the natural and the supernatural, and *therefore can seamlessly interact [not intervene] with his creation*.

I hope that some of these important caveats will be addressed:

1. To date, replicating life in the laboratory from nonliving material has been unsuccessful since the Urey/Miller experiment.
2. Any and all efforts to date, have been done under controlled laboratory conditions.
3. All such efforts trying to create life in the laboratory involve *human interaction*.
4. According to most geophysicists, the atmosphere four billion years ago was oxidizing, not reducing, and thus inimical to the formation of complex molecular systems.

I recommend that the authors consult James M. Tour of Rice University, who is considered one of the world's top synthetic organic chemists. The authors do quote, in passing, Douglas Axe of Biola University, but they do not mention Tour. Neither Axe nor Tour support the authors' evolutionary position regarding life's origin.

Ken Touryan
ASA Fellow

"Rethinking Abiogenesis" Authors Respond

We thank both Drs. Garte and Touryan for taking the time to write with regard to our article, "Rethinking Abiogenesis: Part 1, Continuity of Life through Time" (*PSCF* 72, no 1 [2020]: 25–35). The honor of seeing our argument pass through peer review into publication in *PSCF* is exceeded by learning that it has engaged readers enough for them to respond.

In response to Garte's letter, we express direct gratitude for balancing our argument with the points he makes. We agree with the existence of one-way transitions into ever deeper states of feedback over the course of biological evolution; we perceive no "either/or" in suggesting that evolution is continuous. In other words, we perceive that a continuous evolutionary process may involve transition into higher rates of change over time. Our article's emphasis on continuity reflects our perception that, to date, this aspect of abiogenesis has been underexplored to the detriment of science. Our emphasis, as originally expressed, might well overstate the useful rebalancing that can occur to advance science. Both faces of abiogenesis deserve further research: we write with passion about the one which we perceive as currently lagging. For example, Szathmáry and Smith's seminal work on "major transitions in evolution" (including abiogenesis)[1] predates De Queiroz's "rediscovery" of concepts of continuity[2] by a decade, suggesting that the topic of continuity merits extra attention and research today to account for this lag.

Illustrating what we describe as this balancing act, we appreciate Garte's reference to Gould and Eldredge's theory of punctuated equilibrium as a case in which "an apparent discontinuity should lead us to more in-depth exploration" [quote]. Rather than a counterexample to our argument for continuity, however, we view punctuated equilibrium as illuminating the way in which perspectives of continuity vs. discontinuity have informed and honed one another toward deeper understanding. The theory of punctuated equilibrium arose as a challenge to a longstanding interpretation of the "notorious imperfection of the fossil record" as negative information. If written off as artifacts of missing data, seemingly "sudden" changes over evolutionary time could remain fully consistent with the prevailing theory of gradualism. Recasting the missing data as positive information in its own right, on the other hand, produced evidence for "geologically instantaneous origination and subsequent stability" of morphospecies. In other words, the theory of punctuated equilibrium emerged from a scientific moment in which the evidence at hand—a gap in the fossil record—could be interpreted in two different ways: one, supporting a steady rate of evolution; the other, supporting a view that morphological evolution can speed up to produce rapid change and slow down to produce seeming stasis. Over decades, considerable evidence has favored instances of the latter interpretation,[3] although active debate continues.[4] In this process, the scientific community has not rejected continuity but, rather, has been forced to define the concept of continuity in much more precise terms: the tempo vs. mode of evolution, characteristics of micro- vs. macro-evolution, and stasis in data vs. stasis in the processes that scientific data reflect.

The question in our present exchange of letters remains whether the difference between continuity and discontinuity is merely a product of the speed at which a process occurs, or a fundamental difference in type? We perceive in Garte's words a shared interest in this question and an alignment with our views.

To support the interpretation that different rates are not the same thing as discontinuities, we find a point of mutual agreement and interest with Garte in noting that "transition" should not be conflated with one, singular event labeled abiogenesis. As Garte points out, the emergence of eukaryotes is as much a paradigm of such one-way transitions as the emergence of the standard genetic code … and neither of these transitions involves abiogenesis except in our stated sense that abiogenesis is still underway and "as-yet-incomplete" (p. 25). In other words, we perceive a shared goal with Garte in continuing to balance "continuity" with "transition" in order to advance the science of origins.

While we appreciate the concerns in Touryan's letter, we find less common ground with his position. He writes of our "commitment to" evolutionary creation and our "presuppositions" as though these were chosen without

regard for evidence. The intelligent design community rightly objects to times when their ideas have been dismissed without a fair hearing. But it just doesn't follow from such incidents that all of us Christians who accept evolution do so for any reason other than having been persuaded by the evidence.

To support the idea that our emphasis on theistic evolution is a presupposition, Touryan also writes about the "failure" of origins research—and hints strongly that a more-balanced view would embrace the option of intelligent design. Here we must politely but clearly disagree. In words that one of us has written before on the topic:

> It is true that, at present, evolutionary science does not have a clear, detailed, and well-accepted explanation for how the central dogma of molecular biology emerged. But does that mean it is time to embrace ID as a better approach? By analogy, current medical science has not found the cure for cancer. Taken in isolation, this sound bite could lead to the misleading view that existing research directions, developed for decades, are best written off as a failure. This would miss an important context. Many aspects of cancer are now being treated with far greater effectiveness than ever before as a result of ongoing research. However, these cures are not robust (all-encompassing) enough to be summarized in the statement, "we have found the cure for cancer." This status is typical of big questions within science: failure to reach the sound-bite goal should not be mistaken for evidence that the research program has failed.[5]

Notes

[1]John Maynard Smith and Eörs Szathmáry, *The Major Transitions in Evolution* (New York: Oxford University Press, 1995).

[2]Kevin De Queiroz, "Species Concepts and Species Delimitation," *Systematic Biology* 56, no. 6 (2007): 879–86.

[3]O. G. Woodberry, K. B. Korb, and A. E. Nicholson, "Testing Punctuated Equilibrium Theory Using Evolutionary Activity Statistics," in *Artificial Life: Borrowing from Biology*, ed. Kevin Korb, Marcus Randall, and Tim Hendtlass (Heidelberg, Germany: Springer-Verlag, 2009), 86–95, https://doi.org/10.1007/978-3-642-10427-5_9; and Albert Somit and Steven A. Peterson, eds., *The Dynamics of Evolution: The Punctuated Equilibrium Debate in the Natural and Social Sciences* (Ithaca, NY: Cornell University Press, 1992).

[4]Kjetil Lysne Voje, Emanuela Di Martino, and Arthur Porto, "Revisiting a Landmark Study System: No Evidence for a Punctuated Mode of Evolution in *Metrarabdotos*," *The American Naturalist* 195, no. 5 (2020): 899–917.

[5]Stephen Freeland, "The Evolutionary Origins of Genetic Information," *Perspectives on Science and Christian Faith* 63, no. 4 (2011): 240–47.

Emily Boring, J. B. Stump, and Stephen Freeland

On Galileo and Global Warming

I look forward to perusing *PSCF* for new insights to encourage my faith and worship, and so I was shocked by the lead article "Galileo and Global Warming: Parallels between the Geocentrism Debate and Current Evangelical Skepticism about Anthropogenic Climate Change" by Rachel M. Roller and Louise Ko Huang (*PSCF* 72, no. 1 [2020]: 3–14) in the March issue. From the title and first sentence onward, the young authors prejudice their audience against scientists who disagree with their views on climate change. Evangelical Christians in America are free and diverse in beliefs and denominations. Comparing them to the autocratic, political medieval Roman Catholic Church is unreasonable. They introduce unnecessary prejudice into the discussion by likening critical analysis of causes of climate change to the persecution of Galileo.

Claiming "mounting scientific evidence that human activity is negatively impacting the planet" (p. 3), Roller and Huang present unsubstantiated claims of authority and consensus for their diagnosis of a human cause for global warming. A good source to document the lack of consensus and understand the manipulated and sometimes falsified CO_2 and temperature analysis is *Inconvenient Facts: The Science That Al Gore Doesn't Want You to Know* by Gregory Wrightstone (https://inconvenientfacts.xyz/, 2017). Aside from that, the big picture is what geologists never forget: The earth has experienced many cooling/warming cycles over geologic history, also many highstand/lowstand cycles of oceans. In historic time, we are emerging from the Little Ice Age.

Accusations fly: evangelicals accused of not caring for the environment, "behaving like the two men who refused to look through Galileo's telescope" (p. 9), lacking humility, and being driven by political views. Who is responsible for politicizing environmental science and the investigation of climate change? Could this not also be attributed to liberal parties and organizations, instead of blaming it on the conservative leanings of evangelicals? Augustine's maxim of Christian love should have been applied here.

Thank you.

Catherine Lewis
PhD Geophysics

"Galileo and Global Warming" Authors Respond

We would like to thank Catherine Lewis for her comments. One of our primary goals was to spark dialogue between people of faith on the topic of creation care, so we were encouraged that Catherine took the time to read and respond to our article, "Galileo and Global Warming."