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STRATIGRAPHY AND PETROLOGY OF THE EOCENE ROCKS AT MAGHAGHA (EAST AND WEST), NILE VALLEY, EGYPT

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ABSTRACT

Combined paleontological and petrological studies on the Eocene rocks at Maghagha revealed that the succession belongs to one biostratigraphic zone; the *Nummulites gizehensis gizehensis* zone. *Nummulites striatus* was recorded in this zone. This implies that the range of *N. striatus* should be lowered to the dawn of the middle Middle Eocene.

The nature of the faunal content of the succession together with its lithological characteristics suggests deposition in a quiet shallow marine environment.

INTRODUCTION

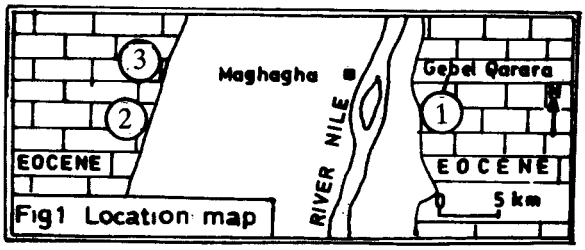
Geologists used to use *Nummulites striatus* (Bruguiere) as an index species for the Upper Eocene (Priabonian) in Egypt (e.g. Cuvillier, 1930; Said, 1962). Shama and Blondeau (1979) recorded *Nummulites* striatus in the Upper Lutetian in Fayoum, P. 14 Blow zone.

According to Strougo (1977 & 1979), it is possible to invisage an approximate correlation between the first occurrence of *Carolia placunoides* Cantraine and the base of the *Globigerinathska semiinvoluta* (Keijer).

Based on *Nummulites* Bishay (1966) and Omara *et al* (1977) related the succession at Maghagha to the late Lutetian (=P12 Blow) and showed that it represents the Qarara Formation and a part of El Fashn Formation. However, their work was restricted to sections east of the Nile Valley. This led the writers to carry out the present work aiming to date and correlate sections east and west of the Nile and elucidate the environmental conditions of deposition. To achieve this, three stratigraphic sections were measured and sampled. (See Fig. 1). Thin sections were examined and point-counted. The results obtained were used to construct a correlation chart.

STRATIGRAPHY

The three measured sections are correlatable in a way that they all start with a thick mudstone layer followed by intercalations of marls and impure limestones (Qarara Formation). The latter is followed by white, hard and massive limestones, cherty at top (lower part of El-Fashn Formation). Microfaunal constituents are *Nummulites discorbinus, N. beaumonti, N. gizehensis, N. striatus* and representative of the families Discocyclinidae and Nonioniidae.



Mega-Fossils are represented by *Wakullina (Huyella) lefeverei, Pycnodonte (Pycondonte) gigantica, Euspatangus* sp., Echinolampas sp., *Conoclypeus* sp., *Vulsella* sp., *Porocidaris* sp., *Sismondia* sp., and members of bryozoa.

The following is a description of the studied three stratigraphic sections; the given petrographic names of the limestones are according to the nomenclature scheme of Folk (1959);

Section (1)

Bed No.	Description	Thickness (m)
Top:	Ground Surface	
9	White limestone (Nonionid biomicrite) with Nonionidae and chert nodules	3.6
8	Chert nodule band	0.4
7	White limestone (Nummulitid-bryozoanechinodermal biomicrite)	4.5
6	White-purple limestone (Nummulitidbryozoan biomicrite)	0.6
5	White limestone (Pelecypod-nummulitidbryozoan biomicrite)	5.0
4	Marl and impure limestone intercalations containing *Nummulites beaumonti* and echinodermal and pelecypod fragments and bryozoda	20.0
3	Impure limestone (Nummulitid biomicrite) with *Nummulites beaumonti, Nummulites gizehensis gizehensis* and *Nummulites striatus.*	6.6
2	Impure limestone (Pelecypod-bryozoan biomicrite)	11.1
1	Clayey siltstone, brownish greenish in colour	9.1
Base:	Not exposed Total	60.9

Section (2)

Bed No.	Description	Thickness (m)
Top:	Ground Surface	
11	White limestone (Pelecypodechinodermal biomicrite) containing chert nodules	9.2
10	White limestone (Bryozoan-pelecypodal biomicrite)	1.7
9	White limestone (Bryozoan-pelecypod-echinodermal biomicrite), flaky	7.3
8	Impure limestone (Bryozoan-nummulitid biomicrite) contains Nummulites	1.8
7	Impure limestone (Pelecypod-bryozoan biomicrite)	1.7
6	Impure limestone (Pelecypodal biomicrite)	5.5
5	Marl, glauconitic	0.5
4	Impure limestone (Bryozoan-pelecypodal biomicrite	3.2
3	Marl, glauconitic containing *Nummulities discorbinus* and *Nummulites beaumonti*	8.2
2	Impure limestone (Nummulitid-echinodermal biomicrite) contains *N. beaumonti, N. gizehensis gizehensis* and *Nummulitis striatus.*	8.8
1	Silty claystone, greenish in colour	11.1
Base:	Not exposed Total	59.0

Section (3)

Bed No.	Description	Thickness (m)
Top:	Ground Surface	
15	White limestone (Pelecypod-bryozoan biomicrite) contains chert nodules	9.2
14	White dolomite (Finely crystalline nummulitid dolomite)	3.6
13	Impure limestone (Nummulitid echindrmal biomicrite)	7.9
12	Marl	3.2
11	Impure limestone (Nummulitid biomicrite) contains *Nummulites beaumonti*	7.3
10	Silty claystone, greenish in colour	2.3
9	Impure limestone (Nummulitid-pelecypodal biomicrite) contains *Nummulites beaumonti* and *Nummulites striatus*	0.3
8	Marl (Pelmicrite) contains *Nummulites* sp. and glauconite pellets.	1.0
7	Marl contains *Nummulites beaumonti,* reddish in colour	1.5
6	Marl contains *Nummulites discorbinus* and *N. beaumonti*	0.9
5	Impure limestone (Nummulitid biomicrite) contains *Nummulites beaumonti, N. gizehensis gizhensis* and *Nummulites striatus.*	9.1
4	Marl contains *Nummulites* sp. and glauconite pellets	0.8
3	Clayey siltstone	0.4
1	Clayey siltstone	16.5
Base:	Not exposed Total	65.8

PETROGRAPHY

The results of the petrographic investigation of the collected samples and the quantitative determination of the various components (Fig. 2) reveal that the succession can be subdivided into four lithologic units. Unit A, at base, is dominantly mudstones; Unit B is a thick layer of impure limestone containing *Nummulites gizehensis;* Unit C is made up of layers of impure glauconitic limestones alternating with marls; Unit D, at top, is white limestones containing chert nodules. The percentage distributions of the microconstituents in the different units are shown of Fig. 2.

Mudstones are made up of silts and clays if different proportions. *Nummulites* spp. and glauconitic pellets are sometimes observed.

Impure limestones (Pl. 1, Figs. 3 & 4) are referred here to rocks similar in many aspects to the marls, but partially crystalline, hence harder, and may contain more carbonates. The insolube residue is high and similar in composition to that of the marl (Pl. 1, Figs. 3 & 4).

The marls (Pl. 1, Fig. 1) are brownish in colour and made up mostly of fine insoluble clastics (very fine sands, silts and clays) in a fine carbonate matrix (micrite and finely broken fossil debris) *Nummulites* spp. and other fossils and fossil fragments are embedded in the matrix. Glauconite grains and pellets are common.

White limestones are hard and massive and the the primary isoluble residue is either small in amount or negligible; recrystallization is usual and in one layer (section 3, bed 14); all the carbonate matrix is replaced by fine dolomite rhombs (Plate 1, Fig. 2).

The reported glauconite grains in Unit C have radial cracks which may be the result of dehydration of strongly hydrous and gelatinous glauconite. It seems to have been formed in place from colloidal masses in a shallow marine environment (Yagi, 1929; Takahashi, 1939 and Blatt *et al,* 1980).

The diagenetic origin of the reported glauconite as being formed from biotite flakes or clay pellets is excluded here or the evidence that no such materials are encountered.

The petrographical characteristics of the studied sections together with their faunal constituents indicate deposition in a shallow marine environment. The changed from turbid at base to a clear one at top as indicated by the general decrease of the primary insoluble clastics from Unit A to Unit D.

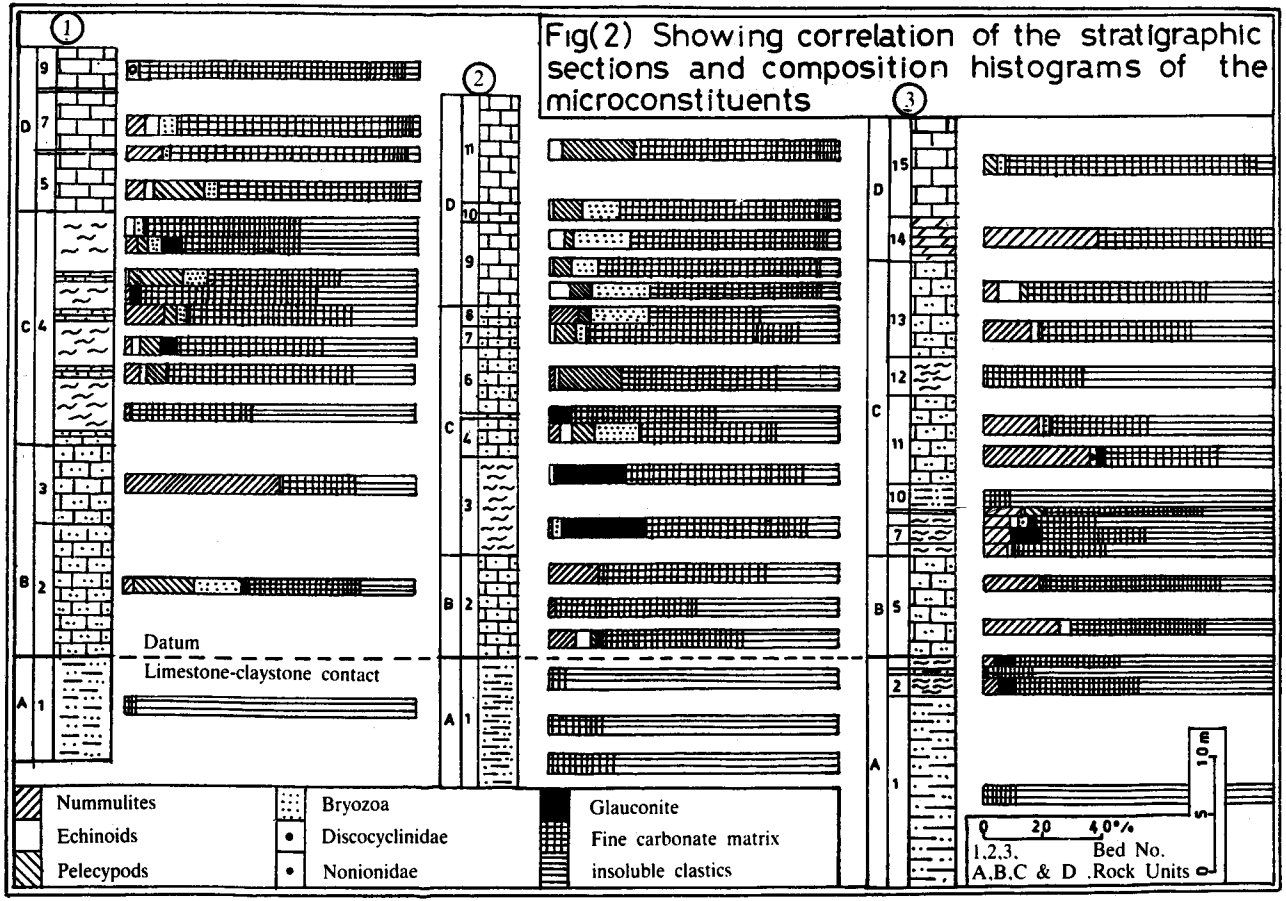


Figure 2. Showing correlation of the stratigraphic sections and composition histograms of the microconstituents.

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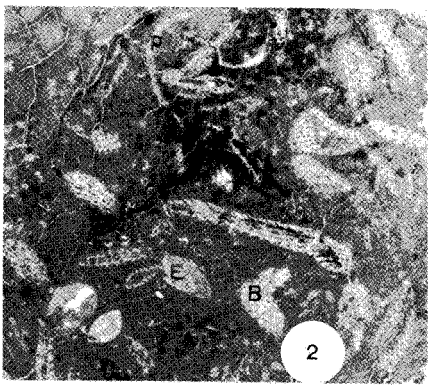
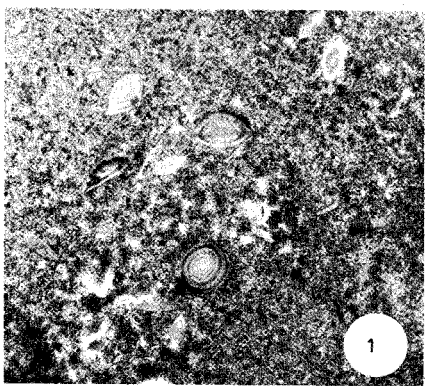




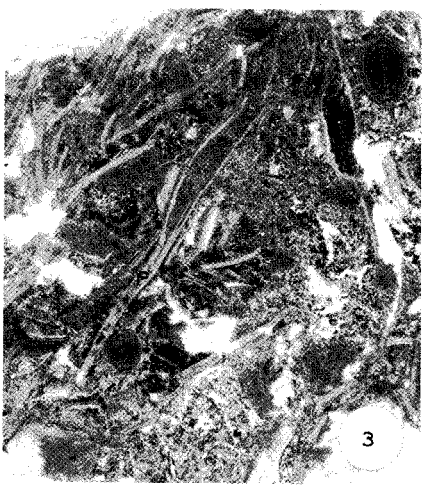
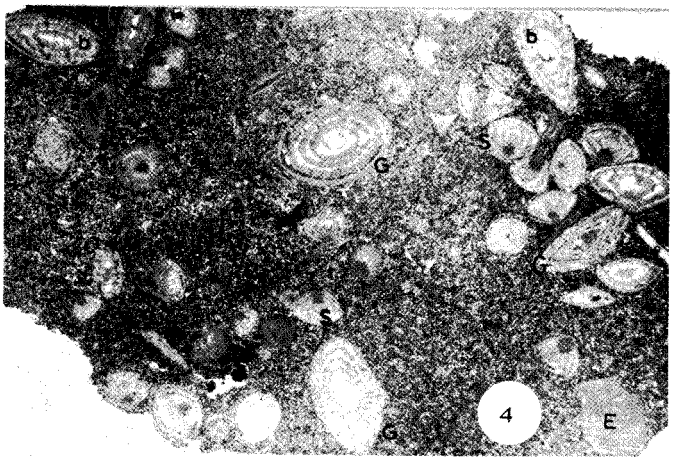


PLATE 1

1. Marl (sect. 3, bed 4) containing nummulites. (x4).
2. White limestone (sect. 2, bed 9), bryozoan (B) - echinodermal (E) - pelecypodal (p) biomicrite. (X4)
3. Impure limestone (sect. 1, bed 2), pelecypodal - bryozoan biomicrite. The encrusting bryozoa are not seen under this magnification. (X4)
4. Impure limestone (sect. 3, bed 5), nummulitid - echinodermal (E) biomicrite containing *Nummulites straitus(s), Nummulites beaumonti(b)* and *Nummulites gizehensis* (G). (X4)



إســـتراتجرافية وبترولوجية صخور الايوسين في منطقة مغاغه ، شـرق وغرب وادي النيـل

محمد عبد القادر بخاري و أحمد عبد الله

أظهرت الدراسات الأحفورية والصخرية أن تتابع الإيوسين في منطقة مغاغه ينتمي إلى نطاق بيواستراتجرافي واحد ، هو نطاق النيوميوليت جيزاهنسس - جيزاهنسس .

وقد تم تسجيل وجود نيوميوليت ستریاتس في هذا النطاق ، مما استدعى تقليص مداه حتى منتصف الإيوسين الأوسط .

وقد دلت المكونات الأحفورية والصفات الصخرية على أن عمليات الترسيب تمت في بيئة بحرية ضحلة هادئة .