Calcareous Nannofossils Biostratigraphy of Aaliji Formation in Well (K- 116), Northern Iraq

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ABSTRACT

Thirteen samples of Aaliji Formation from the well (K-116), Kirkuk area, Northern Iraq, are studied on the basis of the stratigraphic ranges of the recorded calcareous nannofossils for sixty species, the studied section reveals five biozones arranged from oldest to youngest as follows:

1. *Fasciculithus tympaniformis* Interval Biozone (CP4)
2. *Heliolithus kleinpellii* Interval Biozone (CP5)
3. *Discoaster mohleri* Interval Biozone (CP6)
4. *Discoaster nobilis* Interval Biozone (CP7)
5. *Discoaster multiraditus* Interval Biozone (CP8)

These biozones are correlated with other calcareous nannofossils biozones from both local and regional sections leading to conclude the age of Middle Paleocene to Early Eocene.

Key words: Calcareous nannofossils, Biostratigraphy, Paleocene, Iraq.

الطباقية الحياتية لمتحجرات النانو الكلسية لتكوين عليجي في بئر (K–116)، شمالي العراق

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الملخص

درست ثلاثة عشر نموذجا من تكوين عليجي في بئر(K–116)، منطقة كركوك، شمالي العراق، بالاعتماد على الامتدادات الطباقية لمتحجرات النانو الكلسية المسجلة لستين نوعا، ظهر في المقطع قيد الدراسة خمسة أنطقه حياتية هي من الاقدم الى الاحدث كالاتي:

1. *Fasciculithus tympaniformis* Interval Biozone (CP4)
2. *Heliolithus kleinpellii* Interval Biozone (CP5)
3. *Discoaster mohleri* Interval Biozone (CP6)

4. *Discoaster nobilis* Interval Biozone (CP7)
5. *Discoaster multiraditus* Interval Biozone (CP8)

تمت مضاهاة الانطقة الحالية مع الانطقة العالمية واستنتج عمر التكوين بالباليوسين الاوسط الى الايوسين المبكر.

الكلمات الدالة: تكوين عليجي، منطقة كركوك، الطباقية الحياتية، باليوسين، أنطقه حياتية.

INTRODUCTION

Aaliji Formation was first described in northwest Syria (Meidannki, lat. 36° 29' 25" N, long. 36° 53' 32" E) A supplementary type locality has been chosen in Iraq is located at Well K-109 (lat. 35° 33' 08 N and long. 44° 18' 55" E), between drilled depths 2487 feet and 3035 feet, so the thickness is 548 feet (167 meters) (Bellen et. al., 1959).

The studied section that lies in Kirkuk area at (K-116) (lat. 35°47" 28'N and long. 43°59" 06' E) consists of marlstone and marly limestone between drilled depths 1441m. and 1375 m., so the thickness is about 64 m (Fig. 1).

Twenty-Three samples of marly limestone and marl are selected for the studying the calcareous nannofossils using the thin sections (under transmitted-light microscope). The calcareous nannofossils are extracted by using the method (H) (Armstrong and Brasier, 2005).

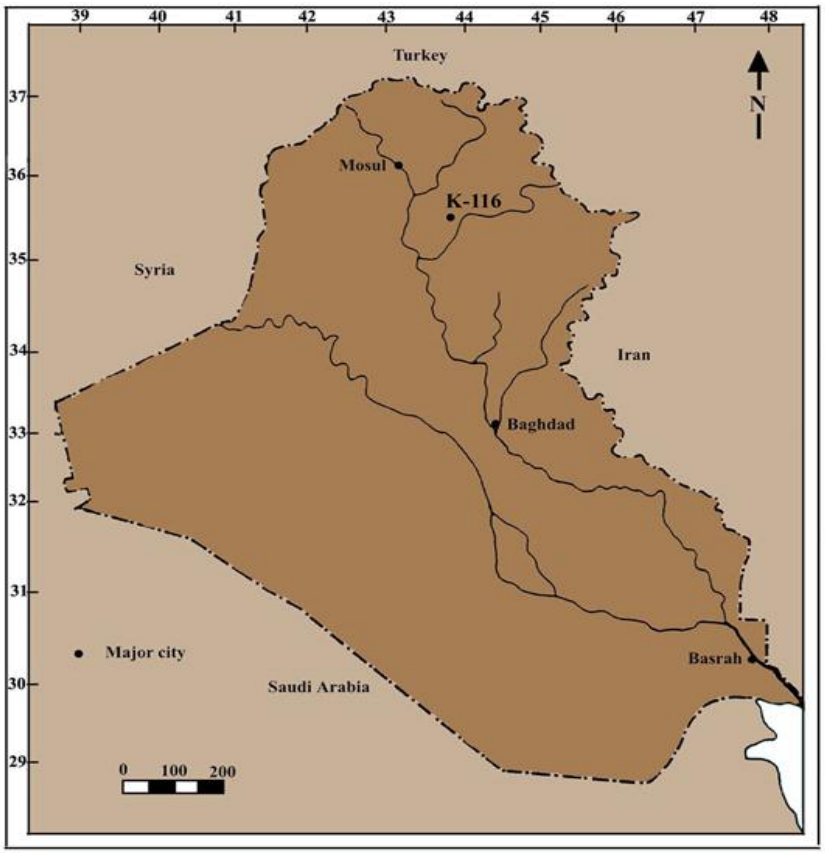

Fig. 1: Location map for the studied section at K-116 Materials and Methods

NANNOBIOSTRATIGRAPHY

Depending on the stratigraphic distribution of the recorded species, five Biozones are identified (Fig.2):

1 - *Fasciculithus tympaniformis* Interval Biozone (CP4) (Part)

Definition: Interval biozone of *Fasciculithus tympaniformis* Hay and Mohler, 1967.

Boundaries: The biozone determinate by FO of *Fasciculithus tympaniformis* Hay and Mohler, 1967 to FO of *Heliolithus kleinpellii* Sullivan, 1964.

Thickness: (4750-4700) ft.

Correlation and Discussion: This biozone correlated with *Fasciculithus tympaniformis* biozone (CP4) by Okada and Bukry (1980) which aged Middle Paleocene (Selandian), and correlated with *Fasciculithus tympaniformis* biozone (NP5) by Martini (1971) which aged Middle Paleocene (Selandian) too. Therefore, depending on stratigraphic correlation above this biozone aged Middle Paleocene (Selandian) (Gradstein *et al*., 2012).

2- *Heliolithus kleinpellii* Interval Biozone (CP5) (CP11)

Definition: Interval biozone of *Heliolithus kleinpellii* Sullivan, 1964.

Boundaries: The biozone determinate by FO of *Heliolithus kleinpellii* Sullivan, 1964 to FO *Discoaster mohleri* (Bukry and Perciavel, 1971).

Thickness: (4700-4670) ft.

Correlation and Discussion: This biozone correlated with *Heliolithus kleinpellii* biozone (CP5) by Okada and Bukry (1980) which aged Middle to late Paleocene (Selandianto Thanetian), and correlated with *Heliolithus klenpellii* biozone (NP6) by Martini (1971) which aged Middle to Late Paleocene (Selandian to Thanetian) too. Therefore, depending on stratigraphic correlation above this biozone aged Middle to Late Paleocene (Selandian to Thanetian) (Gradstein *et al*., 2012).

3 - *Discoaster mohleri* Interval Biozone (CP6)

Definition: Interval biozone of *Discoaster mohleri* Bukry and Perciavel, 1971**.**

Boundaries: The biozone determinate by FO of *Discoaster mohleri* Bukry and Perciavel, 1971 to FO of *Discoaster nobilis* Martini, 1961

Thickness: (4670-4640) ft.

Correlation and Discussion: This biozone correlated with *Discoaster mohleri* biozone (CP6) by Okada and Bukry (1980) which aged Late Paleocene (Thenetian), and correlated with *Discoaster mohleri* biozone (NP7) by Martini (1971) which aged Late Paleocene (Thanetian) too. Therefore, depending on stratigraphic correlation above this biozone aged Late Paleocene (Thanetian) (Gradstein *et al*., 2012).

4 - *Discoaster nobilis* Interval Biozone (CP7)

Definition: Interval biozone of *Discoaster nobilis* Martini, 1961.

Boundaries: The biozone determinate by FO of *Discoaster nobilis* Martini, 1961 to FO *Discoaster multiradiatus* Bramlette and Riedel, 1954.

Thickness: (4640-4590) ft.

Correlation and Discussion: This biozone correlated with *Discoaster nobilis* biozone (CP7) by Okada and Bukry (1980) which aged Late Paleocene (Thenetian), and correlated with *Discoaster nobilis* biozone (NP8) by Martini (1971) which aged Late Paleocene (Thanetian) too. Therefore, depending on stratigraphic correlation above, this biozone aged Late Paleocene (Thanetian) (Gradstein *et al*., 2012).

5- *Discoaster multiradiatus* Interval Biozone (CP8) (part)

Definition: Interval biozone of *Discoaster multiradiatus* Bramlette and Riedel, 1954.

Boundaries: The biozone determinate by FO of *Discoaster multiradiatus* Bramlette and Riedel, 1954 to FO of *Discoaster diastypus* Bramlette and Sullivan, 1961.

Thickness: (4590-4540) ft.

Correlation and Discussion: This biozone correlated with *Discoaster multiradiatus* biozone (CP8) by Okada and Bukry (1980) which aged Late Paleocene to Early Eocene (Thanetian to Ypresian), and correlated with *Discoaster multiradiatus* biozone (NP9) by Martini (1971) which aged Late Paleocene to Early Eocene(Thanetian to Ypresian) too. Therefore, depending on stratigraphic correlation above this biozone aged Late Paleocene to Early Eocene (Thanetian to Ypresian) (Gradstein *et al*., 2012).

CONCLUSIONS

Aaliji Formation in (K-116) well consist of five boizones for calcareous nannofossils, these are from older to younger (Figs.2, 3):

1. *Fasciculithus tympaniformis* Interval Biozone (CP4)
2. *Heliolithus kleinpellii* Interval Biozone (CP5)
3. *Discoaster mohleri* Interval Biozone (CP6)
4. *Discoaster nobilis* Interval Biozone (CP7)
5. *Discoaster multiradiatus* Interval Biozone (CP8)

This biozones aged Middle Paleocene to Early Eocene for studied section (Fig.4).

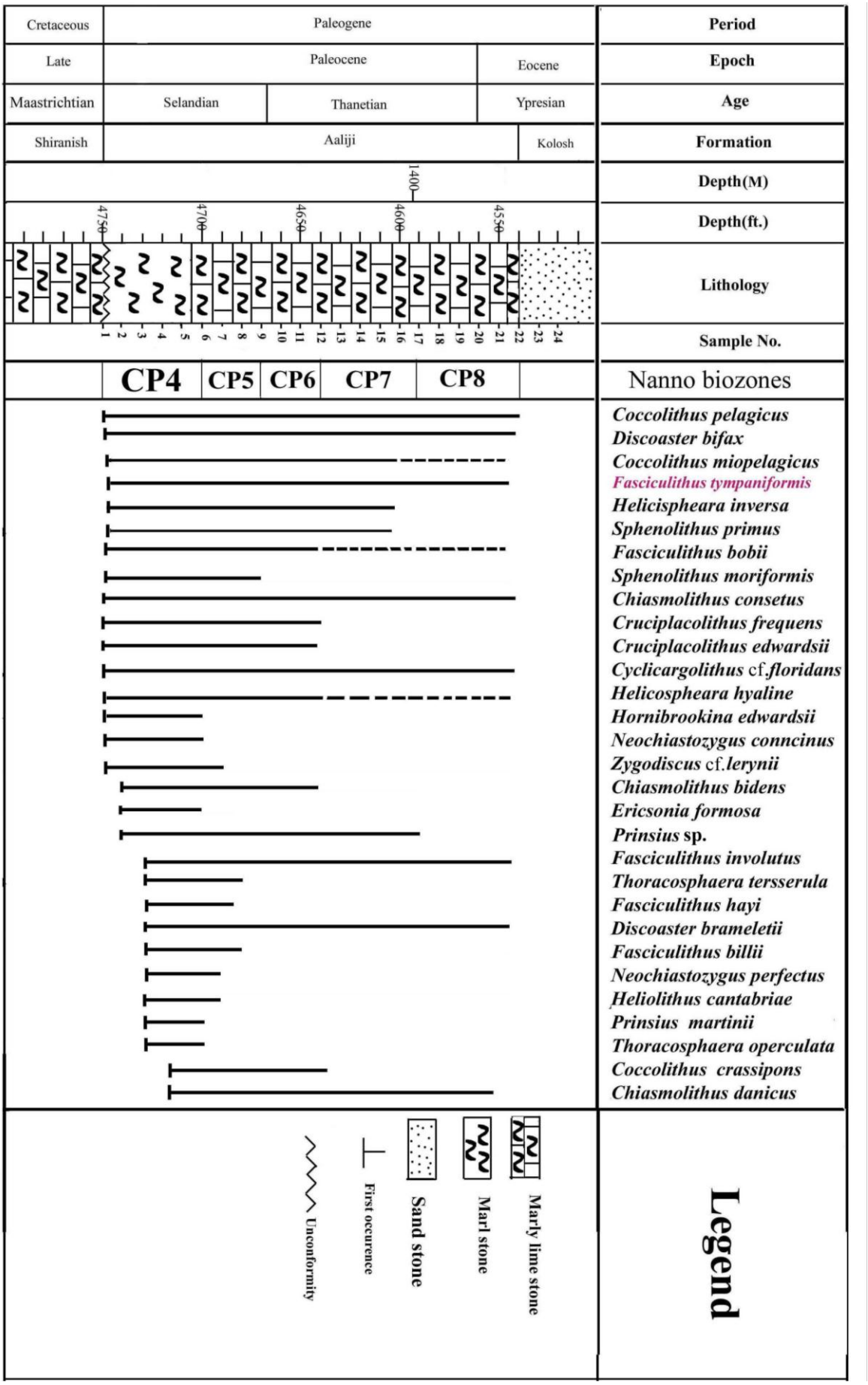

Fig. 2a: Biostratigraphic chart of studied section.

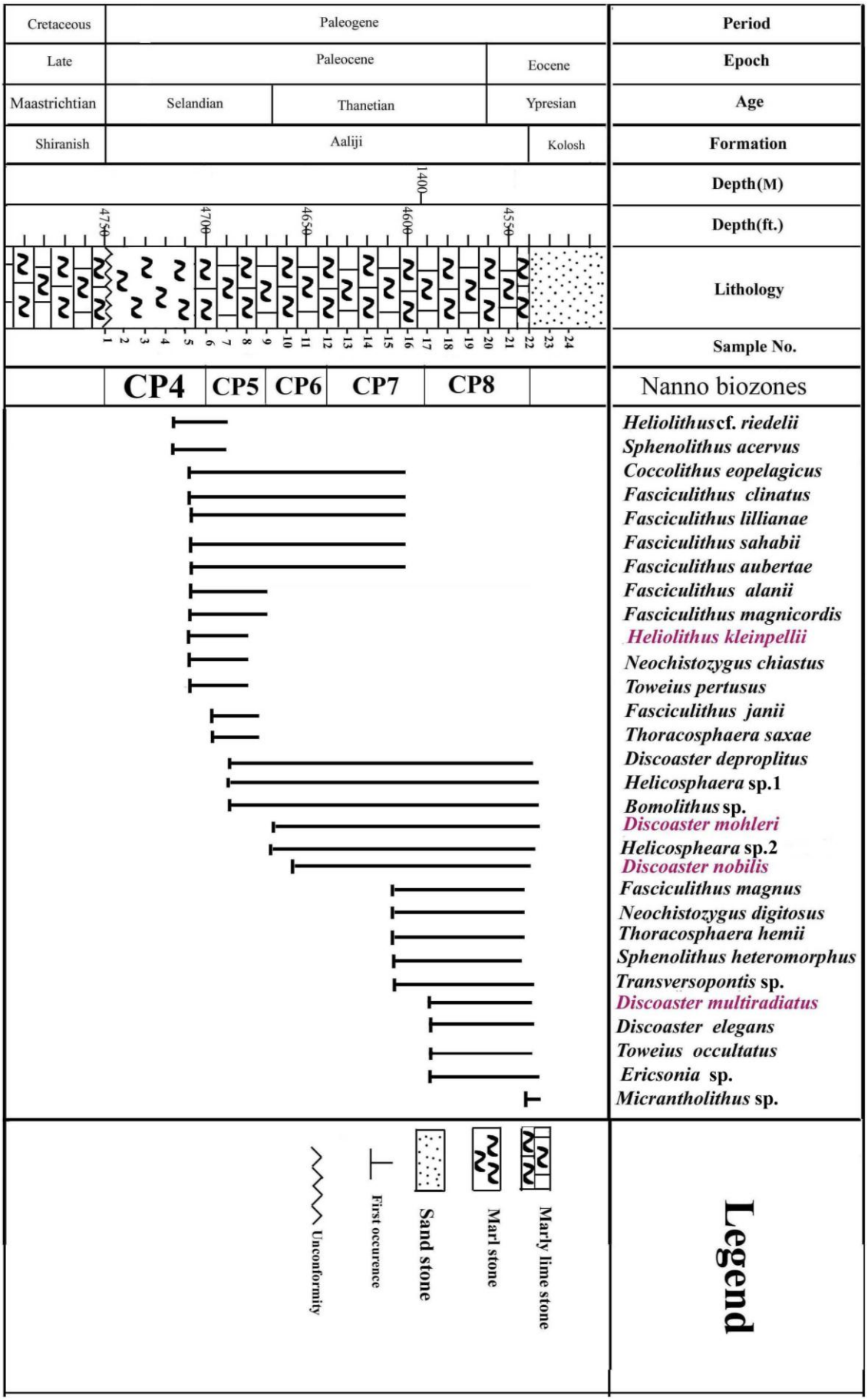

Fig. 2b: Biostratigraphic chart of studied section.

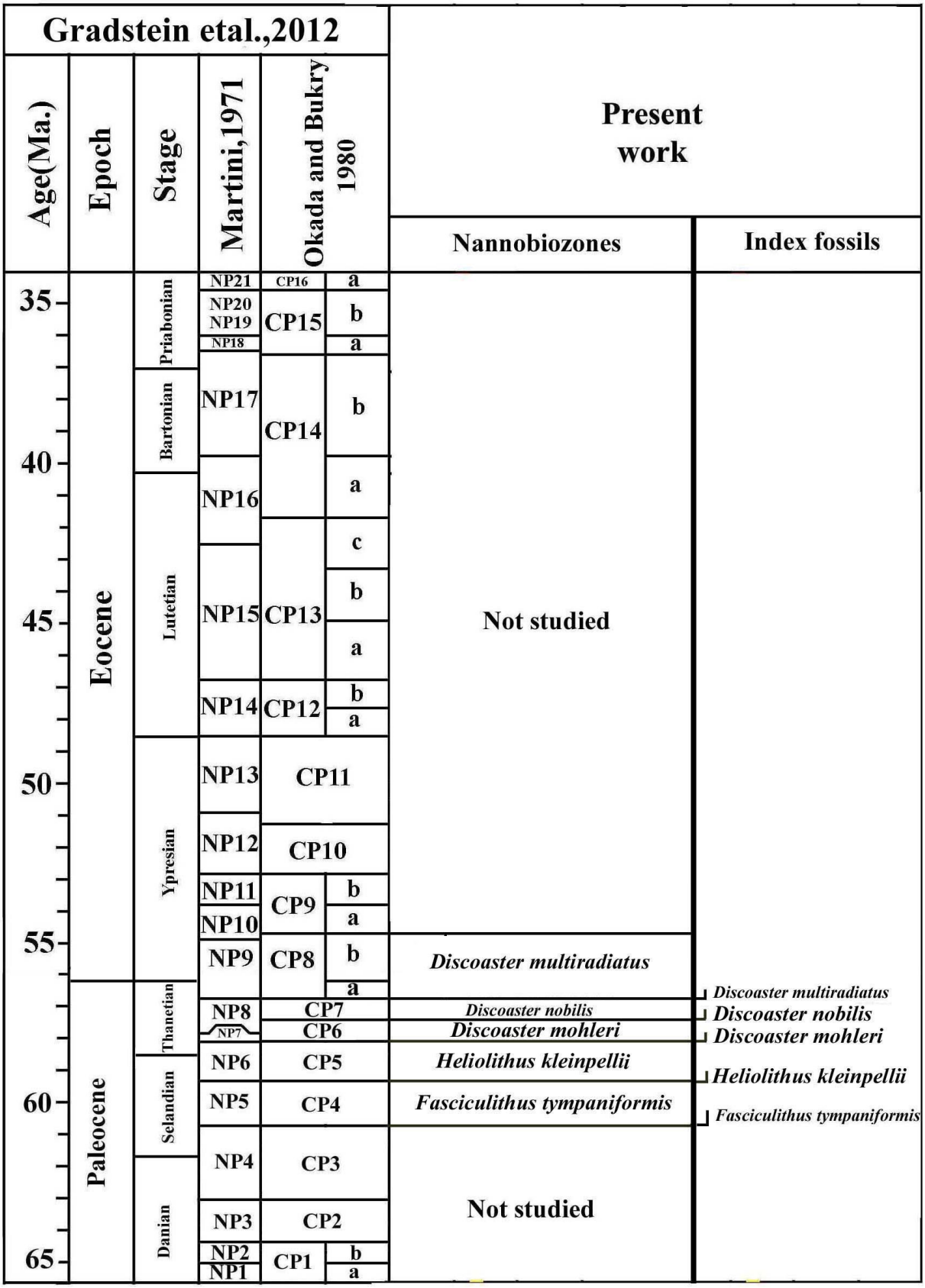

Fig. 3: Index calcareous nannofossils species for studied section.

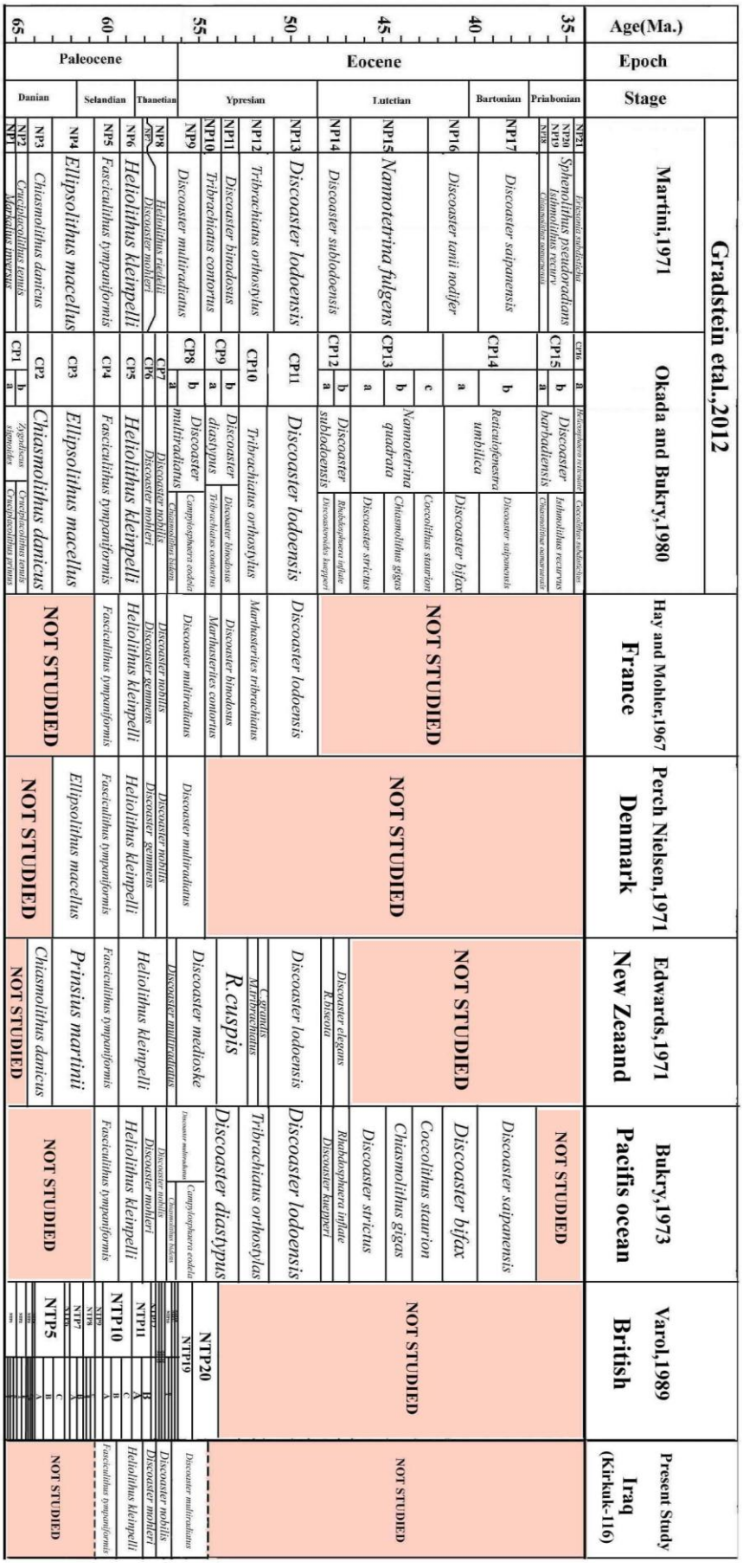

Fig. 4: Comparisons between calcareous nannofossils biozones for studied section.

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PLATE EXPLANATIONS

1, 2 *Thoracosphaera tersserula* Fütter, 1978, bar = 5 micron, (1) Polarized Light Photo (2) Gypsum Light Photo.

3, 4 *Heliolithus klenpellii* Sullivan, 1964, bar = 5 micron, (1) Polarized Light Photo (2) Gypsum Light Photo.

5, 6 *Fasciculithus tympaniformis* Hay and Mohler, 1967 in Hay, Mohler and Roth, 1967, bar = 5 micron, (1) Polarized Light Photo.

7, 8 *Sphenolithus acervus* Bown, 2005, bar = 5 micron, (1) Polarized Light Photo (2) Gypsum Light Photo.

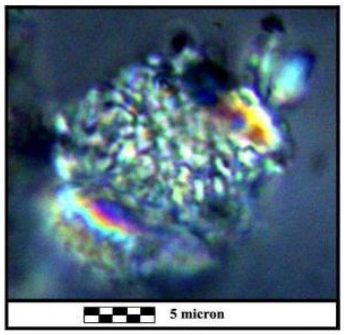
9 *Discoater mohleri* Bukry and Percival, 1971, bar = 5 micron, (1) Normal Light Photo.

10 *Discoater multiradiatus* Bramlette and Riedel, 1954, bar = 5 micron, (1) Normal Light Photo.

11 *Discoaster nobilis* Martini, 1961, bar = 5 micron, (1) Normal Light Photo

12 *Discoaster deproplitus* Martini, 1961, bar = 5 micron, (1) Normal Light Photo.

PLATE



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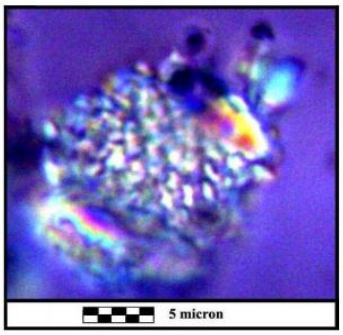

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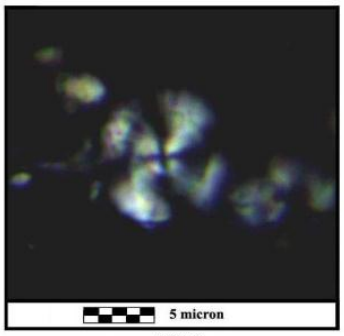

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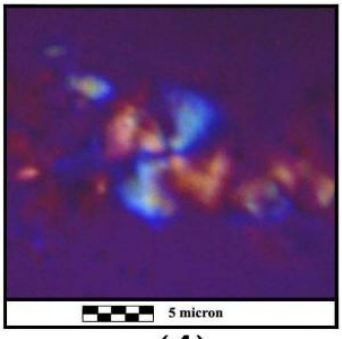

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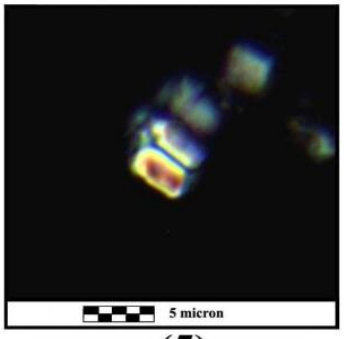

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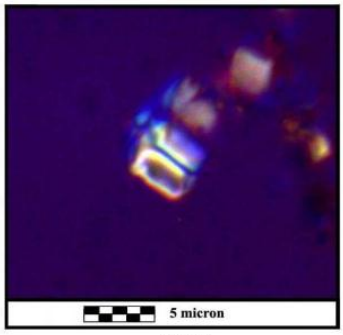

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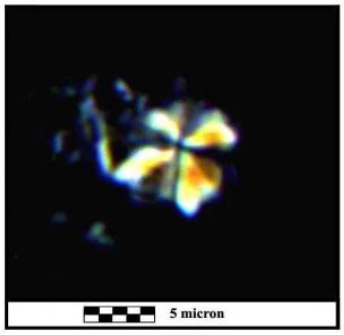

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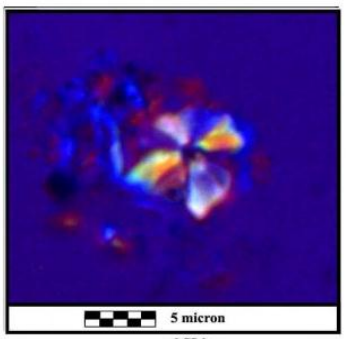

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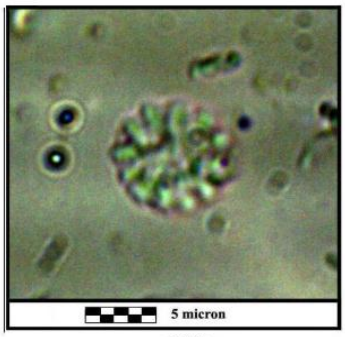

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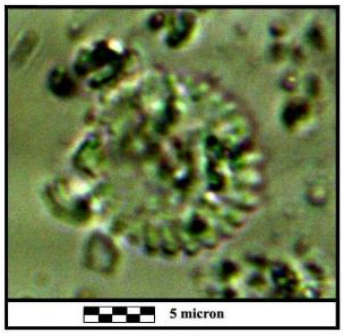

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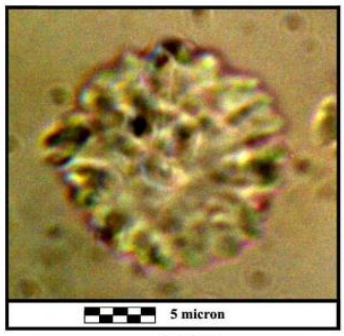

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