CALCAREOUS NANNOFOSSIL BIOSTRATIGRAPHY OF THE BASAL PART OF VIGLA SHALE MEMBER (IONIAN ZONE) IN ITHAKI ISLAND; PRELIMINARY RESULTS*

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ABSTRACT

The calcareous nannofossil biostratigraphy, performed at the basal part of the Vigla Shale Member (Frygano section, Ithaki Island), permits its biostratigraphic correlation with the uppermost part of BC21 biozone (Bown *et al.*, 1998) and the upper part of NC7 biozone (Roth, 1978), which chronostratigraphically point to Late Aptian. This result reinforces the hypothesis that the deposition of Vigla Shales is isochronous in the Ionian zone.

ΠΕΡΙΛΗΨΗ

Στα πλαίσια της παρούσας εργασίας πραγματοποιήθηκε δειγματοληψία από το κατώτερο τμήμα των Σχιστολίθων της Βίγλας, από την τομή Φρύγανο (νήσος Ιθάκη). Η ανάλυση με βάση τα ασβεστολιθικά ναννοαπολιθώματα επιτρέπει τον βιοστρωματογραφικό συσχετισμό της βάσης των Σχιστολίθων της Βίγλας στην τομή Φρύγανο, με το ανώτερο τμήμα των βιοζωνών BC21 (Bown *et al.*, 1998) και NC7 (Roth, 1978), που χρονοστρωματογραφικά συσχετίζονται με το Ανώτερο Απτιο. Η πιστοποίηση της ηλικίας της βάσης των Σχιστολίθων της Βίγλας στη νήσο Ιθάκη (εξωτερικό περιθώριο της Ιονίου λεκάνης) ως Ανώτερο Απτιο, ενισχύει την υπόθεση ότι η απόθεση των Σχιστολίθων της Βίγλας είναι ισόχρονη.

1. Introduction. Geological Setting

Ithaki Island mainly consists of Ionian zone sediments, represented according to IGME map (1991) by Upper Triassic-Middle Lias Pantokrator limestones, Toarcian "Ammonitico Rosso", Doggerian cherts, limestones and shales, Vigla limestones, Albian-Touronian cherts (corresponding to Vigla Shale Member), Senonian clastic limestones, Paleocene-Eocene sublithographic limestones and flysch.

The stratigraphy of the Ionian zone (external Hellenides, western Greece) exhibits three distinct sequences (Kara-

*ΒΙΟΣΤΡΩΜΑΤΟΓΡΑΦΙΚΟΣ ΠΡΟΣΔΙΟΡΙΣΜΟΣ ΜΕ ΒΑΣΗ ΤΑ ΑΣΒΕΣΤΟΛΙΘΙΚΑ ΝΑΝΝΟΑΠΟΛΙΘΩΜΑΤΑ ΤΟΥ ΚΑΤΩΤΕΡΟΥ ΤΜΗΜΑΤΟΣ ΤΩΝ ΣΧΙΣΤΟΛΙΘΩΝ ΤΗΣ ΒΙΓΛΑΣ (ΙΟΝΙΟΣ ΖΩΝΗ) ΣΤΗ ΝΗΣΟ ΙΘΑΚΗ. ΠΡΟΔΡΟΜΑ ΣΤΟΙΧΕΙΑ

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kitsios, 1992, 1995); a prerift, a synrift and a postrift sequence. The latter one consists of the Vigla limestones and overlying Alpine formations and is defined by an Early Berriasian break-up at the base. The postrift sequence continued till the end of the Eocene, followed by the deposition of flysch sediments (Karakitsios 1992, 1995; Sotiropoulos *et al.* 2003).

The Vigla limestone Formation comprises a thick succession of thin-layered, sublithographic pelagic limestones with frequent cherty beds. The radiolarian fauna from the lowermost part of Vigla limestones have shown that these strata were deposited after the Middle Tithonian (Karakitsios *et al.*, 1988).

Karakitsios & Koletti (1992) concluded that the beginning of Vigla limestone deposition is isochronous in the Ionian zone and starts in Early Berriasian. In their upper part, Vigla limestones contain a series of organic matter-rich marlstones and shales interbedded in limestone and chert beds; the Vigla Shale Member. This member corresponds to the Albian-Cenomanian "Upper Siliceous Zone" of IGRS-IFP (1966). More recently Karakitsios *et al.* (2004) dated the Vigla Shales at Gotzikas area (NW Epirus) as Aptian-Touronian.

The main scope of the present study is to give further evidence concerning the biostratigraphic correlation of the Vigla Shale Member at the westernmost margin of the Ionian zone, on the basis of calcareous nannofossil analysis.

2. Materials And Methods. Description Frygano Section

We examined the Vigla Shale Member in Frygano section, located at the middle part of Ithaki Island (Fig. 1), along the

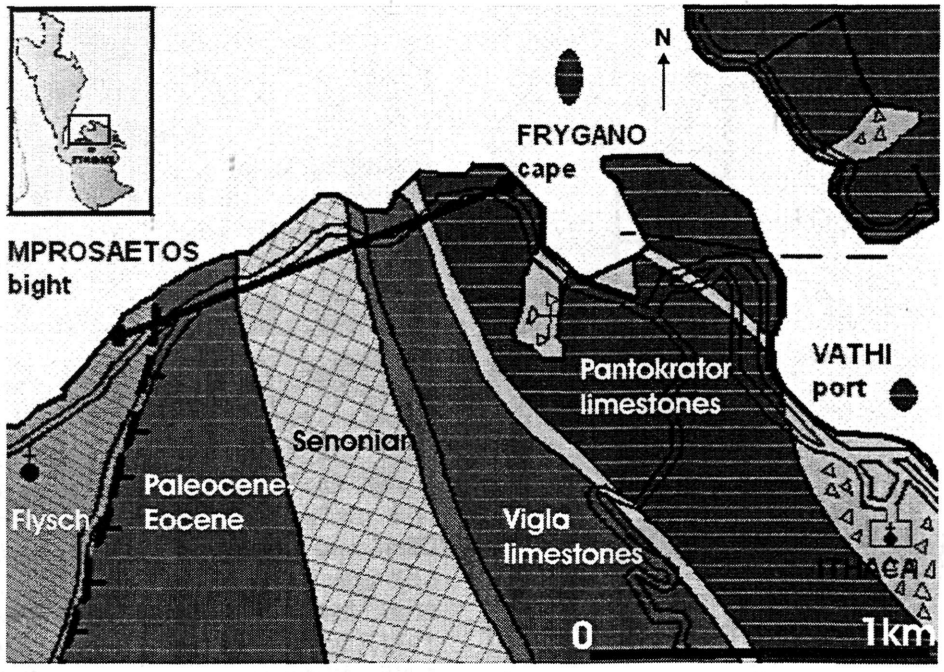

Fig. 1. Location of Frygano section at Ithaki Island and geological map of the area after IGME (1991).

motorway connecting the city of Ithaki (east) with Mprosaetos bight to the west. It comprises of more than 1 km of sediments, representing an almost complete stratigraphic column of the Ionian zone (Fig. 2). Thirty six samples have been collected throughout the section, but in the framework of this study only those coming from the Vigla limestones, and in particular the Vigla Shale member, have been analyzed. The Vigla limestones are represented in Frygano section by more than 100m in thickness, white, thin-layered pelagic limestones with chert intercalations. The Vigla Shale Member is represented in the same section by thin-layered marly horizons interbedding the limestone layers (Fig. 3). Smear slides for nannofossil analysis have been prepared with standard techniques and analyzed under light microscope (LM). In order to search thoroughly for the marker species, around 1650 fields of view have been investigated per slide, under 1250x. The taxonomy of the determined calcareous nannofossil species has been based on Perch-Nielsen (1985) and Bown *et al.* (1998). The nannofossil biostratigraphic results are based on the biozonal schemes of Roth (1978) and Bown *et al.* (1998).

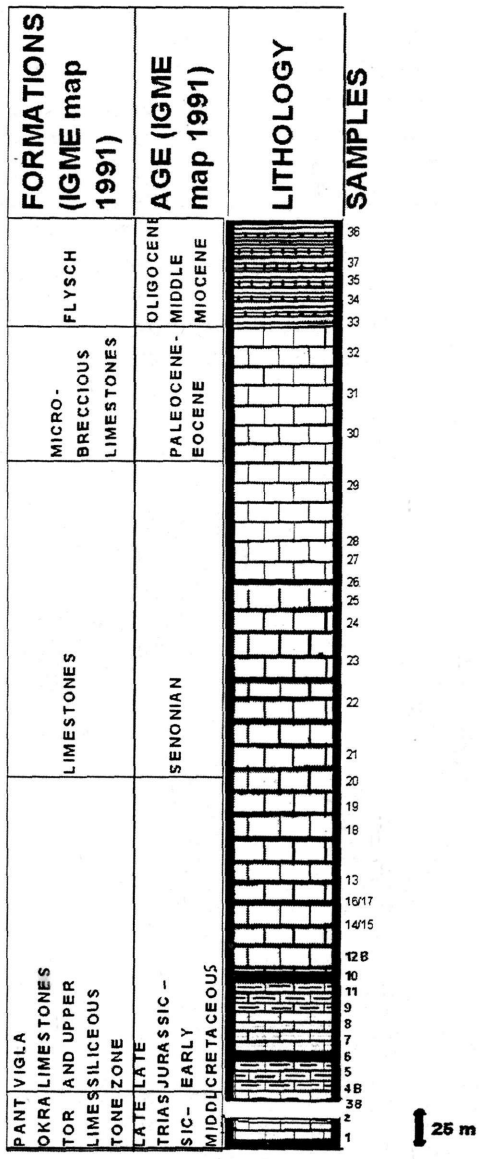

Fig. 2. Lithostratigraphic column of Frygano section.

3. Calcareous Nannofossil Biostratigraphy

The analyzed samples show nannofosil abundances which range from rare to abundant; the preservation state is moderate to poor.

The assemblages (Tab. 1) are dominated by:

Rhagodiscus achylostaurion (Hill, 1976) Doeven, 1983, *R.gallagheri Rutledge* & Bown (1996), *Polypodorhabdus madingleyensis* Black, 1971, *Retecapsa surirella* (Deflandre & Fert, 1954) Grun in Grun and Allemann, 1975, *Flabellites oblongus* (Bukry, 1969) Crux in Crux *et al.*, 1982, *Helenea chiastia* Worsley, 1971, *Cyclagelosphaera margerelii* Noel, 1965, *Watznaueria manivitiae* Bukry, 1973, *Watznaueria britannica* (Stradner,

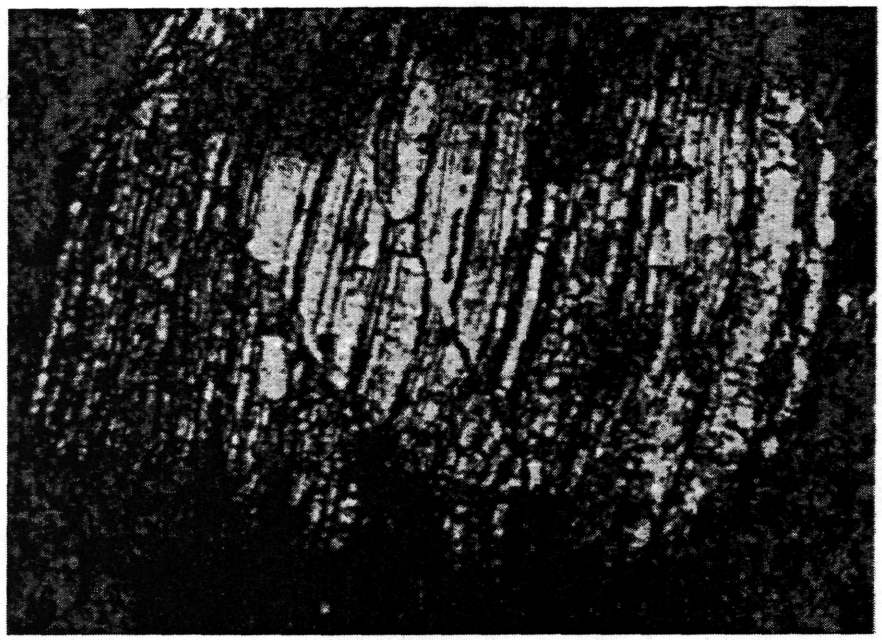

Fig. 3. Outcrop of Vigla Shale Member at Frygano section, Ithaki Island.

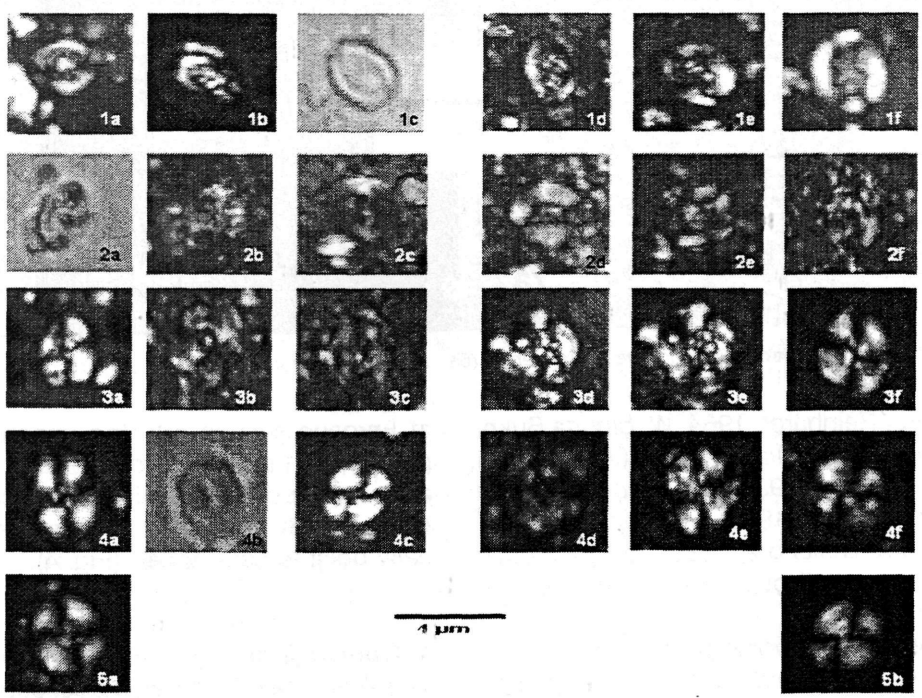

Table 1. *Rhagodiscus achylostaurion (1a), R.gallagheri (1b - f, 2a), Polypodorhabdus madingley-ensis (2b), Retecapsa surirella (2c -e), Flabellites oblongus (2f, 3a - 3c), Helenea chiastia (3d - e), Watznaueria manivitiae (3f), Cyclagelosphaera margerelii (4a - b), Watznaueria britannica (4c -d), W. biporta (4e - f, 5a - b)*

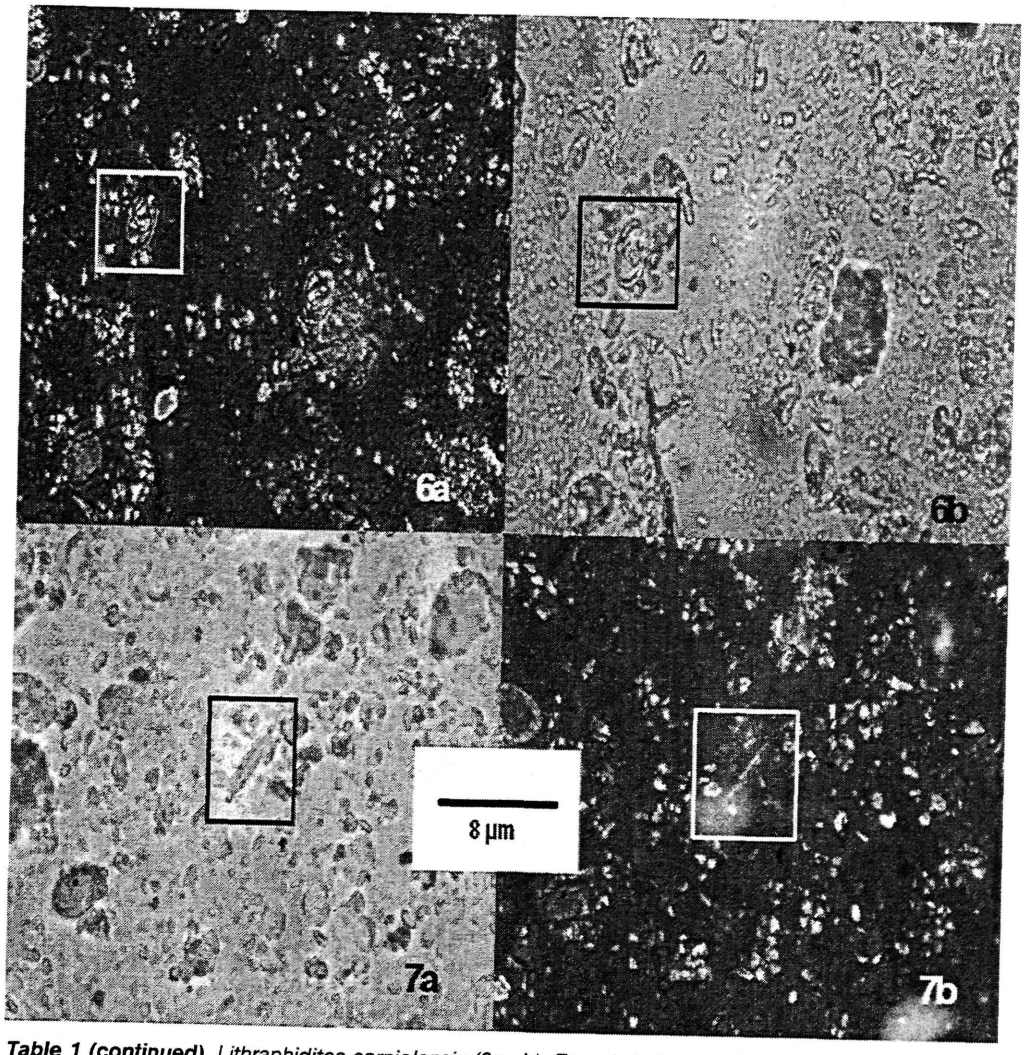

Table 1 (continued). *Lithraphidites carniolensis (6a - b), Zeugrhabdotus embergeri (7a - b).*

1963) Reinhardt, 1964, *W. biporta* Bukry, 1969, *Farhania varolii* (Jakubowski, 1986) Varol, 1992, *Nannoconus* cf. *truitti* Bronnimann, 1955, *Lithraphidites carniolensis* Deflandre, 1963, *Zeugrhabdotus embergeri* (Noel, 1959) Perch-Nielsen, 1984.

The contemporaneous presence of *Rhagodiscus achylostaurion, R. gallagheri*, *Nannoconus* cf. *truitti* and *Farhania varolii* allows the biostratigraphic correlation of the base of Vigla Shale Member at Frygano section with the uppermost part of BC21 biozone (Bown *et al.*, 1998) and the upper part of NC7 biozone (Roth, 1978), which chronostratigraphically point to Late Aptian (Fig. 4).

4. Conclusions

The Vigla Shale Member, a siliceous and organic carbon-rich facies, was considered before as Albian-Cenomanian in age (IGRS-IFP, 1966). Recently

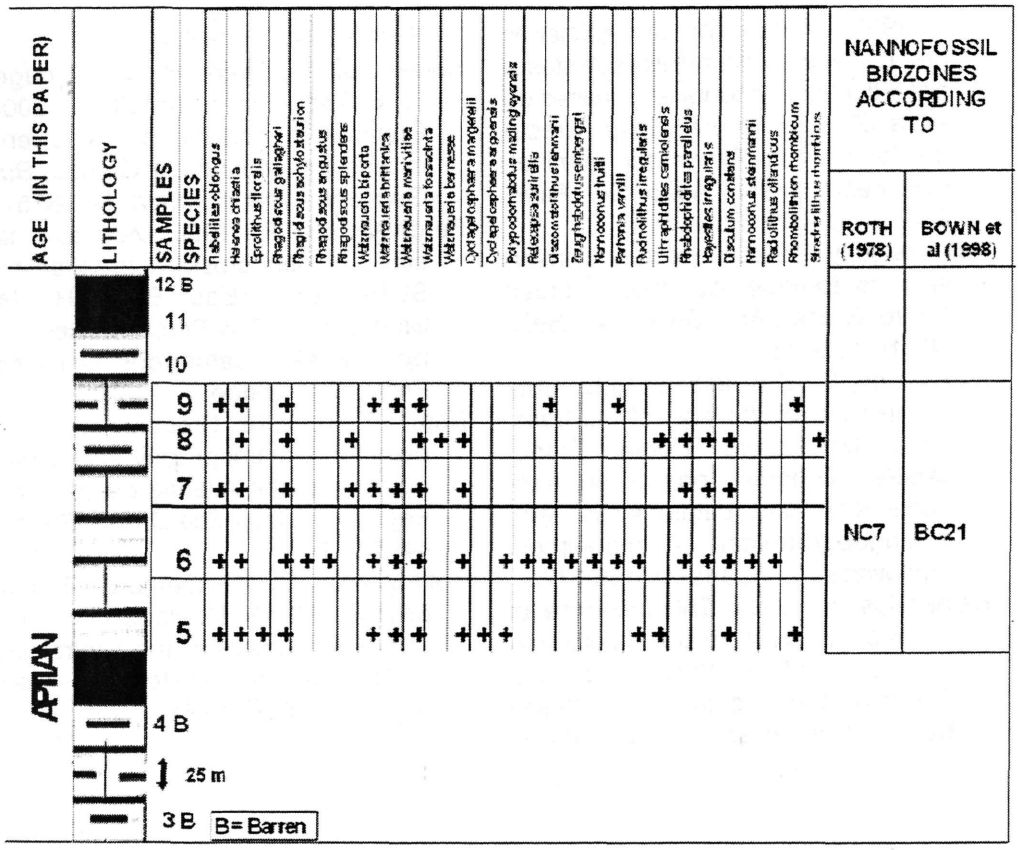

Fig. 4. *Calcareous nannofossil species distribution and biostratigraphic correlation of the Vigla Shale Member at Frygano section*

Karakitsios *et al.* (2004) dated the Vigla Shales at Gotzikas area (NW Epirus) as Aptian-Touronian.

The present study performed at the basal part of the Vigla Shale Member (Frygano section, Ithaki Island), permits its biostratigraphic correlation with the uppermost part of BC21 biozone (Bown *et al.*, 1998) and the upper part of NC7 biozone (Roth, 1978), which chronostratigraphically point to Late Aptian.

The determined age fits well with previous biostratigraphic data, reinforcing the hypothesis that the deposition of Vigla Shales is isochronous in the Ionian zone.

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