

## Discovery of postdepositional, metadepositional and syndepositional convolute laminations in a recent point bar deposit of river Yamuna

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In the Yamuna River point bar deposits, three types of convolute laminations have been observed. Different processes and timing of their deposition reconstruct them into post-, meta-, and syndepositional convolute laminations.

DEPENDING on the inferred relative timing of deposition and deformation<sup>1</sup>, three types of convolute laminations (Fc) were distinguished from a recent point bar observed at three different sections of river Yamuna, Mathura district (Figure 1). The convolute laminations are developed mainly in fine sand, silt and clay, in the

upper part of the point bar. They are overlain by massive mud (Fm) or climbing ripples (Sr) or parallel laminations (Fl), and underlain by massive mud, climbing ripples or horizontal bedding (Sh). The lower part of the point bar consists of large scale trough cross-bedding (St) and the upper part of massive mud. The sections show vertical decrease in the scale of sedimentary structures and grain size.

In postdepositional convolute lamination the fold amplitude decreases upwards and downwards from the centre (Figure 2) and the folds lack internal discordance. These features are indicative of postdepositional development of convolute laminations.

The metadepositional convolute lamination has an undeformed erosional top (Figure 3). Such type of lamination may have resulted either during or some time after deposition of the deformed bed. Pore fluid expulsion due to overlying loading has resulted in this type of convolute lamination<sup>2,3</sup>.

In syndepositional convolute lamination the anticlines rising spasmodically through the accumulating sediment were repeatedly beheaded, while the intervening synclines became infilled (Figure 4). Episodic truncations are restricted to the upper part of the folded zone, pointing to later deformation. In this type of

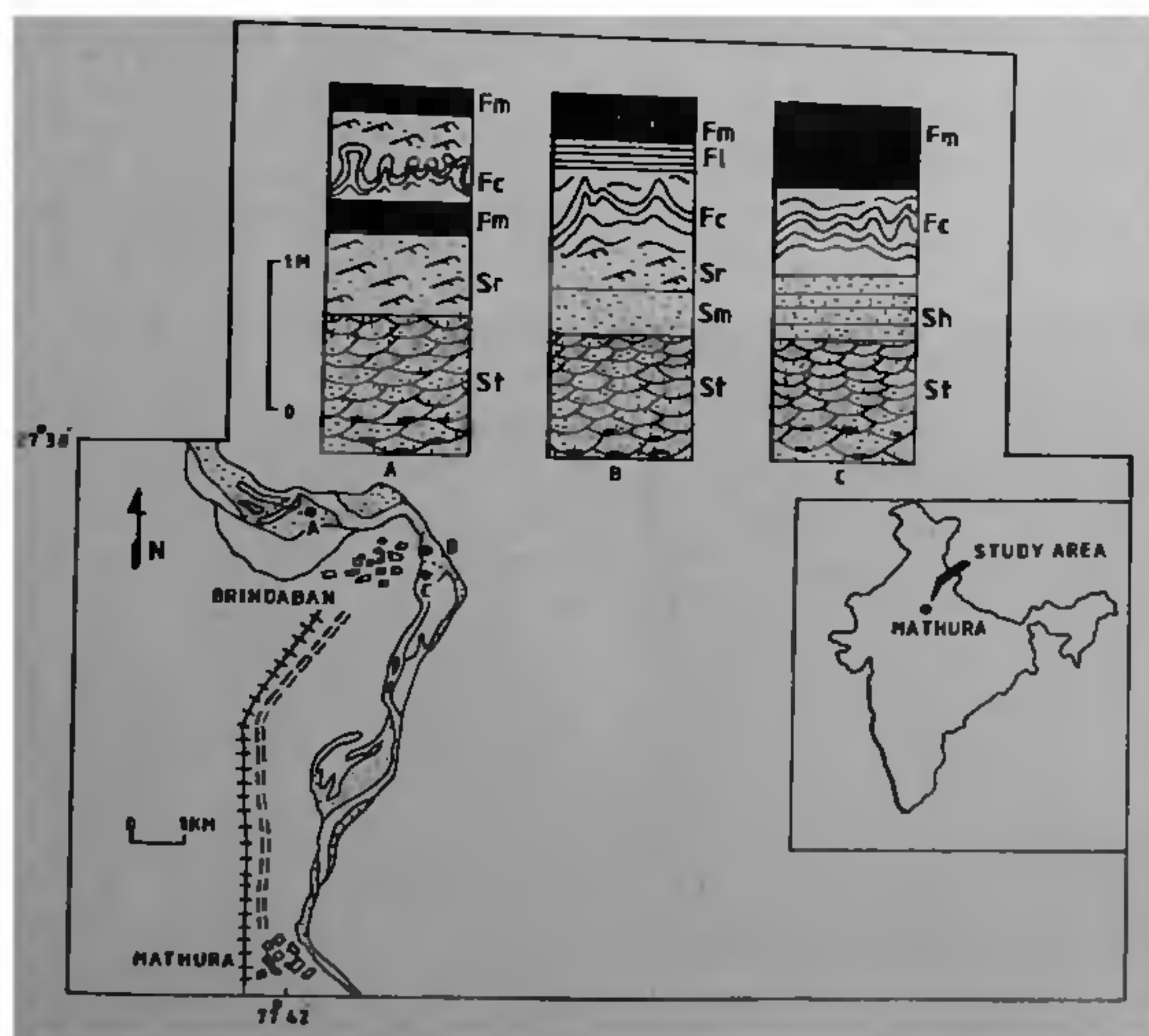
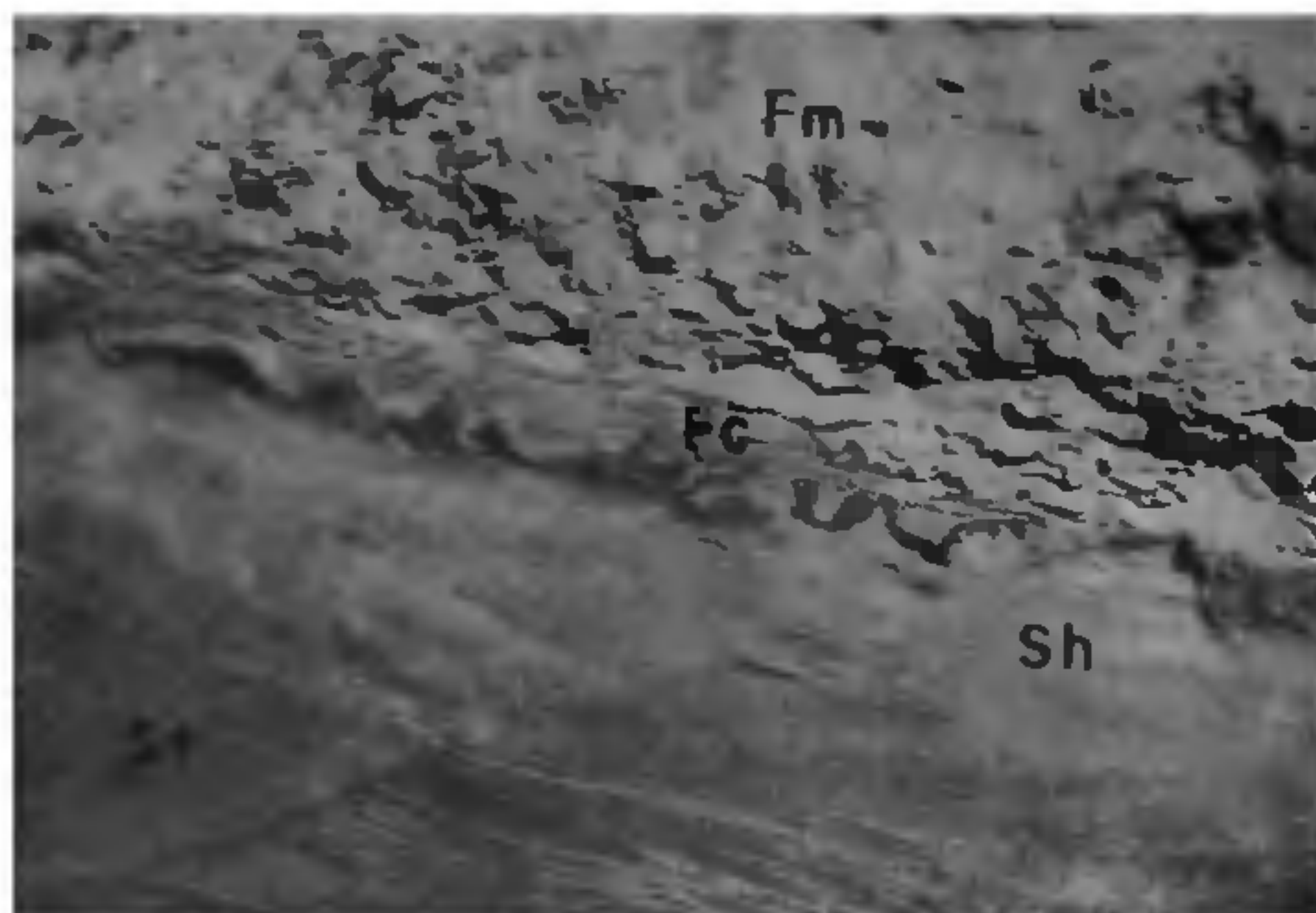


Figure 1. Map of the study area showing three sections from a point bar at A, B and C



**Figure 2.** Section showing postdepositional convolute laminations. The fold amplitude decreases upward and downward from the centre.



**Figure 3.** Metadepositional convolute laminations showing undeformed erosional top overlain by climbing ripples (Sr).



**Figure 4.** Syndepositional convolute laminations overlain by parallel laminations (Fl) showing pointed and sharp anticlines.

lamination, the liquidization occurred due to push-pull pressure fluctuations related to the passes of large turbulence structures in depositing current.

Detailed study of Yamuna River point bar deposits which would be directly applicable in the study of ancient point bar deposits under similar tectonic and climatic setting is underway.

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## A liliaceous inflorescence from the Deccan Intertrappean beds of India

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Three pieces of spicate inflorescence embedded in a chert from the Deccan Intertrappean bed at Umaria (23°06'N and 80°39'E), about 3.5 km SE of Ghughua near Shahpura, District Mandla, Madhya Pradesh, India, yielded oval, elliptical, trichotomosulcate pollen grains with retipilate exine. The pollen grains show affinity with extant species of *Lilium*, *Hemerocallis* and *Asphodelus* of Liliaceae and fossil pollen grains of *Matanomadhiasulcites*.

MONOCOTYLEDONOUS fossils of stem, root, leaf, inflorescence axis, fruit, seed and pollen grains are common from the Cretaceous period onward<sup>1</sup>. But the occurrences of inflorescence with flowers are very rare. *Monocotylostrobus bracteatus*<sup>2</sup> is the only inflorescence so far described from the Tertiary beds of India showing resemblance to Palmae and Liliaceae. *Protyucca shadishii* is a liliaceous wood with secondary growth similar to extant *Yucca*<sup>3</sup>, whereas pollen grains of liliaceous affinity are placed under *Liliacidites*<sup>4</sup>.

A piece of chert 15 × 18 cm in size encompassing three pieces of spikelets is studied; one is 8 cm long and 0.8 cm wide, the other 4 cm long and 0.8 cm wide while the third one is 3 cm long and 0.9 cm wide. Each flower cast measures 0.8 × 0.8 cm. The flowers appear to be spirally arranged on the central axis of the spikelet (Figure 1a, b).

The chert pieces with embodied spikelets were carefully separated in order to avoid extraneous matrix and