

# Fossil sea turtles (Chelonii, Dermochelyidae and Cheloniidae) from the Miocene of Pietra Leccese (late Burdigalian-early Messinian), Southern Italy

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## ABSTRACT

The presence of chelonian remains in the Miocene Pietra Leccese sediments (Lecce, Italy) is known since the 19th century. Two chelonian species have been recognized: *Testudo varicosa* Costa, 1851, and *Euclastes melii* Misuri, 1910. New fossil findings confirm the presence of cheloniid sea turtles and testify for the existence of leatherback sea turtles. The dermochelyid remains are referred to the species *Psephophorus polygonus* Meyer, 1846. The specimen MAUL 990/1a-l represents the largest carapace portion of this species so far reported in the literature. The combination of a sculptured carapace with the scute sulci pattern allows attributing three new cheloniid specimens and the type material of *Testudo varicosa* to the species *Trachyaspis lardyi* Meyer, 1843, a cosmopolitan Miocene species. Many unsculptured cheloniid fragments are present, but due to their bad preservation and their small sizes, it is not possible to attribute them to the already known cheloniid species, "*Euclastes melii*". The repository of the fossil material firstly attributed to the species *Euclastes melii*, and then to *Procolpochelys*

## KEY WORDS

Reptilia,  
Chelonii,  
Dermochelyidae,  
Cheloniidae,  
Miocene,  
late Burdigalian,  
early Messinian,  
*Euclastes melii*,  
*Psephophorus polygonus*,  
*Testudo varicosa*,  
*Trachyaspis lardyi*,  
*Dermochelys coriacea*  
sister taxon,  
Southern Italy.

*melii*, is not known, therefore no direct morphological comparison is possible. The chelonioid assemblage represents a typical Miocene sea turtle fauna, composed of leatherback (*Psephophorus polygonus*), sculptured (*Trachyaspis lardyi*) turtles and smooth cheloniids (a form firstly referred to *Euclastes melii*, and indeterminate members of the family Cheloniidae). This fauna is comparable to the similar and contemporary turtle fauna from the Calvert Formation, where leatherback, smooth and sculptured turtles are present.

## RÉSUMÉ

*Tortues marines fossiles (Chelonii, Dermochelyidae et Cheloniidae) du Miocène de Pietra Leccese (Burdigalien supérieur-Messinien inférieur) en Italie du Sud.*

La présence de restes de chéloniens dans les sédiments du Miocène de la Pietra Leccese (Lecce, Italie) est attestée depuis le XIX<sup>e</sup> siècle. Deux espèces de chéloniens ont été décrites : *Testudo varicosa* Costa, 1851 et *Euclastes melii* Misuri, 1910. La découverte des nouveaux fossiles confirme la présence des tortues marines chéloniides et témoigne de l'existence de tortues luth. Les restes de dermochélyidés ont été attribués à l'espèce *Psephophorus polygonus* Meyer, 1846. Le spécimen MAUL 990/1a-l représente la carapace la plus complète décrite pour cette espèce. La combinaison d'une carapace sculptée avec le « scute sulci pattern » permet d'attribuer trois nouveaux spécimens et le matériel type de *Testudo varicosa* à l'espèce *Trachyaspis lardyi* Meyer, 1843, une espèce cosmopolite miocénique. Beaucoup de fragments lisses de chéloniide sont présents, mais en raison de leur mauvaise conservation et de leurs petites tailles, il n'est pas possible de les attribuer à l'espèce déjà connue, « *Euclastes* » *melii*. Le lieu de dépôt du matériel fossile attribué initialement à l'espèce *Euclastes melii*, et ensuite à *Procolpochelys melii*, n'est pas connu, donc aucune comparaison morphologique directe n'est possible. Cet assemblage de chélonioidés est typique des faunes miocènes à tortues marines, composées par des tortues luths (*Psephophorus polygonus*), des chéloniides à carapace sculptée (*Trachyaspis lardyi*) et à carapace lisse (une forme initialement attribuée à l'espèce *Euclastes melii*, et des membres indéterminés de la famille Cheloniidae). Cette faune est comparable à la faune similaire et contemporaine de tortues de la Formation Calvert, où tortues luth, chéloniides lisses et sculptés sont présents.

## MOTS CLÉS

Reptilia,  
Chelonii,  
Dermochelyidae,  
Cheloniidae,  
Miocène,  
Burdigalien supérieur,  
Messinien inférieur,  
*Euclastes melii*,  
*Psephophorus polygonus*,  
*Testudo varicosa*,  
*Trachyaspis lardyi*,  
*Dermochelys coriacea*  
taxon frère,  
Italie du Sud.

## INTRODUCTION

The Pietra Leccese is a Miocene sandstone extensively cropping out in the SE tip of Italy. Some authors (Largaiolli et al. 1969; D'Alessandro & Robba 1980) proposed that this sandstone originated in the interval from the Langhian to the Tortonian, but others (Bossio et al. 1989a-d, 1991, 1992; Barbera et al. 1993; Mazzei 1994) suggested, on the basis of bio-chronostratigraphic analyses, that the

deposition interval extends from the *Sphenolithus heteromorphus*-*Helicosphaera ampliapertura* zone to the *Amaurolithus primus*-*A. amplificus* zone, that is to say from the late Burdigalian to the early Messinian. The age of the Pietra Leccese is therefore here considered to span the latest early and the earliest late Miocene.

The first author who described turtle remains from the Pietra Leccese was the palaeontologist Oronzo Gabriele Costa. In 1851, in a lecture about the

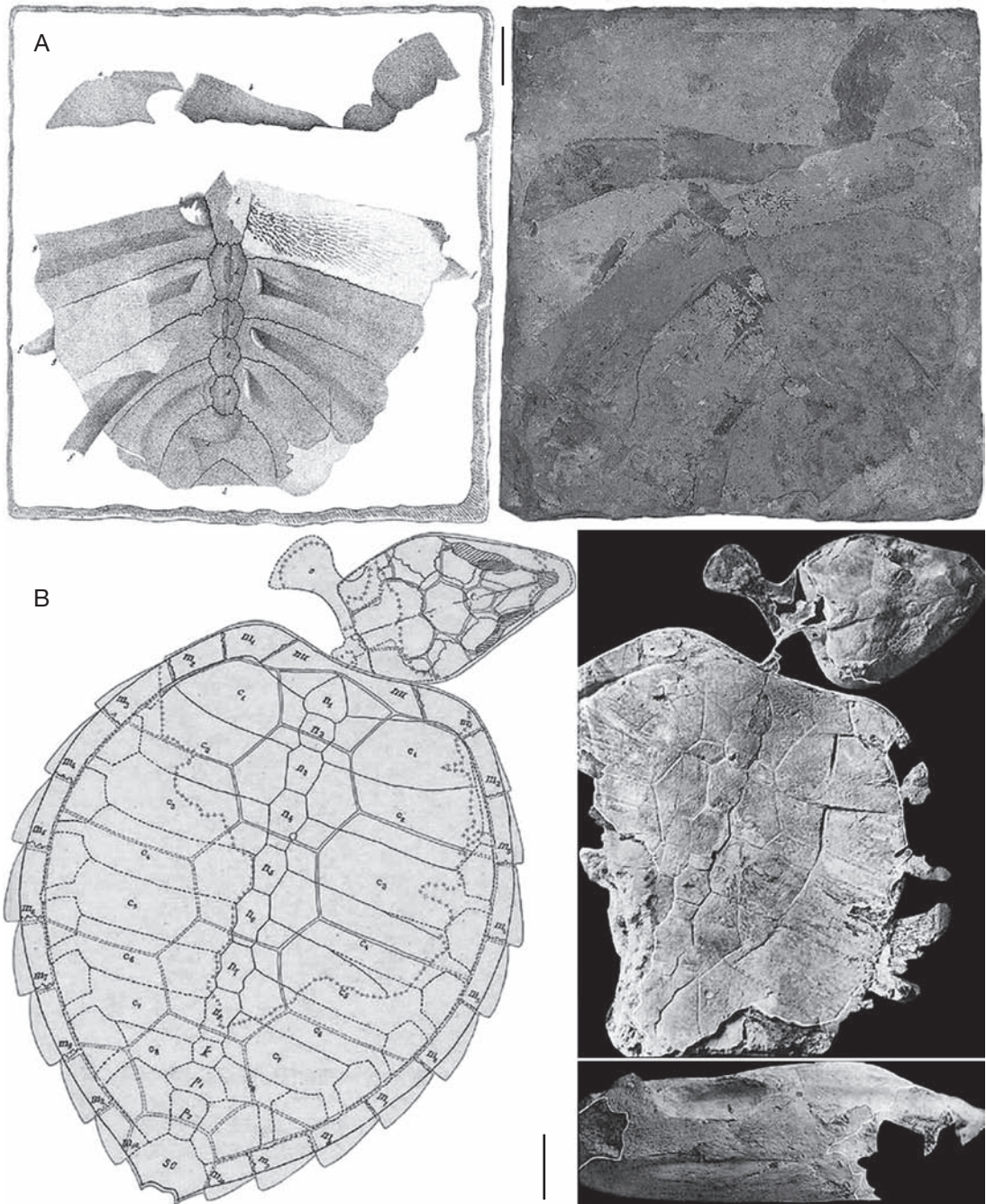


FIG. 1. — **A**, *Testudo varicosa* Costa, 1851 (MP-CMSNN 8448), type specimen, original drawing by Costa (1864) and photograph of the slab as preserved nowadays. Note that Costa did not follow the original position of the specimen in the slab. *T. varicosa* is here considered a junior synonym of *Trachyasps lardyi* Meyer, 1843; **B**, *Euclastes melii* Misuri, 1910 remains, photo and reconstruction (modified from Misuri 1910). Note that a large portion of the reconstructed carapace is not represented in the fossil. Scale bars: A, 40 mm; B, 50 mm.

fossil findings in the Naples Kingdom, read at the Accademia Pontaniana, Costa indicated the finding of “an almost complete chelonian shield”, visible from the visceral surface, which he identified as a marine turtle (Costa 1864: 55) (Fig. 1A). On the basis of this remain and its characteristic vascular marks left on the sediments by the external surface of the missing carapacial portion, he created the new species *varicosa*, attributed firstly to the genus *Testudo* Linnaeus, 1758, but later, in 1864, moved to the genus *Chelonia* Brongniart, 1800 (Costa 1851, 1864). Aldinio (1896: 11), in his memoir on the crocodylian *Tomistoma lyceensis* from the Pietra Leccese sediments, assigned the turtle described by Costa to the genus *Chelone* Brongniart, 1805 (now a synonym of *Chelonia*) but also noted that the sculpture of the plates has an unique pattern: “Parallel marks directed to the periphery of the bones, more dense in the center where they are crossed by other marks, perpendicularly to the first ones, so to form a grid with irregular grills, more dense in the medial part and sparse near the periphery”. The holotypic remains were also the subject of the master thesis of Zoé Armenante in 1901, under the supervision of the eminent professor Bassani, and were attributed to the genus *Trionyx* Geoffroy, 1809. Delfino (2002) has recently proposed to consider *Chelonia varicosa* (Costa, 1851) at the order level as *Chelonii* indet., since the “diagnosis” supplied by Costa (1851, 1864) does not allow to verify the identification and the enclosed picture seems to disagree to the features of the family Cheloniidae.

A recent research in the collection of the Palaeontological Museum of the University “Federico II” of Naples allowed finding the type material of *Testudo varicosa* (collection number M17456). Its morphology and identification will be discussed below along with those of the new remains.

At the beginning of the 19th century, Alfredo Misuri described a new sea turtle finding from the Pietra Leccese, composed by the skull without the right mandible, the incomplete left humerus, the anterior half of the carapace and a plastron fragment (Misuri 1910). Misuri made a comparison with many other remains of sea turtles, reaching the belief that the Pietra Leccese turtle could belong “to the gen. *Chelone*, understood in the large sense

attributed to it before 1867, and more precisely to the gen. *Euclastes*, created in that year by Cope” (Misuri 1910: 135-136). The presence of a nuchal isthmus and above all of the first neural heart-shaped moved the author to describe a new species, *Euclastes melii* Misuri, 1910 (Fig. 1B). De Stefano (1913), reviewing the material, deemed that the “fossil turtle from Lecce [...] should be likely attributed to the modern gen. *Chelone* Brongniart” and therefore referred the remains to *Chelone melii* (Misuri, 1910). Later, Zangerl & Turnbull (1955) noted a strong affinity of *E. melii* with the fossil remains attributed to the species *Procolpochelys grandaeva* Leidy, 1851, belonging to the same family, Cheloniidae, and coming from the Miocene marl of New Jersey. They noticed that these two species differed only for the occurrence of a supernumerary neural in the Italian remain. Assuming that this difference is not valid at the genus level, Weems (1974) attributed the *E. melii* remain to *Procolpochelys*, referring it to *Procolpochelys melii* (Misuri, 1910).

In her comprehensive taxonomic revision of European turtle faunas, Lapparent (2001) recently assigned the *Euclastes melii* remains to an indeterminate member of the sea turtle superfamily Cheloniioidea (as Cheloniioidea *incertae familiae*).

So far, no direct revision of the type material of “*Euclastes melii*” has been performed since there is no information about its repository and it is not unlikely that it is lost.

The limited chelonian fossil record of the Pietra Leccese has been recently increased by the brief report of a slab containing a carapace fragment of a dermochelyid turtle (Delfino 2002) and above all, by the description of several slabs preserving remains of the same taxon as well as cheloniid turtles (Chesi 2005). The present paper represents an updated and improved version of the above mentioned dissertations (Delfino 2002; Chesi 2005), and a revision of the taxonomic status of the remains so far collected in the Pietra Leccese.

#### ABBREVIATIONS

MAUL	Museo dell’Ambiente dell’Università di Lecce;
MCSNAV	Museo Civico di Scienze Naturali e Archeologia della Valdinievole, Pescia;

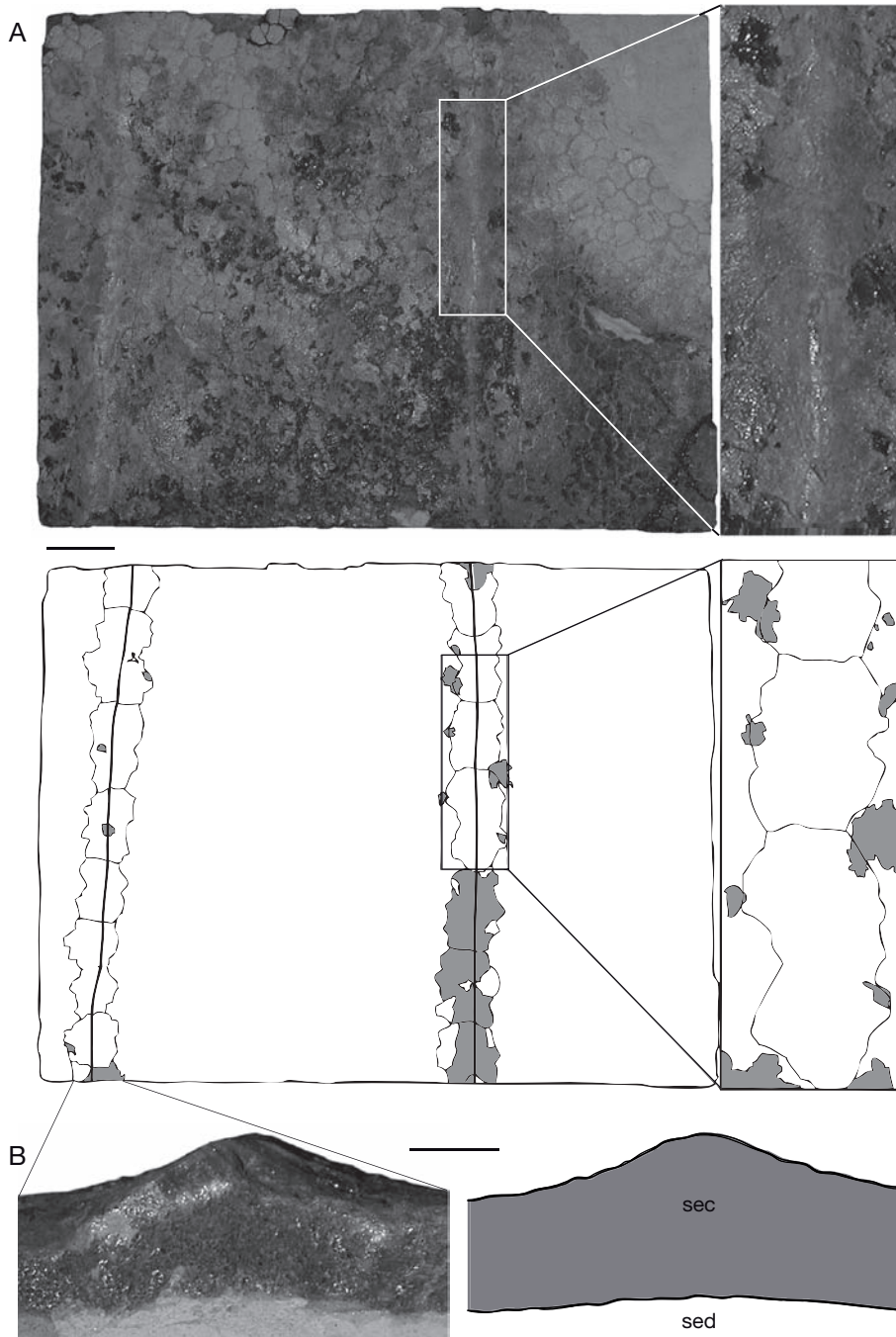


FIG. 2. — *Psephophorus polygonus* Meyer, 1846 (MAUL 1008/1), photographs and interpretative drawings: **A**, dorsal view of the slab and the detail of some elongated ossicles. At left, note the two longitudinal and almost parallel ridges, indicated by hard lines, and that more than five ossicles are present between two ridges; at right, some elongated ossicles that form the ridge are shown; **B**, transversal section of a ridge: the visceral surface is flat and the dorsal one is convex, the ridge sides are low tilted and the apex is rounded. Abbreviations: **sec**, section; **sed**, sediment. Grey areas indicate fragmented surfaces. Scale bars: 50 mm.

MGPUP	Museo di Geologia e Paleontologia dell'Università degli Studi di Padova;
MP-CMSNN	Museo di Paleontologia-Centro Musei delle Scienze Naturali, Napoli;
NNH	Nationaal Natuurhistorisch Museum, Leiden.

the shell morphology of the closest living relatives of this genus, *Dermochelys coriacea* (as described by Gervais [1872], and osteological preparations NNH 20352).

## MATERIAL AND METHODS

Since 1986, several slabs of rock, containing vertebrate remains, have been recovered in several quarries of Pietra Leccese located in the Lecce province (Apulia, SE Italy). General indications like Melpignano, Cursi and Cavallino are sometimes associated with the slabs. The 34 slabs with chelonian remains are now stored at the MAUL with the collection number MAUL 982/1-994/1, 996/1-998/1, 1000/1-1002/1, 1004/1-1009/1, and at the MCSNAV for one unnumbered specimen. The first author found an unedited fossiliferous slab coming from the Pietra Leccese quarries (probably acquired in the 19th century), stored at the MP-CMSNN with the collection number M8448 (this specimen was previously identified "*in schaedis*" as an edentate mammal).

Because of slab extraction methods of the embedding rock as construction material, the fossils are often very incomplete, represented by relatively thin slices and difficult to interpret. The most of the fossil remains are still entirely or partially embedded into slabs and their edges are often represented by the cut surfaces.

The taxonomic identification has been based on the comparison of the bony armour of extant and fossil species of sea turtles as well as on the presence of phylogenetically informative characters of bony shell (dermochelyid turtles according to Wood *et al.* [1996]; cheloniid turtles according to Hirayama [1994]). The state of the characters coded by Wood *et al.* (1996) is reported in the section Remarks of the paragraph *Psephophorus polygonus*. Osteological and taxonomic nomenclature follows Lapparent (2001). No distinction has been made in the section Material examined between perfectly preserved or fragmentary remains. The geometric relationships among the slabs belonging to a single individual of *P. polygonus* have been assessed by comparison with

## SYSTEMATICS

Order CHELONII Brongniart, 1800

Family DERMOCHELYIDAE Fitzinger, 1843

Genus *Psephophorus* Meyer, 1846

*Psephophorus polygonus* Meyer, 1846

MATERIAL EXAMINED. — Carapacial fragments: MAUL 990/1a-l, 994/1, 996/1, 997/1, 1004/1, 1005/1, 1006/1, 1008/1; MCSNAV unnumbered specimen; MP-CMSNN M8448. Additional materials tentatively referred to this taxon: MAUL 989/1, 1000/1, 1001/1, 1002/1, 1009/1.

## DESCRIPTION

A first group of 19 specimens is characterized by the presence of bony carapacial ridges (in few cases, despite the absence of ridges, the fragments are associated to ridge-bearing slabs). The preservation of the slabs is rather good despite the fact that the original curvature has been clearly altered by compression of the overlying sediments and contiguous slabs are separated by a gap of about 15 mm corresponding to the saw action during the cutting of the slabs.

The fossils are represented by a group of adjacent, small and polygonal bony ossicles, with regular shapes and sizes (average size about 22 × 25 mm, the external surface is exposed). The well preserved ossicles show smooth surfaces. Some ossicles are extended along the longitudinal axis, have a larger size (about 33 × 41 mm) and a convex external surface. Such elongated ossicles are arranged in nearly straight lines that, due to the convexity of their surface and the flatness of the surrounding ones, correspond to evident ridges. When two ridges are present in the same slab, they are developed almost parallelly (i.e. MAUL 990/1a-l, 994/1, 1008/1) (Figs 2A; 3).

The collection number MAUL 990/1a-l corresponds to 10 fossiliferous slabs. These remains most

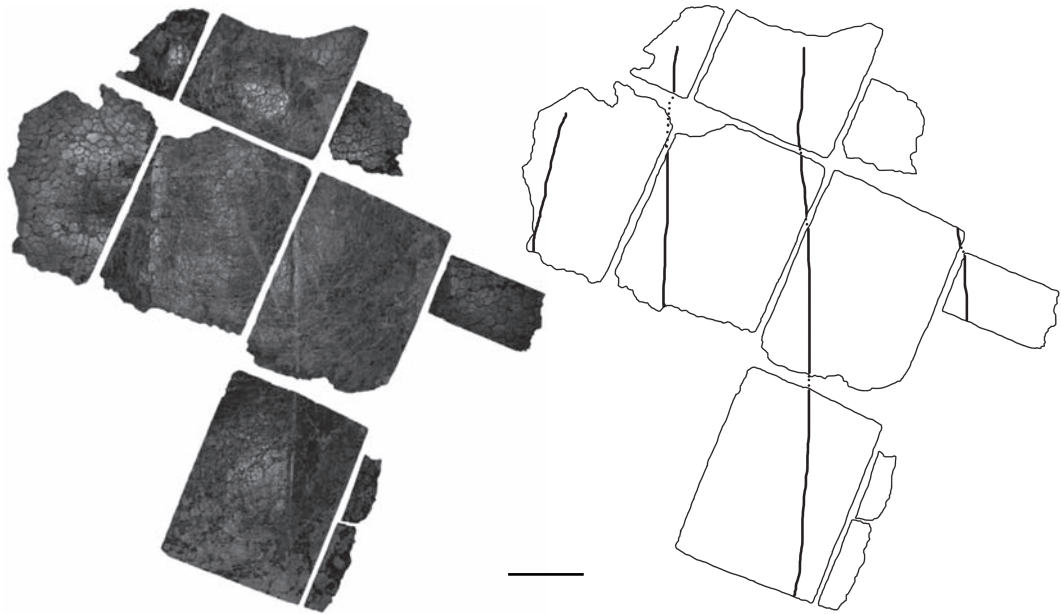


FIG. 3. — *Psephophorus polygonus* Meyer, 1846 (MAUL 990/1a-l), geometric relationships among the slabs belonging to a single specimen. At present, this is the largest known portion of a *P. polygonus* carapace so far reported in the literature. The ridges are indicated by hard lines. Scale bar: 200 mm.

likely belonged to the same living animal, since the size of the ossicles is comparable and above all it is possible to perceive a continuity of the ridges in adjacent slabs. Such material represents the most informative dermochelyid remains from the Pietra Leccese and allows describing the morphology of a large portion of the carapace. Along the external edge, the presence of a concavity indicates the anterior region of the carapace. Of the four recognizable ridges, three begin from such region. The third one, beginning from the center of the concavity, is the longest (about 1480 mm). The ridges are convergent towards the anterior edge of the carapace but they do not meet each other. The second and the third ridges originate from characteristic ossicles (size about  $60 \times 58$  mm), that in both cases are the largest ossicles of the entire ridge. The average distance between the first and the second ridge is about 300 mm, while the distance between the second and the third, and between the third and the fourth is about 360 mm. An average of 13 small ossicles is present between two ridges (Fig. 2A).

The carapace has a laminar structure: the average thickness of all the remains is about 8.1 mm, reaching the maximum of about 12.8 mm in correspondence of the ridges. Along the edges of the slabs, it is clear that the upper (dorsal) surface of the ridges is convex and the lower (visceral) surface is flat (i.e. not following the curved outline of the upper surface; see Fig. 2B).

In lateral view, the ridges visible in specimens MAUL 990/1a-l, 994/1, 996/1, 1008/1 show an undulating outline, with peaks and valleys corresponding to the transversal sutural junctions between two adjoining ossicles. Therefore each single convexity is formed by a couple of ossicles.

A second group of five specimens, MAUL 989/1, 1000/1, 1001/1, 1002/1, 1009/1, is characterized by the absence of any ridge and by a mosaic of bony polygonal ossicles, slightly smaller than those of the previous group. The average size is about  $17 \times 19.6$  mm and the average thickness, where measurable, about 10.5 mm. A peculiar morphology is shown by MAUL 1009/1, whose eroded bony

fragments are chaotically arranged. Its bony ossicles have a size of 24 × 24 mm, a thickness of 4.2 mm (lower than the average size). In transversal section both the upper and lower surfaces are flat. Near one edge, the slab has a different kind of bony element: it is narrow and elongated (15 × 100 mm) and has a rounded outline in cross section, perceivable along the edge of the slab.

In both groups, there are no evidences for the presence of a “sunflower pattern”, as defined by Wood *et al.* (1996).

#### REMARKS

The laminar and weakly curved morphology of these shell fragments, constituted by a mosaic of ossicles, some of them forming ridges, clearly represents the typical carapacial mosaic of bony ossicles that distinguishes the members of the chelonian family Dermochelyidae. As already indicated by Wood *et al.* (1996), the most informative remains are the ones hosting ridges, and therefore in our case the specimens MAUL 990/1a-l, 994/1, 996/1, 997/1, 1004/1, 1005/1, 1006/1, 1008/1, MCSNAV unnumbered, MP-CMSNN M8448. The following characters are recognizable. Two kinds of ossicles are present: elongated ones form anteroposterior carapacial ridges and small ones fill the space between ridges. The small ossicles have regular size and shape (character 19, state 0). There are no ossicles which are greatly elongated along anteroposterior axis (character 18, state 0). The pattern of epithelial mosaic does not show any “sunflower” pattern (a relatively large and scallop-edged central ossicle surrounded by an array of smaller, more or less oval ossicles) (character 17, state 0). The ridges are dorsally rounded (character 16, state 0), neither arched nor tectiform, but showing low tilted sides (character 11, state 0), and a nearly flat visceral surface (character 10, state 1). More than five ossicles are present between ridges (they are about 13 on average) (character 22, state 1) (Fig. 2A). In lateral view, the ridge has an undulating profile, showing a series of peaks and valleys (character 13, state 1). The contemporary presence of this character assemblage, univocally testifies for a leatherback turtle, belonging to the species *Psephophorus polygonus*. This species is considered as sister taxon

of the only extant member of the family Dermochelyidae, *Dermochelys coriacea* (Vandelli, 1761). *P. polygonus* has a strictly European range and shows a chronological distribution from the late Eocene to the earliest late Miocene.

MAUL 990/1a-l represents the largest mosaic portion, so far reported in the literature, of *P. polygonus* (Fig. 3). Because the carapacial mosaic presents the first visible ridge not corresponding to the left carapacial edge (thus indicating that a more lateral ridge should be present) and because the third one (the longest, 1480 mm) extends from the center of the concave anterior edge, we hypothesize that *Psephophorus* possessed the same number of longitudinal ridges of *Dermochelys coriacea*, that is to say seven. The presence of the largest ossicles in correspondence of the beginning of ridges may be used as a character useful to allocate an isolated carapacial fragment. A relevant character to assess the carapace size could be the distance between ridges.

A group of five slabs with polygonal ossicles but without any evidence testifying the presence of the ridges has been tentatively referred to *P. polygonus*, on the basis of its provenance from the same quarries in which such genus has been recognized with confidence.

#### Family CHELONIIDAE Gray, 1825

##### Genus *Trachyaspis* Meyer, 1843

*Trachyaspis* Meyer, 1843: 699.

*Syllomus* Cope, 1896: 139.

*Kurobechelys* Shikama, 1956: 35-62.

##### *Trachyaspis lardyi* Meyer, 1843

*Trachyaspis lardyi* Meyer, 1843: 699.

*Testudo varicosa* Costa, 1851: 4.

*Chelonia varicosa* – Costa 1864: 12, tab. 1.

*Trachyaspis miocoenus* Delfortrie, 1869: 419, 420, tab. 28, figs 24-26.

*Trachyaspis aegyptiaca* Lydekker, 1889: 53, 54.



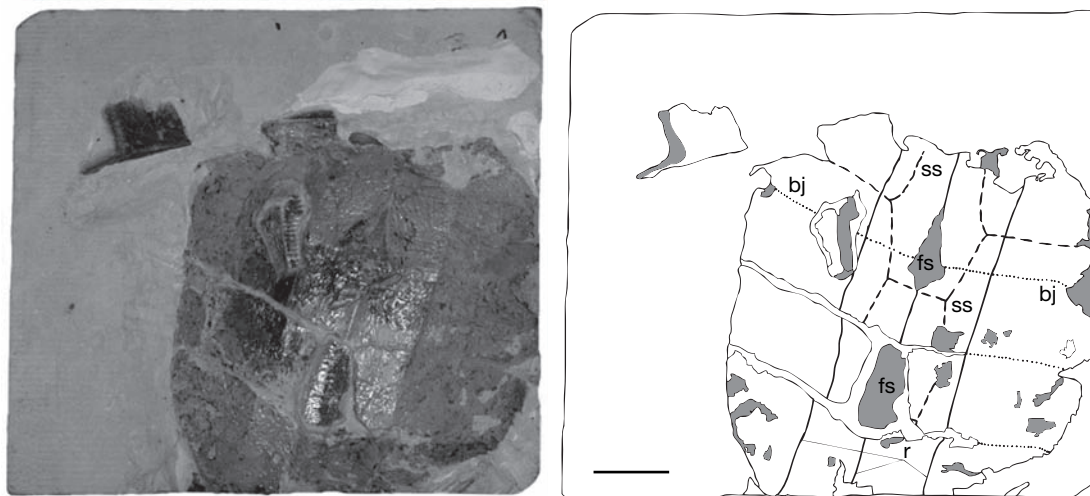


FIG. 4. — *Trachyaspis lardy* Meyer, 1843 (MAUL 992/1), photograph and interpretative drawing of a large portion of a cheloniid carapace. Note the presence of three parallel ridges, the scute sulci pattern (where visible) and the sculptured surface. Abbreviations: **bj**, bone junction (dotted line); **fs**, fragmented surface (grey); **r**, ridge (continuous line); **ss**, scute sulci (dashed line). Scale bar: 50 mm.

*Syllomus crispatus* Cope, 1896: 139.

*Trionyx bellunensis* Misuri, 1911: 1, 8, tab. 1, 2.

*Trachyaspis bellunensis* – Hummel 1932: 102.

*Chelonia marylandica* Collins & Lynn, 1936: 151, 155, 162, tab. 2.

*Peritresius virginianus* Berry & Lynn, 1936: 176, tab. 1-4.

*Kurobechelys tricarinata* Shikama, 1956: 37, 54, tab. 7, figs 1, 2, tab. 8, figs 1-3.

*Syllomus marylandica* – Zangerl 1958: 40, 41.

*Syllomus virginianus* – Zangerl 1958: 40, 41, 52.

*Syllomus aegyptiacus* – Weems 1974: 284.

MATERIAL EXAMINED. — Shell fragments: MAUL 988/1, 992/1, 1007/1.

#### DESCRIPTION

This taxon is represented by three slabs. MAUL 992/1 represents a large portion of a carapace (Fig. 4), whereas the other two slabs are constituted by a chaotic group of laminar fragments, oriented on various plains. In the cases in which the dorsal surface is exposed, many scute sulci are recogniz-

able, together with a well developed sculpture (see description by Aldinio [1896], here reported in the Introduction).

MAUL 992/1 is the most representative specimen, since its orientation allows to describe a large area of the dorsal surface (basic measurements of the exposed area: length 265 mm, width 250 mm, thickness 5 mm). The carapace portion shown in Figure 4 possesses three straight ridges, across the neural region, that run parallel along the entire fragment, and some scute sulci forming a branching pattern. The bad preservation of the surface hinders the recognition of the sutures between the bony plates and the shape of the ridge sections. Interpreting the bony element pattern by the analysis of the scute sulci pattern, MAUL 992/1 represents a carapacial area including at least five right and five left pleural bony plates plus the corresponding neural ones. The central keel extends along the sagittal axis of the carapace (on the neural plate series), while the left and the right ridges are placed parasagittally to the central one (over the proximal region of the pleural plate series).

MAUL 988/1 and 1007/1 present few fully readable shell elements dispersed among many shell fragments. The most informative skeletal element

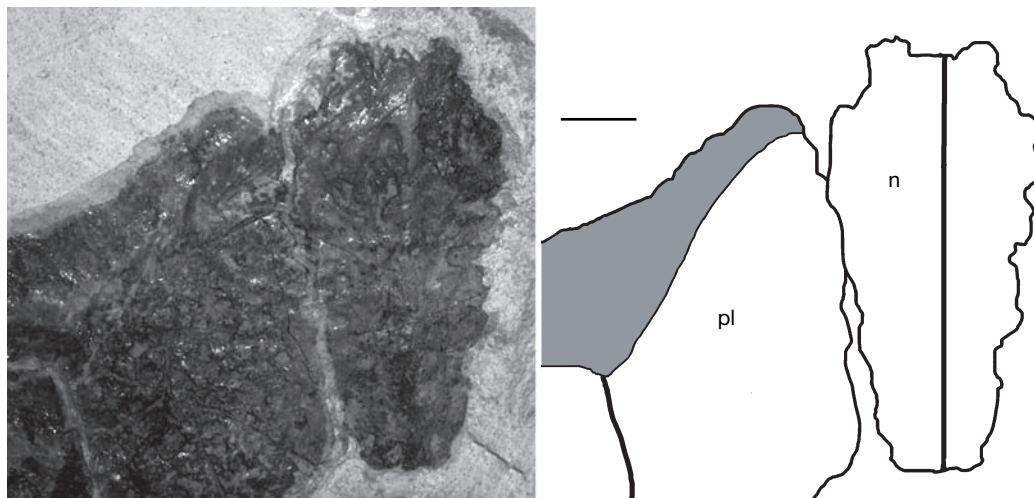


FIG. 5. — *Trachyaspis lardy* Meyer, 1843 (MAUL 988/1 detail), photograph and interpretative drawing. Note the hexagonal, narrow and elongated shape of the neural plate, and the proximal portion of the adjoining left pleural plate. Keels are represented by hard lines, and sectioned surface in grey. Abbreviations: n, neural; pl, pleural. Scale bar: 10 mm.

of specimen MAUL 988/1 is a complete keeled neural plate with the adjoining proximal region of the left pleural plate (Fig. 5). Many laminar fragments scattered around them probably represent pleural portions.

The peculiar ornamentation of the dorsal surface is much more marked in MAUL 988/1 and 1007/1, than in MAUL 992/1.

#### REMARKS

The remains clearly belong to a cheloniid sea turtle characterized by the combination of the scute sulci with the ornamentation of the external surface of the carapace. The presence of a sculptured carapacial surface moved some authors to attribute this kind of remains to the Dermatemydidae or to the softshell turtles of the family Trionychidae, above all to the genus *Trionyx* s.l., but the presence of the marks left by the horny shields on the external carapace surface, the absence of the medial contact between 8th pleurals, and the marine origin of the sediments, indicated that this type of turtle belongs to the genus *Trachyaspis*, family Cheloniidae (Misuri 1911; Hummel 1932; Kuhn 1964; Zangerl in Weems 1974; Lapparent 2001). In literature, many

species have been attributed to this genus, but only three are true cheloniid turtles: *T. lardy*, the type species, from the early Miocene of Switzerland; *T. bellunensis* (Misuri, 1911) from the early Miocene of Italy; *T. miocoenus* Delfortrie, 1869 from the Miocene of France (Lapparent 2001). Fossil decorated sea turtles have been also found in Egypt (*Trachyaspis aegyptiaca* Lydekker, 1889), North America (*Syllomus crispatus* Cope, 1896; *Chelonia marylandica* Collins & Lynn, 1936; *Peritresius virginianus* Berry & Lynn, 1936), and Japan (*Kurobechelys tricarinata* Shikama, 1956). Weems (1974), revising the systematics of these taxa, followed Zangerl's observation that *Trachyaspis* belongs to the family Dermatemydidae, and therefore recognized *Syllomus* as the senior synonym for the genus that include all the Egyptian, American and Japanese decorated Cheloniidae, and *Syllomus aegyptiacus* as the only valid one. Conversely, Lapparent (2001) stated that "if the European form is, as probable, generically identical to the middle Miocene American and Egyptian forms, *Trachyaspis* is the senior synonym of *Syllomus* Cope, 1896" and that *Trachyaspis miocoenus* and *T. bellunensis* are identical to *T. lardy*. It is worth mentioning that recent

unpublished analyses of fossil *Syllomus* and *Trachyaspis* (R. Hirayama pers. comm. March 2007) could indicate that these two taxa are not directly related and that the latter is a non-marine turtle, possibly of trionychoid affinities.

Waiting for a formal revision of these taxa, the opinion expressed by Lapparent (2001) is here provisionally accepted, and *Trachyaspis* is considered to be a cheloniid turtle.

The fossil remains MAUL 988/1, 992/1, 1007/1, representing a sea turtle with a sculptured carapace, are attributed to the species *Trachyaspis lardyi*. The holotypic material of the species *Testudo varicosa* clearly belongs to the same species. *Testudo varicosa* is therefore a junior subjective synonym of *Trachyaspis lardyi*.

#### Cheloniidae indet.

MATERIAL EXAMINED. — Carapacial fragments: MAUL 982/1, 985/1, 986/1, 987/1, 991/1a-c, 993/1; plastral fragments: 983/1, 984/1, 998/1.

#### DESCRIPTION

A group of 11 slabs represents shell fragments with smooth external surfaces. The slabs contain some fully readable shell elements dispersed among many shell fragments.

Seven samples are constituted of only carapacial fragments (the average size about 65 × 65 mm), which are identifiable when the external surfaces are exposed to see the scute sulci pattern: proximal and distal portions of pleurals, complete neurals, and one peripheral, plus many indeterminate carapacial pieces. MAUL 991/1a-c could represent the best samples among this group, a nearly complete carapace, but showing only its visceral surfaces the obtainable taxonomic information is very scarce, except for having smooth external surface shown by the mark visible on the slab.

MAUL 983/1, 984/1, 998/1 probably represent plastral fragments, as suggested by their flat morphology. The presence of spiny processes near the natural lateral edges of the samples MAUL 983/1 and MAUL 984/1 permits to attribute them to the medial elements of the plastron (hyo- or hypo-plastrals).

#### REMARKS

The remains belong to a cheloniid sea turtle characterized by the combination of the scute sulci and smooth surfaces. Because of the oblique position in the embedded matrix, the fragmentary nature of the remains, and the absence of the most informative bony elements, the skull and the leg bones, it is not possible to recognize diagnostic features to identify the material at genus level. MAUL 982/1, 983/1, 984/1, 985/1, 986/1, 987/1, 991/1, 993/1, 998/1, are therefore attributed to an indeterminate member of the family Cheloniidae.

#### CONCLUSION

The chelonian fossil assemblage of the Pietra Leccese, as shown also by the new remains here described, represents a typical Miocene sea turtle fauna. It is composed of dermochelyid (in this case, *Psephophorus polygonus*), decorated and smooth cheloniids (respectively, *Trachyaspis lardyi*; a form formerly referred to *Euclastes melii* and then to *Procolpochelys melii*, that still needs to be revised with a modern approach; indeterminate cheloniids), comparable to the chelonian fauna of the late Miocene of the Calvert Formation, composed by “*Psephophorus calvertensis*, *Trachyaspis lardyi*, and *Procolpochelys grandaeva* (Weems 1974, 1980).

Fossil dermochelyid turtles are known from several localities in the world during the Mesozoic and the Cenozoic. In the European sediments, the leatherback turtles are present from the late Paleocene, with *Eosphargis breineri*, to the early late Miocene, with *Psephophorus polygonus* (for a review of the Cenozoic forms, see Wood *et al.* 1996). The genus *Psephophorus* was formerly used as a waste-basket taxon, and many authors referred to it most of the dermochelyid remains; Wood and co-authors stated that the genus *Psephophorus* is restricted only to the species *P. polygonus*, present from the late Eocene (Germany), through the middle and late Oligocene (Germany and Poland), to all the Miocene (Slovakia, Austria and Italy).

The Pietra Leccese remains permit to confirm the coastal habitat of this taxon, as previously hypothesized in the literature, whereas the good preservation

and this exceptional finding allow for the first time on a single specimen the reconstruction of a large portion of the general morphology of the shell of a Cenozoic leatherback turtle.

In the Italian fossil record, *P. polygonus* remains are also known from the middle Miocene of the “Matese Orientale” near Benevento (Broin & Pironon 1980), while *T. lardyi* is also known from the early Miocene of Bolzano Bellunese (Misuri 1911).

The presence of *P. polygonus* in the Miocene of Pietra Leccese confirms the European range of this dermochelyid taxon, which shows a chronological distribution from the late Eocene to the early late Miocene, while *Trachyaspis* fossil record is restricted to the Miocene.

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