



PLANKTONIC FORMANIFERAL STUDY OF FORT-MUNRO FORMATION AT BARA NALA SECTION, JAMSHORO, SINDH

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ABSTRACT

The Planktonic Foraminiferal study was carried out on Fort-Munro Formation at Bara Nala section of Lower Indus Basin. 62 samples were taken from former formation with the interval of the 5 feet. Following certain procedures of sample preparing came with the results of the Age of the area with definite planktonic zones. The true definition the planktonic zones was not applicable in present area because of the lower contact of the formation is not exposed. Many well-known Globotruncana species of cretaceous age were identified with four Planktonic zonal Foraminiferal species. On the basis of planktonic assemblage and following zonal scheme the assigned age of Fort-Munro formation is early Santonian to middle Maastrichtian, the upper part of the formation is younger than the lower part.

1. INTRODUCTION

The studied area belongs to Kirthar Province, Lower Indus Basin and the area is lies in Laki Range, which is North West to South West to Kirthar Range. Bara Nala section is exposed in the Northern part of the Laki Range about 20 Kilometer West of Amri railway station. Bara Nala is lies on Toposheet No. 35N/16, where the range is transverse by Bara Nala following from West to East. Bara Nala Cuts the Range at a point coincident with the apex of the anticlinal structure thus exposing an interesting succession. The Bara Nala is one of the most important fields in Lower Indus Basin, having great stratigraphic significance being the only locality in the western part of Sindh Province, where the rocks are exposed from cretaceous to the Pliocene succession. The oldest rock in Bara Nala Section is Fort-Munro Formation, Hunting Survey Corporation (1961) included the unit in their "Pab Sandstone" in

the Sulaiman Province and Axial Belt but differentiated it as "Hemipneustes Limestone" in the Kirthar Province. The lithological units of various rocks contain common occurrence of microfossils as well as mega-fossils are reported. Mostly the rock units show abundant occurrence of fossils in varieties of Shale and rare in Limestone and Sandstone.

2. LOCATION & ACCESSIBILITY

The location of the studied area is relatively simple and accessible. Through the rout Indus Highway (N-55) we can reach to the desire destination in four wheeled vehicle. The area Bara Nala section is situated near Amri village in District Jamshoro of Sindh province.

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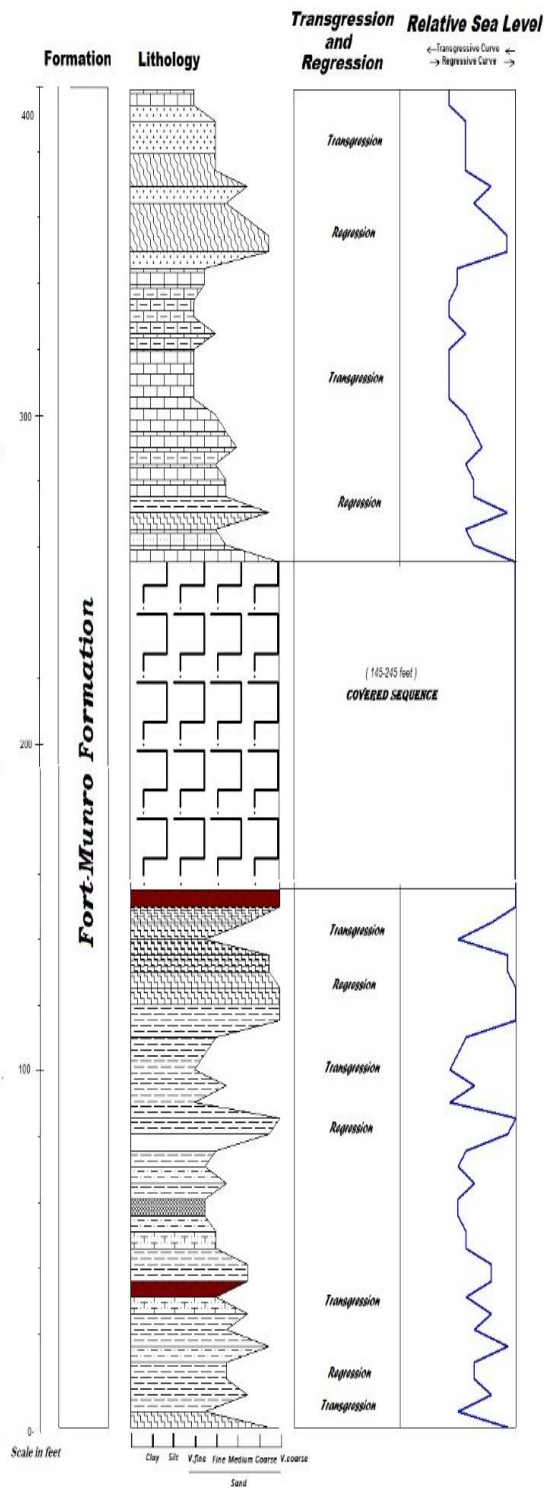


Figure 1. showing lithology and T-R Cycle



160 km in North West direction of Karachi.
50 Kilometer North West of Hyderabad.
Studied area is the channel cutting known as Bara Nala, which is 19 kilometer North West of Amri Village of Sindh province of Pakistan.
Latitude 26° 05' 52.64" to N 26° 06' 47.96" N.
Longitude 67° 53' 53.16" E to 67° 53' 10.43" E.

Figure 2 Map of showing study area.

3. GEOLOGY OF STUDIED AREA

Planktonic Foraminiferal study was carried on Fort-Munro Formation. The studied area is mainly composed of a mixed lithology of clastic and non-clastic sediments which belongs to Cretaceous (Maastrichtian) age. The major constituents are Shale, Limestone, Sandstone, Claystone and Ironstone. Shale represents the detrital type of origin and Lithology is dominantly Gypsiferous, Fossiliferous and Sandy Shale. Limestone, Chalky limestone, Sandstone, Shally Sandstone, Chalk, Claystone and Ironstone were also found. The oldest formation in the Bara Nala area is Fort-Monro Formation of Williams (1959), which lower contact is not exposed due to the thrust fault, it comes in contact with Laki Formation of Eocene age but upper contact with Pab Sandstone is Transitional. The formation is composed of Shale, Limestone, Sandstone, Claystone and Ironstone. The maximum thickness is 410 feet in which 100 feet of area are covered. In the prognosis area Joints and fractured are common features in the studied Formation.

In the studied area the formation dips from 62° EW. The general trend of the strike throughout the area is in °4 EN direction.

The transgression and regression cycle curve is carried out on the basis of grain size change which shows that the formation is deposited under various cycles of regression and transgression but mostly when sea is regressed from the area. This euastatic

level is caused the absence of preserved microfauna may mark the period of maximum regression.

4. MATERIAL AND METHODS

62 samples have been examined for Planktonic Foraminiferal study from Fort–Munro formation. Mainly samples were collected from Shale, Limestone and Chalk, which varied from generally hard and compact to soft material. For this study procedure is followed by the standard techniques described by KUMMEL and RAUP (1965), for isolation and separation of microfauna. The samples were collected from contact to upward at regular (5 ft) intervals. The samples were washed, sieved and picked under the binocular microscope generally using 30X and 70X magnification.

Fig. 1. Globotruncanita subspinosa (Pessagno) from sample no.H-39, H-37.

Fig. 2. Globotruncana sp from sample no.H-41, H-36.

Fig. 3. Rosita fornicata(Plummer) from sample no.H-31, H-55, H-52.

Fig. 4. Dicarinella concavata from sample no. H-03, H-04.

Fig. 5. Globotruncana aegyptiaca (Nakkady) from sample no.H-54, H-48.

Fig. 6. Globotruncana unidentified from sample no.H-24, H-22.

Fig. 7-8. Globotruncana arca from sample no.H-62, H-57, H-15.

Fig. 9: Rosita contuse (Cushman) from sample no.H-58, H-59.

Fig.10-11: Globotruncanella havanensis (Voorwijk) from sample no.H-55, H-59.

Fig. 12-13: Globotruncana sp from sample no.H-29, H-32.

Fig. 14-15:Globotruncanella citae (Bolli) sample no.H-57, H-58, H-62.

Fig. 16-17: Globotruncanita elevate (Brotzen) from sample no.H-02,H-03.

Fig. 18. Archeoglobigerina cretacea (d'Orbigny) from sample no.H-24,H-14.

Fig. 19. Globotruncana sp from sample no.H-01, H-08.

5. SYSTEMATIC PALEONTOLOGY

Family Globotruncanidae Brotzen, 1942

Archeoglobigerina Pessagno, 1967

Archeoglobigerina cretacea(d'Orbigny)

Archeoglobigerina cretacea(d'Orbigny). Banner and Blow, 1960, p. 8-10, pl. 7, figs 1a-c.

(Plate No.1 fig no.18.)

Stratigraphic range:

Archeoglobigerin acretacea is characteristic species which ranges into lower Maastrichtian.

Distribution:

The figured specimen is recorded from sample no.H-24, H-14 of Fort-Munro Formation.

Genus Dicarinella Porthault, 1970

Dicarinella concavata

Rotilaconcovata Brotzen, 1934, p. 66, pl. 3, fig. b.

(Plate No.1 fig no.4)

Stratigraphic Range:

Dicarinellaconcovata is the characteristic zone of upper Coniacian to lower Santonian.

Distribution:

The figured specimen is recorded from sample no.H-03, H-04 of Fort-Munro Formation.

Genus Rosita Robaszynski,

Caron, Gonzalez & Wonder, 1984

Rosita contusa(Cushman)

Pulvinulinaarca Cushman var. contuse Cushman, 1926, p. 23, 9 type-fig – nomennudum. (Plate No.1 fig no.9)

Stratigraphic Range:

Globotruncana contusais ranges to Middle to Upper Maastrichtian.

Distribution:

The figured specimen is recorded from sample no. H-58, H-59 of Fort-Munro Formation.

Rosita fornicate (Plummer)

Globotruncana forincata Plummer, 1931, p. 130, pl. 13, figs. 4a-c. (Plate No.1 fig no.3)

Stratigraphic Range:

Rosita fornicata is ranges from Santonian to Middle Maastrichtian.

Distribution:

The figured specimen is recorded from sample no.H-31, H-55, H-52 of Fort-Munro Formation.

Genus Globotruncanita Reiss, 1957

Globotruncanitaelevata (Brotzen)

Globotruncanitaelevata Brotzen, 1934, p. 66, pl. 3 fig. c.
(Plate No.1 fig no.16-17)

Stratigraphic Range:

Globotruncanita elevata is characteristic Zone of late Campanian age.

Globotruncanitasubspinosa (Pessagno)

Globotruncanita (Globotruncanita) subspinosa
Pessagno, 1960, p. 101, pl. 1, figs. 4-6.

(pl. 1, figs. 4-6).

(Plate No.1 fig no.1)

Stratigraphic Range:

Globotruncanita subspinosa is ranges from Middle Campanian to Middle Maastrichtian age.

Distribution:

The figured specimen is recorded from sample no. H-39, H-37 of Fort-Munro Formation.

Genus Globotruncanella, Resis, 1957

Globotruncanella citae (Bolli)

Globotruncanella citae Bolli, 1907, pl. 35, figs. 4-6.

(Plate No.1 fig no.14-15)

Stratigraphic Range:

Globotruncanella citae is ranges from Middle to Upper Maastrichtian age.

Distribution:

The figured specimen is recorded from sample no.H-57, H-58, H-62 of Fort-Munro Formation.

Globotruncanella havanensis(Voorwijk)

Globotruncanella havanensis Voorwijk, 1957, p. 195, pl. 1, figs. 25,26,29.

(Plate No.1 fig no.10-11)

Stratigraphic Range:

Globotruncanella havanensis is the characteristic of zone of Late Maastrichtian age.

Distribution:

The figured specimen is recorded from sample no.H-55, H-59 of Fort-Munro Formation.

Genus Globotruncana Cushman, 1927

Globotruncana arca

Globotruncana Cushman, Contr, Cushman Lab. Foram. Res., vol. 3, 1927, p.91.

(Plate No.1 fig no.7-8)

Stratigraphic Range:

Globotruncana arca is ranges from Middle Santonian to Upper Maastrichtian.

Distribution:

The figured specimen is recorded from sample no.H-62, H-57,H-15 of Fort-Munro Formation.

Genus Globotruncana Cushman, 1927

Globotruncana aegyptiacanakkady

Globotruncana aegyptiacanakkady, 1950.

Globotruncana ganebini Tilev, 1951, p. 50, pl. 3, figs. 2a-c. (Plate No.1 fig no.5)

Stratigraphic range:

Globotruncana aegyptiaca is the characteristic zone of Late to Middle Maastrichtian age.

Distribution:

The figured specimen is recorded from sample no.H-54, H-48 of Fort-Munro Formation.

6. CONCLUSION

The Cretaceous period is characterized by having abundant amount of Globotruncana species. In the present study the different Globotruncanidae genera were found as shown in the Distribution Chart of planktonic foraminifera. On the basis of succession Hemipneustes bed is overlain by Pab sandstone so on the basis of lithostratigraphic succession this Hemipneustes bed is purely resembled with Fort-Munro formation while biostratigraphy revealed the same. Planktonic foraminiferal assemblage was very well preserved but fauna was rare. The environmental changes from the base of Fort-Munro Formation to the top are associated with small scale of transgression and regression. In the present study, many well-known fauna were found i.e. Archeoglobigerinacretacea, Rositaformicata, Rositacontusa, Globotruncanitaelevata, Globotruncanitasubspinosa, Globotruncanellacitae, Globotruncana arca, with four Planktonic Zonal species.

Dicarinella concavata is the planktonic zone of late Coniacian to late Santonian is the only oldest zone found in the lower part of the studied formation. Globotruncanitaelevata is planktonic zone of late Campanian but the run of species touches the boundary of Maastrichtian, this was reported in the middle part of the studied formation. Globotruncanitahavanensis planktonic zone of early Maastrichtian, and after that Globotruncana aegyptiaca of middle late Maastrichtian zone was found, both of the former zones were reported in the middle and upper part of the studied formation. Planktonic Foraminifera are rare and scattered in the

area. Thus on the basis of these particular reported species, planktonic zones and analysis of Distribution Chart, the age of the Fort-Munro Formation is assigned to be as early Santonian to middle Maastrichtian of Cretaceous period. The lower part of the area is relatively older than the upper part of the formation.

7. CONFLICT OF INTEREST

All authors have declared that there is no conflict of interest regarding publication of this article.

Table 1. Showing Planktonic Foraminiferal assemblage zonal scheme of Cretaceous Age presented in Atlas Mid Cretaceous event 1979 by Caron this scheme was followed in present

Age M.Y.A	Stage	Planktonic Foraminiferal Zones
70	Maastrichtian	Abathomphalus mayaroensis
		Gansserinagansseri
		Globotruncana aegyptiaca
		Globotruncanita havanensis
78	Campanian	Globotruncanita calcarata
		Globotruncana ventricosa
		Globotruncanita elevata
82	Santonian	Dicarinella asymetrica
86	Coniacian	Dicarinella concavata

The Technology Press Massachusetts Institute of Technology, P. 15, 33.

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234,289,322,329,335.

Planktonic foraminiferal of Fort-Munro Sindh

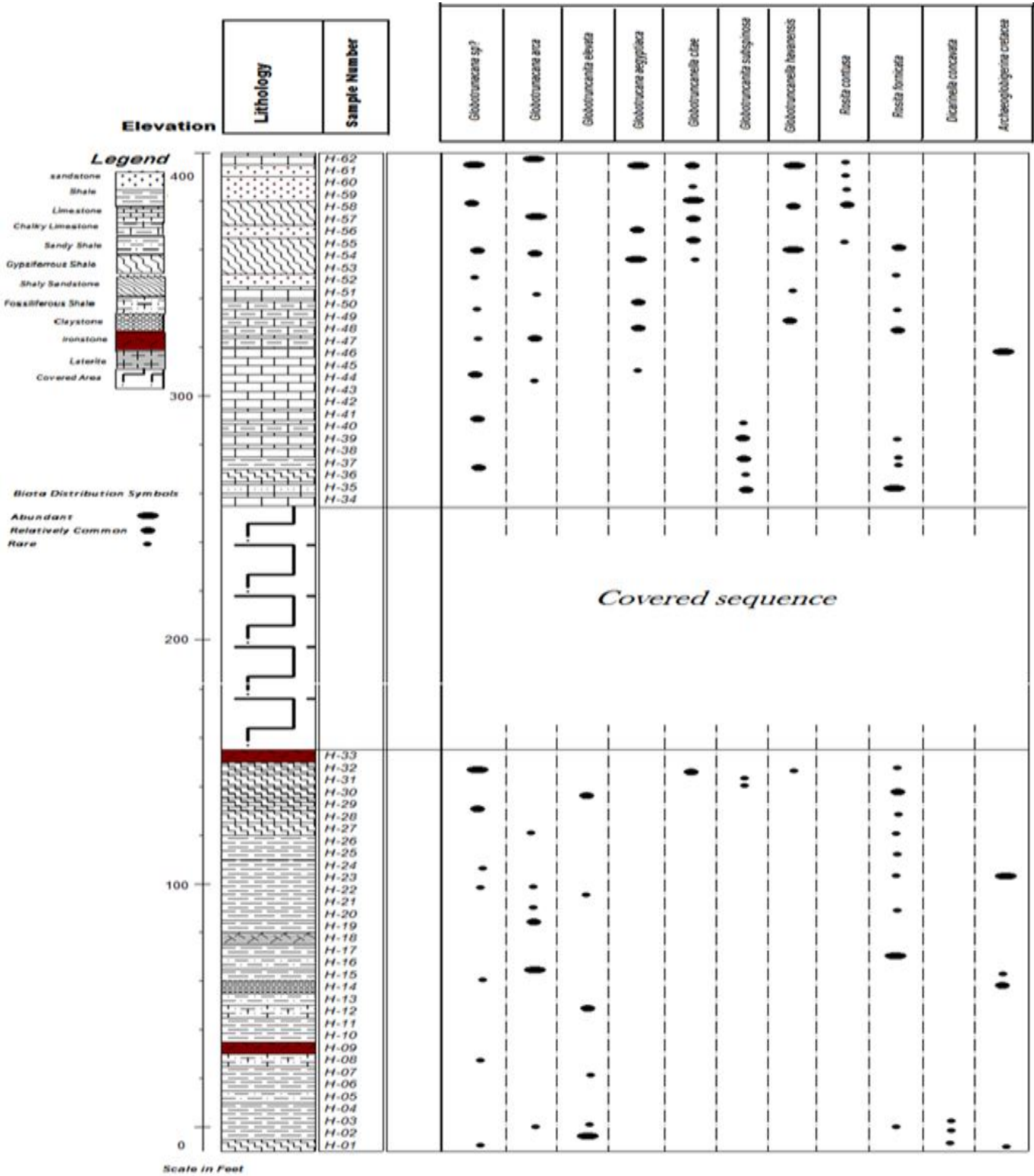


Figure 2 Showing the distribution and abundance of 11 planktonic foraminifera in the selected formation

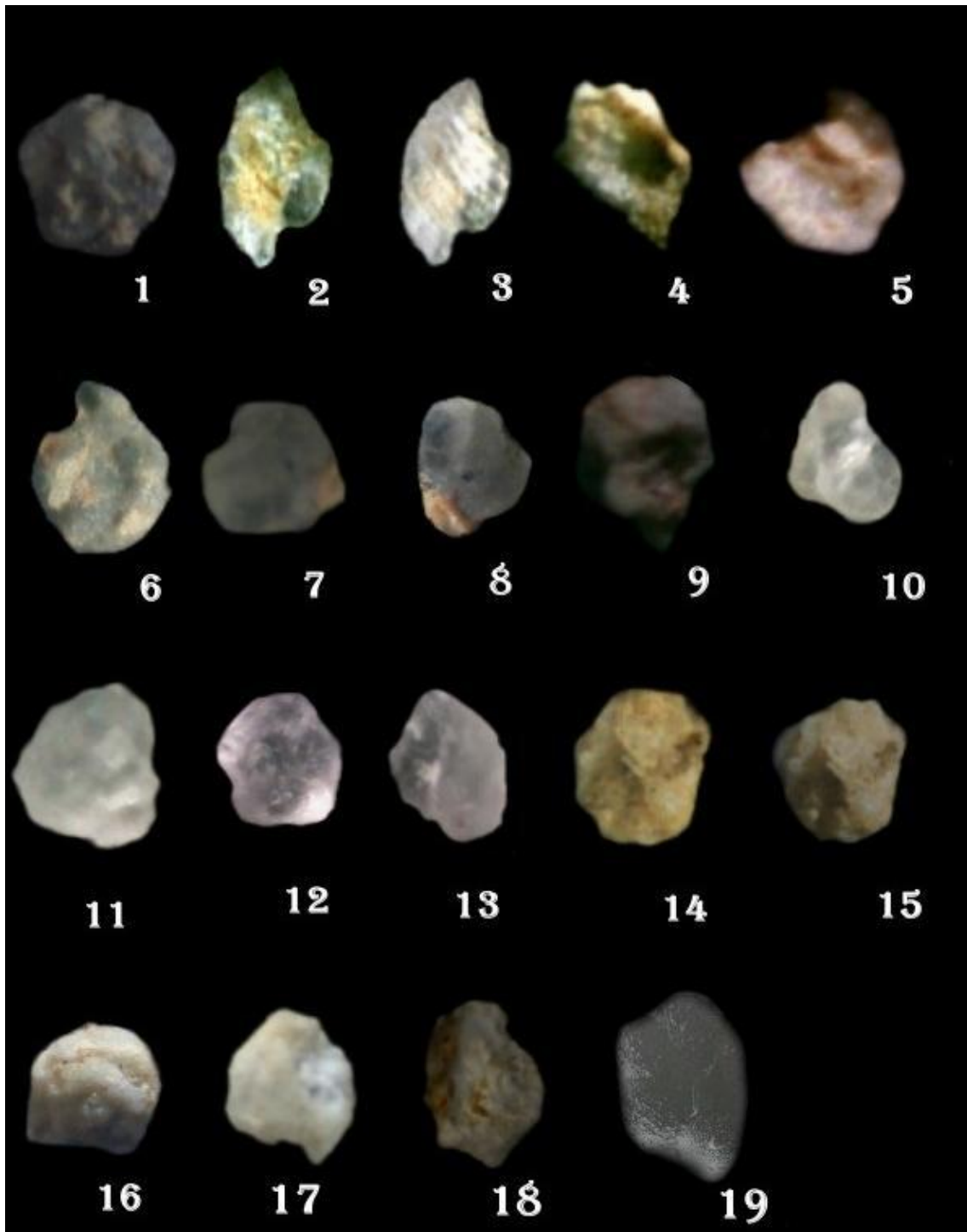


Plate No. 1 Showing picture of fossils.