The Ichnotaxonomy of the Cambrian (Series 3) Spence Shale of Utah: Preliminary Results HAMMERSBURG, Sean R.^{1,2}, HASIOTIS, Stephen T.², ROBISON, Richard A.³, GUNTHER, Lloyd^{4†}, GUNTHER, Val⁴, and JAMISON, Paul⁵

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Introduction

- The Spence Shale Member (SSM) of the Langston Formation is a well-known Konservat-Lagerstätte producing numerous wellpreserved trilobites and soft-bodied tissues.
- Cambrian deposits of the Great Basin form a north-south trending carbonate belt with inner and outer detrital belts flanking the carbonate belt (Palmer, 1960; Robsion, 1960). The "Middle" Cambrian deposits formed on the middle carbonate belt or outer detrital belt (Liddell et al., 1997).
- An ichnotaxonomic study has never been conducted on the SSM, though some studies have reported ichnofossils (Robison, 1969) or used ichnofossils from the SSM for paleoenvironmental analysis (Garson et al., 2012).

Significance and Uses of Ichnofossils Marine Environments

Ichnofossils are important tools for reconstructing ancient environments and provide proxies for physicochemical factors controlling deposition and distribution of organisms, such as: depositional energy, sedimentation rate, bottom-water oxygenation, and nutrient supply.



Preliminary Results and Interpretations

- Sixteen ichnogenera were identified from the University of Kansas Museum of Invertebrate Paleontology ichnology collections and recent donations by several coauthors: Arenicolites, Berguaeria, Cochlichnus, Cruziana, Diplichnites, Gordia, Gyrophyllites, Monocraterion, Monomorphichnus, Neonereites, Palaeophycus, Planolites, Protovirgularia, Rusophycus, Sagittichnus, and Treptichnus.
- Currently, only one ichnocoenosis has been established: the *Cruziana* ichnocoenosis. Each sample slab represents a single ichnocoenosis. Ichnofacies have yet to be established.



In Memoriam

eft—Larry D. Martin, PhD (1943-2013): rofessor of ecology and evolutionary biology; rator of vertebrate paleontology at the Natural listory Museum University of Kansas.

ight—Lloyd F. Gunther (1917-2013): First repipient of the Strimple Award. Paleontologica tions to science from a non-academic donating numerous fossil specimens to museums and universities including this project



"Middle" Cambrian Paleogeography







Ap of the State of Utah. Star denotes ollection localities. Localities include Antimony Canvon. Elder Canyon. Cataract Canyon, and Hollow, Wellsnear Brigham City Utah and High 🗸 Creek Canyon 🏲 ear River



aff. Arenicolites

Closely spaced, paired openings; Left -1-2 mm diameter openings with variable spacing; Right — Single pair of tubes, Burrow width: ~ 10–11 mm, Spacing: 33 mm.





Cruziana

Elongate, bilobate, ribbonlike furrow or burrow with medial ridge or groove; furrow with herring-bonelike to transverse striations.









Cruziana Ichnocoenosis

An ichnofossil assemblage on two slabs (part and counterpart) of laminated shale with discontinuous laminations of fine-grained carbonate sand consisting of *Cruziana*, *Rusophycus*, *Planolites*, and *Treptichnus* (in order of abundance). Scale bar 3 cm.





Berguaeria

Hemispherical mound (hyporelief) with structureless fill and circular cross-sections; ~ 3 cm diameter and $\sim 2 \text{ cm}$ deep.



Cochlichnus

Thin, sinuous, horizontal burrow. Trace commonly resembles a sine curve. Length: $\sim 5 - 10$ mm, width: ~ 0.3 mm.



Diplichnites

Trackway consisting of blunt to elongate, closely spaced impressions that are normal to oblique to track axis.



Rusophycus

Short, bilobate impressions or mounds; lobes are parallel or merged near posterior or elliptical bulges that taper, have a furrow or ridge.







Sagittichnus

Keeled, arrowhead-shaped to rice-grain-shaped mound; Length $\sim 2.5-6.4$ mm, width ~ 0.8–4.6 mm.







Vertical funnel structure penetrated by a central tube. Diameter: ~ 4-10 mm, depth: ~ 1-4



aff. Palaeophycus Horizontal to subhorizontal tube with meniscate-backfill(?) or segmentation(?), lining(?) cutting a collapse structure(?).







Monocraterion mm. Falsely appear as paired.

Gordia

Long, slender, smooth trail of uniform thickness; mostly bent but not meandering. Trail width ~ 1.2–1.3 mm.



Monomorphichnus

Series of straight or sigmoidal

found in pairs; one ridge is more

Planolites

Simple, unlined, cylindrical or

subcylindrical infilled burrow,

straight to gently curved, hori-

zontal to oblique to bedding

(S-shaped) ridges commonly

prominent than the other.

Gyrophyllites

Central, vertical to oblique shaft with club-shaped lobes radiating out along different levels of the shaft in a whorl-like pattern.



Neonereites

Irregularly curved single- or multiple-rowed chains of deep, smooth-walled depressions or



cf. Protovirgularia

Unbranched, keel-like trail with a 🚺 medial furrow; lateral appendages are at an acute angle to the furrow and form several pulses.



References

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