

PLANKTONIC FORAMINIFERA FROM UPPER CRETACEOUS KAWAGARH FORMATION, JABRI AREA, LORA-MAQSOOD ROAD, HAZARA, NORTHERN PAKISTAN

BY

S. J. SAMEENI

Institute of Geology, Quaid-e-Azam Campus, University of the Punjab, Lahore-54590, Pakistan.
Email: sameeni@yahoo.com

KAMRAN MIRZA

Institute of Geology, Quaid-e-Azam Campus, University of the Punjab, Lahore-54590, Pakistan.

AND

HUMAIRA NAZ

Department of Geology, University of Sindh, Jamshoro, Pakistan.

Abstract: *Kawagarh Formation in Jabri area is well exposed with a thickness of 123 meters. Forty samples were collected from bottom to top at equal intervals for micropaleontological studies from two different localities along the Lora-Maqsood road. Thin sections were prepared from hard samples of limestone while loose material was also collected from the marly part of the Formation for the study of complete specimens. Five species of genus **Globotruncana** were observed along with **Planoglobulina sp.**, **Heterohelix reussi**, **Textularia baudouiniana**. The presence of **Globotruncana arca** in the upper part of the Formation indicate that the deposition of the upper part of the Kawagarh Formation may extended into lower Mastrichtian in this area (range of **G. arca** is from **Globotruncana cancavata** zone to **Globotruncana gansseri** zone). On the basis of the observed fauna the age of the Kawagarh Formation ranges from Middle Coniacian to Lower Mastrichtian in this area.*

INTRODUCTION

Jabri (long. 73 10 15", lat. 33, 55) is an easily accessible locality from capital Islamabad via Ghora Gali, located on Lora-Maqsood road where Kawagarh Formation is widely exposed along the road on the north bank of Haro river and when moving further towards north along the road, it is also repeated after Paleogene succession due to fault (Fig. 1).

Day (in unpublished report of Attock Oil Company) introduced the name "Kawagarh Marls" for the Upper Cretaceous rocks exposed in the Kawagarh Hills, north of Kala Chitta Ranges. Stratigraphic Committee of Pakistan had approved the name "Kawagarh Formation" and extended to its facies changes in Kohat ("Sublithographic Limestone" of Davies, 1930 and "Darsamand Limestone" of Fatmi & Khan, 1966) and Hazara area ("Chinali Limestone" of Mir Latif, 1970).

The Kawagarh Formation at Jabri is 123 meters (430 feet) thick, trending NE-SW, comprises mainly of very fine grained limestone with marly beds at the base and in the lower-middle part of the formation. The limestone contains dolomitic patches and is light brown, chocolate, whitish grey, light grey to pinkish grey on fresh surface. It weathers to off-white, light rusty grey, pale yellowish and light grey. The limestone breaks with concoidal to subconcoidal fracture.

The thickness of the beds varies from 6 cm to 70 cm. Basal portion of Kawagarh Formation comprises mainly of earthy grey to light grey, off-whitish grey, creamish off-white to very light grey marl with nodular layers of limestone. It weathers to rusty grey, off-whitish grey to dirty grey. The marl is highly fossiliferous, splintery, thinly laminated and at places, contains intercalations of nodular (2 cm x 6 cm) limestone bands (4 cm to 7 cm thick). The limestone contains glauconite which imparts a green tinge to this part. The formation contains (1 to 2.5 cm thick) calcite veins which are frequent in the unit.

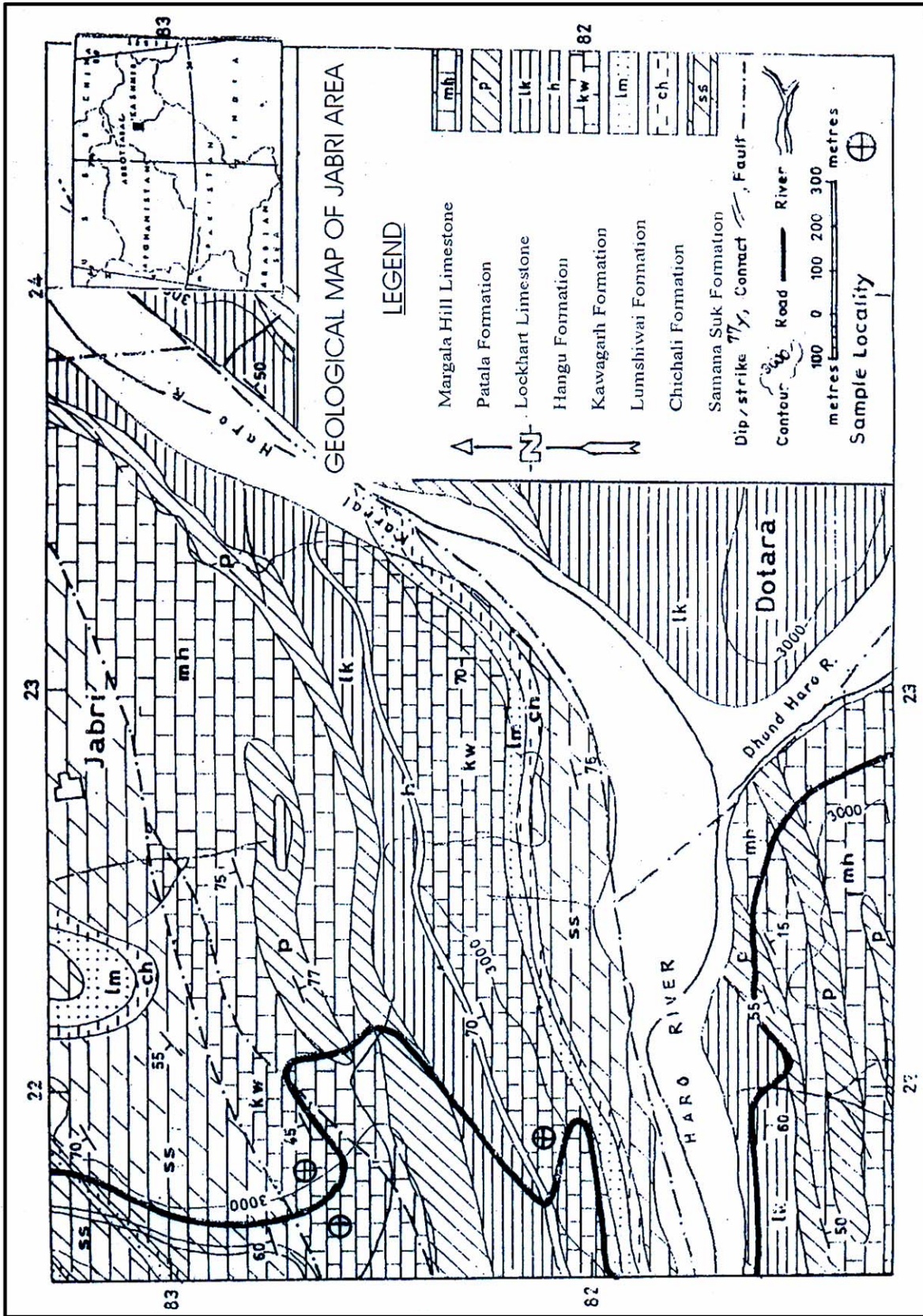


Fig. 1: Geological Map of Jabri Area.

Plate 1

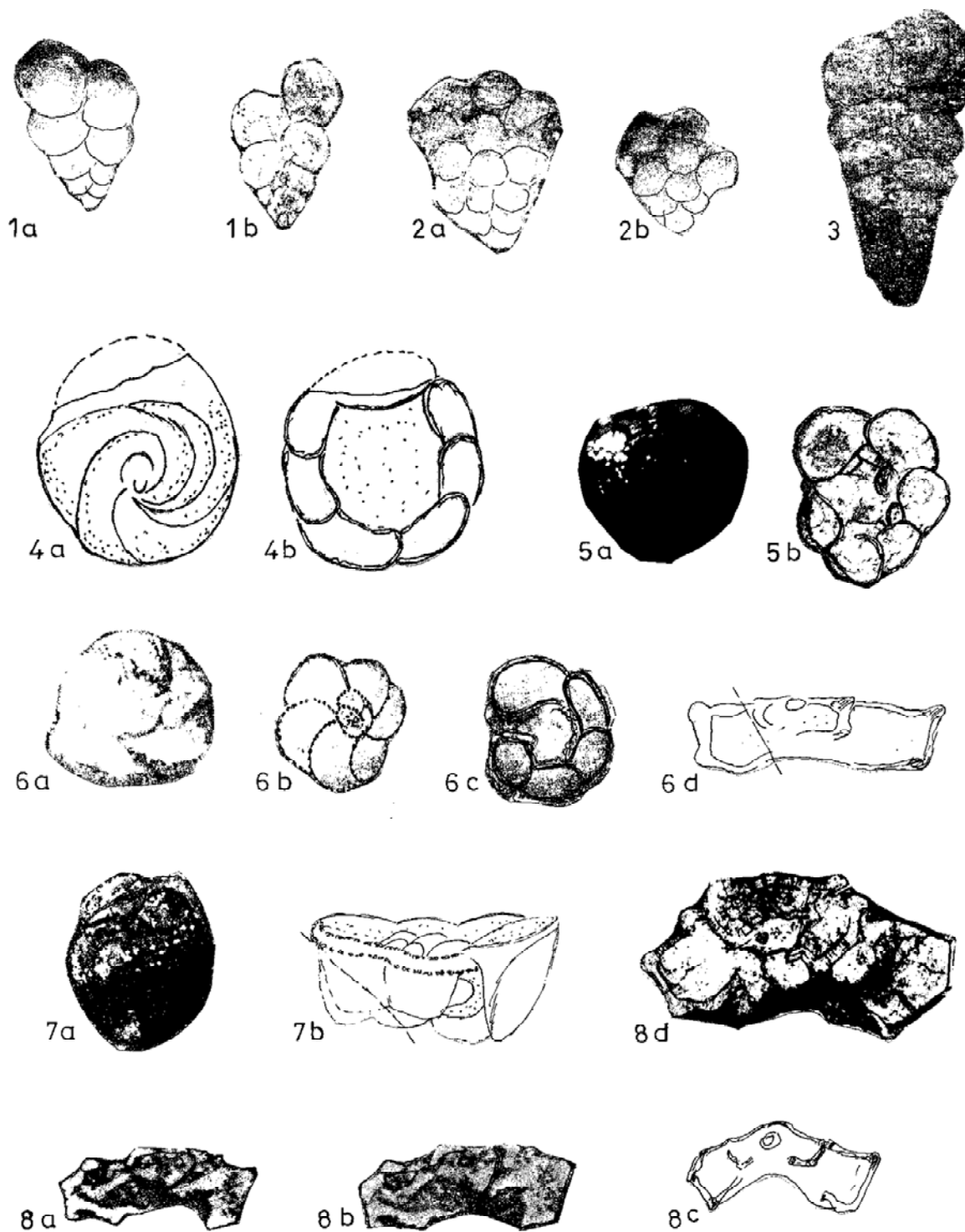


PLATE-1:

Fig-1a,b: *Heterohelix reussi* (Cushman); **Fig-2a,b:** *Planoglobulina* sp.;
Fig- 3: *Textularia boudouiniana* d'Orbigny ; **Fig-4a,b:***Globotruncana fornicate* Plumer 1931
Fig-5a,b: *Globotruncana ventricosa* White 1928; **Fig-6a-d:***Globotruncana linneiana* d'Orbigny 1939
Fig-7a,b:*Globotruncana carinata* Dalbeiz 1955; **Fig-8a-c:***Globotruncana arca* (Cushman) 1926
Fig-8d: *Globotruncana arca* (Cushman) 1926 Text Fig.

The underlying Lumshiwai Formation consists of glauconitic sandstone and some shaly beds which are brownish grey to yellowish grey and rusty brown on weathered surface and on fresh surface it is brownish grey and yellowish green. The sandstone is coarse grained, well bedded to massive with joints. The overlying Laterite of the Hungu Formation is just 3 m (15 feet) thick in the area (Fig-2). The regional stratigraphy of the Jabri area is a part of Attock Hazara Fold and Thurst Belt (AHFTB).

OBSERVATIONS

Naveed Ahsan and Sameeni et. al. (1993) in their preliminary work on the microfacies and microfauna on the Kawagarh Formation of the Jabri area, reported the presence of *Globorotalia multisepta*, *Globotruncana sp.*, *Haplophrogmoides eggeri*, *Lenticulina sp.*, *Planularia liebusi*, *Rugoglobigerina rugosa*, *Textularia sp.*, *Trochamina diagonis*, *Heterohelix globulosa* and *Pseudotextularia sp.* Latif (1970) also reported the same species from Hazara area. Naveed Ahsan and Sameeni et. al. (1993) also worked on Kawagarh Formation of Barian area on the microfacies of the formation. Butt (1969) published a note on Cretaceous-Tertiary boundary of Hazara area and reported foraminiferal species from Kawagarh Formation. First time detailed micropaleontological studies of the Kawagarh Formation from Jabri area is carried out. For this purposes samples were collected from bottom to top at 10 equal intervals (Fig-3). 40 thin section slides were prepared from hard samples of limestone while loose material from the basal shaly/marly part and from the lower middle part of the formation was also collected for the study of the loose specimens.

The following age diagnostic foraminiferal species were observed during the present study.

- *Heterohelix reussi* (Cushman)
- *Planoglobulina sp.*
- *Textularia boudouiniana* d'Orbigny
- *Globotruncana fornicata* Plummer 1931
- *Globotruncana linneiana* d'Orbigny 1939
- *Globotruncana carinata* Dalbiez 1955
- *Globotruncana arca* (Cushman) 1926

SYSTEMATIC PALEONTOLOGY:-

Genus **Heterohelix** Ehrenberg, 1853

Heterohelix reussi (Cushman)

(Plate:1 Fig: 1,2)

Gumbellina reussi CUSHMAN, 1938, Contr. Cushman Lab. Foramin. Res., vol. 14, pt. 1, p. 11, pl. 12, figs. 6-9; 1946, U.S.G.S., Prof. Paper no.206, p. 104, pl. 44, figs. 18-19.

Heterohelix reussi (Cushman), PESSAGNO, 1967, Paleontogr. Americana, vol. 5, no. 37, p. 263, pl. 85, figs. 1-9; pl. 86, figs. 1-2; DOUGLAS, 1969, Micropal. Vol. 15, no. 2, p. 158, pl. 11, fig. 15.

Remarks:- These specimens were recorded from the lower part of the formation.

Age:- Santonian to Campanian.

Genus **Textularia** DeFrance, 1824

Textularia boudouiniana d'Orbigny, 1839

(Plate 1, Fig. 3)

Textularia boudouiniana d'ORBIGNY, 1839, Mem. Surles. Foraminifera; EGGER, 1902, Abh. d. 11/C.D.K. Akad. Wiss. XXI, Bd. 1, Alith. P. 24, pl. 2, figs. 10-11.

Remarks:- A few specimens were recorded from the lower part of the formation.

Age:- Upper Coniacian.

Genus **Planoglobulina** Cushman, 1927

Planoglobulina sp.

(Plate 1, Fig. 2a-b)

Planoglobulina CUSHMAN, 1927, Some new genera of the foraminifera. Contr. From the Cushman Lab. for Foramin. Res. vol. 2, p. 77-81, pl. 488, figs. 1-10.

Remarks:- These specimens were recorded from middle upper part of the formation.

Age:- Maastrichtian.

Genus **Globotruncana** Cushman, 1937

Globotruncana fornicata Plummer, 1931

(Plate:1, Figs. 4a,b)

Globotruncana fornicata PLUMMER, 1931, Univ. Texas bull., no. 3101, p. 198, pl. 13, figs. 4-6; DALBIEZ, 1955, Micropal., vol. 1, p. 165-166; BARR, 1962, Paleont., vol. 4, p.570, pl. 69, fig. 6; pl. 72, figs. 1-2; VAN HINT, 1965, Proc. Kon. Nederl. Akad. Wetensch., Ser. B., vil. 68, no. 1, p. 21, pl. 1, fig. 1.; pl. 2, fig. 1-2; TAKAYANAGI, 1965, Tohoku Univ. Sci. Rep., 2nd Ser. (Geol.), vol. 36, no. 2, p. 214, pl. 24, fig. 4.

Globotruncana (Globotruncana) fornicate Plummer, VAN WHITE, 1965, Proc. Kon. Nederl. Akad. Wetensch., Ser. B., vol. 68, no. 2, p. 83, pl. 1, fig. 6.

Remarks:- These specimens were recorded from the loose material collected from the lower and middle part of the formation.

Age:- Upper part of *Globotruncana schneegansi* zone to top of *Globotruncana stratiformis* zone. Questionable occurrence in lower *Globotruncana ganserri* zone.

***Globotruncana ventricosa* White**

(Plate 1, Figs. 5a,b)

Globotruncana canaliculata var. *ventricosa* WHITE, 1928, Some Index Foraminifera of Tampico embayment area of Mexico. Jour. of Paleont. Vol. 2, no. 4, p. 284, pl. 38, figs. 5 a-c.

Remarks:- These specimens were also recorded from lower and part of the formation.

Age:- Lower part of *Globotruncana elevata* zone to *Globotruncana calcarata* zone. Questionable occurrence in lower part of *Globotruncana stratiformis* zone.

***Globotruncana linneiana* (d'Orbigny)**

(Plate 1, Figs. 6a-d)

Rosalina linneiana d'ORBIGNY, 1939, in Ramen de la Sagra, Hist. Phsy. Pol. Nat. Cuba, Paris, vol. 8, p. 101, pl. 5, figs. 10-12.

Globotruncana linneiana (d'Orbigny), BRONNIMANN & BROWN, 1955, Eclog. Geol. Helvet., vol. 48, no. 2, p. 540, pl. 20, figs. 13-17; pl. 21, figs. 16-18; NAGAPPA, 1959, Micropal., vol. 5, no. 2, p. 179, pl. 6, fig. 6; VAN HINTE, 1965, Proc. Kon. Nederl. Akad. Wentsch., Ser. B., vol. 68, no. 1, p. 23, pl. 1, fig. 3; CARON, 1966, Rev. Micropal., vol. 9, no. 2, p. 83, pl. 5, fig. 3.

Globotruncana (Globotruncana) linneiana linneiana (d'Orbigny), VAN WHITE, 1965, Proc. Kon. Nederl. Akad. Wetensch., Ser. B., vol. 68, no. 2, p. 84, pl. 2, fig. 4.

Globotruncana lapparenti lapparenti, BOLLI, 1944, Zur Stratigraphie der Oberen Kreide in den hoheren helvetischen Decken. Ecologicae Gelologicae Helvetiac, vol. 37, no. 2, p. 230, text fig. 1, nos. 15,16, pl. 9, fig. 1.

Remarks:- These frequently existing specimens were recorded from lower and middle part of the formation both in the form of loose specimens as well as in thin sections.

Age:- Lower part of *Globotruncana concavata* zone to uppermost part of *Globotruncana stratiformis* zone.

***Globotruncana carinata* Dalbiez**

(Plate 1, Figs. 7a,b)

Globotruncana (Globotruncana) ventricosa carinata DALBIEZ, 1955, The genus *Globotruncana* in Tunisia. Micropal., vol. 1, no. 2, p. 168, text fig. 8.

Remarks:- These specimens were also recorded from lower and middle part of the formation.

Age:- Upper part of *Globotruncana concavata* zone to lowermost part of *Globotruncana elevata* zone.

***Globotruncana arca* (Cushman)**

(Plate 1, Figs. 8a-d)

Pluvulinina arca CUSHMAN, 1926, Some Foraminifera from the Mendez Shale of Eastern Mexico. Contr. Cushman Lab. Foram. Res., vol. 2, no. 3, pl. 3, figs. 1a-c.

Remarks:- These specimens are recorded only from the topmost part of the formation i.e. from hard limestone only in thin sections, not found in loose form.

Age:- Base *Globotruncana calcarata* zone top *Globotruncana ganserri* zone. Questionable occurrence in the lower part of *Globotruncana mayaroensis* zone.

REMARKS:-

During the present study it was observed that the erosion of Upper Cretaceous Kawagarh Formation is minimum as the Laterite in this area is not well developed. Further foraminiferal study shows that

- i. *Planoglobolina* sp. is observed in the middle upper part of the formation which is of Maastrichtian age (Cushman 1927).
- ii. *Globotruncana arca* has a long stratigraphic range and is observed in thin sections only in the upper most part of the formation, not with any other *Globotruncana* species, which shows it is recorded from its upper most occurrence zones that is lower Maastrichtian. Butt (1988) reported *Globotruncana arca* from Kawagarh Formation of the Kala Chitta area but don't mentioned from which level of the formation it was recorded.

On the basis of the above mentioned observation the age of the Kawagarh Formation may extended into Lower Maastrichtian (Fig-4) in this area.

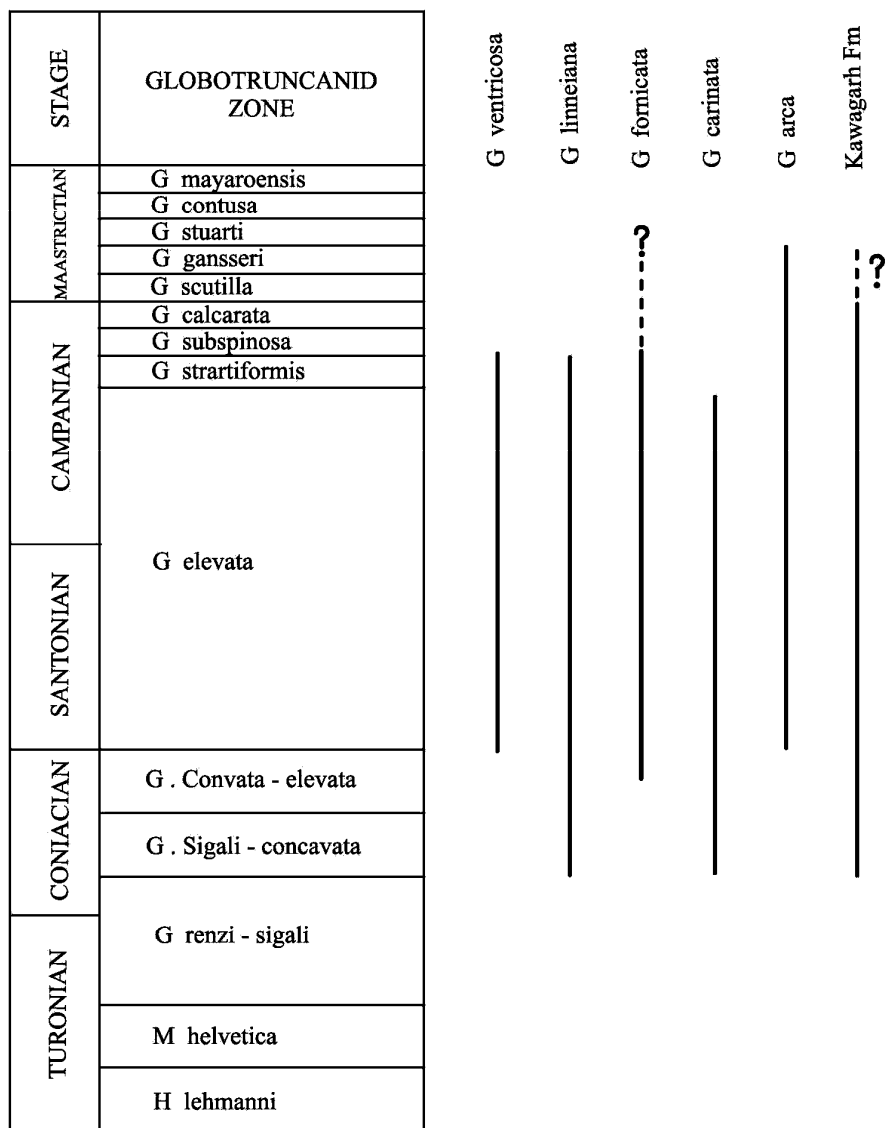


Fig. 4: Late Cretaceous Planktonic foraminiferal zonation after Hinte (1976), Gorsel (1978) and based on numerous workers stratigraphic range of recorded species.

G=Gobotruncana

REFERENCES

- Ahsan, N., Chaudhry, M.N., Sameeni, S.J., Ghazanfar, M., (1993): Reconnaissance Micrfacies study of Kawagarh Formation, Jabri area, Hazara, Pakistan. *Pak. Jour. Geol.* **1(2)**: 32-49.
- Butt, A.A., (1969): A note on the Cretaceous-Tertiary boundary in Hazara, West Pakistan. *Geol. Bull. Punjab Univ.* **8**:73-78.
- Butt, A.A., (1986): Plate Tectonics and Upper Cretaceous biostratigraphic synthesis of Pakistan. *Acta Mineralogica Pakistanica* **2**: 60-64.
- Butt, A.A., (1988): Upper Cretaceous Foraminiferal biostratigraphy of Pakistan. *Acta Mineralogica. Pakistanica*, **4**: 90-95.
- Fatmi, A.N. (1973):Lithstratigraphic units of Kohat-Potowar Province, *Indus basin, Mem. Geol. Surv. Pakistan*, **10**: 1-80.
- Latif, M.A., (1962): An Upper Cretaceous Limestone in Hazara Distt. *Geol. Bull. Punjab Univ.* **2**: 57.
- Latif, M.A., (1968): Contribution to geology and micropaleontology of Hazara, West Pakistan. *Verh. Geol. Bundesanst*, **3**: 92-94.
- Latif, M.A. (1970): Explanatory notes on the geology of the southeastern Hazara to Accompany the revised geological map- *Jahrb. Geol. Bundesanst.*, **15**: 25-61.
- Latif, M.A., (1970): Micropaleontology of the Chinali Limestone, Upper Cretaceous of Hazara, West Pakistan. *Jahrb. Geol. B.A., Bundesanst* **15**: 25-61.
- Middlemiss, C.S. (1896): The geology of Hazra and Black mountains, *Mem. Geol. Surv. India.*, **26**: 1-290.
- Shah, S. M. I. (ed) 1977. Stratigraphy of Pakistan. *Mem. Geol. Surv. of Pakistan*, **12**: 138.