Rivista Italiana di Paleontologia e Stratigrafia	volume 102	numero 3	tavola 1	pagine 375-384	Dicembre 1996

LARGE MAMMAL REMAINS FROM LATE MIDDLE PLEISTOCENE DEPOSITS OF SICILY: NEW STRATIGRAPHIC EVIDENCE FROM THE WESTERN EDGE OF THE HYBLEAN PLATEAU (SOUTHEASTERN SICILY)

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Key-words: Pleistocene, Large mammals, Southeastern Sicily.

Riassunto. All'estremo margine sud-occidentale del Plateau Ibleo, in contrada Cacaladritta, a sud di Niscemi, sono stati rinvenuti resti di grandi mammiferi in depositi limnici costituenti la sommità di una sequenza sedimentaria finora attribuita interamente al Pleistocene inferiore marino. I resti di mammiferi appartengono a specie (*Elephas mnaidriensis* Adams, *Hippopotamus pentlandi* Meyer, *Bos primigenius* Bojanus), che caratterizzano il complesso faunistico del tardo Pleistocene medio della Sicilia. La piattaforma carbonatica di età cretaceo-miocenica costituente la parte centrale del Plateau Ibleo (piattaforma ragusana) è rimasta isolata dal resto della Sicilia durante il Pliocene e il Pleistocene inferiore. Lungo il margine occidentale della piattaforma, nell'area di Comiso, depositi limnici interposti tra calcareniti marine del Pleistocene inferiore e sabbie marine dell'inizio del Pleistocene medio rappresentano l'evidenza di una prima pianura costiera estesa al margine occidentale della piattaforma di Ragusa. I sedimenti limnici di Comiso contengono un'associazione di vertebrati comprendente *Elephas falconeri* Busk, il più piccolo elefante siciliano, che appartiene al complesso faunistico più antico del Pleistocene medio della Sicilia. I sedimenti limnici e la fauna di Contrada Cacaladritta dimostrano l'esistenza di una pianura costiera più giovane estesa a ovest di Comiso e forniscono le basi per ricostruire i tempi del progressivo estendersi delle aree continentali a ovest del Plateau durante il Pleistocene medio. Al margine orientale del Plateau i resti di mammiferi del complesso faunistico a *E. mnaidriensis* e a *H. pentlandi* sono contenuti in depositi terrazzati sovrastanti a depositi marini del tardo Pleistocene medio e sottostanti a calcareniti eutirreniane. La differenza di quota tra i depositi di pianura costiera dei due margini del Plateau contenenti la stessa fauna di mammiferi indica che il margine occidentale del Plateau ha subito un sollevamento molto più importante, ma solo a partire dal tardo Pleistocene medio.

Abstract. Large mammal remains have been found in limnic deposits of Contrada Cacaladritta, south of Niscemi, which were previously attributed entirely to the marine environment. The limnic deposits cap a marine sequence attributed to the Lower Pleistocene. The uncovered remains, including *Elephas mnaidriensis* Adams, *Hippopotamus pentlandi* Meyer, *Bos primigenius* Bojanus, belong to species typical of the late Middle Pleistocene large mammal association of Sicily. The Cretaceous-Miocene carbonate platform constituting the central part of the Hyblean Plateau (Ragusa platform) remained isolated from the rest of Sicily for the entire Pliocene and Early Pleistocene. Along the western edge of this platform (Comiso area) a sequence of limnic deposits, interposed between Lower Pleistocene marine deposits and lowermost Middle Pleistocene marine sands, provides evidence for the first Pleistocene coastal plain. The limnic sediments at Comiso contain a vertebrate assemblage, including *Elephas falconeri* Busk, the smallest Sicilian elephant, which belongs to the older Middle Pleistocene mammal association recognized in Sicily. Thus, the new findings suggest that a younger coastal plain extended west of the Comiso area. Moreover these data provide a basis for understanding the chronology of the progressive extension of continental areas west of the Plateau during the Middle Pleistocene. On the eastern side of the Plateau the remains of the *E. mnaidriensis* - *H. pentlandi* association are contained in terraced deposits overlying late Middle Pleistocene marine sands and underlying Euthyrrhenian calcarenites. The late Middle Pleistocene mammal-bearing deposits of coastal plain environment on the western edge are found at a higher elevation above sea level than those on the eastern edge, indicating that the western edge of the Hyblean Plateau underwent a more significant uplifting since the late Middle Pleistocene.

Foreword.

Following the stratigraphic research by Accordi (1963, 1965), papers dealing with Pleistocene mammal-bearing deposits of the Hyblean Plateau (southeastern Sicily) provide the most significant stratigraphic record of Sicily. The present paper deals with the recent discovery of large mammal remains (*Elephas mnaidriensis* Adams, *Hippopotamus pentlandi* Meyer and *Bos primigenius* Bojanus) in the coastal plain deposits of Contrada Cacaladritta, south of Niscemi, at the southwestern edge of the Plateau, which to date was thought to have originated exclusively in the marine environment. These remains belong to species of the younger faunal association noted in the continental Middle and Upper Pleistocene of Sicily and therefore provide additional data for a more precise description of the Pleistocene palaeogeographic evolution of the margins of the Hyblean Plateau.

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Geologic outline of the Hyblean Plateau.

In the carbonatic Hyblean Plateau (Fig. 1) three sectors have been distinguished by Di Geronimo et al. (1980) and Carbone et al. (1982a, 1982 b): 1) a carbonate platform s.s., made from the limestones of the Ragusa platform; 2) a transitional area between the carbonate platform and the foredeep, stretching from Gela to Catania and including the Catania Plain to the northeast and the Vittoria-Gela Plain to the southwest, and 3) the Gela-Catania foredeep, directed northeast to southwest, delimiting the western margin of the Hyblean Plateau. The foredeep divides the Hyblean foreland from the Caltanissetta Trough and from the orogenic belt which constitute the central western and northern portions of Sicily respectively (Catalano & D'Argenio, 1982).

The limestone portion of the Hyblean Plateau is a Cretaceous-Miocene carbonate platform, dissected by block-faulting along normal faults which began during Tortonian-Messinian times. While the central part of the Plateau (Ragusa platform) underwent gradual uplifting, the transitional areas were affected by progressive sinking of the Hyblean substratum below the Plio-Pleistocene sediments (Di Geronimo et al., 1980; Carbone et al., 1982 b; Grasso & Lentini, 1982). Di Geronimo (1979), Di Geronimo et al. (1979), Di Geronimo & Costa (1978) recognized a single Plio-Pleistocene marine cycle throughout the Plateau, which ends with the clays and sands of the uppermost Lower Pleistocene (Sicilian, *sensu* Ruggieri & Sprovieri, 1975).

At the beginning of the Middle Pleistocene the transitional areas along the margins of the carbonate platform also emerged. A structural high directed from southeast to northwest formed, dipping respectively toward the Catania and the Vittoria-Gela Plains (Carbone et al., 1982 b). During the Middle Pleistocene many marine terraces originated along the margins of the carbonate platform due to interactions between glacio-eustatic marine cycles and neotectonic activity. At the eastern, southern and western margins of the Hyblean Plateau, Carbone et al. (1982 a) recognized six orders of Middle Pleistocene terraces that underlie sedimentary covers made by conglomerates and littoral calcarenites.

On the eastern edge of the Plateau, Di Grande & Raimondo (1984) recognized only three Middle Pleistocene marine cycles, represented by three orders of terraces covered by three calcarenitic Middle Pleistocene units. The calcarenites, however, do not display differences in facies and are not stratigraphically correlated. On the eastern edge of the Plateau three further terraces were correlated to the Tyrrhenian transgressive cycle by Di Grande & Scamarda (1973) and by Grasso & Scamarda (1979). These Upper Pleistocene deposits are made of sands containing *Strombus bubonius* Lamarck, associated with species still living in the Mediterranean, that are found only on the Augusta outskirts (Fig. 1). The Lower and Middle Pleistocene coastlines have been dislocated by tectonic activity which formed coastal horst-graben structures throughout the Plateau (Carbone et al., 1982b).

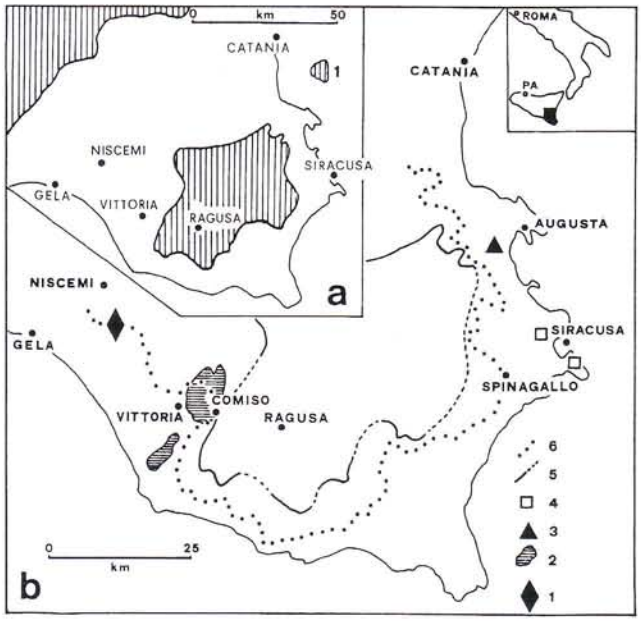


Fig. 1 - a: Paleogeography of the Hyblean Plateau during the Plio-Pleistocene; 1 = Emerging areas. b: Mammal bearing deposits of the coastal plain environment in the Hyblean Plateau. 1) Contrada Cacaladritta (described in this paper). 2) Comiso area, where the deposits are interposed between Lower Pleistocene marine deposits and lowermost Middle Pleistocene marine sands. 3) Coste di Gigia, where the deposits overlie uppermost Middle Pleistocene calcarenites. 4) Syracuse and Maddalena Peninsula, where the deposits underlie Euthyrrhenian calcarenites. 5) Uppermost Lower Pleistocene coastline. 6) Uppermost Middle Pleistocene coastline. PA = Palermo.

Near Comiso (Fig. 1), at the base of the steep escarpment bordering the western rim of the Ragusa platform, a sequence of coastal plain vs. limnic deposits overlies the Lower Pleistocene calcarenites. The limnic deposits pass upwards to lowermost Middle Pleistocene marine sands (Conti et al., 1979). Alluvial fan deposits overlie the limnic deposits near the base of the escarpment (Fig. 2). Southwest of Comiso (Vittoria-Gela Plain), a Plio-Pleistocene marine sequence has been identified, that gently dips southwards (Niscemi monocline, Ruggieri, 1973).

Mammal-bearing deposits on the Hyblean Plateau.

Two Middle Pleistocene large mammal associations have been recognized in Sicily, both containing elephants together with reptiles, amphibians and birds. The relative and absolute chronology has been extrapo-

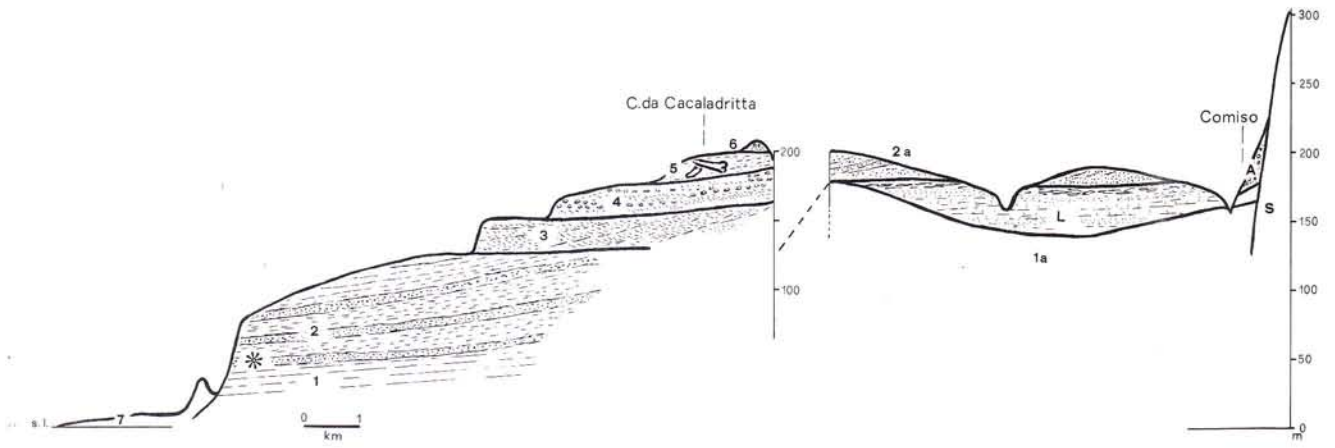


Fig. 2 - Stratigraphic outline of the Pleistocene deposits in the Vittoria-Gela plain (left) and of the stratigraphic sequence at Comiso (right). 1-7, description in the text. Asterisk, stratigraphic position of the Case Schifo marine sands. L, limnic deposits; A, alluvial fan deposits at Comiso. Correlation is according to Conti et al. (1979).

lated from geochemical dating provided by Bada et al. (1991) and by stratigraphic data collected in western Sicily (Burgio & Cani, 1988) and especially in the Hyblean Plateau (Accordi & Colacicchi, 1962; Accordi 1963, 1965; Bonfiglio 1992; Bonfiglio & Insacco, 1992; Bonfiglio et al., 1993; Basile & Chilardi, 1996). Elephants of different size are contained in both assemblages. The older faunal association is characterized by the smallest endemic elephant *Elephas falconeri* Busk and by endemic micromammals [*Leithia melitensis* (Adams), *Leithia cartei* (Adams)]. The earliest traces of this association are recorded in the lake deposits of Comiso dated to the beginning of the Middle Pleistocene (Conti et al., 1979; Bonfiglio & Insacco, 1992). The younger faunal assemblage contains elephants of larger size, classified in the literature as *Elephas antiquus* (Gignoux, 1913; Ruggieri, 1977), *Elephas* cf. *antiquus* (Ambrosetti, 1968), *E. antiquus leonardii* (Aguirre, 1968-69), *E. mnaidriensis* (Vaufrey, 1929), associated with *Hippopotamus pentlandi* Meyer, *Bos primigenius* Bojanus, *Cervus siciliae* Pohlig, *Megaloceros carburangelensis* (De Gregorio) and carnivores. This faunal assemblage is found in uppermost Middle Pleistocene terraced deposits (Bonfiglio, 1991, 1992) and in Upper Pleistocene calcarenites (Accordi, 1963, 1965; Ruggieri, 1977).

In the Hyblean Plateau numerous mammal-bearing deposits are known which have the following characteristics:

1 - on the Ragusa platform, which started to emerge in the Miocene, fissure-filling deposits are not correlated with coastal lines and contain faunal associations belonging both to the older and to the younger association (Bonfiglio & Insacco, 1992; Bonfiglio et al., 1993).

2 - Mammal-bearing deposits of the eastern sector:

a) at Spinagallo two caves have been investigated: the lower cavity contains species of the older faunal association while the upper cave contains species belonging to the younger faunal association (Accordi & Colacicchi, 1962). The bottom of the lower cavity is occupied by Middle-Pleistocene calcarenites belonging to the oldest Middle Pleistocene marine deposits of the eastern sector of the Hyblean Plateau (Carbone et al., 1982 a; Di Grande & Raimondo, 1984).

b) mammal-bearing deposits containing the younger mammal faunal association either overlie terraced littoral calcarenites of the uppermost Middle Pleistocene (Coste di Gigia), underlie Euthyrrenian calcarenites (Maddalena peninsula, eastern area of Syracuse); or occupy an unknown stratigraphic position (Catania Plain) (Aradas, 1864; Accordi 1963, 1965; Bonfiglio, 1991, 1992; Basile & Chilardi, 1996). They all extend from the height of 40 m to 15 m above sea level.

3 - Mammal-bearing deposits of the western sector:

a) the Comiso coastal plain deposits contain the *Elephas falconeri* association and extend to a maximum height of 185 m above sea level (Conti et al., 1979; Bonfiglio & Insacco, 1992).

b) the alluvial fan deposits of Comiso contain *Elephas mnaidriensis, Hippopotamus pentlandi, Cervus siciliae,* as well as bovids and overlie the limnic deposits of the same locality (Conti et al. 1979; Bonfiglio & Insacco, 1992).

Stratigraphic sequence at Contrada Cacaladritta.

Mammal remains at Contrada Cacaladritta are contained in deltaic clayey sands that underly gravelly, sandy and calcareous continental deposits with fresh water molluscs. The two units constitute the uppermost portion of the Niscemi monocline. According to Roda (1965) the Niscemi sequence consists of Sicilian marine deposits. According to Ruggieri (1973) the Niscemi monocline is capped by a Middle Pleistocene terraced surface ("large upper terrace" of Ruggieri & Unti, 1974), that

overlies the Lower Pleistocene marine sequence. Moreover, according to Ruggieri (1973), the upper portion of the marine sequence may be continuous or interrupted by gaps or transgressions. Fig. 2 shows the succession of the Pleistocene deposits south of Niscemi (left) and at Comiso (right). The following units are present, from top to bottom:

7 - Upper Pleistocene-Holocene deposits.

6 - Yellow-reddish fine massive sands, alternating with heterometric, quartz-bearing sands with clayey matrix, containing abundant internal casts of fresh water molluscs (*Bitinia, Pisidium, Planorbis*). These layers cap the underlying sequence.

5 - Unlayered yellow-reddish sands, canalized by sandy silts of deltaic environment with rare *Ostrea edulis* specimens. The mammal remains come from the sandy-silt layers.

4 - Gravels and sands containing abraded marine mollusc fragments. Calcareous pebbles, eroded from the Hyblean substratum, are flattened.

3 - Fine quartz sands alternating with sandstone and silty-clayey levels of tidal flat environment. Strongly cemented reddish levels, 1-3 cm thick, alternate with loose fine sands, that display cross-bedding and load casts. Bioturbations and infrequent levels of small, flattened pebbles coated with manganese oxide are present. Fragments of cetacean remains, wood casts and rare specimens of *Ostrea edulis* come from these sands.

2 - Clay silts alternating with fossiliferous yellowish sandstones. In the interpretation of Ruggieri (1973) malacofaunas from Case Schifo suggest a shallow water environment (no more than 40 meters deep). This unit, containing *Globorotalia truncatulinoides excelsa* Ruggieri, Sprovieri & Unti, was dated by Ruggieri (1977) to the late Early Pleistocene (Sicilian, following Ruggieri & Sprovieri, 1975), while Conti et al. (1979) assigned an age ranging from the Early to the Middle Pleistocene for the faunas of Case Schifo.

1 - Gray-blue clays of bathyial environment passing downwards to calcarenites and sands containing *Arctica islandica* (Lentini, 1984) (1a).

At Comiso Lower Pleistocene calcarenites (1a) pass upwards to limnic deposits (L) which in turn pass conformably to the lowermost Middle Pleistocene sands and calcarenites (2a). Conti et al. (1979) found that the limnic deposits at Comiso are coeval with part of the marine deposits of the Vittoria-Gela plain and of the Case Schifo sands. They are covered in continuity by marine sands which also end the Lower-Middle Pleistocene marine cycle of the Vittoria-Gela plain.

Mammal remains.

Fossil bones are concentrated in a limited area of the sandy silts, at the base of a steep cliff cut for agricultural purposes in a hill of Contrada Cacaladritta. Some fossil bones were removed in preliminary excavations, whereas others still remain *in situ*. The present extent of the mammal-bearing deposits is unknown because necessary systematic excavations are difficult, due to the morphology of this area.

Remains of *Hippopotamus pentlandi* Von Meyer, *Elephas mnaidriensis* Adams and *Bos primigenius* Bojanus have been collected. Seven rib fragments and one vertebra have not been classified.

Hippopotamus pentlandi Von Meyer, 1832 (Pl. 1, fig. 1-4).

A left temporal fragment, a right second upper incisor, a left humerus and a left humerus diaphysis of *Hippopotamus pentlandi* were collected (Tab. 1, 2).

The left temporal fragment includes a portion of the zygomatic process, the glenoid cavity and the occiput jugular process. The bone is very small. By direct comparison with *Hippopotamus pentlandi* skull remains from Acquedolci (northeastern Sicily) (Bonfiglio & Marra, in progress), this fragment seems to belong to a very young individual. The bone surface is slightly rough, which is a typical characteristic of younger individuals, and the glenoid cavity and jugular process are small; the articular surface of the zygomatic process is not welded to the temporal process of the zygomatic bone. The glenoid cavity is 67 mm broad and 31.5 mm long. The parietal margin is laterally swollen in dorsal view similar to the younger specimens from Acquedolci.

The second right incisor is curved in lateral view, is oval in cross section with the largest dimension along the anterior-posterior axis. In anterior view, the enamel forms a stripe with typical transversal thickening (Accordi, 1955; Bonfiglio & Marra, in progress). The posterior wear surface is vertical.

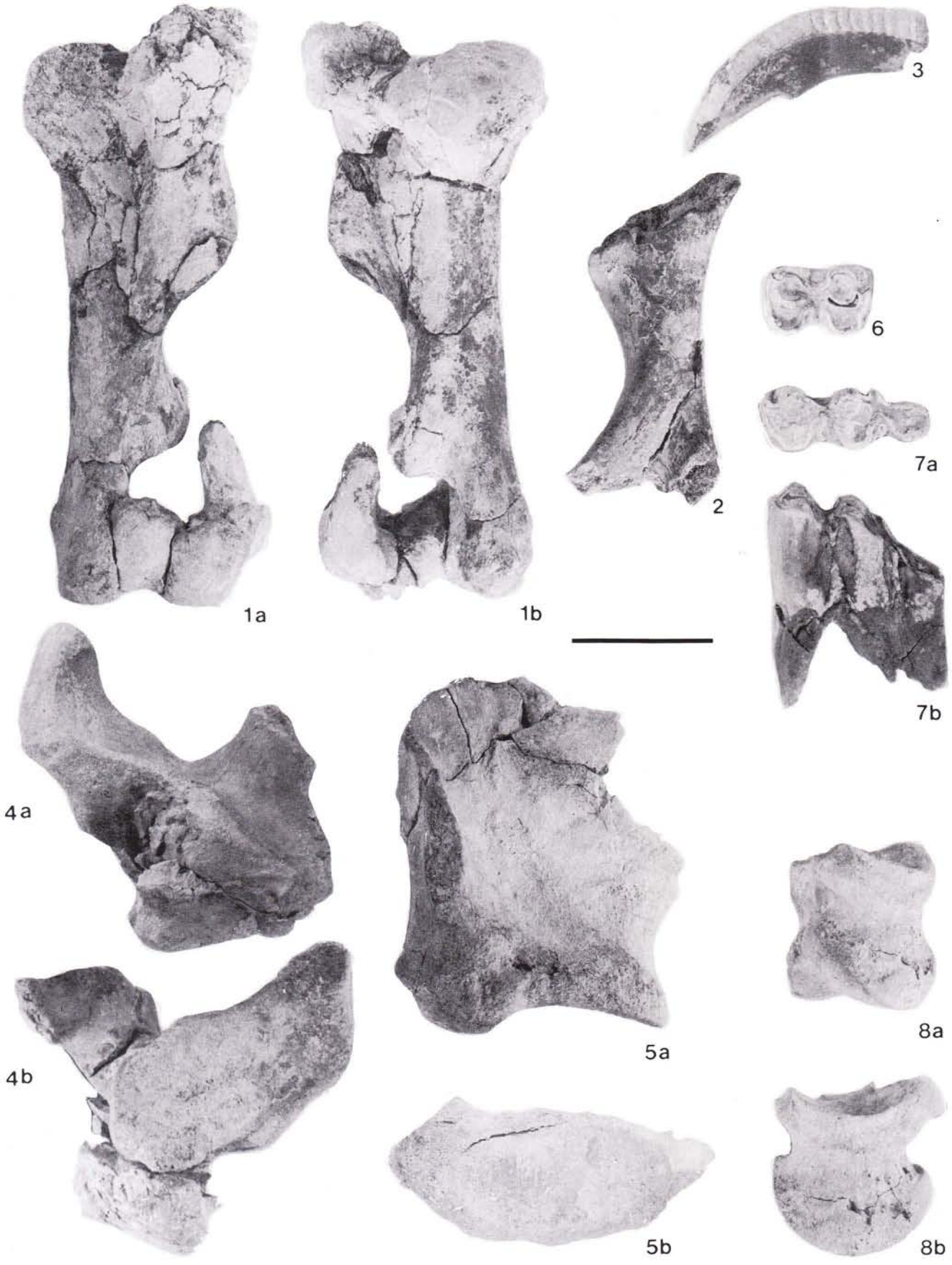
PLATE 1

Fig. 1-4 - *Hippopotamus pentlandi* Von Meyer. 1a, b) Left humerus (humerus 1) in anterior and posterior views. 2) Left humerus diaphysis (humerus 2) in posterior view. 3) Second right incisor in lateral view. 4 a, b) Left temporal fragment in dorsal and ventral views.

Fig. 5 a, b - *Elephas* cf. *mnaidriensis* Adams left scapula fragment. a) In lateral view. b) Glenoid cavity.

Fig. 6-8 - *Bos primigenius* Bojanus. 6) Right M/2 in occlusal view. 7 a, b) Left M/3 in occlusal and labial views. 8 a, b) Second forelimb phalanx in dorsal and abaxial views.

Scale: 4 cm for Fig. 3, 6-8; 8 cm for Fig. 1, 2, 4, 5.


1a
1b
2
3
4a
4b
5a
5b
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7a
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8a
8b

The summit of the greater turbercle of the humerus (humerus 1) is lacking. The proximal articular head is broadly convex and has a semicircular posterior margin. The bicipital groove is broad. The diaphysis is short and broad, with a strong crista humeri; the deltoid tuberosity has a protruding margin that turns backwards. The coronoid fossa is broad and the epicondyle is slender. The trochlea is broad and largely convex and has a U-shaped groove. The angle between the longitudinal axis of the trochlea and the axis of the bone is very small. The humerus diaphysis (humerus 2) is smaller than that of humerus 1, but is morphologically comparable to it. The size and the slightly rough surface of the bone are typical of younger individuals. Morphology and measurements (according to Mazza, 1991) are within the range of variability of *Hippopotamus pentlandi* (Accordi, 1955; Garreffa, 1988, unpublished thesis).

Because of its smaller size the temporal fragment belonged to a younger individual while the humerus 2 belonged to an older individual. Therefore at least 3 distinct specimens of *Hippopotamus pentlandi* are present in our collection.

	I2/
antero-posterior diameter	21
lateral diameter	15,8

Tab. 1 - *Hippopotamus pentlandi*: I2 (mm).

	humerus 1	humerus 2
length	280*	
proximal breadth	150*	
smallest breadth of the shaft	51.3	41.9
distal breadth	122.1	
depth of the medial portion of the distal epiphysis	109.1	
depth of the lateral portion of the distal epiphysis	83,1	
breadth of the trochlea	90	

Tab. 2 - *Hippopotamus pentlandi*: humeri (mm).

Elephas cf. *mnaidriensis* Adams, 1874 (Pl. 1, fig. 5).

A left scapula fragment was collected. In this specimen the ventral angle has been preserved, including the glenoid cavity, the neck, the supraglenoid tubercle and the robust insertion of the spine. The general form corresponds to that of *Elephas antiquus*, in its solid appearance, the broad and not very definite neck, the large concavity of the glenoid cavity and the very low insertion of the spina, (Trevisan, 1954; Maccagno, 1962; De Lorenzo & D'Erasmo, 1927). The spina however was not found. The articular surface of the glenoid cavity is slightly abraded with a length of 110 mm and a breadth 62 mm. These dimensions are distinctly too large to be within the range of variability of *Elephas falconeri* (Vaufrey, 1929; Ambrosetti, 1968) and too small to belong to *Elephas antiquus* (Andrews & Cooper, 1928; Trevisan, 1954; Maccagno, 1962). Both the size and the geographic position of this scapula suggest that it belong to *Elephas* cf. *mnaidriensis.*

Bos primigenius Bojanus, 1827 (Pl. 1, fig. 6-8).

Two molars (left M/3, and right M/2) and the second phalanx of a forelimb have been collected (Tab. 3, 4).

The occlusal surface of the left third lower molar shows: a protruding and narrow metaconid; a wide and rounded entoconid; a rounded protoconid and hypoconid; an oval shaped ectostylid, with transvers greater axis connetcted to the conids and a rounded parastylid that is turned towards the lingual side. There is a circular accessory column between the hypoconid and the hypoconulid. The labial re-entrant valley between the hypoconid and hypoconulid is rounded. The hypoconulid is directed backwards, has an oval cross-section and a rounded posterior margin. The wear is greater in the posterior conids. The tooth has a slight swelling above the neck and there isn't a constriction below it.

The second column and the rounded labial re-entrant valley between the hypoconid and the hypoconulid, the slight swelling above the neck, the backwardly directed hypoconulid and the absence of the hypoconulid distal swelling are typical features of *Bos* (Azzaroli, 1978; Sala, 1986; Brugal, 1987). Because of these characteristics the left third molar is likely from *Bos primigenius*, though it appears brachyodont.

The right second molar has, in occlusal view, quadrangular U-shaped conids on the buccal side, with more rounded conids on the labial side. The ectostylid is U-shaped, and wider along the transverse axis. The shape of the enamel around the central cavity is a quadrangular U shape, without complicated folds. There is a U-shaped fold between the metaconid and the entoconid. The tooth columns appear compressed in medio-distal view, similar to *Bos* (Sala, 1986; Brugal, 1987).

The second phalanx is short and broad in abaxial view; in dorsal view the abaxial condyle is close to the proximal articulation. These features are diagnostic for the forelimb phalanx (Sala, 1986). In dorsal view the abaxial condyle is transversely displaced to the extent that it meets the axial side, and the saddle-like depression between articular condyles is not particularly marked. The dorsal margin is short and very curved. The proximal articular surfaces are very concave.

The second phalanx is also likely from *Bos primigenius* due to its generally squat appearance, abaxial condyle orientation, small saddle-like depression between the dorsal condyles and the shape of dorsal margin. The size of this specimen is within the range of variability of *Bos primigenius* (Sala, 1986).

Brugal (1987) classified as *Bos* (*Bos*) *primigenius siciliae* Pohlig, 1911 the remains excavated from the Puntali cave (Palermo), without examining the holotype of the Sicilian species preserved in the Paleontological Museum of Palermo. The morphological features of the specimen described by Brugal do not differ from those of the continental species *Bos primigenius*; the size of the bones and of the theet are within the range of variability of the continental species.

	M/3	M/2
length	47.4	28.6
anterior breadth	18	19.6
posterior breadth	16.5	19.3
hypoconulid breadth	11.3	

Tab. 3 - *Bos primigenius*: teeth (mm).

	II phalanx
greatest length	48.6
proximal end diameter	44x40.6
smallest breadth of the diaphysis	34.2
distal end diameter	38.3x43.5

Tab. 4 - *Bos primigenius*: phalanx (mm).

Discussion.

The lithology of the continental deposits at Contrada Cacaladritta is very similar to that of the coastal plain sediments of the outskirts of Comiso (Conti et al., 1979). Both sediments derived from the same coastal plain environment. The vertebrate fauna at Comiso belongs to the older Middle Pleistocene mammal faunal association of Sicily while the Contrada Cacaladritta fauna contains some species which characterize the younger late Middle Pleistocene-Upper Pleistocene faunal assemblage. The new findings suggest that a younger coastal plain extended west of the Comiso area.

The height of the coastal plain deposits at Contrada Cacaladritta, compared to those of the same environment extending along the eastern margin of the Hyblean Plateau, and containing the same large mammal association, shows an important palaeogeographic asymmetry in the Pleistocene evolution of the Plateau.

On the eastern edge, the coastal plain deposits containing the younger mammal faunal association are located between a height of 40 and 15 meters above the present sea level. The height of the Contrada Cacaladritta coastal plain deposits, on the other hand, extends from 150 meters above sea level upwards, and shows that the western margin of the Plateau underwent a significant uplifting after the late Middle Pleistocene. The continuity in sedimentation described by the authors in the regressive marine sequence of Niscemi (Roda, 1965; Ruggieri, 1973) indicates that this area has been stable during the Lower Pleistocene. The thickness of the littoral and coastal plain deposits (unities 3, 4, 5) demonstrates that the same area was subsiding during most of the Middle Pleistocene, while the early Middle Pleistocene terraced deposits of the eastern edge were uplifted.

Conclusions.

The results of this work may be summarized as follows:

1 - A new large mammal-bearing deposit derived from a coastal plain environment has been discovered in the very western edge of the Hyblean Plateau.

2 - The Contrada Cacaladritta deposits in the stratigraphic sequence overlie the limnic deposits of Comiso, which contain the *Elephas falconeri* association of early Middle Pleistocene age.

3 - The mammal remains of Contrada Cacaladritta belong to species (*Hippopotamus pentlandi, Elephas mnaidriensis, Bos primigenius,*) which characterize the late Middle Pleistocene-Upper Pleistocene mammal faunal association of Sicily.

4 - The "monocline of Niscemi" sequence is capped by coastal plain deposits of late Middle Pleistocene-Late Pleistocene age.

5 - During the Middle Pleistocene the western peripheral zones of the Hyblean Plateau were occupied by two successive coastal plains, inhabited by large continental mammals.

6 - The thickness and present height above sea level of the Contrada Cacaladritta deposits indicate the persistence of a subsiding belt during the Middle Pleistocene in the western edge of the Plateau which experienced a considerable uplift only in the late Middle Pleistocene. At the eastern side of the Plateau the uplift began earlier during the early Middle Pleistocene.

7 - The uplift of the western edge of the Plateau was probably coeval with a slight lowering of the eastern edge since at present the old Greek quarries located near Syracuse are located 10 meters below sea level.

Acknowledgments.

This research was supported by M.U.R.S.T. 40%. Thanks are due to Prof. F. Masini for helpful suggestions in classifying the *Bos primigenius* remains, and to F. Tumeo for the photography.

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Receveid April 10, 1996; accepted August 7 1996