Biostratigraphy of Upper Part of the Kolosh Formation from Sartaq-Bamo Northeastern Iraq

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Abstract

The range of Planktonic Foraminiferida in the upper part of Kolosh Formation (Upper paleocene-Lower Eocene) from Northeastern Iraq is discussed. Based on the evidence of twenty seven Planktonic Foraminiferidal species and subspecies, the upper part of the Kolosh Formation from Sartaq-Bamo is subdivided into two biozones, these are from bottom to top:-

The *Globorotalia velascoensis* biozone and the *Globorotalia wilcoxensis* /*Globorotalia rex* biozone. The Planktonic Foraminiferidal biozones are correlated with other areas of Iraq and the world. Nature of the contact between Kolosh and Sinjar Formations is discussed lithologically and environmentally. The representative age of the Kolosh Formation is Late Paleocene to Early Eocene.

Introduction

Sartaq-Bamo area is located approximately at the intersection of the latitude 34° 58′N and the longitude 45° 45E about 30km southeast of Derbendikhan town, at the extreme northeastern Iraq, near the Iranian border (Fig-1). Tectonically the area represents the boundary between the high and low folded zones (Buday and Jassim, 1987). There is about (60m) thick outcrop of fissile green marl beds which can be seen when travelers entering the Sartaq valley through Sartaq-Gorge. These beds overlie Singar Formation which is stratigraphically studied by (Karim, 1987), and he refered these beds as Kolosh Formation which originally was first described by (Dunnigtone, 1952), who designated the type section at Kolosh village, north of Koisinjak in the high folded zone, but at the type section Singar Formation is missing in the stratigraphic section which is reflected by the occurrence of Gercus Formation which lies above the Kolosh Formation. (Bellen et.al., 1959). This Formation is composed of shale and sandstone, which contain fragments of green rocks, chert radiolarite and are rich in microfauna. (Op. Cit.). In the studied area unfortunately the lower boundary is not exposed. The present study is directed toward age determination and subdivision of the exposed upper part of the Kolosh Formation in this area into their naturally

occurring biozones on the basis of Planktonic Foraminifera content. In this connection this study is the first one in this area concerned with biostratigraphy of the Kolosh Formation. In previous studies there was no a certain agreement about the tectonic and environment of Kolosh Formation. According to (Buday, 1980), Kolosh Formation is the sediment of the deepest and mobile sedimentary basin of paleocene-lower Eocene cycle and connected with gradual lateral passage with the penecontemporaneous Aaliji Formation which represents clastic facies. But according to (Al-Hashimi and Amer, 1985) the sediment of the Kolosh Formation were deposited in a trough basin of less subsiding area where turbidite sedimentation took place mainly in open shelf margin and part of the Formation was deposited in a slope fore area as it passed towards the platform (neritic) area. In this study (22) samples were collected from an outcrop of the upper part of Kolosh Formation (Fig. 2 and 4), cooking method is made for each sample.

Lithology and Fossil Content

There are some differences between lithology of the type section and that of the studied area, because in Sartaq-Bamo area, Kolosh Formation is mainly composed of fissils olive green marl and the shale mentioned by (Dunnington, 1952) is not observed in this area, at least in the upper part, the absence of shale is attributed to increased content of calcareous material at expense of clay materials. Toward the upper part of the Kolosh Formation near the boundary with Sinjar Formation, one can see regular intercalation of medium thick beds of limestones (Nummulitic wackestone) which is rich in large Nummulite, the thickness of these beds gradually increase upwards which finally change to Sinjar Formation (Fig.4) which is composed of massive (or very thick bedded) fossiliferous limestones mainly composed of Nummulite (Nummulitic packstone to grainstone), (Fig. 3). Fortunately this clear gradational contact gives claw to the nature of Kolosh environment at this area which exactly coincides with the idea of (Al-Hashimi and Amer, 1985) which states that the Kolosh Formation was deposited in continental slope environment and gradually passes into continental shelf (Shoal environment) when it changes to Sinjar Formation. Planktonic Foraminifera are the most abundant fossils in the kolosh Formation. This Formation has been studied biostratigraphically, at other localities, by several authors (Kassab, 1976a, 1978b, Munim, 1976, Al-Barram, 1980 and Al-Mutwali, 1983, according to these studies the age of the Kolosh Formation was Paleocene–Early Eocene. While according to (Hana, 1993) Palynomorphs exist in the

Kolosh Formation especially Dinoflagellates. Moreover (Al-Ameri and Al-Mutwali, 1994) found many spores and pollens in the Kolosh Formation, which are attributed to Ferns terrestrial plants.

Planktonic Foraminiferidal Zonation

Based on the top occurrences of Planktonic Foraminiferida, the upper part of the Kolosh Formation in the studied area is subdivides into two zones, which are from bottom to top: -

1-*Globorotalia velascoensis* Zone- (Total - Range-Zone)-Part,

2-*Globorotalia wilcoxensis/Globorotalia rex* Zone (Concurrent – Range- Zone),

Ranging from Late Paleocene to Early Eocene (Fig.5).

1-*Globorotalia velascoensis* Zone (Total-Range-Zone) Part.

The lower boundary of this zone is characterized by the first appereance of Globorotalia *velascoensis velascoensis* (Cushman) and its upper part by its disappearance, and it corresponds to upper late paleocene age, the thickness of this zone is (34m). The characteristic species appearing in this zone which are not restricted to it are:- *Globigerina triloculinoides triloculinoides* (Plummer), 1926; *Globigerina triloculinoides parve* El-Naggar, 1966; *Globigerina inaequispira* (Subbotina), 1953; *Globigerina haynesi* El-Naggar, 1966; *Globigerina soldadoensis* Bronnimann, 1952; *Globigerina spiralis* Bolli, 1952; *Globigerina mckannai* White, 1928; *Globigerina bacuana* Khalilov, 1956; *Globigerina velascoensis* Cushman, 1925; *Globigerina chascanona* Loeblich and Tappan, 1957; *Globigerina aquensis* Loeblich and Tappan, 1957; *Globorotalia perclara* Loeblich and Tappan, 1957; *Globorotalia velascoensis velascoensis* Cushman, 1953; *Globorotalia velascoensis parva* El-Naggar, 1966; *Globorotalia irrorata* Loeblich and Tappan, 1957; *Globorotalia occlusa* Loeblich and Tappan, 1957; *Globorotalia aequa* Cushman and Renz, 1942; *Globorotalia esnaensis* (Le Roy), 1953; *Globorotalia acuta* Toulmin, 1941; *Globorotalia faragi* El-Naggar, 1966; *Globorotalia cf. convexa* Subbotina, 1953; *Globorotalia whitei* Weiss, 1955; *Globorotalia wilcoxensis* Cushman and Ponton, 1932 .

2-*Globorotalia wilcoxensis/Globorotalia rex* Zone (Concurrent-Range-Zone)

The lower boundary of this zone is characterized by the first appearance of *Globorotalia rex* Martin, 1943, and the upper boundary is at the lower limit of Sinjar Formation (Nummulitic Limestone) (Fig.3). This zone represents the lower Eocene stage and it is about (13m) thick, in addition to the zonal marker (*Globorotalia aragoensis* Nuttal, 1930, *Globorotalia*

gracilis Bolli, 1957 and *Globorotalia elongata* Glaessner, 1952) are also restricted to this interval. Other characteristic species, although not limited to this zone, are:- *Globigerina triloculinoides triloculinoides* (Plummer), 1926; *Globigerina triloculinoides parva* El-Naggar, 1966; *Globigerina inaequispira* Subbotina, 1953; *Globigerina soldadoensis* Bronnimann, 1952; *Globorotalia aequa* Cushman and Renz, 1942; *Globorotalia whitei* Weiss, 1955; *Globorotalia cf. convexa* Subbotina, 1953 .

Age Determination and Regional Correlation

Based on the recognized Planktonic Foraminiferidal zones, the age of upper part of the Kolosh Formation at the studied area is ranging from upper late Paleocene to early Eocene, the correlation of these zones with zones recorded from other regions shows that these zones closely resemble those proposed by El-Naggar, 1966,1969 from Nile Valley, Bolli, 1966 in Trinidad, Postuma, 1971, Kassab, 1976a, 1978b, Kassab et. Al., 1988 and Ghafor, 1988 in North Iraq. (Fig.6). This means that these species are worldwide spread in the ocean during the late Paleocene –early Eocene.

Results and Conclusions

The study showed that:

1. Kolosh Formation is characterized by abundant and well-developed Planktonic Foraminiferal assemblages. (Plates 1,2,and 3)
2. Two Planktonic Foraminiferidal biozones are recorded which are from bottom to top:

   A-*Globorotalia velascoensis* Zone.

   B-*Globorotalia wilcoxensis /Globorotalia rex* Zone.
3. The age of upper part of the Kolosh Formation is ranging from Late Paleocene to Early Eocene.
4. The upper contact of the Kolosh Formation with the Sinjar Formation is conformable, but the lower contact is not exposed.
5. The data show that the Kolosh Formation was deposited in an environment which is similar to the environment of continental slope, but this environment change gradually at the upper part to that of the continental shelf which is represented by Sinjar Formation. This is showed (in the text) by the stratigraphic column, lithologic description and microfacies types.

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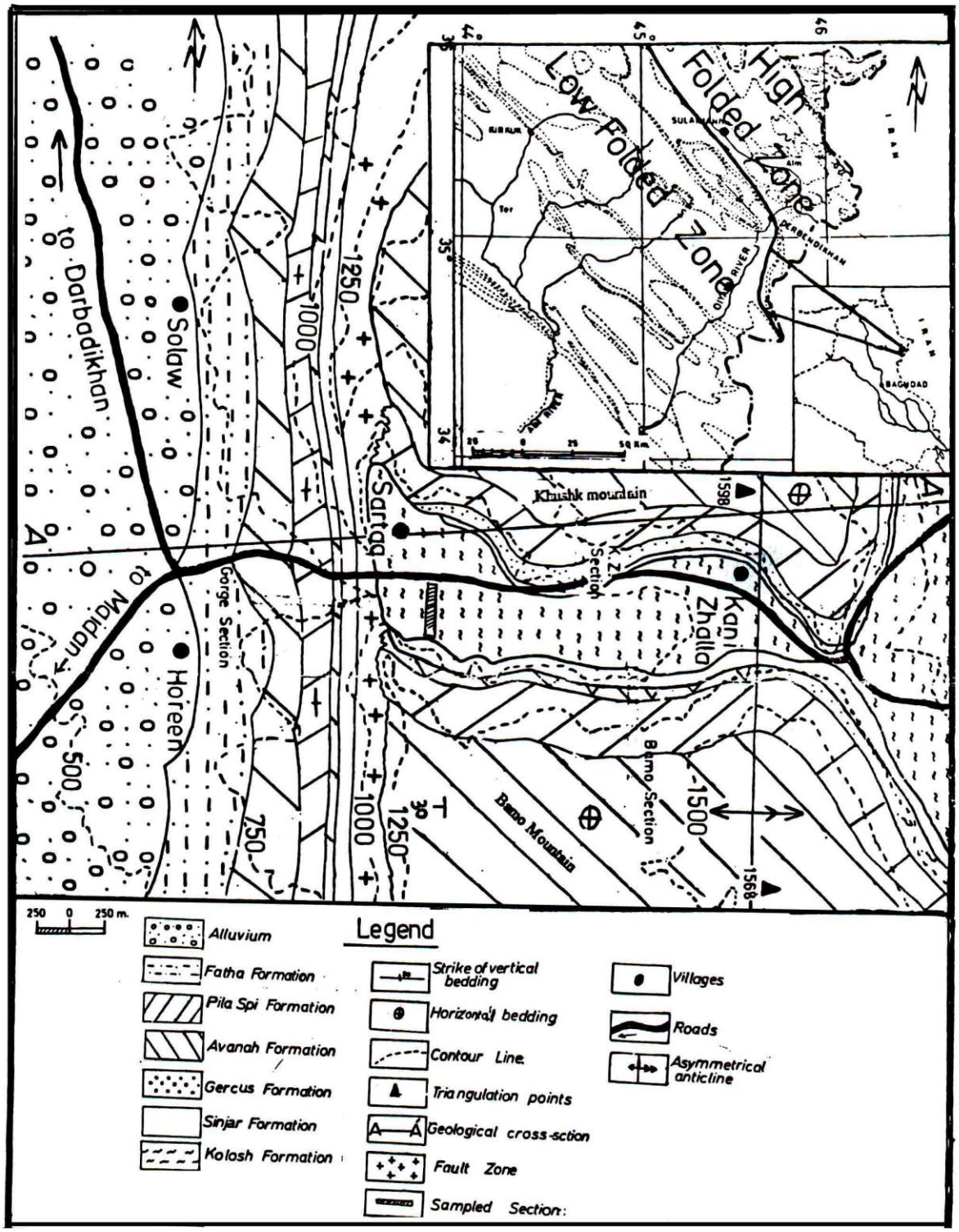

Fig. (1): Location and geologic map of the studied area (Karim, 1997); slightly modified.

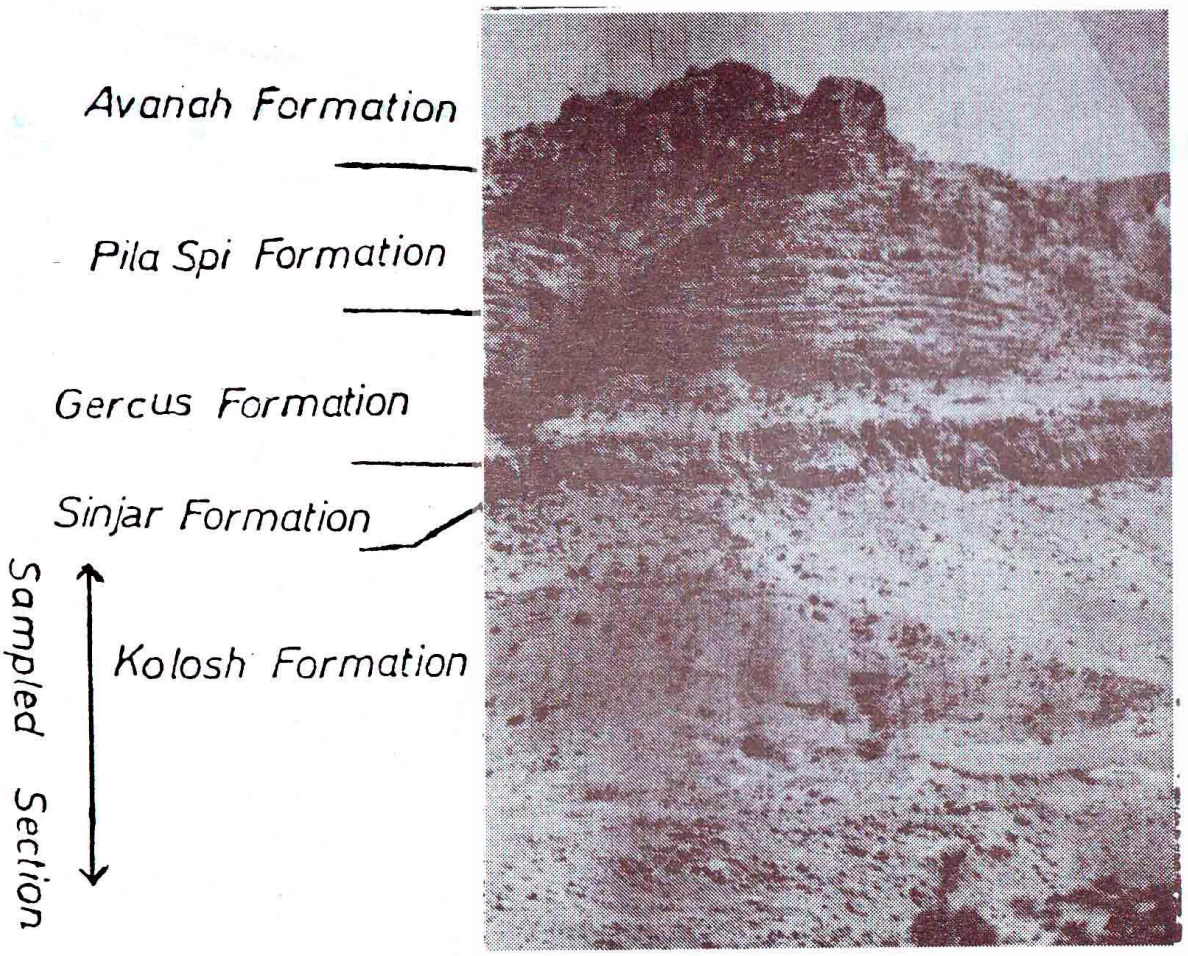

Fig (2): Shows exposed Formations in the studied area.

Fig (3): Hand specimen of Sinjar Formation shows Nummulitic limestone

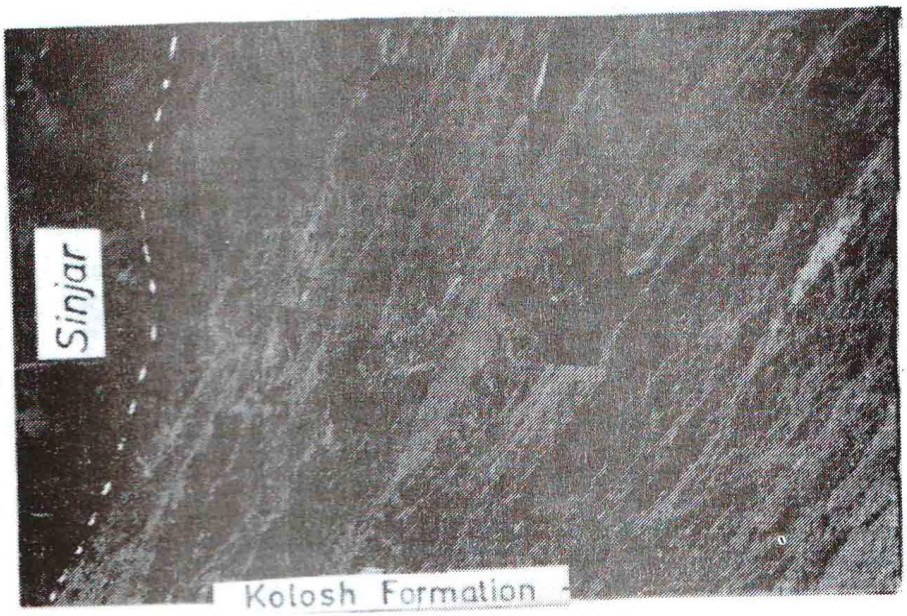

Fig (4): Close-up photo of the gradational contact between Sinjar Formation and Kolosh Formation

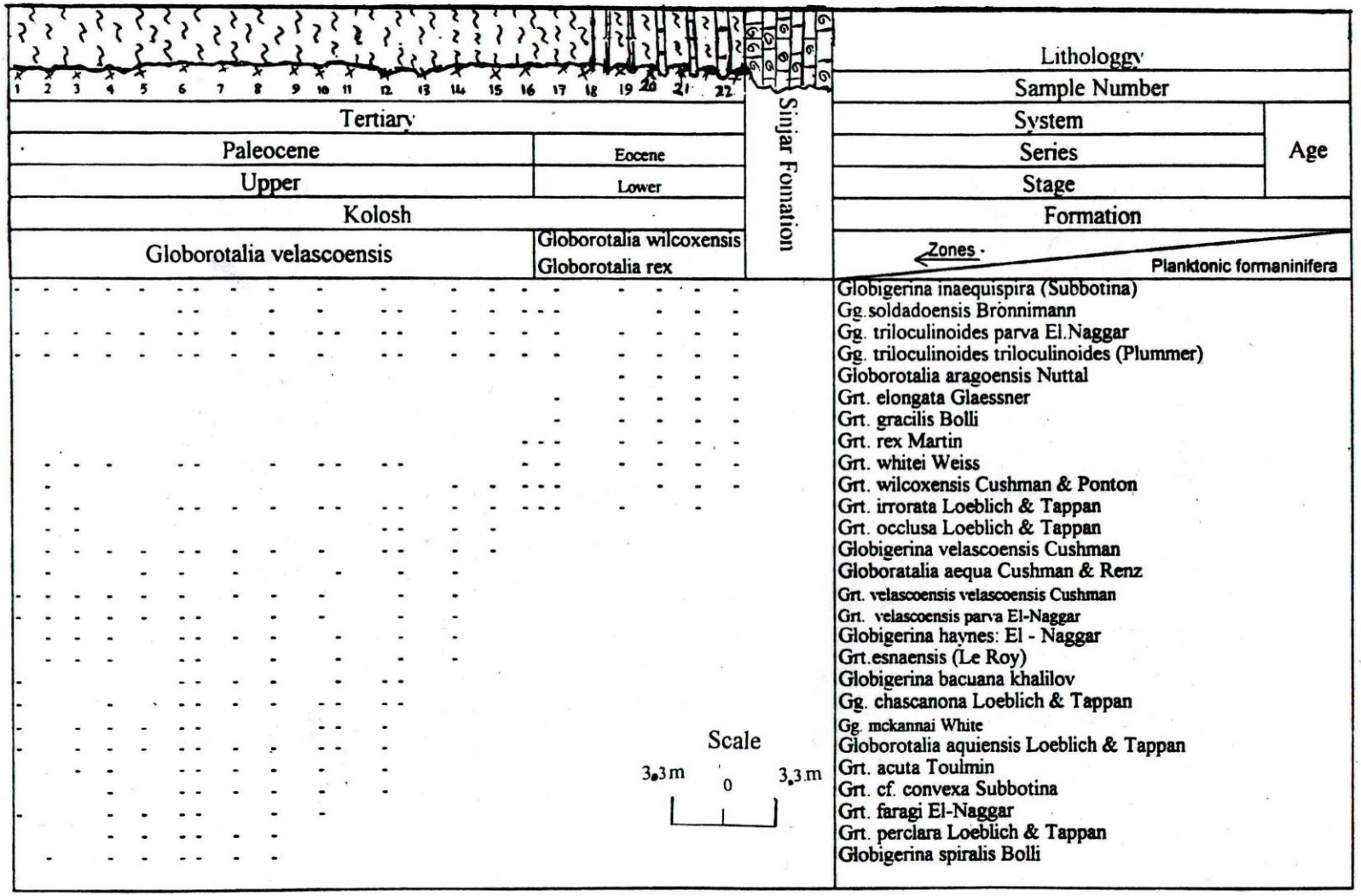

Fig (5): Stratigraphic ranges (Top Occurance) of plaktonic foraminifera in the kolosh formation Sartaq-Bamo area.

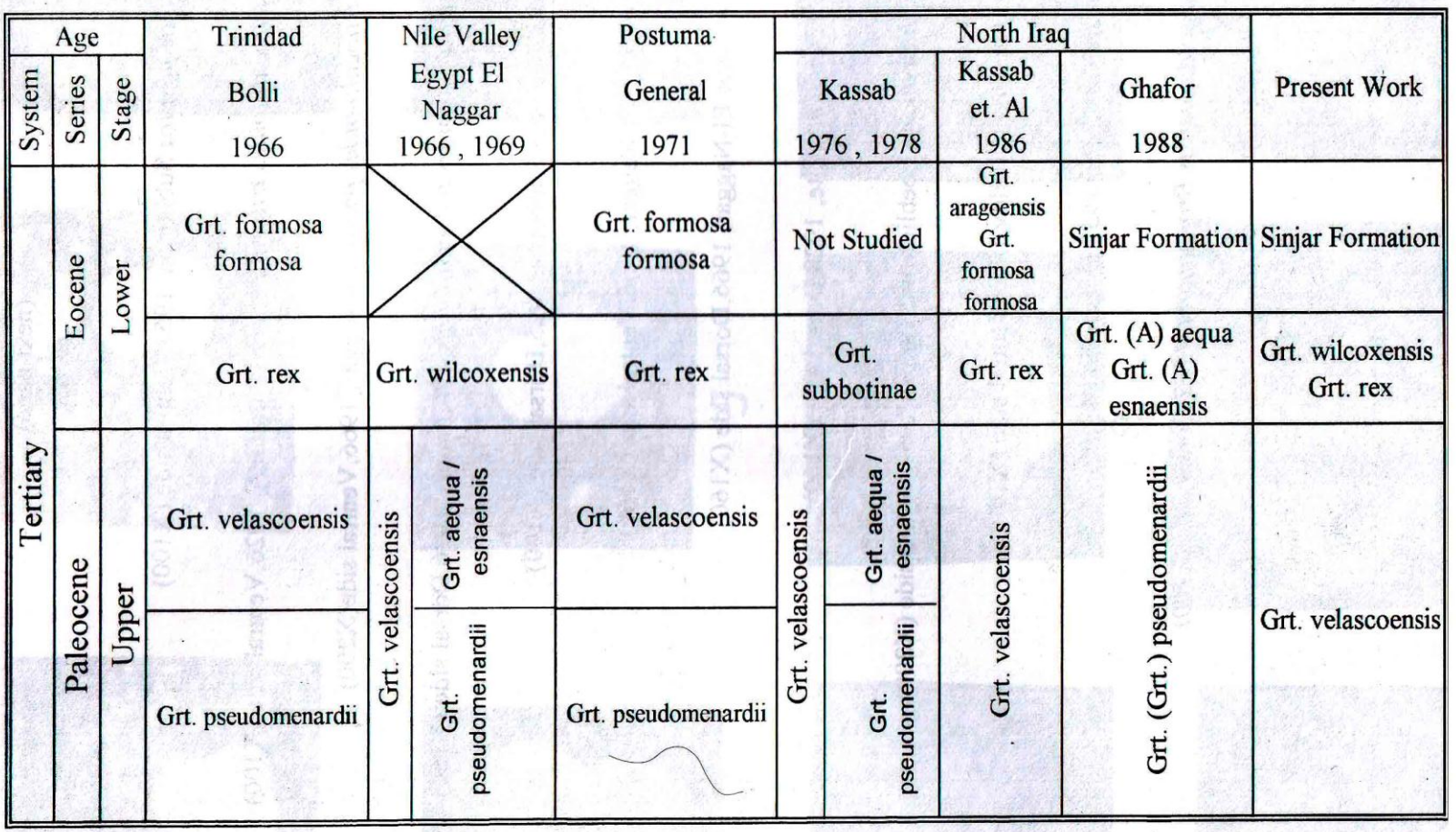

Fig (6): Comparision of Zonal Schemes in Different arena

Grt.= Globorotalia
(A.) = Acaranina

Plate (1)

(next page)

1- *Globigerina inaequispira* Subbotina, 1953,Ventral side (X100)

2- *Glogigerina triloculinoides triloculinoides* (Plummer), 1926,Ventral side (X100)

3- *Globigerina triloculinoides parva* El-Naggar, 1966,Ventral side(X200)

4- *Globigerina triloculinoides triloculinoides* (Plummer), 1926,Dorsal side (X160)

5- *Globigerina velascoensis* Subbotina,1925,Dorsal side (X100)

6- *Globigerina haynesi* El-Naggar, 1966,Ventral side (X160)

7- *Globigerina haynesi* El-Naggar, 1966,Dorsal side (X160)

8- *Globigerina mckannai* White, 1928,Dorsal side (X160)

9- *Globigerina chascanona* Loeblich and Tappan,1957,Ventra side (X200)

10- *Globigerina bacuana* Khalilov,1956,Ventral side (X160)

11- *Globigerina spiralis Bolli, 1957,Dorsal side (X200)*

12- *Globigerina soldadoensis Bronnimann, 1952,Dorsal side (X100)*

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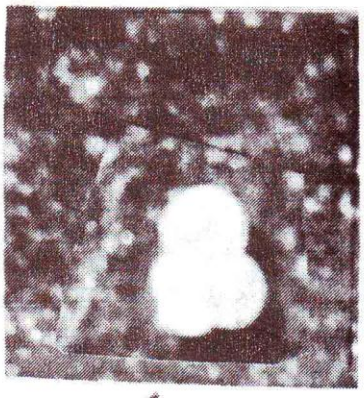

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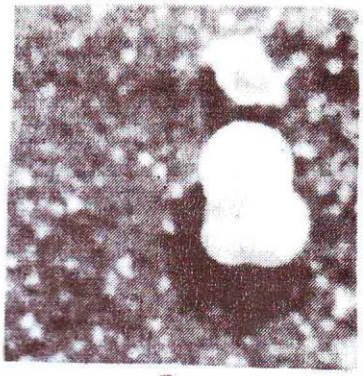

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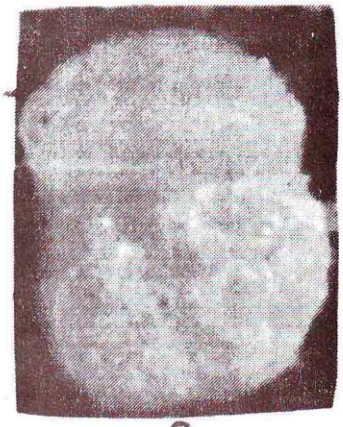

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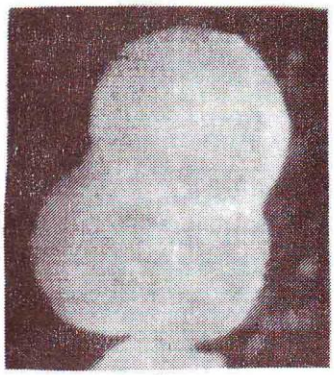

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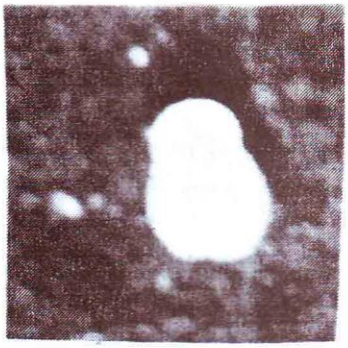

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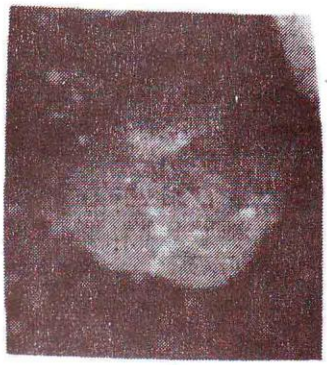

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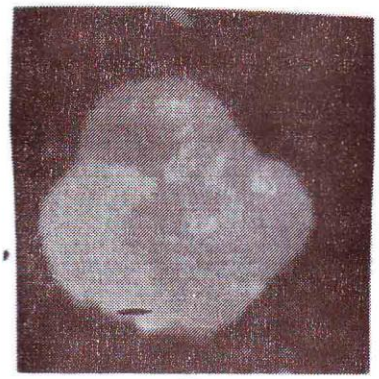

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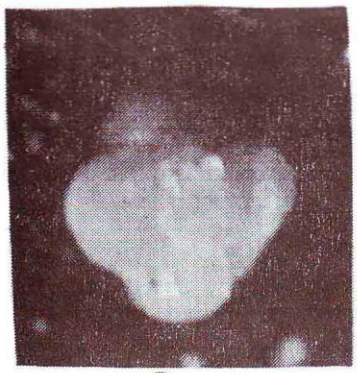

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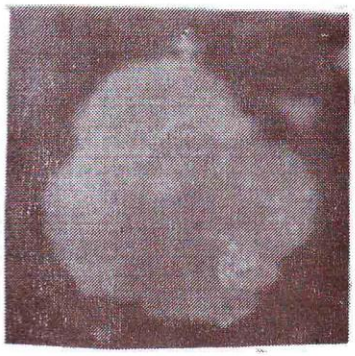

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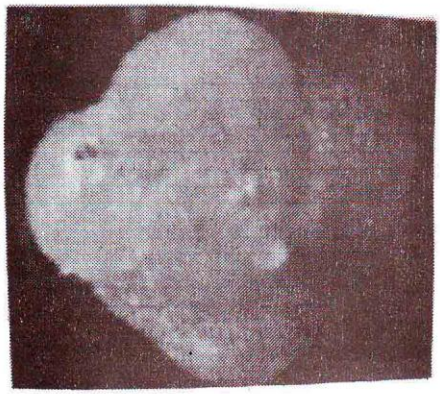

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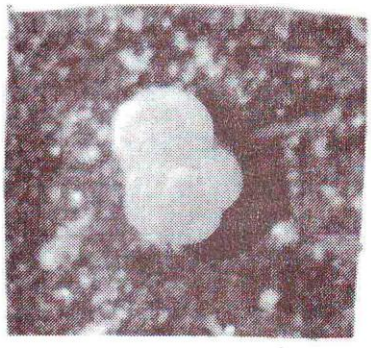

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(Plate 2)

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1- *Globigerina triloculinoides parva* El-Naggar, 1966, Ventral side (X200)

2- *Globigerina chascanona* Loeblich and Tappan, 1957, Dorsal side (X200)

3- *Globigerina chascanona* Loeblich and Tappan, 1957, Dorsal side (X100)

4- *Globigerina mckannai* White, 1928, Dorsal side (X160)

5- *Globigerina triloculinoides triloculiinoides* (Plummer), 1926, Dorsal side (X2

6- *Globigerina aquiensis* Loeblich and Tappan, 1957, Dorsal side (X100)

7- *Globorotalia rex* Martin, 1943, Ventral side (X100)

8- *Globorotalia wilcoxensis* Cushman and Ponton, 1932, Ventral side (X100)

9- *Globorotalia perclara* Loeblich and Tappan, 1957, Ventral side (X140)

10- Globorotalia cf. convexa Subbotina, 1953, Dorsal side (X150)

11- *Globorotalia aragoensis* Nattal, 1930, Dorsal side (X150)

12- *Globorotalia aragoensis* Nattal, 1930, Dorsal side (X160)

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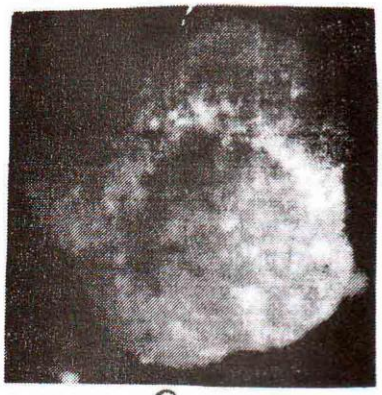

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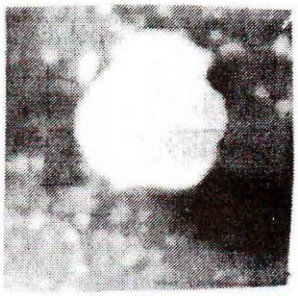

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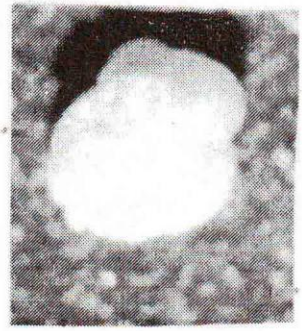

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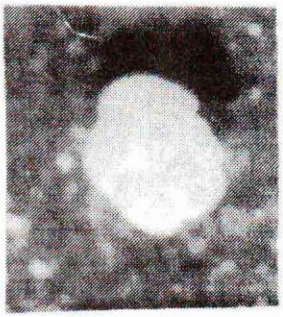

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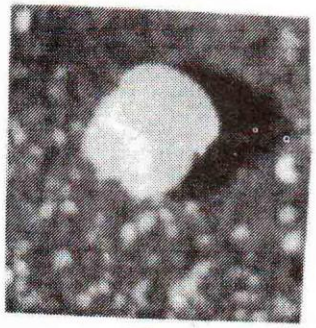

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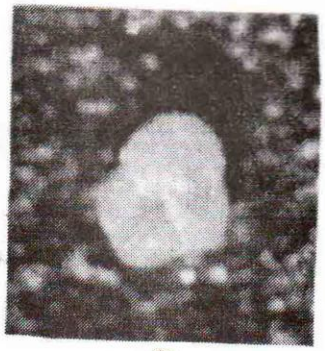

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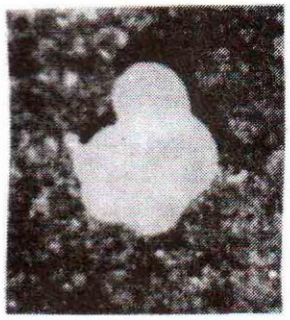

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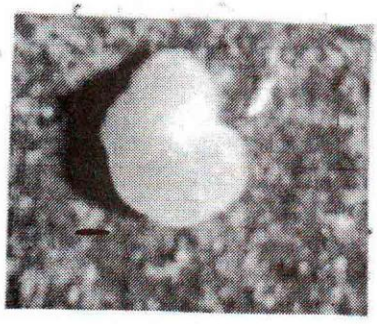

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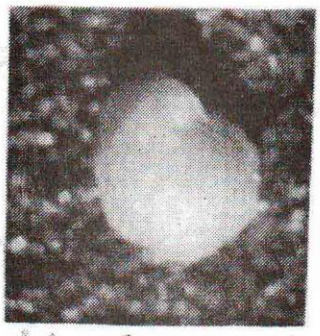

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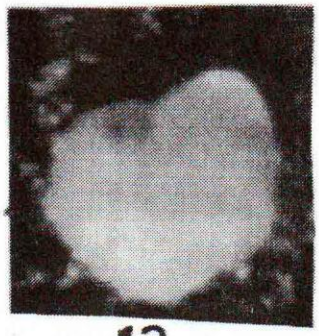

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(Plate 3)

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1- *Globorotalia esnaensis* (Le Roy), 1953,Ventral side (X100)

2- *Globorotalia faragi* El-Naggar, 1966,Ventral side (X200)

3- *Globorotalia acuta* Toulmin, 1941,Dorsal side) X200)

4- *Globorotalia aequa* Cushman and Renz, 1942,Ventral side (X200)

5- *Globorotalia velascoensis velascoensis* (Cushman), 1953,Ventral side (X200)

6- *Globorotalia velascoensis velascoensis* (Cushman), 1953,Ventral side (X200)

7- *Globorotalia gracilis* Bolli, 1957,Dorsal side (X200)

8- *Globorotalia cf. convexa* Subbotina, 1953,Ventral side (X200)

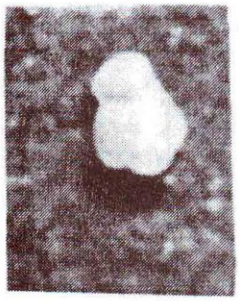
9- *Globorotalia occlusa* Loeblich and Tappan, 1957,Ventral side (X200)

10- *Globorotalia occlusa* Loeblich and Tappan, 1957,Dorsal side (X160)

11- *Globorotalia occlusa* Loeblich and Tappan, 1957,Dorsal side (X200)

12- *Globorotalia irrorata* Loeblich and Tappan, 1957,Dorsal side (X200)

Plate 3



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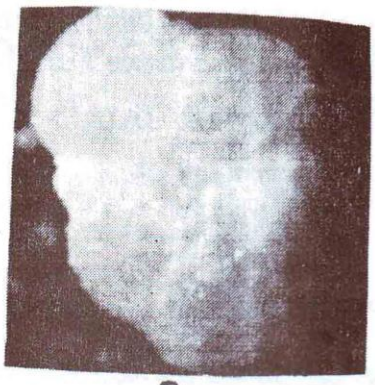

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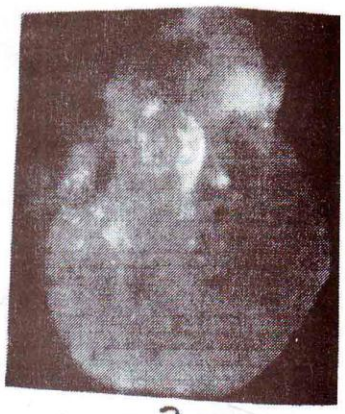

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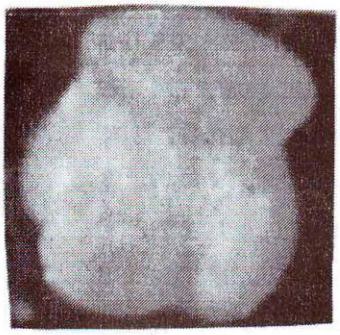

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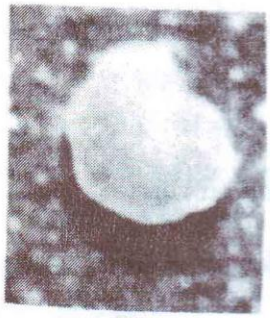

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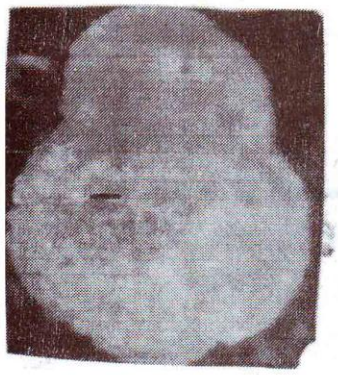

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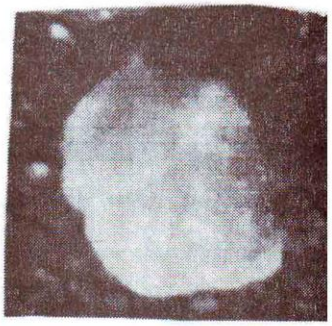

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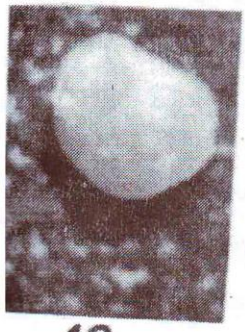

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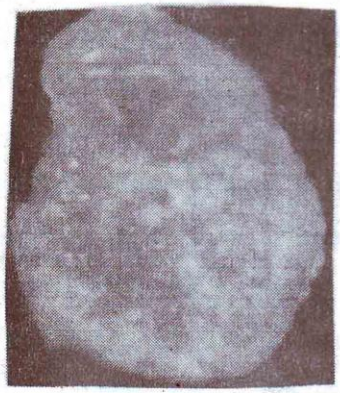

11

12