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SOME RARE VENEROID CLAMS FROM MIDDLE JURASSIC ROCKS OF KALA DONGOR PACHCHHAM ISLAND, DISTRICT KACHCHH (GUJARAT)

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Seven veneroid taxa belonging to six bivalve genera *Quenstedtia, Sowerbya, Anisocardia, Isocyprina, Ceratomyopsis* and *Eocallista* are for the first time described from "Island belt" of Kachchh. The fossil specimens belonging to these genera have been collected from Bajocian-Bathonian (Middle Jurassic) rocks of Kala Dongor, which occupies the northern-half of the Pachchham Island (the westernmost island of Kachchh, Gujarat). The genus *Quenstedtia*, the subgenus *Antiquicyprina* and the taxa *Sowerbya woodwardi* & *Isocyprina* (*Antiquicyprina*) are systematically described here for the first time from the Jurassic of India. The broad stratigraphic importance of these taxa are also discussed in brief.

Key Words : Veneroida; Bivalvia; Bajocian-Bathonian; Kala Dongor; Kachchh

INTRODUCTION

THE veneroid clams described here belong to four superfamilies Tellinacea, Arcticacea, Glossacea and Corbiculacea. In all, seven taxa belonging to the genera *Quenstedtia* Morris & Lycett, *Sowerbya* d'Orbigny, *Anisocardia* Munier-Chalmas, *Isocyprina* Roeder, *Ceratomyopsis* Cossmann, and *Eocallista* Douville have been described here. These genera are relatively rare in Kachchh and mostly represented by single example. But for the genus *Quenstedtia*, Kanjilal[1,2] systematically described *Anisocardia* (*Anisocardia*) *minima* (J. Sowerby), ?*Isocyprina* sp., *Sowerbya singhi* Kanjilal, *Ceratomyopsis striata* (d'Orbigny) and *Eocallista* (*Eocallista*) *tancrediformis* (Blake & Hudleston) from Callovian beds of Habo Dome in Mainland of Kachchh. This is the only account so far dealing with the systematic description of the above genera from Kachchh or even from India. In the present paper, the genus *Quenstedtia*, the subgenus *Antiquicyprina* Casey, and the taxa *Sowerbya woodwardi* Lycett & *Isocyprina* (*Isocyprina*) *simplex* Arkell have been for the first time systematically documented from India. Moreover, the recod of *Eocallista* (*Eocallista*) *tancrediformis* and *Sowerbya singhi* from Bajocian and rest of the five taxa from Middle Bathonian horizons of the present area is of great s gnificance, since these horizons were not known to exist in Kachchh until their discovery by Singh *et al.*[3]

The fossil specimens belonging to above genera have been collected from the marine Middle Jurassic rocks of Kala Dongor area, which constitutes the northern-half of Pachchhm Island (location, geology and stratigraphy *vide* Refs. 4-7).

The specimens are lodged at Invertebrate Palaeontology Laboratory, Department of Geology, Banaras Hindu University, Varanasi.

Systematic Palaeontology

Order—VENEROIDA Adams & Adams 1856

Superfamily—TELLINACEA de Blainville 1814

Family—QUENSTEDTIIDAE Cox 1929

Genus—*Quenstedtia* Morris & Lycett 1855

Type Species—*Pullastra oblita* Phillips 1829; SD Stoliczka 1871, Middle Jurassic, England.

Quenstedtia cf *bathonica* (Morris & Lycett) (Fig 2)

Material One bivlave from Middle Bathonian of south of Jatara Talav.

Dimension

Specimen No.	*Length*	*Height* (%)	*Inflation* (%)
PK/125/25	25 mm	64.0	42.0

Description—Shell longitudinally ovate and subelliptical in outline; umbones contiguous, small and almost orthogyrous; antero-dorsal margin long and straight, anterior obtusely rounded, ventral curved elliptically and merges with anterior and posterior in obtusely rounded off angles. A sharp umbonal ridge appears to extend postero-dorsal from umbo. Surface almost eroded. Hinge character not visible.

Remarks—The specimen compares well with *Corbis* (*Corbicella*) *bathonica*[8] in outline of the available portions and visible surface characters. Its umpo is slightly more towards the middle than the specimen from England. However, its postero-dorsal margin is broken therefore, the present specimen is kept as *bathonica* with reservation.

Family—SOWERBYIDAE Cox 1929

Genus—*Sowerbya* d'Orbigny 1850

Type Species—*Sowerbya crassa* d'Orbigny 1850. Upper Jurassic, France.

Sowerbya singhi Kanjilal (Fig 5)

1980 *Sowerbya singhi* Kanjilal, p. 249, Fig 2

Material

One specimen from Bajocian of Nerweri.

Dimensions

Specimen No.	*Length*	*Height* (%)	*Inflation* (%)
PK/144/25	26mm	76.9	55.0

Description—The specimen characterized by subtrigonal outline, moderately strong inflation; acute and prosogyrous umbo. An angular and sharp oblique carina separating vertical posterior area with median sulcus in it; surface with fine concentric threads.

Remarks—It compares well with *Sowerbya singhi* Kanjilal from Callovian of Habo Dome except that it is a little less elongated and more inflated (55%) against 48% of latter). Since the type material was based on a single valve, the inflation measurement may not have been accurate.

Sowerbya woodwardi Lycett[14] (Fig 4)

1863. *Sowerbya woodwardi* Lycett. p.67, Pl.40, figs. 27 *a, b* & *c*.

Material

One bivalve from Middle Bathonian of south of Jatara Talav.

Dimensions

Specimen No.	*Length*	*Height* (%)	*Inflation* (%)
PK/125/17	20.5mm	70.07	51.2

Description—Shall ovately trigonal, subequilateral and moderately inflated; umbo obtusely angular, projecting a little over the hinge, situated just posterior to the middle of shell-length; antero-dorsal margin small, gently and convex; postero-dorsal elongated and straight; ventral margin strongly and symmetrically convex. An oblique ridge undercuts posteriorly, extends from umbo towards postero-ventral corner and delimits a flat and gently sloping posterior area. Surface ornamented with fine concentric closely packed growth lines which continue over the posterior area.

Remarks—The species compares well with the English species *Sowerbya woodwardi* from Great Oolite in outline and surface ornamentation except the posterior area, which is smooth in that species. The umbo in the present specimen is slightly more towards middle. However, these differences do not seem to warrant a new trivial name.

Superfamily—ARCTICACEA Newton 1891

Family—ARCTICIDE Newton 1891

Genus—Anisocardia Munier-Chalmas 1863

Type Species—Anisocardia elegans Munier-Chalmas 1863, Kimmeridgian, France.

Subgenus—Antiquicyprina Casey 1952

Type Species—Cyprina lowcana Morris & Lycett 1854, Middle Jurassic, England.

Anisocardia (*Antiquicyprina*) cf. *globosa* (Bean) (Fig. 3)

Material—Three specimens from Middle Bathonian of south of Jatara Talav.

Dimensions

Specimen No.	*Length*	*Height* (%)	*Inflation* (%)
P/K123/39	23.7+ mm	101.2	62.5
PK/122/93	23.5+ mm	106.3	68,0

Remarks—All the three specimens are broken partially but as judged from the growth lines their probable outline would be subovate. Anterior margin of sp. no. PK/123/39 uniformly and moderately convex merging smoothly with almost straight ventral margin. A faint oblique carina is discernible in dorsal-half region. Umbones salient, prosogyrous and a little over the hinge margin; lunule undefined and shallow; escutcheon absent. Surface appears to be smooth. In all these characters they appear to be very near to *Anisocardia globosa* (Bean) described by Arkell[10] (1934, p. 272, Pl. 36, figs. 3-7). However, posterior radial striations due to broken margin, are not visible in the present specimen. *Anisocardia beumoti* (d'Archiac) described by Fischer[11] (p. 104, Pl. 11, figs. 23-34) from France differs from these specimens in having a different outline and more elongated posterior and anterior margins. Due to inadequate preservation, the specimens, are questionably referred to *globosa*.

Genus—Isocyprina Roeder 1882

Type Species—*Cardium cyreiniformis* Buvignier 1852. Upper Jurassic, England.

Subgenus—Isocyprina s. s.

Isocyprina (*Isocyprina*) *simplex* Arkell (Fig. 1).

1934. *Isocyprina simplex* Arkell, p. 289, Pl. 35, figs. 17–20.

Material—One left valve from Middle Bathonian of northeast of Kuran.

Dimensions

Specimen No.	*Length*	*Height* (%)	*Inflation* (%)
PK/44/13	10.5	80.9	38.9

Remarks—The present specimen, in its small size, well rounded margins, small but distinctly salient umbo, and more or less smooth surface is similar to *Isocyprina simplex* Arkell described from Callovian of England and matches well particularly the figure No. 18.

In addition, two disarticulated valves (Nos. PK/140/5 & 6) from the same horizon are doubtfully kept under the genus as *?Isocyprina* sp. indet. since they are broken along the margins. The specimen no, PK/140/5 is orbicular in outline, while the other (No. PK/140/6) has small, submesial and less salient umbo. Anterior margin has concavity and the others are well rounded and maximum inflation lies below the umbo. If the available characters of both these are combined together they fall under the genus *Isocyprina*. Their specific identification is also not possible.

Superfamily—GLOSSACEA Gray 1847

Family—CERATOMYOPSIDAE Cox 1964

Genus—*Ceratomyopsis* Cossmannn 1915

Type Species—*Ceratomyopsis helveticus* de Loriol 1897; SD Rollier 1913. Upper Jurassic, Switzerland.

Ceratomyopsis striata (d'Orbigny) (Fig. 8)

1925. *Ceromya sarthacensis* (d'Orbigny) : Cottreau,[15] p. 9, Pl. 37, figs. 7–8.

1934. *Ceratomyopsis striata* (d'Orbigny) : Arkell, p. 317, Pl. 13, figs. 8–9.

1965. *Ceratomyopsis basochiana* (Defrance) : Cox, p. 106, Pl. 17, figs. 7–8.

1965. *Ceratomyopsis striata* (d'Orbigny) : Cox, p. 106, Pl. 17, fig. 9.

1979. *Ceratomyopsis striata* (d'Orbigny) : Kanjilal p. 26, Pl. 1, fig. 1.

Material : Three specimens—PK/143/52 & PK/120/105 from Modansar Talav, PK/129/18 from notheastern of Taga; Middle Bathonian

Dimensions

Specimen Nos.	*Length*	*Length* (%)
PK/143/52	30.5 mm	98.5
PK/120/105	29.5 mm	115.2
PK/129/18	27.5 mm	121.8

Remarks—One of the three specimens (No. PK/143/52) is almost identical to *Ceratomyopsis basochiana* (Defrance) described by Cox[16] from Callovian of Tanzania in its strongly coiled umbones, shell-outline and surface ornamentation. The remaining two are identical to *Ceratomyopsis striata* (d'Orbigny) described by earlier workers quoted in synonymy. Actually there is no appreciable difference between the two species so as to warrant their identity.

Superfamily—CORBICULACEA Gray 1847

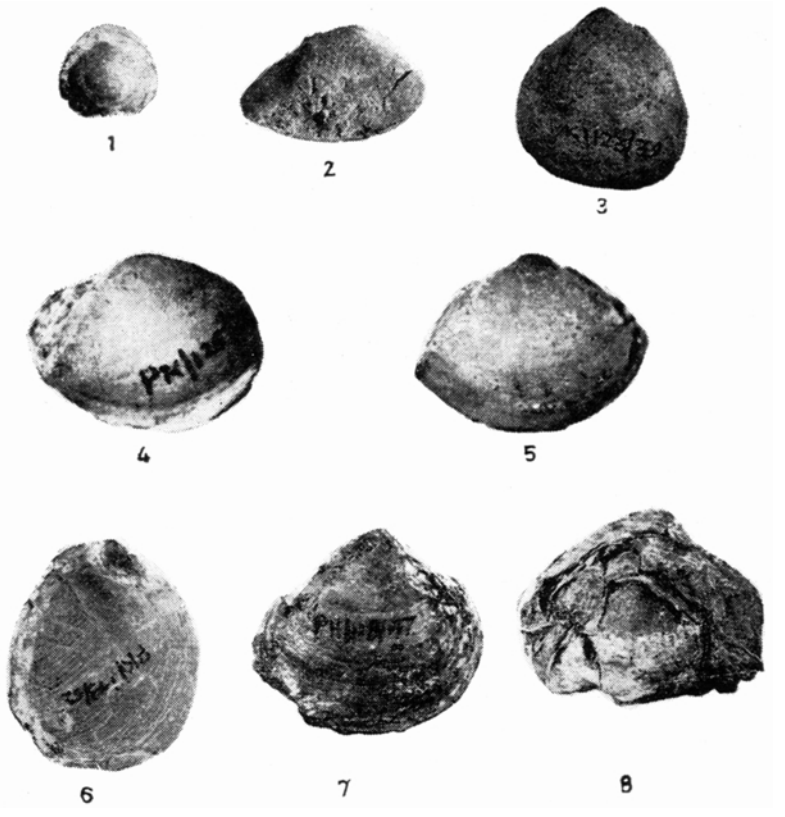

FIG 1 *Isocyprina* (*Isocyprina*) *simplex* Arkell
Sp. No. PK/44/13 from Middle Bathonian of ENE Kuran.
Left Valve exterior (×2).

FIG 2 *Quenstedtia* cf. *bathonica* (Morris & Lycett)
Sp. No. PK/125/25 from Middle Bathonian of S of Jatara Talav.
Right Valve exterior

FIG 3 *Anisocardia* (*Antiquicyprina*) *cf. globosa* (Bean)
Sp. No. PK/123/39 from Middle Bathonian of S of Jatara Talav.
Left Valve exterior.

FIG 4 *Sowerbya woowardi* Lycett
Sp. No. PK/125/17 from Middle Bathonian of S of Jatara Talav.
Right Valve exterior (×2)

FIG 5 *Sowerbya singhi* Kanjilal
Sp. No. PK/144/25 from Bajocian of Nerweri.
Rigt Valve exterior (×2).

FIG 6, 7 *Eocallista* (*Eocallista*) *tancrediformis* Blake & Hudleston
Sp. No. PK/118/47 (fig. 6) from Bajocian of Nerweri.
Right Valve exterior.
Sp. No. PK/118/1 (fig. 7) from same horizon & locality.
Left Valve interior.

FIG 8 *Ceratomyopsis striata* (d'Orbigny)
Sp. No. PK/143/52 from Middle Bathonian of Modansar Talav.
Right Valve exterior.

Family—CORBICULIDAE Gray 1847

Genus—Eocallista Douville 1921

Type Species—Venus brongniarti Romer 1836; SD Frizzel 1936. Portlandian, France.

Subgenus—Eocallista s. s.

Eocallista (*Eocallista*) *tancrediformis* (Blake & Hudleston) (Figs. 6,7)

1927. "*Cyprina*" cf *corallina* (d'Orbigny) : Arkell, p. 166, Pl. 1, fig. 5.

1934. *Eocallista tancrediformis* (Blake & Hudleston) : Arkell, p. 302, Pl. 41, figs. 4-6; 8-9 and text fig. 71.

1979. *Eocallista* (*Eocallista*) *tancrediformis* (Black & Hudleston) : Kanjilal, p. 27, Pl. 1, fig. 6.

Material—Two specimens from Bajocian of Nerweri.

DIMENSIONS

PK/118/47	50.5 mm	88.1	60.3 (both valve)
PK/118/1	50.5 mm	80.1	32.0 (left valve)

Remarks—The specimens match well in their general characters with those described by Arkell and Kanjilal. One of the present specimens (No. PK/118/1) exhibits dentition which is similar to that of the holotype given by Casey[12] (Fig. 10c) but differs from that given by Arkell[9] of the same specimen.

Discussions

The bivalves in general are long ranging, nevertheless they are useful for local zonation and palaeobiogeographical purposes. Of the seven taxa described here, *Quenstedtia* cf. *bathonica*, *Sowerbya woodwardi*, *Anisocardia* (*Antiquicyprina* cf. *globosa* and *Ceratomyopsis striata* have been obtained from the same horizon which yielded the two ammonite genera *Gracilisphinctes* Buckman and *Micromphalites* Buckman. These two ammonite genera together indicate a Middle Bathonian age. *Eocallista* (*Eocallista*) *tancrediformis* has been collected alongwith the ammonite *Leptosphinctes* sp. which belongs to Upper Bajocian.[6] While *Sowerbya singhi* occurs below the Upper Bajocian horizon and *Isocyprina* (*Isocyprina*) *simplex* occupies a position in between the Upper Bajocian and Middle Bathonian horizons.

On the basis of the occurrences, where the two definite horizons with precise ages have been established, a broad conclusion can be arrived at for the positions of these taxa in the stratigraphical column of the Kachchh Jurassics.

Quenstedtia bathonica still stands as a representative of Bathonian horizon.

The lower limit of *Sowerbya singhi* goes down to Bajocian.

The range of *Isocyprina (Isocyprina) simplex* and *Ceratomyopsis striata* lowered down to Middle Bathonion.

The stratigraphic range of the genus *Eocallista* which was so far known to occur in different parts of world in Upper Jurassic only,[13] is further extended down to Bajocian (Middle Jurassic).

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