\[ \geq (\log 10)^{-1} \exp(-32^{g} \log 3 \log 11 \log(d + 4)) \]
\[ - (\log 10)^{-1} \frac{d}{n} \]  
(16)

\[ \geq (\log 10)^{-1} \exp(-32^{g} \log 3 \log 11 \log(d + 4)) \]
\[ - (\log 10)^{-1} \frac{d + 4}{n} \]  
(17)

So \( \max(|I_n + d - m_2|, |I_n - m_1|) \) is at least half the quantity in equation (17). We can assume that \( n \) is so large that the expression (17) is

\[ \geq \frac{1}{2} (\log 10)^{-1} \exp(-32^{g} \log 3 \log 11 \log(d + 4)). \]  
(18)

This requires

\[ \frac{1}{2} \exp(-32^{g} \log 3 \log 11 \log(d + 4)) \geq \frac{d + 4}{n} \]  
(19)

i.e.

\[ n \geq 2 (d + 4) \frac{(d + 4)^{32^{g}} \log 3 \log 11}{(d + 4)^{32^{g}} \log 3 \log 11} . \]  
(20)

Hence we have the following

Lemma. Let

\[ n \geq 2(d + 4)^{1 + 32^{g}} \log 3 \log 11. \]  
(20)

Then

\[ \max(|I_n + d - m_2|, |I_n - m_1|) \geq \frac{1}{4} (\log 10)^{-1} (d + 4)^{-32^{g}} \log 3 \log 11 \]  
(21)

where \( m_1 \) and \( m_2 \) are integers nearest to \( I_n \) and \( I_n + d \) respectively and therefore equation (21) holds for all arbitrary integer pairs \( m_1, m_2 \).

Remark. If \( m_1 = m_2 \) then \( m_3 = 0 \) and equation (14) gives the lemma in this case also.

Simplifying the constants we state

Theorem 4. Let \( d \geq 1 \) be any integer and \( n \) any integer satisfying

\[ n \geq (d + 4)^{32^{g}}. \]  
(22)

Then for any pair \( (m_1, m_2) \) of integers \( m_1, m_2 \) we have

\[ \max(|I_n - m_1|, |I_n + d - m_2|) > (d + 4)^{-32^{g}} \]  
(23)

Remark. We have \( (32)^{32^{g}} = 2^{65} \leq (10)^{14} \). Thus we can round off the RHS of equation (22) to \( (d + 4)^{14} \) and the RHS of equation (23) to \( (d + 4)^{-14} \) where \( C = (10)^{14} \).

**A Maastrichtian ostracode assemblage (Lameta Formation) from Jabalpur Cantonment, Madhya Pradesh, India**

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We report the occurrence of a rich assemblage of ostracodes from the classic localities of Lameta Formation (Maastrichtian) at Chui Hill and at Bara Simla Hills, Jabalpur. The assemblage, comprising several thousand specimens, mostly represented by internal moulds, was recovered by using bulk washing and screening techniques.

This work was initiated during IGCP 245 project (1990) on Nonmarine Cretaceous Correlation. The occurrence of a rich assemblage of ostracodes from the classic localities of Lameta Formation (Maastrichtian) at Chui Hill and at Bara Simla Hills, Jabalpur, Madhya Pradesh (Figure 1), is reported here. Although ostracodes had been reported from these sections before, they had never been described in detail. The present assemblage consists of nine taxa of ostracodes (Families: Cyprididae, Candonidae, order Podocopida). A special feature of the assemblage is the occurrence of unusually large-sized species (up to 4.8 mm in length) comparable to *Mongolocypris gigantea* from Late Cretaceous Yunnan, China. The present ostracode taxa show distinct similarities with Maastrichtian ostracodes described from Nemegt Basin of Mongolia, China and from the Deccan intertrappean beds of Central India. A check list of the ostracode assemblage, and comparison of Jabalpur intertrappean biotas with other localities and with Mongolia and China is given in Table 1. Brief taxonomic features and comments on various recorded species are also given.

**Taxonomic features and other comments**

*Mongolocypris* cf. *M. gigantea* (Figures 2a–d). This large-sized species (length varies from 2 mm to 4.8 mm) is represented by both dimorphic generations and is comparable to *Mongolocypris gigantea* reported from.
Figure 1. Geological map of the Jabalpur Cantonment Area and lithostratigraphic sections at the collecting locality (modified after Matley, 1921).

Table 1. Ostracode assemblage collected from Jabalpur

<table>
<thead>
<tr>
<th>Indian occurrences</th>
<th>Other occurrences</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Mongolocypris</em> cf. <em>M. gigantic</em> (Ye)</td>
<td>China³</td>
</tr>
<tr>
<td>VPL/AK 1001, L = 1 12 mm, H = 2 85 mm</td>
<td></td>
</tr>
<tr>
<td>VPL/AK 1002, L = 2 85 mm, H = 1 78 mm</td>
<td></td>
</tr>
<tr>
<td><em>Paracandonana</em> <em>jabalpurensis</em></td>
<td></td>
</tr>
<tr>
<td>VPL/AK 1003, L = 0 9 mm, H = 0 58 mm</td>
<td></td>
</tr>
<tr>
<td><em>Cypridea</em> (<em>Pseudocyprisida</em>) sp</td>
<td></td>
</tr>
<tr>
<td>VPL/AK 1004, L = 0 60 mm, H = 0 38 mm</td>
<td></td>
</tr>
<tr>
<td>VPL/AK 1005, L = 0 56 mm, H = 0 30 mm</td>
<td></td>
</tr>
<tr>
<td><em>Cycloocypris</em> <em>transitoria</em> (<em>Szczczurek</em>)</td>
<td></td>
</tr>
<tr>
<td>VPL/AK 1006, L = 0 60 mm, H = 0 44 mm</td>
<td></td>
</tr>
<tr>
<td>? <em>Cypridopsis</em> <em>bogutsavius</em> (<em>Stankevitch</em>)</td>
<td>Takh¹</td>
</tr>
<tr>
<td>VPL/AK/1007, L = 0 88 mm, H = 0 64 mm</td>
<td>Mongolia¹⁷</td>
</tr>
<tr>
<td><em>Eucypris</em> sp</td>
<td></td>
</tr>
<tr>
<td>VPL/AK 1008, L = 1 26 mm, H = 0 93 mm</td>
<td></td>
</tr>
<tr>
<td><em>Alliancecypris</em> sp</td>
<td></td>
</tr>
<tr>
<td>VPL/AK/1009, L = 1 73 mm, H = 1 11 mm</td>
<td></td>
</tr>
<tr>
<td><em>Mongolacrella</em> <em>palmosa</em> (<em>Mandelstam</em>)</td>
<td>Astafbad, Takh¹ and Mamoni⁶</td>
</tr>
<tr>
<td>VPL/AK 1010, L = 1 12 mm, H = 0 44 mm</td>
<td></td>
</tr>
<tr>
<td><em>Candonina</em> <em>alumulacens</em> (<em>Szczczurek</em> and Blaszyk)</td>
<td></td>
</tr>
<tr>
<td>VPL/AK 1011, L = 0 56 mm, H = 0 35 mm</td>
<td>Takh¹</td>
</tr>
<tr>
<td></td>
<td>Mongolia⁴</td>
</tr>
</tbody>
</table>
Maastrichtian of Yunnan, China. The species also appears to be close to *Mongolocypris distributa* described from Nemegt Basin, but because of the several mould stages present in our material we are inclined to compare the present species with *Mongolocypris gigantea*. The species shows prominent left over right overlap along the entire margin and there is a prominent antero-ventral beak in the better preserved specimen of the female carapace (Figure 2d).

*Altanicryps* sp. (Figures 2n, o, p). This species is closely related to forms described previously (7) and illustrated from intertrappean beds. The most important character present in this species has a lip-like extension at the anterior end. However, a few specimens show faint pitting on the surface as against smooth shells described from Nemegt Formation. It is likely that it is a new species; better preserved specimens are required to ascertain it.

*Mongolinanella palmosa* (Figures 2q, r). This form is abundantly represented in the present collection and is comparable with *Mongolinanella palmosa* described from Deccan intertrappean beds (5, 6). This species shows considerable variation in length as well as in length-height ratio as observed earlier (8). Our specimens come within the range of variation of the species.

*Eucypris* sp. (Figure 2m). This indeterminate species of the genus *Eucypris* is rare in our material and more specimens are required for precise placement. However, it shows superficial similarity with *Eucypris bayshintsavica* described from Bayshingtoav region in south-eastern Mongolia of Late Cretaceous age.

*Cypridea* (Pseudocypridina) sp. (Figures 2g, h, i). This characteristic but indeterminate species of subgenus *Pseudocypridina* is extremely rare in our material. Of the two specimens illustrated, one (Figure 2g) was lost subsequent to being photographed. The surface of the specimen illustrated (Figure 2h, i) shows faintly developed tubercles and straight ventral margin, a feature also seen in *Cypridea* (Pseudocypridina) *piedmonti* described from Lower Cretaceous of South Dakota and Wyoming (9).

? *Cypridopsis bugintsavicus* (Figures 2k, l). We have typical specimens of the species which has been unquestionably assigned (4) to *Cypridopsis bugintsavicus* from Nemegt Formation of Mongolia. The specimens are highly inflated at the postero-dorsal end.

*Paracandonia jabalpurensis* (n. sp.) (Figures 2e, f). This new species (named after Jabalpur town) of genus *Paracandonia* (Family, Canidinidae, Holotype VPL/AK/1003) has a characteristic inflated carapace, elliptical outline in lateral view. The left valve overlaps the right along the entire margin. The dorsal margin is arched and ventral margin is straight. Maximum height is in the middle. Both the extremities are broadly rounded. The surface shows a strongly-pitted ornamentation. The species does not show resemblance to any other known Late Cretaceous species.

*Cancona altanaulaensis* (Figure 2s). We have typical specimens of this species in our material which was first described from Upper Cretaceous of Nemegt Formation (10). The species is also known from intertrappean beds. Specimens had been earlier illustrated as *Eucypris*, now those are considered synonymous to this species.

*Cypridopsis transitoria* (Figure 2j). Dozens of specimens have been collected and they show similar characters to those from the Late Cretaceous of Mongolia (11, 12).

Affinities of ostracode assemblage. The present ostracode assemblage is found in association with charophytes (*Platychara, Microchara, Pecchikara*); pulmonate gastropods (*Physa, Lymnaea*); microvertebrates and dinosaur eggshell fragments in the Bara Simla Hill locality. The affinities of the Late Cretaceous freshwater ostracodes follow the same general trend of Laurasian affinities documented on the basis of the other biotas (13), except for distinct dinosaurian assemblages in the two regions. It is clear that ostracodes form a dominant component of the fluvial-lacustrine faunas and in general are consistent with a Maastrichtian age. Of the above described taxa none was hitherto known from Jabalpur, but *Mongolinanella palmosa*, ? *Cypridopsis bugintsavicus* have been recorded from Asifabad in Andhra Pradesh, Tekli in Maharashtra and Mamoni in Rajasthan (14, 15).

Repository. The material is deposited in Vertebrate Palaeontology Laboratory, Department of Geology, Panjab University, Chandigarh.
RESEARCH COMMUNICATIONS

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Giant marine reptilian skulls from the Jurassic of Kachchh, Gujarat

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We report here the occurrence of two large reptilian skulls from the Callovian marls of the Chari Formation underlying the Dhosa Oolites in Kachchh district of Gujarat. They are identified as the marine crocodile, Steneosaurus. This occurrence has important bearing on the palaeogeography during the Jurassic.

Jurassic rocks of Kachchh (Figure 1) are known since the end of nineteenth century to be richly fossiliferous1. Subsequent work has brought to light salient features of their stratigraphy and fossil content2–7.

Here we report the occurrence of two large crocodilian skulls (Figures 2 and 3), which were located around Bhuj. To the south of Bhuj the Chari Formation (=Jumara Formation) is exposed in an anticline. The northern limb of the anticline has a subdued expression in the form of a low ridge. The top of this ridge is formed by iron oxide rich Dhosa Oolite6. The Dhosa Oolite is the best datum in Kachchh stratigraphy6.

The present find occurs stratigraphically 150 m below the top of Dhosa Oolite on the northern slope of a dried pond to the west of Bhuj–Mandavi road (69°36’E; 23°36’10”N) about 10 km from Bhuj. The bed containing these skulls is a dirty grey calcareous clay with abundant bivalves. Ammonites and belemnites are also found in it. These calcareous clays have yielded a fairly good nannoflora with Stephanolithon bigoti bigoti which helps in fixing its age as Callovian–Oxfordian. The skulls are enveloped in a ferruginous clay.

Figure 1. Geological map of the area showing the site where two skulls were found

Figure 2. Outline sketches of the two skulls not to scale (approximately X1/13), showing the measured dimensions. A. Total length of skull; B. Preorbital length; C. Width of skull; D. Postorbital length; E. Width at anterior rim of orbits; F. Width of snout; O. Orbits; T. Temporal fossae. Dimensions of S1: A. 1602 mm; B. 992 mm, C. 702 mm, D. 602 mm, E. 290 mm, F. 114 mm.