REPRINT FROM *DINOSAUR TRACKS*
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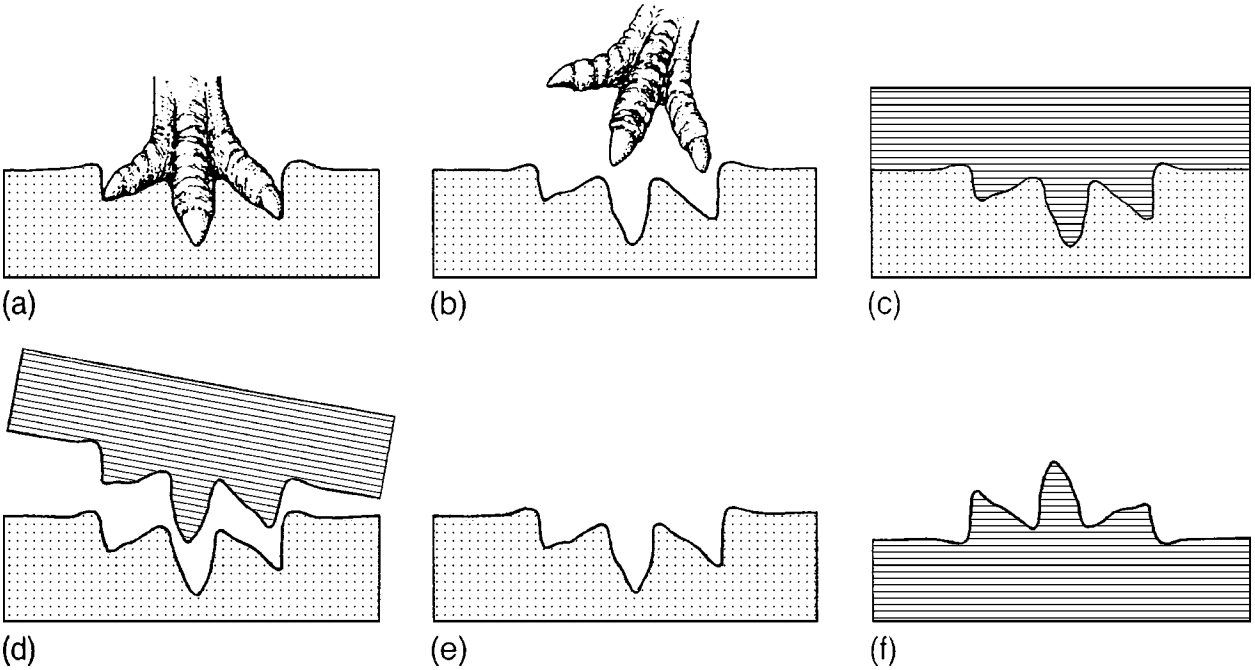
THE PRESERVATION OF DINOSAUR TRACKS: SIMPLIFIED MODEL



Simplified model to explain the formation and preservation of dinosaur tracks: (a) a dinosaur's foot impressed in the substrate; (b) the foot is withdrawn, leaving its imprint; (c) the footprint is filled and buried by accumulating sediment; (d) after lithification, the sediments are split open to reveal the original footprint and its filling; (e) the original imprint or natural mould; (f) the footprint filling or natural cast, shown inverted.

The sequence of events leading to the preservation of dinosaur tracks is explained diagrammatically in this illustration. First of all a dinosaur traversed an area of soft sediment, leaving its footprints as it did so (diagrams a and b). It might, for example, have walked across the mudflats of an ancient estuary, leaving its tracks in the wet sediment exposed by the falling tide. The next rising tide might deposit more sand and mud over the newly formed footprints (diagram c), and once they were buried in this way they would be largely protected from the destructive effects of sun, wind and water. Continued accumulation of sediments would result in deeper burial of the footprints, and the consequent changes in pressure, temperature and water chemistry would bring about the complex process of lithification, or the transformation of soft wet sediment into harder and drier rock. The layers of sediment would be compressed and reduced in thickness; the water would be squeezed out from between the grains of sand and mud, which would be packed more tightly and, in many instances, cemented by mineral deposits. Ultimately, the lithified sediments would be raised by earth-movements and exposed by erosion. The layers of rock containing the footprints might then be exposed in hillsides, river beds, cliffs, quarries or roadside cuttings. Finally, those layers might be split open, by natural weathering or by an inquisitive fossil-hunter, to reveal the ancient footprints (diagram d).

Notice that each footprint will be represented by two fossils - an imprint, or mould, in the upper surface of the substrate (diagram e), and its infilling, or cast (diagram f). The terms ‘cast’ and ‘mould’ are used throughout this book because they are simple, easy to remember and widely used. Equivalent terms such as concave epirelief (= mould) and convex hyporelief (= cast) abound in the literature dealing with invertebrate traces but are decidedly cumbersome and are not so commonly applied to the tracks of vertebrates. The terms ‘positive footprint’ and ‘negative footprint’ are ambiguous and best avoided. Most people have no trouble in identifying moulds as foot prints, but they may experience genuine difficulty in recognizing that casts are also fossil footprints. This conceptual difficulty arises because casts are usually studied by turning them upside down (diagram f). Consequently, the footprints appear in the form of raised reliefs, rather than cavities, and the left and right directions are reversed. The easiest way to overcome this conceptual problem is to remember that casts are the *fillings* of the original footprints.