionian sea (Fedele, 1988).

In the Neogene and the Quaternary the palaeogeography of the Central Mediterranean area underwent an intense geodynamic evolution related to the opening of the Tyrrhenian Basin and the folding and uplifting of the Apennine chain. In particular, during the Oligo-Miocene and in the early Pliocene large scale tectonics, mainly translational, combined with medium - high order eustatic fluctuations played the main role modifying the geography of the emerged lands, creating and/or disrupting the connections among the various lands. High scale palaeogeographic maps can give only a rough idea of the land configuration of Mediterranean area in the Paleogene. In this time span Sicily was not yet emerged and only some sporadic continental episodes document its temporarily emersion (see Table 1).

During Plio – Quaternary land configuration has been controlled by the interaction between tectonics, mainly uplift, and glacio - eustatic fluctuations (Masini et al., 2002a and 2002b). The establishment of an extensional tectonic regime affecting Sicily from the early Pliocene onward resulted in the collapse of peripheral zones of the island that at the end of Early Pleistocene led to the creation of a series of deep marine basins (the foredeep basins of Caltanissetta and Castelvetrano) which occupied large areas around and between a partially emerged northern chain and the structural height of the Iblean plateau. Even the Etna volcano was not yet emerged being his volcanic activity fully submarine since 700 ka ago (pillow lavas at Acicastello) and would appear like a wide gulf, probably connected during Early Pleistocene with the Gela basin forming a seaway, between the two structural heights, from the Ionian sea to the Sicilian Channel (Fig. 2). The first part of Middle Pleistocene is characterised by a general sea regression that added to the continuing uplift tendency may be responsible of the further emersion of the northern chain, of the emersion of wide sectors of the foredeep basins and of the expansion of the Iblean-Maltese plateau (Agnesi et al., 1998). The south-western sectors

of the island (Capo Bianco, Selinunte, Mazara del Vallo, Marsala) and the Catania Plain instead went drown (Ghisetti and Vezzani, 1982). Even though the northern and central sectors of the island were more or less emerged during Pleistocene, the coastal areas were subject to sea level fluctuations that in some cases reached also the inner sectors forming wide marine terraces whose relics are recognisable along Trapani, Agrigento and Iblei coasts (Carbone et al., 1982; Bonomo et al., 1996). The reconstruction of the most recent Quaternary coastal lines is attempted on the base of geomorphological and paleontological-stratigraphic data (Antonioli et al., 2006; Ferranti, 2006). Another tectonic uplift is well documented at the beginning of Late Pleistocene after the last Interglacial high stand phase (Eemian, isotopic substage MIS5e) as in the whole Sicily the deposits of the abrasion surface formed during this climatic phase are located at very different heights (the inner edge of the marine terrace ranges from some meters to 35 meters above extant sea level in North-western sector while in the North-eastern sector of the island the inner edge reaches about 180 meters; Antonioli et al., 2006). During the last glacial acme (late Wechselian) the continental shelf expands on the south connecting with the Maltese islands. Even the coasts between Mazara del Vallo and Sciacca extends south-western wards forming a wide promontory. The extant Sicilian Channel shrinks as the proximity between Sicilian and North African coasts is greatly reduced (Fig. 3).

Fig. 2. Palaeogeographic outlines of Sicily during Early Pleistocene (continuous line) and situation of known Eemian coasts (dotted line). Extant island (punctuated line). Modified from Bonfiglio and Piperno (1996).

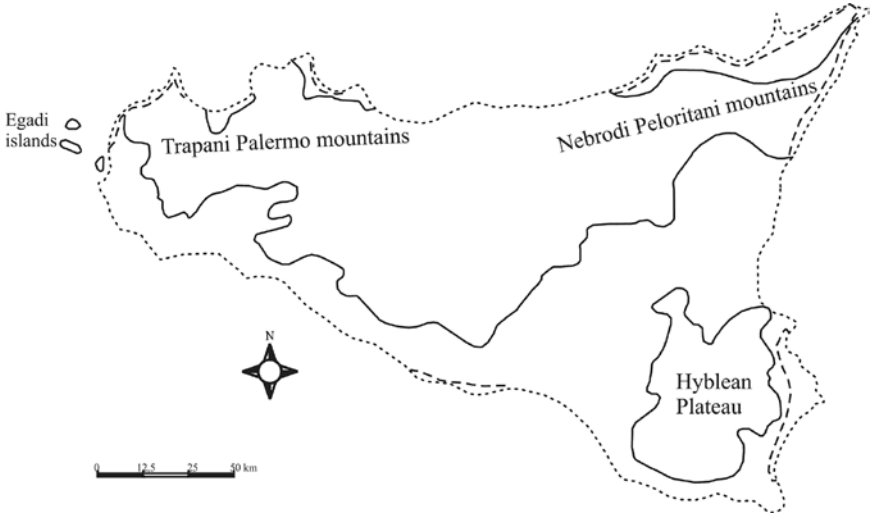
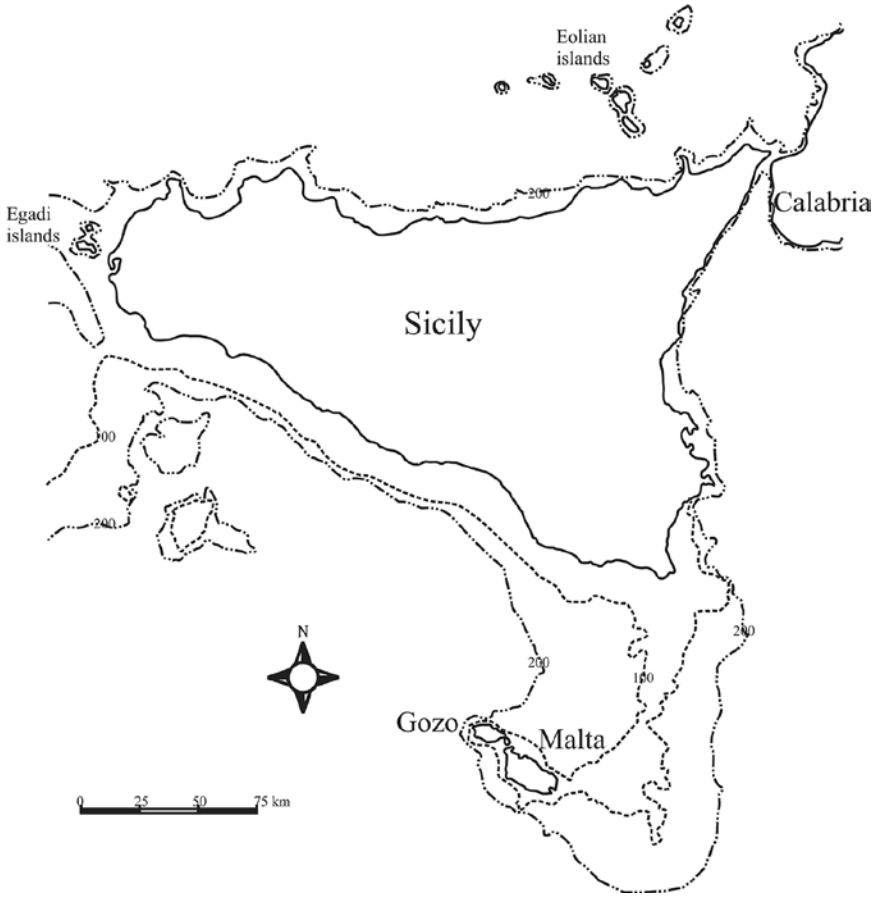


Fig. 3. Extension of Sicilian coasts during Late Wechselian.



FAUNAL AND HUMAN DYNAMICS IN PENINSULAR ITALY

Human movements throughout Europe have been influenced by climatic-environmental changes that reorganized fauna and flora distribution during the Neogene-Quaternary (Hemmer, 2000; Carrión, 2011). Even though early humans have been affected by a technologic inadequacy that greatly circumscribed their colonization to low intermediate latitudes. Moreover the fossil record is unpaired by objective problems of consistency, especially considering that limited or very sporadic events of regional peopling give few evidences and the stochastic possibility to find and describe them is very low too.

Early human arrival in Italy has to be analyzed in conjunction with the main mammal turn over episodes occurred between the late Pliocene-Early Pleistocene and the Early-Middle Pleistocene (Mussi, 2001; Manzi et al., 2011). The Early Pleistocene documents the extinctions of taxa linked to warm-humid environments and the beginning of cooler events (Azzaroli, 1983). The faunal renewal brought to the progressive occurrence and

diffusion of middle-large carnivores and to a parallel increase of middle-large herbivores (Mussi, 2001). In particular, at the site of Pirro Nord (Foggia - Apulia region) is documented a progressive decrease of large herbivores whereas carnivores are constantly numerous and diverse (Rook and Sardella, 2005). This structure, with large preys and a huge diversity of gregarious and solitary efficacious predators, live short room to human activity and can explain the very low representation of hunter-gatherers along the peninsula. This situation continues until the end of Early Pleistocene when is documented a dramatic decrease of predators. First human evidences in Italy are known from Mode 1 techno-complexes coming from Pirro Nord (1,6-1,3 Ma: Arzarello and Peretto, 2010) and Monte Poggiolo (Forlì – Emilia Romagna region; Peretto, 1992; Peretto et al., 1998).
Middle Pleistocene is characterized by the dispersal of centre European and Asiatic taxa followed by real turn-overs. The faunal renewal regards primarily herbivores that become very abundant whereas carnivores are limited to the already present panther and to the new immigrant hyena scarcely represented too (Mussi, 2001). To the early Middle Pleistocene are related the first reliable proofs of consistent human settlements (Isernia la Pineta, Isernia – Molise region; Peretto, 1994; Coltorti et al., 2005. Venosa Notarchirico, Potenza – Basilicata region; Piperno, 1999; Lefevre et al., 2010. Pagliare di Sassa, Aquila – Abruzzo region; Palombo et al., 2001 and 2010) and the earliest human fossil, represented by the Ceprano (Frosinone, Latium region) calvarium, recently re-dated to 400 Ka (Manzi et al., 2011). Sites with late Middle Pleistocene faunas and evidences of human activity other than *Homo* remains, are Anagni –Fontana Ranuccio (Rome, Latium region; Biddittu et al., 1979) and Visogliano (Trieste, Friuli-Venezia Giulia region; Abbazzi et al., 2000; Falguères, 2008).

FAUNAL AND HUMAN DYNAMICS IN MAIN ITALIAN ISLANDS

The earliest Prehistoric evidences of western Mediterranean islands record's are not at all represented or covered by uncertainties. Such situation regards even the largest islands (Sicily and Sardinia) and is probably related to the low attraction exerted by those environments to hunter-gatherer populations.
Continental Italy and its major islands behaved very differently in this period in respect to faunal migrations. The fossil records is differently distributed in time as the Sardinian documentation is quite abundant at the beginning of late Pliocene, while in Sicily the true record begins during Early Pleistocene becoming consistent only from the Middle Pleistocene. Moreover the faunas do not have any common element testifying the different biogeographic history of the two domains (Masini et al., 2008). The faunal dynamics in the two islands can have a paradigmatic value in our reconstruction.

Sardinia

Sardinia remained for more time in isolated conditions and probably had never experienced fully connections with the mainland. The island, after a hypothetic continental phase during Messinian crisis, received taxa from the Italian Peninsula and/or Corsica during late Pliocene – Early Pleistocene, returning to be isolated since the last 800-900 thousand years, during the glacial epoch. During such time span the endemic

fauna remains quite monotonous if not for phyletic evolution events. Nevertheless it is difficult not only to define the ancestors of this endemic fauna but also the timing of migratory episodes due to the lack of absolute dating. Early human evidences occur in the early Middle Pleistocene and are represented by lithic industries attributed to the early Clactonian culture from the site of Anglona in the north of the island (Sa Coa de Sa Multa, Martini, 1999). The chronology is only based on typological features of the lithic artifacts so that is highly debatable. Sondaar (2000) traces back the first human arrival to the Early Pleistocene in relation to the great turn over episode that involved the fauna. The author considers a more consistent human arrival during late Middle Pleistocene as artifacts attributed to late Clactonian have been recovered from the sites of Coa de sa Mua (Perfugas) and Sa Pedrosa (Pantallino, Sassari; Arca et al., 1982; Bini et al., 1993; Martini, 1992). There is a hiatus in the archaeological record till the upper part of the Late Pleistocene, age attributed to a lithic complex coming from Corbeddu cave (Oliena - 14.000-12.000 BP; Martini, 1992; Sondaar et al., 1991).

Sicily

Sicily is a young geographic entity as its continental history begins really late in comparison with that of Sardinia and of Italian Peninsula. Moreover the distribution of mammalian fossil record is scattered in time and characterized by long stratigraphic gaps.
The continental record begins with the spotty remain of a third molar of a small sized mastodon in Early Burdigalian coastal calcarenites close to the village of Burgio near Agrigento (Checchia Rispoli, 1914). This find has to be considered in conjunction with that of a first and a second molar of mastodon coming from a phosphatic level between the lower and middle *Globigerinae* sandstones (early Miocene in age) at the site of Kolla il Bajda near Malsalforno in Gozo Island (Malta; Kotsakis, 1986a). The size of those teeth it is about the same of the smallest specimens of *Gomphoterium angustidens* coming from Gebel Zelten (Lybia) and their occurrence could suggest that this area (Southern Sicily and Malta) was part of the North African shelf during Early Miocene (Rook et al., 1995).
Apart this sporadic find the oldest Sicilian mammal assemblage comes from eastern Sicily. In particular, it has been found by De Natale in the second part of the XIX century in some deposits close to Messina and nowadays enclosed in the expansion of the town. The main outcrop is that of Gravitelli but minor finds come from other localities such as Rometta, S. Pier Niceto, Scirpi and Ritiro (the latter found by Pata and Baldanza, 1947). The fossil material described and figured by Seguenza (1902, 1907) comes from a lignite and lacustrine clay deposit overlain by the Messinian diatomite and gypsum marls of the Sicilian “Gessoso-Solfifera” Formation, and therefore is dated late Turolian (MN 12-13). The fauna (see Table 1) is not endemic and include Euro-Asiatic taxa (a mastodon, a doubtful rhino, a sabre-toothed, a suid, two hyaenid and a Colobinae; Rook, 1999), together with African ones (a rhino, a hippo and a bovid; Thomas et al., 1982). Unfortunately the fossil collection went destroyed during the 1908 Messina earthquake, consequently the information about this fauna can be taken only by Seguenza descriptions (1902, 1907). The only available material is however represented by two casts of the European suid *Propotamochoerus* stored in the Earth Department of Florence University (Gallai and Rook, 2006). Moreover a primate maxilla (Carnieri and Mallegni,

2003), historically acquired by the G.G. Gemmellaro Museum of the Palermo University, dubitative belongs to this assemblage.

Even with systematic uncertainties due to the fact that is impossible a revision of Gravitelli taxa it is evident the importance of the fauna and is worth to make some inferences. The fauna is well balanced being composed of perissodactyls and carnivores and appears not endemic. Moreover quite all the faunal elements have European origin so that they may have arrived from Calabria. For what concern the African taxa, apart the doubtful rhino and bovid, the hippo remains are the most abundant in all the outcrops and are belonging to an African exaprotodont hippo. According to Rook et al. (2000) the Gravitelli fauna may witness the existence of a Late Miocene Calabrian – Peloritan not endemic palaeo-bioprovince. To sustain such hypothesis helps the find at Cessaniti (near Vibo Valentia in Calabria) in a Clypeaster-rich sandstone of a mammal assemblage made up of African taxa. The affinities of these taxa with North African ones and their non-endemic character, clearly underscore a direct connection of the Calabria–Peloritan arch with North Africa (Rook et al., 2006).

After a very long gap (from the late Messinian to the Late Pliocene) the mammal record starts again in the Quaternary. The succession of Quaternary mammalian population phases in Sicily is arranged in biochrons named as Faunal Complexes (Bonfiglio et al., 2002a; see Table 1), which differ as regards their composition and the degree of endemism and correspond to diverse dispersal events of African and/or European provenance, controlled by filtering barriers of different intensities. Variation in palaeogeography caused by tectonics and glacial and eustatic marine cycles have controlled the processes and timing of Middle and Late Pleistocene vertebrate faunal dispersion in Sicily, through temporary connections via Messina Strait and the Catanzaro isthmus (Southern Calabria) that played an important filter role in the colonization events of Sicily and Malta.

The Monte Pellegrino Faunal Complex is documented only by three deposits, outcropping at different heights, in the area of Monte Pellegrino (Palermo). The poorly diversified fauna is composed mainly of small mammals (see Table 1), some of which are strongly endemic (a soricid, a mouse, a dormouse and a ctenodactylid) and probably are the relics of an older (likely Messinian ?) and not known population phase. Apart *Pellegrinia* that shows derived characters of the African stock of Ctenodactylids (Thaler, 1972), the geographic provenance of the other taxa is controversial because they have plausible ancestors both in Europe and Africa. The taxa characterized by moderately endemic features such as the leporid (Fladerer and Fiore, 2002) and the otter (Burgio and Fiore, 1997), have a certain European origin. Consequently is probable that the dispersal from the European route followed the African one. Both systematic and geological data (relative to the Calabrian-Peloritan Arch) reveal with confidence that the European taxa would have arrived not before Early Pleistocene.

The following *Palaeoloxodon falconeri* Faunal Complex is even poorer in terms of mammalian biodiversity. Deposits documenting such biochron have an uneven distribution and are concentrated in the northern-west (Palermo and Trapani Mountains) and southern-east (Hyblean Plateau) sectors of the island. The absolute dating method applied to the tooth enamel of the elephant gave an age of 455.000±90.000 years B.P. (Bada et al., 1991). The relative age of the deposits containing such faunal assemblage, coming from eastern (from Comiso, Ragusa; Bonfiglio and Insacco, 1992) and western

Sicily (from San Vito lo Capo Peninsula, Trapani; Di Maggio et al., 1999), confirm the numerical age referring the Faunal Complex to the early Middle Pleistocene. The assemblage is very unbalanced including mostly small mammals, a dwarf elephant and a small carnivore (Table 1). The shrew *Crocidura esuae* is an endemite of uncertain biogeographic, African or European, affinity (Kotsakis, 1986b). The Gliridae occur with three species (the giant *Leithia melitensis, Leithia cartei* and *Maltamys gollcheri*), that probably descend from the Monte Pellegrino dormouse (Petruso, 2003). Large mammals include the pigmy elephant *Palaeoloxodon falconeri*, strongly reduced in size, and a member of the Lutrinae (*Nesolutra trinacrie*; Burgio and Fiore, 1988). The occurrence of a small bear and of a fox is considered uncertain. Another taxon peculiar of the assemblage is a giant tortoise recently under revision attributed to the subfamily Testudininei indet. (Delfino, 2002). Either the ancestry or the geographic provenance (African or Euro-Asiatic) of *P. falconeri* is still under discussion (Palombo, 2001) as the extreme endemic degree of the taxon, the ancestor of "normal size" has not yet been found. Some authors consider it derived from populations of *P. antiquus* coming from Italian Peninsula, while others sustain the possibility of a dispersal from African route through the siculo-tunisian isthmus (Bonfiglio and Piperno, 1996). Other data concerning the geographic provenance of this fauna come from the tortoise revision, as the origination area of this taxon could be the North Africa where terrestrial tortoises are documented in the Quaternary of Algeria and Egypt (Lapparent de Broin, 2000). Moreover, taxa close to this fossil giant tortoise have been described for Malta Island (Adams Leith, 1887). The composition of this Faunal Complex reveals a polyphasic origin; one taxon probably is a relic from the preceding phase (*Maltamys*) and the others are 'newcomers' that probably entered the island through a strongly filtering barrier. The low diversity of the assemblage and the uneven geographic distribution of the deposits that contain it, denotes that the insular system was made up of strongly geographically isolated small islands, with very difficult and sporadic connections with the mainland (Bonfiglio, 1992; Bonfiglio et al., 2002b). Moreover the occurrence in the south-eastern sector of Malta (sites of Mnajdra and Benghisa Gap and of Maghlaq) of a coeval faunal assemblage composed by the dwarf elephant, the tortoise and the giant dormice, testifies that the land configuration during Early to early Middle Pleistocene could have formed the so-called siculo-maltese paleo-archipelago.

The subsequent *Palaeoloxodon mnaidriensis* Faunal Complex is deeply renewed with respect to the preceding biochron. The pigmy *Palaeoloxodon falconeri* becomes extinct and is replaced by the larger sized *Palaeoloxodon mnaidriensis*, whose probable ancestor (*Paleoloxodon antiquus leonardii*) has been found in the marine calcarenites of Via Libertà fossil site (inside Palermo town). The absolute ages of the fossils of *Paleoloxodon mnaidriensis* F.C. (tooth enamel of elephants and hippos) are that of 200.000± 40.000 years B.P. (AAR; Bada et al., 1991) and 146.000±28.000 years B. P. (Electron Spin Resonance, ESR; Rhodes, 1996), while the elephant forerunner is dated back about 440.000 B.P. (AAR; Bada et al., 1991). The relative data both in the eastern (Contrada Fusco, Siracuse; Chilardi and Gilotti, 1996) and western sector (from San Vito lo Capo Peninsula, Trapani; Di Maggio et al., 1999) of the island, are congruent with the numerical age referring the *Palaeoloxodon mnaidriensis* F.C. to the late Middle Pleistocene-Late Pleistocene interval (Fig. 4). The composition of the large mammal assemblage is more balanced including carnivore (also top predators such as the spotted

cave hyena and the lion) and herbivore taxa (bison, auroch, fallow deer, red deer, boar, hippo) that, apart the elephant, are moderately modified with respect to the congeneric/conspecific taxa from the Italian Peninsula. In particular, the auroch, the red and the fallow deer are only slightly endemic as shown by the modest reduction in size at the extent that they are considered geographic subspecies (Gliozzi and Malatesta, 1984; Gliozzi et al., 1993; Abbazzi et al., 2001). The small mammal assemblage is composed instead by the survivors from the *P. falconeri* F.C. (Table 1). The characteristics of the assemblage suggest that the large mammal fauna dispersed from the Italian Peninsula through a sort of filtering barrier such as a partially emerged sea floor or a swampy lagoon system, which likely has prevented small mammals entering the island.

The two younger Faunal Complexes (Grotta di San Teodoro – Contrada Pianetti and Castello), which are dated to the last glacial cycle and to the Late Glacial respectively, demonstrate that the faunal dispersals become more frequent, so that the mammalian population of Sicily becomes very similar to that of the Southern Italian peninsula, even though less diversified (Bonfiglio et al., 1997, 2001, 2007; Masini et al., 2002b; Fig. 4). The faunal history of this period is dominated by extinction events (large predators, elephant, fallow deer, endemic dormice and shrew), and by the dispersal of 'continental' small mammals (*Microtus* (*Terricola*) gr. *savii*, *Crocidura* cf. *sicula*, *Apodemus* cf. *sylvaticus*, *Erinaceus europaeus*) and large mammals as the wild ass *Equus hydruntinus*, red deer, auroch, etc. The extinction of the endemic small mammals that survived for the whole Middle Pleistocene is probably due to the severe climatic deterioration during the Last Glacial cycle combined with the arrival of small sized terrestrial predators (for instance *Mustela* and *Vulpes*) via a land bridge connection. The only taxon, which shows a certain degree of endemism is the shrew *Crocidura sicula* (Sarà, 1995). The dispersal to Sicily of the savii ground vole, which has a fossorial habit, and of the wild ass, that prefers open landscapes, might imply that a fully exposed connection (a temporary land bridge related to eustatic low stand) had formed, perhaps more than once during the last glaciation. The replacement of the fauna took place step-wise as in the Grotta di San Teodoro – Contrada Pianetti Faunal Complex are still present several endemites, whilst in the Castello Faunal Complex the faunal renewal is complete.

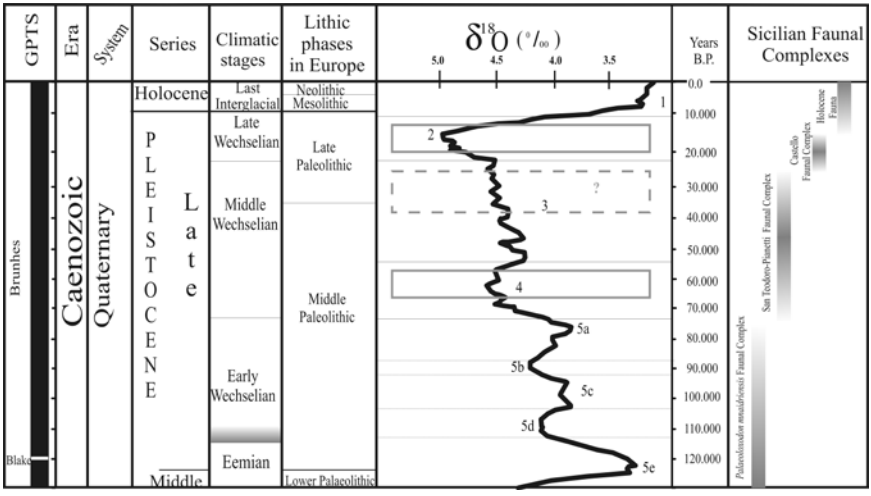
Table 1: Sicilian Biochronological Scheme (Modified from Bonfiglio et al., 2001).

Faunal Assemblages	Taxa	Assemblage characteristics
Castello Faunal Complex	*Canis lupus* *Vulpes vulpes* *Equus hydruntinus* *Cervus elaphus* *Bos primigenius* *Sus scrofa* *Erinaceus europaeus* *Crocidura* cf. *sicula* *Microtus (Terricola)* cf. *savii* *Apodemus* cf. *sylvaticus* *Lepus europaeus* vel *corsicanus*	No endemic assemblage. Diffusion of humans. Relative Age: top Late Pleistocene (late Wechselian). Absolute Age: from 13.760±330 B.P. to 10.370±100 (Bonfiglio and Piperno, 1996)

Grotta di San Teodoro-Contrada Pianetti Faunal Complex	*Crocuta crocuta spelaea* *Canis* cf. *lupus* *Vulpes vulpes* *Ursus* cf. *arctos* *Equus hydruntinus* *Paleoloxodon mnaidriensis* *Cervus elaphus siciliae* *Bison priscus siciliae* *Bos primigenius siciliae* *Sus scrofa* *Erinaceus europaeus* *Crocidura* cf. *sicula* *Microtus (Terricola)* ex gr. *savii* *Apodemus* cf. *sylvaticus*	Reduced or no endemic Assemblage. Extinction of small endemic mammals and of some large mammals of previous FC. Relative Age: top Late Pleistocene (Middle Wechselian).
Paleoloxodon mnaidriensis Faunal Complex	*Panthera leo spelaea* *Crocuta crocuta* cf. *spelaea* *Canis lupus* *Ursus* cf. *arctos* *Lutra trinacriae* *Paleoloxodon mnaidriensis* *Hippopotamus pentlandi* *Dama carburangelensis* *Cervus elaphus siciliae* *Bos primigenius siciliae* *Sus scrofa* *Crocidura* aff. *esuae* *Leithia* cf. *melitensis* *Maltamys* cf. *wiedincitensis*	Moderate endemic characteristics of large mammals derived from dispersal events from the Southern Italian Peninsula, while small mammals endemites survived from the previous Faunal Complex. Relative Age: late Middle Pleistocene– base Late Pleistocene Absolute Age: 200.000± 40.000 years B.P. (Bada et al., 1991); 146.000±28.000 e 170.000 years B.P. (Rhodes, 1996)
Paleoloxodon falconeri Faunal Complex	*Ursus* sp. *?* *Vulpes* sp. ? *Lutra trinacriae* *Paleoloxodon falconeri* *Crocidura esuae* *Leithia melitensis* *Leithia cartei* *Maltamys gollcheri*	Strongly endemic assemblage with dwarf elephant and giant dormice. Relative Age: base Middle Pleistocene Absolute Age: 455.000±90.000 years B.P. (Bada et al., 1991)
Monte Pellegrino Faunal Complex	*Pannonictis arzilla* *Asoriculus burgioi* *Apodemus maximus* *Maltamys* n. sp. *Pellegrinia panormensis* *Hypolagus peregrinus*	Strongly endemic taxa together with slightly reduced endemic ones. Poliphasic dispersals from Africa and Europe. Relative Age: Early

		Pleistocene
Gravitelli assemblage	*Zygolophodon* cfr. *turicensis* ? *Dicerorhinus* sp. *Mesopithecus monspessulanus* *Machairodus ogygia* *Propotamochoerus* sp. *Ictitherium hipparionum* *Ictitherium orbignyi* *Diceros* aff. *pachygnatus* *Hexaprotodon* Reduncinae indet.	Continental taxa of African and European origin. Relative Biochronological Age: late Turolian (MN12-13)
Burgio fossil remain	*Gomphoterium angustidens*	African taxon of small size. Relative Age: early Burdigalian

Fig. 4. Climato-chronological scheme of the late Quaternary after Ravazzi (2003) modified. On the column occupied by the isotopic oxygen curve the dotted and continuous rectangles above the MIS indicate the main dispersal phases and faunal exchanges respectively.



THE LITHIC EVIDENCES

The earliest human certain evidences in Sicily belong to the late Upper Palaeolithic and are represented by artifacts related to Epigravettian cultures found sometimes together with sporadic human remains, coming from several caves (see Tables 2 and 3 and Fig. 5). Older prehistoric evidences attributed to Lower Palaeolithic culture come from different reports, since the beginning of the twentieth century, unlikely all are dubitative as for different reasons. The first undeniable reason is connected to the difficulty of their recognisability, especially the coarsest Mode 1, even more for the historic finds due to the

limited expertise of the epoch. Moreover most of the artifacts are surface retrievals hence out of stratigraphic context, while among the few recovered within a deposit there is often no association with fauna, whose recognition could supply a relative dating and support or deny the typological attribution. Other problems are that some of these evidences are historical and lie within the case of a Museum without any precise location of their recovery site. Consequently, working for an adequate revision, it is only possible to remind such finds not excluding outright the existence in Sicily of a lithic culture earlier than the Late Palaeolithic attested one. Effectively scholars and palethnologists challenge since the sixties the possibility of a pre-epigravettian culture (Bianchini, 1969, 1971 and 1972; Radmilli, 1978; Segre et al., 1982; Tusa, 1992; Piperno, 1997; Villa, 2001; Martini, 2003) in the Island.

Sicilian Lower Palaeolithic dubious sites are distributed all across the island from west to south-east (Fig. 6). The earliest news of the occurrence of Lower Palaeotlithic in Sicily comes from Paolo Orsi (1907 cited by Vaufrey, 1929) who refers to have found a "coup de poing" (the French idiom for amygdale) Chellean-type in the zigzag valley close to Calatafimi-Segesta Railway Station. Vaufrey went through this find that recognised as an example of Campignan lithotecnic denying the existence of a lower Paleolithic horizon in Sicily (1929). The question was raised again only in the sixties (Meli, 1961). Since this input, old complexes, hypothetically represented by a Mode 1 – like technology, have been identified and described by several Authors. Biddittu and Piperno (1972) during surface surveys on the Quaternary marine terraces of southern Sicilian coast close to Agrigento, found tools made of limestone and quartzite in the locality of Bertolino di Mare (between Sciacca and Menfi) and quartzite tools in Contrada Cavarretto. Even if there is no fauna associated with these tools it is worth to underline that they have been found on the first order terrace named Grande Terrazzo Superiore (GTS; Ruggeri and Unti, 1974) Middle Pleistocene in age. The abrasion surface with a gentle dip of 5 degree reaches the height of 500 meters on the western sectors, covering an enormous area from Trapani to Menfi (Bonomo et al., 1996). This terrace cuts the Calcareniti di Marsala (Early Pleistocene, Siciliano; Ruggieri et al., 1975) that are covered by a paleosoil terrain consequent to a sub-aerial exposition. Moreover, Tusa (1990) found, in the same terraced context between Trapani and Marsala (sites of Guarrato, Granatello and Marausa), other discussed pebble tools derived from the quartz cobble stones recovered in the paleosoil but coming from the coarse erosion of the close river.

Bianchini (1969, 1971 and 1972) reported similar discoveries generally out of stratigraphic context, and mostly not in association with fauna, in between Realmonte and Palma di Montechiaro, in the neighbouring of Agrigento. Moreover reports that Mascle have identified within the Quaternary terraces outcropping at Capo Rossello and Casa Biondi at least two relevant high stand phases: the oldest should pertain to a Calabrian beach (early Middle Pleistocene), nowadays identified between 65 and 70 m above the sea level, the youngest should be due to a continental erosive event and identified at about 130 m above the sea level, along the so-called "Magaggiari" surface. The youngest surface is rich of pebbles probable used as raw material for the industry found in situ on the Calabrian beach (Bianchini 1971). A further level has been described in Mandrascava near Agrigento at the height of 40 meters above the sea level where have been collected a fossilized trunk of *Quercus* sp., a molar of elephant and two amygdale (Bianchini and Mascle, 1971).

On the fluviatile terrace of the Fiume Grande in Salemi, Venezia and Lentini (1994) report the discovery of some lithic assemblages (mainly on quartzite) from three sites (Bovara, Fiume Grande, Carnemolla). These complexes, not in stratigraphic context, are made of pebble tools, discoids and retouched flakes. In the sites of Bovara and Fiume Grande (near "Fattoria Salvo" – Accardo, 1997) have also been collected fossil fragments of an elephant mandible and a tusk respectively, probably belonging to the middle sized elephant (*Palaeoloxodon mnaidriensis*).

Moreover there are many reports of lithic remains coming from surface surveys on the fluviatile terraces of Simeto river (north-western sector of Catania plain) related to a Clactonian horizon (Bagnone, 1981; Revedin, 1984; Broglio et al., 1992). The case of the Simeto river basin and its surroundings, in the Etna volcanic zone, has to be analyzed taking into account the data on the volcanic formation that is relatively young (about 700 ka, with a submerged activity). Within the area were identified at least three orders of terraces (Chester and Duncan, 1982), the oldest of which could be attributed to a high stand phase of the Middle Pleistocene (between 400 ka and 300 ka), the second would be formed between 230 ka and 65 ka, and the last should be attributed to Late Pleistocene (65 ka – 10 ka). The artifacts from some of these sites (Poggio Monaco and Stimpato 8) have been identified on the oldest order terrace (Piperno, 1997).

On a fluvio-marine terrace close to Termini Imerese town, a quartzite assemblage has been discovered in 1957 by Meli inside a Pleistocenic stratigraphic succession, the so-called Giancaniglia section, exposed on the northern slope of the fluviatile terrace of San Leonardo river. The Author compared such succession with the one, that he considered coeval, close to Buonfornello (Lista Pirrone site; Ciofalo and Battaglia, 1888; De Gregorio, 1924) where have been found hippo remains (partially stored in Minà Palumbo Museum at Castelbuono and in Baldassare Romano Museum at Termini Imerese) but none artifact (Meli, 1961). A recent archaeological survey carried on in Giancaniglia section, made possible the discovery of a fossil femur of the medium size elephant *Palaeoloxodon mnaidriensis*, but did not produce any lithic artifact (Forgia, 2009). This finding underlines the importance of further investigations as the dating of the fossil mammal could temporally constrain the eventual finding of lithic industries.

An hypothetic Mode 2 technology is represented by different handaxes coming from Platani river basin within Agrigento territory: two from the river-bed and four close to the river mouth. The earliest news about the occurrence in Sicily of Palaeolithic bifacial implements (two handaxes from Eraclea Minoa) was given by Meli (1961). Another handaxe, made up on a quartzite pebble (common among the alluvial material of the river), has been discovered in San Giovanni Gemini area (Contrada Rocca del Vruaro; Fig. 7) in a red sand level containing large mammal remains in bad conservation status. This significant tool was collected by Bianchini (1971, 1972) and B. Arezzo (personal communication) and is nowadays part of the exhibition of Agrigento National Museum while a copy is exhibited at the Musée de l'Homme in Paris. A further tool described as a small amygdale coming from Diga del Leone, close to Santo Stefano di Quisquina, was collected by Bianchini (1971, 1972) too. Another amygdale, donate by Baron Tulumello di Racalmuto around 1930, exhibited at the Agrigento National Museum, comes from the Realmonte territory. Another specimen was recovered in the area of Eraclea Minoa by De Miro (1967) and was described by Graziosi (1968).

The main interpretative problem is that in Sicily, the campignan tradition, very common since Late Neolithic and mainly during Copper and Bronze age (Nicoletti 1996), can be problematically associated to the presumed Lower Palaeolithic artifacts (as quartzite implements, un-retouched or retouched flakes, discoid cores; Fig. 8), discarded on fluviatile terraces. On the contrary, the presence of bifaces, not always easily related with campignan implements, and the probable association of Pleistocenic fauna with Palaeolithic tools from alluvial Quaternary terraces, are elements in the direction of a human presence, even if labile, on the insular system, at least during some limited periods, when environmental and palaeogeographical conditions were favorable.

Table 2. Main supposed Lower Palaeolithic sites in Sicily. Legend of symbols: * coordinates and altitude referred to toponym, # not contextual faunal remains, ° probably contextual faunal remains

Id.	Toponomastic ref.	Coordinates	Altitude meters a.s.l.	Faunal remains	Bibliographic references
1	Bertolino di Mare - C.da Cavarretto	*37°35'8.62"N 12°59'48.12"E	Bertolino 35 Cavarretto 130		Biddittu and Piperno, 1972
2	Torre di Monterosso	* 37°18'28.12"N 13°25'47.06"E	* 116		Decima and Veggiani, 1965
3	Capo Rossello	37°17'44.63"N 13°27'2.95"E	111 70		Bianchini, 1969
4	Casa Biondi	37°17'45.53"N 13°27'35.48"E	70		Bianchini, 1972
5	Punta Bianca	37°12'56.01"N 13°39'18.76"E	55		Bianchini, 1972
6	Mandrascava	*37°13'40.81"N 13°39'45.20"E	*66		Bianchini, 1972
7	Carnemolla	*37°47'42.40"N 12°48'10.84"E	*170		Venezia and Lentini, 1994
8	Fiumegrande (Fattoria Salvo)	*37°46'17.48"N 12°47'05,92"E	*130	*#Palaeoloxodon mnaidriensis*	Venezia and Lentini, 1994; Accardo, 1997
9	Bovara	*37°47'48.1"N 12°50'26.24"E	*190	*#Palaeoloxodon mnaidriensis*	Venezia and Lentini, 1994

10	Guarrato, Granatello, Marausa	*37° 52’ 18’’ 12° 31’ 44’’	*61		Tusa, 1990
11	Poggio Monaco - Stimpato 8	*37°26'29.11"N 14°48'06.30"E	85 - 90 above the river		Revedin Arborio Mella, 1984; Broglio, 1992
12	Muglia Nord	*37°32'22.23"N 14°43'43.14"E	*100		Revedin Arborio Mella, 1984
13	Pianometa	*37°21' 20.65"N 14°58'08.33"E	*100		Revedin Arborio Mella, 1984
14	Giancaniglia	37°59'25.31"N 13°41'18.21"E	12	°*Palaeoloxodon mnaidriensis*	Meli, 1961 Forgia, 2009
15	Eraclea Minoa	*37°23'37.96"N 13°16'50.32"E	*70		Meli, 1961; De Miro, 1968
16	Realmonte	indef .	indef.		Graziosi, 1968
17	Rocca del Vruaro	*37°36'23.20"N 13°39'33.95"E	*490	not collected mammal remains	Graziosi, 1968
18	Diga del Leone	*37°40'16.21"N 13°27'59.29"E	*830		Bianchini, 1971

Table 3. Absolute dating of Sicilian Late Pleistocene and early Holocene archaeological horizons

Site	Archaeology	^{14}C age BP	authors
Addaura	Epigravettian	16,060e 15,007 cal.	Mannino et al., 2011
S. Teodoro ST1	Epigravettian	15,232e 14,126 cal.	Incarbona et al., 2010a and 2010b
Oriente A level 7	Epigravettian	14,200	Poggiali et al., 2012
Acqua Fitusa	Epigravettian	13,760±330	Bianchini and Gambassini, 1973
Oriente A	Epigravettian	12,132±80	Martini et al, 2009
Grotta Giovanna	Epigravettian	12,840±100	Bietti, 1990
Grotta Perciata	Epigravettian	11,960±330	Alessio et al, 1970
Grotta Genovesi	Epigravettian	11,710±295	Alessio et al, 1970

Grotta Genovesi	Epigravettian	11,180±120	Alessio et al, 1970
Grotta Genovesi	Epigravettian	10,175±300	Alessio et al, 1970
Grotta Genovesi	Epigravettian	10,110±300	Alessio et al, 1970
Grotta Uzzo	G9	10,070±90	Meulengracht et al., 1981
Grotta Genovesi	Epigravettian	9,694±110	Alessio et al, 1970
Oriente B	meso	9,440 ± 40	Mannino personal communication
Oriente B	meso	9,395 ± 45	Mannino personal communication
Oriente B	meso	9,275 ± 45	Mannino personal communication
Grotta Uzzo	C3	9,300±100	Meulengracht et al., 1981
Grotta Uzzo	A16	9,180±100	Meulengracht et al., 1981
Grotta Uzzo	A7	9,030±100	Meulengracht et al., 1981
Perriere Sott.	L53	8,700±150	Aranguren and Revedin, 1998
Oriente X		8,653 ± 39	Mannino personal communication
Oriente A	level 6	8,608 ±65	Martini et al., 2009
Molara	Meso	8,600±100	Canci et al., 1995
Perriere Sott.	L60	8,460±70	Aranguren and Revedin, 1998
Grotta Uzzo	T 16-18	8,330±80	Meulengracht et al., 1983
Oriente B B100/114	*O.turbinatus*	8159 ± 37	Mannino personal communication
Grotta Uzzo	T 13-14	7,910 ±70	Meulengracht et al., 1981
Oriente B B40/60	*O.turbinatus*	6,955 ± 36	Mannino personal communication
Grotta Uzzo	T 7,9	6,750±70	Tusa, 1992
Grotta Uzzo	T w15	6,720±80	Piperno, 1985

Fig.5. Climato-chronological scheme with magnification of Holocene times after Ravazzi (2003) modified. On the right column are indicated main Sicilian late Palaeolithic and Mesolithic sites (the ones with absolute dating) were have been found *Homo* evidences (human direct and indirect evidences).

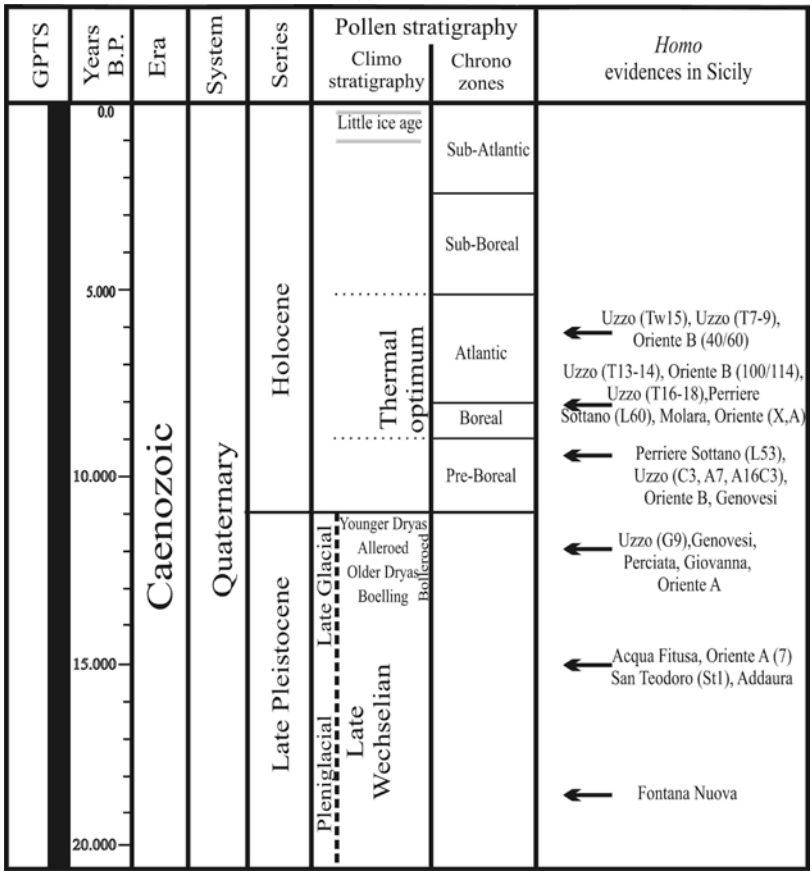


Fig. 6. Sicilian palaeogeographic map during Middle Pleistocene with the geo-referred location of main fossil mammal sites and archaeological sites. Legend: the *Palaeloxodon falconeri* Faunal Complex sites (from 19 to 27) are symbolized by black triangles, the *Palaeloxodon antiquus leonardii* site (number 28) with a circle and the *Palaeloxodon mnaidriensis* Faunal Complex sites (from 29 to 53) with a star. The archaeological Early Palaeolithic supposed evidences are identified with a grey rhombus (from 1 to 18; in 8 and 9 sites is signaled the association with *P. mnaidriensis*). The continuous line represents Middle Pleistocene reconstructed coastline (modified after Photographic archive G.G. Gemmellaro Museum in Palermo), while the dotted line the extant Sicily.

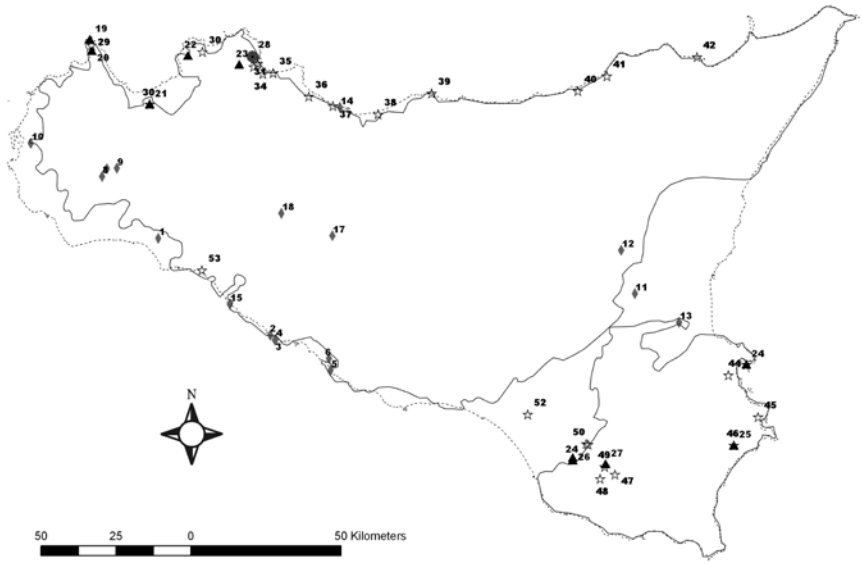


Fig. 7. Handaxe from Rocca del Vruaro (San Giovanni Gemini). Photo by LS

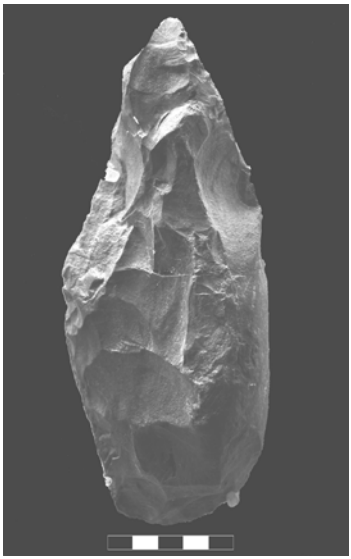


Fig. 8. Pebble tool surface find. Photo by LS

HUMAN SKELETAL RECORDS IN SICILY

If evidences indicate a recent human peopling of Epigravettian times, we have to register that claims were made in 70s and 80s for supposed direct evidences of Pliocenic hominins in the island. Worth to note the description made by Bianchini (1982) of a facial fragment claimed to posses and "*Australopithecus*"–like appearance found at Rocca Ficuzza, near Sciacca, on the south coast (exhibited in his Personal Collection in Agrigento). Furthermore the Author describes also a cranium coming from Mandrascava

(close to Agrigento) attributed to *Homo erectus* in association with Mode 2 industry. Actually Mandrascava's skull appears as a modern-looking *Homo*. Subsequent investigations discussed and criticised these evidences, the claimed stratigraphic context and the associations (Radmilli, 1985). This situation resolved itself in the ostracism of all south-side stories and hypothesis on an early peopling of Sicily. But as already said Mode 1 and 2 industries can still today be occasionally collected in surface or trench surveys in different areas of Sicily, especially from the southern coast.

However, at the present state of our knowledge, the human skeletal record of Sicily is reliably documented only since the latest Pleistocene. It represents a suitable evidence to study the early peopling of the island and to allow for some interpretative hypotheses concerning the history of its settlement. The potentially oldest osteological remains come from a rock shelter near Fontana Nuova, in the Ragusa province (South-Eastern Sicily), where extremely incomplete remains (Table 4) were recovered as surface finds from a Middle-Upper Aurignacian (Upper Palaeolithic) context, the southernmost of the whole Europe (Chilardi et al., 1996). Such evidence of human presence, perhaps sporadic, might date back to between 32,000 and 27,000 years B.P. However, these remains are extremely fragmentary with poor diagnostic value, and might come from a reworked, non primary archaeological context (Becker, 2002). Apart from the dubious Aurignacian-age Fontana Nuova finds, other human skeletal remains dating to Late Pleistocene are the fragmentary bones coming from Addaura cave dated by Mannino et al. (2011) to the initial Late Epigravettian (Late Wechselian), a metatarsal from the southern shore of the Levanzo island in the Egadi archipelago, and the (probable) Late Epigravettian fragmentary remains from Riparo del Castello near Palermo (Bigazzi et al. 2001; Table 4). The paucity of these finds do not allow to infer many information concerning the physical aspect and the biological relationships of the first inhabitants of Sicily, and highlight the importance of the most significant Late Pleistocene Sicilian site, Grotta di San Teodoro (Acquedolci, province of Messina, North-Central shore). In the cave several human skeletal remains and ecological evidences of human frequentation were found between 1937 and 1942, in association with final Late Pleistocene faunal remains and a Late Epigravettian (late Upper Palaeolithic) lithic industry (Graziosi, 1947). The sample consists of seven adult individuals in various states of preservation, numbered as San Teodoro 1-7 (Table 4).

Table 4. List of Late Pleistocene human skeletal remains from Sicily. Legend symbols: * sex is currently under revision by L.S. and A.M.; # recent revision and restoration by D'Amore et al., 2006 that indicate a possible attribution of the skull to the early Holocene

Specimen	Description	Reference
Addaura	Fragmentary skeletal remains	Mannino et al., 2011
Fontana Nuova 1	parietal bone fragment	see Mallegni, 2005a for references
Fontana Nuova 2	child tooth	Mallegni, 2005a
Fontana Nuova 3	adult tooth	Mallegni, 2005a
Fontana Nuova 4	adult talus	Mallegni, 2005a
Levanzo 1	Metatarsal	Fabbri et al., 1988
Oriente A	incomplete adult calvarium and mandible	D'Amore et al., 2010
Oriente C	not yet described skeletal remains	
Riparo del Castello	mandible fragment, isolated tooth and hand phalanx	Bigazzi et al., 2001
San Teodoro 1	almost complete skeleton of an adult female*	Mallegni, 2005b
San Teodoro 2	almost complete skull of an adult male	Mallegni, 2005b
San Teodoro 3	less complete skull and fragmentary left humerus of an adult male	Mallegni, 2005b
San Teodoro 4	fragmentary pelvic and limb bones of an adult female	Mallegni, 2005b
San Teodoro 5#	incomplete skull, partial mandible and fragmentary limb bones of an adult male	Mallegni, 2005b
San Teodoro 6	frontal bone and facial skeleton of an adult female	Mallegni, 2005b
San Teodoro 7	calvarium and mandible of an adult male	Mallegni, 2005b

Regarding to San Teodoro horizon, direct AMS-^{14}C dating of 14,800 years B.P. has been recently obtained for San Teodoro 1 specimen (D'Amore et al., 2009; Incarbona et al., 2010a 2010b). A conservative estimate of 15,000-10,000 years B.P., is the most probable dates for San Teodoro individuals ST2-4. A similar date is also likely for individuals 6 and 7, although there is no precise information concerning their stratigraphic provenance. Individual 5, on the contrary, was recovered from a higher level (Graziosi, 1947) and is probably more recent (D'Amore et al., 2006). Six out of the seven individuals preserve craniofacial and/or mandibular parts, and five are sufficiently complete to be included in general comparative studies of late Palaeolithic and Mesolithic craniofacial morphometric evolution (e.g. Bianchi et al., 1980; Henke, 1989). Recently, the whole cranial sample was restudied and compared to an array of both prehistoric and recent samples through multivariate techniques including D^2 distance analysis, canonical variate analysis, cluster analysis and multidimensional scaling (D'Amore et al., 2009). Three possible models of settlement by the people represented by San Teodoro sample were tested: 1. an early arrival followed by isolation; 2. an early arrival followed by continuous gene flow; 3. a

late arrival. The authors proposed that a pattern where San Teodoro group shows much higher affinity with an earlier comparative group, or a significant differentiation from all the groups, would provide support for model 1; a pattern where San Teodoro is similarly related both to an earlier and to a coeval comparative group, would support model 2; a pattern where San Teodoro shows much higher affinity with a coeval comparative group, would support model 3. The resulting patterns of phenetic relationships illustrated the possible role played by San Teodoro people in the settlement of Sicily during the latest part of Pleistocene: overall, the San Teodoro cranial sample displays a morphometric pattern close to Western European groups of similar antiquity, in particular those of Late Epigravettian age from Central and Southern Italy. According to these results, D'Amore et al. (2009) concluded that the first populations of Sicily probably came from peninsular Italy by sea during the Late Epigravettian epoch. A less probable hypothesis is that they descended from immigrants that arrived by land during a low sea level episode corresponding to the late Wechselian maximum regression, about 18,000 years B.P. Gene flow then caused these populations to became morphologically homogenous with the populations of peninsular Italy.

After the early settlement, a rich human skeletal record is available for the subsequent Early Holocene period. Precisely, this skeletal sample constitutes the richest one from the whole Italy associated with a Mesolithic context. Sites such as Grotta della Molara (province of Palermo), Grotta dell'Uzzo (province of Trapani) and Grotta d'Oriente (Favignana island in the Egadi archipelago) returned as many as seventeen individuals, that are listed in Table 5.

Table 5. List of Early Holocene human skeletal remains from Sicily.

Specimen	Description	Reference
Molara 1	incomplete skull and mandible of an adult male	Canci and Borgognini Tarli, 2005a
Molara 2	almost complete skeleton of an adult male	Canci and Borgognini Tarli, 2005a
Molara 3	fragmentary face and mandible of an adult of indeterminate sex	Canci and Borgognini Tarli, 2005a
Oriente B	skeleton of an adult female	D'Amore et al., 2010
Uzzo 1	skeleton of an adult female	Canci and Borgognini Tarli, 2005b
Uzzo 2	skeleton of a young adult male	Canci and Borgognini Tarli, 2005b
Uzzo 3	incomplete postcranial bones of an adult male	Canci and Borgognini Tarli, 2005b
Uzzo 4	fragmentary skeleton of a newborn	Canci and Borgognini Tarli, 2005b
Uzzo 5	skeleton of an adult male	Canci and Borgognini Tarli, 2005b
Uzzo 6	skeleton of an adult female	Canci and Borgognini Tarli, 2005b
Uzzo 7	skeleton of an adult male	Canci and Borgognini Tarli,

		2005b
Uzzo 8	fragmentary skeleton of a 5-years-old child	Canci and Borgognini Tarli, 2005b
Uzzo 9	skeleton of an adult male	Canci and Borgognini Tarli, 2005b
Uzzo 10	fragmentary skeleton of an adult female	Canci and Borgognini Tarli, 2005b
Uzzo 11	fragmentary skeleton of a 3-months-old infant	Canci and Borgognini Tarli, 2005b
Uzzo 12	fragmentary skeleton of an adult female	Canci and Borgognini Tarli, 2005b
Uzzo 13	not yet published	Di Salvo et al., 2006

Direct ^{14}C dating (see Table 3) have been obtained for Molara 2 (8600±100 years B.P.), Uzzo 5 (9700±100 years B.P.) and Oriente B (9395±45 years B.P.) individuals. Multidisciplinary research have revealed many bio-anthropological aspects related with lifestyles, dietary habits, health conditions and subsistence strategies of these ancient peoples. Data mainly collected for the Uzzo sample (Borgognini Tarli et al., 1993) suggested that adult individuals were a morphologically and metrically homogeneous population, characterised by low stature, low degree of sexual dimorphism and limb lateralization, but also by marked skeletal stoutness. Analysis of skeletal indicators of functional stress indicated an utilization of upper limbs in repetitive activities and intense involvement of lower limbs, load transportations for dorsal portion of vertebral column and overloading of the lumbar portion, and habitual squatting position. Dental wear/microwear and trace elements analysis suggested regular consumption of animal proteins, especially of marine origin (including whales and dolphins), but with relevance of vegetal components and a relatively sugar intake. Finally, good nutritional and health conditions were also inferred, but with a high frequency of dental caries, anomalies and a strong wear.

A study was recently carried out in order to assess the morphological affinities of Oriente B individual (D'Amore et al., 2010). For this purpose, the authors used the whole Mesolithic adult cranial sample available from Sicily in a comparative analysis with other late Palaeolithic and Mesolithic samples from Italy and neighbouring European areas, as well as with some reference samples from modern populations, for which genetic relationships are known. This allowed also to test hypotheses concerning peopling of Sicily during the ecological transition towards the Early Holocene period. Multivariate techniques including D^2 distance analysis, partial Mantel test, cluster analysis, multidimensional scaling, R-matrix analysis, and principal coordinate analysis, were used not only to calculate craniometric distances, but also to assess the role played by gene flow and drift to produce the resulting pattern of variations and relationships. D'Amore et al. (2010) set out the starting hypotheses to show that, if the Sicilian Mesolithic sample reveals more affinity with an earlier Sicilian late Palaeolithic comparative group, it is plausible that there was a continuity between them in conditions of relative isolation. However, if the Mesolithic Sicilians are similarly related both to a chronologically preceding Sicilian comparative group, and to a coeval non-Sicilian comparative group,

such results may support a major role of gene flow. A much greater affinity with a coeval non-Sicilian comparative group or a significant differentiation from all the groups, would support an extra-Sicilian source for the Mesolithic peopling of Sicily. The results of biodistance analysis showed that the Sicilian Mesolithic sample was morphologically very close to an Italian Late Upper Palaeolithic comparative group; additionally, a general similarity among Western/Central European late Palaeolithic and Mesolithic groups was also detected, thus suggesting a major role played by gene flow. We have also tested through D^2 distance analysis and canonical variate analysis, the alternative hypothesis of a close relationship of Sicilian late Palaeolithic and Mesolithic specimens with North African specimens of similar antiquity. We used craniometric data for eleven Sicilian cranial specimens and eleven comparative groups, including two North African groups: an Iberomaurusian (latest Pleistocene group), and a Capsian-Columnatian (early Holocene) group. Preliminary results are reported in Table 6 (this research is yet in progress). They do not suggest any morphological connection between Sicily and the nearby North Africa.

The results of R-matrix analysis in D'Amore et al. (2010) confirmed that intensive gene flow among hunter-gatherer populations could account for the close resemblances among European late Palaeolithic and Mesolithic groups. Gene flow might have been necessary among prehistoric bands to avoid extinction because of low population density (late Palaeolithic European populations might have had a density on the order of 0.001-0.02 peoples per km^2 according to Bocquet-Appel et al., 2005). Instead, a decreasing trend of gene flow among populations, as detected by R-matrix analysis, for the transition from the late Palaeolithic to the Mesolithic, and even more for the following main cultural transitions, could indicate the beginning of a certain regional characterisation. In fact, bio-archaeological evidence suggests a significant increase in population density for the second half of Mesolithic period. This increase was coupled by a transition in social complexity, in the level of social organization from the band level to an incipient tribal level. This transition was associated with the development of more frequent endogamy, a decrease in mobility and an increase of cultural regionality (Constandse-Westermann and Newell, 1989). The consequent progressive reduction in gene flow among the populations with the new level of social organisation ultimately gave rise to the regional differentiation observable in the subsequent time periods.

Table 6. Morphological affinities of eleven Sicilian specimens on the basis of a D^2 distance analysis.

Specimen	Morphometrically closest comparative group
San Teodoro 1	French-Cantabrian Mesolithic
San Teodoro 2	Italian Late Epigravettian
San Teodoro 3	French-Cantabrian Mesolithic
Molara 2	South German Mesolithic
Oriente B	French-German Magdalenian
Uzzo 1	Balkan Mesolithic
Uzzo 2	Balkan Mesolithic

Uzzo 5	South German Mesolithic
Uzzo 6	Balkan Mesolithic
Uzzo 7	Italian Late Epigravettian
Uzzo 9	Brittany Mesolithic

CONCLUSIONS

This paper is a reasoned and updated multidisciplinary synthesis of the early Prehistory of Sicily in which the authors examined the available data without any of the prejudices that since the last thirty years have, in a certain way, limited the adequate approaches to the interpretation of the argument. We have inspected all available evidences coming from different fields in respect to the debated issue of an Early Pleistocene human peopling of Sicily. Moreover, in comparison with the conventional approaches, the paper discuss new data such as the recent absolute dating of some archaeological sites (published data) and some craniometric and morphological evaluations of latest Pleistocene humans' (unpublished data). This work came up against both archaeological and geological lack of data and of synthesis that created fertile ground to several prejudicial positions. Archaeological evidences are limited by two factors such as the originality of the lithic implements and the existence of emerged lands when and where the artifacts have been recovered. As matter of fact, one of the biggest limit of this issue has been the application of a strict typological approach that brings to relate Sicilian early artifacts with Early Pleistocene age. In consideration of the current Sicilian palaeogeographic reconstructions at this time, a good amount of these evidences are geo-referred in areas that were submerged. This fact has generally truncated all the possible discussions about the originality of those artifacts, giving to the empirical palaeogeographic reconstructions an excessive value. The situation changes drastically if we use a paleogeographic reconstruction of Middle Pleistocene times (when the coast line was more similar to the extant one) as base for the geo-referred location of faunal and human evidences, as is shown in figure 6. The reconstruction here proposed has never been attempted before and constitutes, in our opinion, a consistent base for further debate.

It is worth to remember that the Sicilian artifact assemblages are considered by many as peculiar and thence their too rigid attribution to cultural phases, known in peninsular Italy and western Europe, is not so rigorously applicable. In general terms it should be kept in mind that the peculiarities can represent delays or anticipations of a determined technique, moved by environmental and/or cultural circumstances such as different ergonomic solutions or the import of a technique by cultural contact. Another problematic that increases the complexity of the issue, is that lithic implements collected during surface surveys (mostly on the western and south – western sectors of Sicily) are too often easily associated to a Campignian typology that characterise the recent Holocene, but that in some occasion could belong to the coarsest Mode 1.

Even the approach to the question of an early human peopling is mostly conditioned by paleogeographic and paleobiogeographic reconstructions. The occurrence on the island of

terrestrial faunas is reason of speculation if we consider the strong relation between big games and hunters. Moreover, faunal migrations need a physical substratum that must be used by eventual humans moving as consequence. All this discussion suffers of a chronic and paradigmatic lack of human fossil record, fruit of the exiguity of human groups and of a not systemic research over the territory.

The palaeontological data show a panorama in which the earliest faunal peopling (the spotty Neogene record and the Monte Pellegrino Faunal Complex, Early Pleistocene in age) have a polyphasic character with faunal elements of African and European provenance not excluding a double route (from south and north) dispersal. From the ecological point of view, in terms of carrying capacity, humans would have arrived in Sicily in close conjunction with the dispersal of the faunas of the *Palaeoloxodon mnaidriensis* Faunal Complex, as those are mostly similar to the congeneric/conspecific peninsular taxa, during a low stand phase of the Middle Pleistocene. Geological and geomorphological data assess that only during the late Wechselian (latest Pleistocene) the island was fully connected by a land bridge. Unfortunately oldest scenarios reconstructions are highly speculative as the geodynamic of western Mediterranean area has been very active during the whole Pleistocene.

The most restrictive topic we have faced in this work is the complete absence of human fossil remains relative to the great part of the Pleistocene. This is a strong limit (but common to the greatest part of Early Pleistocene horizons from Africa to Eurasia), that we partially overcome presenting a new craniometric comparative analysis of the available Sicilian Late Pleistocene evidences with Italian, European and African samples. This has been performed starting from the consideration that cranial and facial morphologies can describe the provenance and the possible relationships of Late Pleistocene *Homo sapiens* in respect to African and/or European forerunners. On the base of this results we can affirm that Epigravettian and Mesolithic humans in Sicily not retain *stigmata* of ancestrality. Even the Late Pleistocene peopling was sporadic and did not created the base for a solid local evolution, but nevertheless was one of the presumably repeated peopling of the island, until the Mesolithic period. As we can hypothesise the extinction of Epigravettians, we must therefore consider the rapid disappearance of the more ancient, presumably more reduced in number, settlers.

On the base of the debated evidences we can affirm that the presence in Sicily of an early humanity, in the Early-Middle Pleistocene cannot be excluded, and that this hypothesis must be more efficaciously tested on new data from the field. It is time for a new era of prehistoric studies in the Mediterranean basin, and in the main Italian islands, that starts from the consideration that academic paradigms are not generally followed by the Nature, as like a strict parsimonious approach.

The work is not even the conclusion of a story but only the starting point for a new and reasoned collection of data on the Sicilian channel approachability, on stratigraphic contexts of faunal and lithics' assemblages, with the primary aim to construct a model of predictive analysis of possible precocious migration and peopling of Europe by the African humanity.

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