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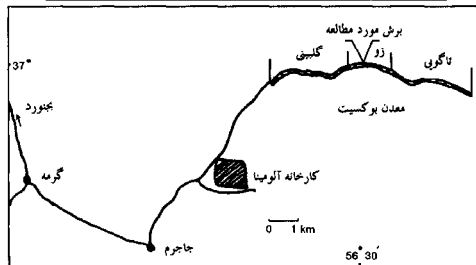
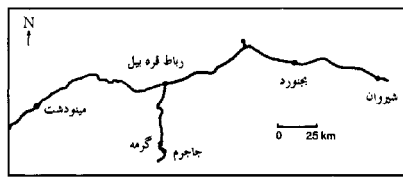
*Nannoceratopsis*

*Valensiella ovulum* Biozone و *spiculata* Biozone

(Afshar-Harb, 1979)

( )

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...

( )

.(AfsharHarb, 1979)

( )

( )

(Williams *et al.*, 1998) (Sarjeant, 1974)

Division Dinoflagellata (Butschli 1885) Fensome et al. 1993

Subdivision Dinokaryota Fensome et al. 1993

Class Dinophyceae Pasher 1914

Subclass Dinophysiphycidae Mohn 1984 ex Fensome et al. 1993

Order Nannoceratopsiales Piel & Evitt 1980

Family Nannoceratopsiaceae Gocht 1970

(cyst)

»: Sarjeant (1974, p. 145)

:

(proximate)

(cingulum)

(epittract)

(hypottract)

(horn)

(antapical)  
(epitracial archeopyle) « (operculum)

Genus *Nannoceratopsis* Deflandre 1938 emend. Evitt 1961 emend. Piel & Evitt  
1980 emend. Poulson 1992

Type species : *Nannoceratopsis pellucida* Deflandre 1938a emend. Evitt 1961b

»: Sarjeant (1978, p. 34-35) :

(antapical horns)

ventral )

(horn

(epittract)

(hypottract)

(sulcus)

«.

*Nannoceratopsis spiculata* Stover 1966

(Pl. 1, Figs. 1, 2)

1989 *Nannoceratopsis spiculata* : Prauss; p. 16, pl. 7, fig. 8.

1990 *Nannoceratopsis spiculata* : Rauscher & Schmitt; p. 129, pl. 11, fig. 4.

1992 *Nannoceratopsis spiculata* : Powell; pl. 2.7, fig. 3.

" (cyst) :

: (exine)

(Prauss, 1989)

(Powell, 1992)

Order Peridinales Schutt 1896  
Family Gonyaulacaceae Lindeman 1928

...

(cyst) »: Sarjeant (1974, p. 138) :  
 (proximate)  
 5 - 7''' 1-2p : (tabulation) (apical horn)  
 . 0 - 1pv 0 - ?7pc 0 - 1''' 1 - 6' 0 - 5a 6 - 8''  
 .  
 (spines) .  
 ( ) (pericingular archeopyle)  
 «.

Genus *Aldorfia* Stover & Evitt 1978

Type species : *Aldorfia aldorfensis* (Gocht 1970) Stover & Evitt 1978

:

(sutural)

(helicoidal)

*Aldorfia dictyophora* (Deflandre 1938) Stover & Evitt 1978

(Pl. 1, Figs.4, 8; Pl. 2, Fig. 5)

1998 *Aldorfia dictyophora*: Williams et al.; p. 31.

(cyst) :

:

:

:

(Williams et al., 1998)

:

Genus *Gonyaulacysta* Deflandre ex Norris & Sarjeant emend. Sarjeant 1982  
 Type species : *Gonyaulacysta jurassica* (Deflandre 1939) Deflandre ex Norris &  
 Sarjeant emend. Sarjeant 1982

» : Sarjeant (1982, p. 28) :

(proximochorate)

(parasutural crests)

0-2pa, 3-4', 0-1a, 6", 6c-?7c, 6"', 1p, 0-1pv, 1''' : (paratabulation)

4' (sulcus)

6" 1'

3'''

«.

*Gonyaulacysta centriconnata* Riding 1983

(Pl. 1, Fig. 5)

1986 *Gonyaulacysta centriconnata* : Berger; p. 351, figs.7: 9,10.

1989 *Gonyaulacysta centriconnata* : Prauss; pl. 11, fig. 5.

1992 *Gonyaulacysta centriconnata* : Powell; pl. 2.12, fig. 3.

1995 *Gonyaulacysta centriconnata* : Fauconnier; p. 18, fig. 3.

1999 *Gonyaulacysta centriconnata* : Riding et al.; p. 25, text-fig. 13.

(cyst) :

— : — :  
— :  
— (Prauss, 1989) — (Berger, 1986)  
(Fauconnier, 1995) — (Powell, 1992)

...

— (Williams *et al.*, 1998) —  
(Riding *et al.*, 1999)

*Gonyaulacysta jurassica* subsp. *jurassica* Deflandre 1952 emend. Sarjeant 1982  
(Pl. 1, Fig. 3)

- 1972 *Gonyaulacysta jurassica* : Sarjeant; p. 10, pl. 1, figs. 2-4.
- 1986 *Gonyaulacysta jurassica* subsp. *jurassica* : Berger; p. 340.
- 1987 *Gonyaulacysta jurassica* : Huber et al.; p. 458, pl. 1, fig. 9.
- 1988 *Gonyaulacysta jurassica* subsp. *jurassica* : Riding & Thomas; p.78, pl.1, fig. 5.
- 1989 *Gonyaulacysta jurassica* : Smelror & Leereveld; p. 132, pl. 4, fig. 2, pl. 5, fig. 9.
- 1990 *Gonyaulacysta jurassica* : Van der Zwan; p. 163, fig. 3.
- 1996 *Gonyaulacysta jurassica* subsp. *jurassica* : Poulsen; p. 177, pl. 21, fig. 3.
- 1999 *Gonyaulacysta jurassica* subsp. *jurassica* : Riding et al.; p. 134, pl. TP6, figs. 5,8;pl. RP3, fig. 7; pl. RP8, figs. 2,3.
- 1999 *Gonyalacysta jurassica* : Ghasemi-Nejad et al.; pl. 18, fig. 6, pl. 19, fig. 8

(cyst) :

: :  
 (Sarjeant,1972) — :  
 — (Berger,1986) —  
 (Riding & Thomas,1988) (Huber et al.,1987)  
 — (Smelror & Leereveld,1989) —  
 (Poulsen,1996) — (Van der Zwan,1990)  
 Ghasemi-Nejad) (Riding *et al.*,1999)  
 (et al., 1999)

Genus *Liesbergia* Berger 1986

Type species : *Liesbergia liesbergensis* Berger 1986

(cyst) » : Berger (1986, p. 431) :  
(P=3" , or 2P=3" + 4")

(paratabulation)

(Gonyaulacoid)

«.

*Liesbergia liesbergensis* Berger 1986

(Pl. 2, Fig. 6)

1986 *Liesbergia liesbergensis* Berger; p. 341, fig. 5: 1-7

1999 *Liesbergia liesbergensis*: Ghasemi-Nejad *et al.*; pl. 12, fig. 5

(cyst) :

:

(Berger, 1986)

(Ghasemi-Nejad *et al.*, 1999)

Family Membranilarnaciaceae Eisenack 1963 emend. Sarjeant & Downie 1966

(cyst) »: Sarjeant (1974) :

«.

Genus *Valensiella* Eisenack 1963

Type species : *Valensiella ovulum* (Deflandre 1947) Eisenack 1963

»: Sarjeant (1978, p. 18) :

areole (septa)

(ectophragm)

(Accessory sutures)

(Sulcal notch)

«.



...

*Valensiella ovulum* (Deflandre 1947) Eisenack 1963  
(Pl. 2, Figs. 1,7)

- 1970 *Valensiella ovulum* : Gocht; p. 148, pl. 34, figs. 1-6, text-figs.19b, c
- 1986 *Valensiella ovulum* : Berger; p. 339.
- 1992 *Valensiella ovulum* : Powell; pl. 2.7, figs. 6,9.
- 1996 *Valensiella ovulum* : Burger; pl. 10, figs. M-O
- 1999 *Valensiella ovulum* : Ghasemi-Nejad et al.; pl. 27, fig. 6

(cyst) :

— : : .

— (Gocht,1970) :

(Powell,1992) — (Berger,1986)

(Williams *et al.*, 1998) (Burger,1996) —

(Ghasemi-Nejad *et al.*, 1999)

Family Pareodiniaceae Gocht 1957 emend. Sarjeant & Downie 1974

(cyst) » :Sarjeant (1974, p.140) :

(proximate)

"

"

«.

Genus *Kalyptea* Cookson & Eisenack 1960 emend. Wiggins 1975

Type species : *Kalyptea diceras* Cookson & Eisenack 1960

:

*Kalyptea diceras* Cookson & Eisenack 1960

(Pl. 1, Figs. 6,7)

1973 *Kalyptea diceras*: Wiggins; p. 110, pl. 5, figs. 6-9

1992 *Kalyptea diceras*: Quattrocchio & Sarjeant; p. 109, pl. 4, fig. 11.

(apical horn)

(cyst)

:

(antapical horn)

—

:

(Wiggins, 1973)

:

(Quattrocchio & Sarjeant, 1992)

—

Genus *Pareodinia* Deflandre 1947

Type species : *Pareodinia ceratophora* Deflandre 1947

»: Sarjeant (1978, p. 7)

:

(intercalary archeopyle)

:

Kalyptra

«

*Pareodinia ceratophora* Deflandre 1947

(Pl. 2, Fig. 4)

1970 *Pareodinia ceratophora* : Gocht; p. 154, pl. 35, figs. 1-8, text-figs. 22-25.

1972 *Pareodinia ceratophora* : Pocock; pl. 24, fig. 3

1973 *Pareodinia ceratophora* : Wiggins; p. 103, pl. 1, figs. 1-7

1975 *Pareodinia ceratophora* : Filatoff; p. 90, pl. 29, fig. 15.

1978 *Pareodinia ceratophora* : Muir & Sarjeant; p. 223, pl. III, fig. 2.

1979 *Pareodinia ceratophora* : Ashraf; p. 132, pl. 5, figs. 12-15.

1986 *Pareodinia ceratophora* : Jansonius; p. 214, pl. 5, figs. 9,10.

1986 *Pareodinia ceratophora* : Kumar; p. 398, pl. VI, fig. 1.

...

- 1988 *Pareodinia ceratophora* : Smelror; pl. I, fig. 9.
- 1990 *Pareodinia ceratophora* : Rauscher & Schmitt; pl. XI, figs. 8,12
- 1996 *Pareodinia ceratophora* : Burger; pl. 8, fig. AA.
- 1999 *Pareodinia ceratophora* : Riding et al.; pl. 122, pl. NS7, fig. 9.
- 1999 *Pareodinia ceratophora* : Ghasemi-Nejad et al.; pl. 8, fig. 7.

(proximate) (cyst) :

:(intercalary)

:

(Gocht,1970) :

(Wiggins, 1973) (Pocock,1972)

(Ashraf,1979) (Filatoff, 1975)

Svalbard (Jansonius, 1986) (Kumar, 1986)

(Prauss,1989) (Smelror,1988)

Riding *et al.*, ) (Burger, 1996)

(Ghasemi-Nejad *et al.*, 1999) (1999)

Family Systematophoraceae Sarjeant & Downie 1974

(cyst) » :Sarjeant (1974) :

(chorate)

« . 1-5', 0-1a, 0-6c, Xs, 5-6''' , 0-1p, 0-1'''' :

Genus *Systematophora* Klement 1960 emend. Stancliffe & Sarjeant 1990  
 Type species : *Systematophora areolata* Klement 1960

» :Stancliffe & Sarjeant (1990, p.207-208) :

phragmochorate

0-2pr, 4", 6", 5-6"', 1p, 1"', 1-5s :  
(intratabular) (penitabular)

(sulcal)

(cingular)

(tA)

«. (sulcal notch)

*Systematophora* sp  
(Pl. 2, Figs. 2,3)

(cyst) :

:

:

:

Group Acritarcha Evitt 1963  
Subgroup Acanthomorphae Downie, Evitt & Sarjeant 1963  
Genus *Micrhystridium* Deflandre 1937 emend Sarjeant 1967  
Type species : *Micrhystridium inconspicuum* Deflandre 1937

*Micrhystridium densispinum* Valensi 1953  
(Pl. 2, Fig. 8)

1979 *Micrhystridium densispinum* : Ashraf; p. 146, pl. 10, fig. 10

...

(Ashraf, 1979)

*Micrhystridium fragile* Deflandre 1947  
(pl. 2, fig. 9,10)

- 1962 *Micrhystridium cf. fragile*: Jansonius; p. 85,86; pl. 16, fig. 64; text-fig. 3e.
- 1970 *Micrhystridium fragile*: Horowitz; p. 180, pl. V, fig. 9.
- 1979 *Micrhystridium fragile*: Ashraf; p. 146, pl. 10, figs. 13,15; pl. 11, figs. 1,2
- 1981 *Micrhystridium fragile*: Achilles; p.55, pl.17, fig.9.
- 1994 *Micrhystridium fragile*: Koppelhus & Nielsen; pl. 5, fig. 12.

(Jansonius, 1962)

(Ashraf, 1979)

(Koppelhus & Nielsen, 1994)

—

(Horowitz, 1970)

(Achilles, 1981)

(local)

:( )

*Nannoceratopsis*

(FJ-95 )

:Total range zone I

*spiculata*

*Pseudogrammoceras* ex gr. *Fallaciosm* Bayle

( )

*Kalyptea diceras* *Aldorfia dictyophora*, *Liesbergia liesbergensis*

:Total range zone II

*Gonyaulacysta jurassica*

*Valensiella ovulum*

*Systematophora* sp *Gonyaulacysta centriconnata* subsp. *jurassica*

*Pareodinia ceratophora*

*M. densispinum* *Micrhystridium fragile*

*Dictyophyllum*

Vaez-Javadi *et al.*, (2002)

*Podozamites lattisimus* *exile*, *Nilssonia polymorpha*

*Valensiella ovulum* *Nannoceratopsis spiculata*

SYSTEM		STAGE	ROCK UNIT	THICKNESS	SAMPLE NO.	LITHOLOGY	DISTRIBUTION OF DINOFLAGELLATE & ACROTARCH TAXA	LIST OF SPECIES	B.Z
JURASSIC	HETT-SINEM.	TOARCICAN	SALENIAN	Fm.	2000	FJ-251		1- <i>Nannoceratopsis spiculata</i> 2- <i>Kalyptea diceras</i> 3- <i>Aldorfia dictyophora</i> 4- <i>Liesbergia liesbergensis</i> 5- <i>Valensiella ovulum</i> 6- <i>Gonyaulacysta centriconnata</i> 7- <i>Gonyaulacysta jurassica</i> 8- <i>Pareodinia ceratophora</i> 9- <i>Systematophora</i> sp. 10- <i>Michystridium fragile</i> 11- <i>Michystridium densispinum</i>	II
					1500	FJ-227			I
JURASSIC	HETT-SINEM.	TOARCICAN	SALENIAN	Fm.	1000	FJ-135			
					500	FJ-101			
JURASSIC	HETT-SINEM.	TOARCICAN	SALENIAN	Fm.	500	FJ-66 FJ-60			
					0				

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## Explanation of Plates

### Plate 1

- Figs. 1, 2. *Nannoceratopsis spiculata* Stover 1966  
Fig. 3. *Gonyaulacysta jurassica* subsp. *jurassica* Deflandre 1952 emend. Sarjeant 1982  
Fig. 4, 8. *Aldorfia dictyophora* (Deflandre 1938) Stover & Evitt 1978  
Fig. 5. *Gonyaulacysta centriconnata* Riding 1983  
Figs. 6, 7. *Kalyptea diceras* Cookson & Eisenack 1960

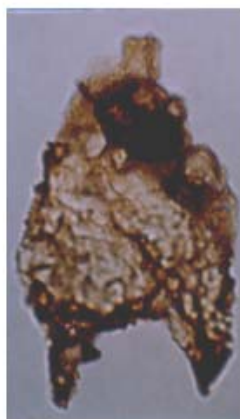
### Plate 2

- Fig. 1, 7. *Valensiella ovulum* (Deflandre 1947) Eisenack 1963  
Figs. 2, 3. *Systematophora* sp.  
Fig. 4. *Pareodinia ceratophora* Deflandre 1947  
Fig. 5. *Aldorfia dictyophora* (Deflandre 1938) Stover & Evitt 1978  
Fig. 6. *Liesbergia Liesbergensis* (Berger 1986)  
Fig. 8. *Micrhystridium densispinum* Valensi 1953  
Figs. 9, 10. *Micrhystridium fragile* Deflandre 1947

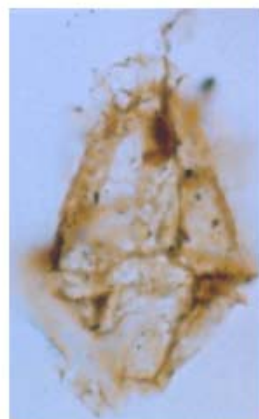
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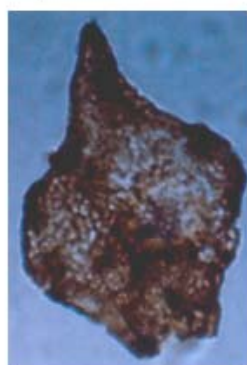
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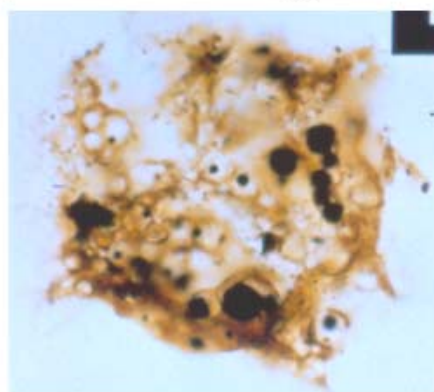
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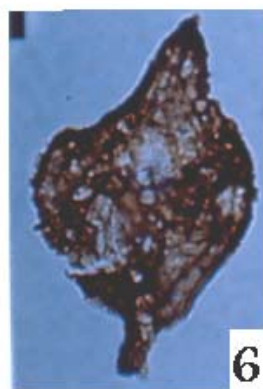
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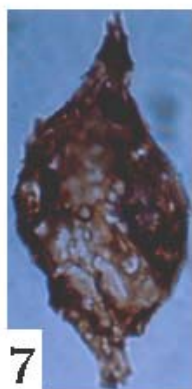
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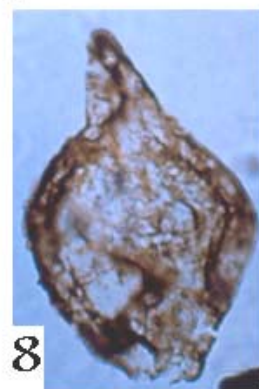
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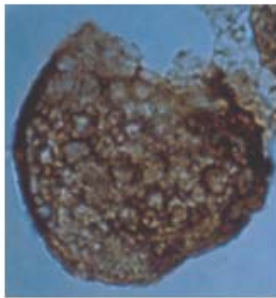
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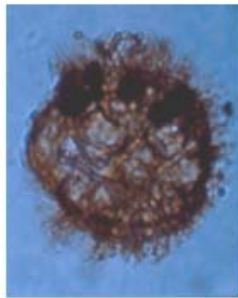
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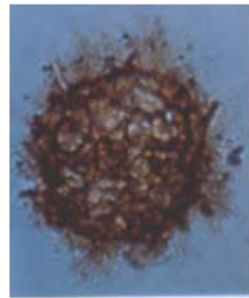
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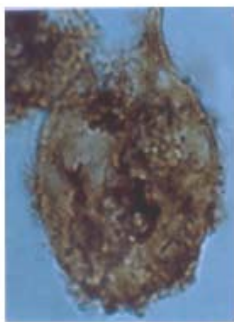
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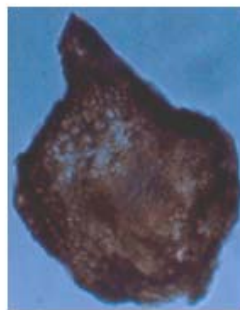
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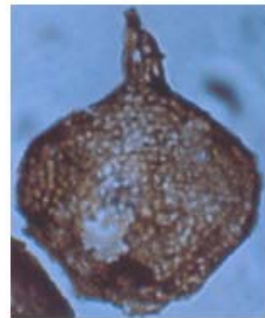
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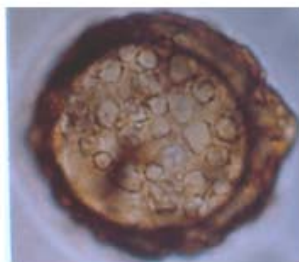
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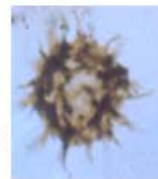
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