

Thaumatoporella parvovesiculifera (Raineri): typification, age and historical background (Senonian, Sorrento Peninsula – southern Italy)

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SUMMARY – The historical circumstances determining the inexact locality-indication (Torre d'Orlando, near Castellammare, Naples district) and the inexact age-attribution (Cenomanian) of the lectotype (designed in this paper) of *Gyroporella parvovesiculifera* Raineri (1922) are outlined. This taxon, type-species of *Thaumatoporella Pia* (1927), is a microfossil of debated taxonomic position well known in the Mesozoic carbonate-platform facies.

Really the others microfossils present in the Torre Orlando-labelled thin-sections, studied by Raineri, witness a Senonian rather than a Cenomanian age. Moreover the microfacies of these sections and the Senonian-rock distribution in the Castellammare zone allow us to specify better the type-locality. It is not Torre d'Orlando, where only Lower Cretaceous rocks outcrops, but is located a little to the south and likely along the coast-road at north-western slope of Monte S. Angelo near Meta di Sorrento.

RIASSUNTO – [*Thaumatoporella parvovesiculifera* (Raineri): tipificazione, età e antefatti storici (Senoniano, Penisola Sorrentina – Italia meridionale)] – Vengono illustrate le vicende storiche che determinarono la erronea attribuzione dell'età (Cenomaniano) e l'imprecisa designazione della località (Torre d'Orlando presso Castellammare in provincia di Napoli) del lectotipo (designato in questa sede) di *Gyroporella parvovesiculifera* Raineri, 1922, specie tipo del genere *Thaumatoporella Pia*, 1927. È questo un microfossile dalla posizione sistematica controversa, ampiamente diffuso nelle facies di piattaforma carbonatica di tutto il Mesozoico.

Gli altri microfossili, presenti nelle sezioni sottili etichettate "Torre d'Orlando", studiate da Raineri, indicano un'età senoniana anziché cenomaniana. Inoltre le microfacies di queste sezioni e la distribuzione delle rocce senoniane nella zona di Castellammare fa escludere che esse possano provenire da Torre d'Orlando (= Capo d'Orlando), dove affiora soltanto il Cretaceo inferiore. Le rocce da cui esse provengono si trovano verosimilmente poco più a Sud, lungo la litoranea che passa per le pendici nord occidentali del Monte S. Angelo presso Meta di Sorrento.

INTRODUCTION

Thaumatoporellas are widely cosmopolite microfossils reported from Japan and from Malaysia to Guatemala and Texas. They are largely widespread in the Bahamian platform facies from the Triassic (Ladinian) up to the Cretaceous end and disappear in Paleocene times. For this reason they have been attracting the authors' attention for a long time. In particular the species *Thaumatoporella parvovesiculifera* is recorded from Ladinian to Paleocene. Exhaustive indications about *thaumatoporellas* distribution are furnished by Senowbari-Daryan (1984).

About its systematic position, the authors' opinions are disagreeable: see at this purpose what synthesized by De Castro (1990). In reality in a same rock-sample or thin section of *thaumatoporellas* you can observe a puzzled coexistence of morphological and structural types linked by intergraded passages. This makes the individuation of different taxa difficult and consequently also doesn't permit a good utilization of these fossils to chronostratigraphic purposes.

Here the inexactness about *Thaumatoporella parvovesiculifera*'s type-locality and its age, through the events-history which determined them are clarified. The problem about *thaumatoporellas* systematic and

Thaumatoporella parvovesiculifera's variability is not the aim of this work.

ANTECEDENTS

The wide promontory of Capo d'Orlando, that to the northern side of Sorrento Peninsula, stretches oneself in the Naples Gulf, consists mainly of Cretaceous carbonates. It is well known in the geological literature for the seventeenth century end (Breislak, 1798) for having furnished, during the exploitation of the numerous quarries, present along the coast, many fossil fishes: it is the classical fossil fish's deposit of Castellammare. Between 1866 and 1910 the Capo d'Orlando rock-age, particularly the ichthyolite deposit one and a greenish marly level filled by orbitolinas (*Orbitolina*, *Orbitolina* or orbitolinids, level, *auct.*) overlying the ichthyolite deposit, had been source of controversial opinions. The age had been attributed to the Jurassic in a first time, then to the Lower Cretaceous (mainly Neocomian, but Urgonian, Urgo-Aptian, and Aptian) not excluding it might be Cenomanian; refer at this purpose to the detailed history by Bassani & D'Erasmo (1912). These Authors, both of Naples Istituto di Geologia and specialists of fossil fishes,

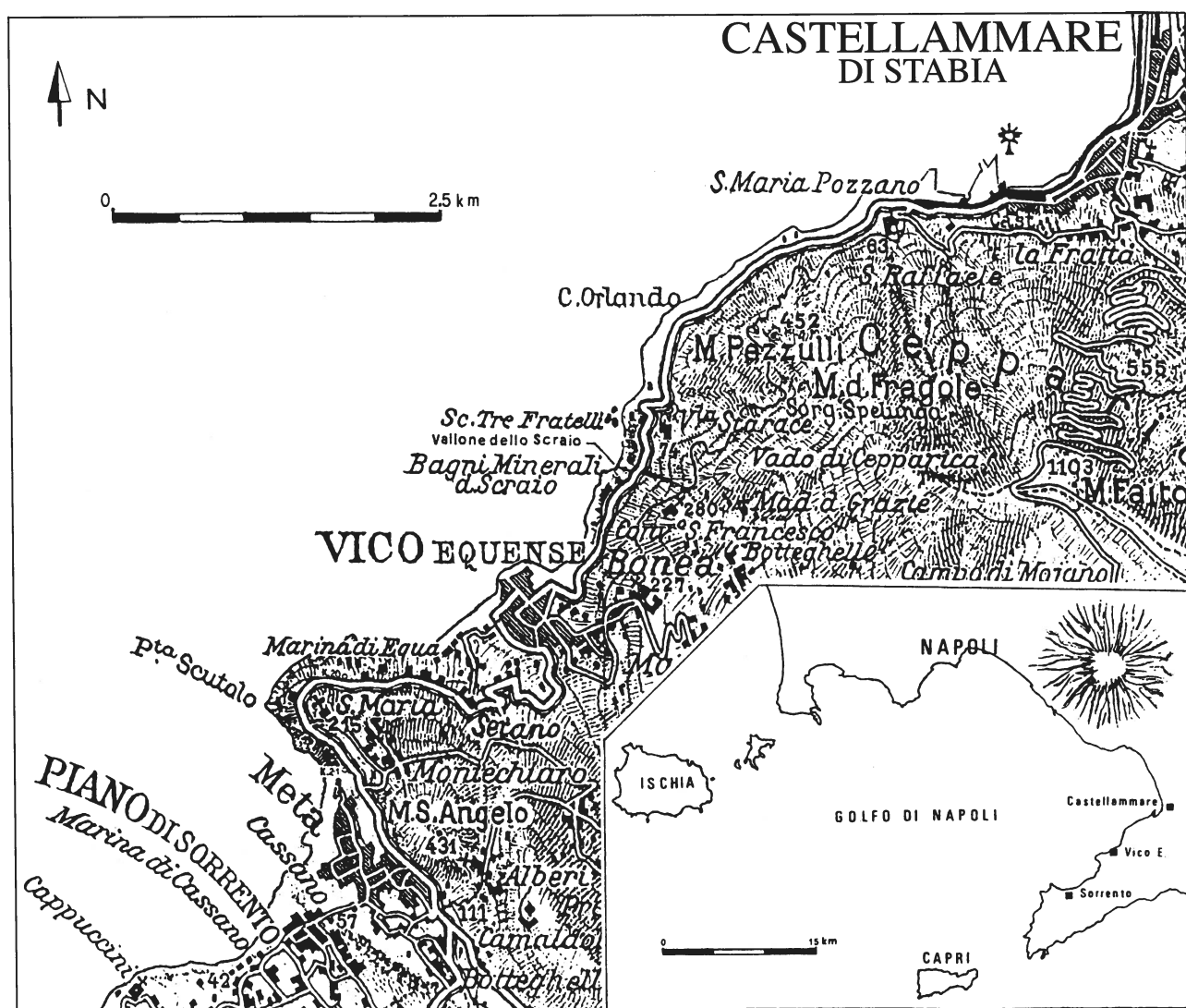
during the preparation of their important monograph about the ichthyolite deposit of Capo d'Orlando tried to settle the long-time existing problems.

They in order to come a surer fossil-fishes age-determination utilized both the numerous macrofossils of the *Orbitolina* level (well known since 1866) and some rudist-bearing rock-samples which supposed to be "interposed" to it (Bassani & D'Erasmus, 1912, p. 20). This supposition was surely influenced by Collomb and Spada's declaration of hippurites presence over and under the ichthyolite beds, though this

situation had been considered with reservation by other authors (Bassani & D'Erasmus, 1912, pp. 11-12).

It is to be said, at this purpose, that in neighbourhood of the *Orbitolina* level the stratigraphic sequence is not easily observable. As a matter of fact it lies in the quarry upper edge or high in position as to the quarry floor; moreover it may be hidden by detritus or its position may be made questionable by other overlying marly layers, *Orbitolina*-lacking.

Thus, this situation didn't allow both to verify the mentioned level relations with underlying/overlying



Text-fig. 1 - Part of a topographic map published in 1927 (not long after the Bassani & D'Erasmus monograph on the Capo d'Orlando ichthyolite deposit) by Touring Club Italiano (Guida d'Italia, Italia Meridionale, vol. II, Napoli e dintorni). All the localities of the older reported map can be easily identified on the actual ones too. However, in the recent maps, Punta Scutolo is more north-eastern locate (about 700 m.) and its position in the mentioned old map corresponds really to Punta Gradelle. The arrows indicate the actual position of the km 20 and km 21 milestones. Both the Vallone dello Scaio (Scaio small valley), corresponding to an important fault, and the actual position, marked by small ring, of the kilometres 20 and 21 (K.20, K.21) milestones has been introduced by the writer. The lectotype locality of *Gyroporella parvovesiculifera* lies likely between the west periphery of Seiano and about 250 metres to the north of the Km 21 milestone.

rocks and to take samples directly on it. However samples surely belonging to the marly *Orbitolina* level, easily recognizable for their colour and the characteristic-fossil abundance, freefall from the quarry upper parts, might be taken, however both at the quarry floors and along the coastal road too. Rudist-bearing limestone samples weren't taken either by Bassani and D'Erasmo or by Parona, but they belonged to the early collections of the Naples Museo di Geologia.

The authors availed themselves, to this purpose, other specialists' collaboration: i.e. Parona (Director of the Turin geological Institute) for the study of the mollusks and Prever for the orbitolines one. Parona identified some bivalves in the *Orbitolina* marl and the following rudists in the limestones

- *Sauvagesia nicaisei* Coquand, Cenomanian
- - *Eoradiolites* f. ind. (?),
- *Apricardia douvillei* Thomas & Peron (?), Upper Cenomanian.

On the bases both of the rudists (mainly *Sauvagesia nicaisei*) and the *Orbitolina* species (at time studied only with the inadequate morphologic criteria) and the age by themselves supposed for these fossils, Parona e Prever (Bassani & D'Erasmo, 1912, pp. 19-23) ascribed the *Orbitolina* level to Cenomanian. Relying on this result, Bassani & D'Erasmo attributed the same age to the Capo d'Orlando stratigraphic sequence and, consequently, to ichthyolite deposit too. This dating influenced greatly the Campania geology for about half-century.

Parona's taxonomic-identification of the bivalves coming from surely by *Orbitolina* level, as to say surely from Torre d'Orlando quarries, have been later on revised by De Castro (1962): his new taxonomic-recognitions together with the abundance of *Salpingoporella dinarica* (dasycladaleans), that is not over the Lower Albian, confirmed the Aptian age previously supposed by some authors. This age has been successively remarked by Cherchi *et al.* (1978) on the ground of *Orbitolina* morphostructural study and the new micropaleontological knowledge of the Cretaceous carbonate microfacies too.

In the limestone samples (included those afterwards indicated with A460 and A461) bearing rudists (at time often indicated inexactly as hippurites), Parona identified with sureness only *Sauvagesia nicaisei* Coquand, referring it to the Cenomanian. However, from Castellammare to the Sorrento-Peninsula extreme end, the Cenomanian is lacking while rudist-rich Senonian-limestones are widespread (refer to afterwards).

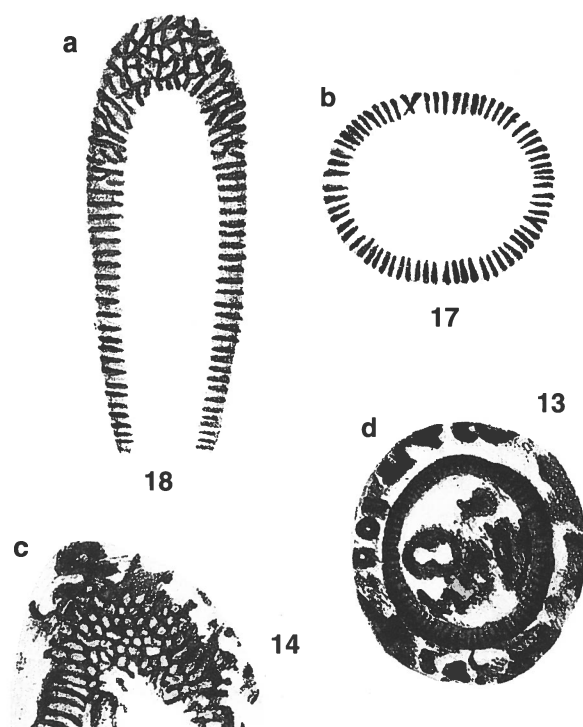
NEW DATA ON *THAUMATOPORELLA* *PARVOVESICULIFERA* (RAINERI)

The material studied by Raineri (1922), when established *Gyroporella parvovesiculifera*, type species of the genus *Thaumatoporella* Pia (1927), consists of

thin sections coming from the "rudists and miliolids Cenomanian limestones of Capo d'Orlando (Naples)", from the Turonian of Trevi (Fontana Mora and Fontana Capo d'Acqua localities) in Latium and from the Upper Cretaceous of Colle di Medea in Friuli. They had been supplied to Raineri by Parona (director of the Torinese Istituto di Geologia). Particularly the Capo d'Orlando thin sections come from by the samples given for study to Parona by Bassani (director of the Neapolitan Istituto di Geologia) on the occasion of the Bassani & D'Erasmo monograph on Capo d'Orlando fossil fishes (refer to Raineri, 1922, footnote 4 on p. 83 and p. 86).

Raineri (1922) did not supply the provenance of the specimens figured in thin sections. However, Pia (1938) could examine the same material and make known the localities reported on the thin sections labels. In a second time (1987-1988) also the writer has been able to study them.

Lectotype – Raineri (1922) gave the drawings of two specimens: a "longitudinal" section and a "transverse" one but didn't establish the holotype. She referred them to Dasycladaleans likely on the ground of the longitudinal section. Therefore I propose as



Text-fig. 2 - *Thaumatoporella parvovesiculifera* (Raineri) Pia, 1927 [*Gyroporella parvovesiculifera* Raineri, 1922]. a: Raineri original fig. 18 (drawing): "longitudinal section, x 37". b: idem fig. 17 (drawing): "transverse section, x 70". c: upper side of the specimen of Raineri fig. 18, redrawn partially by Pia (1938) at fig. 14; "x 60 about". d: specimen of Raineri fig. 17 redrawn by Pia (1938) at fig. 13, "x 60 about".

lectotype the specimen in “longitudinal” section corresponding to her fig. 18. This specimen has been partially redrawn by Pia (1938, pl. II, fig. 14) and is illustrated on pl. 1, fig. 1 of this work. The lectotype is present in the thin section marked by A11-137-6903 and by the indication, but inexact (refer to afterwards), Torre d’Orlando. This specimen pertains really to an oblique longitudinal section of a *Thaumatoporella* cylindrical branch.

The other specimen (isotype) figured by Raineri, also this redrawn by Pia (1938, pl. II, fig. 13), is present in the thin section A11/136, coming from Fontana Mora, and is shown, here, on pl. 1, fig. 9. There isn’t any proof that it really corresponds to a transversal section of a cylindrical body as Raineri believed.

Depository – All the material studied by Raineri (1922) belongs nowadays to “Parona Collection” and is deposited at the Museo Regionale di Scienze Naturali in Turin. The other thin sections studied by Raineri labelled Torre d’Orlando are A11/127-6903, A11/128-6903, A11/129-6903 (locality and numbers written by Raineri herself). In the labels the first two number (f.e. A.11-137) of the marks indicate the present call-number in the Turin Museum. In accordance with both the common number 6903 and the same petrographic and micropaleontological characters, all these thin sections have the same age and come likely from a same sample too. Therefore the No. 6903 corresponds likely to the sample from which the thin section was performed. The number 6903 didn’t marked by Turin or Naples institute-operators. Another institution (likely the Geological Survey) by request of Parona (at time president of both the Reale Comitato Geologico d’Italia and the Società Geologica Italiana), performed the thin sections by the sample temporarily furnished by the Naples Istituto di Geologia. In the Naples Paleontology Museum, the sample from which was likely performed the thin section group to which the lectotype belongs (refer to afterwards), lacked of any label but had an adjoined card bearing some essential indication. This sample has been indicated by the writer as A481 since 1962, when he carried out research about the *Orbitolina* level. Therefore 6903 and A481 refer likely to the same sample.

The sample A481 and the other rudist-bearing samples studied by Parona were surely present at Museo di Paleontologia (belonging to the Istituto di Paleontologia) of the Naples University at least up to 1980. At the present time they, despite of the researches carried out by the curator, they have not been found yet. It isn’t to be excluded that they have been lost during the collections-transfer suffered after the tremendous earthquake of November 20th, 1980.

Type-locality – The type-locality, on the ground of what will be said after, likely is the north-western

slopes of Monte S. Angelo, 435 metres a.s.l. (431 in some old maps), to the northern side of the Sorrento Peninsula, along the coast-road between Vico Equense and Meta di Sorrento, probably between the west periphery of Seiano and about 250 metres to the north of the Km 21 milestone. This place is situated more southern than Capo d’Orlando and about 7 km to south-west of Castellammare (Text-fig. 1).

Consideration on the lectotype-locality – In the past the wide Capo d’Orlando promontory, stretching oneself from Sorrento peninsula in the Naples Gulf, could be indicated also with Torre d’Orlando (f.e. Collegno, 1847; Pilla, 1843; Bassani & D’Erasmus, 1912, p. 185). This name however, isn’t present in the maps of Capo d’Orlando area. A tower indicated as Torre dello Scraio was present, up to the half of the last century, coastwise at the southern edge of the promontory.

The lectotype-locality can’t be Capo d’Orlando one even if it is a little far from it. As a matter of fact along the coast of Capo d’Orlando only Lower Cretaceous rocks no younger than the Lower Albian outcrop, while the Torre Orlando-labelled thin sections studied by Raineri, have undoubtedly Senonian microfossils (refer to afterwards).

The imprecise indication of the thin-sections provenience is likely to be attributed to the fact that the Capo d’Orlando place-name might be also employed to indicate near but less known localities. It is to be taken into consideration also that the Raineri thin sections, labelled as Torre Orlando, come from samples that hadn’t been collected either by Parona or by Bassani and D’Erasmus (Bassani & D’Erasmus, 1912, p. 24 foot-note 3). They really took part of “*campioni mutilati* (precedentemente troncati per studiare le Rudiste ?) *dell’antica collezione del Museo Geologico di Napoli*” [incomplete samples (previously cut for rudist study?) belonging to the ancient collection of the Naples Museo Geologico].

The first collections of this museum, founded in 1860 together with the Geology chair, were by far older than the birth of the museum itself, and came from the transfer of geo-paleontologic (not mineralogic-petrographic) samples from the Real Museo Mineralogico, open to public in 1801, to the neo-established geological institute.

Really, “*Rocce fossilifere di Castellammare* [Castellammare fossiliferous rocks]” correspond to numbers 4577-4702, in the “inventory of the state personal property existing in the Geological Museum by December 31st 1870, first series”.

Leopoldo Pilla, for a short time (from 1841 to 1842), and Arcangelo Scacchi, from 1844 to 1891, were the directors of the Real Museo Mineralogico, who were likely to take there samples of paleontologic interest. Pilla particularly had a thorough knowledge of the chronostratigraphic problems of Capo d’Orlando area and “*aveva raccolto esemplari di ippuriti anche negli strati di Castellammare* [had collected

hippurites specimens even in the Castellammare layers]" (Bassani & D'Erasmus, 1912, p. 10). Also Guiscardi, first director of the geological institute and annexed museum from 1860 to 1888, and moreover rudists-specialist, could collect these samples. Surely one of these samples (successively indicated by me as A480; refer to afterwards), on the base of the date reported on its joined card, was collected in 1863.

After the establishment of the Istituto di Paleontologia in 1932, the samples of paleontologic interest of the Museo di Geologia (included those coming from the Real Museo Mineralogico) were transferred to the newly-instituted Museo di Paleontologia. Of this museum D'Erasmus kept on being the accurate organizer and the jealous curator up to his death, suddenly overcome on the first days of February 1962. In that year the writer (1962, pp. 109-110), during his researches about the *Orbitolina* level, studied the material examined by Parona; it included also some rudist-bearing limestone-samples which lacked any recognizing mark but had adjoined cards.

The recognizing sample-marks by which they are indicated below was imposed by me to some thin slabs of theirs cut by me in order to perform thin sections; the indications which were present on the original adjoining cards follow. Every card had the indication, here omitted, "*determinazione Parona, Cenomaniano*" [taxonomic identification by Parona, Cenomanian].

A.480, Castellammare 8 marzo 1863, *Sauvagesia nicaisei*

A481, Torre d'Orlando, Castellammare, *Sauvagesia nicaisei*

A610, Torre d'Orlando, marne di Castellammare

A611, Torre d'Orlando, marne di Castellammare, *Sauvagesia nicaisei*,

A612, Torre d'Orlando, marne di Castellammare

A613, Torre d'Orlando, marne di Castellammare, *Eoradiolites* f. indet.,

A614, Torre d'Orlando, marne di Castellammare, *Apricardia douvillei* Thomas & Peron (?).

All these samples, except for A.641, contain similar microfacies and are referred to the same age (Senonian) (see below). In particular A481 present the major lithologic and micropaleontological affinities with the thin section group which the lectotype belongs to. It is likely, consequently, also on the base of what is said later, that the lectotype comes from this sample.

Only A614, the only without radiolitid fragments, contained an association totally different; it is attributable to Lower Cretaceous for the occurrence of *Vercorsella laurentii* (Sartoni & Crescenti) and dasycladalean algae equal or similar to *Salpingoporella mühlbergii* (Lorenz). It is likely that this sample comes really from the Capo d'Orlando quarries.

On the base of recent geological researches (G. Cavuoto and C. Donadio, personal communication,

December 2001), along the coast going from Castellammare to Sorrento, the Upper Cretaceous outcrops, nearest to Capo d'Orlando, are present in the graben comprised between the small Scraio valley and Meta di Sorrento town. Nevertheless along this coastal band, the Mesozoic limestones outcrop poorly between Capo d'Orlando and Vico Equense (including the eastern periphery of the Seiano village) due also to urbanization. So it is foreseeable that the sample A481 comes from a bit more southern outcrops, as to say from the Monte S. Angelo (435 meters a.s.l.) north-western or western slopes of the Monte S. Angelo which is essentially made by Senonian carbonates, often radiolitid rich (De Castro, 1967; Carannante *et al.*, 1998, 1999). These outcrop spectacularly at the north-western slope of the mountain along the coast-road ("Strada statale 145 della Penisola Sorrentina") between the western periphery of Seiano suburb and Meta di Sorrento small town.

In particular the macro-micropaleontological characteristics both of the lectotype and the other Torre d'Orlando labelled thin-sections, studied by Raineri, make us to presume that the sample from which they come from, might have probably been taken between the western periphery of Seiano and about 250 metres north of the 21 km milestone.

The presumed lectotype locality agrees to what was acquainted to the late eighteenth and first nineteenth centuries' geologists. Collegno already (1847, pp. 253-254; refer also to Bassani & D'Erasmus, 1912, pp. 10-11) declared that "*...sulla strada nuova di Sorrento all'Ovest di Vico-equense il calcare sembra quasi impastato di sole ippuriti delle quali si riconosce immediatamente la forma generale, benchè, a cagione appunto del loro impastamento nella roccia, sia difficile determinarne la specie*". [*...on the new road of Sorrento at the west of Vico Equense, the limestone seemed to be made only by hippurites of them you immediately recognize the general shape though, because of their pasting in the rock, it is difficult to identify the species*]. Also Pilla (1845) had written that the ichthyolite limestones "*...fanno parte di un promontorio calcareo [Capo d'Orlando] ch'è evidentemente neocomiano, perché a piccola distanza dai pesci fossili, cioè presso Vico, contiene un gran numero di ippuriti e di altri fossili neocomiani*". [*...belong to a calcareous promontory [Capo d'Orlando] that is evidently Neocomian in age, because in a short distance from fossil fishes [deposit], as to say nearby Vico, contains a great number of hippurites and other Neocomian fossils*]. As regards the hippurites Guiscardi (1866), rudist specialist, had remarked "*per quanti individui egli ne avesse veduti, erano Sferoliti*". [*for the great deal he himself had seen of them, they were spherolites*].

(The reported passages give an idea about the confused and approximated evaluations of those times on both the fossil age and systematic and the stratigraphy too.)

Type-level – The lectotype thin section (A11-137-6903) agrees with a fossiliferous limestone (wackestone) of Senonian age (likely Upper Santonian-Middle Campanian; refer to afterwards) and is almost totally occupied by a radiolite fragment. The microfossils (: frequent; * very frequent) are mainly *T. parvovesiculifera** (various-shape sections: from cylindrical to round and to irregular), "*Aeolisaccus*" *kotori* Radoicic*, *Sgrossoella parthenopeia* De Castro*, *Accordiella conica* Farinacci, *Moncharmontia apenninica* (De Castro), *Rotorbinella scarsellai* Torre, *Nummuloculina robusta* Torre, *Murgella lata* Luperto Sinni, textularids (*Textularia*, *Spiroplectammina*) and *Spiroloculina*-like miliolids.

A11-127-6903 contains also *Stensioina surrentina* Torre; in A11-129-6903 *Moncharmontia compressa* (De Castro) and rare fossils similar to *Bacinella irregularis* Radoicic (? Porifera) are present.

The sample of the Naples paleontology museum from which the Torre d'Orlando thin sections studied by Raineri likely come from, as it is said above, is here indicated with A481. It presents the same microfacies of the lectotype thin section; however the greater number of thin sections performed by him allows to be more precise on the fossiliferous content. This sample also contains a big fragment of radiolitid (*Sauvagesia nicaisei* according to Parona), and numerous well preserved microfossils: *Thaumatoporella parvovesiculifera* (various-shape sections: from cylindrical to round and to irregular), *Aeolisaccus kotori* Radoicic*, *Sgrossoella parthenopeia* De Castro*, *Accordiella conica* Farinacci, *Moncharmontia apenninica* (De Castro)*, *Rotorbinella scarsellai* Torre*, *Nummuloculina robusta* Torre, litiolids, miliolids* (among them *Quinqueloculina*, *Triloculina* and *Spiroloculina*-like forms), *Pseudocyclammina*, *Dicyclina schlumbergeri*, *Reticulinella fleuryi* Cvetko *et al.* (this recently-established species from the Brač Island is ascribed to Upper Santonian - Middle Campanian [Cvetko *et al.*, 1997; Cvetko Tešović *et al.*, 2001]; it is reported here for the first time in Italy). The occurrence, according to Parona, of Cenomanian *Sauvagesia nicaisei* (Coquand) in this sample as well in the other above mentioned ones, containing at the

same time undoubtedly Senonian microfacies, rises perplexity. With regard to this, it must be kept in mind that Bassani and D'Erasmo placed only incomplete samples at Parona disposal.

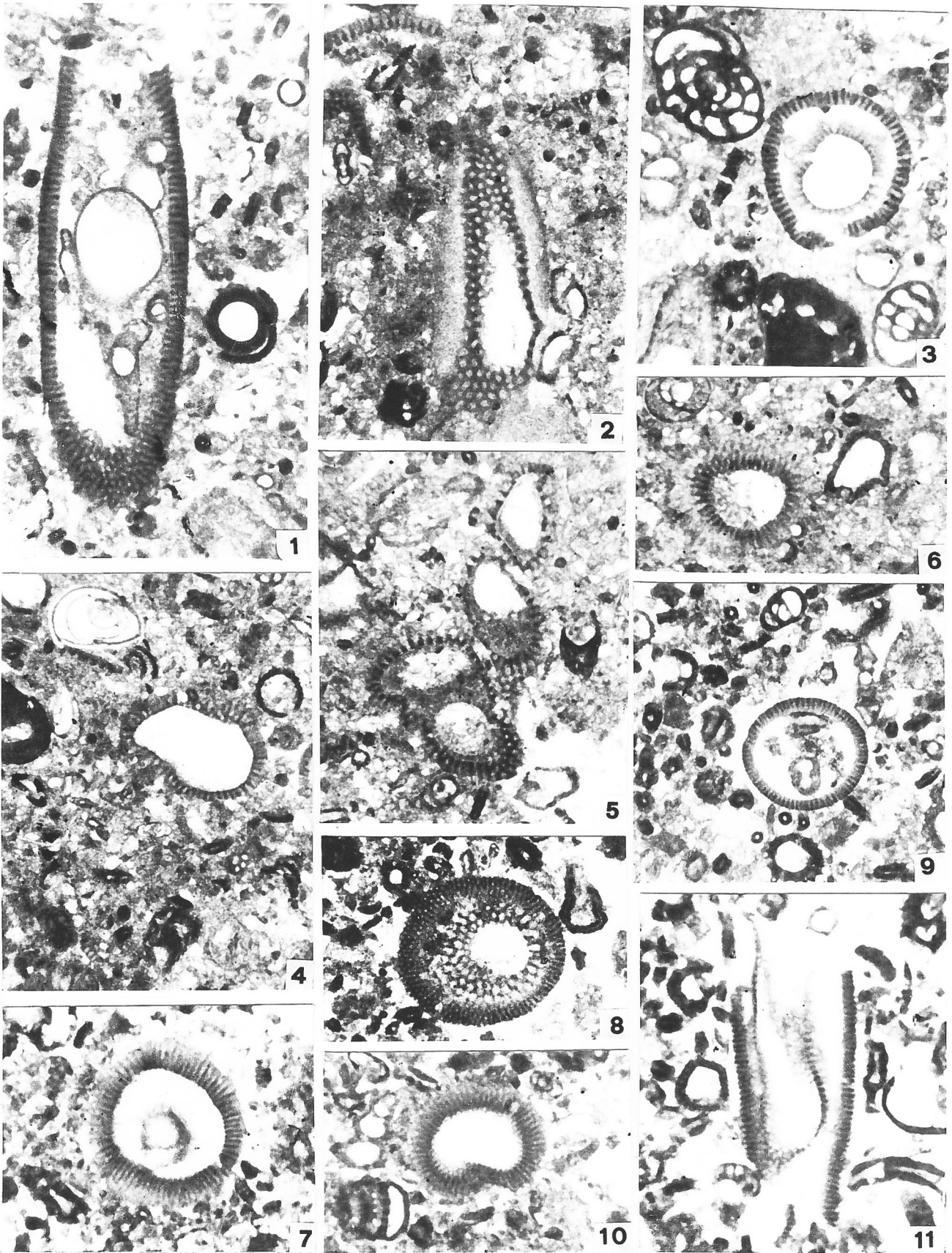
The above-mentioned Monte S. Angelo (435 meters a.s.l.) near Meta di Sorrento is made by a carbonate sequence relatively uniform of about 400 meters in thickness. The lower part of the stratigraphic succession dips to NNE mainly at about 14°-19°; so the dipping tends to diminish and in the uppermost part takes the value of about 5° (Text-fig. 3).

The sequence is mainly made by calcilutites, calcarenites and dolomites often radiolitid-rich. Dolomites are more frequent in the lower part while in the middle and upper parts are less frequent or lacking. Intraformational breccias made by carbonate polygenic clasts, often black coloured, are present subordinately; these are frequent chiefly in the middle sequence and often occur in the upper part of calcilitic and/or calcarenitic layers. The limestones often contain greenish or yellowish irregular marly inclusions. The colour of the rock ranges from the dark hazel-brown to the dark-grey in the lower mainly-dolomitic part of the sequence, while in the middle and the upper ones is mainly light-brown or hazel-brown. The layer-thickness is comprised between some centimetres and beyond two metres, but is more frequent of 15-90 centimetres. The sequence has been studied by De Castro (1966) and referred to the Senonian; recently it has studied also by Carannante *et al.* (1999) for stratigraphic purposes and facies analysis.

Taking the layer-dipping into consideration, the carbonates outcropping in the above supposed lectotype-locality, pertain to the middle/upper part of the Monte S. Angelo sequence. In this interval, corresponding to the "upper interval" of Carannante *et al.* (1998, 1999), these authors report numerous radiolitids (mainly Sauvagesinae) belonging to *Bournonia excavata* (D'Orbigny), *Sauvagesia tenuicostata* Polsak, *Rajka spinosa* (Milovanovic), *Biradiolites angulosissimus* Toucas. On the ground of the now mentioned species they have assigned this stratigraphic interval to Santonian. Therefore on the ground of the

EXPLANATION OF PLATE 1

- Fig. 1 - *Thaumatoporella parvovesiculifera* (Raineri) [*Gyroporella parvovesiculifera* Raineri, 1922]. Lectotype corresponding both to the Raineri (1922) pl. III/fig.18 and Pia (1938) pl. II/fig.14. Collezione-Parona thin-section labelled "Torre d'Orlando, A11/137 - 6903" pertaining probably to a sample coming from the north-western slopes of Monte S. Angelo, to the north of Meta di Sorrento. Senonian (likely Lower Santonian-Middle Campanian). x 48.
- Figs. 2-6 - *Thaumatoporella parvovesiculifera* (Raineri). Various shaped specimens. Collezione-Parona thin-sections labelled "Torre d'Orlando" and "A11/129 - 6903" (figs. 2-3), "A11/128 - 6903" (figs. 4-6). These thin sections pertained probably, to the same above cited sample coming likely from the north-western slopes of Monte S. Angelo, to the north of Meta di Sorrento. Senonian (likely Lower Santonian-Middle Campanian). x 48.
- Figs. 7-11 - *Thaumatoporella parvovesiculifera* Raineri. Various shaped specimens. Collezione-Parona thin-sections labelled "Anticoli (Trevi)" and "A11/133" (figs. 7, 10), "A11/136" (fig. 8-9), "A11/135" (fig. 11). Fig. 9, in particular, is an isotype corresponding to the Raineri (1922) fig. 17, coming according to Pia (1938) from Fontana Mora and redrawn by this author at fig. 13. Senonian. x 48.



chronostratigraphic significance of both the rudists and the foraminifers (in particular to *Reticulinella fleuryi* like forms), the age of *Gyroporella parvovesiculifera* lectotype can be ascribed to the Senonian (Upper Santonian-Middle Campanian).

The isotype thin-section A11/136, come likely from a Senonian wackestone with bivalve fragments, *Thaumatoporella parvovesiculifera** (various-shape sections: from cylindrical to round and to irregular), *Aeolisaccus kotori**, textularids, lituolids, miliolids* (among them *Quinqueloculina* and *Spiroloculina*-like costate forms), *Pseudorhapydionina mediterranea* De Castro.

The Fontana Capo d'Acqua thin sections (A11-132, A11-133, A11-135) are surely Senonian in age too and show microfacies quite similar to the previous one: bivalve fragments, thaumatoporellas* (various-shape sections: from cylindrical to round and to irregular), *Aeolisaccus kotori**, ?*Sgrossoella parthenopeia*, *Moncharmontia apenninica*, *Accordiella conica*, *Pseudorhapydionina mediterranea*, *Dicyclina*, miliolids*, nubecularids*, textularids, lituolids.

Among the Colle di Medea thin sections of the Parona Collection observed by myself, only A10-158 contains thaumatoporellas and presents a microfacies

dubitably comparable to the previous ones. The other microfossils are bivalves fragments and poorly preserved forms (f.e. *Cuneolina pavonia* ?, ? *Pseudorhapydionina mediterranea*, ? *Sgrossoella parthenopeia*).

CONCLUSIONS

The first description of *Gyroporella parvovesiculifera* Raineri, type-species of *Thaumatoporella* Pia, is closely linked to the age-determinations of both the fossil-fish deposit and the *Orbitolina* level of Capo d'Orlando (= Torre d'Orlando) near Castellammare (Naples district). The above-cited species was founded on rudist-limestone thin-sections but this authoress didn't designate the holotype; consequently one of the two drawings furnished by her is proposed in this paper as lectotype.

Raineri received the thin sections by Parona and this author in tour received the material from which they were performed by Bassani and D'Erasmo. These authors in fact, in order to come a surer age of the famous ichthyolite deposit of Capo d'Orlando utilized both the numerous macrofossils of the overlaying well-known marly *Orbitolina*-level and some rudist-bearing limestone samples. These were erroneously supposed to



Text-fig. 3 - A representative small interval of the Monte S. Angelo sequence. The mountain, 435 metres high (431 in some old maps), consists of a thick sequence of Senonian carbonates, distinctly cyclic at places. The lectotype of *Gyroporella parvovesiculifera* Raineri, type species of *Thaumatoporella*, comes likely from its north-western slopes. The well bedded sequence, is mainly made by often radiolitid-rich calcilutites, calcarenites and dolomites.

be "interposed" to the *Orbitolina* level and come from its same locality. Really the rudist-bearing samples were not taken either by Bassani and D'Erasmus or by Parona, but belonged to the early collections of the Geological Museum which came, in a large part at least, from the Real Museo Mineralogico (open in 1801).

On the base of both the available, largely poorly-preserved fossils and erroneous indication on their provenance, Parona attributed to the Cenomanian the material received. Consequently the *Orbitolina* level, the ichthyolite deposit and the lectotype of *G. parvovesiculifera* were considered to have the same age.

Capo d'Orlando, really corresponds to the *Orbitolina*-level locality but, contrarily to what it was believed, only a part of the material given for study to Parona and Prever come from it (*Orbitolinas* and non-rudist bivalves of the *Orbitolina* level). Moreover along the coast of Capo d'Orlando, the outcropping carbonate-platform facies (including the *Orbitolina* level) are surely Lower Cretaceous in age (De Castro 1962; Bravi & De Castro, 1995).

The rudist limestone samples (consequently the *G. parvovesiculifera* lectotype too), owing to the rather vague or imprecise indications than available, were erroneously thought to come from Capo d'Orlando. Really they don't come not only from Capo d'Orlando but on the base of their microfossils, well known in the Mediterranean basin are referable to the Senonian (likely Lower Santonian-Middle Campanian). Both the Mesozoic outcrop-age and distribution in the Sorrento Peninsula, permit to believe that they likely come from a more southern area lying to the north-western slopes of Monte S. Angelo, along the coast-road between Vico Equense and Meta di Sorrento.

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