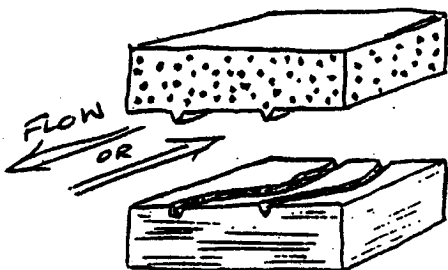


Flute marks are heel-shaped, bulbous depressions found in the bedding surface of firm muds. They usually occur in groups and are oriented with the deepest part upstream. They are most often preserved as sole marks, that is, on the bottom of the overlying bed which acts as a casting medium. The orientation of flute marks gives a reliable indication of flow direction.



Groove marks are linear ridges found as sole marks on the bottoms of sandstones. Preserved as ridges, they are casts of long grooves cut into the underlying mud layer by some object that was dragged across the mud surface by flowing water. These are useful paleocurrent indicators.

Impact marks are another kind of erosional features, but have a variety of shapes depending on the object used to make them, and whether that object bounced, rolled, skipped or wobbled across the mud surface (Figure 12). Another general term for these marks is tool marks.

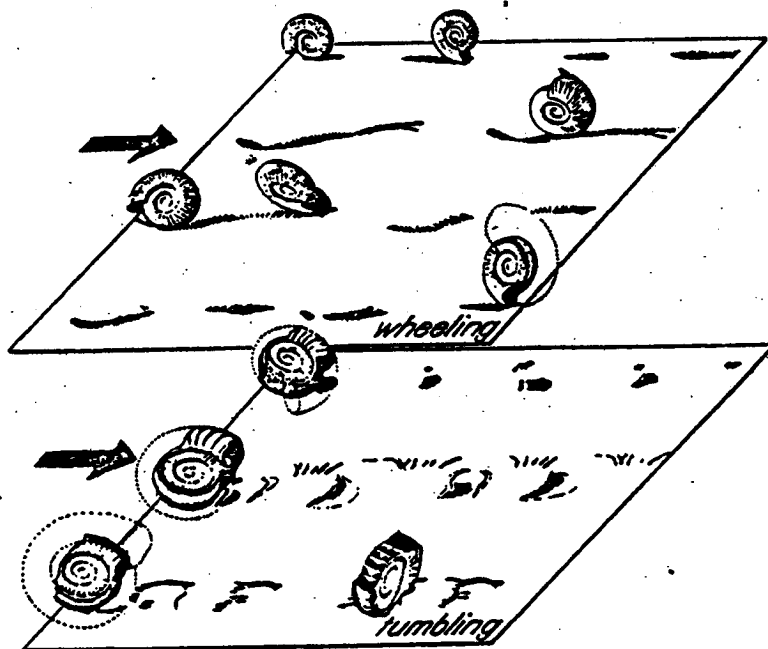


Figure 12. Impact marks from ammonite shells. Notice how the shape of the impact depression changes with the manner in which the shell travels across the bed surface (wheeling versus axial tumbling) and as the shell is abraded and broken into more irregular shapes (bottom on figure). From Seilacher (1973).