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STRATIGRAPHIC ARCHITECTURE OF THE SALENTO COAST FROM CAPO D'OTRANTO TO S. MARIA DI LEUCA (APULIA, SOUTHERN ITALY)

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Riassunto. Lungo la costa orientale della Penisola Salentina, da Capo d'Otranto a S.Maria di Leuca, esiste un'architettura stratigrafica assai particolare dovuta al fatto che diversi sistemi carbonatici, di età compresa tra il Cretaceo superiore e il Quaternario, sono disposti lateralmente e variamente "incastrati" l'uno rispetto all'altro. Così, mentre al centro della Penisola Salentina, cioè sul carapace della Piattaforma Apula, la successione post-cretacea è ridotta a poche decine di metri e suddivisa da importanti inconformità e lacune, sul margine e sullo *slope* di tale piattaforma molti sistemi carbonatici sono stati preservati, anche con spessori considerevoli.

Il nostro studio dimostra anche che alcuni di questi sistemi carbonatici sono in realtà degli *slope* clinostratificati, associati a scogliere coralline disposte linearmente lungo la costa salentina. È questo il caso dei depositi del Priaboniano, del Cattiano inferiore e del Messiniano inferiore, quest'ultimo identificato e descritto per la prima volta.

La conclusione geologica della nostra ricerca è che, a partire dal Cretaceo superiore e fino all'attuale, la costa orientale della Penisola Salentina ha coinciso, più o meno, con il margine della Piattaforma Apula. La relativa stabilità di questa piattaforma, che ha rivestito il ruolo di avampaese sia rispetto alla nascente catena ellenica ad est che a quella appenninica a ovest, registrandone a distanza le fasi evolutive più importanti, ha permesso l'accumulo e la preservazione di consistenti sedimenti carbonatici soltanto sui suoi fianchi.

Abstract. The Cretaceous to Quaternary succession of the Apulia Platform cropping out on the eastern coast of the Salento Peninsula shows a special stratigraphic architecture. Whereas on the platform top, i.e. on the Salento Peninsula proper, the succession is at most a few tens of metres thick and is punctuated by unconformities, on the margin and slope of the platform, along the present-day eastern coast of the peninsula, several carbonate systems are laterally disposed and grafted one upon the other. Three of these systems are clinostratified and include well developed reef tracts of Priabonian, early Chattian and early Messinian age.

The geologic conclusion of our study is that, since the Late Cretaceous, the eastern coast of the Salento Peninsula grossly coincided with the margin of the Apulia Platform. This paleogeographic element acted as a foreland horst and registered important geodynamic events related to the growth of the adjacent Hellenide and Apennine thrust belts. During the last 60 m.y., the horst carapace was constantly near sea level and sediments were mainly accommodated and preserved on the deep margin and slope of the platform.

Introduction.

Studies on carbonate platforms normally focus on platform-top architecture, defining sequence boundaries, facies distribution, cyclicity, aggradation and progradation geometries, etc. It is also a common notion that platforms grow upward, i.e. aggrade, owing to relative sea-level rise (tectonic subsidence and eustasy). By contrast, where relative sea-level is stable no accommodation space is produced on the platform top and carbonate production and accumulation are forced to take place on platform flanks and adjacent base-of-slope settings; meanwhile, the platform top may be frequently exposed to erosion and diagenesis. As a result, the platform top succession is very thin, condensed and punctuated by several and prolonged hiatuses and, surprisingly, the only record of the past existence of a carbonate platform system might be found as a slope succession.

The eastern margin of the Apulia Platform (southern Italy), from Capo d'Otranto to Capo S. Maria di Leuca, is just a case in point (Fig. 1). Whereas on the platform top, i.e. on the Salento Peninsula proper, the Upper Cretaceous to Quaternary succession is a few tens of metres thick at the most and is punctuated by large lacunae, on the margin, along the eastern coast of the peninsula, several carbonate systems, Late Cretaceous to Quaternary in age, are laterally disposed and grafted one upon the other. Except for the Cretaceous, Middle Eocene and Quaternary deposits, all others are clinostratified slope systems. The time represented by

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the stratigraphic succession includes periods of foreland tectonic response to the growth of adjacent Hellenide and Apennine thrust systems, and of dramatic oceanic changes, such as the Messinian salinity crisis. The purpose of this report is to describe in stratigraphic and geologic terms this unusual stratigraphic architecture.

Brief comment on the geological map.

The rationale of the geological map (Fig. 1) is to show the intricate stratigraphic architecture on the eastern coast of the Salento Peninsula. Along the rocky shore, outcrops are fairly good and it is possible to map in detail the many lithological units, whereas on the platform extensive inhabited areas, olive orchards, terra rossa cover and the almost flat morphology make it difficult to do detailed geological mapping.

Originally, field mapping was done at 1:10,000 scale, but here, mainly for practical and space purposes, it is presented simplified at 1: 50,000 scale. The map covers a 40-45 km-long coastal strip. It shows that, from Capo d'Otranto southward to S. Cesarea Terme, the Cretaceous substratum is disconformably mantled by the Upper Eocene Torre Specchialaguardia Limestone (clinostratified slope), which is in turn overlain by the Upper Oligocene Porto Badisco Calcarenite, accommodated in the Oligocene erosional depression of Porto Badisco (Nardin & Rossi, 1966). From S. Cesarea Terme to Tricase Porto, the rocky coast is mainly constituted by the Chattian Castro Limestone (reef and associated clinostratified slope). An exception is represented by the "stratigraphic window" of Grotta Romanelli where the Cretaceous limestone, associated with some Lutetian-Bartonian rocks, is exposed along the coast. From Tricase Porto to the cape of S. Maria di Leuca, the coastal strip is characterized by the presence of a Messinian reef complex (Novaglie Formation) disconformably mantling the Castro Limestone slope. The Novaglie Formation, mainly represented by clinostratified sediments (but several reef tracts proper are still preserved), is accommodated in re-entrants of the original Messinian rocky shore. The boundaries of these re-entrants are two "capes" of Castro Limestone or even of Cretaceous rock (a typical example is present east of Corsano).

The scalloped morphology has been a constant feature of the Salento rocky shore from Eocene to the present and is clearly recognizable during the Late Eocene, Early and Late Oligocene, early Messinian and Pleistocene. A very peculiar megabreccia (Leuca Breccia), here interpreted as a late Messinian lowstand deposit, occurs in small, scattered outcrops (S. Maria di Leuca, harbour of Marina di Novaglie, S. Cesarea Terme). Finally, the entire Tertiary succession is disconformably onlapped by the lower Pleistocene Salento Calcarenite, which is preserved discontinuously along the rocky shore.

Previous work and present geologic knowledge.

Geologic and stratigraphic studies on the eastern coastal strip of the Salento Peninsula go back to the last century and papers mainly dealing with the recognition of new stratigraphic units were the principal contributions until the mid-50's (see Parente, 1994a for proper citations). A substantial geologic advance came in the 60's with the field work associated with the preparation of the geologic map of Italy 1:100,000 and subsequent publication of a large set of papers (Luperto, 1962; Alvino, 1964; Martinis, 1962, 1967, 1970; Rossi, 1966, 1968, 1969a, b; Nardin & Rossi, 1966; Largaiolli et al., 1966; Rossi & Ungaro, 1969). A better subdivision of Eocene to Oligocene terrains was recognized, but the really important dispute was between Martinis (1962, 1967, 1970) and the geologists of Ferrara University (Largaiolli et al., 1966; Rossi, 1966, 1968, 1969a, b; Nardin & Rossi, 1966). According to Martinis, many lateral contacts between different formations were mainly tectonic in origin, whereas according to the Ferrara group the same contacts were largely stratigraphic, i.e. old coastal onlaps.

Then we come to the contributions of the last ten years. Bossio et al. (1989) defined in detail the Neogene stratigraphy of the platform top; F. R. Bosellini & Russo (1992) first described the Oligocene Castro Limestone reef complex, defining age, facies and depositional geometries and recognizing for the first time the occurrence of clinostratifications. Parente (1994a) revised the stratigraphy of the Upper Cretaceous to Oligocene succession. Bosellini (1993) and Bosellini & Parente (1994) first described particular stratigraphic relationships along the Salento coast, pointing to the presence of large erosional features and recognizing that the eastern margin of the Late Cretaceous-Tertiary Apulia Platform was roughly positioned along the present Salento coastline.

The various geologic maps of the Salento eastern coast published so far (sheets "Otranto" and "S. Maria di Leuca" of Carta Geologica d'Italia; Bossio et al., 1986, 1997; Ciaranfi et al., 1992) appear inadequate for the purposes of this report.

The stratigraphic succession.

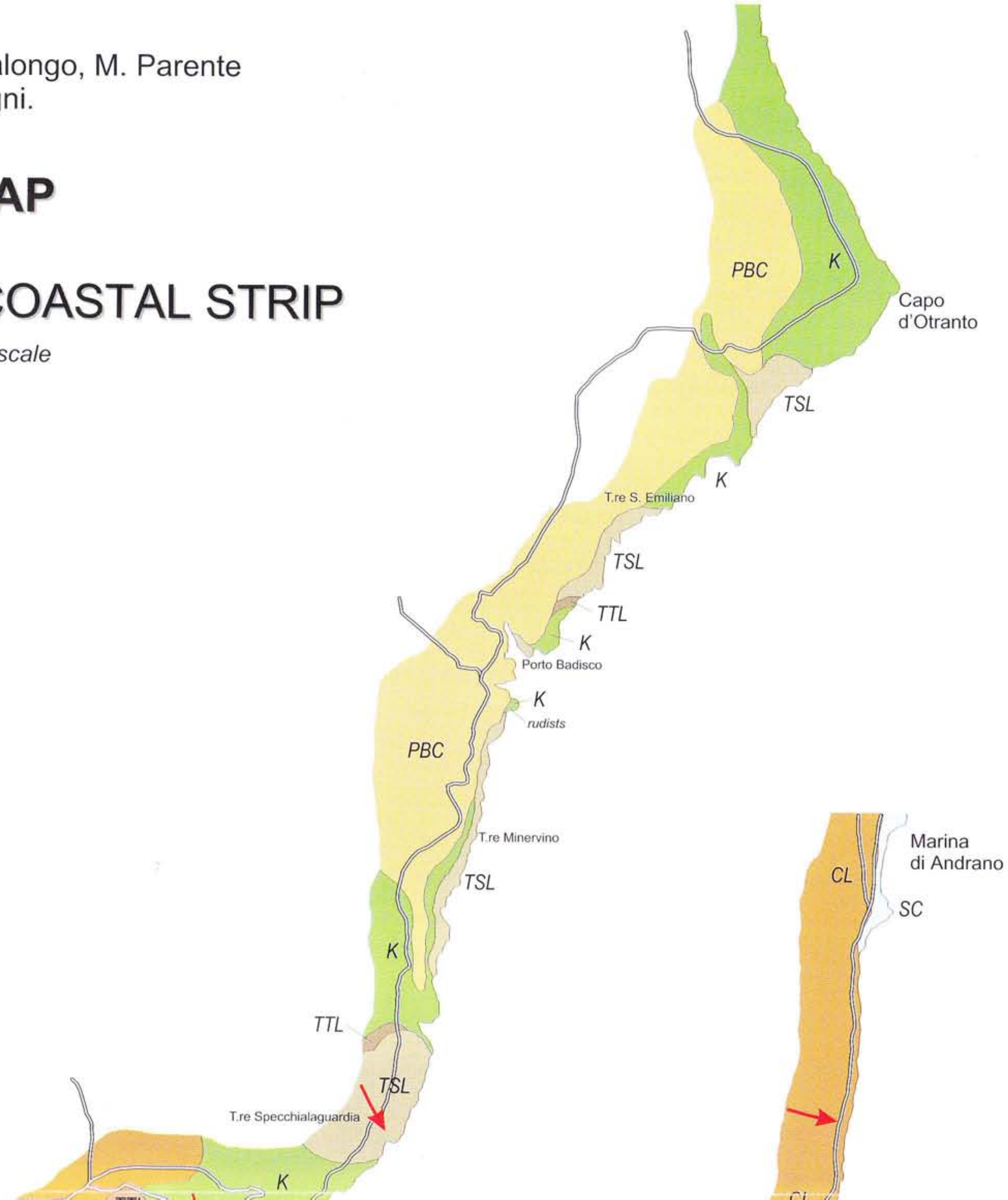
In this section we briefly describe, in chronologic order, the various lithostratigraphic units outcropping

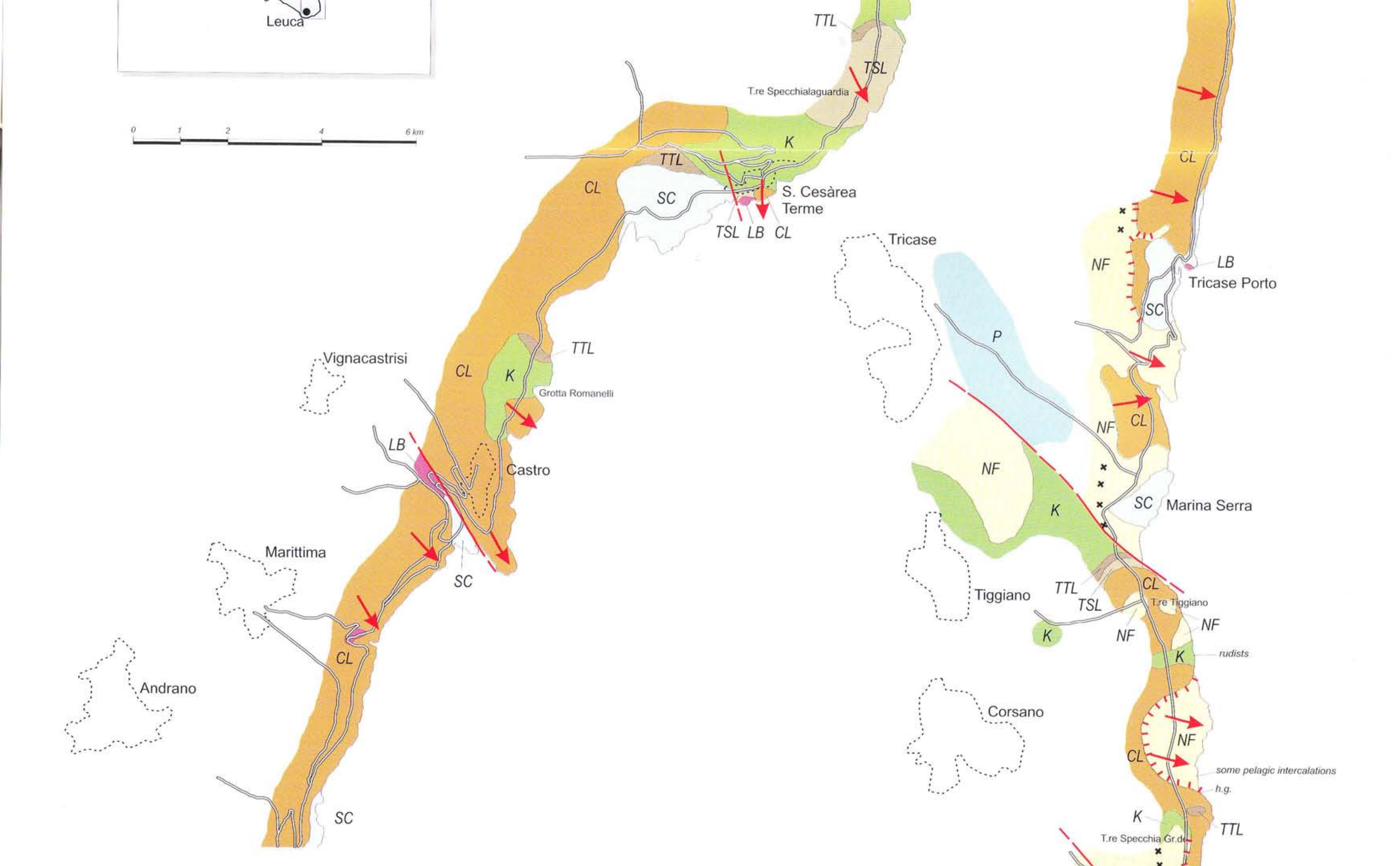
Fig. 1 - Geologic map of the eastern coastal strip of the Salento Peninsula.

A. Bosellini, F. R. Bosellini, M. L. Colalongo, M. Parente
A. Russo & A. Vescogni.

GEOLOGIC MAP of THE EASTERN SALENTO COASTAL STRIP

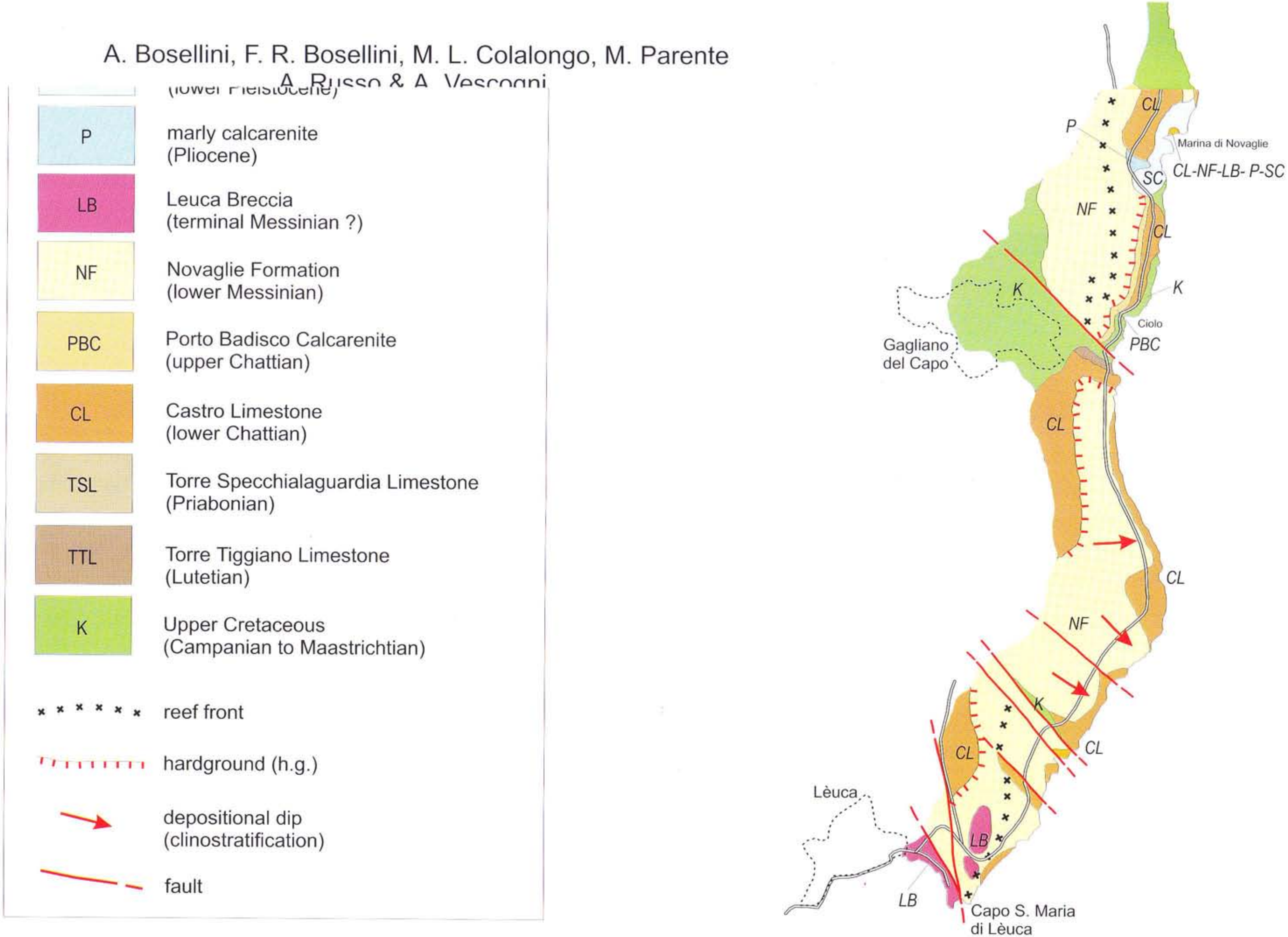
Original mapping at 1:10,000 scale





LEGENDA

SC	Salento Calcarenite


(lower Pleistocene)
P
marly calcarenite (Pliocene)
LB
Leuca Breccia (terminal Messinian ?)
NF
Novaglie Formation (lower Messinian)
PBC
Porto Badisco Calcarenite (upper Chattian)
CL
Castro Limestone (lower Chattian)
TSL
Torre Specchialaguardia Limestone (Priabonian)
TTL
Torre Tiggiano Limestone (Lutetian)
K
Upper Cretaceous (Campanian to Maastrichtian)
reef front
hardground (h.g.)
depositional dip (clinostratification)
fault
Marina di Novaglie
CL-NF-LB- P-SC
SC
P
NF
CL
K
Ciolo
PBC
Gagliano del Capo
Lèuca
LB
Capo S. Maria di Lèuca

Lithostratigraphic unit	Age
Salento Calcarenite	lower Pleistocene
Uggiano La Chiesa Formation	middle Pliocene
Trubi	lower Pliocene
Leuca Breccia	terminal Messinian ?
Andrano Calc. / Novaglie Fm	lower Messinian
Pietra Leccese	lower Messinian – upper Burdigalian
Porto Badisco Calcarenite	upper Chattian
Castro Limestone	lower Chattian
Torre Specchialaguardia Limestone	Priabonian
Torre Tiggiano Limestone	Lutetian - Bartonian
Melissano Lm / S.Cesarea Lm / Ciolo Lm	UPPER CREATACEOUS (Campanian - Maastrichtian)

Fig. 2 - Lithostratigraphic units outcropping on the eastern Salento Peninsula.

along the eastern coast of the Salento Peninsula (Fig. 2). For a more detailed description of the Cretaceous to Oligocene terrains see F. R. Bosellini & Russo (1992, 1994), Parente (1994a), F. R. Bosellini & Perrin (1994), and Bosellini & Parente (1994). For the Miocene and younger formations of the platform top see Bossio et al. (1989, 1991, 1994). Although the occurrence of a Miocene reef has been recently reported (Bosellini, 1993), a general description of this unit (reef core and reef slope succession) is presented here for the first time. Detailed studies on reef facies and coral associations are in progress.

The Cretaceous "basement".

It is well known that only Upper Cretaceous sediments are cropping out south of the Ostuni-Carovigno zone, including the whole of the Salento Peninsula (see for example the geologic map in Ciaranfi et al., 1992). Here, as pointed out in the introduction, the Upper Cretaceous is entirely of shallow-water facies, from platform interior to high-energy margin; no slope or basinal facies have been recognized along the Salento coast.

The Upper Cretaceous of Apulia has been formally designated as the Altamura Limestone (Valduga, 1965; Azzaroli, 1967), but the equivalent succession has been called the Melissano Limestone in the Salento Peninsula (Martinis, 1967; see discussion in Reina & Luperto Sinni, 1994). In the Salento, however, the Cretaceous is represented by a variety of lithostratigraphic units. The following description is largely taken from Parente (1994a) and Bosellini & Parente (1994).

- Melissano Limestone (Turonian? to early Campanian). It is represented by meter-scale peritidal cycles, with abundant and thick stromatolites. The railroad cut of the Melissano station, proposed by Martinis (1967) as the type-section of the Melissano Limestone, has been studied recently by Cestari & Sirna (1987) and Reina & Luperto Sinni (1993a). A Campanian age has been proposed by Reina & Luperto Sinni (1993a) for the presence of the benthic foraminifer *Murciella cuvillieri*.

Spectacular outcrops of peritidal cycles of the platform interior occur along the coastal road, west of S. Maria di Leuca (Bosellini & Parente, 1994) (Fig. 3A). From the presence of badly preserved specimens of *Rhapydionina liburnica*, these facies can be correlated with those exposed near Veglie (Ricchetti, 1972) and along the western coast of the Salento Peninsula (Reina & Luperto Sinni, 1994).

- S. Cesarea Limestone (late Campanian-early Maastrichtian). This unit is still represented by a peritidal succession, but inter-supratidal microbial laminites are thin and rare. On the other hand, discontinuous concentrations (storm layers) of rudist fragments and bioclastic grainstone are quite common (Bosellini & Parente, 1994). The type outcrop of this facies is north of S. Cesarea Terme, along the coastal road.

Spectacular monospecific associations of radiolitids in growth position occur on some rocky shores. The best locality is near Porto Badisco, but other good outcrops occur near Torre S. Emiliano and at the rocky shore east of Torre Tiggiano.

The rudist fauna of the limestones cropping out north of S. Cesarea Terme, studied by Cestari & Sirna (1987), points to a late Campanian-Maastrichtian age.

- Ciolo Limestone (Maastrichtian). This very characteristic and easily recognizable facies is represented by very coarse bioclastic calcarenites and calcirudites (Fig. 3B), commonly with parallel and, locally, oblique lamination; clasts consist of rudist fragments, orbitoids and other larger foraminifers, corals, bryozoans and calcareous algae. Typical localities include the Ciolo cove, the road cuts near Torre Tiggiano and the sea cliffs of Capo d'Otranto. The larger foraminifers association, consisting of *Orbitoides apiculata*, *Omphalocyclus macroporus*, *Siderolites calcitrapoides* and *Lepidorbitoides socialis*, points to a Maastrichtian age (*Orbitoides apiculata* zone of Van Hinte, 1976) and most probably to the late Maastrichtian (*Lepidorbitoides socialis* zone of Van Gorsel, 1978). This age is supported also by the presence

Fig. 3 - Facies of the Cretaceous succession. A) Peritidal cycles with thick stromatolitic layers (Melissano Limestone; coastal cliff west of Leuca); B) grossly laminated calcirudite rich in rudist fragments, larger foraminifers, corals and calcareous algae (Ciolo Limestone; Capo d'Otranto).

of rare specimens of *Contusotruncana contusa*. The rudist fauna of the Ciolo cove has been studied by Pons & Sirna (1994) and by Laviano (1996). The presence of *Hippurites cornucopiae* confirms a Maastrichtian age. Algal assemblages of the Ciolo Limestone consist of Corallinaceae, Peyssonneliaceae and Dasycladales. The rich dasycladacean association has been recently described by Parente (1994b, 1997).

Torre Tiggiano Limestone (Middle Eocene).

First recognized by F.R. Bosellini & Russo (1992) and subsequently described and designated as Torre Tiggiano Limestone (Parente, 1994a), the Lutetian-Bartonian limestones are very discontinuous and scanty along the coast (maximum inferred thickness is 10-15 m). They consist of parallel laminated grainstone (large scale crossbedding is locally present), very rich in alveolinids and nummulitids (Parente, 1994a), often with a characteristic light brown color. Alveolinids, nummulitids and other benthic foraminifers are very common. Calcareous algae consist of *Corallinaceae* (*Sporolithon* sp. and *Lithoporella* sp.), *Peyssonneliaceae* and *Dasycladales* (*Cymopolia zitteli*, *Jodotella* sp. and *Pseudocymopolia* sp.). Typical outcrops of the Torre Tiggiano Limestone occur in the roadcut north of Torre Tiggiano, near Torre di Specchia Grande (km 38.6 of the coastal road), north of Ciolo cove (F.R. Bosellini & Russo, 1992), in a roadcut west of S. Cesarea Terme on the road to Vitigliano (F.R. Bosellini et al. 1993) and along the coast from S. Cesarea Terme to Torre S. Emiliano, 2 km south of Capo d'Otranto. These outcrops are the erosional remnants of a more complete Middle Eocene succession that most probably originally comprised more than one depositional sequence. At Torre Tiggiano two depositional sequences are separated by an erosional unconformity. The lower unit, about 7 m thick, contains *Alveolina callosa*, *Alveolina tenuis* and *Assilina spira abrardi*. This association can be referred to the early Lutetian (SBZ 13 of Serra Kiel et al., 1998). The upper unit, about 1.5 m thick, contains nummulitids suggesting a Bartonian age (C. Papazzoni, personal communication). In the roadcut west of S. Cesarea Terme, the presence of *Alveolina fusiformis* points to the early Bartonian (SBZ 17 of Serra Kiel et al., 1998).

The boundary between the Torre Tiggiano Limestone and the underlying Upper Cretaceous is unconformable and clearly erosional. Locally, the *Alveolina*

Fig. 4 - Clinostratified Priabonian foreslope (P) mantles discordantly the underlying subhorizontal Upper Cretaceous shelf limestones (K).

calcarenites fill and onlap a pronounced relief of the Cretaceous substratum. Reddish or greenish mineralized surfaces (hardgrounds) separate the Eocene limestone from the overlying units (Priabonian or Oligocene). As deposits of the Torre Tiggiano Limestone occur scattered from Capo d'Otranto almost to Capo S. Maria di Leuca (a huge block occurs in the Leuca Megabreccia, in the port of Tricase Porto), it is reasonable to infer that originally, during the Middle Eocene, a continuous belt of carbonate sands was present more or less along the present day coastal strip.

Torre Specchialaguardia Limestone (Priabonian).

Recognized and described by Parente (1994a), this unit also occurs discontinuously along the Salento coastal strip. The two main outcrops are in a roadcut north of Torre Tiggiano and north of S. Cesarea Terme (at km 13.5 of the coastal road). The Torre Specchialaguardia Limestone overlies with angular unconformity both Cretaceous and Middle Eocene units and consists of breccias and bioclastic sediments; it represents a steep forereef slope onlapping a rocky Cretaceous or Eocene paleocliff (Fig. 4). Priabonian clinostratifications, rich in coral fragments, are particularly manifest near Torre Specchialaguardia and below Torre S. Emiliano. The presence of *Asterocyclina priabonensis* and *Heterostegina gracilis* points to the late Priabonian (SBZ 20 of Serra Kiel et al., 1998). Calcareous algae are represented by Corallinaceae (*Sporolithon* sp. and *Lithothamnion* sp.), *Dasycladales* (*Cymopolia zitteli*, *Neomeris* sp. and *Acicularia* sp.) and *Halimeda* sp.

Castro Limestone (lower Chattian).

Lithology, facies distribution and coral assemblages of the Castro Limestone have been recently described by F. R. Bosellini & Russo (1992). This unit, widely outcropping between Capo d'Otranto and S. Maria di Leuca, represents a fringing reef complex and shows a very well preserved lateral zonation of the reef subenvironments and associated facies (back reef, reef flat, reef crest, reef front and reef slope) (F. R. Bosellini & Russo, 1992, 1994; F. R. Bosellini & Perrin, 1994). The coral fauna is highly diversified, being composed of about 50 zooxanthellate species (F. R. Bosellini, in prep.).

The benthic foraminiferal associations in the Castro Limestone are characterized by *Lepidocyclina (Nephrolepidina) praemarginata*, *Lepidocyclina (Eulepidina) dilatata*, *Heterostegina assilinoides*, *Operculina complanata*, *Spiroclypeus* sp, *Austrotrillina asmariensis*, *Neorotalia viennoti*, *Sphaerogypsina* sp. and *Planorbulina* sp. The co-occurrence of quite evolute populations of *Lepidocyclina (Nephrolepidina) praemarginata* and *Lepidocyclina (Eulepidina) dilatata* and the absence of *Miogypsinoides* is indicative of the *Cycloclypeus* zone of Drooger & Laagland (1986) corresponding to the SBZ

Fig. 5 - Rhodolite accumulation at the base of the Porto Badisco Calcarenite (Porto Badisco cove).

22B in the more recent scheme of Cahuzac & Poignant (1997). According to Drooger & Laagland (1986), this zone is middle Chattian in age and correlates with the lower part of the *Globigerina ciperoensis* zone (P22). This would agree with the occurrence in the Castro Limestone of planktic foraminifers of the P22 zone reported by F.R. Bosellini & Russo (1992). However, following Laagland (1990) and Cahuzac & Poignant (1997), larger foraminiferal assemblages of the SBZ 22B correlate with the upper part of the P21 zone (early Chattian). Calcareous algae are represented by Corallinaceae (*Sporolithon*, *Lithothamnion* and *Mesophyllum*) and Peyssonneliaceae.

The Castro Limestone disconformably overlies the older units (Cretaceous, Middle or Upper Eocene).

Porto Badisco Calcarenite (upper Chattian).

The Porto Badisco Calcarenite is constituted by poorly cemented bioclastic calcarenites with a maximum thickness of 50-60 m in the area of Porto Badisco, where it appears to infill a paleodepression (Nardin & Rossi, 1966). The base, everywhere erosional, is characterized by a 1-2 m thick horizon rich in rhodolites (Fig. 5). South of Porto Badisco cove, the Upper Oligocene calcarenites rest with a sharp angular unconformity on the upper Campanian S.Cesarea Limestone. Scattered outcrops testify to the original distribution of the Porto Badisco Calcarenite from Capo d'Otranto as far as the Ciolo cove to the south (F.R. Bosellini & Russo, 1992). Its attitude is horizontal, onlapping the underlying formations and paleomorphologies as described in detail by Nardin & Rossi (1966).

A thin (35 m) lagoonal to lacustrine section of Chattian age, cropping out near Galatone (Esu et al., 1994), is the only remnant of a probably Upper Oligocene cover of the interior of the Salento area. The lower part of this section (shallow marine to intertidal) may correspond to a back reef setting of the Castro Limestone, whereas the upper part (lacustrine) may correlate with the Porto Badisco Calcarenite. The two facies are separated by an exposure surface (Esu et al., 1994).

Associations of larger foraminifers in the Porto Badisco Calcarenite consist of *Lepidocyclina (Eulepidina) dilatata*, *Lepidocyclina (Nephrolepidina) morgani*, *Miogypsina (Miogypsinoides)* ex. interc. *complanata-formosensis*, *Neorotalia viennoti*, *Operculina complanata*, *Heterostegina* sp., *Amphistegina* sp., *Austrotrillina* sp.. These associations can be referred to the late Chattian *Miogypsinoides* zone of Drooger & Laagland (1986), corresponding to the SBZ 23 of Cahuzac & Poignant (1997).

The Miocene formations.

According to previous authors (Giannelli et al., 1965, 1966; Rossi, 1969; Martinis, 1970; Bossio et al., 1989, 1994; Mazzei, 1994), the Miocene of the Salento Peninsula is represented by two only formations, the Pietra leccese and the Andrano Calcarenite. However, as discussed later, this is true only for the platform interior.

- *Pietra leccese* (late Burdigalian-early Messinian). This formation, well known for its rich fossil content and quarried as building stone since ancient times, is a characteristic carbonate unit of the middle of the Salento Peninsula. Near Lecce and Maglie, the most classic localities, the Pietra leccese reaches its maximum thickness (30 m). It consists of a yellowish, soft and friable biomicrite with planktonic foraminifers and nannofossils (Mazzei, 1994), rich in phosphatic and glauconitic

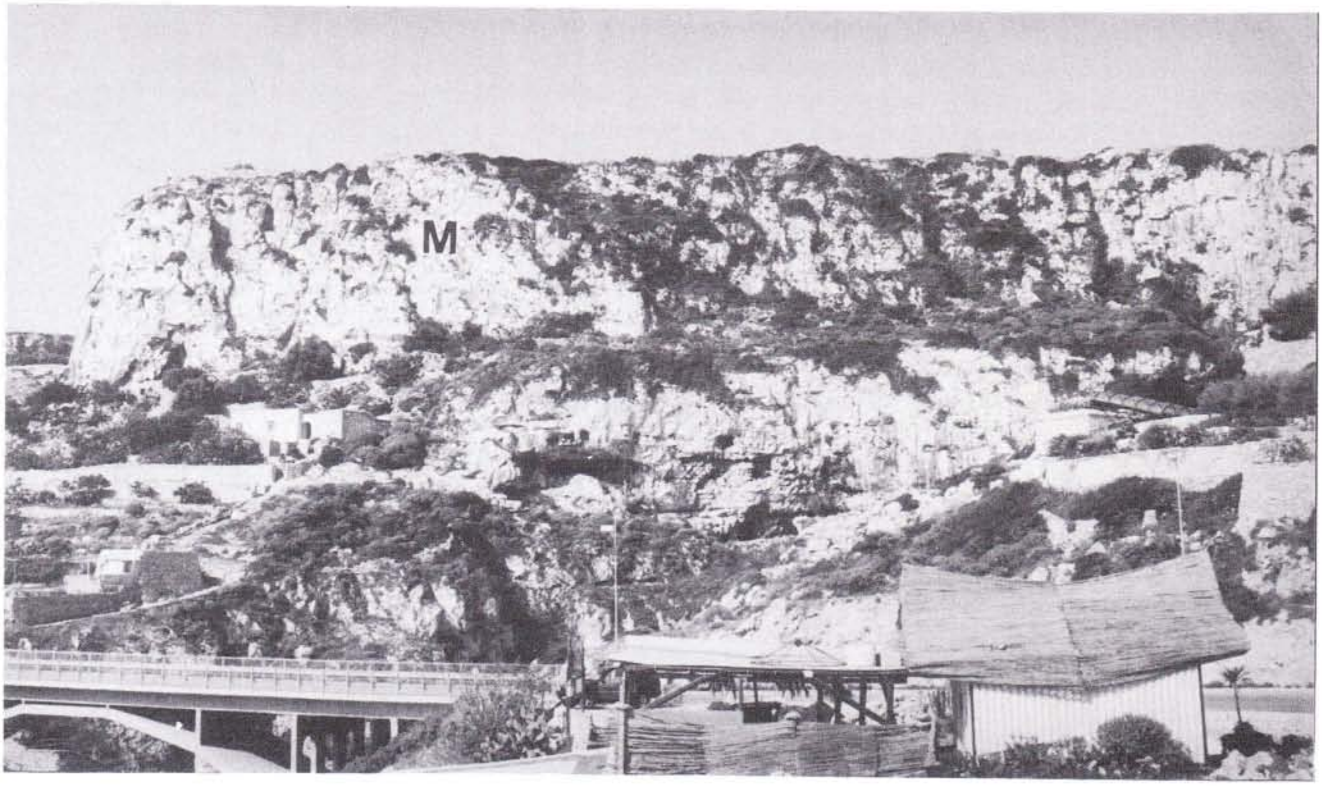


Fig. 6 - The Messinian reef (M) at Ciolo cove.

grains. The Pietra leccese lies unconformably on different Paleogene and Cretaceous strata. On the eastern margin of the platform, the Pietra leccese is extremely thin or missing; it is represented in many places by a characteristic layer ("livello ad *Aturia*"; Giannelli et al., 1965, 1966), a 10-30 cm thick reddish-brown or greenish-brown hardground, containing some phosphatized pebbles (a beautiful conglomerate with head-size cobbles is associated with the hardground on the rocky shore south of Torre Specchia Grande) from the underlying units, and rich in fossils (planktonic foraminifers, fish teeth, cephalopods, solitary corals, etc.).

- *Andrano Calcarenite* (early Messinian). This unit, named by Martinis (1967), is a carbonate succession widely exposed on the eastern half of the peninsula (sheets "Gallipoli" and "Capo S. Maria di Leuca" of Carta Geologica d'Italia 1:100,000; Bossio et al., 1994), with a maximum thickness of 50-60 m. It was deposited on a shallow shelf, behind a reefal margin (Bosellini, 1993). An instructive section occurs in the roadcut of the new highway east of Tricase, where marlstone, shelly storm-layers, coral banks and crossbedded oolitic calcarenites are present. The age of the Andrano Calcarenite, early Messinian, has been determined by several micropaleontological studies (Bossio et al., 1989; Bossio et al., 1994) based mainly on planktonic foraminifers, ostracods and nannofossil associations.

According to Bossio et al. (1989, 1991), the Pietra leccese and the Andrano Calcarenite constitute two different sedimentary cycles only in the Leuca area. For the rest of the peninsula, the two formations should constitute a single cycle.

Stepping forward from the published literature, in the last six years our field work has revealed that a classic Messinian reef tract was present along the margin of the platform (Bosellini, 1993). Today this unit is preserved from north of Tricase Porto as far as Capo S. Maria di Leuca, for a total lenght of about 17 km. Outcrops are limited and not continuous, but the reef is well preserved in several localities (Marina Guardiola, Ciolo cove, Capo S. Maria di Leuca, for example) (Fig. 6). However, the adjacent forereef slope is almost continuous and widely exposed, and constitutes 70-80% of the rocky cliffs from Tricase Porto to Capo S.Maria di Leuca (Fig. 7) (see also geologic map, Fig. 1).

It becomes clear at this point that a new formational terminology is needed: we cannot use the same name (Andrano Calcarenite) for shelf carbonate sands, coral reef, clinostratified breccias and associated prograding slope and base-of-slope sediments. We therefore propose to designate the reefal tract (reef proper and associated clinostratified slope) as *Novaglie Formation* (Novaglie is a coastal locality where the Messinian reefal sediments crop out extensively) and to keep it separate from the shelf carbonates of the Andrano Calcarenite.

- *Novaglie Formation* (early Messinian). It consists of a discontinuous (original?) reef tract and associ-

Fig. 7 - Clinostratified forereef slope of the lower Messinian Novaglie Formation (about 1km north of Capo S. Maria di Leuca).

ated forereef slope, for a total preserved length of 17-18 km. A spectacular outcrop of the reef front and core is along the roadcut (now protected with a net) of the new road connecting the coast to Gagliano del Capo (Bosellini, 1993). It is also present along the rim of the plateau west of Novaglie and below the lighthouse of Capo S. Maria di Leuca.

Detailed sampling has been carried out in several outcrops, and the age of this unit is confirmed as being early Messinian, the same as the Andrano Calcarenite. In particular, the foraminifer association found in many reef core and reef slope sections seems highly specialized and mainly consituted by *Bulimina echinata* and *Brizalina dentellata*; this allows the identification of the *Bulimina echinata* zone. In fact, the base of the *B. echinata* zone occurs just after the *Globigerina conomiozea* FAD (Colalongo et al., 1979) and this is commonly considered a reliable biostratigraphic datum for recognizing the early Messinian on the basis of benthic foraminifers in the Mediterranean basin. As regards ostracods, several reef sections revealed the association of some typical "Sahelian" taxa such as *Pokornyella italica*, *Pokornyella devians*, *Aurila* (*Albaurila*) *albicans*, *Arutella saheliensis*, and *Aurila subtilis* (Ruggieri et al., 1977; Bonaduce et al., 1992), confirming an early Messinian age.

The reef of the Novaglie Formation can be considered a typical monogeneric Messinian reef, mostly characterized by *Porites* colonies (type B of Esteban, 1979, 1996) (Fig. 8).

In general, the reef framework is constituted of Porites (40% in average), with laminar and massive-globular colonies in the shallower part of the reef front and columnar/branching morphs towards the reef slope. Secondary framebuilders are abundant vermetids, serpulids and algal crusts, commonly coating sticks and massive coral colonies, together with encrusting foraminifers and microbialite crusts. Generally, the reef sediment is a coarse, shelly calcarenite (60%) rich in benthic foraminifers, ostracods, fragments of coralline algae, molluscs etc.

Scattered vermetid-serpulid banks colonize the shallowest part of the reef margin (Leuca, plateau east of Corsano, northwest of Porto Tricase). These organisms form discontinuous "trottoirs", about 20 m wide and 70 cm thick, that can be traced for at least 100 metres. Bryozoans, coralline algae and benthic foraminifers are also abundant. Microbialite crusts are common.

The reef slope proper is typically clinostratified (20°-30°) (Fig. 7) and preserved for a total height of 120-130 m. At Funnu Voiere, on the sea shore, the clinostratifications flatten out and the breccia layers are interbedded with white pelagic chalks (Fig. 9), but clear

Fig. 8 - Reef front of the Messinian reef: *Porites* in growth position (lighthouse of Capo S. Maria di Leuca).

basinal sediments have never been observed. For this reason, the slope could have been a little higher (about 150 m).

A synthetic profile of the slope consists of the following facies, starting from the top of the slope (Fig. 10):

- a megabreccia with reworked colonies and fragments of *Porites* (coastal road south of Ciolo cove; on the new road Novaglie - Alessano the breccia is constituted of *Porites* branches). Among the megabreccia blocks, a bioclastic rudstone with large numbers of bivalves and serpulids is present. At some places, the megabreccia layers are separated and mantled by white lime mudstones and associated with bioclastic calcarenites; 30 m thick. Locally, several laminar-dish colonies of Porites are in growth position.

- clinostratified *Halimeda* limestone layers, associated with various kinds of bioclastic calcarenites (bivalves, rhodolites); 50 m thick. Locally, a few *in-situ Halimeda* banks are present.

- a sandy (coarse calcarenite) apron with breccia layers, truncation surfaces (slumps) and some pelagic intercalations; 60-70 m thick. In places, these sediments alternate with layers rich in isooriented vermetids (Fig. 11 A).

The lower boundary of the Novaglie Formation is everywhere erosional and unconformable on different pre-Miocene units, generally the Castro Limestone but, locally, also the Porto Badisco Calcarenite (Ciolo cove) and the Cretaceous (Torre Tiggiano, Torre Specchia grande). The basal contact is generally, but not everywhere, characterized by the 10-50-cm-thick phosphatic hardground of the "livello ad Aturia"; this hardground can be present both on the platform top (south of Gagliano del Capo) as well as on the slope and base-of-slope (rocky shore east of Funno Voiere). The basal part of the Novaglie Formation is generally characterized by thin vermetid banks, associated with barnacles (Fig. 11) (Chiesa dell'Ascensione at La Serra, Novaglie, km 45 of the coastal road, etc.) and the rocky substratum is extensively bored (Novaglie harbour).

Pliocene.

According to Bossio et al. (1989,1991, 1994), the Pliocene of the Salento Peninsula is represented by two formations, the Leuca Formation and the Uggiano la Chiesa Formation.

- *Leuca Formation* (lower Pliocene). It lies disconformably on different Cretaceous to Miocene strata and consists of a lower breccia/conglomerate member (Fig. 12) and an upper marly unit (glauconitic at the top), rich in planktonic foraminifers (*Globorotalia* ex gr. *crassaformis* zone). Maximum thickness is on the order of 30 m. Between the lower conglomerate and the upper marly unit there is everywhere a hiatus (Bossio et al., 1991).

- *Uggiano la Chiesa Formation* (middle Pliocene). This unit, quite thin (normally 2-3 m, but near Poggiardo it can be as much as 50 m), consists of yellowish and friable calcarenite rich in bivalves, red algae, bryozoans, etc.; it lies unconformably on the Leuca Formation and locally on older formations, and starts with a basal breccia/conglomerate.

We have serious reservations about the nomenclature and the stratigraphic significance of the so-called Leuca Formation. First of all, it seems quite anomalous to consider it as one formation composed of two completely different lithologic units - a polymictic breccia (with carbonate clasts of various age) and a marlstone rich in planktic foraminifers - everywhere separated by a hiatus. Moreover, we have found that shelf marly calcarenites of Early Pliocene age (*Globorotalia puncticulata* zone) infill a large part of the "Tricase gulf", onlapping to the south against the faulted Cretaceous limestone and to the north on the Oligo-Miocene strata. For the origin of the Leuca Breccia, no explanation has been proposed so far. Considering its stratigraphic position, its sedimentological character and relationships with

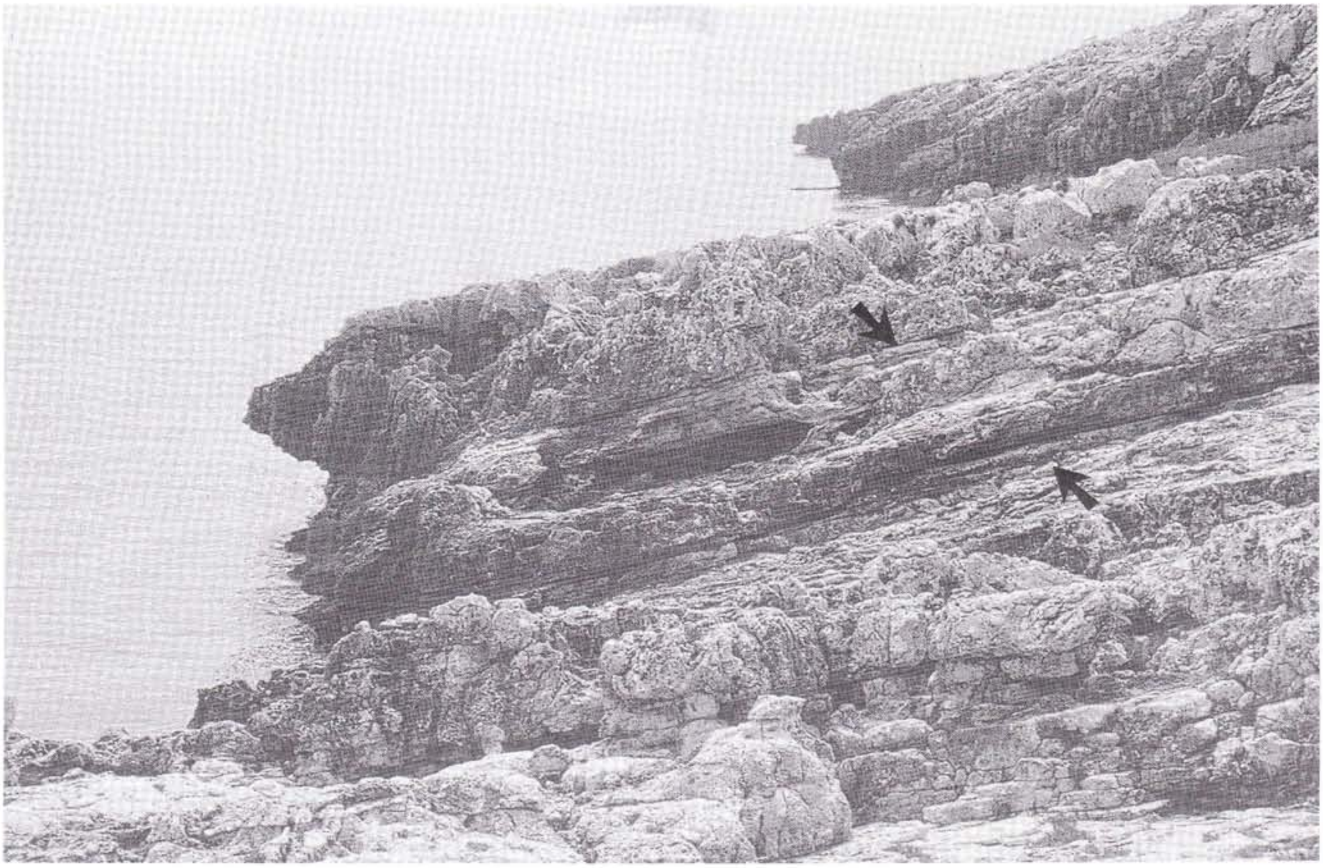


Fig. 9 - Lower forereef slope of the Novaglie Formation. Thin basinal (chalk) intercalations indicated by arrows (Funno Voiere).

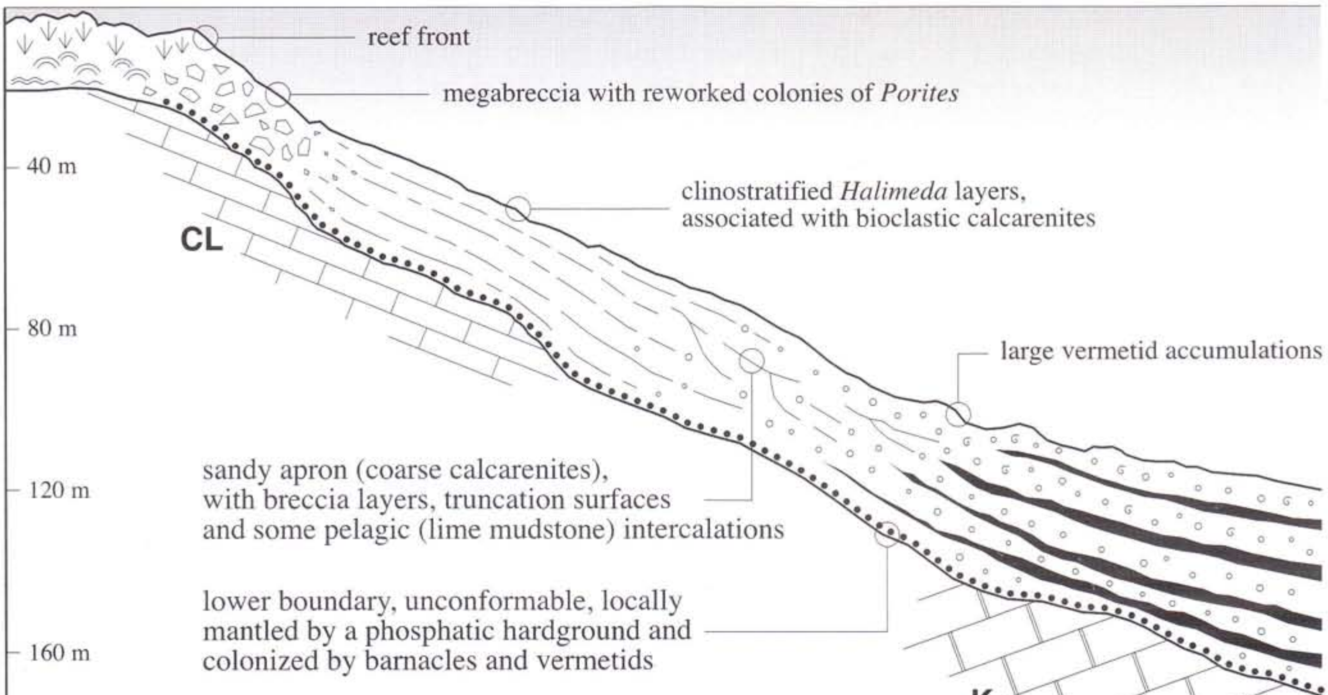


Fig. 10 - Synthetic profile of the Messinian forereef slope. CL, Castro Limestone; K, Cretaceous limestone.

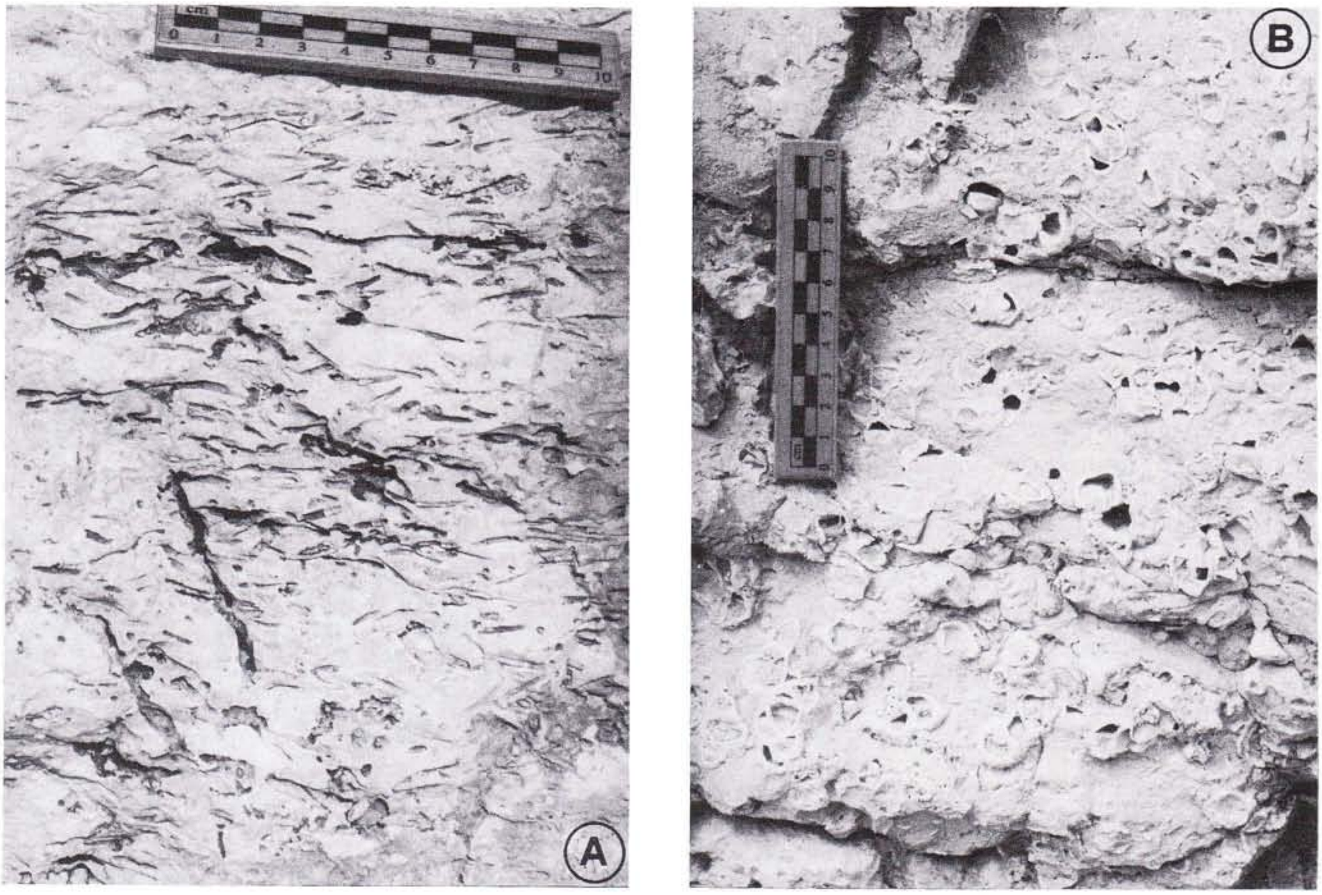


Fig. 11 - Characteristic facies at the base of the Novaglie Formation. A) isooriented vermetids; B) barnacles.

underlying and overlying units, we suggest that the Leuca Breccia (type locality at Punta Ristola, Leuca town; Bossio et al., 1989) (Fig. 12A) represents a terminal Messinian lowstand deposit associated with the Mediterranean salinity crisis and that it is derived from the subaerial dismantling of the exposed Salento ridge. The following Early Pliocene marlstones, rich in planktic foraminifers are equivalent to and correlatable with the well known Trubi Formation of Sicily and are the result of the general post-Messinian flooding of the Mediterranean basins.

Salento Calcarenite (lower Pleistocene).

The Salento Calcarenite is a coarse, friable calcarenite rich in bivalves, brachiopods, red algae etc., and is strongly bioturbated with large burrow "tubes". According to Bossio et al. (1989) the Salento Calcarenite is early Pleistocene in age; it lies unconformably on older units and occurs in two different structural-geographic settings: the rocky shore and inland depressions. Maximum inferred original thickness was probably on the order of 60-70 m. The Salento Calcarenite crops out discontinuously along the eastern shore of the peninsula; typical localities include Porto Miggiano-S. Cesarea Terme, Castro harbour, Marina di Andrano, Tricase Porto, Marina Serra, Novaglie harbour and Leuca. Along the shore, the Salento Calcarenite shows large-scale festoon cross-bedding; generally less than 10 m thick. It onlaps discordantly various rock units of Cretaceous, Oligocene and Miocene age.

The stratigraphic architecture.

The various lithostratigraphic units described in the preceding section are not simply superposed one upon the other, according to the classic layer-cake stratigraphy. On the contrary, they are reduced and very thin on the platform top (except the previously described outcrop of Oligocene near Galatone, the entire Paleogene section is missing), but more numerous and relatively thick on the margin and slope, i.e. on the east coast of the peninsula. The stratigraphic framework present on the coast is an intricate interlace of various carbonate units, most of them represented by slope sediments.

Platform top stratigraphy (Fig. 13). Above the Cretaceous succession (Melissano Limestone), which is ubiquitous on the Salento Peninsula, the oldest formation is the Pietra leccese (upper Burdigalian-lower

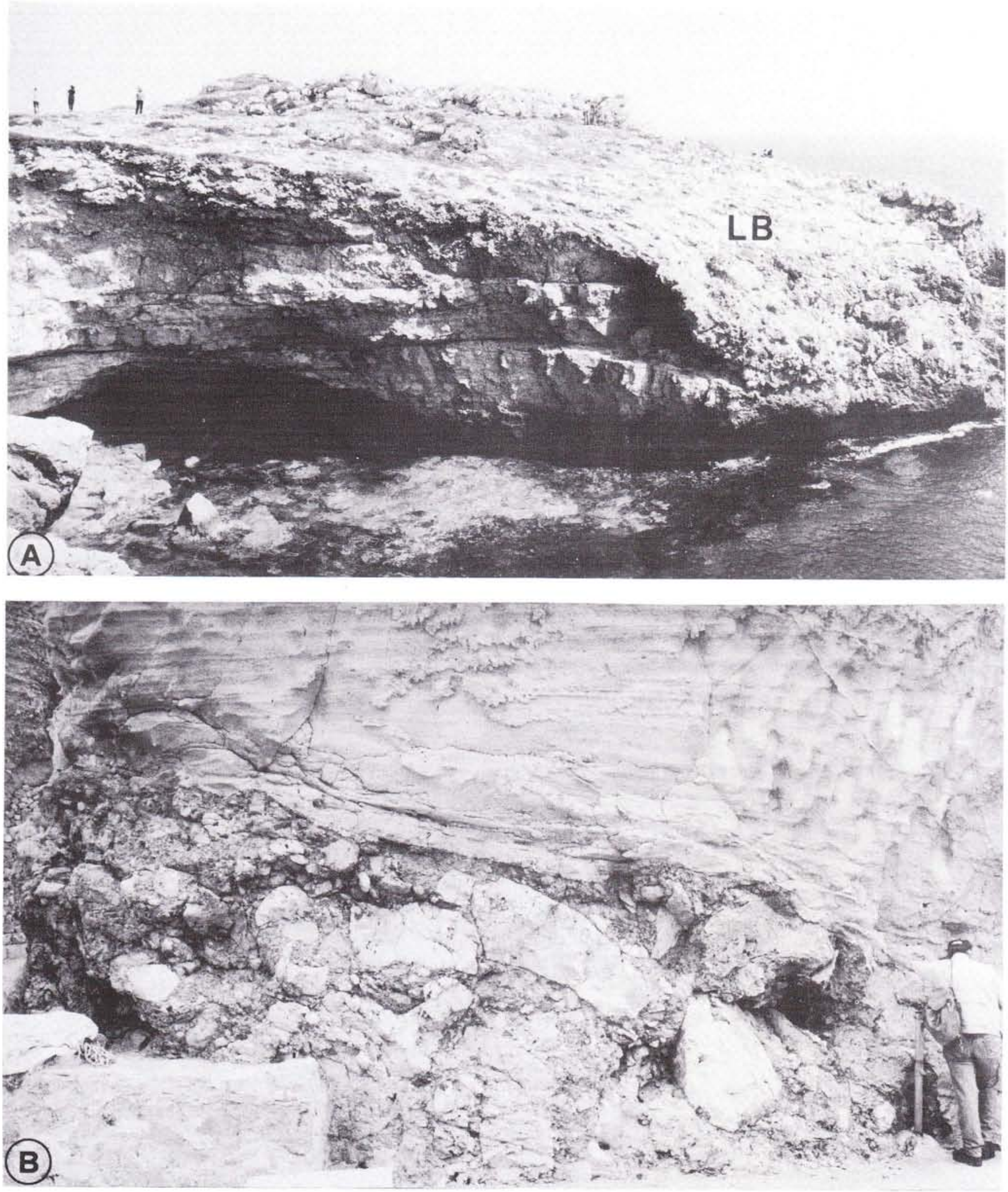


Fig. 12 - The Leuca Breccia. A) The breccia unconformably overlies the Andrano Calcarenite (Punta Ristola, Leuca); B) the breccia consists of lower Messinian megablocks with *Porites* and vermetids (Novaglie harbour).

Messinian), which to the south (Leuca, Gagliano del Capo, Tricase) is largely represented by a phosphoritic hardground and to the north (Lecce, Maglie) can reach a thickness of 30 m. Then follows the Andrano Calcarenite (lower Messinian), mainly cropping out on the eastern half of the peninsula with a maximum thickness of 50-60 m. This formation is unconformably followed by the Leuca Breccia, the Trubi Formation (maximum thickness 30 m) and the Uggiano la Chiesa Formation (normally 2-3 m thick). Finally, the lower Pleistocene

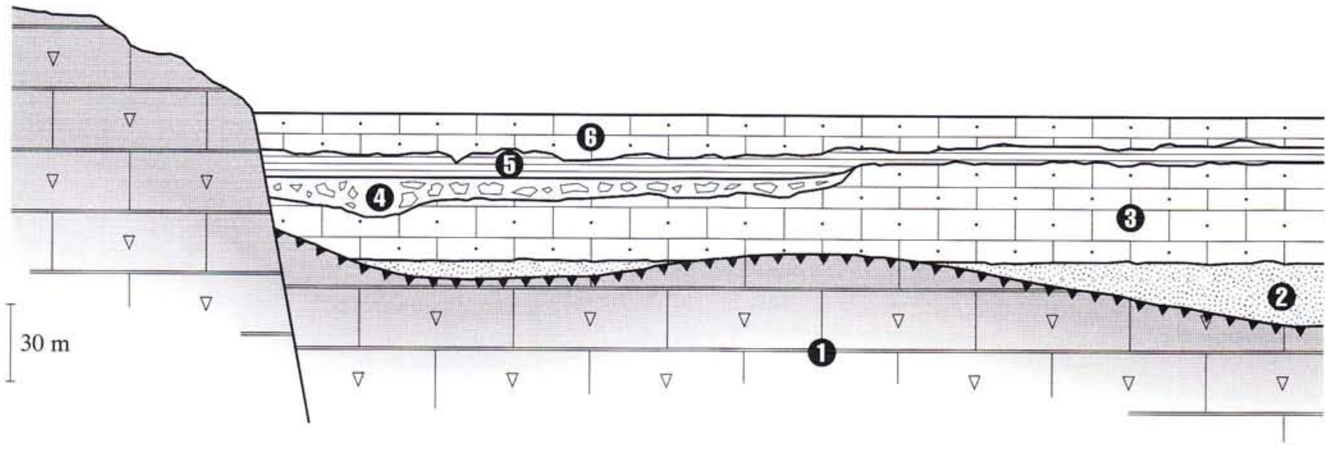


Fig. 13 - Schematic diagram showing platform top stratigraphy of the eastern Salento Peninsula.

Salento Calcarenite fills some tectonic depressions in the platform with thicknesses up to 30-40 m (Bossio et al., 1986, 1997). On the whole, the post-Cretaceous platform succession is punctuated by large lacunae and reaches a maximum aggregate thickness of 100-150 m; there is a great lateral variability of the formation thicknesses.

Platform margin-and-slope stratigraphy (Fig. 14). On the platform margin and slope, several carbonate systems lie laterally adjacent to each other and are grafted one upon the other but separated by erosion surfaces. These units can be missing in one place or reduced to 1-2 m only, whereas nearby a thick section can be present.

The oldest formations are the Cretaceous platform-margin facies (S. Cesarea Limestone, Ciolo Limestone) which are clearly tectonically tilted: in places they are horizontal, in other seaward (Ciolo cove) or landward (Porto Badisco) inclined. Then follows the Torre Tiggiano Limestone, a shallow-water, high-energy facies. It is very scanty and overlies an erosion surface carved on the Cretaceous. The Torre Tiggiano Limestone outcrops are very limited, but they cover a long coastal stretch, from Torre S. Emiliano (2 km south of Capo d'Otranto) to km 46 on the coastal road (2 km south of Ciolo cove). It is reasonable to infer an original continuous belt of the middle Eocene *Alveolina* limestone. No slope facies has been identified. The structural attitude of the Eocene limestone is similar to the Cretaceous one, even if the contact is strongly disconformable.

The next unit is the Priabonian Torre Specchialaguardia Limestone, a clastic wedge, clinostratified and onlapping in angular unconformity Cretaceous or Middle Eocene platform sediments (Fig. 4). No platform facies of Priabonian age has been recognized. The Torre Specchialaguardia Limestone is represented only by forereef slope facies, and it is the first unit not evidently tilted or tectonically deformed. According to Parente (1994a), its maximum preserved thickness is 76 m.

A major unconformity separates the Priabonian slope deposits from the Chattian Castro Limestone, which is widely exposed along the coast, especially in the S. Cesarea Terme - Tricase Porto tract. This unit covers a large spectrum of environments, including back reef, reef front and slope (F. R.Bosellini & Russo, 1992, 1994; F. R. Bosellini & Perrin, 1994). The maximum observed thickness, near Castro and Zinzulusa cave, is 80-100 m. The extension of the Castro Limestone outcrops suggests that the entire coastal strip, from Otranto to Leuca, was originally "colonized" by the Chattian reef. The next unit is the Porto Badisco Calcarenite, latest Chattian in age. A clear unconformity separates this younger unit from the underlying reefal limestone (whose upper surface is minutely bored) or older formations. The Porto Badisco Calcarenite is a temperate, sandy carbonate system onlapping and infilling the preexisting morphologic features. It is everywhere horizontal, starts with a spectacular rhodolite facies and infills an erosional depression in the Porto Badisco area (Nardin & Rossi, 1966; Matteucci & Parente, 1993), where it can reach a thickness of 50-60 m. Most probably, the Porto Badisco Calcarenite was also present along the entire Salento coastal strip, as today occurrences extend from Otranto (Punta Faci) to the Ciolo cove.

The Novaglie Formation, i.e. the lower Messinian reef complex, is the principal unit cropping out south of Tricase Porto (see geologic map). It mantles discordantly the underlying Cretaceous to Oligocene formations, which crop out in numerous stratigraphic "windows". The Messinian slope is commonly hosted in paleo-reentrants or paleo-embayments. In fact, the pre-Messinian

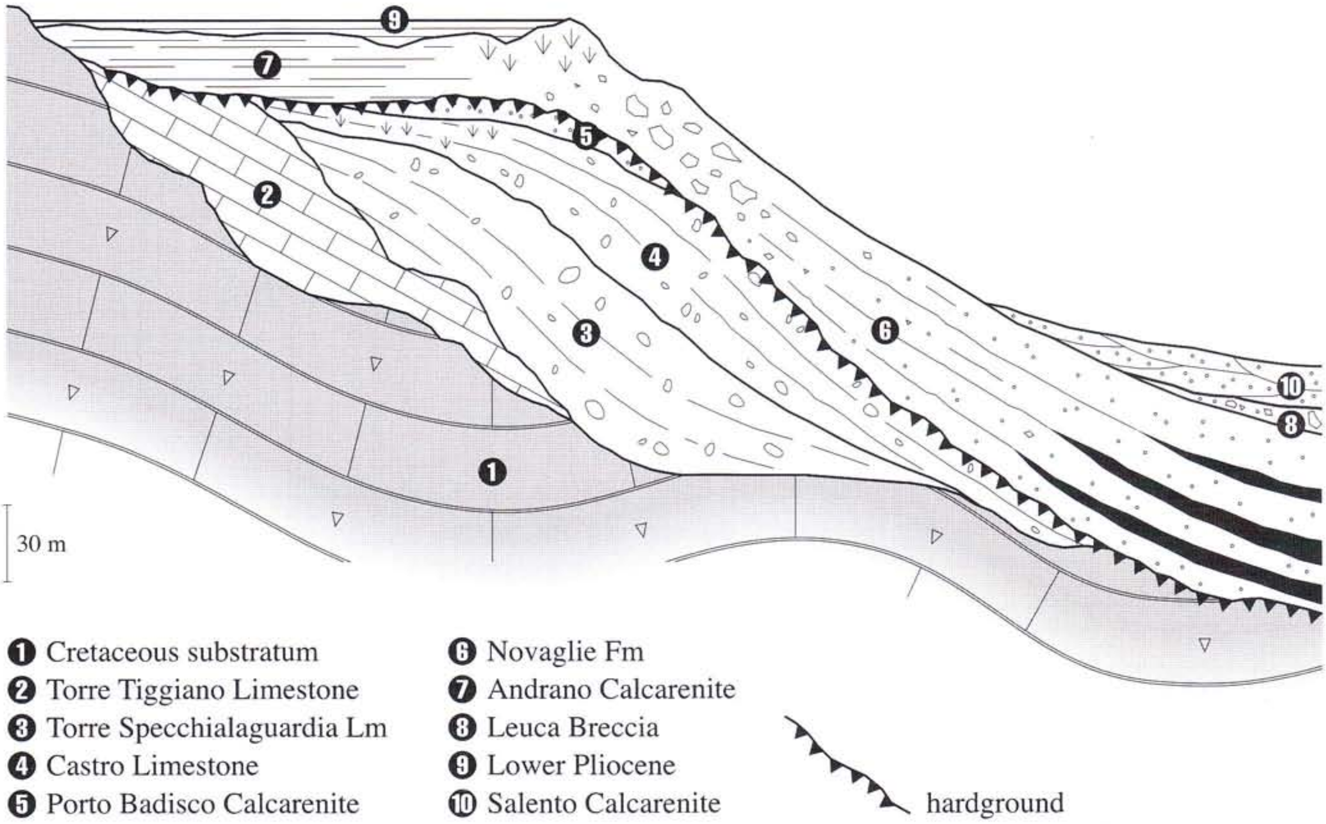


Fig. 14 - Schematic diagram showing platform margin-and-slope stratigraphy of the eastern Salento Peninsula.

subaqueous rocky cliff was quite indented, with "capes" of Cretaceous rock (see geologic map). The Messinian slope sediments onlap and fit tangentially to this complex morphology. In places, the lower boundary is marked by a phosphoritic hardground, but also vermetid and barnacle-rich sediments are a common lithology at the base.

The youngest carbonate system of the Salento eastern coast is the Salento Calcarenite. It constitutes the coastal cliffs in several localities (with maximum thicknesses of 10-15 m), where it discordantly onlaps older units, from Cretaceous to Miocene. The Salento Calcarenite is also present in some inland tectonic depressions (Bossio et al., 1986, 1997), therefore suggesting a former much wider distribution and thickness.

Sequence architecture and its generating mechanisms.

The stratigraphic architecture described in the preceding section demands some explanation in terms of sequence stratigraphy and regional tectonic evolution. Starting from the Late Cretaceous, the Salento segment of the Apulia Platform has been constantly near sea level; the net result is that almost no accommodation space has been produced in the last 65-70 m.y.: the thickness of the entire Tertiary-Quaternary succession is on the order of 100 m (Fig. 13). In addition, this extremely thin succession is punctuated by several erosion episodes, mainly caused by tectonic uplift. This is inferred from the presence of several carbonate systems on the margin and slope of the platform, which are missing on the platform top. Major unconformities separate the various lithostratigraphic units both on the platform and on the slope. The time actually represented by rock units is only 25-30% of total Cenozoic time (Fig. 15). A third consideration is that the stratigraphic palimpsest of the Salento Peninsula is constituted of a series of unconformity-bounded or allostratigraphic units (North American Stratigraphic Code, 1983; International Subcommission on Stratigraphic Classification-ISSC, 1987; Parente, 1994a), only in part referable to the classic depositional sequences (Mitchum et al., 1977). These are objective, non-interpretative units as they are established and recognized without any regard to the cause of their bounding unconformities, whether they are the result of orogenic events, epeirogenic episodes, eustatic sea-level changes, or any combination of them (ISSC, 1987).

Foreland bulge development (Eocene-Oligocene).

As discussed by Bosellini & Parente (1994), field data suggest that, at least from the Late Cretaceous (Campanian-Maastrichtian) onwards, the eastern margin of the Apulia Platform roughly lay along the present

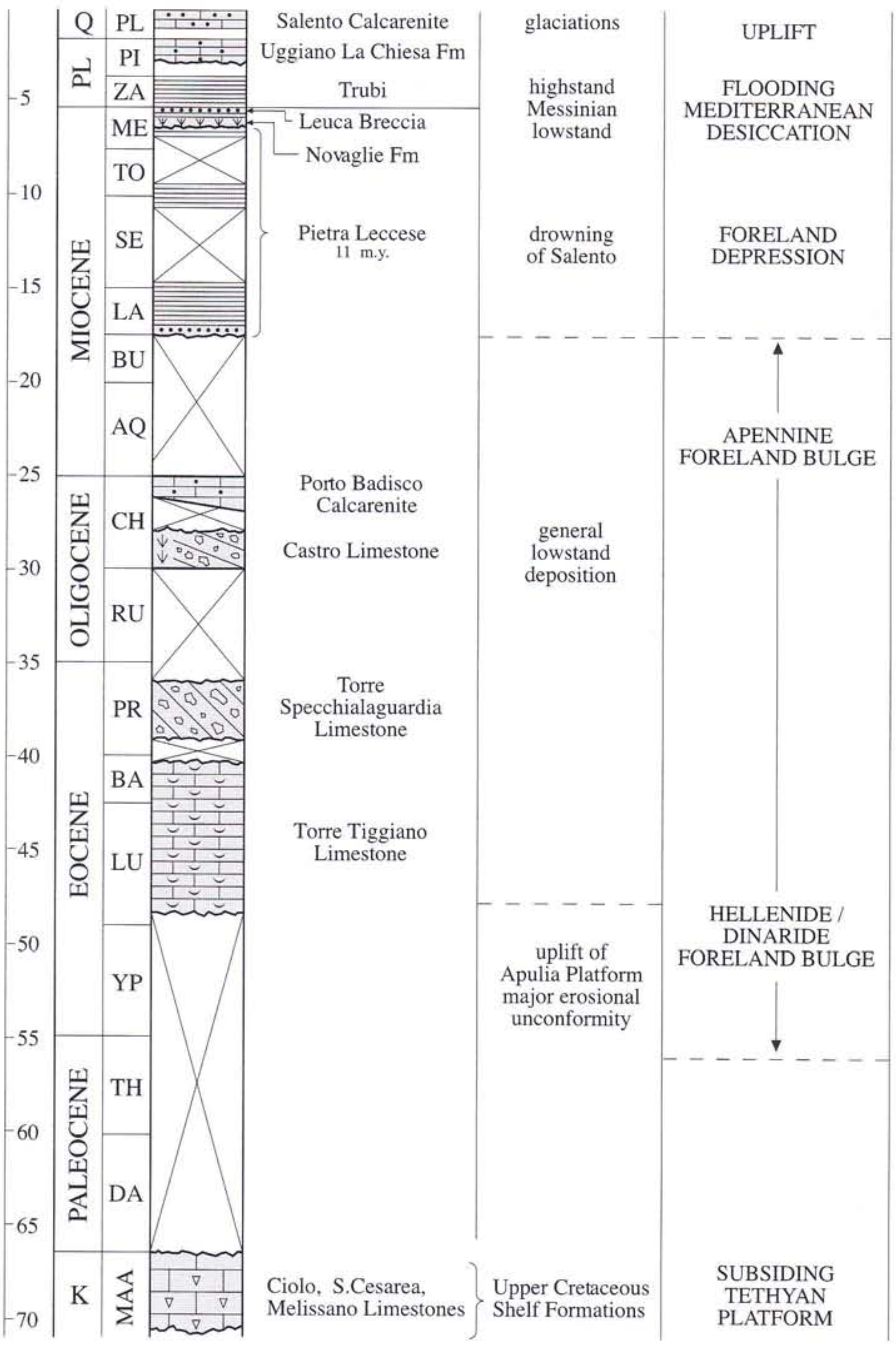


Fig. 15 - Tertiary chronostratigraphy of the eastern Salento Peninsula, showing hiatuses and interpreted mechanisms responsible for the various unconformities. Note that the time actually represented by sediments is about 25% of the total Tertiary time. Time scale after Haq et al. (1987).

Salento coastline, from Otranto as far as Capo S. Maria di Leuca. Both the Upper Cretaceous and Middle Eocene sediments are characterized by high-energy facies, probably a marginal belt of sandy shoals, and appear tectonically folded. A major hiatus of some 15 m. y., including part of the Paleocene and Early Eocene separates the Cretaceous from the next unconformity-bounded unit, the Lutetian-Bartonian Torre Tiggiano Limestone. This unconformity is well known in the entire Southern Apennines (D'Argenio et al., 1973), in the Gargano Peninsula (Bosellini et al., 1993; Bosellini & Neri, 1995) and in the Adriatic offshore (wells Jolly 1, Grazia 1, Gondola 1, Rosaria Mare 1; De Dominicis & Mazzoldi, 1989; Colantoni et al., 1990; De Alteriis & Aiello, 1993).

Laterally grafted onto Cretaceous or Middle Eocene terrains, is the clinostratified Torre Specchialaguardia Limestone of Priabonian age (Parente, 1994a). The temporal hiatus occurring at the base of this Upper Eocene carbonate system is not long, but the unconformity is clearly visible in the field. Outcrops of both Middle and Upper Eocene units are very rare along the Salento coast; nevertheless they testify to the former occurrence of important carbonate systems all along the southern stretch of the Salento peninsula, from Otranto as far as S. Maria di Leuca. The Priabonian limestones are the oldest sediments clearly not involved in tectonic folding. Probably, after the deposition of the Middle Eocene Torre Tiggiano Limestone, there was a tectonic pulse and the Priabonian reef system grafted onto a deformed rocky substratum. Most probably, Eocene platform sediments were never deposited on the interior of the Salento Peninsula proper, but a reef rim could have developed on its lower margin and slope during short events of relative highstand in a general and longer Paleogene lowstand period.

The nondepositional hiatus at the base of the Middle Eocene should span some 10 m.y., too long to invoke eustasy. The Salento segment of the Apulia Platform was quite close to the Dinaric-Hellenic continental margin, which started to be involved in crustal shortening since Late Cretaceous time (Underhill, 1989). As northern parts of the Hellenide system were developing and migrating toward Apulia synchronously with Apenninic deformation, it is clear that the Adriatic served as a foreland area for both collisional chains. "The migration of the flexural foreland bulge across Apulia is recorded in the successive development of erosion and nondeposition surfaces capping the carbonate shoals and overlain by deep-water carbonate breccia and bathyal mudstone" (Gonzalez-Bonorino, 1996, p.1153). Possibly, the Paleocene-Early Eocene hiatus of the southern tip of Apulia is associated with the flexural foreland bulge of the Hellenides (Fig. 15).

Another important erosional unconformity, also present offshore (De Dominicis & Mazzoldi, 1989; De Alteriis & Aiello, 1993), separates the lower Chattian Castro Limestone from the Priabonian rocks. And a further erosional unconformity separates the Castro Limestone from the overlying Porto Badisco Calcarenite, also of Chattian age (F.R.Bosellini & Russo, 1992, Parente, 1994). The "Porto Badisco" is horizontal, onlaps the clinostratified flank of the Castro Limestone and overlies its top, thus documenting its character as a lowstand deposit.

One of the most dramatic sea-level lowstands represented in the cycle chart of Haq et al. (1987) starts at 30 m.y., just at the beginning of the Chattian. It is tempting to correlate the Chattian erosional unconformities of Salento with the eustatic falls represented by Haq et al. (1987). However, this is also the time of the evolution of the foreland bulge of the Apennine thrust system which followed almost in continuity the preceding one. Probably, the pre-Chattian unconformity is the result of both these processes, but it is quite difficult to separate and quantify them.

Foreland basin development (Miocene).

As previously discussed, the Apulia carbonate platform underwent a sort of yo-yoing movement. After the uplifts associated with the foreland bulges (Eocene to Oligocene), the area subsided rapidly as a direct result of the emplacement of two thrust loads on either margin of the Adriatic, causing accentuated lithospheric depression and foreland basin development (Underhill, 1989).

Normally, peripheral foreland basins evolve from an underfilled to a filled or overfilled depositional state. There is a tripartite division of underfilled foreland basin stratigraphy (Sinclair, 1997; Galewsky, 1998) that can be summarized as follows (1) a lower unit dominated by carbonate platform deposits; (2) a middle unit of pelagic sediments; and (3) an upper unit dominated by turbidites and classically termed "flysch" (Sinclair, 1997). The initiation of the middle unit records the time at which relative sea-level rise linked to long-term flexural subsidence outpaced the growth of shallow-water carbonate platforms.

This model of foreland basin stratigraphy, however, must take into account the distal nature of the area with respect to the thrust wedge. The Salento Peninsula has never been involved in the third stage of the "underfilled trinity"; it was too far from both the growing chains and very little siliciclastic influx could reach the present-day Salento Peninsula, which became a starved plateau, block-faulted and swept by currents (Fig. 15). The result was the deposition of Pietra leccese, a formation well dated through the detailed work of Bossio et al. (1989, 1991) and Mazzei (1994). It is a very thin (0-30 m) pelagic unit, punctuated by many omission surfaces and hardgrounds, which covers a long time span (about 11 m.y.), from late Burdigalian to early Messinian (Mazzei, 1994). At the base of the Pietra leccese there is the well known "livello ad Aturia", a phosphatic hardground less than 1 m thick and rich in fossils (planktonic foraminifers, cephalopods, etc.). The Pietra leccese and its basal hardground lie on different units of Cretaceous to Oligocene age.

The Messinian lowstand and the Early Pliocene flooding.

The foreland basin stage represented by the Pietra leccese was interrupted by the late Messinian lowstand. In the Salento Peninsula, this well known Mediterranean event is documented by two distinct depositional systems, namely the Andrano Calcarenite/Novaglie Formation and the Leuca Breccia.

Both the Andrano Calcarenite and the associated reef complex of the Novaglie Formation are characterized by a lower erosional and unconformable boundary against different pre-Miocene units, and clearly represent an abrupt shallowing after the deeper water phase of the Pietra leccese. As their age is early Messinian, i.e. pre-evaporite (Bossio et al., 1991, 1994; Bosellini, 1993), the onset of these two formations is probably related to the sea-level fall associated with the late Messinian salinity crisis. No Messinian evaporites are known from the Salento Peninsula; during this dramatic lowstand, the peninsula was a rocky ridge, largely emerged and subjected to a remarkable dismantling, as suggested by the extensive occurrence of the Leuca Breccia.

The general re-establishment of marine conditions in the Mediterranean basins, represented by the Trubi Formation in other parts of southern Italy, is here documented by the marlstone and glauconitic mudstone of the upper Leuca Formation (sensu Bossio et al., 1989, 1991).

The Late Pliocene to Quaternary shallowing.

Starting from Late Pliocene, the Salento Peninsula underwent a general shallowing (uplift?) testified by shallow-water carbonate sediments (Uggiano la Chiesa Formation). It is worth pointing out that during this time, to the north, the Murge tract of the Apulia Platform was subsiding, as shown by the occurrence of the Gravina Calcarenite, which in that area is moderately deep (100-120 m) and unconformably overlies the Cretaceous substratum (Taddei Ruggiero, 1996).

The youngest unit of the eastern Salento succession is the Salento Calcarenite, which is Pleistocene (Sicilian) in age (Bossio et al., 1994) and lies discordantly on units of different age. Along the present rocky shore, the Salento Calcarenite onlaps Oligocene (Castro Limestone) and Miocene (Novaglie Formation) clinostratified slope deposits or even Cretaceous rudist limestones. In this stratigraphic setting, it shows large scale cross-bedding and appears as a typical coastal sandy deposit, piled up by high energy flows (waves, storms). The Salento Calcarenite is also present on top of the platform, where it fills tectonic depressions, smoothed by marine erosion (see Tricase and Leuca depressions); here the sandy unit, which onlaps the bounding fault scarps, is characterized by parallel bedding and is strongly burrowed.

The Salento Calcarenite and other associated Pleistocene deposits of the peninsula were deposited during a time of pronounced eustatic fluctuations. It is therefore quite difficult to recognize and quantify the tectonic component during the sediment accumulation. Most probably, the Salento Peninsula underwent westward tilting during the final Pleistocene uplift. This westward tectonic inclination is suggested by the different, present-day morphologies of the eastern (high) and western (low) coasts of the peninsula, and confirmed by the succession of Pleistocene marine terraces present on the western low-lying coast (D'Alessandro & Massari, 1997).

Conclusions.

The Cretaceous to Quaternary succession of the Apulia Platform exposed on the eastern coast of the Salento Peninsula shows a particular stratigraphic architecture: whereas on the platform top, i.e. on the Salento Peninsula proper, the succession is a few tens of metres thick at the most and punctuated by large lacunae, on the margin and slope of the platform, along the present-day eastern coast of the peninsula, several carbonate systems are laterally disposed and grafted one upon the other. Many of these systems are clinostratified and include well developed reef tracts of Chattian and early Messinian age.

The cause of this unusual stratigraphic architecture is the relative tectonic stability of the Salento Peninsula which, since the Late Cretaceous, acted as a high area in the center of the wider Mesozoic Apulia carbonate platform. This high registered important geodynamic events, including the mid-Cretaceous emersion and retreat of the Apulia Platform margin (Bosellini et al., 1999), a yo-yoing movement associated with the development of a foreland bulge and subsequent foreland basin related to both the Hellenide-Dinaride and Apennine thrust systems, and a final (Pleistocene) uplift and westward tilting. Remarkably, during the last 60 m.y. the carapace of the high did not subside enough to accommodate a sufficient amount of sediment to be preserved after the following lowstand and exposure; during its yo-yoing movement the carapace was constantly not too far from sea level. Consequently, sediments were mainly accommodated on the deep margin and slope of the platform.

Acknowledgments.

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