Issue #5: Dinosaur tracks and Coal

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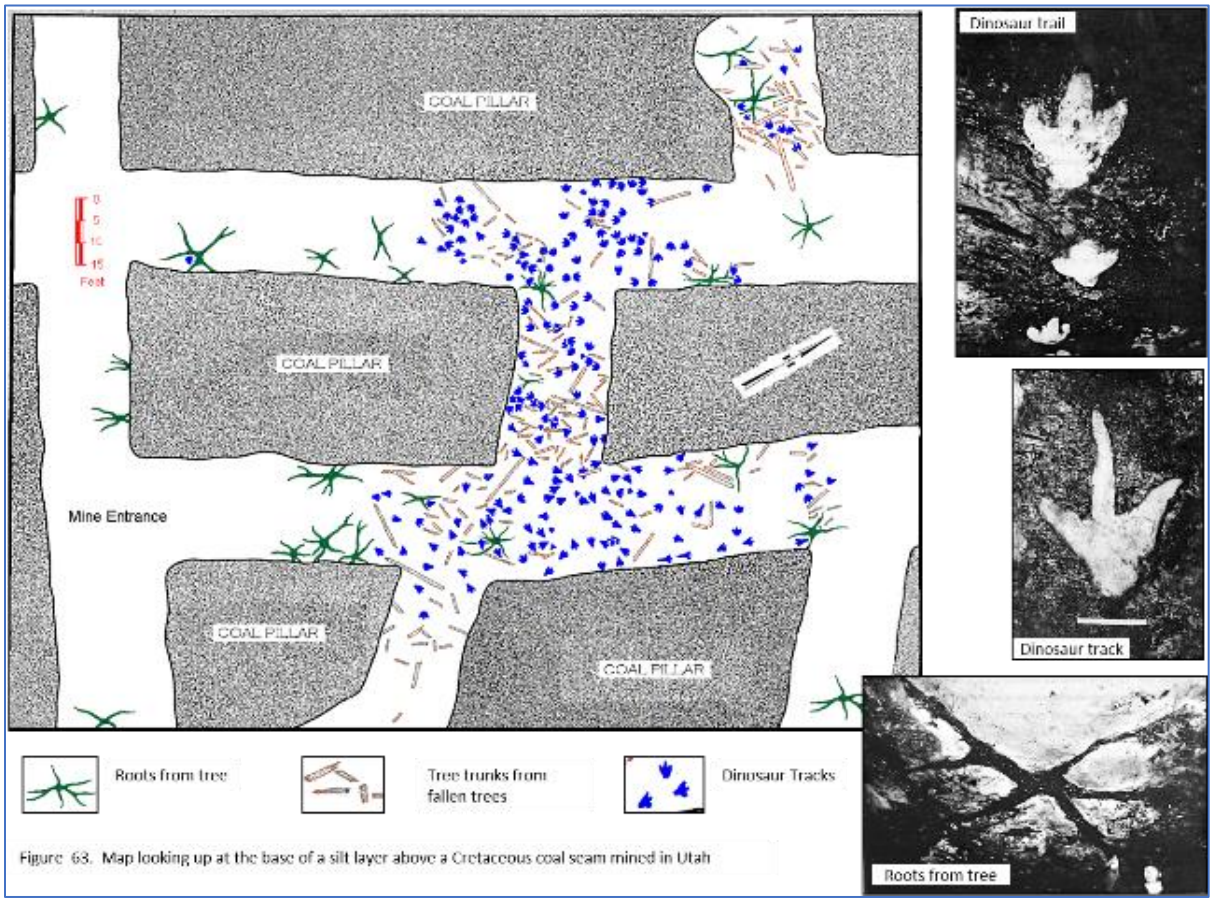

Figure 1: Map looking down up at the base of a silt layer above a Cretaceous coal seam in Blackhawk Formation, Utah (Balsley, 1980)

Assertions:

1. We observe dinosaur tracks and plant root systems, including those from mature trees associated with coal deposits.
2. All observations are consistent with an ancient swamp setting similar to those found today, except with a different cast of characters.

3. Mature trees did not grow during a global flood. Dinosaur tracks do not reflect escape from an advancing flood.

4. The roots, tracks and wealth of environmental data demonstrate that the unit took significantly longer than 1 year to form.

5. If one considers this part of the post-flood deposits, then too little time is available in the YEC time line for all of the later deposits.

Key assumptions:

a) Dinosaur tracks, bones, eggs, etc. were from real animals.

b) The tree roots with the dinosaur tracks were real and that trees don't grow to full size in a few days.

c) We can study the rocks and determine that they were not deposited by debris flows or turbidites or other rapid processes.

Discussion:

Many YEC articles point to deposits associated with the Mount St Helens' eruption in 1980 as way for trees in apparent growth position to be consistent with the flood model. The YEC point that trees with root balls can be transported in a catastrophic event is quite valid. When the volcanics collapsed on Mount St Helens, the resulting debris flow incorporated many trees with root balls. The resulting debrite in Spirit Lake, Washington included about 4-13% of the trees in upright position. The fact that trees can be transported and preserved in apparently growth position does not prove that all were, though more may have been than were recognized historically. There are many examples of petrified logs in vertical positions in the rock record around the world, in rocks of many different ages. It is likely that some of these were transported into position. In many cases, root systems are not preserved or those preserved are too poorly exposed to be interpreted confidently.

I want to use one example from the Upper Cretaceous Blackhawk Formation in Utah to show this issue. Dr. John Balsley documented these in a report on ancient wave-dominated deltas. It was used in field courses that he taught for petroleum geologists for many years. (Balsley 1980), see Dinosaur Tracks and Flood Geology (Part 2) (also documented in part in Parker and Balsley, 1989). These outcrops in Utah are located in the Book Cliffs region and include coal deposits that have been mined for many years. The great exposures there have made these some of the most studied sedimentary sections in the world. Listed below are some observations regarding the coals and dinosaur tracks based on Balsley's report.

Observations from Blackhawk Formation, Upper Cretaceous, Utah

- Coal beds were deposited in three different settings
    - Fluvial lower coastal plain
    - Delta-flank embayments and strand-plain environments (strand plains are sand ridges adjacent to wave-dominated deltas)
    - Laterally continuous delta plains and strand plains
- Evidence indicates that thick peats formed because a delicate balance between the level of the water table and the rate of organic accumulation was maintained – controlled by the rate of subsidence and its effect on the water table
- There are two distinct populations of coals, distinguished by the sulfur content – fresh water sourced and brackish water sourced.
- Coal beds settings are distinguished by the type of beds above and below them. Examples are
    - Fluvial (river) deposits both above and below
    - Overlying sandy foreshore environments and overlain by fluvial channels
- Balsley recorded this observation in a sequence of coals on the strand plains: "*Small roots typically extend several feet downward into the sandstone beneath the coal*".
- Small channel deposits occur through the coal beds. In addition to sand, channel beds include: "*logs, branches, leaves and macerated plant material from the swamp*".
- Coals primarily are all composed of coniferous material. Authors interpret that often shorelines had a "carpet of green vegetation that extended down to the shoreline" with conifers as the most abundant trees. (These were supported by root-penetrated sediments). Away from the shoreline, the forest were more commonly redwood trees. (silicified trunks and logs)
- Peat deposition was occasionally interrupted by thin siltstone beds interpreted as storm deposits (consistent with both their internal character and external geometry)
    - "*Deposition of overbank sediment in the swamp forests during relatively instantaneous flood events has preserved the trees in grown position and infilled dinosaur track impressions in the forest peat beds. As a result, the flood deposits have preserved the record of a very short time interval – a day or two – in the history of a Cretaceous coal swamp*."
    - After the silt beds were deposited, some of the trees then grew roots into the silt.
    - Imprints of leaves are best preserved in fine-grained, more distal storm deposits.
- Trees are preserved in growth position at the base of the storm deposited siltstone
    - Both large and small roots are well preserved. Maps show the large roots extending out unbroken, several feet from the trunk.
    - Tree spacings were "*similar to spacing of Cypress trees in the modern Okefenokee Swamp*".

- Fallen logs are common and the orientation of logs and the root systems suggest they were influenced by the prevailing winds
- Coal beds include charred layers with "charred stumps, logs, and charcoal", suggesting that during dry periods, the swamp burned across, such as swamps do today.
- Dinosaur tracks were best preserved in delta plain and strand plain environments.
    - The large number of tracks suggest that the delta plain was the "*principal dinosaur habitat*".
    - Maps only show the largest and most complete tracks but many more were evident.
    - Three-toed tracks are most common, and are attributed to duck-billed hadrosaurs.
    - Tracks located beside trees in growth position are interpreted to have been made as the dinosaurs fed on foliage from the trees.
    - Paths can sometimes be traced for a considerable distance.
- Dinosaur tracks also preserved in siltstones from pond-lake sediment and channel deposits
    - Iguanodon tracks are found in this setting with desiccation mudcracks, reflecting periods when the area dried out. (Figure 2)
    - Vegetation and roots are evident before and after repeated small flood events.
- "*A flood basin palm thicket preserved in growth position by flood-deposited silt*" is shown in the map of the roof of one coal mine.

Figure 2 Overbank siltstone slab with desiccation cracks and iguanadon tracks (Balsley, 1980)

The coals are located in the right setting and the root systems document several different forest types and settings. Explaining these deposits as transported flood deposits would require a lot of hand waving.

In Dr. Clarey's model (Clarey, 2020), all these features would have to come into existence in a matter of days, as the Blackhawk Formation was deposited as part of the Zuni megasequence. Dr. Clarey interprets the fossil trees in Carboniferous coal beds in Scotland as having grown before the flood and preserved in place (p. 436-438) but that would be impossible for the Utah example. "*Carved in Stone*" suggests that the evidence of forests in Antarctica supports its flood model, but forests are reported as in "growth position" in sediments of multiple ages, and some appear to be clearly in situ.

YEC explanations:

Uncertain

References:

Balsley, J. 1980. *Cretaceous Wave-Dominated Delta Systems: Book Cliffs, East Central Utah: A Field Guide* (Vol. available in most university geology libraries). Denver: Unpublished. Amoco Production Company.

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Parker, LR; Balsley, JK, 1989, "Coal Mines as Localities for Studying Dinosaur Trace Fossils" In *Dinosaur Tracks and Traces*, Gillette, DG and Lockley, MG eds., Cambridge University Press, 1989, http://allanmccollum.net/amcnet3/reprints/parkerb.html#:~:text=Dinosaur%20footprint%20casts%20have%20been,only%20in%20rock%2Dfall%20areas.&text=Fossil%20plants%20occur%20with%20many%20of%20these%20footprints.