Mineral Res. ExPlate Bull., 112. 71-76. 1991

PRESENCE OF *NUMMULITES FABIANII* (PREVER) GROUP *(Nummulites* ex gr. *fabianii)* AND ASSOCIATED FORAMINIFERS IN THE ELAZIĞ REGION

Niyazi AVŞAR*

ABSTRACT— The presence of *Nummulites* ex gr. *fabianii* has been indicated in the Eocene sediments, and the stratigraphy of the region is briefly given. The rock units of Paleozoic, Mesozoic and Cenozoic ages crop out in the region. The Paleozoic sequence is composed of metamorphic rocks. This unit is tectonically underlain by the Mesozoic sequence formed of magmatic rocks. The Paleozoic and Mesozoic rocks arc unconformably overlain by the sandstone and algal limestones of the Upper Lutetian age. Algal limestone contain genera of the Foraminifcra such as *Nummulites perforatus* (Montfort). *Assilina spira* (de Roissy), *Alveolina fusiformis* Sowerby, *Alveolina elongata* d'Orbigny, *Fabiania cassis* (Oppenheim) and *Chapmanina gassinensis* (Silvestri). The Priabonian sequence conformably overlies the sandstone and algal limestones of the Upper Lutetian age. It is composed of the alternating sandstone and clay and limestones. The Priabonian sequence is characterized by the species of Foraminifera such as *Nummulites fabianii* (Prever), *Nummulites* ex gr. *fabianii, Nummulites striatus* (Bruguicrc), *Chapmanina gassinensis* (Silvestri), *Asterigerina rotula* (Kaufmarm), *Linderina brugesi* Schlumberger, *Eorupertia magna* (Le Calvez). *Halkyardia minima* (Liebus) and *Praernapydionina huberi* Henson. The Upper Miocene sequence unconformably overlies the limestone of the Phabonian age, and it is composed of volcanic rocks.

INTRODUCTION

The investigated area is located around the Üçtepe, Körpe, Çatalharman and Egopköy 15 km NW of Elazığ province (Eastern Anatolia) (Fig. 1).

The geology of this area was studied by numerous researchers (Ketin, 1946; Tolun, 1955; Kipman, 1976; Tuna, 1979; Naz, 1979; Bingöl, 1984; Turan, 1984; Özkul, 1982; Asutay, 1985). In the eastern part of studied area, in Palu region, the presence of the marine Oligocene has been determined by Sirel et al. (1975).

The purpose of this study is to reveal the presence *of Nummulites* ex *gr. fabianii* in the Elazığ region which is known all over the world up to now but which could not be included within any group between *Nummulites fabianii* (Prever) and *Nummulites intermediums* (d'Archiac) and to give briefly the stratigraphy and the associated foraminifers of the region.

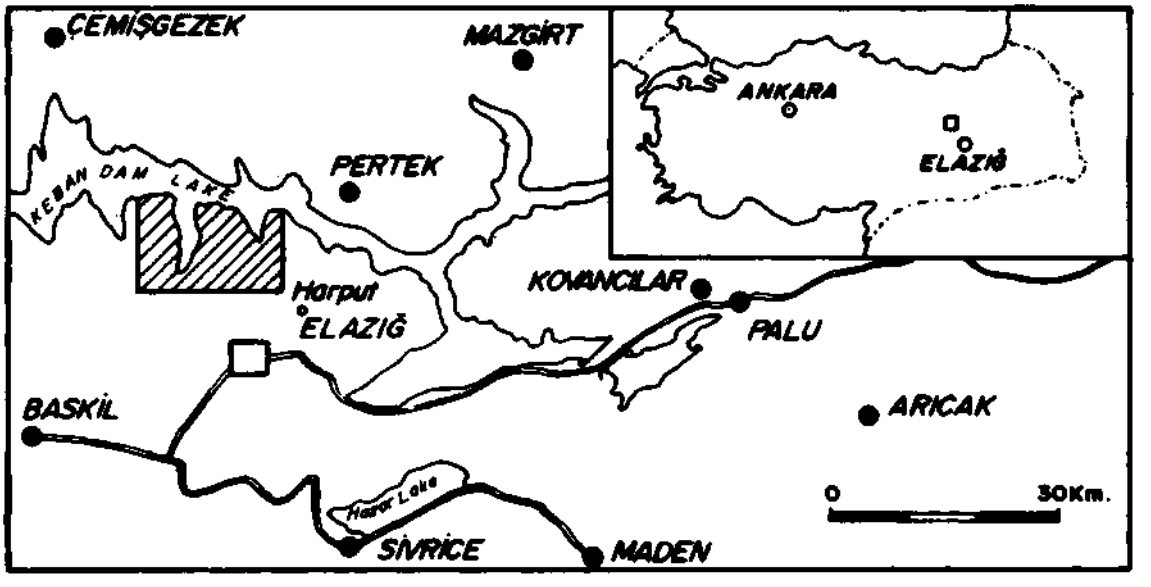

Fig. 1- Location map of the study area.

STRATIGRAPHY

Paleozoic

The Paleozoic sequence is composed of metamorphic rocks such as crystallized limestone, calcschist, marble, metaconglomerate and calcphyllite. These metamorphic sequences are tectonically thrusted over the Mesozoic units, and their primary relation is not known.

Mesozoic

This sequence is represented by granite, granodiorite, gabbro, diabase, basalt, agglomerate, tuff, volcanic sandstone and limestone. This magmatic unit is unconformably overlain by the younger sedimentary and volcanic rocks.

Eocene

Upper Lutetian: The Paleozoic and the Mesozoic rocks are unconformably overlain by the Upper Lutetian sediments. It consists of conglomerates which are various colored, medium to thick bedded sandstone and algal limestones. Algal limestones contain genera of Foraminifera such as *Nummulites perforates* (Montfort), *Assilina spira* (de Roissy), *Alveolina fusiformis* Sowerby, *Alveolina elongata* d'Orbigny, *Fabiania cassis* (Oppenheim), *Chapmanina gassinensis* (Silvestri) and *Silvestriella tetraedra* (Gümbel).

Priabonian: The Priabonian sediments conformably overlie the sandstone and algal limestones of the Upper Lutetian age. It is composed of the alternating sandstone and clay and limestones which are white yellow and beige colored fossiliferous and regularly bedded. The Priabonian sequence is characterized by the species of Foraminifera such as *Nummulites fabianii* (Prever). *Nummulites* ex gr. *fabianii, Nummulites striatus* (Bruguiere), *Asterigerina rotula* (Kaufmann), *Eorupertia magna* (Le Calvez), *Halkyardia minima* (Liebus), *Linderina brugesi* Schlumberger and *Praerhapydionina huberi* Henson.

Miocene

Upper Miocene: This unit unconformably overlies the limestones of the Priabonian age and the older units. It generally consists of basalt, tuff, agglomerate, limestone and sandstone.

SYSTEMATIC DESCRIPTION

In this chapter, the description *of Nummulites* ex gr. *fabianii* which belongs to *Nummulites fabianii* (Prever) group, found in the Priabonian and associated foraminifers is given below.

(Plate I, figs. 1-10; Plate II, figs. 1-9)

Form A: Test small, slightly inflated lenticular, with a rounded margin. The surface is covered by a reticulum generally arranged in two different ways. Its mesh is rectangular shaped on the margin and near the margin, and it has a reticulum towards the center of test. Diameter is 4.2-5.1 mm. and its thickness is 2.3-3.2 mm.

In the equatorial section, the dimension of the first chamber is about 263 microns in sphacrical and protococh 288x361 microns, deutroconch 175x350 microns in oval. The spiral lamina is growing progressively until the end of the penultimate whorl.

Septa are rectilinear, slightly recurved and slightly inclined to the spiral lamina of the previous whorl. The chambers are subquadrate or slightly longer than higher in the early whorls, but later become decisively rectangular and towards the last whorls the chambers are 3-4 times longer than higher.

Form B: Test lenticular, with a sharp margin, and it has a slightly swollen in the center. Its diameter is 8-10.6 mm. and thickness is 1.4-3 mm. In the equatorial section, the first chamber is very small. Other characteristics are the same as the macrospheric form.

Distribution and associated foraminifers

The *Nummulites* ex gr. *fabianii* is found in the limestone of the Priabonian with *Nummulites fabianii* (Prever), *Nummulites striatus* (Bruguiere), *Sphaerogypsina globulus* (Reuss), *Linderina brugesi* Schlumberger, *Chapmanina gassinensis* (Silvestri), *Asterigerina rotula* (Kaufmann), *Eorupertia magna* (Le Calvez), *Halkyardia minima* (Liebus), *Praerhapydionina huberi* Henson, *Rotalia* sp., *Austrolrillina* sp., *Peneroplis* sp., and *Planorbulina* sp. in the Körpe, Egopköy and Çatalharman measured stratigraphic sections (Fig. 2), (Plate II, III).

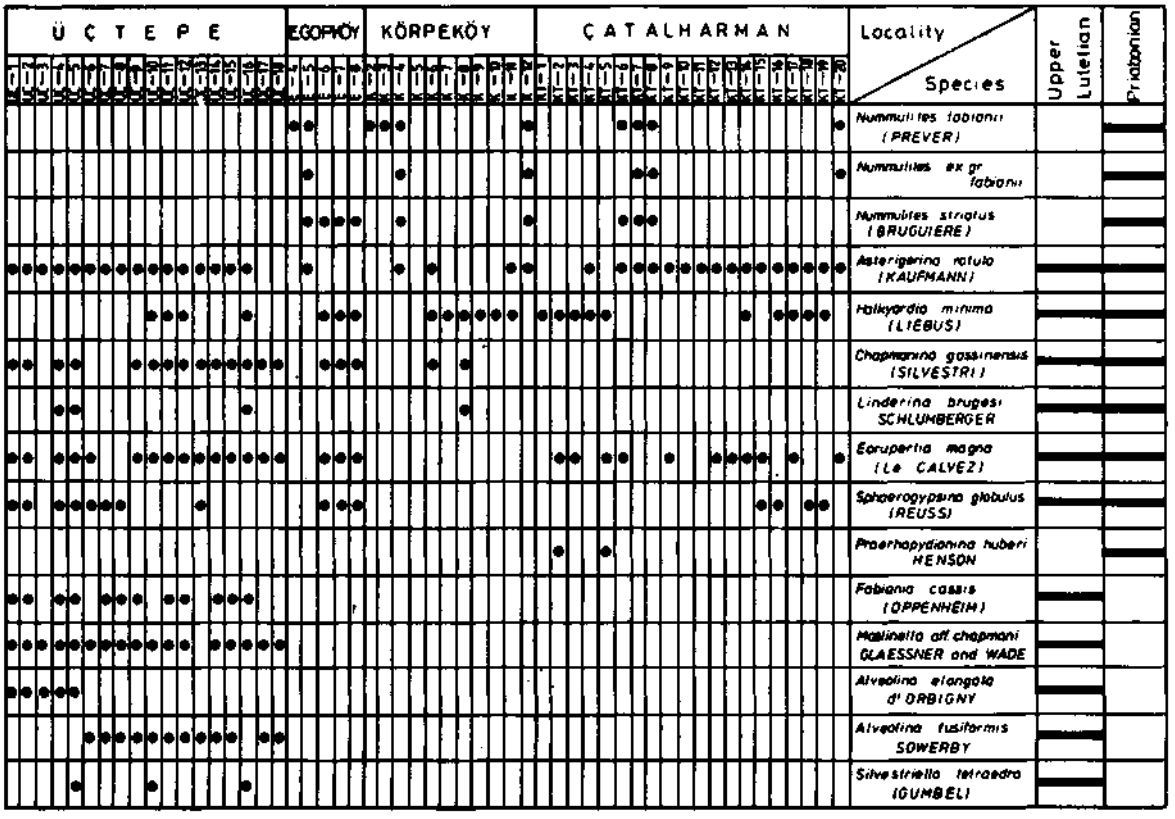

Fig.2- Biostratigraphic distribution of the foraminifers in limestone in Elazığ.

In addition, the same fossil is observed around the Baskil region (Turan, 1984; Asutay, 1985) together with the fossil assemblages: *Nummulites fabianii* (Prever), *Nummulites striatus* (Bruguiere), *Eorupertia magna* (Le Calve?.), *Chapmanina gassinensis* (Silvestri), *Fabiania cassis* (Oppenheim), *Halkyardia minima* (Liebus), *Sphaerogypsina globulus* (Reuss), *Amphistegina* sp., *Heterostegina* sp., and *Alveolina* sp

Stratigraphic level: Priabonian.

DISCUSSION AND CONCLUSIONS

The nummulites which belong to *Nummulites fabianii* (Prever) group are different from real *Nummulites fabianii* (Prever). Also, these species are diffrerent from *Nummulites fichteli* Michclotti which arc characteristic of Oligocene. Our species are found together with the characteristic foraminifers of Eocene; *Nummulites fabianii* (Prever), *Nummulites striatus* (Bruguiere), *Halkyardia minima* (Liebus), *Chapmanina gassinensis* (Silvestri), *Linderina brugesi* Schlumberger, *Asterigerina rotula* (Kaufmann), *Eorupertia magna* (Le Calvez) and *Sphaerogypsina globulus* (Reuss) and that is why there is no doubt about their age.

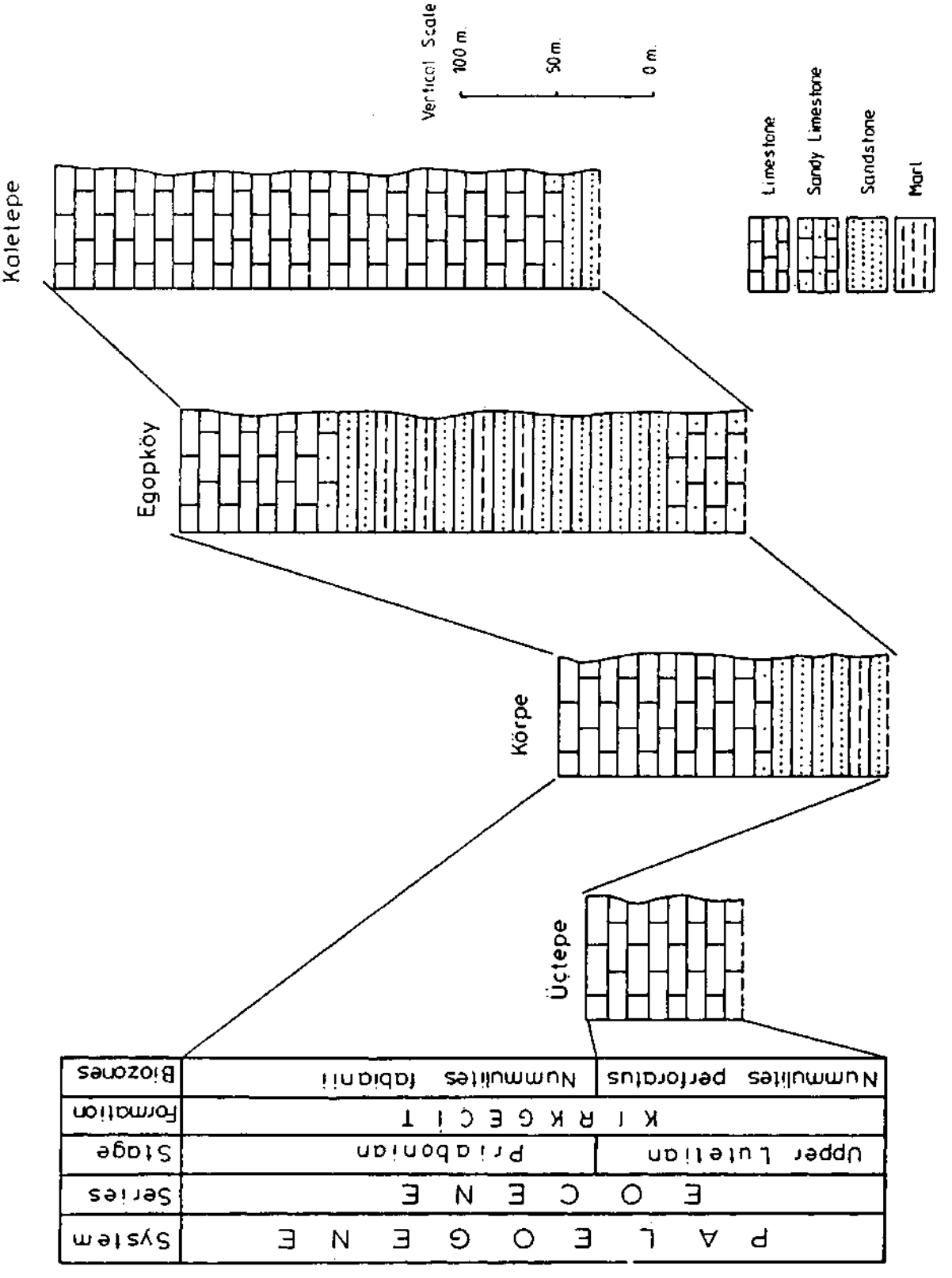

Fig.3- The correlation of the measured stratigraphic section in the study area.

However, paleontologists studied on the nummulites all over the world have indicated their problems about naming this kind of nummulites.

Boussac (1911) stated that there were transitional nummulites between *Nummulites fabianii* (Prever) and *Nummulites intermedius* (d'Archiac) in Biarritz, and showed evidence revealing that the latter originated from the former. In addition, the same author pointed out that typical *Nummulites fabianii* (Prever) posses a sparse net and more granules, and *Nummulites* ex gr. *fabianii* are not found in the lower part of the Priabonian (Bartonian) and they indicate a variation approaching typical *Nummulites intermedius* (d'Archiac).

Flandrin (1938) pointed out that the transitional forms were in the upper part of the Eocene beds, and the lower part of the Oligocene layers having studied the materials collected from Algeria. The nummulites in the Flandrin's thesis resemble those of the Hoia-Cluj samples.

Grigorian (1961) accepts *Nummulites reliatus* Roveda as a subspecies. In addition, the same researcher pointed out that *Nummulites fabianii reliatus* Roveda indicated a transitional morphology between *Nummulites fabianii* (Prever) and *Nummulites intermedius* (d'Archiac) and was found at the Upper Eocene-Lower Oligocene boundary.

Roveda (1970) indicated that the nummulites are faced with a dangerous inflation as being parallel to the other foraminifcral group as result of the author's comprehensive study. For this reason, Roveda (1970) produced forty-one species, subspecies and varieties *of Nummulites fabianii* (Prever) and accepted only five of them.

Bombita (1975) revealed that four laxons of the group followed each other in Transilvania, first of which has a little primitive character and was found in Lcgia-Cluj Limestones, second of which formed an epibole species in the marls with *Nummulites fabianii* (Prever), third of which diminished in the marls bearing Bryozoa, and fourth of which formed a transitional form to *Nummulites intermedius* (d'Archiac) in Hoia Limestones and described the forms as follows;

1- Having studied the initial form (Plate I, figs. 1-17) from subspecies of Transilvania (Bombita, 1975), it was determined that the diameters of microspheric forms vary between 7.5-11.5 mm. The superficial net of the test shows transitional aspects of great nets to irregularly trajectory and broken and elongated meshes disposed, sinuous and granules arranged parallel to that of central form *of Nummulites fabianii* (Prever). In the equatorial section, the spiral lamina is growing progressively until the end of the penultimate whorl, and towards the last whorls of the chambers are longer than higher. The surface of the macrospheric form is covered by a reticulum. The diameter of the macrospheric form (3.5-4.5) is bigger than the previous form. The diameter of the macrosphere is approximately 0.35 mm.

2- *Nummulites* ex *gr. fabianii* (Plate II, figs. 1-15; Plate VII, figs. 1-6) are found in the marls with *Nummulites fabianii* (Prever) in the epibole zone of the Baci (Cluj) region. The margin of the test at these forms is undulated, and the superficial net is sinuous, meandriform and of parallel bunched forms containing thin meshes. The diameter of the test is between 12-13.5 mm. The diameter of the macrospheric forms (3-4 mm.) are less than those of the species of Legia Limestones, but diameter of the macrosphere is slightly larger.

3- *Nummulites* ex gr. *fabianii* collected from the Hoia Limestones, cropped out the western part of the Cluj, formed the transitional form between *Nummulites fabianii* (Prever) and *Nummulites intermedius* (d'Archiac) (Plate IV, figs. 1-19). The diameters of the microspheric forms of the Hoia arp 5.9-9.3 mm. and generally vary between 7-7.5 mm. The margin of the test is often undulated and the central part is poorly prominent. In general, the secondary ramification of the superficial nets is not to be gathered in the nets but turminates in the meshes with or without granules. Unification as being net shaped can be seen at the polar, zone of the test in a narrow band. However, this unification docs not attain to the fineness revealed by the *Nummulites intermedius* (d'Archiac). The meshes of the net are more elongated in radial direction which form a similar type *of Nummulites fabianii* (Prever). Despite the fact that the diameter of the macrospheric form is found in the same variability limits in the marl with *Nummulites fabianii* (Prever), the diameter of the macrosphere indicated a slightly lessening magnitude (0.3-0.35 mm.). Most of the macrospheric forms, as seen in *Nummulites fabianii* (Prever), contain the rectangular mesh between septa and spiral lamina. In adult forms the lenghts of the final whorls arc more than their heights.

After having throughly studied all the general characteristics of *Nummulites* ex *gr.fabianii* collected from the Elazığ region (Eastern Anatolia), they are found to be within the same limits and to resemble the characteristics of *Nummulites* ex *gr.fabianii* determined from Baci, Legia and Hoia Limestones in Transilvania.

As pointed out before, a chaotic naming still continues. These nummulites are included in the *Nummulites fabianii* (Prever) group in this work because of the rarity of the nummulites.

Manuscript received April 19,1990

REFERENCES

Asutay, J., 1985, Baskil (Elazığ) çevresinin jeolojik ve petrografik incelenmesi: A.Ü. Fen Bil. Enst., Doctora thesis (unpublished), Ankara.

Bingöl, F., 1984, Geology of the Elazığ area in the Eastern Taurus region in: Tekeli, O. and Göncüoğlu, M.C. (eds), Geology of the Taurus Bell, MTA Publ., p. 209-216, Ankara.

Bombita, G., 1975, Remarques sur le groupe de Nummulites fabianii: Revista Espanole de Mikropalcontologia, v. VII, n.1, p. 33-90.

Boussac, J., 1911, Etudes stratigraphiqucs et palcontologiques sur le Nummulitique de Biarritz: Ann. Hebert, Paris, v. 5, pp. 1-95, Plate 4, figs. 4,7,9, Plate 6, fig. 4.

Flandrin, J., 1938, Contribution a l'etude palcontologique du Nummulitique algerien: Algeria, Service Carte Geol., Matcriaux Carte Geol. Algerie, Macon, France, ser. 1 (Pal.), no. 8, pp. 5-158, Plate 3, figs. 71-75.

Grigorian, S. M., 1961, Nouvelles sous-especes de Nummulites de l'Eocene supericur d'Armania (en russe): Dokl. Akad. Nauk. Arm. SSR 32/2.

Ketin, İ., 1946, Elazığ-Palu ve Pertek yöresinin jeolojisi: MTA Rep., 1708 (unpublished), Ankara.

Kipman, E., 1976, Kebanın jeolojisi ve volkanitlerinin petrolojisi: Doctora thesis, İst. Üniv. no. 134 (unpublished) İstanbul.

Özkul, M., 1982, Elazığ doğusu (Güneyçayırı) sedimantolojik incelemesi: F.Ü. Yüksek Lisans Tezi (unpublished), Elazığ.

Roveda, V., 1970, Revision of the Nummulites (Foraminiferida) of the Nummulites fabianii-fichteli group: Riv. Ital. Palcont. v.76, n.2, pp.235-324, tav.22-25, Milano.

Sirel, E.; Metin, S. and Sözeri, B., 1975, Palu (KD Elazığ) denizel Oligosenin stratigrafisi ve mikropalcontolojisi: Türkiye Jeol. Kur. Bull., 18.no.2, 175-180, Ankara.

Tolun, N., 1955, Elazığ-Keban-Çemişgezek ve Pertek bölgesinin jeolojisi: MTA Rep., 2227 (unpublished), Ankara.

Tuna, E., 1979, Elazığ-Palu ve Pertek dolayının jeolojisi: TPAO Rep., 1362 (unpublished), Ankara.

Turan, M., 1984, Baskil-Aydınlar (Muşar) yöresinin stratigrafisi ve tektoniği: F.Ü. Fen Bil. Enst. Doct. thesis (unpublished), Elazığ.

PLATES

PLATE -I

Nummulites ex gr. *fabianii*

Fig. 1- Equatorial section, microspheric form (E5-2f), X7.

Fig. 2-Equatorial section, microspheric form (E5/1), X7

Fig. 3- Equatorial section, microspheric form (E5-2i), X7.

Fig. 4- Equatorial section, microspheric form (E5-2h), X7.

Fig. 5- Axial section, microspheric form (E5-2b), X7.

Fig. 6- Equatorial section, microspheric form (E5-lk), X6.

Fig. 7- Equatorial section, microspheric form (E5-2k), X6.

Fig, 8- Axial section, microspheric form (K4-ld), X6.

Fig. 9-Equatorial section, microspheric form (E5-1n), X5.

Fig. 10- Equatorial section, microspheric form (E5-2g), X6.


1
2
3
4
5
8
9
10

PLATE - II

Nummulites ex gr. *fabianii*

Fig. 1-Equatorial section, macrospheric form (E5-2), X11.

Fig. 2-Equatorial section, macrospheric form (E5/3), X12.

Fig. 3-Axial section, macrospheric form (E5-lb), X9.

Fig. 4- Axial section, macrospheric form (E5-lc), X9.

Fig. 5- Equatorial section, macrospheric form (E5/4), XI2.

Fig. 6- Equatorial section, macrospheric form (KT-7/4), XI1.

Fig. 7- Equatorial section, macrospheric form (E5/5), X12.

Fig. 8- Surface view, macrospheric form (E5/6), X9.

Fig. 9- Surface view, macrospheric form (E5/8), X8.

Nummulites fabianii (Prever)

Fig. 10- Equatorial section, macrospheric form (E4/1), X5.

Fig. 11- Equatorial section, macrospheric form (E4/2), X4.

Fig. 12- Surface view, macrospheric form (K-3), X6.

Nunvnulites striatus (Bruguiere)

Fig. 13- Surface view, macrospheric form (K4-2/1), X7.

Fig. 14- Axial section, macrospheric form,(K4-2), X7.

Fig. 15-Axial section, macrospheric form (K4-2d), X10.

Fig. 16- Equatorial section, macrospheric form (K4-2/3), X8.

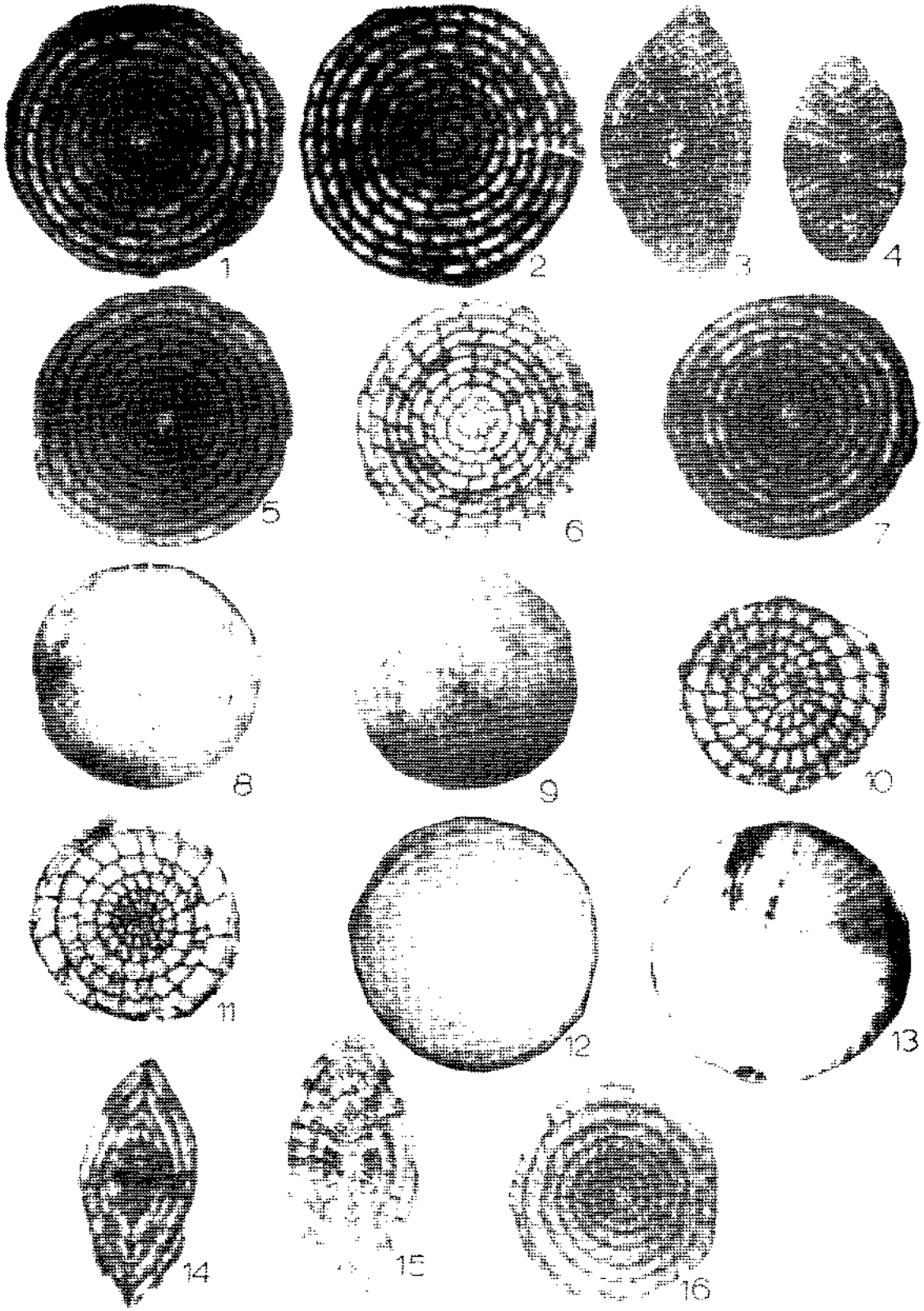
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16

PLATE - III

Eorupertia magna (Le Calvez)

Fig. 1-Equatorial section (Üç-18/1), X28.

Fig. 2-Axial section (Üç-17), X25.

Fig. 3- Axial section (Al-7), X16.

Halkyardia minima (Liebus)

Fig. 4-Axial section (A1-1), X92.

Fig. 5- Axial section (KT-14/1), X51.

Praerhapydionina huberi Henson

Fig. 6- Vertical section (A1-21/6), X34.

Fig. 7-Vertical section (Al-21/12), X32.

Chapmanina gassinensis (Silvestri)

Fig. 8- Vertical section (N-8), X34.

Fig. 9- Basal section (N-9), X32.

Sphaerogypsina globulus (Reuss)

Fig. 10- Axial section (KT-15/1), X36.

Asterigerina rotula (Kaufmann)

Fig. 11- Axial section (KT-14/1), X45.

Fig. 12- Axial section (KT-14/2), X47.

Rotalia sp.

Fig. 13-Axial section (KT-15/2), X33.

Austrolrillina sp.

Fig. 14- Equatorial section (Al-21/12), X35.

Peneroplis sp.

Fig. 15- Axial section (Al-21/4), X20.

Linderina brugesi Schlumberger

Fig. 16- Vertical section (Al-4), X35.

Planorbulina sp.

Fig. 17- Axial section (KT-18), X75.

NiyaziAVŞARPLATE-III