Reworked foraminifera in the Triassic Monte Facito Formation Auctt., Lagonegro Basin (southern Apennines, Italy)

CIARAPICA, Gloria, et al.

Abstract

Two Upper Permian fusulina subzones are reworked in the lower part of the Triassic Monte Facito Formation, Lagonegro Basin, southern Apennines: the Neoschwagerina craticulifera subzone of Middle Murghabian age and the younger Neoschwagerina margaritae subzone of Upper Murghabian age. Above the margaritae subzone, large fusulinas are absent and, in our interpretation, replaced by smaller foraminifera of Upper Permian age (Djulfian s.l.). We have also retained the hypothesis, that at the end of the Permian (Dorashamian) there existed, for a time, conditions of emergence. The discovery of Meandrospira pusilla, in the turbiditic lower part of the Monte Facito Formation, shows that also Lower Triassic microfaunas have been reworked. The occurrence of Lower Triassic palynomorphs in the shaley beds of the same turbiditic sequence seems to confirm this age determination. The Permian foraminifera encountered in the lower part of the Monte Facito Formation have been compared with other Permian microfaunas of the western Tethys (Valley of the Sosio, Sicily; Djebel Tebaga, southern Tunisia; the Julian and Carnian Alps; the [...]
REWORKED FORAMINIFERIA IN THE TRIASSIC
MONTE FACITO ORMATION AUCTT., LAGONEGRO BASIN
(SOUTHERN APENNINES, ITALY)

Nota dei Soci GLORIA CIARAPICA (*), SIMONETTA CIRILLI (*), ROSSANA MARTINI (**),
ROBERTO PANZANELLI FRATONI (*) & LOUISETTE ZANNETTI (***) e di GIOVANNA SALVINI-BONNARD (***)

ABSTRACT

Two Upper Permian fusulinia subzones are reworked in the lower part of the Triassic Monte Facito Formation, Lagonegro Basin, southern Apennines: the Neoschwagerina craticulifera subzone of Middle Murghabian age and the younger Neoschwagerina margaritae subzone of Upper Murghabian age.

Above the margaritae subzone, large fusulinas are absent and, in our interpretation, replaced by smaller foraminifera of Upper Permian age (Djulfian s.l.). We have also retained the hypothesis, that at the end of the Permian (Dorashamian) there existed, for a time, conditions of emergence.

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The Permian foraminifera encountered in the lower part of the Monte Facito Formation have been compared with other Permian microfaunas of the western Tethys (Valley of the Sosio, Sicily; Djebel Tebaga, southern Tunisia; the Julian and Carnian Alps; the Dinarides).

KEY WORDS: Monte Facito Formation, Triassic, reworked Permian and Triassic foraminifera, Fusulinacea, Lagonegro Basin, Southern Apennines.

RIASSUNTO

I rimaneaggiamenti delle microfaune permiane superiori nella parte inferiore della Formazione triassica di Monte Facito risultano interessare almeno due sottozona di Fusuline: la sottozona a Neoschwagerina craticulifera (Murghabiano medio) e la sottozona a Neoschwagerina margaritae (Murghabiano superiore).

Le grandi Fusuline che scompaiono nei livelli più elevati del Permiano sono sostituite, secondo la nostra interpretazione, da piccoli Foraminiferi la cui età è riferibile al Giuliano s.l. Viene pure proposta l’ipotesi dell’instaurazione in Appennino meridionale di condizioni temporanee d’emersione verso la fine del Permiano (Dorashiamiano).

La segnalazione di Meandrospira pusilla, anch’essa risiedimentata nella parte inferiore della Formazione di Monte Facito, permette di riconoscere anche microfauna del Trias inferiore in alcuni degli intervalli torbiditici. Questa datazione confermata dalla presenza di palynomorfi di età triassica inferiore nei livelli marnosi delle sequenze torbiditiche.

È possibile infine stabilire dei confronti tra le microfaune permiane dell’Appennino meridionale e quelle di altre regioni della Tetide occidentale (Valle del Sosio, Sicilia; Djebel Tebaga, Tunisia meridionale; Alpi Giulie e Carniche; Dinaridi).

TERMINI CHIAVE: Monte Facito, Trias, Foraminiferi permiani e triassici rimaneaggiati, Fusulinacea, Bacino di Lagonegro, Appennino meridionale.

INTRODUCTION

The here described foraminifera have been encountered in the lower part of the Triassic Monte Facito Formation, Lagonegro Basin, southern Apennines (CIARAPICA et al., 1990). They occur in polygenic conglomerates (calcirudites and calcarenites), often showing graded bedding, which contain variable amounts of
quartz and pelites. Some of these conglomerates are rich in Permian foraminifera, others contain Lower Triassic microfaunas.

Donzelli & Crescenti (1970) had already reported the occurrence of "probabilmente rimane-neggiato" Permian material in an isolated block found near the top of the Monte Facito (fig. 1). Donzelli and Crescenti's material was re-examined first by Pasini (1982), who only considered the fusulinas, and then by Ciarpica, Cirilli, Martini & Zaninetti (1986), who reviewed the smaller foraminifera. These later investigations were made in order to determine the age interval represented by the reworked Permian foraminifera and also to compare them with Permian microfaunas from other regions of the western Tethys.

I. THE CONGLOMERATES OF THE MONTE FACITO

In the lower turbiditic part of the Monte Facito Formation several beds of reworked conglomerates have been observed. On the outcrop, these conglomerates show similar lithological aspects. However, their microscopic examination reveals different types distinguished on the basis of sedimentological and above all micropaleontological criteria. Using these criteria, four types of fossiliferous conglomerates have been recognized. They are listed in stratigraphic order from the base of the Upper Permian to the Lower Triassic (fig. 2). This order does not necessarily correspond with the chronology of the re-depositional events, and in particular does not permit to deduce an overall Permo-Triassic age for the Monte Facito Formation of which we know that at least a portion is of Middle Triassic age.

The principal conglomerates of the lower part of the Monte Facito Formation are:

— the Chusenella conglomerates;
— the Neoschwagerina conglomerates;
— the smaller Permian foraminifera conglomerates, occasionally oolitic;
— the Meandropsira pusilla conglomerates, occasionally oolitic (broken oolites).

I.1. THE "PERMIAN" CONGLOMERATES

The samples from these conglomerates contain the only Permian microfossils so far discovered in the southern Apennines. The limestones outcropping at Abriola were considered to be Permian by Azzaroli (1961) and Luperto (1963, 1965a, b), but are, in fact, of Triassic age (see Panzanelli Fratoni et al., 1987). Donzelli & Crescenti (1970) were the first to report the occurrence of calcareous "brecciole" and calcarenites of Permian age in the «lower member» of the Monte Facito Formation and to describe summarily their microfaunas. In view of the presence of well dated Permian foraminifera within a formation which was considered to be Triassic, these authors (1970, p. 10) proposed that the overall age of the Monte Facito Formation could be Permian to Middle-Upper Triassic. However, the later work done on Donzelli and Crescenti's material by Pasini (1982) and by Ciarpica et al. (1986) confirmed the reworking of Permian foraminifera in the Monte Facito Formation so that its age is post-Permian. Sedi-
REWORKED FORAMINIFERA IN THE TRIASSIC MONTE FACITO FORMATION AUCT., LAGONEGRO BASIN

![Table and Diagram]

Fig. 2. - Stratigraphical position of the reworked Permian and Triassic foraminifera in the conglomerates of the lower part of Monte Facito Formation.

mentologically, the lower part of the Monte Facito Formation is of turbiditic origin. Hence the occurrence of reworked material.

**Foraminifera**

The most characteristic foraminifera found in the Permian conglomerates of the Monte Facito Formation are Fusulinacea (Fusulinidae, Verbeekinidae, rare Ozawainellidae). These larger foraminifera are often associated with Nodosinellidae, Geinitzinidae, Palaeotextulariidae, Tetrataxidae, Biseriamminidae, Endothyridae, Lasiodiscidae, Hemigordiopsidae, etc.

a) **Fusulinacea**

Two assemblages of fusulinas can be recognized (fig. 2). One characterizes the “Chuse-nella conglomerates”, which has until now only been found in the region south of Moliterno (fig. 1), and the other the “Neoschwagerina conglomerates”, which is found in most of the fossiliferous Permian samples encountered on the slopes of the Monte Facito. In spite of the fact, that the Permian foraminifera have been reworked, the above mentioned groups do not occur together. They come from two distinct Upper Permian subzones of the “Neoschwagerina Zone”, i.e. the Chusenella assemblage from the Neoschwagerina craticulifera Subzone and the Neoschwagerina assemblage from the Neoschwagerina margaritae Subzone (fig. 2). Hence, the reworked associations seem to reflect their original compositions.

b) **Smaller foraminifera**

Most of the Permian species of smaller foraminifera had already been observed in Donzelli and Crescenti’s material by CIARAPICA et al., (1986). Of particular interest is the description of *Crescentia vertebralis* CIARAPICA, CIRILLI, MARTINI & ZANINETTI 1986, and the first record in the southern Apennines of *Dagmaritida, Paradagmaritida, Paraglobivalvulina, Abadehella*, etc., and particularly of “Kamurana bromimanni” which, in Turkey, is a good marker in the Upper Permian for the youngest Paleozoic beds (ALTINER & ZANINETTI, 1977; ALTINER, 1981).

I.2. THE CONGLOMERATES OF LOWER TRIASSIC AGE WITH *Meandrospira pusilla*

The conglomeratic intercalations containing Lower Triassic foraminifera differ, on the outcrop, in their sedimentological features not much from those with Permian material. However, the microscopic examination shows the presence of numerous specimens of *Meandrospira pusilla*. This characteristic species suggests that also Lower Triassic sediments have been reworked in the lower part of the Monte Facito Formation. The conglomerates with *Meandrospira pusilla* belong to the turbiditic sequence of the lower part of the Monte Facito Formation, consisting of calcarenites, quartzarenites, often showing crossbedding, and shaley beds. The
shales have yielded palynomorphs, also of Lower Triassic age:

— Densoisporites nejburgii (SCHULZ) BALME, 1970;
— Densoisporites playfordi (BALME) PLAYFORD, 1965;
— Lundbladispora brevicula BALME, 1963;
— Endosporites papillatus JANSNIUS, 1962;
— Acritharchs of the group Micryhystridium-Veryhachium.

II. THE AGE OF THE PERMIAN MICROFAUNAS

II.1 THE Chusenella CONGLOMERATES

These conglomerates contain the oldest fusulinas known so far in the southern Apennines. The association is characterized by the following species:

— Chusenella (Sosioella) sosioensis PASINI, 1964;
— Neoschwagerina ex gr. craticulifera (SCHWAGER, 1883);
— “Schwagerina” sp.;
— Afghanella schencki THOMPSON, 1946;
— Sumatrina sp.;
— Yanghienia thompsoni SKINNER & WILDE, 1966.

The genera Chusenella, Neoschwagerina and Afghanella occur often associated with Schwagerinidae ("Schwagerina") and occasionally with Sumatrina. The genus Pseudodololina, which is present in the Neoschwagerina association, has not been observed in the Chusenella conglomerates.

This assemblage of fusulinas can be placed in the Neoschwagerina craticulifera Subzone of Upper Permian, Middle Murghabian age (fig. 2).

II.2. THE Neoschwagerina CONGLOMERATES

These conglomerates, which correspond to the "Yabeina conglomerates" described by PANZANELLI FRATONI et al. (1987), and by CIARAPICA et al. (1988) contain a younger association of fusulinids. The more important species are listed below:

— Neoschwagerina cristatulifera (SCHWAGER, 1883), with transitional forms to Neoschwagerina margaritae DEPRAT, 1913;
— Sumatrina sp.;
— Pseudodololina sp.;
— Yanghienia thompsoni SKINNER & WILDE, 1966;
— "Schwagerina" sp.;
— Afghanella schencki THOMPSON, 1946, rare.

The dominant element of this microfauna is the genus Neoschwagerina, the other genera being only occasionally present. Of particular interest is the almost complete disparition of Afghanella and the occurrence of Pseudodololina, so far known only in two localities of the Mediterranean basin, the southern Apennines and the Dinarids.

The Neoschwagerina assemblage is placed into the Neoschwagerina margaritae Subzone of Upper Permian, Upper Murghabian age (fig. 2).

II.3. THE SMALLER PERMIAN FORAMINIFERA CONGLOMERATES

These conglomerates are finer grained than the preceding ones and contain smaller foraminifera of Upper Permian age. Fusulinaceae are virtually absent. It is, therefore, difficult to establish a zonal age for these associations. The virtual absence of the large tests of fusulinas may be due to the mechanical selection of only smaller sized grains, or these fine grained conglomerates could represent a particular stratigraphic interval above the Neoschwagerina margaritae ubzone. The latter possibility may be the most probable one in view of the high Permian age of some of the smaller foraminifera (Crescentia, Paradagmaria, Paraglobivalvula?, Kamurana, etc., see detailed list in PANZANELLI FRATONI et al., 1987). On the basis of this asso-

Plate 1 - 1,2,4: Neoschwagerina sp., transitional form from N. craticulifera (SCHWAGER, 1883) to N. margaritae DEPRAT, 1913; 4: detail of the central part; 3: Chusenella (Sosioella) sosioensis PASINI, 1964; 5: Yanghienia thompsoni SKINNER & WILDE, 1966; 6: Afghanella schencki THOMPSON, 1946; 7: Sumatrina sp.; 8: Pseudodololina sp.; 9,10: Neoschwagerina ex gr. craticulifera (SCHWAGER, 1883); 10: detail of 9b. - Neoschwagerina craticulifera Subzone (Middle Murghabian) typical association: Neoschwagerina ex gr. craticulifera, Schwagerinidae, Chusenella, Afghanella, Sumatrina. - Neoschwagerina margaritae Subzone (Upper Murghabian) typical association: Neoschwagerina sp. (transitional forms from N. craticulifera to N. margaritae), Pseudodololina, Schwagerinidae, rare Afghanella. - 1,2,4,7-10: Locality Monte Facito; 1: RP 84 gr; 2,9,10: RP 84 a; 4,7: RP 85 l; 8: RP 86 c; 3,5,6: Locality Ricotta Fetente (Moliterno region); 3: RP 89; 5: RP 98 a; 6: RP 98 l.
ciation of smaller foraminifera we arrived at a Djulfian s.l. (Midian to Dorashamian) age for these conglomerates. The terminal Permian beds, at the end of the Dorashamian, could be represented by continental sediments, hence not documented by marine microfossils.

The Upper Permian, from the Murghabian to the Dorashamian, seems to be almost completely reworked and redeposited in the lower part of the Monte Facito Formation.

These results confirm and improve in a certain measure those obtained by Donzelli & Crescenti (1970, p. 17) who arrived at a Permian age, probably Middle to Upper Permian [for us, the Murghabian and a higher Upper Permian (Djulfian s.l.) (fig. 2)] for the Paleozoic microfaunas redeposited in the Triassic of the Lagonegro Basin. Pasini (1982), on the other hand, proposed the presence of two groups of fusulinas. One group is of Lower Permian age (this interval is, according to our studies, not represented), and the other one would be characteristic for the interval from the Middle to the base of the Upper Permian (in our interpretation, the probable equivalent of the Murghabian and a younger interval within the Djulfian s.l., fig. 2).

III. COMPARISON WITH OTHER PERMIAN LOCALITIES OF THE WESTERN TETHYS

The Permian outcrops nearest to those here described are situated in the valley of the Sosio, Sicily, and in the Djebel Tebaga, S. Tunisia. It seems, therefore, obvious to compare the microfaunas from these localities with those from the southern Apennines, and also with those from the “Middle” to Upper Permian of the Carnian and Julian Alps and of the Dinarides.

In the valley of the Sosio, Skinner & Wilde (1966) placed the Permian microfaunas, as was already done by Miller (1933), in the Lower Guadelupian which, according to our investigations, may correspond with the Neoschwagerina craticulifera Subzone (fig. 2). Also for Pasini (1964), the microfauna from the valley of the Sosio is “di indubbia età guadelupiana” that is of “Middle Permian” or Murghabian age in our interpretation (fig. 2).

From the Tunisian locality at Djebel Tebaga, Skinner & Wilde (1967) described microfaunas similar to those found in the Permian of the southern Apennines, except for the presence in Tunisia of the genus Yabeina, so far not observed, according to Pasini (personal information), in the Monte Facito Formation. The stratigraphic sequence of the Permian fusulinas from the Djebel Tebaga is not known, but the general composition of the microfaunas is suggestive of the presence of two zones of fusulinas: the Afghanella Zone (Gluntzeboeckel & Rabate, 1964) which probably corresponds with the Neoschwagerina Zone (fig. 2), and the younger Yabeina Zone. The hypothesis for this latter zone is based on the presence of abundant Yabeina; Yabeina syrtalis, Yabeina punica in the Djebel Tebaga (Skinner & Wilde, 1967).

The Permian foraminiferal associations of the southern Apennines also show similarities with those of the “Middle Permian” (Murghabian) to Upper Permian encountered reworked in conglomerates of Ladinian age in the Julian Alps (Ramows & Kochansky-Devide, 1979). The sedimentological situation is quite similar to that observed at the base of the Monte Facito Formation. Also the microfaunas are similar, at least in the “Middle Permian” characterized by Neoschwagerina craticulifera, Kahlertina, Sumatrina, etc.

In the Carnian Alps, Fluge, Kahlert & Kahlert (1978) have reported a fusulina assemblage which is close to that of the Chusenella Zone of the southern Apennines. These authors listed in their “feinbrekzisen Kalke” (p. 451) of Middle Permian age (probably Murghabian in our interpretation, see fig. 2) Neoschwagerina craticulifera, Afghanella, Chusenella, Sumatrina, etc., and compared the microfaunas with those from the Neoschwagerina beds of the Julian Alps (Kochansky-Devide, 1967).

ACKNOWLEDGEMENTS

The authors wish to express their thanks to Prof. M. Pasini, Siena University, for the critical review of the manuscript.

Manoscritto consegnato il 31 gennaio 1989
Testo accettato per la stampa il 26 giugno 1989
Ultime bozze restituite il 27 marzo 1990

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