

## UNDERPRINTS OF VERTEBRATE AND INVERTEBRATE TRACKWAYS IN THE COCONINO SANDSTONE (PERMIAN) IN NORTHERN ARIZONA

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The Coconino Sandstone is a Permian deposit of cross-bedded sandstone which is distributed over much of northern Arizona. Vertebrate fossil trackways are abundant in the Coconino Sandstone, and invertebrate trackways are present but less abundant. No other fossils have been found in this formation.

A number of papers dealing with the systematics and paleoecology of these tracks have been published, but underprints have not previously been reported from the Coconino Sandstone. A slab from north of Seligman, Arizona bears intersecting trackways of an invertebrate and two tetrapods. A portion of the slab contains the surface on which the animals were walking. On the remainder of the slab a thin layer bearing that upper surface has broken away to reveal another surface with well preserved underprints of both invertebrates and tetrapods (systematic and behavioral aspects of these trackways will be described in a separate paper).

The underprints are very distinct, deep depressions with uniformly rounded edges, while the original tracks are shallower and much less distinct because some sand slumped into them. It appears that as the animal lifted its foot out of a track the sand partly filled in the depression, but in underlying laminae the contour of the underprint was protected by the sand pushed down from above by the animal's foot.

Comparison of this slab with other fossil trackways from the Coconino Sandstone suggests that a number of these trackways may be underprints. Evidence favoring that interpretation are the clarity and depth of the footprints and their uniformly rounded edges. This interpretation also suggests an explanation for some footprints that are so deep that the sand on the front edge of the track overhangs the footprint impression. The Coconino Sandstone is composed of fine sand and does not show evidence of clays or other material that could provide the cohesion to retain such steep, even overhanging, surfaces. If these footprints are underprints, the deep, undercut impressions may have been preserved by the continuity of the overlying laminae while the surface depressions were partly filled by slumping sand.

It might be expected that underprints would be less distinct and detailed than the actual print. That may be true for tracks made in a substrate with an ideal consistency for preserving the tracks, but in pure, fine sand slumping of sand at the surface can apparently obliterate footprint details that are preserved in the underprints.