Polystrate Trees and Deep Time

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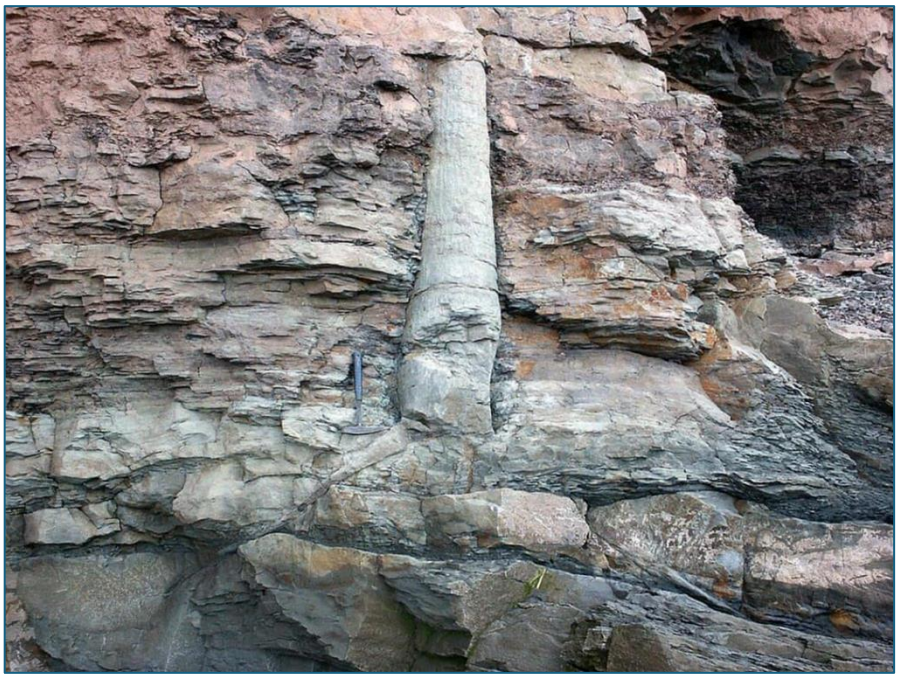

"Polystrate" tree fossil from Joggins Formation in Nova Scotia, Canada.
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Are there "incontrovertible" reasons to affirm a young Earth? What does it mean to be incontrovertible? Some YEC seem to believe that this means that it is claimed by any YEC author that they appreciate. It is easy to list claims that might sound impressive. What happens if we dig into those claims? Can they stand up to analysis?

How long does it take a tree to rot away? It certainly varies depending on the setting, but we all agree it does not take millions of years. If strata take millions of years to deposit sedimentary rocks, how could there be fossil trees buried by meters of sediment? Here the seeming problem comes from Paul Humber's "Reasons to Affirm a Young Earth". (Humber 2013)

The reason for a Young Earth given in this case is:

22. Polystrate Fossils

A "polystrate" fossil is simply a fossil of a single organism (such as a tree trunk) that extends through more than one geological stratum. How much time does it take geological strata to be deposited?

Humber's basic claim is:

"Polystrate" trees demonstrate that the geologic record in the rocks took place within a few years, not millions of years.

He offers in support of this:

1) A 2006 article by Michael Oard and Hank Giesecke titled "Polystrate Fossils Require Rapid Deposition" (https://crs-alchemy-attachments.s3.amazonaws.com/uploads/pdf/polystrate_fossils.pdf)
2) His calculation for the average rate of deposition in the Grand Canyon based on conventional geologic dates.

What kind of things do YEC, such as Humber, need to demonstrate in order to prove their case? They must:

- Prove that geologists believe that rocks that encase so called "polystrate" trees were deposited over long periods of time, significantly beyond the lengths of time when such tree trunks could still exist.
- Prove the trees did not grow in place but were within rocks that were deposited as part of a global catastrophic flood.

Calder et al. (2014) and Oard and Giesecke (2006) give a number of examples of ancient trees that cross multiple layers of rock. Here are Oard and Giesecke's key examples along with good references from the geologic literature for each site.

1. Joggins Formation of Nova Scotia, Canada (Pennsylvanian Period) (Davies et al. 2005; Calder et al. 2011)
2. Yellowstone Park, Wyoming (Eocene Epoch) (Viney 2008; Yuretich 1984)

3. Ginkgo Petrified Forest State Park in Washington (Miocene Epoch) (National Park Service nd; Karlson 2006)

4. Axel Heiberg Island, Canada (Eocene Epoch) (Greenwood and Basinger 1993; Hawke and Stasiuk 2000)

5. Cook Inlet-Susitna coal province, Sutton, Alaska (Oligocene (?)) (Merritt 1990; Conwell, Triplehorn, and Ferrell 1982)

First perhaps, it is worth pointing out that geologists fully agree with Humbers that the trees did not stand vertically for millions of years while sediments slowly accumulated around them. This is a bit of a strawman argument, perhaps unintentionally, because no geologist believes that that is what occurred. Let me illustrate. What if someone tells you that they spent all day going to a town that is 24 miles away? What all could that mean? It could mean that they went 1 mph for 24 hours. It could mean that they went 70 mph, got there in about 20 minutes and spent the rest of the day in the town. It could be that they went part way, stopped and had lunch and then went over. In any case, the average speed was 1 mph doesn't tell you what the actual speeds were.

Geological rates are a bit like this. It may be true that on average about 1/10,000 inch would be laid down annually, but that number doesn't mean that much sediment was not deposited rapidly. Conventional geology anticipates that there were long periods when all the deposition was taking place elsewhere. There also were unconformities developed where erosion was taking place. Many of these are very evident in the Grand Canyon, while some are more subtle. A lot of thickness might have been present, but all we see is an erosional surface.

YEC have often pictured the vertical fossil trees very differently than geologists do. (See **Figure 1**). As non-geologists, they picture these fossils extending across large parts of the geologic column. Note that most YEC with significant technical training accept that the "geologic column" is a valid summary of thousands of observations around the world, even if they do not accept the ages assigned by most geologists. Regardless, that has nothing to do with the polystrate trees. As the figure shows, the trees in the Joggins Formation in Nova Scotia all come from a tiny part of the Pennsylvanian period in the column.

Oard and Giesecke correctly recognize that geologists believe that each of the fossil trees were buried rapidly, especially in geologic terms. They state, "Uniformitarian geologists usually ignore polystrate fossils or claim that they represent only local rapid deposition, but they rarely supply any supporting evidence." This is interesting because they are invoking extremely rapid deposition associated with a global flood to explain most of the deposits. They want extremely rapid deposition but complain that geologists don't document this. Perhaps they are expecting geologists to document that each of the deposits with the **in-situ** trees, those interpreted to have grown in place, were just local. One issue that I have is that they do not define what they mean by words like: local, rapid, or slow. Is a deposit that covers one basin considered local? If so,

then that fits all of the examples given. If rapid deposition means that it took place over a short enough duration to preserve trees in root position, then we would agree that the deposits were rapid. If it means that they were formed in a few days within a one-year catastrophic flood, then that should be recognizable by the sedimentary structures found. How long does he believe that geologists consider necessary for a bed of coal to form? Apparently, the timeframe that he believes is longer than most geologists actually recognize.

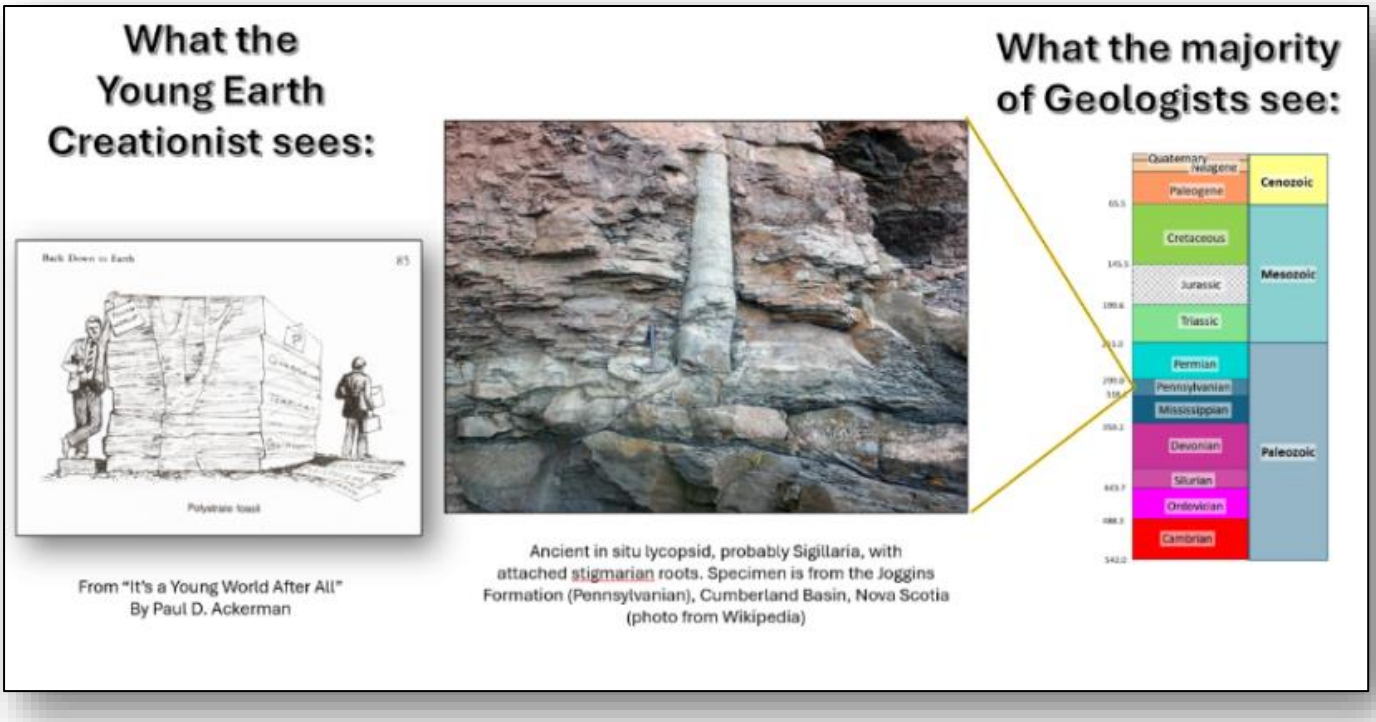

Figure 1. *What do you see? While the YEC may picture the trees deposited by strata from multiple geologic periods over multiple millions of years, geologists picture that same strata as having been formed relatively quickly as a tiny portion of one geologic period.*

In each of the cases that Oard and Giesecke cite, the depositional processes and timing presented in the geologic literature are quite able to bury trees in growth position. The University of Kentucky has a website that is a great resource for understanding how this occurred: "**Upright (Standing) Fossil Tree Stumps**" (Kentucky Geological Survey, n.d.) One limitation here is that this site covers just a few scenarios. An exceptional geological article on in situ tree examples is a 2011 article by DiMichele and Falcon-Lang. It is titled, "*Pennsylvanian 'fossil forests' in growth position (T0 assemblages): origin, taphonomic bias and palaeoecological insights*". It includes many clear examples.

The fossil forests of the Joggins Formation in Nova Scotia are spectacular examples to consider. As shown in **Figure 2**, 84 separate forest horizons have been identified here. **Figure 3** shows schematically what some of the section is like. The rocks consist of sandstones and mudstones deposited by small river systems, thin coal beds and occasionally covered by limestones. Besides the petrified trees in situ, many fossils are also found such as crab tracks, at times resting and perhaps even mating. (Stimson and MacRae 2010; Calder et al. 2011; Buhler and Grey 2016).

These fit well in quiet waters, but would be tough to place in a catastrophic flood deposit. One of my favorite finds is that of a small reptile found within one of the in-situ trees. It appears that the inner part of the tree rotted out. As the sediments covered most of the tree, the reptile fell in and couldn't get out. (Nova Scotia Museum 1998)

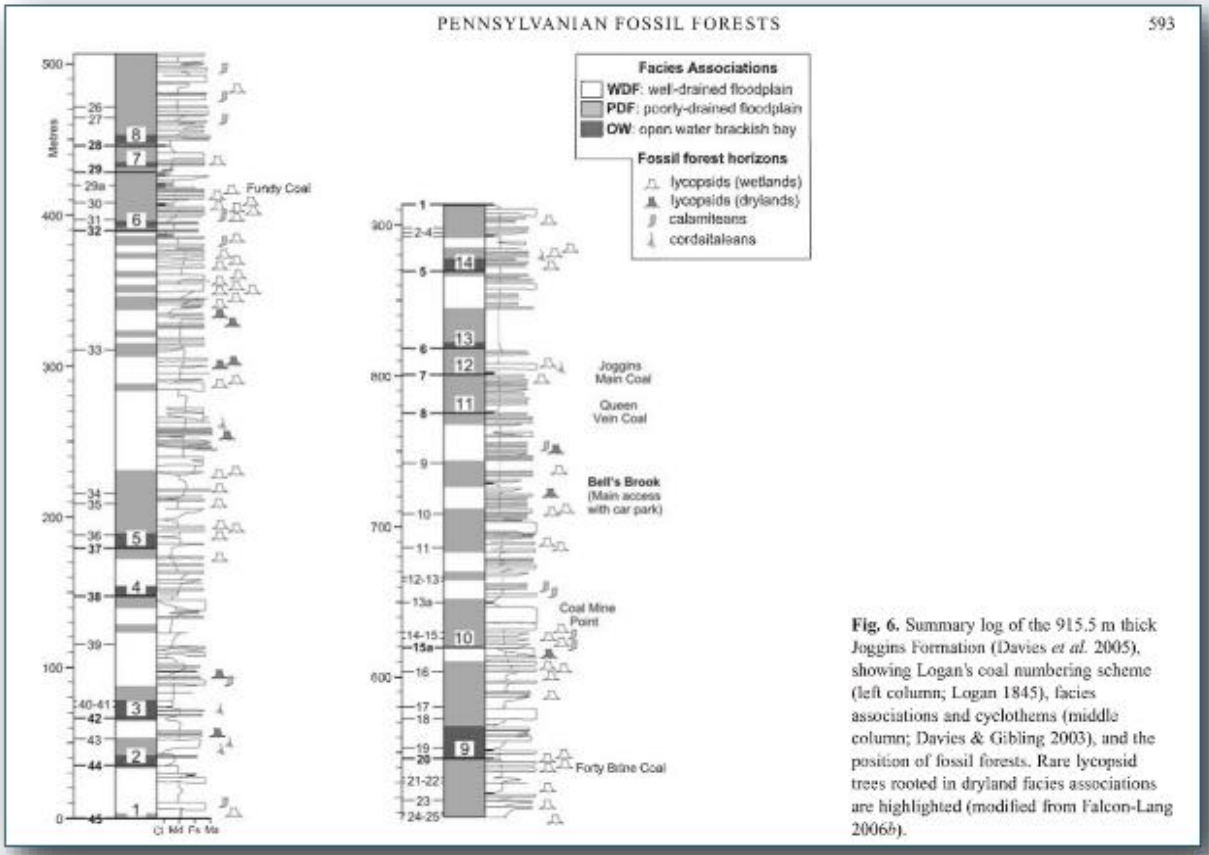

Figure 2. *Joggins Formation forests from DiMichele and Falcon-Lang (2011)*

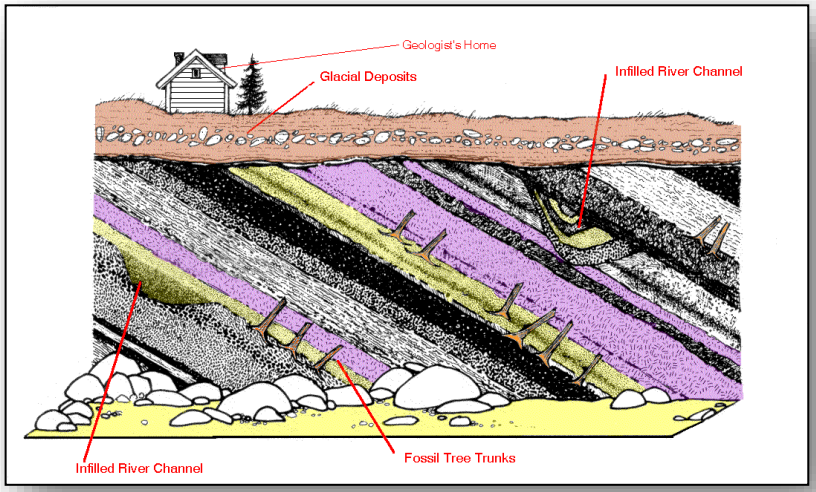

Figure 3. *Schematic of Joggins section*

Figure 4 shows the in-situ tree that Humber used in his book. This photo from Wikipedia shows the roots extending through several layers of sediment that are now rock. The combination of tree roots, animal tracks, and swamp deposits is compelling. In many other places, tree trunks are found with desiccation mudcracks and large dinosaur tracks.

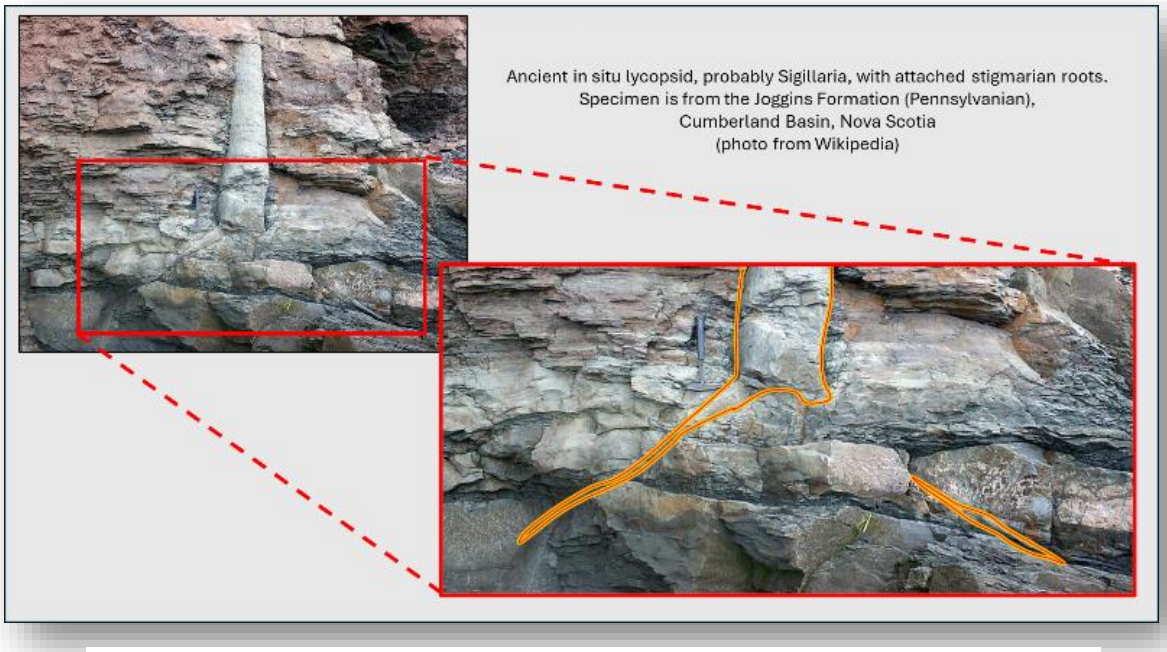

Figure 4. *Example from Joggins Formation used by Humber, highlighting roots preserved that penetrate multiple layers of rock*

YEC have used the example of trees transported upright in Spirit Lake on Mount St Helens to make the case that vertical tree fossils were transported by large floods. (Coffin 1983) Certainly the examples in Spirit Lake demonstrate how some upright petrified wood examples were deposited. That is quite reasonable. Fritz and Harrison (1985) used the Spirit Lake examples and showed how we can recognize when fossil examples were formed this way vs. having grown in place. (Fritz and Harrison 1985). It is worth also noting that just as there were upright stumps transported as a result of the eruption on Mount St Helens, many trees were buried in growth position (Karowe and Jefferson 1987).

Oard and Giesecke stated, "One explanation is that trees dropped vertically into the strata from a log mat floating on the water during the Genesis Flood". The rocks that we see in each of the cases occur in sediments that would have been formed over relatively short periods of time. The Ginkgo Petrified Forest in Washington must have formed in a very short time, but I have not found evidence of vertical trees here. (National Park Service nd). The trees here are largely horizontal or randomly oriented. The contrast between this deposit and the others makes the point that the others formed over periods of time far shorter than the one-year long duration of Noah's flood.

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Related thoughts:

When does the average rate of sedimentation become meaningful?

In this article, I have shown that using the average rate of sedimentation from the Grand Canyon to say how much time it takes to lay down the sediments that surround “polystrate” trees is inappropriate. It yields an answer that is meaningless. When a geologist says that a formation was deposited over a period of millions of years, that does not mean that you can divide the thickness by the time and learn how much time it took for parts of it to be deposited. Some parts could have been deposited very quickly while the area also may have had no deposition for a long time. Parts could have been eroded away. The calculated average rate of deposition might be a long way off of what really happened.

In the above article, I used the illustration of a person driving 24 miles and perhaps taking all day. The average speed using the 24 hours would pretty low compared to the speed that they might have actually driven. If the time reported is longer than a legal speed limit, then it probably wouldn’t raise many eyebrows. If he were to say that he drove a 100 mile journey and it only took 45 minutes, that would raise quite a few eyebrows. Averaging 133 mph is illegal and tough to do in any case.

YEC proposals for flood geology claim that most of the sedimentary rocks in nature were deposited during Noah’s flood, a one-year long catastrophic event. In fact, they have proposed which geologic intervals were deposited over portions of the flood. That means it is possible to calculate average depositional rates for such intervals. (Such as Cambrian in the Grand Canyon - Link) If there were pauses in sedimentation, such as to allow dinosaurs to walk around, then the actual depositional rate would have needed to be even faster.

Could the enormous rates of deposition have been part of Noah’s flood? While the Bible says nothing about the geologic results of the flood, if YEC claims were true, then one would have to speculate that enormous rates of deposition would have occurred. Indeed enormous rates are occasionally seen but have distinctive characteristics. One challenge for YEC is to explain why so much of the geologic record clearly deposited much slower than their theories propose.