

# The discovery of a Mycenaean-type *tholos* tomb in the Bronze Age necropolis on the Gazzi buried floodplain (Messina, southern Italy): new geological and anthropological data

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**ABSTRACT:** This paper deals with a monument that is, up to this date, unique in Sicily and in the Italian peninsula: the Mycenaean-type *tholos* tomb of the Gazzi necropolis in Messina. A recent excavation in the alluvial deposits revealed extensive traces of a funerary area with a *tholos* tomb and several *enchytrismos* tombs with skeletal remains, presumably dated back to the end of the Early or the initial stage of the Middle(?) Bronze Age.

The present multi-disciplinary investigation has been developed to analyse new data related to sediments, building stones and skeletal remains of this funerary area. The stratigraphic succession hosting the necropolis was formed by overbank sediments deposited on the alluvial floodplain of the Gazzi palaeostream and developed during a regressive trend. The *tholos* building stones were opportunely selected and distributed in the different sectors of the tomb. The crystalline building stones are unworked stones derived from the alluvial pebbles of the palaeostream, whereas the worked stones are derived from local quarries of limestones located in the surrounding hills. The osteological remains are ascribable exclusively to *Homo*. The minimum number of individuals inside the *tholos* was calculated to consist of one adult, whereas one adult and one infant were found in the *enchytrismos* burials.

The Gazzi necropolis discovery demonstrates the important role played by the Messina settlements during the Bronze Age, when relationships between the Aegean and Western world became closer.

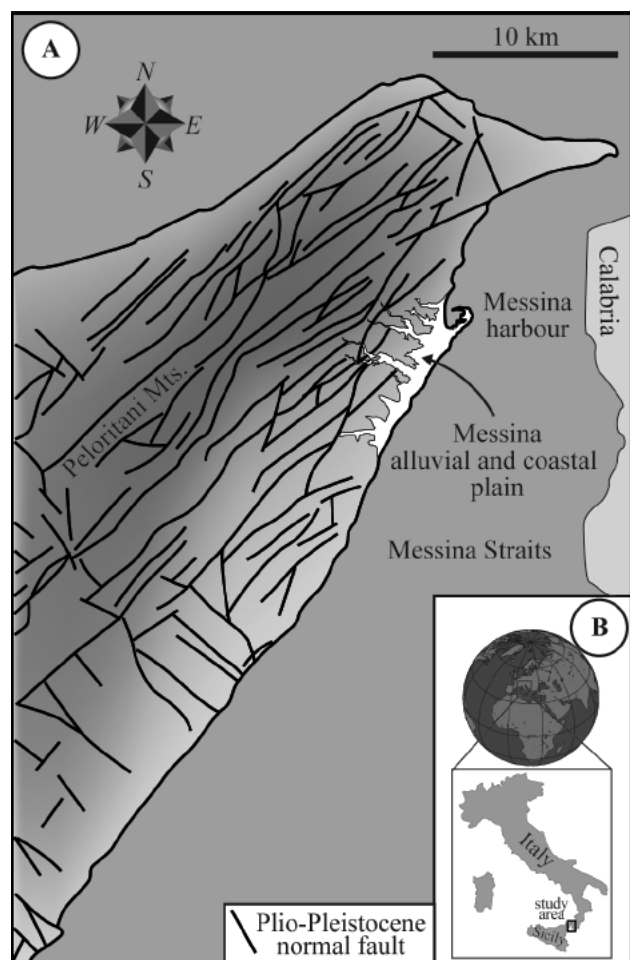
**Keywords:** Early-Middle Bronze Age; necropolis; Mycenaean-type *tholos*; Messina Holocene alluvial plain; building stones; human skeletal remains.

## INTRODUCTION

Most maritime cities host archaeological findings in their coastal and alluvial plains. This is the case of the Messina urban centre constructed on the Sicilian side of the Messina Straits (southern Italy; text-fig. 1), where several prehistoric findings of necropoleis and/or settlements from the Neolithic to the Bronze Age were discovered in Holocene stratigraphic sequences (Scibona 1971; Scibona and Berdar 1978; Riccobono 1975; Riccobono et al. 1988; Bernabò Brea 1999; Bonfiglio 1999; Bonfiglio et al. 1994; Bacci Spigo and Martinelli 1996; 1998-2000; Martinelli and Bacci 1999; Martinelli et al. 1999; Tigano et al. 1999; Tigano 2012 and references therein) mostly in the area near the Messina natural harbor (text-fig. 2A). A recent excavation during construction south of the Messina harbor, along the Gazzi stream, highlighted a new important necropolis (text-fig. 3). In this funerary area, namely the Gazzi necropolis, a *tholos* tomb (a monumental tomb) made up of different types of

building stones and several *pithoi* (very large earthenware jars used for placing the body of the deceased) in *enchytrismos* tombs (burial procedure with *pithos*), both with skeletal remains, were unearthed.

This discovery compelled the authors to investigate the Gazzi necropolis with a multi-disciplinary research (Somma et al. 2012) on: *i*) the sedimentology of the stratigraphic sequence where the necropolis was settled, in order to reconstruct the framework of paleoenvironmental evolution of the Holocene alluvial and coastal plain; *ii*) the petrography of the necropolis building stones, in order to understand architectonic style, provenance and location of the possible quarries of the Peloritani Mountains used by the prehistoric builders; *iii*) the bioanthropological and palaeopathological characteristics of the skeletal remains preserved both in the *tholos* and the *enchytrismos* tombs (*pithos* burials), in order to define the biological profile of the buried individuals.



TEXT-FIGURE 1  
 A) Location of the Messina alluvial and coastal plain in the tectonic framework of the Peloritani Mountains (modified after Ghisetti 1981). B) Location of the study area in the Calabria-Peloritani Arc (southern Italy).

## GEOLOGICAL BACKGROUND AND PREVIOUS ARCHAEOLOGICAL RESEARCH

### Geological background

The Gazzi necropolis was unearthed from the Gazzi alluvial deposits present in the coastal plain. The plain is characterized by a NNE-SSW trending narrow belt, 10 km long and 2 km wide, which is exposed along the Sicilian side of the Messina Straits, which is a graben developed from Pliocene-Pleistocene extensional tectonics (Ghisetti 1981; text-fig. 1). The plain, formed by Holocene littoral and alluvial deposits, is bounded westwards by the northern hills of the Peloritani Alpine Chain (southern Calabria-Peloritani Arc, Bonardi et al. 1976; Lentini et al. 2000; Messina et al. 2004; Aldega et al. 2011; and references therein) and eastwards by the crescent-like spit delimiting the Messina harbor (text-figs. 1A and 2A). This area of the chain is composed of tectonic units made up of metamorphic rocks, overlain by a Miocene onwards post- to late-orogenic siliciclastic and carbonate sedimentary cover. Specifically, the tectonic units outcropping in this area of the chain are the

Aspromonte Unit and the Mela Unit; these units consist of medium to high grade metamorphic rocks, locally intruded by migmatitic and granitoid rocks (Messina et al. 2004 and references therein; text-fig. 2B). As far as the sedimentary cover is concerned, it is mainly made up of middle-upper Miocene clastic and evaporitic rocks evolving upwards to lower Pliocene- middle Pleistocene calcareous-marly and sandy-clayey deposits (Carbone et al. 2008 and references therein). The youngest deposits are represented by middle-upper Pleistocene sandy and sandy-gravelly marine deposits related to marine terraces, located at different altitudes along both sides of the Messina Straits because of the strong tectonic uplift and eustatism (Bonfiglio and Violanti 1984; Barrier 1987; Kezirian 1992; Miyauchi et al. 1994; Barrier et al. 1995; Bonfiglio et al. 2010; Antonioli et al. 2014 and references therein).

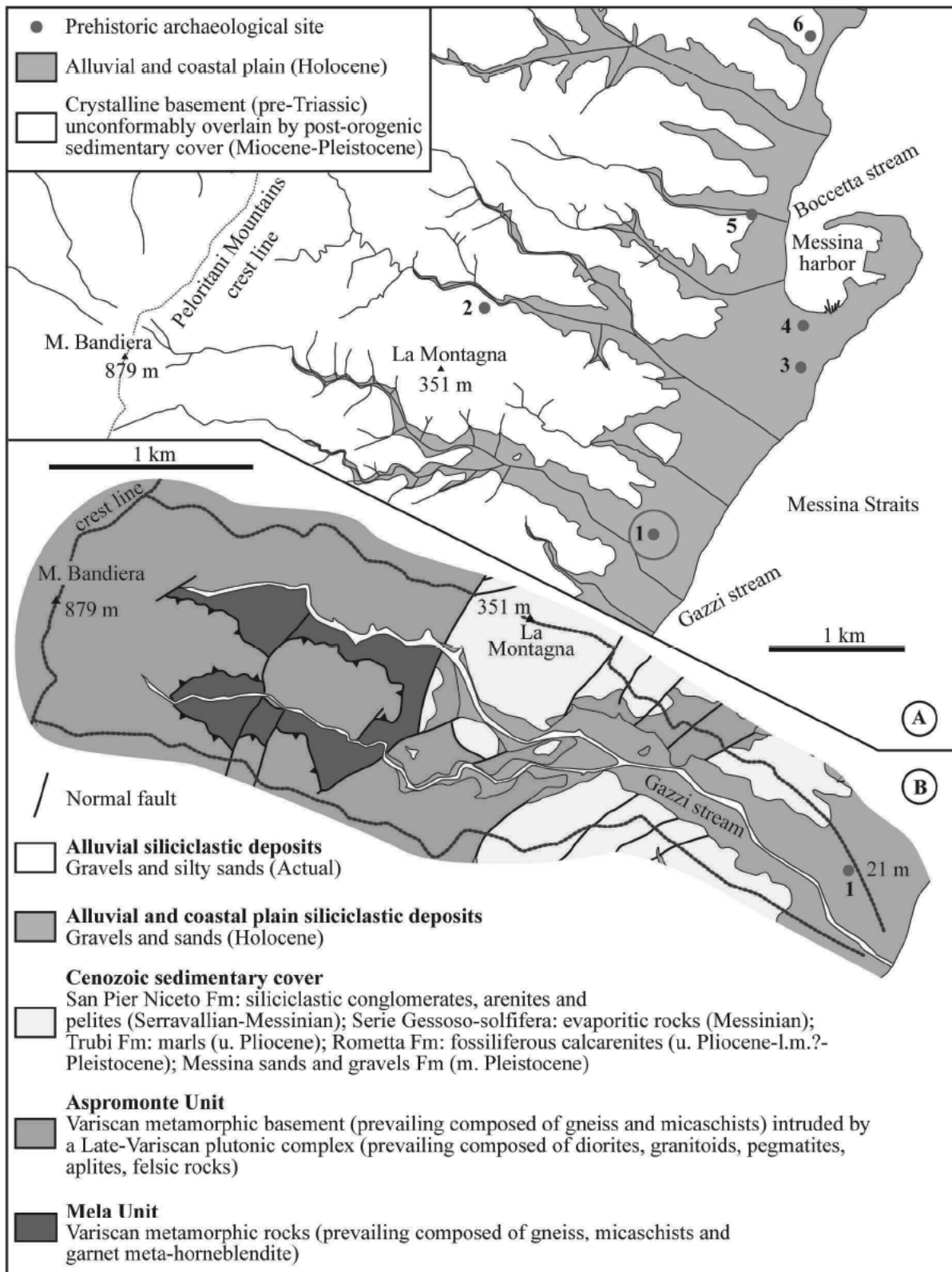
### Previous archaeological data on the Gazzi necropolis

The *tholos* (also known as beehive tomb) is a monumental tomb with a funerary chamber, covered by a dome built by superposing circular levels of mudbricks or stones with progressively decreasing diameter in order to form a vault. The vaulted *tholoi* were well attested in several cultures of the Mediterranean and West Asia during the Late Bronze Age.

The *tholos* tomb of the Gazzi necropolis is located entirely above the ground level and formed by a circular funerary chamber (maximum diameter of 3.75 m, internal diameter of 1.80 m) enclosed by a peculiar, slightly elliptical precinct wall (Tigano 2012) (text-fig. 3). The covering of the tomb is thought to be a false dome, 1.25/1.30 m high. The double faced wall with *emplecton* (the core of the two parallel walls between them is filled with rubble or other infill, creating one thick wall) of the funerary chamber was formed by stones of different sizes. The wall sides were built with stones, carefully selected, different in thickness but mainly worked, rough-hewed, slab shaped, dry set, embossed and arranged with a staggered setting of stone elements to form what was originally a vault, found collapsed in the interior. Evidence of such a peculiar housing technique is well displayed in the portion of the wall still standing, preserving from seven to five levels of slab-shaped stones, respectively, in the internal and external side of the wall (Tigano 2012) (text-fig. 3). The ground level of the funerary chamber was covered with cobbled paving formed by 0.1 m to 0.5 m sized pebbles with some slab-shaped stones (text-fig. 3C), in order to construct a solid floor to the tomb. The chamber was entered by a doorway *stomion* facing eastwards, 0.74-0.76 m high, 0.80-0.90 m wide. Remains of both a well-defined beaten ground-level and the collapsed elevated structure suggest that the tomb was not covered by a *tumulus* (a mound of soil and stones raised over a grave) but by a dome covering with ogival sections. The slightly elliptical precinct wall defined a ring-like corridor around the funerary chamber. This wall was built with larger stones at the base of the wall and with a technique less accurate than that used for the chamber (Tigano 2012).

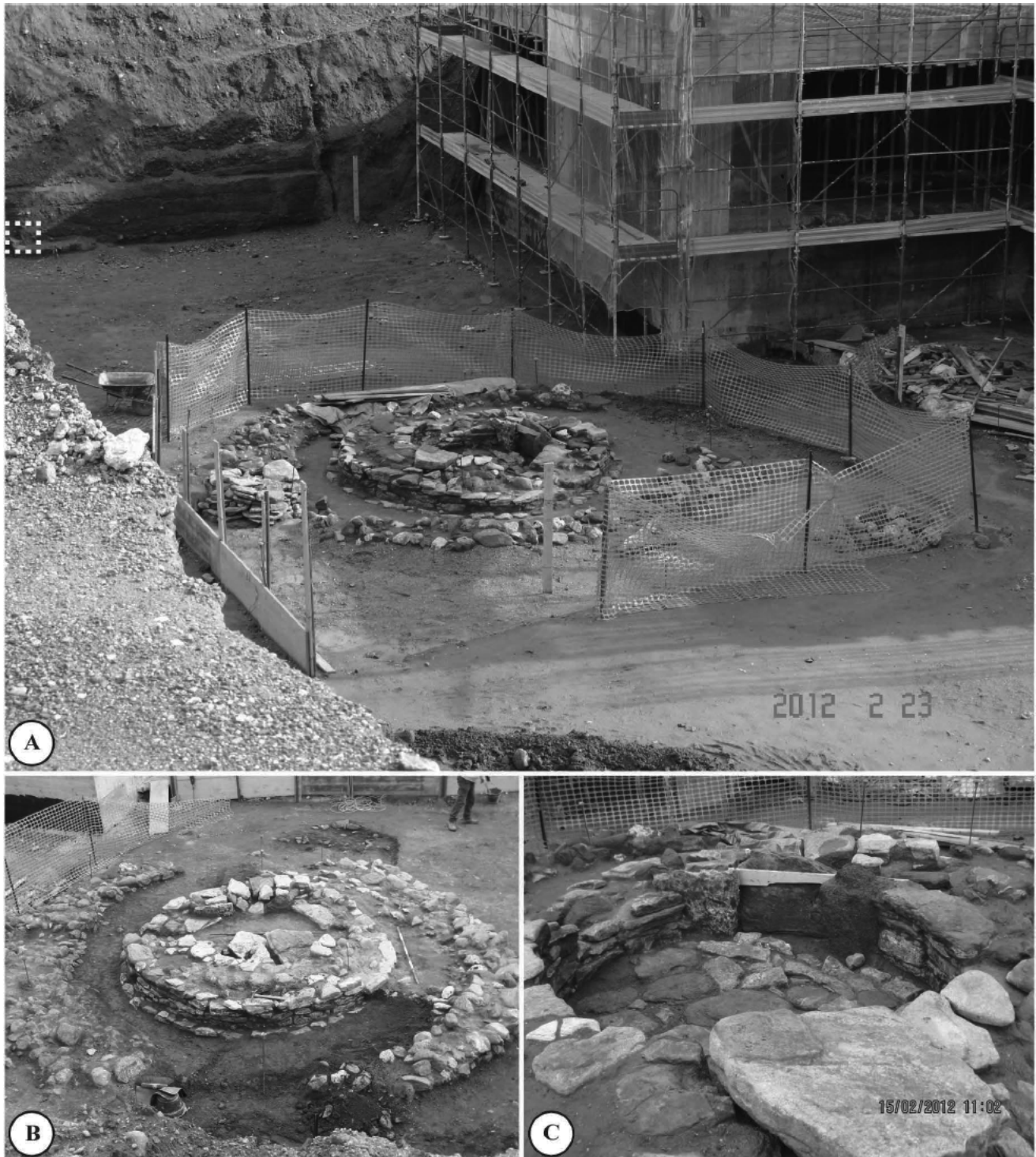
In the Gazzi necropolis, *enchytrismos* tombs (*pithos burials*) were also found near the *tholos*. They consist of four *pithoi* formed of clay containers settled horizontally in the ground and evidenced on the planking level by a marker represented by single stones or a *tumulus* of stones (Tigano 2012).

For a full description of the archaeological features of the Gazzi necropolis see Tigano (2012).

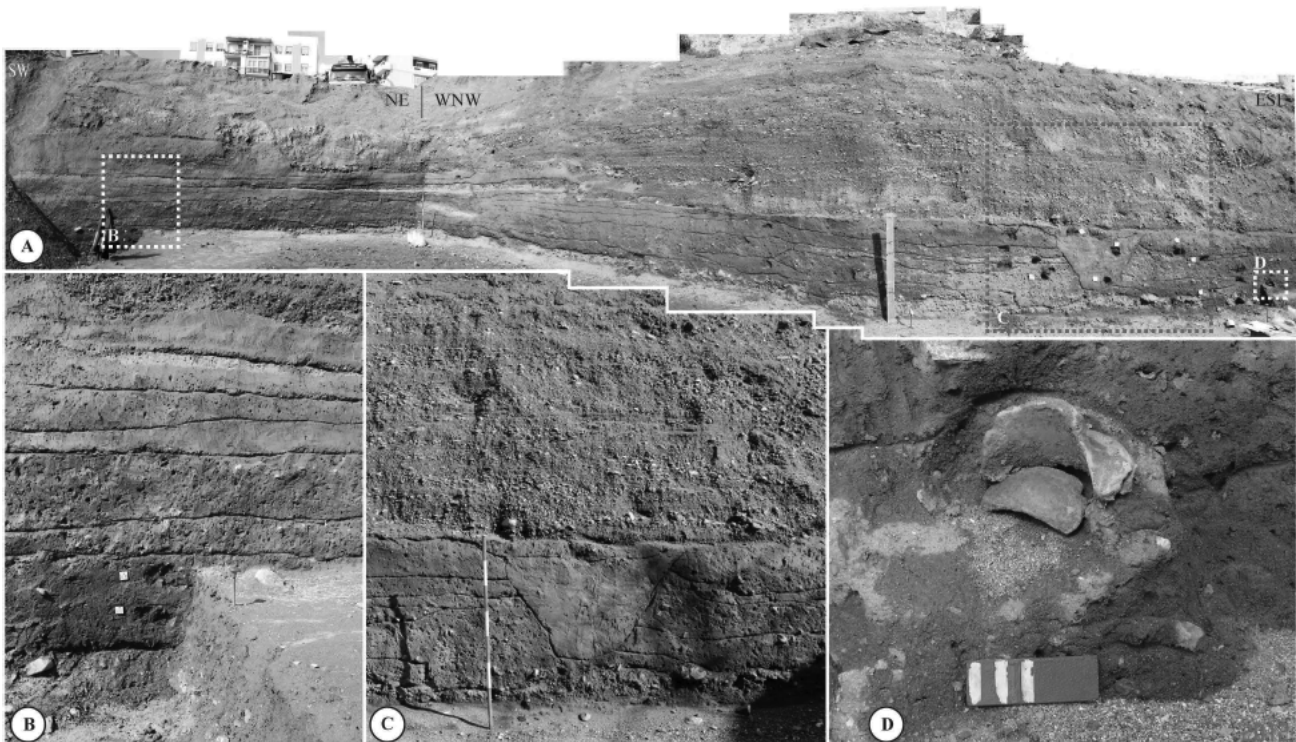


TEXT-FIGURE 2

A) Geological sketch map of the Messina Holocene alluvial and coastal plain with location of the main streams. B) Geological sketch map of the Gazzi hydrographic basin. Symbols: location of the main prehistoric archaeological sites (red circles 1-6): 1. Gazzi necropolis; 2. Camaro site; 3. Via La Farina, n. 158; 4. Cavallotti square; 5. Palazzo della Cultura (Bocchetta stream); 6 Paradiso-Contemplazione site.



TEXT-FIGURE 3  
The Gazzi necropolis. A) View of the construction site where the necropolis was highlighted. The Holocene stratigraphic succession is observable in the artificial section. B) The *tholos* structure with the funerary chamber enclosed by the precinct wall. C) Detail of the ground level of the *tholos* funerary chamber and of the *stomion*.



TEXT-FIGURE 4

Stratigraphy of the Gazzi archaeological site. A) General view of the artificial cuts of the construction site where the Gazzi necropolis was unearthed. B) Detail of Fig. A: View of the second bed from the bottom (on the left) where the planking level of the necropolis was settled. C) Detail of Fig. A: View of the amalgamated beds cross cut by the alluvial channel. D) Detail of Fig. A: View of the bed overlying the planking level of the necropolis and hosting fragments of *pithos*. The amalgamated surface is adapted on the *pithos* fragments.

## MATERIALS AND METHODS

In the present multi-disciplinary research related to the Gazzi necropolis, three different types of materials have been analysed: *i*) sediments; *ii*) building stones; *iii*) skeletal remains.

The stratigraphic study was conducted on the sedimentary sequence hosting the necropolis, during a very limited field work session because of the rapid construction of containment walls.

The necropolis building stones were studied by L.B and R.S. exclusively during field work by using magnifying glass and hydrochloric acid diluted at 10% to preserve their integrity. Of the surveyed *tholos* stones fewer than 100 of the stones were not analysed since they were too small to be correctly identified on the archeological site.

The skeletal remains were analysed after field work and were cleaned and partially restored by K.K., R.M. and L.S. in the Laboratorio di Antropologia e Applicazioni Forensi (Labhomo) dell'Università di Palermo. The Soprintendenza ai Beni Culturali e Ambientali di Messina authorized K.K., R.M. and L.S. to analyse only one *-pithos* T2- of the four *pithoi*, found in the necropolis. Human remains were studied according to current methods of analysis for the determination of the Minimum Number of Individuals (MNI), age and sex (White 1953; Ubelaker 1989; Buikstra and Ubelaker 1994). The description of the pathological features was carried out following the standards of Aufderheide and Rodriguez-Martin (1998) and Ortner (2003). A radiocarbon dating of bones was attempted by Accel-

erator Mass spectrometry (AMS) on the collagen extracted from two samples, in the Laboratorio Circe dell'Università della Campania "Luigi Vanvitelli" di Napoli.

## RESULTS AND INTERPRETATIONS

### The sedimentary sequence

The archaeological site of the Gazzi necropolis is located in the southern zone of the Messina urban centre (southern Italy; text-figure 1), more precisely known as  $38^{\circ}10'02.08''$  N and  $15^{\circ}32'32.93''$  E, on the left side of the Gazzi stream, 21 m a.s.l., 370 m from the actual Gazzi watercourse and 550 m from the Ionian coast (text-fig. 2).

The necropolis sedimentary succession appears formed by horizontal beds of siliciclastic deposits distinguishable into two main superposed units (text-fig. 4A).

The basal unit is from 1.5 to 3.5 m thick and is made up of a bedset of amalgamated brown silts with sands and brown detritus made up of metamorphic rock pebbles. This unit exhibits 11 main strongly amalgamated and anastomosed beds, from 0.10 to 0.7 m thick, delimited by horizontal amalgamated surfaces (text-fig. 4). The *tholos* was found, at 16.5 m above sea level (a.s.l.), on a brown, humic palaeosoil, poorly developed, sitting on a bed of silts with sandy detritus, 0.35 m thick, present in the deepest amalgamated beds (text-fig. 4B). This level may be interpreted as the original planking level of the necropolis. The *pithoi* were found a few meters away from the *tholos*, in two superposed lay-



ers, placed inside graves dug at a few decimeters from the *tholos* ground level. The youngest beds overlying the necropolis show the occurrence of fragments of *pithoi* (text-fig. 4D) and Greek period earthenware. The uppermost beds appear cross-cut by a channel, 0.8 m high and 1.20 m wide, crossed at the top by an amalgamation surface (text-fig. 4C). The lower stratigraphic boundary of the basal unit is not exposed in the trench, but stratigraphic data from a test drilling made in the neighboring area suggest that this unit may reach a thickness of 10 m.

The top unit overlies the basal one, along an erosive contact on which onlap bed terminations are present (text-fig. 4A). The top unit is 3 m thick and is exclusively composed of coarse-grained debris made up of grayish sandy detritus, weakly silty and with prevailing sub-angular pebbles. The bedset appears stratified in alternating horizontal beds, with a regular thickness of a few decimeter, of grey sandy detritus and sands with grey detritus composed of metamorphic rock fragments ranging from pebbles to blocks (text-fig. 4A, C).

Stratigraphic data from drillings, made in the neighboring area, indicate that the analysed succession overlies lower Holocene silts, clays and peat with bivalves (*Cardium* and *Tellina*), which in turn overlies Middle Pleistocene sands and gravels.

#### The necropolis building stones

For the study, 636 *tholos* building stones were examined (text-fig. 5). Of the 636 *tholos* building stones, 52% were determined to be composed of crystalline rocks and 48% of sedimentary rocks.

The *crystalline building stones* (n. 326) mainly consist of dark, light and dark-light in colour high-grade metamorphic and plutonic rocks. Dark rocks are mainly represented by strongly schistose blackish melanocratic and mafic rocks, grey gneisses and grey schists. Light rocks consist of schistose, whitish, leucocratic rocks and light grey quartzites, pegmatites, aplites, fels, granitoids and mylonites (text-figs. 5 and 6B). Dark-light rocks are represented by migmatite gneisses with alternating dark and light bands (text-figs. 5 and 6A, C) or augen gneisses with whitish oriented porphyroblasts alternated with black micaceous bands. Among crystalline rocks, the migmatites, the blackish mafic rocks and the whitish pegmatites are the prevailing used building stones. One block of a schistose, blackish garnet meta-hornblende was also found (text-figs. 5 and 6D). From a morphological point of view, the crystalline building stones are exclusively represented by pebbles and their surfaces are prevalently rounded and sharp; pebbles show prevailing blade forms (maximum size: 0.5x0.3x0.1 m).

The *sedimentary building stones* (n. 310) are mainly represented by yellowish and beige bioclastic packstones and rudstones (n. 295) (text-figs. 5 and 6E-J). Packstones show planar surfaces corresponding to bedding joints with man-made well-squared shapes (maximum size: 0.7x0.4x0.15 m) (text-figs. 5 and 6F-I). Rudstones are mainly characterized by abundant calcareous bioclasts of molluscs (pectinids and ostreids), brachiopods (*Terebratula*), bryozoans and corals (text-figs. 5 and 6E). The remaining stones are represented by brown hybrid arenites with intercalations of conglomerates with crystalline pebbles. A few of small rounded pebbles (maximum size: 0.25x0.2x0.1 m) with prevailing blade form are made of whitish coral rudstones (text-figs. 5 and 6J). Coral rudstones show a packstone matrix composed of organic skeletal fragments; centimetric-long tubular cavities host centimetric

skeletal fragments of white, frame-building deep-water scleractinians (prevailingly *Desmophyllum cristagalli*, *Caryophyllia coronata*, *Lophelia pertusa* and *Madrepora oculata* (text-figs. 5 and 6J).

The stones of the funerary chamber and the external and internal sides of the delimiting double faced wall are mainly represented by well-squared packstones (79%, text-fig. 7) (text-figs. 5 and 6F-I) with a minor contribution of crystalline stones (21%), present in the interior part of the double faced wall and on the funerary chamber floor; whereas the stones of the precinct wall are prevailingly represented by crystalline stones (85%) with a minor contribution of well-squared sedimentary blocks (15%) (text-figs. 5 and 7).

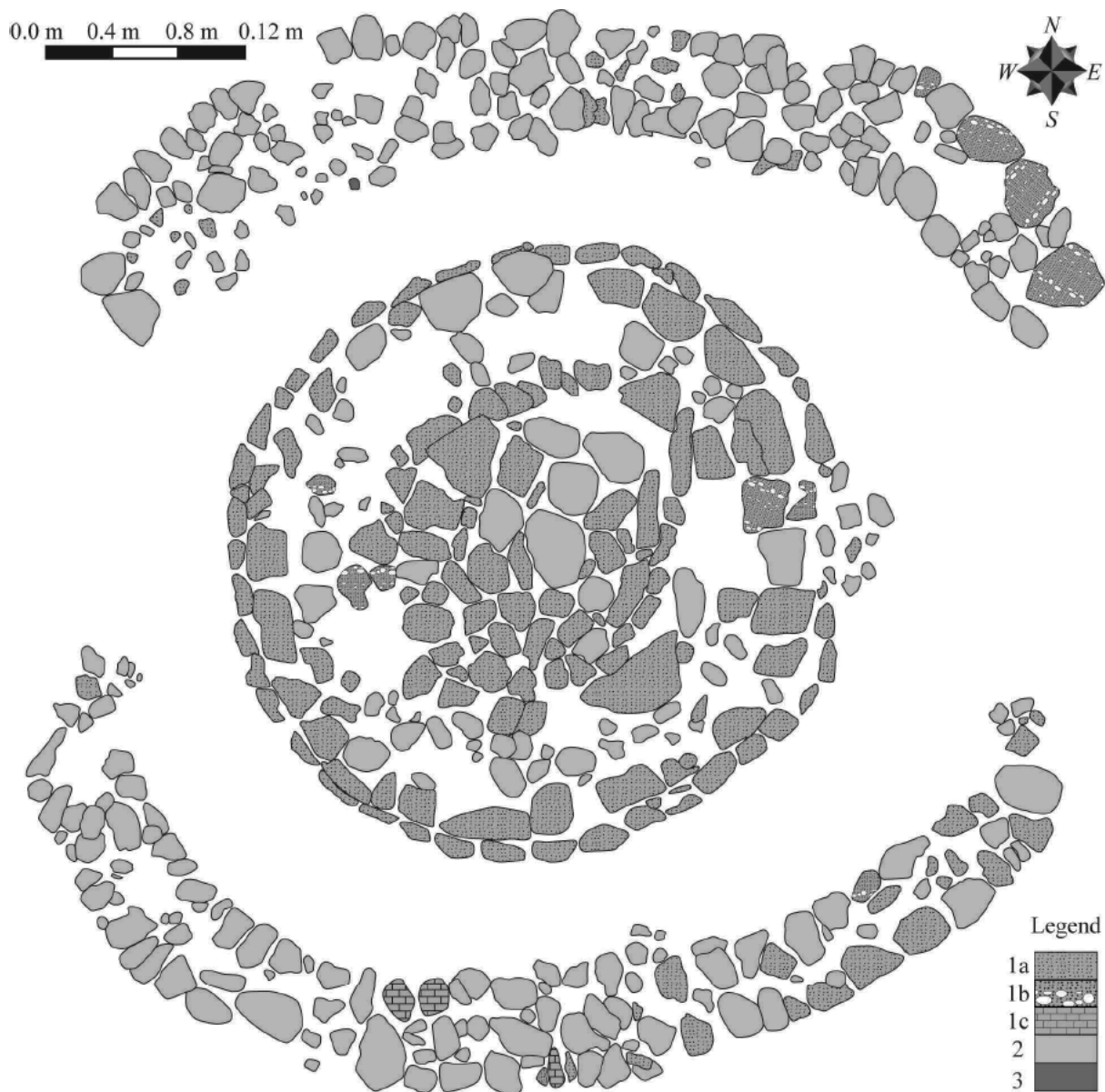
As concerns the *pithoi*, a pile with a few tens of stones was found on the palaeosoil overlying the graves. Most of these stones are composed of sedimentary and crystalline rocks, analogous to those of the *tholos*. Particularly, two stones with major dimensions are represented by a block with a roller form made up of whitish coral rudstones and a block with man-made, well-squared shapes formed by well bedded, beige colour packstones. Both blocks were found vertically placed along the major axis in the planking level.

#### Anthropological features

The anthropological study comprised an extremely fragmented sample (n. 726 bone fragments) coming from both the *tholos* tomb and the *pithos* (T2) of the *enchytrismos* burials. The high fragmentation of the samples was evident since the most represented dimensional class (78%) included remains with a maximum dimension lesser than 20 mm (text-fig. 8). This much compromised context unfortunately limited the anatomical, anthropological and palaeopathological analysis. Due to this bad state of preservation, the sex of the recognized individuals was not possible to be evaluated. Notwithstanding, it was possible to ascertain that the bone fragments exclusively belong to *Homo*, as any bone fragment referring to not-human animals was not recorded.

When the funerary chamber of the *tholos* was entirely cleared, nothing more than scattered bone fragments was found. The remains were found at a height of 0.2 m with respect to the chamber ground level, not in anatomical position but scattered all around the chamber and included in a reddish sandy-silty matrix with a muddy consistency. Taphonomic analysis highlighted a strong diagenetic action, presumably related to an abundant and repeated water circulation in the soil that strongly altered the mineral component of the buried bones. The minimum number of individuals was calculated (White 1953) as one adult inside the *tholos*; this data is compatible with the total amount of bone fragments collected (Table 1).

The anthropological analyses of the skeletal remains recovered inside the *pithos* (T2) allowed the identification of two individuals: one adult and one infant of 7±1 years old; this age at death was assigned considering the sequence of formation and eruption of the teeth on the left mandibular and on the right maxillary (Ubelaker 1989) (text-fig. 9A). The occurrence of proliferative lytic bone lesions was ascertained in a cranial fragment belonging to the adult individual (me' 12su28-06, Table 2). The lesions, perforating the outer cranial table, were identified in the center-medial part of the left parietal bone and were characterized by coalescence and irregular margins. The nature of



TEXT-FIGURE 5

Sketch plan of the *tholos* tomb of the Gazzi necropolis showing the building stone distribution (in plan view). Block patterns are related to the different lithotypes, as described in the legend. Legend - Sedimentary rocks - 1a: Packstone-rudstones with mollusks, brachiopods, bryozoans and corals; 1b: hybrid arenites with conglomerate intercalations; 1c: coral limestones ("calcarei a polipai" s.s.). Crystalline rocks - 2: Gneiss, migmatitic gneiss, melanocratic and leucocratic rocks, mafic rocks, pegmatites, aplites, granitoids, schists, quartzites, fels, augen gneiss, mylonites. 3: Garnet meta-hornblende.

the lesions appeared to be exclusively osteolytic as no evidence of osteoblastic activity was recorded.

Finally, the AMS radiocarbon dating was attempted on two samples of bones, one from the *tholos* (me'12su74-11, weight 7.80 g, table 1) and one from the *pithos* (me'12su28-03, weight 8.30 g, table 2); unfortunately, the analyses gave a negative outcome as it was not possible to extract enough bone collagen to be analysed. Further analyses, such as the FTIR (Fourier Transform Infra Red Spectroscopy) and the AA (Atomic Absorption) methods, may provide useful data and are in progress.

## DISCUSSION

### Archaeological concerns

Spatial structure (circular plan), architectural features and housing technique associate the monumental tomb of the Gazzi necropolis to the *tholoi* built under the Mycenaean influence and well attested in the Aegean world (Hood 1960; Pelon 1976) but not yet found in Sicily. The size of the Gazzi *tholos* in comparison with the *tholoi* of the Greek inland is small and consequently in a ranking of *tholoi* by size it should be in the bottom quarter. Otherwise, the Gazzi *tholos* size appears analogous to that of the

TABLE 1  
Identified bones in the *tholos*.

Code	Description	Age	Side
me'12su74-01	<i>Squama occipitalis</i> - Fragment	Adult	-
me'12su74-02	<i>Os parietalis</i> - Fragment	Adult	Sx
me'12su74-03	<i>Squama occipitalis</i> - Fragment	Adult	-
me'12su74-04	<i>Squama cranii</i> - Fragment	N.D.	N.I.
me'12su74-05	<i>Os temporale (pars tympanica)</i> -	Adult	N.I.
me'12su74-06	<i>Os temporale (pars mastoidea)</i> -	Adult	Sx
me'12su74-08	<i>Corpus femoris</i> (diaphysis)	Adult	Dx
me'12su74-09	<i>Ala ossis ilii</i> - Fragment	Adult	Dx
me'12su74-10	<i>Corpus humeri</i> (diaphysis) - Fragment	Adult	N.I.
me'12su74-11	<i>Corpus humeri</i> (diaphysis) - Fragment	Adult	N.I.
me'12su74-12	<i>Corpus humeri</i> (diaphysis) - Fragment	Adult	N.I.
me'12su74-13	<i>Ala ossis ilii</i> - Fragment	Adult	N.I.

Mycenaean *tholos* at Kolophon (Anatolia) and compared with the Late Minoan *tholoi* of Crete, the Gazzi *tholos* should be ranked better (Bridges 1974). The *tholos*, showing a ratio 1:4 between the entrance wide and the diameter of the chamber, should be analogous to the Argolid *tholoi* in Greece (Bridges 1974).

The recognized unusual architectonic features of the Gazzi *tholos* are twofold: *i*) the funerary chamber was characterized by a dome structure built with a technique totally unknown in Sicily until now and allowing to relate this tomb to a *tholos*; *ii*) the precinct wall enclosed the funerary chamber excluding important components of the Aegean typology (the *tumulus* and the *dromos*, Pelon 1976). These unusual features may be explained with the involvement of local builders or Aegean/Mycenaean architects (La Rosa 2004) in the construction project.

Only generic comparisons may be made between the *tholos* and other Sicilian monumental tombs dating back from the beginning of the Middle Bronze Age, *i.e.* XV-XIII century B.C. (*Thapsos facies*) to the end of the XI century B.C. (Tomasello 1997; Tusa 1997; La Rosa 2004; 2007). At Thapsos some semi-hypogean tombs, partially carved in the rock (the prevailing type in Sicily), bear an ogival section (Tomasello 1997). Better comparisons, for typology and size, may be made with tombs at Adrano (Sciare Manganelli, Catania; La Rosa 2004); these structures, likely re-used in historic age were probably without a *tumulus* but built "as an oven". Another comparison may be made with the tombs at Paternò (Catania), built with lava building stones, but dated in the facies of Pantalica Nord (Tusa 1997).

The exceptionality of the present archaeological discovery adds new elements supporting the close relationships with the Aegean world. These were already demonstrated in the Aeolian Islands, as evidenced by the thermal bath of San Calogero in Lipari dating back to the the initial stage of the Middle Bronze Age (Bernabò Brea and Cavalier 1990; Belli 1992 and references therein). This monument, partially carved in the rock and not used for funerary purposes, is likely the only one supposed to be built by Mycenaean skilled builders. The studied Gazzi *tholos* could be coeval with the early Mycenaeanization of the Aeolian Islands, as attested by the imported pottery (Calderoni and Martinelli 2005; Cultraro 2006). Notwithstanding the lack of funerary goods in the *tholos*, human bone dating in the Gazzi necropolis and any incontestable elements for dating back the *tholos*, the association with *enchytrismos* tombs (Messina-

TABLE 2  
Identified bones in the *pihos*.

Code	Description	Age	Side
me'12su28-01	<i>Squama occipitalis</i> - Fragment	Adult	-
me'12su28-02	<i>Os parietalis</i> - Fragment	Adult	Sx
me'12su28-03	<i>Squama occipitalis</i> - Fragment	Adult	-
me'12su28-04	<i>Squama cranii</i> - Fragment	N.D.	N.I.
me'12su28-05	<i>Os temporale (pars tympanica)</i> - Fragment	Adult	N.I.
me'12su28-06	<i>Os temporale (pars mastoidea)</i> - Fragment	Adult	Sx
me'12su28-08	<i>Corpus femoris</i> (diaphysis)	Adult	Dx
me'12su28-09	<i>Ala ossis ilii</i> - Fragment	Adult	Dx
me'12su28-10	<i>Corpus humeri</i> (diaphysis) - Fragment	Adult	N.I.
me'12su28-11	<i>Corpus humeri</i> (diaphysis) - Fragment	Adult	N.I.
me'12su28-12	<i>Corpus humeri</i> (diaphysis) - Fragment	Adult	N.I.
me'12su28-13	<i>Ala ossis ilii</i> - Fragment	Adult	N.I.
me'11su58-15	<i>Mandibola</i> - Fragment	Infant	Sx
-	<i>Dens incisivus medialis superior</i> not mature	Infant	Dx
-	<i>Dens incisivus medialis inferior</i> not mature	Infant	Dx
-	<i>Dens molaris II inferior</i>	Infant	Dx
-	<i>Dens molaris II superior</i>	Infant	Sx
me'11su58-12	<i>Os temporale</i> - Fragment	N.D.	N.I.
me'11su58-13	<i>Os parietalis</i> - Fragment	N.D.	N.I.
me'11su58-06	<i>Os parietalis</i> - Fragment	N.D.	Sx
me'11su58-10	<i>Os frontalis</i> - Fragment	N.D.	-
me'11su58-01	<i>Calcaneum</i> - Fragment	Adult	Sx
me'11su58-02	<i>Talus</i> - Fragment	Adult	Sx
me'11su58-03	<i>Talus</i> - Fragment	Adult	Dx
me'11su58-04	<i>Os metatarsi V</i> - Proximal epiphysis	Adult	Dx
me'11su58-05	<i>Phalanx proximalis</i> - foot	Adult	Sx
me'11su58-09	<i>Copus tibiae</i> - Fragment	N.D.	N.I.
me'11su58-07	<i>Corpus fibulae</i> - Fragment	Adult	N.I.
me'11su58-08	<i>Os metacarpalis</i> - Fragment	Adult	N.I.

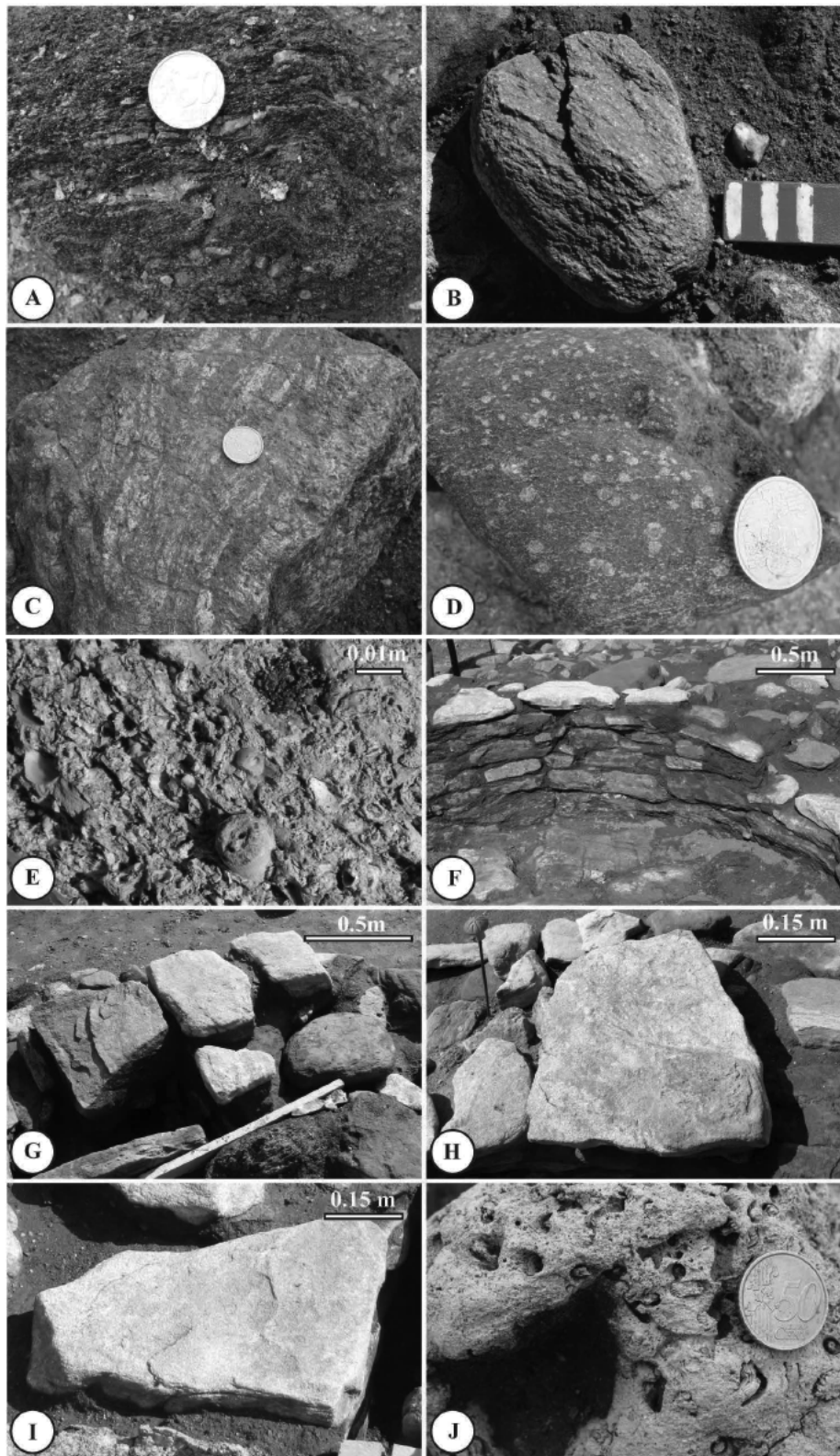
Ricadi facies) - being a ritual well attested over the Messina Straits in the Sicilian Early and Middle Bronze Age (Scibona 1971; Bernabò Brea 1985; Pagano 1991; Maniscalco 1999), it is reasonable to hypothesize a chronology possibly dated back to the end of the Early or the initial stage of the Middle(?) Bronze Age for the Gazzi necropolis.

#### Environmental considerations and comparisons with other Bronze Age findings

The sediment textures, structures and sedimentary facies associations of the deposits where the Gazzi necropolis was found (text-fig. 4) suggest that they represent overbank sediments, formed on a marshy, distal area of a floodplain of an alluvial plain with poorly developed palaeosols, presumably since the end of the Early Bronze Age. The *tholos*, appearing covered by sediments containing scant traces of shards attributable to the Greek period, should have been standing, intact or partially destroyed, before it was definitively buried by the collapse of the tomb dome and by the overlying overbank sediments, deposited at least until the post-Greek period.

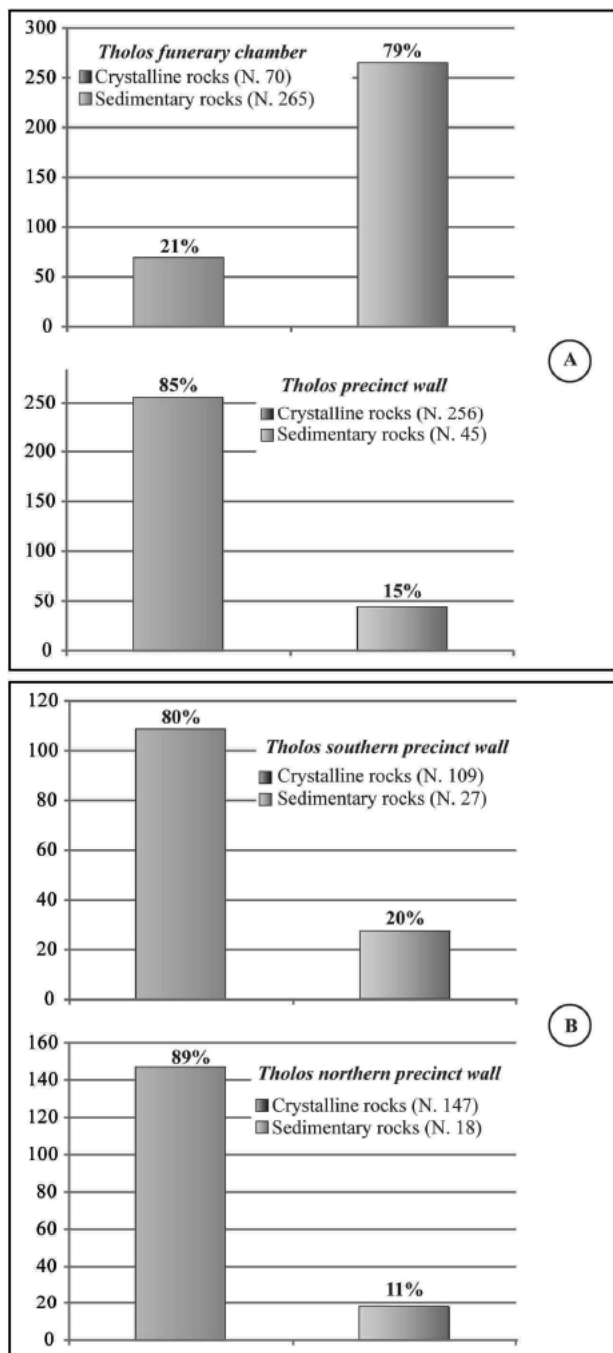
Stratigraphic data from the surrounding area indicate that the analysed alluvial deposits overlie lower Holocene(?) littoral deposits with *Cardium* and *Tellina* (silts, clays and peat with bi-valves), which in turn overlie the Middle Pleistocene fluvio-deltaic sands and gravels of the Messina Formation. This sequence could be the evidence of a transgressive-regressive cycle as demonstrated by Bonfiglio et al. (1994) in the Holocene succession exposed a few km north-wards the Gazzi necropolis, near the Messina split (Cavallotti site; text-fig. 2A).





TEXT-FIGURE 6

The building stones of the *tholos*. A) Pebble of melanocratic rock. B) Pebble of mylonitic gneiss. C) Pebble of migmatitic rock. D) Pebble of meta-hornblendite rock. E) Pebble of rudstones showing corals, brachiopods and bioclasts. F) Internal side of the wall of the funerary chamber showing the layers of manufactured stones with sharp edges and well-squared shapes made up of bioclastic packstones. G-H-I) Details of manufactured stones. J) Pebble of coral rudstones with corals.



TEXT-FIGURE 7  
Distribution of the *tholos* building stones. A) Histograms showing the different building stone distribution in the *tholos* funerary chamber and precinct wall. B) Histograms showing the analogous building stone distribution in the *tholos* northern and southern part of the precinct wall.

Several prehistoric findings of necropoleis and/or settlements from the Neolithic to the Bronze Age were unearthed in the Messina urban center (Riccobono 1975; Riccobono et al. 1988; Bonfiglio 1999; Bonfiglio et al. 1994; Bacci Spigo and Martinelli 1998-2000). The Bronze Age necropoleis are generally localized in the back zones of the alluvial plain, towards the

hills, whereas the related settlements are generally widespread in the coastal plain, near the Messina split (Scibona 1984-85; Bacci Spigo and Martinelli 1998-2000; Bonfiglio 1999; and references therein).

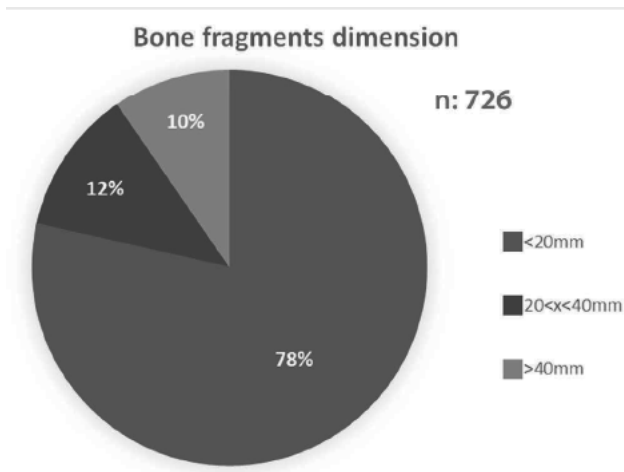
Comparisons between the Gazzi necropolis and other lower Bronze Age necropoleis found in the Messina alluvial plain may be made exclusively with the Palazzo della Cultura archaeological site (Scibona 1983; 1984-85; Bonfiglio 1999), where analogous *enchytrismos* burials (*pithoi* tombs) were discovered (Fig. 10). The palaeogeographic and environmental features of the Gazzi and Palazzo della Cultura archaeological sites are analogous, being both located on the overbank deposits of the alluvial floodplain, at a comparable altitude, about 550 m and 400 m from the coast, respectively. Sedimentary structures, such as amalgamated surfaces and fluvial channels, are characteristic features of both sites. Notwithstanding, important differences between the two sites are observed. The sediments hosting the two coeval funerary areas stand on deposits formed in different environments. They are lower Holocene(?) littoral sediments in the Gazzi necropolis and Early Eneolithic to Middle Neolithic alluvial deposits in the Palazzo della Cultura site (Scibona 1983; 1984-85) (Fig. 10). These data suggest that during the Neolithic Age, the area of the Palazzo della Cultura site was an emerged land whereas the zone of the Gazzi necropolis was under the sea level, in a littoral environment. This observation could explain the reason why the Neolithic findings have been unearthed exclusively in the most elevated areas of the coastal plain, towards the hills.

Consequently, during the early Holocene the palaeogeography of the Messina coastal plain should be presumably characterized by a narrower belt (Bonfiglio et al. 1994) occupied in its high-lying areas by the Neolithic long-term human settlements; conversely, the low-lying areas of the coastal plain from the Messina harbor to the Gazzi stream had to be under shallow seawater or in wetlands. From the Bronze Age onwards the seaward coastline migration was responsible for a plain widening (but narrower than today) accompanied by new lands available for colonization. The Bronze Age *Homo* constructed new settlements expanding eastwards.

Palaeobotanical data on the Holocene coastal plain indicate that the hills surrounding the plain were covered by the Mediterranean *maquis* (rich in *Quercus - ilex-coccifera*, *Rhamnus/Phillyrea*, *Pomoideae* and *Olea europea L.*), whereas the alluvial and coastal plain was mostly devoid of shrubberies and trees (Bacci Spigo and Martinelli 1998-2000). The choice of a stream as preferential site where to settle the Gazzi necropolis, being an area devoid of tall stem plants, was presumably made in order to guarantee its visibility in the countryside, becoming a characterising element of the prehistoric landscape because of its peculiar symbolic importance (La Rosa 2004). The necropolis, located about 2 km away from other human prehistoric settlements developed near the Messina split, may testify the occurrence of a distinct settlement presumably constructed near the area of the stream mouth along the Ionian Sea, with an important strategic role in the control of the access from south towards the Messina Straits.

#### The petrography of the tholos building stones

The petrographic study of the *tholos* building stones indicates that the stones were differentially distributed in the tomb according to two criteria followed by the monument builders



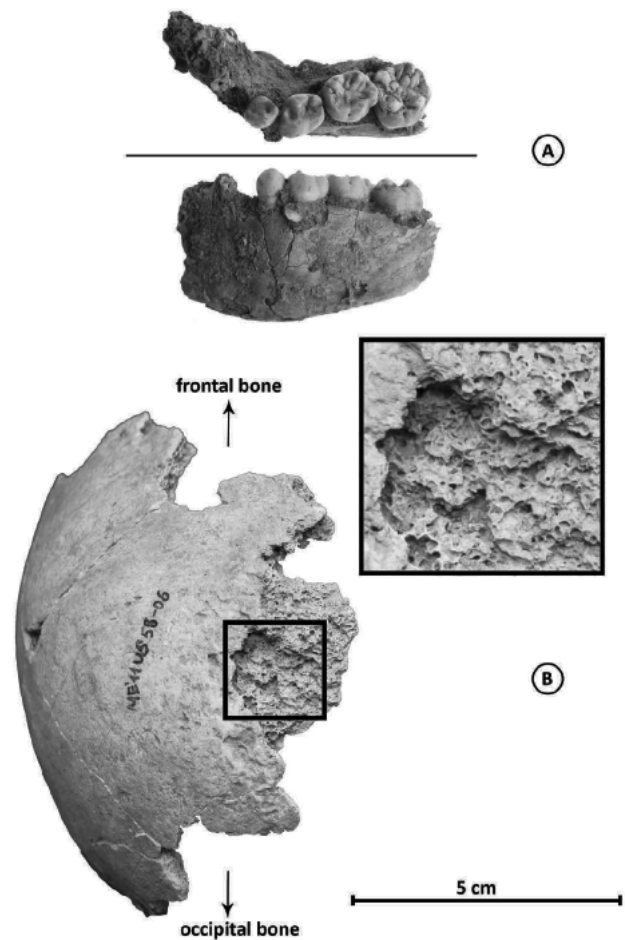
TEXT-FIGURE 8  
Pie chart showing the percentage distribution of the maximum dimension of bone fragments among the whole sample analyzed in the Gazzi necropolis.

(text-figs. 5 and 6). The stones were opportunely selected among the crystalline and sedimentary rocks, which are the lithotypes equally distributed in the monument (52% and 48% crystalline and sedimentary rocks, respectively). Another peculiarity may be recognized in the different distribution of the building stones; the crystalline stones (85%) are located in the slightly elliptical precinct wall (with a minor contribution of well-squared, sedimentary blocks - 15%), whereas, conversely, the well-squared sedimentary blocks (79%) are located in the funerary inner chamber (with a minor contribution of the crystalline stones - 21%) (text-figs. 5, 6, 7). The preferential use of the hand-made worked stones in the inner chamber is dependent on the architectonic necessity to build the vault.

#### The provenance of the necropolis building stones

The crystalline building stones of the necropolis, predominantly migmatites, mafic rocks and pegmatites, derive from the Variscan crystalline basement of the Aspromonte Unit (Messina et al. 2004 and references therein); only one building stone (garnet meta-hornblende) is assigned to the Mela Unit (Messina et al. 2004 and references therein). The sedimentary building stones, being prevailing packstone-rudstones, derive from the Peloritani Pliocene-Pleistocene successions (Carbone et al. 2008).

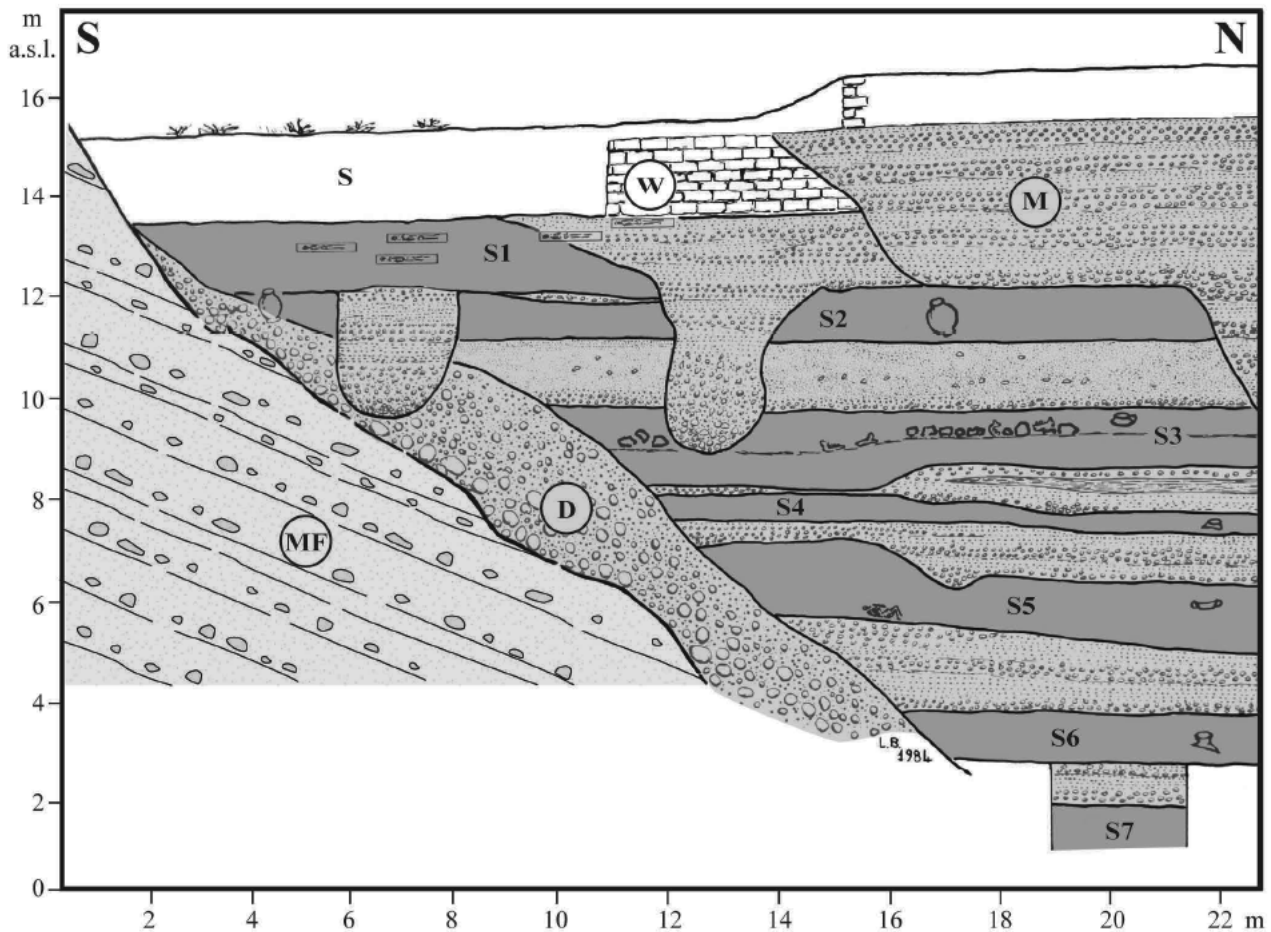
The crystalline building stones consist exclusively of rounded pebbles analogous to those directly observable in the Holocene alluvial deposits of the Gazzi stream where pebbles of both the Aspromonte Unit and the Mela Unit are present, as the alluvial sediments were fed by the most elevated outcrops of the hydrogeological basin (text-fig. 2B). Analogously, a few rounded pebbles were formed by sedimentary building stones made up of packstone-rudstones, hybrid arenites and coral rudstones, reflecting the local geology of the area. These rocks may be ascribed to the upper Pliocene-middle Pleistocene Rometta Formation exposed on the left side of the hydrogeological basin (La Montagna hill, text-fig. 2B), where lower Pleistocene coral rudstones, namely the *calcarei a polipai*,



TEXT-FIGURE 9  
Skeletal remains. A) Emimandible of the individual 7±1 years old recovered in the *enchytrismos* tomb. B) Fragment of left parietal bone of the adult individual recovered in the *enchytrismos* tomb. The magnification square highlights the osteolytic lesion.

are also present (Carbone et al. 2008 and references therein). Definitely, considering that the necropolis was built on a poorly developed palaeosoil overlying the overbank deposits of the distal area of the Gazzi stream, an alluvial provenance from the stream is hypothesized for the 52% of the necropolis building stones.

The remaining building stones (48%), mostly packstones bounded by bedding joints and exhibiting sharp edges and well-squared shapes (text-fig. 6 F-I), represent manufactured stones. Bedding joints were exploited by the *tholos* builders as preferential cutting surfaces easier to work. These rocks were extracted from outcrops with well-bedded sedimentary rocks showing layers a few centimetres thick, as observed in the necropolis. Possible outcrops with such composition and structures may be located at about 2.5 km WSW of the necropolis, along the right side of the San Filippo stream, on a hill presumably visible from the prehistoric settlements of the then-coastal plain. Other outcrops exploited by the builders as quarry may be located near La Montagna hill (text-fig. 2B), but the outcropping rocks show beds with thickness different from that observed in the *tholos* stones.



TEXT-FIGURE 10  
 Stratigraphy of the Palazzo della Cultura site (according to Scibona 1984-85; Bonfiglio 1999, modified). M) Medieval alluvial deposits; W) Foundation wall of the XIV century; S) Present soil level; S1) Roman necropolis of Augustean Age (I sec. A.D.); S2) Early Bronze Age soil containing *enchytrismos* tombs (*pithos* burials); S3) Early Eneolithic (?) soil; S4) Diana Facies of the late Neolithic soil; S5) Serra d'Alto Facies of the Middle Neolithic soil; S6) "Capri Style" early Middle Neolithic soil; S7) Sterile soil; D) Slope deposits; MF) Middle Pleistocene Messina Formation. The figure is not to scale and the thickness of the archaeological soils is exaggerated.

### Anthropological concerns

The almost exclusive presence of the ritual of inhumation among the Sicilian population of the Early and Middle Bronze Age is well attested, as well as the use of rock-cut chamber tombs and large jar burials (Leighton 1999). The human remains recovered in the Gazzi necropolis confirm the inhumation ritual, providing also the information of a double burial inside one of the *pithos* of the *enchytrismos* burials.

The poor state of preservation of the osteological remains strongly biased any anthropological analysis aimed to provide a satisfactory biological profile of the buried individuals. However, it is worth reporting the presence of the lytic lesions on the parietal bone of the adult individual recovered inside the *pithos*. The lytic lesions are due to an imbalance in bone remodelling process and occur when there is a prevalence of osteoclastic activity that produces a resorption of the bone matrix. Providing a reliable differential diagnosis for these lesions is complicated as they present different aetiologies: traumatic, inflammatory and neoplastic. Despite this, in adult individuals the most common

cause of lytic lesions affecting the cranium are of neoplastic origin (Lloret et al. 2009), it is necessary taking into consideration other causes, especially when the skeleton is not complete and/or in good state of preservation. Therefore, a neoplastic origin for the lytic bone lesions found in the skull of the adult individual buried in the *pithos* may be only cautiously hypothesized. However, according to recent trends in paleo-oncology (Kirkpatrick et al. 2018) further planned analysis with the help of computed tomography (Miccichè et al. 2018) and biomolecular analysis (Nerlich 2018) may better define the pathological status suffered by the adult individual buried in the *pithos*.

### CONCLUDING REMARKS

The Gazzi necropolis comprises a *tholos* tomb and several *enchytrismos* burials whose chronology possibly dated back to the end of the Early or to the Middle(?) Bronze Age. The *tholos* architectural features indicate that it may represent a Mycenaean-type tomb.

The Gazzi *tholos* is a monument to this date unique in Sicily and the Italian peninsula for its unusual features. Its discovery gives new evidence to the role played by the Messina settlements (and those of northeastern Sicily) during the Bronze Age, when relationships and connections between the Aegean and Western world became closer. The similitudes with the Messina archaeological heritage confirm the existence of non-episodic relationships between the eastern Mediterranean and the northeastern Sicily from the late Neolithic Age onwards. Messina, with its natural harbor, presumably dominated one of the main maritime traffic routes between the Eastern and Western Mediterranean.

The present multi-disciplinary investigation, based on new geological, petrographic and anthropological data, has shown that:

i) The sedimentary succession, where the Gazzi necropolis was settled, is composed of overbank sediments (text-figs. 2 and 4) formed on the alluvial plain of the Gazzi palaeostream, on a marshy, distal area of the floodplain.

ii) The *tholos* funerary chamber and the precinct wall (text-figs. 3 and 5) were constructed by using different types and distributions of the building stones (text-figs. 5, 6, 7). The used stones were selected by the builders choosing half crystalline rocks and half sedimentary rocks (text-fig. 7). The crystalline stones mainly formed the precinct wall, whereas the funerary chamber was mostly constituted by hand-made, worked sedimentary blocks suited to build the dome structure.

iii) The *tholos* crystalline building stones mainly consist of alluvial pebbles of the Gazzi palaeostream (text-fig. 6), whereas the provenance of the worked, hand-made stones may be hypothesized to derive from local quarries in the surrounding hills.

iv) The extremely fragmented human skeleton remains found in the Gazzi necropolis are ascribable to *Homo* (text-fig. 9). The high level of attrition and diagenesis alteration showed by the osteological sample strongly biased the anthropological characterization of the buried individuals. Furthermore, the diagenetic alteration most likely have also caused a loss of collagen, affecting the AMS radiocarbon dating attempted on bone fragments, unfortunately, without results. However, the analyses allowed to identify one adult (as minimum number of individuals) in the *tholos* and one adult and one child 7±1 years old in the *pithos*. Despite the lack of a conclusive diagnosis, the proliferative lytic bone lesions were ascertained in the remains of both the adult individual in the *tholos* and the *pithos* constitute an interesting paleopathological datum providing further information on the health status of the Sicilian population in the Early-Middle(?) Bronze Age.

After the Gazzi necropolis was unearthed and studied in the 2012 by the Soprintendenza per i Beni Culturali ed Ambientali di Messina and the Authors of the present paper, the project for the civil building construction, whose excavations evidenced the archaeological finding, started again and a residential complex was realized without providing, inappropriately in the opinion of L.S. and R.S., any structure to preserve the extraordinary discover of the *tholos*. Consequently the *tholos* of the Gazzi necropolis described in this paper has newly disappeared but this time buried by the concrete shed by the *Homo* of the 3rd millennium.

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