argued for and exemplified a collaborative and mutually beneficial relationship between the two.

Vacek laments that despite the biblical calling to "love your neighbor," the church generally has not done better than society in understanding and caring for those who suffer mentally. There is often a gap between belief and practice; this is exacerbated by stigma, which not only limits care but is also contrary to biblical teachings on inclusion. In her concluding chapter, Vacek suggests using the concept of hospitality (e.g., Rom. 12:13), implied by the five individuals studied, as a way forward. A practical theology approach considers God's redemptive mission and informs a Christian response. We need to be conscious of suffering and work in solidarity with those who suffer. Hospitality includes welcoming and incorporating all people into fellowship, showing compassion, and exercising patience.

Vacek's work is thorough and thoughtful, but at times her conclusions extend beyond the evidence she presents. In particular, she neglects the many developments that have occurred in mental health care and the medicine-religious dialogue in the last few decades. Despite this weakness, *Madness* is a fascinating read and of particular interest to historians, mental healthcare practitioners, and those researching the intersection between medicine and religion. And, since the "poor in spirit" will always be with us, it also calls for action on the part of all Christians.

Reviewed by E. Janet Warren, MD, PhD, President of the Canadian Scientific and Christian Affiliation. ✦

Letters

Old Age at Lake Suigetsu, Japan, and Glacial Tillites, Geologic History, and Biblical Chronology

The fine article by Gregg Davidson and Ken Wolgemuth explains how we can have confidence in age dating, based on comparisons of independent data sets ("Testing and Verifying Old Age Evidence: Lake Suigetsu Varves, Tree Rings, and Carbon-14," *PSCF* 70, no. 2 [2018]: 75–89). It takes a unique approach of comparing raw carbon-14 data (no use of calibration curves) with tree-ring counts back to 14,000 years (most from Europe), and annual sediment layer (varve) counts covering 50,000 years of sediment deposition in Lake Suigetsu, Japan, to show how assumptions such as constant radioactive decay rates, annual growth of tree rings, and annual deposition of layered sediments can be tested and verified. Lake Suigetsu is well suited for radiocarbon studies, because storm water first enters an adjacent lake where the coarser sediment deposits, and then water flows into Lake Suigetsu with mostly very fine sediment. Bits of leaves and twigs washed in and deposited with these sediments contain carbon-14 derived directly from the atmosphere, preserving a historical record of atmospheric carbon-14 in each successive layer.

The article is simply fabulous for effectively communicating the reliability of radiocarbon dating to a reader interested in science. Instead of using a logarithmic scale for exponential decay of carbon-14, the authors used a graph with the scale of percent modern carbon: it shows visually the decrease of carbon-14 with the passage of time, due to radioactive decay (see fig. 1).

To my knowledge, no one else has ever plotted these data in this visually dramatic way to communicate with nonscientists. These tree-ring data and varve data from leaves are simply excellent to tie together the varve data to tree-ring data, because there are 4,000 years of overlap. The alignment of tree-ring and varve carbon-14 with conventional expectations, and the utter failure to align with young-earth expectations, is stunning. Furthermore, the research team found an ash from a known volcanic eruption at the depth where the carbon-14 content was equal to that of tree rings ~10,200 years. The Ar-Ar age of the ash was 10,000 ± 300 years, an excellent confirmation from a completely different radiometric dating method.

Then the authors went above and beyond merely writing a paper for a journal, by adding six call-out sections, referred to as "Casting Doubt," such as the topic of Circular Reasoning. Young-earth writers and advocates typically do not appreciate or understand radiocarbon dating correctly, so they can only raise doubt about the reliability of the results. These six sections address the various doubts and claims made

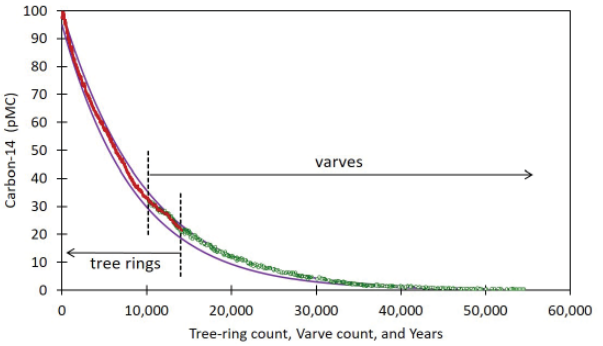

Figure 1. Tree ring and varve count vs. carbon-14 content. Solid lines represent the window for conventional expectations.

by young-earth advocates, and demonstrate why the conventional understanding is more in keeping with the nature of God. If I knew of a journal that offered an award for the paper with the most effective communication written for a most difficult target audience, I would submit this paper!

The above carbon-14 old-age dating is also consistent for very old ages as are obtained from U/Pb radiometric age dating that has been applied to glacial tillites that occur in the recent Ice Age, in the Paleozoic Era, and then farther and farther back in the Precambrian to very old ages. See http://www.csun.edu/~vcgeo005/Nr40tillites.pdf. Early life on Earth had anaerobic bacteria that produced methane as a waste product, but when cyanobacteria evolved that had photosynthesis as part of their metabolism, oxygen was released as a waste product, which was a poison for the anaerobic bacteria. Therefore, the earth experienced its first mass extinction as increased amounts of oxygen killed the anaerobic bacteria. Life then evolved to produce organisms that could tolerate oxygen, but these organisms combined oxygen with carbon in their metabolism and produced carbon dioxide as a waste product. But this waste product had subsequent consequences. Methane in the early atmosphere absorbed the sun's heat and kept the earth warm, but when carbon dioxide began to increase in the atmosphere, cooling occurred that may have produced a "snowball" Earth because tillites can be found at the earth's equator. All these changes certainly cannot have happened in 6,000 to 10,000 years as is promoted for the age of the earth by young-earth creationists, if the natural laws that the Creator also produced are obeyed.

Davidson and Wolgemuth should be congratulated on demonstrating the trustworthiness of scientific dating methods, and showing that the young-earth creationists have no logical basis for claiming a very young age for the earth.

Lorence G. Collins
ASA Member

About the "Literal" Interpretation of Genesis Chapters 1 and 2

I have a suggestion, or request, for our ASA community's discussion of the interpretation of the creation accounts in the Bible, primarily, of course, Genesis 1 and 2. We often use the term "literal interpretation," referring to the opinion that the days of creation were consecutive 24-hour days, and therefore that the creation of the earth and the entire universe occurred only about 120 hours before the creation of Adam, a few thousand years ago. This is commonly called young-earth creation, or YEC.

Whatever we call this interpretation, I propose that we cease calling it "the literal" interpretation. This is what the advocates of this view claim for it, thus implying that all other interpretations are not literal, but are something else, and claiming a sort of high ground in the competition for legitimacy. We do not need to concede this mantle to them.

What does the account literally tell us? It says God caused the earth to sprout. How long does that ordinarily take? Is there any indication in the text that this was done nearly instantaneously, in a few hours at most, with a mature botanical ecosystem and soil appearing from nowhere on top of previously bare inorganic rock? Can this be called literal interpretation? It says God planted a garden, again sounding somewhat slower than instantaneous completion.

If the sun, moon, and stars were not created until the fourth day, how was there light and dark, evening and morning on the first three days? And what does "the heavens and the earth" mean in verse 1? At what point on the globe was evening and morning observed? All these points have been debated for centuries, and I am not advocating any particular conclusion, only pointing out that whatever conclusions have been proposed, have all been heroic exercises of logical gymnastics. Such explanations may be right or wrong, but they cannot be called simple literal interpretation.

On this account, Adam had a prodigiously busy and productive first few hours of existence. From a blank slate of memory, he learned a language, learned to care for the garden, observed a large number of animals and formed meaningful names for them, and observed that they came in pairs and he did not. This is equivalent to a whole series of doctoral dissertations. Then he had to learn to fix his own lunch. No wonder he needed a nap in the afternoon and was happy to acquire a wife to help him. Is this seriously what we think Moses thought and meant when he wrote this account? Is this what the contemporary first-generation Israelite listeners thought when they heard it in the wilderness? Can we call this "literal" interpretation with a straight face?

So, whatever our various preferred interpretations are, and what we call them, let's stop conceding to the solar-day recent-creation viewpoint the claim of "literal" interpretation. There is no such thing as a simple, literal interpretation of the creation accounts, so let's retire this label. Of course, that raises the question of what label to replace it with.