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An analysis of Eocenemollusc and fauna from shirtkola atji, Bikaner, Rajasthan: in light of fresh Collection.

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Abstract: This paper includes a check list of 48 taxa of Bivalvia and 14 of Gastropoda with proper occurrence, horizon and age. The list comprises besides earlier known taxa, the additional ones and forms new to science. An analysis of these fauna with respect to earlier known fauna is attempted and three biostratigraphic zones are erected. The reported fauna hereby reflect that these are not confined to Lower Eocene Beds as per earlier record but also passing into Middle Eocene.
Keywords: Sankhla Basti, Lower and Middle Eocene, Mollusc, Biostratigraphic Zones.

I. SUMMARY

Due to mining activity in full cry, there is a danger that all fossiliferous outcrops entombed with molluscs will be no more there in near future. In view of it a collection of molluscs mainly from a mine section near SankhlaBasti, ShriKolayatJi, Bikaner is made to enrich the paleontological record which will help in knowing marine basin configuration during Lower and Middle Eocene time.

II. INTRODUCTION

The main purpose of the present paper is to highlight presence of marine molluscan fauna especially Bivalves and Gastropods from ShriKolayatji area Bikaner, Rajasthan. Earlier records of mollusc are mainly from outcrops around Marh village (27˚51'30" N, 72˚56'0" E), but at present whole of this area has been subjected to mining in full swing, therefore, fossiliferous outcrops are not available except in and around SankhlaBasti Mine. In near future this mining activity may lead to vanishing of available outcrops in small area.Another effect may be the covering of outcrops by thick pile of the mine waste. In view of this, there is an urgency to make a collection of entombed fauna bed by bed to reveal geological history of this area. To date back, many workers in the field of palaeontology have visited this area and recorded few taxa without any illustration leaving that of Bhatia and Khosla (1978). They have illustrated overall 45 taxa of mollusca of which 26 bivalves and 19 gastropods from Khuiala Formation. All of these are assigned to Ypresian (Lower Eocene)and clubbed into one biozone viz. Venericardiamutabilis. Prior to that Singh (1969, 1971) has also proposed a Pelecypoda zone within the Kolayat stage which is said to be equivalent of the LakiSeries (Ypresian) of Pakistan. In light of single biozone, authors have decided to make fresh collection,to workout high resolution molluscanstratigraphy. For this,authors have visited the area in the month of April, 2017 and made the collection accordingly. It has been brought to the laboratory and fossils have been cleaned and prepared for identification with their proper taxonomic status. Overall 48 taxa of bivalves and 14 of gastropods have been identified. A litho log has been prepared to show the position of fossiliferous horizons in the area of SankhlaBasti Fuller's Earth Mine. The mine is in form of an open quarry geologically situated in a shallow gently dipping syncline showing youngest strata at the core of youngerBandah Formation within Khuiala Formation.

A. Fauna

1) *Bivalves:*Bivalves comprisea single class i. e. Bivalvia with three subclasses namely Pteriomorphia, Heterodonta and Anomalodesmata which are further divided into six orders cited here as Arcoida, Mytiloida, Pterioida, Veneroida, Myoida and Pholadomyoida with one additional suborder Ostreina of Pteriomorphia. In the lower categories, recorded bivalves are further grouped into 19 superfamilies i. e. Arcacea, Mytilacea, Pinnacea, Pectinacea, Anomiacea, Ostreacea, Lucinacea, Chamacea, Carditacea, Crassatellacea, Cardiacea, Mactracea, Tellinacea, Arcticacea, Glossacea, Veneracea, Myacea, Pandoracea and Poromyacea with 21 families synonym with superfamilies with –idae ending instead of -acea. Exceptions are Ungulinidae, Psammobiidae, Trapeziidae, Corbulidae and Periplomatidae. Likewise 16 subfamilies are recorded bearing the title in

accordance with family name leaving aside Milthinae of family Lucinidae and Pitarinae of family Veneridae. Lastly, at the species level clubbed to 27 genera and 10 subgenera. (See table). It may be noted with interest that the subgenus Turkostrea (Lower- Middle Eocene) recorded only from North Africa and Central Asia and species Spisula (Rueilla) bernayi from Europe are being reported first time from India.

2) *Gastropods:*Gastropods are represented by one class, subclass and one order i.e. Gastropoda, Prosobranchia and Mesogastropoda respectively. Fossil individuals belongs to five super families namely Strombacea, Naticacea, Buccinacea, Volutacea, and Conacea, with subgroup of eight families and three subfamilies as Strombidae, Amphiperatidae, (Amphiperatinae a subfamily), Naticidae (Ampullospirinae a sub family), Neptuneidae, Volemidae, Volutidae, (Athletinae a subfamily) Harpidae and Conidae. The recorded taxa belong to 13 genera and two subgenera shown in Table.

III. COMPARISON OF TAXA WITH EARLIER RECORDED ONES:

Bhatia and Khosla (1978) are the only workers who came out with proper illustration of 26 bivalves and 19 gastropods belong to 19 and 17 genera respectively. As per their record six bivalve taxa are not specifically identified and among remaining twelve are found to be common with present record (Table 1). Whereas, seven forms namely Mytilusnummuliticusd'Archiac and Haime, Modiolusdaviesi Cox, Ostrea (Pycnodonte) brongniarti (Bronn), Venericardia (Glyptoactis) vinquesneli (d'Archiac and Haime), Trachycardiumcotteri (Cox), T. halaense (d'Archiac and Haime) and (?) Macrocallista (Costacallista) punjabensis Eames are missing in present collection. But these are occurring inJaisalmer region where collection has been made (Table 2). The only species Anodontiapharaonis (Bellardi) is totally missing from both Jaisalmer and Bikaner area. To be on positive side as many as seven species are found to be new to science namely Chlamys n. sp., Anodontia n. sp., Crassitina (Chottonia) n. sp., Trachycardium n. sp., Corbula (Varicorbula) n. sp., Periploma (Aelga) n. sp., and Poromya n. sp. In addition to these, two new varieties are also erected viz. Chama (Chama) brimontid'Archiac and Haime n. var. and Blagraveiasindensis (d'Archiac and Haime) n. var. It may not be out of context to mention that one of the indeterminable species of Bhatia and Khosla (1978) namelyChlamys sp. has been included in the present new species asChlamys n. sp. (Table 3).Among gastropods Bhatia and Khosla (1978) have recorded 19 forms of which nine are indeterminable, however, two of these namely Trivia sp. indet. And Ampullospira (?)sp. indet. Are retained as such (Table 4). On the other hand five forms are missing in the present collectionbut present in Jaisalmar namely Prestrombusrockei Cox, Lambisgoniophora (Bellardi), Cypraediahyderabadensis Cox, Volutilitheskohatica Eames and Indovolutahumberti (d'Archiac and Haime).On the other hand,Rimellapakistanica Eames, Hippochrenesamplus (Solander in Brander), Euspirocrommiumoweni (d'Archiac and Haime), Eovasumhaimei (d' Archiac in d'Archiac and Haime) and Conus (Leptoconus) safaedensis Eames are found to be common. One of the indeterminable formnamelyTerebellum sp. indet.being identified precisely as Terebellumsubbelemnitoidumd'Archiac and Haime. For sake of convenience, the taxa recorded by Bhatia and Khosla (1978) as well as of present study are tabulated in the table(1).

A. Biozonation

As mentioned earlier Khosla (1973) has clubbed all molluscan taxa in single zone namely Venericardiamutabilis zone, i. e. his 4th zone in the ascending order with Lower Eocene age i.e. Ypresian. Contrary to it authors have erected three biozones i. e. Lower, Middle and Upper ranging from Upper Palaeocene to Middle Eocene.(Table 6).

B. Lower zone

This zone is confined to white calcareous siltstone bed and titled as Venericardia zone. In this zone seven taxa have restricted range and one is passing into the Middle zone i.e. Venericardia (V.) mutabilis (Lower- Middle Eocene). The check list of restricted range taxa is as follows- Venericardia (V.) hanguensis (Cox) (Lower- Middle Eocene), V. (V.) soriensis Eames (Lower- Middle Eocene), Glyptoactissindensis (Cox) (Lower- Middle Eocene) Venericardia (V.) pakistanica Eames(Lower- Middle Eocene) Venericardia (Venericor) sp. juv. planicosta Lamarck (Middle Eocene) Terebellumsubbelemnitoidumd'Archiac and Haime (Lower Eocene) and Ampullospira sp. indet (Lower Eocene). This assemblage is dominated by various forms of Venericardia and in turn Venericardia assemblage is generally assigned to upper Palaeocene - Early Eocene. One need not give much weightage to Venericardia (Venericor) planicosta Lamarck a Middle Eocene form from France, because ours is a juvenile one.

C. Middle zone

The over lying Middle zone is confined to the three Fuller's Earth beds alternating with shales. Species wise this zone is quite rich and as many as 28 taxa are encountered of which one is continuing from the Lower zone and four are passing into the Upper zone

namely Blagraveiacorrugata Cox (Lower- Middle Eocene), B. sindensis (d'Archiac and Haime) (Lower- Middle Eocene) a new var., Corbula (Bicorbula) subexaratad'Archiac and Haime var. lituus Cotter (Eocene) and Euspiracrommiumoweni (d'Archiac and Haime) (Early Eocene- Oligocene). 23 taxa which have restricted occurrence within this zone are - Barbatiasp, Noetiamagnifica Eames (Lower- Middle Eocene), Pinna sp. indet., Anodontia n. sp., Diplodonta sp. indet., Chama (C.) brimontid'Archiac and Haime n. var., Glyptoactisdufrenoyi (d'Archiac and Haime) (Lower- Middle Eocene), Crassatina (Chattonia) n. sp., Trachycardium n. sp., Spisula (Ruellia) cf. bernayi (Cossmann) (Eocene), Macrosolenbirmanicus (Cotter) (Eocene), Blagraveiasindensis (d'Archiac and Haime) (Lower- Middle Eocene), Periploma (Aelga) n. sp., Poromya n. sp., Rimellapakistanica Eames(Lower- Middle Eocene), Terebellopsis cf. lanceolatum (Cossmann and Pissarro) (Lower Eocene), Simnia (Calpurna) sp., Euspirocrommiumconicum Cox (Lower Eocene), HemifususheroniVredenburg (Lower Eocene), Siphonalia sp., Harpa (?) soriensis Eames (Lower- Middle Eocene), Volutocorbispakistanica Eames(Middle Eocene) and Conus (Leptoconus) safaedensis Eames (Lower- Middle Eocene). With these ranges it is not possible to give precise age, therefore, broadly assigned to Lower- Middle Eocene.

D. Upper zone

This zone is thin but rich in fossil fauna and confined to laminated yellow marl limestone. 26 taxa are identified from this zone of which three are indeterminable, four are continuing from Middle zone and two are new to science viz. -Chlamys n. sp. and Corbula (Varicorbula) n. sp.. Remaining 17 taxa are restricted to this zone namelySeptifer cf. denticulatus Lamarck (Middle Eocene), Anomia (A.) pakistanica Eames (Lower- Middle Eocene), Ostrea (O.) multicostataDeshayes (Lower- Middle Eocene), O. (O.) cf. rouaultiMallada (Lower- Middle Eocene), O. pseudoflemingi Eames (Lower- Middle Eocene), Diplodonta (D.) punjabensis Eames (Lower- Middle Eocene), Venericardia (V.) babiaensisBigyapati (Middle Eocene), GlyptoactisgilliMathur (Lower- Middle Eocene), Trachycardium cf. gigasCossmann and Pissarro (Eocene), T. cf. coxiMathur (Middle Eocene), Nemocardium (N.) turgidum (Solander) (Upper Eocene), N. (Discors) bunburyi (d'Archiac and Haime), N. (D.) punjabensis Eames, Pitar (Calpitaria) pseudosubcyrenoides Eames (Lower- Middle Eocene), LyriavaricosaVredenburg(Lower- Middle Eocene) N. (D.) tewariiMathur (Lower Eocene) and Dosiniarakhiensis Eames. This assemblage represents the age of Lower to Middle Eocene. On more precise side oyster assemblage is characteristic of Middle Eocene following Eames (1951),Mathur(1975, 78) and Bigyapati MS (2011),therefore, the assignment. Obviously, range of the last two forms viz. Dosiniarakhiensis Eames and Nemocardium (Discors) tewariiMathuris to be extended up to Middle Eocene.

Zone wise distribution of recorded taxa is given in Table 6

E. Inference

Majority of the form are occurring in Sindh (Pakistan), Kachchh (Gujarat) and Shimla Hills (Himachal Pradesh), therefore, it is inferred here that during Lower and Middle Eocene time there was a large marine basin and areas of Jaisalmer and Bikaner were part of it.

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REFERENCES

[1] Bhatia, S.B, and Khosla, S.C., 1978. Some Lower Eocene Mollusca from Rajasthan. Recent Research in Geology. "A collection of papers in honour of Professor G. W. Chiplonkar", (4), 225- 249.
[2] Borooah, S.K., 1946. The occurrence of the laki Series in Jodhpur state. Curr. Sci., 15, 317.Jain, R.L., 2010. Personal communication.\Kachhara, R.P., Jodhawat, R.L., and K. Bigyapati Devi. 2011. A study of Palaeogene mollusc fromLakhpatTaluqua, District Kachchh (Gujarat) and Jaiselmer Region (Rajasthan). U.G.C. Major Research Project , Department of Geology, MLSU Udaipur. 201.
[3] Khosla, S.C., 1973. Stratigraphy and microfauna of the Eocene beds of Rajasthan. Jour. Geol. Soc. India, 14(2), 142- 152.
[4] Roy, A.B., and Jakhar, S.R., 2002. Geology of Rajasthan (Northwest India). Precambrian to Recent, Scientific Publisher Jodhpur. 1- 421.
[5] Singh, S.N., 1953. Geology of the area WNW of Marh village, near Kolayat, Bikaner, Rajasthan. Proc. Nat. Acad. Sci., 23(1- 3), 13- 20.
[6] Singh, S.N., 1969. Stratigraphy of Eocene of Rajasthan. Ind. Sci. Congr. 56thProc (Abstr), 216- 217.
[7] Singh, S.N., 1971. Planktonic Forminifera in Eocene Stratigraphy of Rajasthan. Proc 2nd Planktonic Conference Roma, 1169- 1181.
[8] Vredenburg, E.W., 1928. A supplement to the Mollusca of the Ranikot Series. Palaeont. Indica NS 10 (4), 1- 75.West, W.D., 1949. General report for the year 1948. Rec. Geol. Surv. India, 82 (1), 1- 253.

Table 1:		Table2:	
Sl. No.	Common taxa of Bhatia and Khosla (1978)	Sl. No.	Missing species from present collection
1	Noetiamagnifica Eames	1	Mytilusnummuliticusd'Archiac and Haime
2	Chlamys sp. indet.	2	Modiolusdaviesi Cox
3	OstreamulticostataDeshayes	3	O. (Liostrea) cf. O. (L.) rouaultiMallada
4	Chama brimontid'Archiac and Haime	4	O.(Pycnodonte) brongniarti (Bronn)
5	Venericardiamutabilis (d'Archiac and Haime)	5	Anodontiapharaonis (Bellardi)
6	V.(Glyptoactis) sindensis (Cox)	6	Venericardia (Glyptoactis) viquesneli(d'Archiac and Haime)
7	V. (Glyptoactis) dufrenoyi (d'Archiac and Haime)	7	Trachycardiumcotteri (Cox)
8	Nemocardium (Discors) bunburyi (d'Archiac and Haime)	8	T. halaense (d'Archiac and Haime)
9	Blagraveiasindensis (d'Archiac and Haime)	9	? Macrocallista (Costacallista) punjabensis Eames
10	Pitar (Calpitaria) pseudosubcyrenoides Eames	10	Corbula (Bicorbula) subexaratad'Archiac and Haime
11	Dosiniarakhiensis Eames	11	Prestrombusrockei Cox
12	Rimellapakistanica Eames	12	Lambisgoniophora (Bellardi)
13	Hippochrenesamplus (Solander, in Brander)	13	Cypraediahyderabadensis Cox
14	Terebellum sp. indet.	14	Volutilitheskohaticus (Eames)
15	Euspiracrommiumoweni (d'Archiac and Haime)	15	Indovolutahumberti(d'Archiac and Haime)
16	Conus (Leptoconus) cf. C. (L.) safaedensis	16	Eovasumhaimei(d'Archiac and Haime)

TABLE 3

Sl. No.	New to science
1	Chlamys n. sp.
2	Anodontia n. sp.
3	Crassitina (Chattonia) n. sp.
4	Trachycardium n. sp.
5	Corbula (Varicorbula) n. sp.
6	Periploma (Aelga) n. sp.
7	Poromya n. sp.
8	Chama(C.) brimontid'Archiac and Haime n. var.
9	Blagraveiasindensis (d'Archiac and Haime) n. var.

TABLE 4

Sl. No.	Indeterminable taxa of Bhatia and Khosla (1978)	Present collection
1	Brachidontes sp. indet.	Barbatia sp.
2	Septifer sp. indet.	Brachidontes sp.

3	O.(L.) sp. indet.	Lithophaga sp. indet.
4	Diplodonta (?) sp. indet.	Pinna sp. indet.
5	Trapezium sp. indet.	O. (Turkostrea) sp. indet.
6	Trivia sp. indet.	Diplodonta sp. indet.
7	Ampullospira (?) sp. indet.	Mactra (Eomacttra) sp.
8	Globularia sp. indet.	Simnia (Calpurna) sp.
9	Galeodea sp. indet.	Ampullospira sp. indet
10	Latirus sp. indet.	Siphonalia sp.
11	Lyria sp. indet.	
12	Conus sp. indet.	
13	Conus (Leptoconus) sp. indet.	

Table 5

Sl. No.	Additional taxa	Sl. No.	Additional taxa
1	Septifer cf. denticulatis Lamarck	15	Nemocardium (N.) turgidum (Solander)
2	Anomia (A.) pakistanica Eames	16	N. (Discors) punjabensis Eames
3	O. (O.) cf. rouaultiMallada	17	N. (D.) tewariiMathur
4	O. pseudoflemingi Eames	18	Spisula (Ruellia) cf. bernayi (Cossmann)
5	Diplodonta (D.)indica Cox	19	Macrosolenbirmanicus (Cotter)
6	Diplodonta (D.) punjabensis Eames	20	Trapezium cf. oblongum (Linné)
7	Venericardia (V.) hanguensis (Cox)	21	Blagraveiacorrugata Cox
8	V. (V.) Soriensis Eames	22	Corbula (Bicorbula) subexaratad'Archiac and Haime var. lituus Cotter
9	V. (V.) babiaensisBigyapati	23	Terebellopsis cf. lanceolatum (Cossmann and Pissarro)
10	V. (V.) pakistanica Eames	24	Euspirocrommiumconicum Cox
11	V.(Venericor) sp. juv. planicosta Lamarck	25	HemifususheroniVredenburg
12	GlyptoactisgilliMathur	26	Volutocorbispakistanica Eames
13	Trachycardium cf. gigasCossmann and Pissarro	27	Harpa (?) soriensis Eames
14	T. cf. coxiMathur		

Table 6Zonewise distribution of Molluscan taxa

Sl. No.	Name of species	Zone 1	Zone 2	Zone 3
1	Venericardia (V.) hanguensis (Cox),	+		
2	V. (V.) soriensis Eames	+		
3	Glyptoactissindensis (Cox)	+		
4	Venericardia (V.) pakistanica Eames	+		
5	V. (Venericor) sp. juv. planicosta Lamarck	+		
6	Terebellumsubbelemnitoidumd'Archiac and Haime	+		
7	Ampullospira sp. indet.	+		
8	V.(Venericardia) mutabilis (d'Archiac and Haime)	+	+	
9	Barbatia sp.		+	
10	Noetiamagnifica Eames		+	

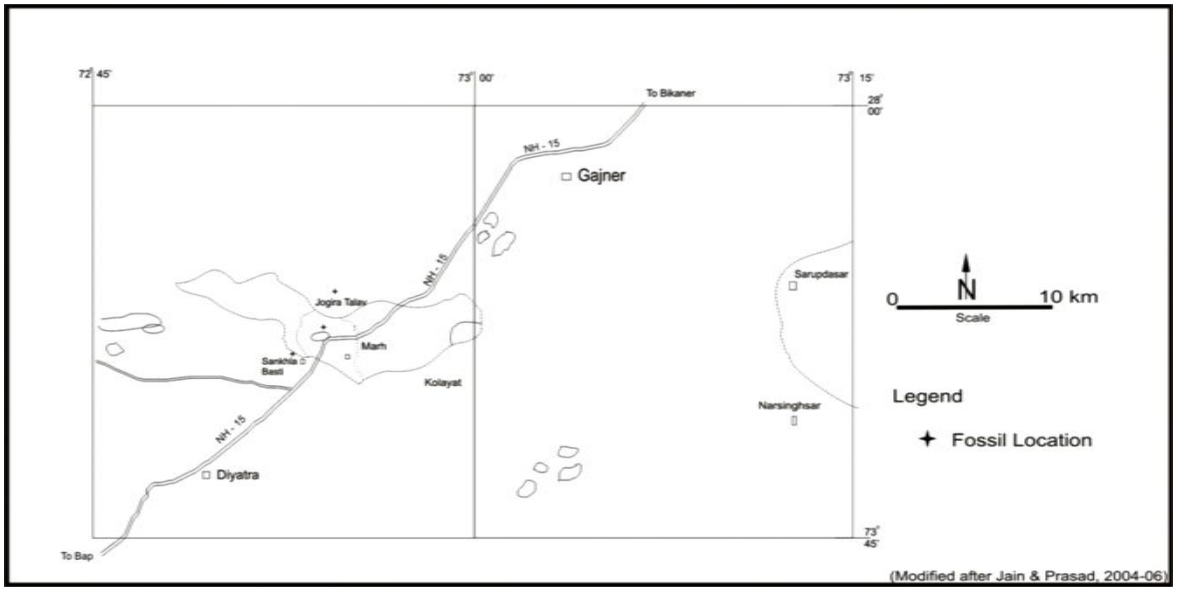
11	Pinna sp. indet.		+	
12	Anodontia n. sp.		+	
13	Diplodonta sp. indet.		+	
14	Chama (C.) brimontid'Archiac and Haime n. var.		+	
15	Glyptoactisdufrenoyi (d'Archiac and Haime)		+	
16	Crassatina (Chattonia) n. sp.		+	
17	Trachycardium n. sp.		+	
18	Spisula (Ruellia) cf. bernayi (Cossmann)		+	
19	Macrosolenbirmanicus (Cotter)		+	
20	Trapezium cf. oblongum (Linné)		+	
21	Blagraveiasindensis (d'Archiac and Haime)		+	
22	Periploma (Aelga) n. sp.		+	
23	Poromya n. sp.		+	
24	Rimellapakistanica Eames		+	
25	Terebellopsis cf. lanceolatum (Cossmann and Pissarro)		+	
26	Simnia (Calpurna) sp		+	
27	EuspirocrommiumconicumCox		+	
28	HemifusesheroniVredenburg		+	
29	Siphonalia sp.		+	
30	Harpa (?) soriensis Eames		+	
31	Volutocorbispakistanica Eames		+	
32	Conus (Leptoconus) safaedensis Eames		+	
33	Blagraveiacorrugata Cox		+	+
34	B. sindensis (d'Archiac and Haime) var. elongata n. var		+	+
35	Corbula (Bicorbula) subexaratad'Archiac and Haime var. lituus Cotter		+	+
36	Euspiracrommiumoweni (d'Archiac and Haime)		+	+
37	Brachidontes sp.			+
38	Septifer cf. denticulatus Lamarck			+
39	Lithophaga sp. indet.			+
40	Chlamys n. sp.			+
41	Anomia (A.) pakistanica Eames			+
42	Ostrea (O.) multicostataDeshayes			+
43	O. (O.) cf. rouaultiMallada			+
44	O. pseudoflemingi Eames			+
45	O. (Turkostrea) sp. indet.			+
46	Diplodonta (D.) punjabensis Eames			+
47	D.(D.) indica Cox			+
48	Chama(C.) brimontid'Archiac and Haime			+
49	Venericardia (V.) babiaensisBigyapati			+
50	GlyptoactisgilliMathur			+
51	Trachycardium cf. gigasCossmann and Pissarro			+
52	T. cf. coxiMathur			+
53	Nemocardium (N.) turgidum (Solander)			+
54	N. (Discors) bunburyi (d'Archiac and Haime)			+
55	N. (D.) punjabensis Eames			+

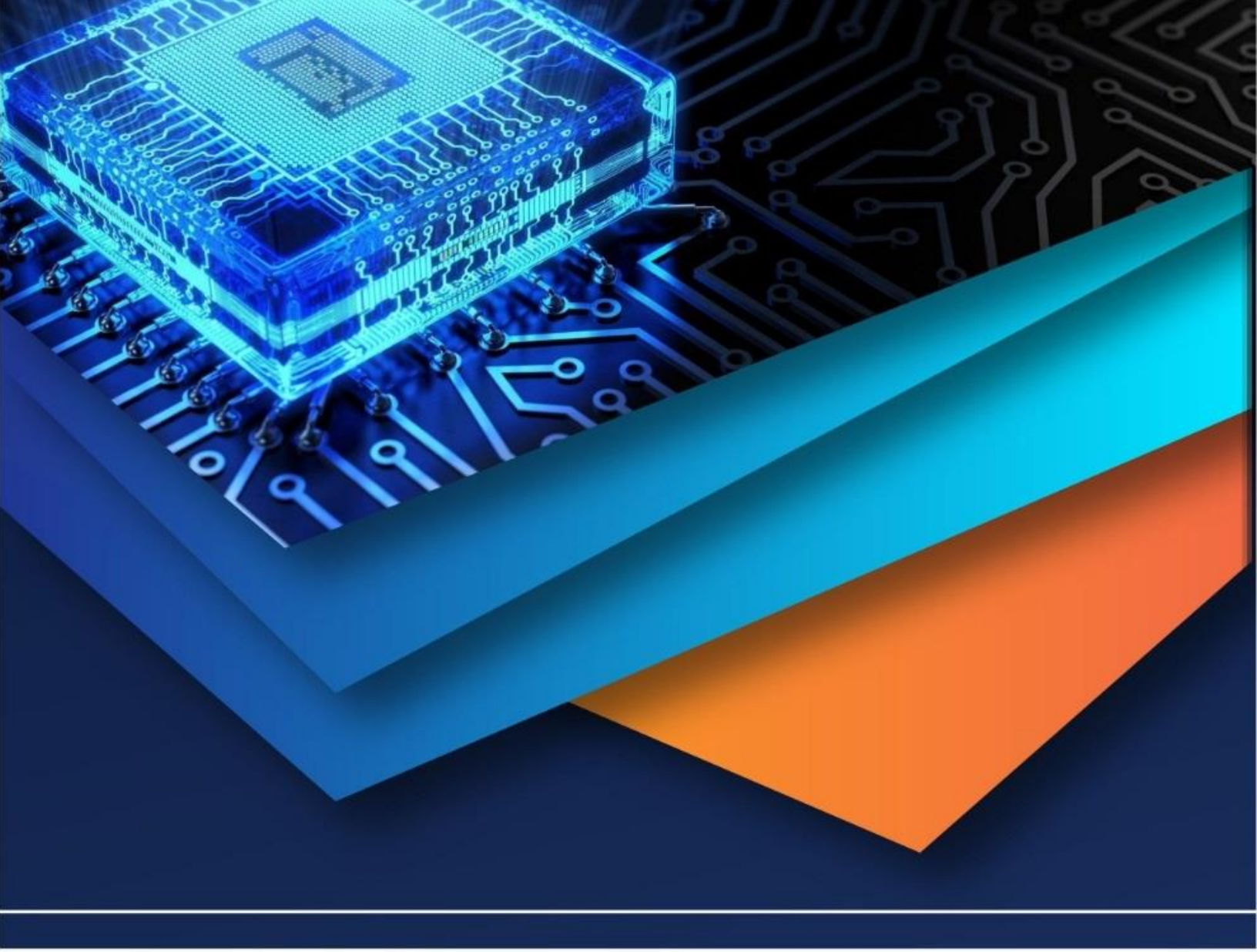
56	N. (D.) tewariiMathur			+
57	Mactra (Eomactra) sp.			+
58	Pitar (Calpitaria) pseudosubcyrenoides Eames			+
59	Dosiniarakhiensis Eames			+
60	Corbula (Vericorbula) reversa n. sp.			+
61	LyriavaricosaVredenburg			+
62	Hippochrenesamplus (Solander, in Brander)			

PLATE 1

Photographs in the plate 1 showing the field work in and around Fuller's Earth Mine, SankhlaBasti.

Fig1. Location map showing fossil locality in and around SankhlaBasti, ShriKolayatJi, Bikaner, Rajasthan.





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