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\*\* گروه زمین شناسی دانشگاه صنعتی شاهرود

(Globotruncanita

(Dicarinella asymetrica zone)

(Globotruncana ventricosa zone)

elevate zone)

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### **Biostratigraphy of the Ilam Formation in the Type Section and Maleh-Kuh Well No. 1 (SE of Ilam city)**

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**Abstract**

A total of 329 samples from the Ilam Formation of the type section and Male-kuh well no. 1 were paleontologically investigated to revise the biostratigraphical zonation and determine the paleodepth of this formation. 11 genera and 16 species of planktonic foraminifera and oligosteginids were recorded, which permit the recognition of 3 biostratigraphic zones: Zone 1 (*Dicarinella asymetrica* zone) suggests Late Santonian. Zone 2 (*Globotruncanita elevate* zone) confirms Early Campanian. Zone 3 (*Globotruncana ventricosa* zone) indicates Middle Campanian. Study of morphotype groups of planktonic foraminifera shows that deposition of the Ilam Formation mostly took place in a relatively deep marine condition (more than 100 m).

**Keywords:** Ilam Formation, Planktonic foraminifera, Biostratigraphy, Zagros Basin.

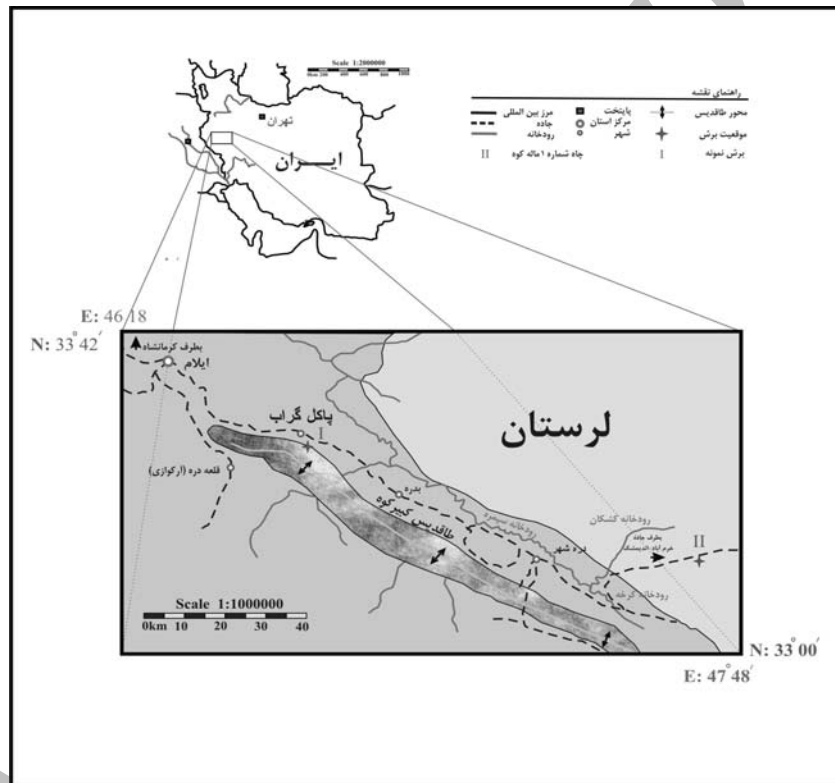
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Kalantari (1972, 1976)



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Postuma, 1971; Loeblich and Tappan,  
1987; Bolli et al., 1987; Sliter, 1989; Hart  
et al., 1989; Premoli Silva. and Sliter,  
1994; Longoria and VonFeldt, 1991;  
Verga and Rettori, 2004  
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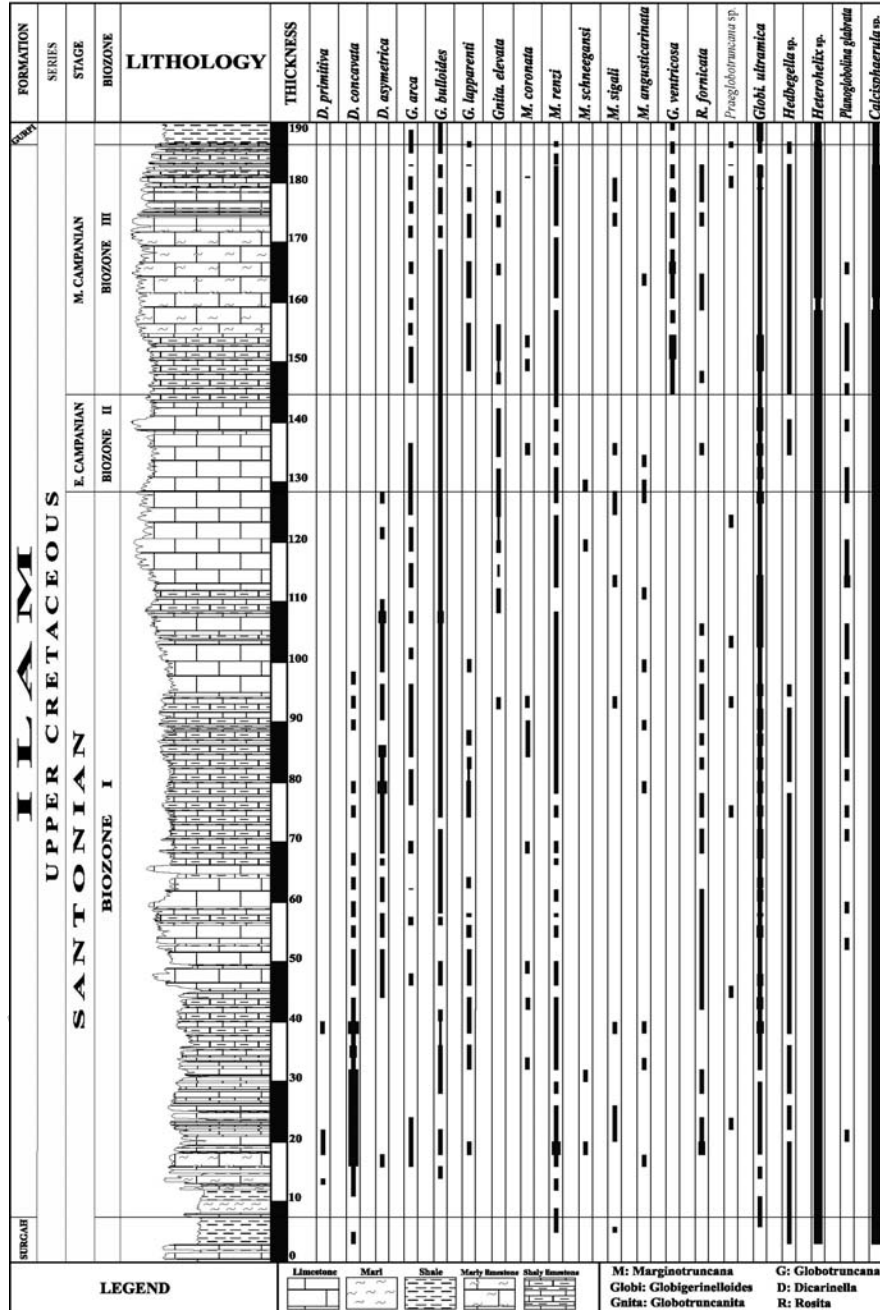
(Wynd, 1965; Robaszynski and Caron, 1995)

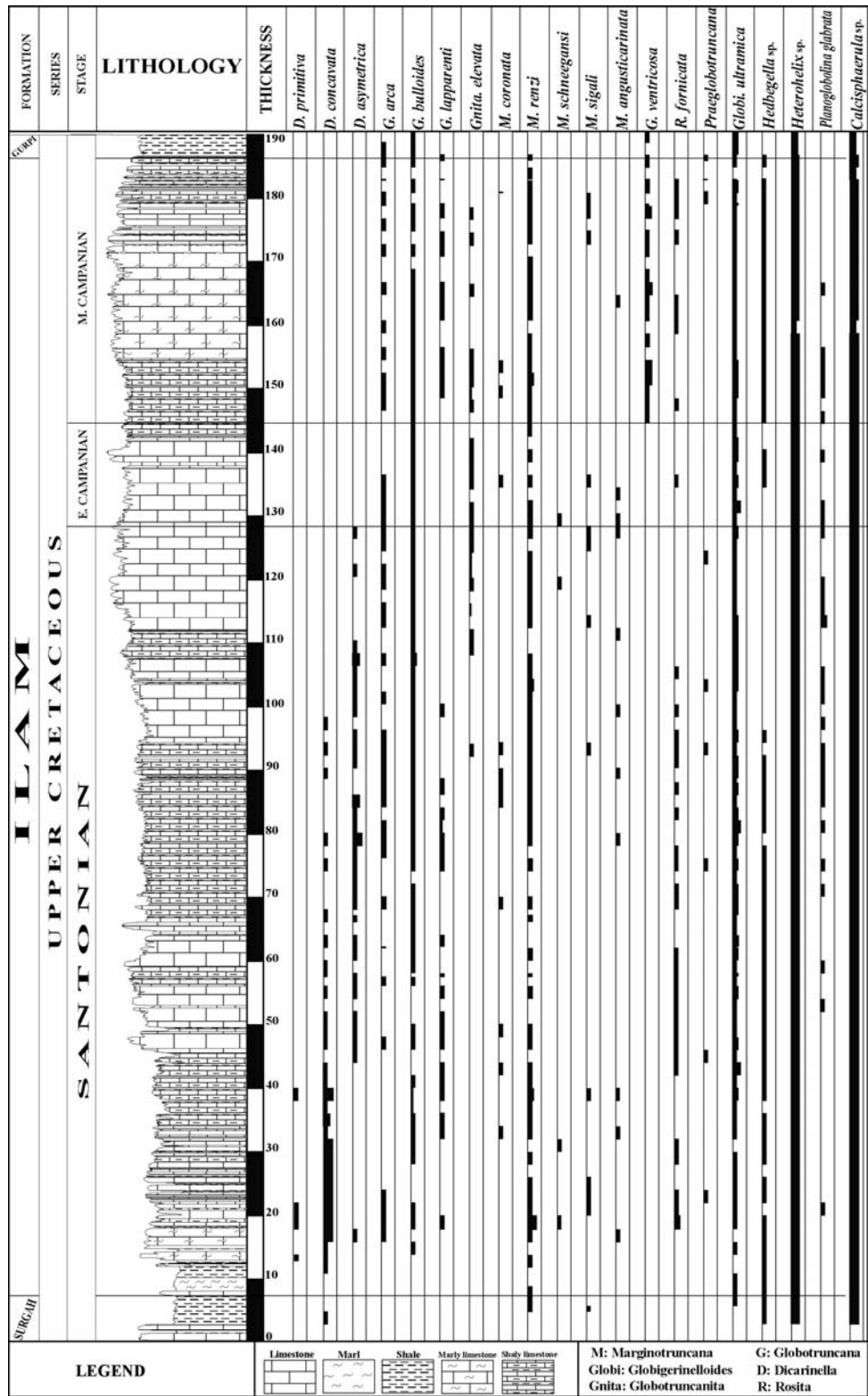
<p style="text-align: center;">Globo truncan ita elevata zone (Partial )</p> <p style="text-align: center;">range Zone</p> <p style="text-align: center;">Dicarinella asy metrica</p> <p>Globo truncana ven tricosa</p> <p style="text-align: center;">:</p> <p>Globo truncana arca, Globo truncana bulloides, Margino truncana coronata, Margino truncana angusticarinata, Margino truncana renzi, Margino truncana sigali, Rosita fornicata, Globigerinelloides ultramica, Planoglobulina glabrata, Heterohelix sp., Hedbergella sp., Calcisphaerula sp., Pithonella ovalis.</p> <p style="text-align: center;">:</p> <p>(Robaszynski and Caron, 1995)</p> <p style="text-align: center;">Globo truncan ita elevata</p> <p>Globo truncana elevata (Wynd, 1965)</p> <p style="text-align: center;">elevata</p>	<p style="text-align: center;">Dicarinella asy metrica zone (Total range zone)</p> <p style="text-align: center;">Dicarinella asy metrica</p> <p style="text-align: center;">:</p> <p>Margino truncana renzi, Margino truncana schneegansi, Margino truncana sigali, Margino truncana marginata, Margino truncana sinuosa, Margino truncana angusticarinata, Margino truncana coronata, Dicarinella primitiva, Dicarinella concavata, Rosita fornicata, Globo truncana arca, Globo truncana bulloides, Globo truncana lapparenti, Globo truncana linneiana, Globo truncan ita elevata, Globigerinelloides ultramica, Preaglobo truncana cf. gibba, Planoglobulina glabrata, Heterohelix sp., Hedbergella sp., Calcisphaerula innominata, Calcisphaerula sp., Stomiosphaera sphaerica, Pithonella ovalis.</p> <p style="text-align: center;">:</p> <p>(Robaszynski and Caron, 1995)</p> <p>Wynd, ) Dicarinella asy metrica</p> <p>Globo truncana (1965</p> <p style="text-align: center;">concavata+ven tricosa</p> <p style="text-align: center;">.</p>
<p>Globo truncana ven tricosa zone</p>	<p style="text-align: center;">.</p>

Globotruncanita calcarata

(Interval Zone)

Globotruncana ventricosa





**LEGEND**

- Limestone
- Marl
- Shale
- Marly limestone
- Shaly limestone

- M: Marginotruncana
- Globi: Globigerinelloides
- Gnita: Globotruncanita
- G: Globotruncana
- D: Dicarinella
- R: Rosita

Age	Wynd (1965)	Robaszynski & Caron (1995)	This study
m.y. 71.3	Zagros	Europe-Mediterrane	Ilam Formation Ilam and Male-kuh areas
Campanian	Globotruncana elevata, elevata	Gansserina gansseri	
		Globotruncana aegyptica	
		Globotruncanella havanensis	
		Globotruncana calcarata	
		Globotruncana ventricosa	Globotruncana ventricosa
83.5 Santonian 85.8	Globotruncana concavata+ ventricosa carinata	Globotruncanita elevata	Globotruncanita elevata
		Dicarinella asymetrica	Dicarinella asymetrica

### Wynd (1965) Robaszynski & Caron (1995)

Globotruncana arca, Globotruncana bulloides, Globotruncana lapparenti, Globotruncana linneiana, Marginotruncana coronata, Marginotruncana angusticarinata, Marginotruncana renzi, Marginotruncana sigali, Rosita fornicata, Globotruncanita elevata, Globotruncanita stuartiformis, Globotruncanella havanensis, Rugoglobigerina rugosa, Preaglobotruncana sp., Planoglobulina glabrata, Heterohelix sp., Hedbergella sp., Calcisphaerula sp., Pithonella ovalis.

(Robaszynski and Caron, 1995)

Globotruncana ventricosa  
(Wynd, 1965)

(Hart, 1980; Keller 1999; Keller

et al. 2002)

(0-50 m)

(Heterohelix )

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(Hedbergella

(50-100 m)



Marginotruncana coronata,  
Marginotruncana angusticarinata,  
Marginotruncana renzi, Marginotruncana  
schneegansi, Marginotruncana sigali,  
Dicarinella primitiva, Dicarinella  
concovata, Dicarinella asymerica, Rosita  
fornicata, Globotruncana arca,  
Globotruncana bulloides, Globotruncana  
lapparenti, Globotruncana linneiana,  
Globotruncanita elevata, Globotruncana  
ventricosa

Praeglobotruncana

:(100m

Marginotruncana

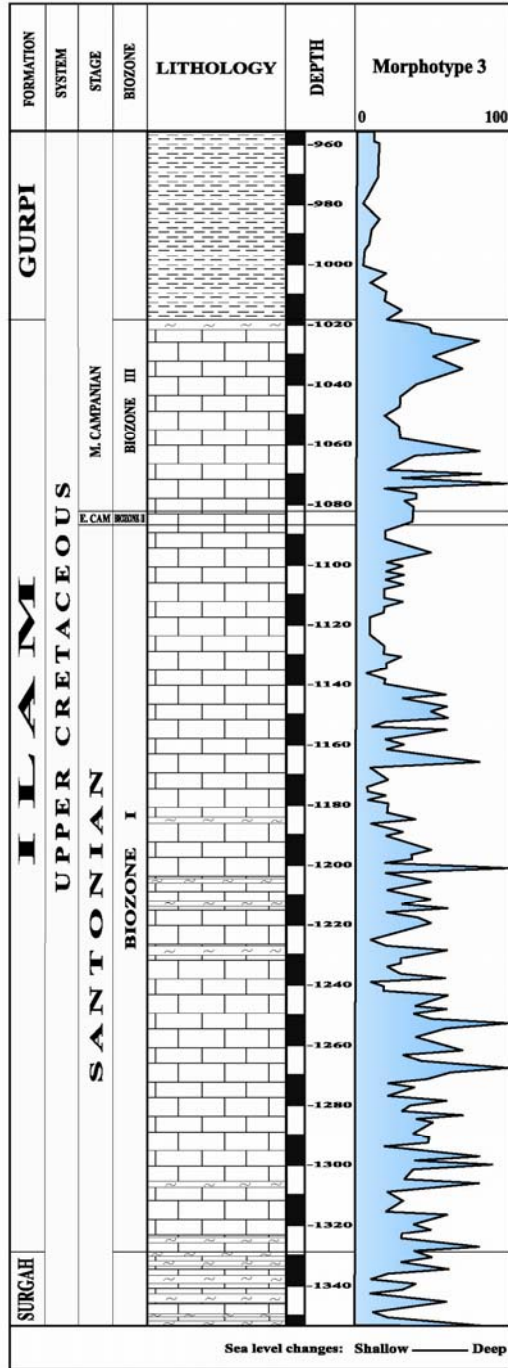
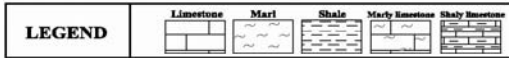
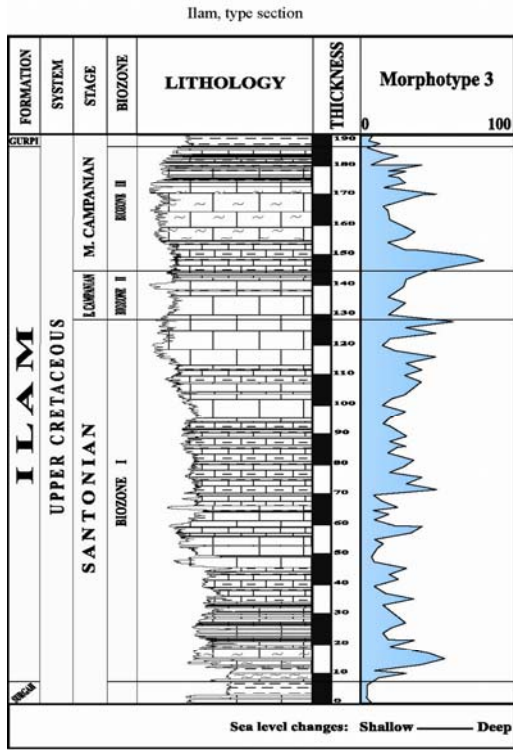
Dicarinella

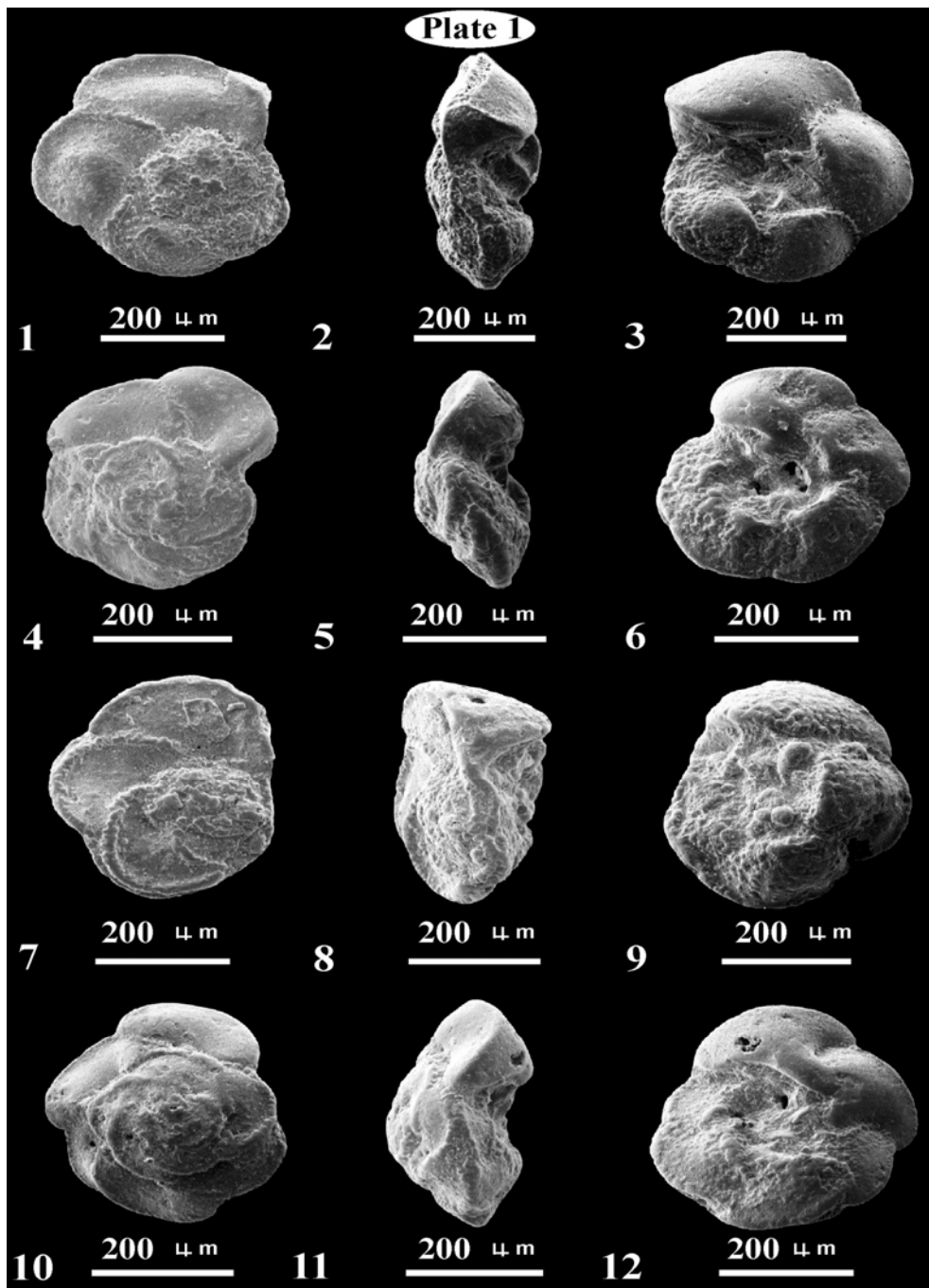
(Be, 1977;

Hart, 1980)

(Keller et al. 2002)

Globigerinelloides ultramica,  
Praeglobotruncana sp., Planoglobulina  
glabrata, Heterohelix sp., Hedbergella sp.





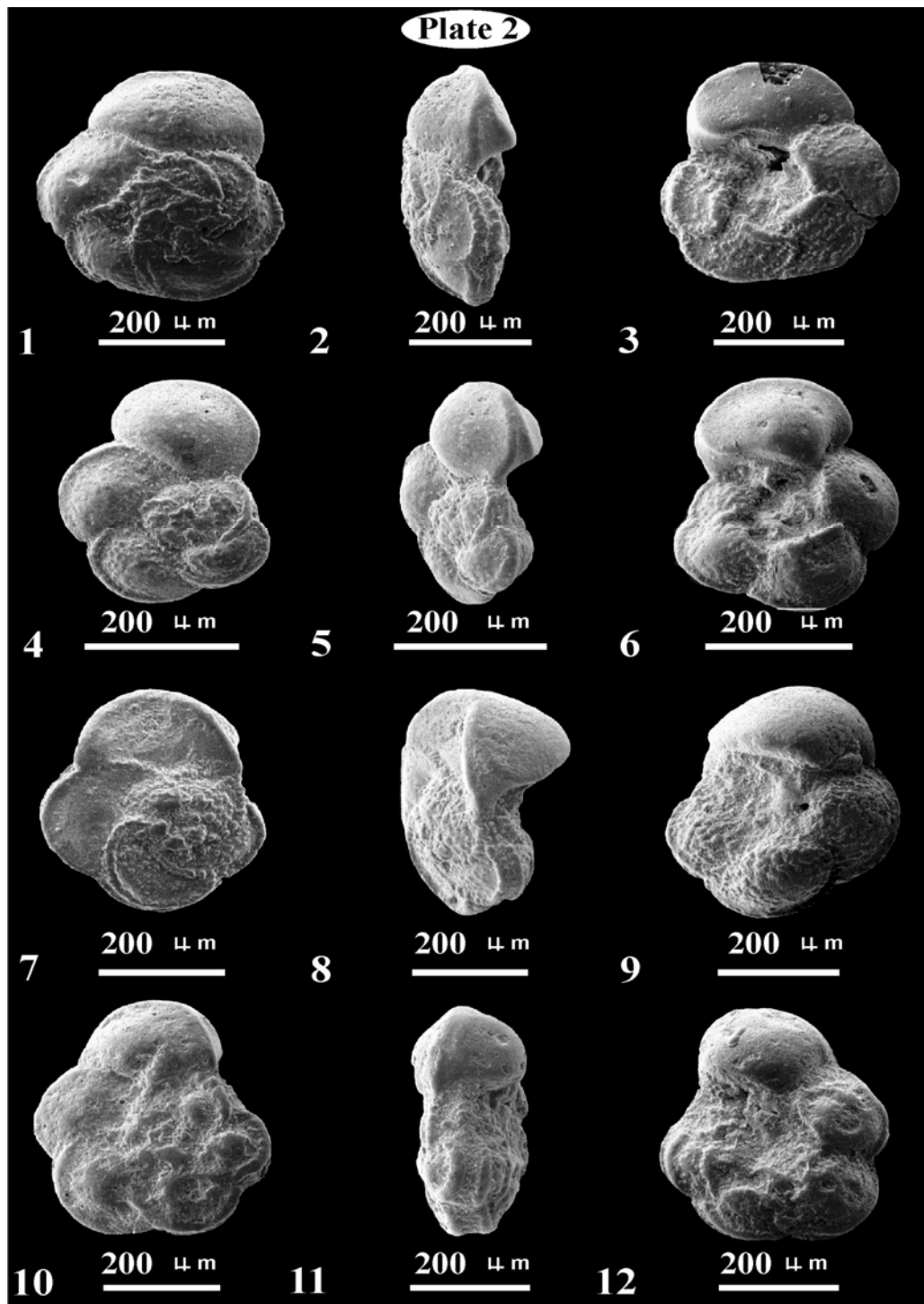
**PLATE 1**

Figs 1-3 *Dicarinella primitiva* Dalbiez, 1955, sample no. G-192.1

Figs 4-6 *Marginotruncana renzi* Gandolfi, 1942, sample no. G-192.1

Figs 7-9 *Dicarinella asymetrica* Sigal, 1952, sample no. G-192.1

Figs 10-12 *Marginotruncana sigali* Reichel, 1950, sample no. G-192.1



**PLATE 2**

Figs 1-3 *Marginotruncana sinuosa* Porthault, 1970, sample no. G-192.1

Figs 4-6 *Marginotruncana schneegansi* Sigal, 1952, sample no. G-192.1

Figs 7-9 *Globotruncana ventricosa* White, 1928, sample no. G-340.1

Figs 10-12 *Globotruncana bulloides* Vogler, 1941, sample no. G-348.2

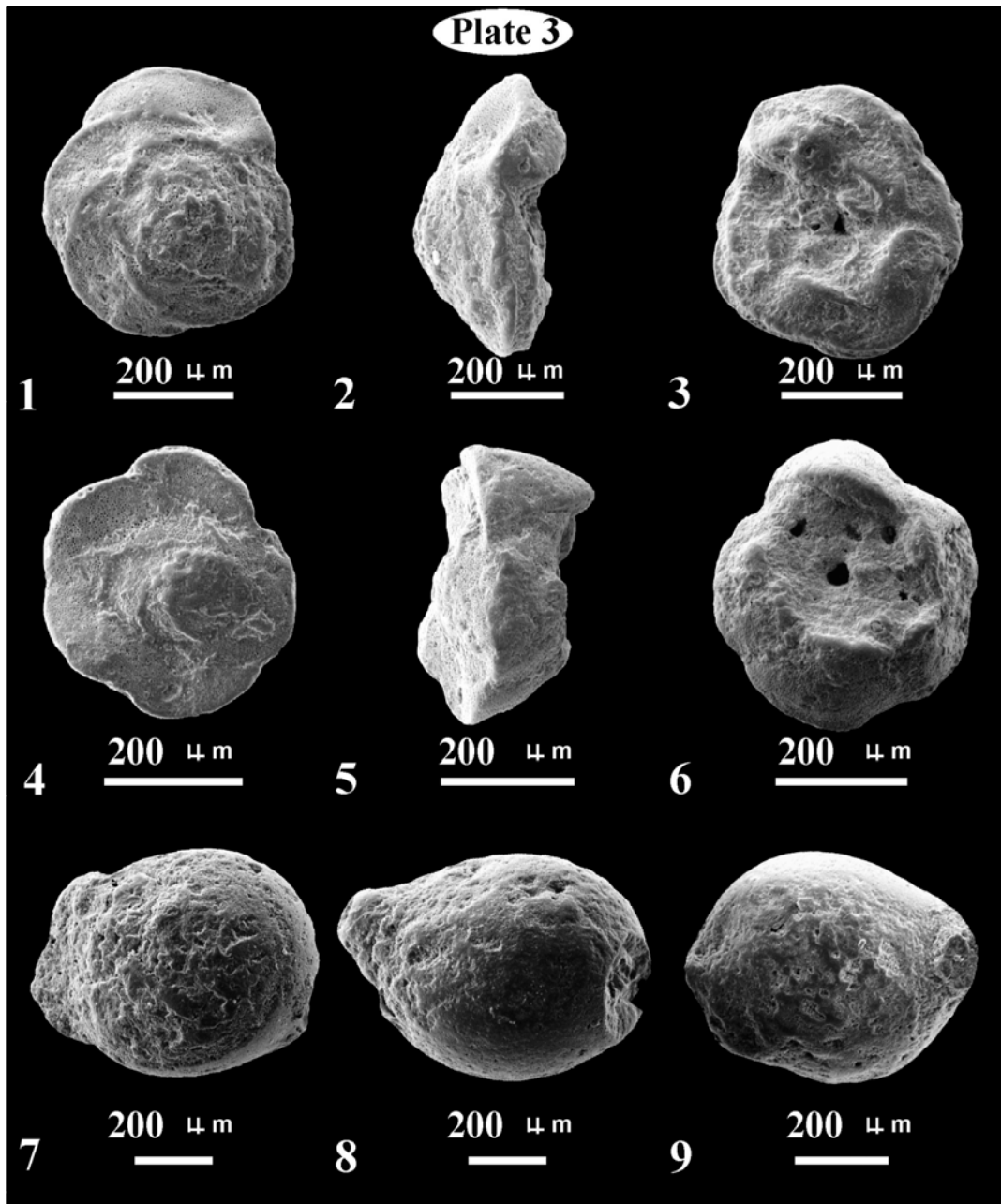


PLATE 3

Figs *Rosita fornicata* Plummer, 1931, sample no. G-353.1

Figs 4-6 *Globotruncanita elevata* Brotzen, 1934, sample no. G-353.1

Fig 7 *Pithonella sphaerica* Kaufmann, 1865, sample no. G-192.1

Figs 8-9 *Pithonella ovalis* Kaufmann, 1865, sample no. G-192.1

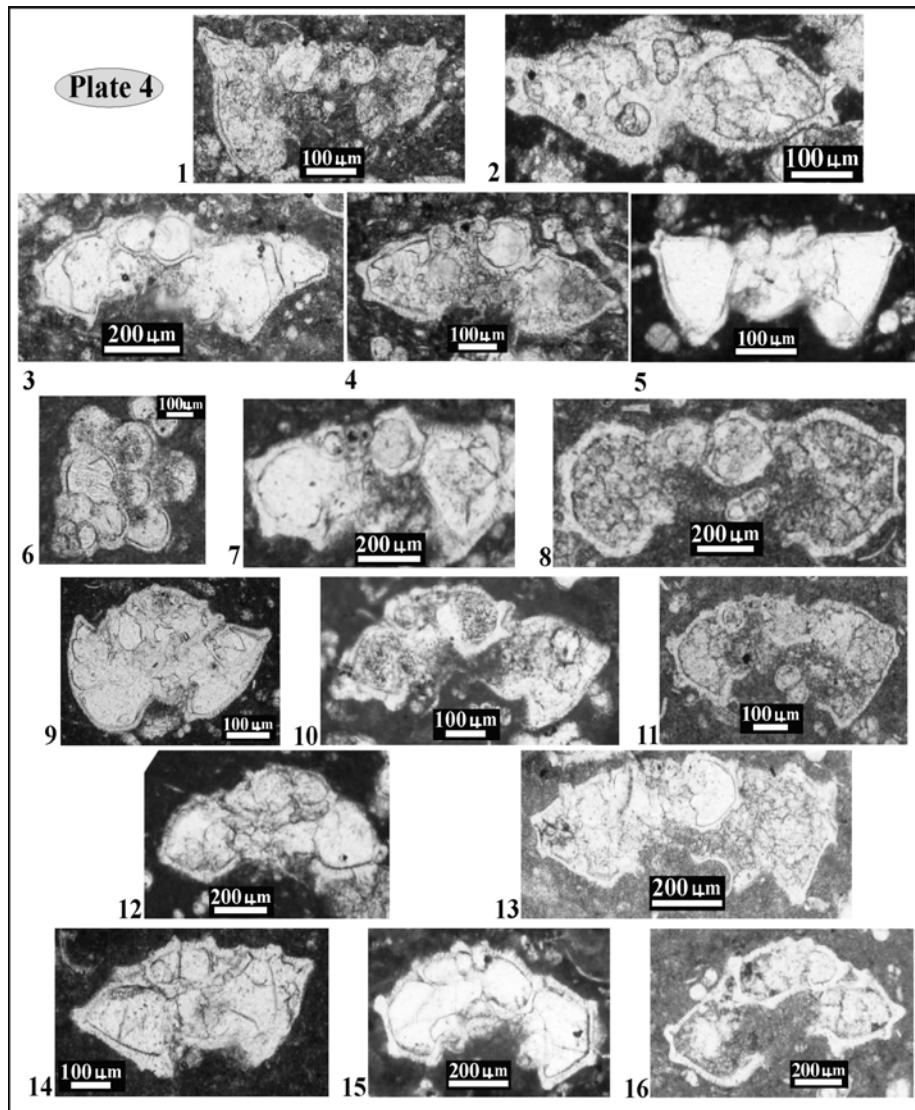


PLATE 4

- Fig1 *Dicarinella concavata* Brotzen, 1934, sample no. G-184
- Fig 2 *Dicarinella primitiva* Dalbiez, 1955, sample no. G-186
- Fig 3 *Marginotruncana cf.coronata* Bolli, 1945, sample no. G-192
- Fig 4 *Marginotruncana renzi* Gandolfi, 1942, sample no. G-228
- Fig 5 *Dicarinella asymetrica* Sigal, 1952, sample no. G-212
- Fig 6 *Planoglobolina glabrata* Cushman, 1927, sample no. G-228
- Fig7 *Globotruncana lapparenti* Brotzen, 1936, sample no. G-256
- Fig 8 *Globotruncana bulloides* Vogler, 1941, sample no. G-268
- Fig 9 *Globotruncanita elevata* Brotzen, 1934, sample no. G-254
- Fig 10 *Marginotruncana sigali* Reichel, 1950, sample no. G-294
- Fig 11 *Globotruncana ventricosa* White, 1928, sample no. G-312
- Fig 12 *Globotruncanella havanensis* Voorwijk, sample no. G-314
- Fig 13 *Globotruncana ventricosa* White, 1928, sample no. G-330
- Fig 14 *Globotruncanita stuartiformis* Dalbiez, 1955, sample no. G-334
- Fig 15 *Globotruncana arca* Cushman, 1926, sample no. G-338
- Fig 16 *Rosita fornicata* Plummer, 1931, sample no. G-344

5-Georgescu, M. D., 1996, Santonian-Maestrichtian planktonic foraminifers in the Romanian Black Sea offshore: *Micropaleontology*, v. 42, no. 4, p. 305-333.

6-Hart, B. M., 1980, A water depth model for the evolution of the planktonic foraminiferidae: *Nature*, v. 286, p. 252-254.

7-James, G. A., and J. G. Wynd, 1965, Stratigraphic nomenclature of Iranian oil consortium agreement area: *American Association Petroleum Geology Bulletin*, v. 49, p. 2182-2245.

8- Kalantari, A. 1972, Microbiostratigraphy of the Cretaceous to Lower Eocene succession in Khorramabad-Kermanshah area (W. Iran): *Bull. of the Iranian Petrol. Institute*, no. 48.

9-Kalantari, A. 1976, Microbiostratigraphy of the Sarvestan area SW Iran: *N.I.O.C., Geol. Lab. Pub.* no. 5.

10-Keller, G., 1999, The Cretaceous-Tertiary mass extinction in planktonic foraminifera: Biotic constrains for catastrophe theories, in: Macload, N., and Keller, G., (eds.) *Cretaceous-Tertiary mass extinction: Biotic and environmental changes*, W. W. Norton Company, New York-London, p. 49-83.

11-Keller, G., T. Adatte, W. Stinnesbeck, V. Luciani, N. Karoui-Yaakoub, and D. Zaghbi-Turki, 2002, Paleocology of the Cretaceous-Tertiary mass extinction in planktonic foraminifera: *Paleocology, Paleogeography, Paleoclimatology*, v. 178, p. 257-297.

12-Loeblich, A. R., and H. Tappan, 1988, *Foraminiferal genera and their classification*: Van Nostrand Reinhold Company, New York, 970 p.

13-Longoria, J. F. and E. Vonfeldt, 1991, Taxonomy, phylogenetics and biochronology of single-keeled globotruncanids (Genus *Globotruncanita* Reiss): *Micropaleontology*, v. 37, p. 1-16.

14-Postuma, J. A., 1971, *Manual of Planktonic Foraminifera*: Elsevier, Amsterdam, 840p.

3-Be, A.W.H., 1977, An ecological, zoogeographical and taxonomic review of recent planktonic foraminifera, in: Remsay, A.T.S., (ed.) *Oceanic Micropaleontology*, Springer, New York, no.1, p.1-100.

4-Bolli, H. M., J. B. Saunders, and K. P. Nielsen, 1987, *Plankton Stratigraphy*: Cambridge University Press, 1032 p.

18-Verga, D. and Rettori, R., 2004, Practical manual of Cretaceous planktonic foraminifera: 3 course, dalla Tipografia Pontefelcino-Perugia. p. 283.

19- Wynd, J. G., 1965, Biofacies of the Iranian oil consortium agreement area: IOOC report, no. 1082, unpublished.

15-Premoli Silva, I. and W. V., Sliter, 1994, Cretaceous planktonic foraminiferal biostratigraphy and evolutionary trends from the Bottaccione section, Italy: *Paleontographica Italica*, v. 82, p. 1-89.

16-Robaszynski, F., and M. Caron, 1995, Foraminifera planktonique du cretacea: *Bull. Soc.Geol., France*, p. 681-692.

17-Sliter, W. V., 1989, Biostratigraphic zonation for Cretaceous planktonic foraminifera examined in thin section: *Journal of Foraminiferal Research*, v. 19, no. 1, p. 1-19.

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