

Nannobiostratigraphy of Jaddala Formation in Well (KH 12/7) West Iraq

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(Received 28/12/2009 , Accepted 18/3/2010)

ABSTRACT

Thirteen species of Calcareous Nanofossils were identified from the Jaddala Formation from well (KH 12/7) of depth (107-130 m.) west Iraq. The recorded calcareous nanofossils assemblages permits the recognition of two biozones these are (from top to bottom):

- 2- *Discoaster saipanensis* Interval zone(Part) (CP14b)
- 1- *Discoaster bifax* Interval zone(Part) (CP 14 a)

On the basis of biocorrelation with previous works Middle Eocene (Bartonian) age confirmed for the Jaddala Formation at the studied section.

الطباقية الحياتية لمتحجرات النانو الكلسية لتكوين جدالة في بئر
(KH 12/7)، غرب العراق

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المخلص

تم تشخيص ثلاثة عشر نوعاً من الأنواع التابعة لمتحجرات النانو الكلسية من تكوين جدالة من بئر (KH 12/7) غرب العراق للأعماق (107 - 130 متر). بالاعتماد على الأنواع المشخصة تم تحديد نطاقين حياتيين هما (من الأعلى إلى الأسفل):

2- *Discoaster saipanensis* Interval zone(Part) (CP14b)

1- *Discoaster bifax* Interval zone(Part) (CP 14 a)

بالاعتماد على المضاهاة الطباقية الحياتية للدراسات السابقة يمكن التأكيد على أن عمر تكوين جدالة في هذا المقطع هو الايوسين الأوسط (البارتونيان).

INTRODUCTION

Jaddala Formation was first described by (Henson, 1940, in Bellen *et al.*, 1959), near Jaddala village at southern limb of Sinjar anticline NW Iraq, about 342 m. in thickness consist of marly Limestone, chalky Limestone and Marlstone. The previous studied about nannofossils in Iraq were very rare, the only works related to the studied formation outline below :

Authors	Successions	Conclusions
Elewi, 1982	Jaddala Formation in Sinjar anticline(near Sinjar area)	E.-M. Eocene
Al-Badrani, 2007	Uppermost part of Jaddala Formation in Sinjar anticline (type section of Jaddala Formation)	M. Eocene

MATERIALS

The studied section situated in the stable shelf tectonic unit of Iraq (Buday and Jassim,1987) (Fig. 1) of which the thickness about 23 m. range between(107-130 m. in depth), Lithologically consist of Limestone alternated with Glauconitic Limestone, change to Dolostone in upper part of the section. Nine samples were investigated to identify the nannofossils species.

SYSTEMATIC PALEONTOLOGE

Kingdom Protista

Division Chrysophyta Rothmaler, 1949

Class Coccolithophyceae Rothmaler, 1949

Family Braarudosphaeraceae Deflandre, 1947

Genus *Braarudosphaera* Deflandre,1947

Type species: *Braarudosphaera bigelowi* (Gran and Braarud) ; Deflandre,1947; C.R. Acad. Sc., 225: 439, Figs. 1-5.

Braarudosphaera sp.

Pl.1, Fig.1

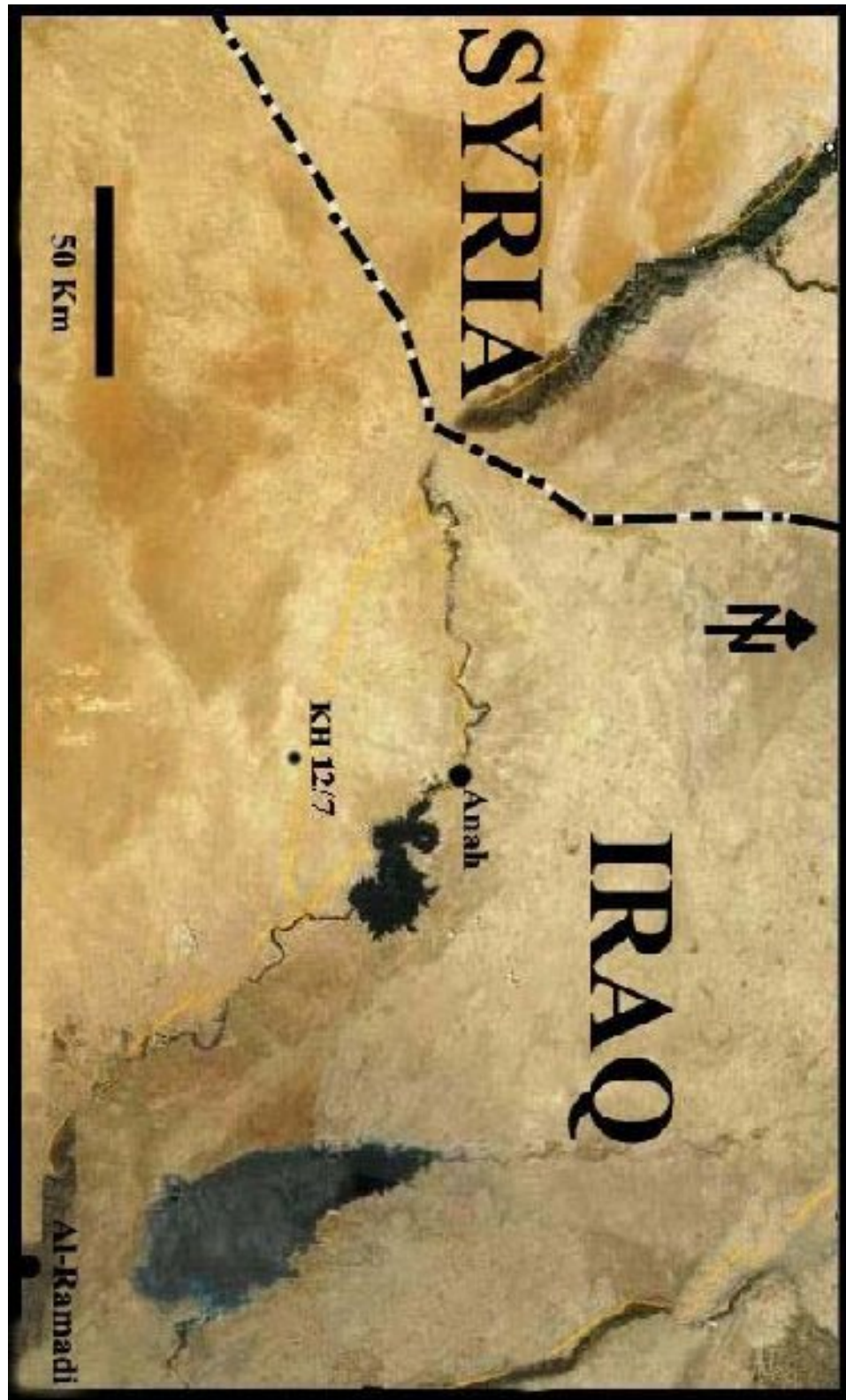


Fig. 1: Satellite Image for Studied Section

Description: Discoidal Nannoliths consisting of several crystal units and showing radial symmetry, elements trapezoidal, sutures go to edges of the pentagon, and it is not good clear.

Family Coccolithaceae **Poche,1913**

Genus *Coccolithus* Schwarz,1894

Type species: *Coccolithus oceanicus* Schwarz,1894; Ann. And Mag. Nat. Hist., ser. 6, 14: 341, Figs. 1-27.

Coccolithus sp.

Pl.1, Fig.2

Description: This have the *Coccolithus* -type rim-structure, and it is not good clear.

Family Discoasteraceae Tan Sin Hok,1927

Genus *Discoaster* Tan Sin Hok, 1927

Type species: *Discoaster pentaradiatus* Tan Sin Hok, 1927; Mededeelingen, Vol. 5: pp. 92 - 114.

Discoaster aster Bramlette and Reidel,1954

Pl.1, Fig.3

1954 *Discoaster aster* Bramlette and Riedel ; J. Paleontology, 28(4), 385-403.

Occurrence:

Authors	Date	Age	Location
Bramlette and Reidel	1954	Early Oligocene	Bardados
Levin and Joerger	1967	Eocene to Oligocene	Alabama
Baumann	1970	Eocene to Oligocene	Italy
Al-Badrani	2007	Eocene	Iraq

Discoaster barbadensis Tan Sin Hok 1927

Pl.1, Fig.4

1927 *Discoaster barbadiensis* Tan Sin Hok ; J. Paleontology, 28(4), 385-403.

Occurrence :

Authors	Date	Age	Location
Tan Sin Hok	1927	Oligocene	Bardados
Bramlette and Reidel	1954	Eocene	Alabama
Levin and Georger	1967	Eocene	Alabama
Bilguty <i>et al.</i>	1967	Eocene	France
Stradner	1967	Upper Eocene	Austria
Baumann	1970	Eocene	Italy
Gibson	1976	Eocene	U.S.A.
Aurby	1986	Middle Eocene	Europe
John and Firth	1989	Eocene	Atlantic
El-Dawoody	1992	Eocene	Egypt
El-Dawoody and Elewi	1994	Eocene	Iraq
Ananiadis <i>et al.</i>	2004	Middle Eocene	Greece
Garecka	2005	Oligocene	Poland
Melinte	2005	Eocene	Romanian
Bown	2005	Eocene	World wide
Al-Badrani	2007	Eocene	Iraq

***Discoaster bifax* Bukry (1971)**

Pl.1, Fig. 5

1971 *Discoaster bifax* Bukry; Trans.San. Diego. Soc. Ant.Hist.,16,303-27.

Occurrence :

Authors	Date	Age	Location
Bukry	1971	Eocene	Pacific

***Discoaster cubensis* Ferruzola and Iturralde,1967**

Pl.1, Fig.6

1967 *Discoaster cubensis* Ferruzola and Iturralde ; Tecnologica ,Vol. 5, No.1 pp.3 - 11, pls. 1, 2, text- Figs.1 - 4.

Occurrence :

Authors	Date	Age	Location
Ferruzola and Iturralde	1967	Oligocene	Cuba
Baumann	1970	Oligocene	Italy
Al-Khafaf	2006	Miocene	Iraq
Al-Badrani	2007	Eocene	Iraq

***Discoaster elegans* Bramlette and Sullivan,1961**

Pl.1, Fig.7

1961 *Discoaster elegans* Bramlette and Sullivan ; Micropaleont., 7: 159, Pl. 11.
Fig. 16.

Occurrence :

Authors	Date	Age	Location
Bramlette and Sullivan	1961	Eocene	U.S.A.
Perch-Nielsen	1971,1972, 1985	Eocene	Denmark
Elewi	1982	Eocene	Iraq
Aurby	1986	Eocene	Eourpe
Al-Badrani	2007	Eocene	Iraq

***Discoaster floreus* Bystricka,1964**

Pl.1, Fig.8

1964 *Discoaster floreus* Bystricka ; Geol. Sborn., 15: 213, Pl. 6, Figs. 1,2.

Occurrence :

Authors	Date	Age	Location
Bystricka	1964	Miocene	USSSR
Elewi	1982	Eocene	Iraq
Al-Badrani	2007	Eocene	Iraq

***Discoaster gemmifer* Stradner(1961)**

Pl.1, Fig.9

1964 *Discoaster gemmifer* Stradner ; Geol. Sborn., 15: 213, Pl. 6, Figs. 1,2.

Occurrence :

Authors	Date	Age	Location
Stradner	1961	Eocene	World wide

***Discoaster saipanensis* Bramlette and Riedel,1954**

Pl.1, Fig. 11

1954 *Discoaster saipanensis* Bramlette and Riedel ; J. Plaeont., 28: 398, Pl. 39,
Fig. 4.

Occurrence :

Authors	Date	Age	Location
Bramlette and Riedel	1954	Upper Eocene	U.S.A.
Bilguaty et al.	1967	Eocene	France
Levin and Geoerger	1967	Eocene	Alabama
Stradner	1967	Upper Eocene	Austria
Baumann	1970	Eocene	Italy
Perch-Nielsen	1971,1972,1985	Eocene	Danemark
Rade	1977	Eocene	Australia
Aurby	1977	Middle Eocene	Europe
Haq	1978	Eocene	General
John and Ferth	1989	Eocene	Labrador
El-Dawoody	1992	Eocene	Egypt
El-Dawoody and Elewi	1994	Eocene	Iraq
Ananiadis et al.	2004	Middle Eocene	Greece
Garecka	2005	Middle Eocene	Poland
Melinte	2005	Eocene	Romania
Al-Badrani	2007	Eocene	Iraq

***Discoaster triangularis* Bystricka,1966**

Pl.1, Fig. 12

1966 *Discoaster triangularis* Bystricka ; Geologicky sbornik, Vol. 12, No.2 p.237, Figs.1 - 3.

Occurrence :

Authors	Date	Age	Location
Bystricka	1966	Eocene	France
Al-Badrani	2007	Eocene	Iraq

Discoaster sp.1

Pl.1, Fig. 11

Description : Discoidal Nannoliths consisting of several crystal units and showing radial symmetry, semi star-shaped species(Eudiscoaster), usually consists of (6) thick and wide which vary markedly in width and degree of separation, the rays are somewhat irregular in outline due to their rather rough surface.

Discoaster sp.2

Pl.1, Fig. 13

Description : Discoidal Nannoliths consisting of several crystal units and showing radial symmetry, star-shaped species(*Eudiscoaster*), usually consists of (6) rays , there are not good clear nodes on each ray .

Nannobiostratigraphy

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

1- *Discoaster bifax* Interval zone(Part) (CP 14 a)

Definition: Interval from First occurrence of *Discoaster bifax* Bukry (1971) to last occurrence of *Discoaster bifax* Bukry (1971).

Thickness: Lower(3) meters consist of Glaunitic Limestone.

Boundaries: The lower boundary of this biozone not exposed in the studied section, The upper boundary is marked by the last occurrence of *Discoaster bifax* Bukry (1971).

Discussion: This biozone correlated with *Discoaster bifax* Subzone (CP14a) (Okada and Bukry,1980) aged Middle Eocene, and correlated with *Discoaster tanii nodifer* biozone(Hay *et al.*,1967) emended. Martini (1970) aged Middle Eocene, therefore this Biozone aged Middle Eocene.

2- *Discoaster saipanensis* Interval zone(Part) (CP14b)

Definition: Interval from Last occurrence of *Discoaster bifax* Bukry (1971) to end of the section.

Thickness: Upper(20) meters consist of Glauconitic Limestone alternated with Limestone and change to Dolostone in the upper part.

Boundaries: The lower Boundary is marked by Last occurrence of *Discoaster bifax* Bukry (1971) The upper boundary not exposed in the studied section.

Discussion : This biozone is correlated with *Discoaster saipanensis* Subbiozone (CP14b)(Okada and Bukry,1980)aged Middle Eocene , and correlated with *Discoaster saipanensis* Biozone (Maritini ,1970) aged Middle Eocene, therefore this Biozone aged Middle Eocene.

CONCLUSIONS

The boundary between CP14a/CP14b(Calcareous nannobiozones) identical to the boundary between P12/P13(Foraminiferal biozones) Gradestin *et al.*,2004 and Perch-Nilesen, 1985. Jaddala Formation, in the recent section, aged Middle about Late Eocene by Basi *et al.* 1987, then(Al-Mutwali,1992) change it's age at Middle Eocene in the recent section, and in this study the two boundaries appears closed to each other when it correlated to biozones that made by (Al-Mutwali, 1992) (P12,P13) (Fig. 2). Depended on the Calcareous nannobiozones and Foraminiferal biozones one can concluded that time level 39.8 Ma lies at depths about (125-127 m.depth) in this well Fig. 3.

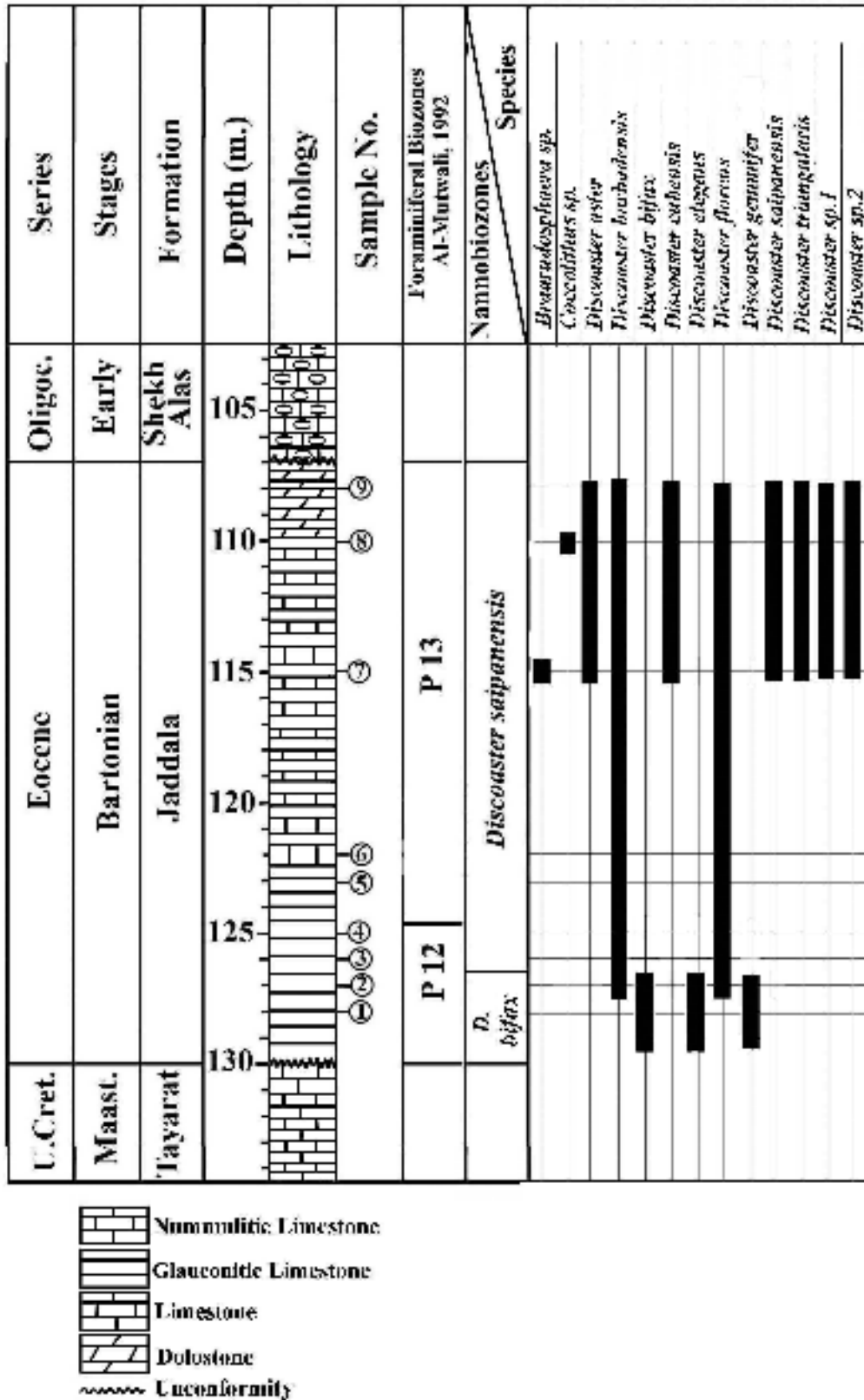


Fig. 2: Range Chart of Calcareous Nanofossils for KH 12/7.

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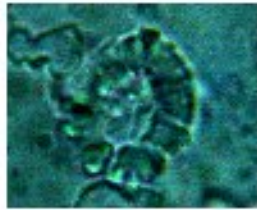
PLATE 1

- 1 - *Braarudosphaera* sp.
- 2 - *Coccolithus* sp.
- 3 - *Discoaster aster* Bramlette and Reidel,1954
- 4 - *Discoaster barbadensis* Tan Sin Hok1927
- 5 - *Discoaster bifax* Bukry(1971)
- 6 - *Discoaster cubensis* Ferruzola and Iturralde,1967
- 7 - *Discoaster elegans* Bramlette and Sullivan,1961
- 8 - *Discoaster floreus* Bystricka,1964
- 9 -*Discoaster gemmifer* Stradner(1961)
- 10- *Discoaster* sp.1
- 11-*Discoaster saipanensis* Bramlette and Riedel,1954
- 12-*Discoaster triangularis* Bystricka,1966
- 13-*Discoaster* sp.2

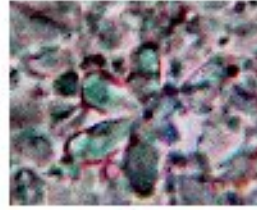
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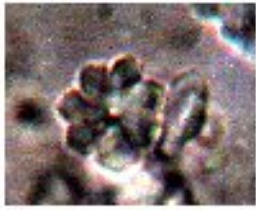
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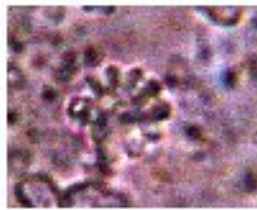
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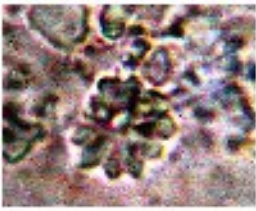
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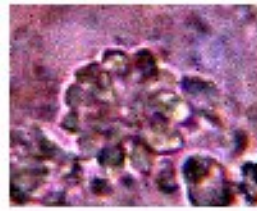
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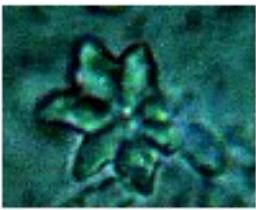
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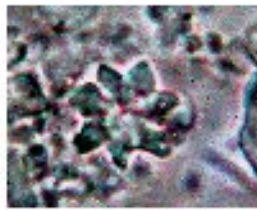
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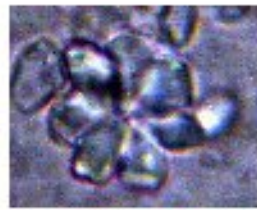
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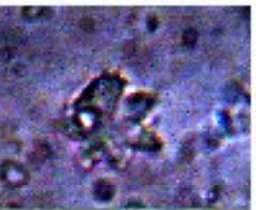
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