environmentalists and now intensified by Ken Funk in his article (*PSCF* 59, no. 3 [2007]: 201–11) on "technology." I have an instant cure for this mode of malaise, guaranteed to elicit viscerally from all readers the thought, "Thank God for modern technology": read, as I have, the book review of *Hubbub, Filth, Noise and Stench in England, 1600–1770* by Emily Cockayne (Yale University Press, 2007) titled "Cesspool in the City" by Florence King in the *American Spectator* (September 2007): 66–8. In this case, we thank God for modern technology of sanitary engineering—plumbing, water supply, waste removal, and so forth. Similar joyful exclamations occur as we read of the sounds, smells, and sights of urban neighborhoods in the nineteenth century. Thus we honestly can thank God for electricity and automobiles (vs. horses).

The point is that "technology," at least in these cases, can be viewed essentially as an unqualified good, which we not only accept gratefully but perhaps ponder why these gifts were so delayed in the long history of humans. As in all things, we accept the unavoidable risks and work to reduce them—a long-term task for many engineers and scientists.

Technology, per se, can be good with no need to look for associated faults of negligible significance. (In all cases, the goal of perfect reliability is not attainable.) As such, I believe many Christians involved in the development of "technology" can validly present a positive view of technology to the ASA. That was the guiding thought in my role in creating the name "Christian Engineers and Scientists in Technology" (CEST)—a current ASA affiliation.

I have had a life-long career in developing microwave power technology and microwave safety standards. Throughout, I thank God daily for the insights that reflect imperfectly *his* understanding of microwave physics and have never felt guilty before God for my career. If I refer to the "Guide to Prudent Technological Practice" (Table 1 in Funk's paper), I meet all his criteria for positive assessment except those (especially #8) that imply absence of competition (industrial or academic) and valid proprietary intellectual property. This ethical dilemma is akin to debating whether the New York Yankees or the Boston Red Sox is "God's team." We can rationalize this problem and still end up optimistic pro-technology Christians.

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Residual Radiocarbon in an Old-Earth Scenario

Radiocarbon dating of ancient organic material is based on the radioactive decay of ^{14}C, with a half-life of 5730 years, or with a decay constant ln2/(5730 years) = 0.121 per millennium. After 100 millennia, the ^{14}C has decayed to an undetectably minute fraction of its original value (less than 6 millionths). However, in rocks or minerals millions of years old, contamination by modern carbon or other processes may introduce tiny amounts of ^{14}C. To interpret these as due to decay of original organic ^{14}C, and thus to get an apparent age, is quite mistaken.[1]

Recently, Rogland has reinterpreted some data, cited by young-earth creationists, on minute fractions of ^{14}C in samples dated by other methods as being 0.4 to 2000 million years old.[2] He considers as a possibility that this ^{14}C is indeed a remnant of original organic ^{14}C, but that it has not been decaying with a constant rate constant. Instead, a decay equation of stretched exponential form is proposed, $N = \exp(-At^{1+B})$.

The similar Kohlrausch-Williams-Watts (KWW) equation[3] accurately describes the decay or relaxation of stress in some viscoelastic materials after they are stretched, or the analogous relaxation of charge in a dielectric. A viscoelastic polymer, with a broad distribution of molecular weights, has a spectrum of relaxation processes, each with a relaxation time, the analog of the decay constant. When the relaxation processes have gradually decreasing strength as their relaxation time increases, the KWW equation represents their total effect well. However, radioactive decay is entirely different: there is no distribution of atomic weight of the decaying nucleus. Rather, the one decay process has a single decay constant, leading to simple exponential decay. Accordingly, in teaching or presentations on dating,[4] one should keep to the accepted understanding of radioactive decay, without mention of the stretched exponential as an alternative.

Maybe we should focus instead on how much change there is in intervals we experience, such as a year or a lifetime. Because of God's faithfulness in sustaining his creation in a stable way, we see little change in nature during such an interval. The ancient Bible writers, who had no technology to measure tiny changes due to processes taking thousands or millions of years, may have expressed this stability symbolically by attributing life spans of many ordinary lifetimes to the patriarchs (Genesis 5, 11). While the total of several thousand years may then have been effectively infinite to the Bible writers, to our generation with scientific knowledge of Earth's past going back billions of years, it seems short. Instead of debating vainly about ages, we should rather heed the biblical call to stewardship of creation in the light of scientific understanding of Earth's history, as we view its destruction in our lifetime extending from atmosphere to zoosphere.

Notes

[1] R. Isaac, "Assessing the RATE Project," *PSCF* 59, no. 2 (2007): 143–6.
[2] R. Rogland, "Residual Radiocarbon in an Old-earth Scenario," *PSCF* 59, no. 3 (2007): 226–8.
[3] Wikipedia, http://en.wikipedia.org/wiki/Stretched_exponential_function. Accessed October 31, 2007.
[4] D. A. Young, "How Old Is It? How Do We Know? A Review of Dating Methods," *PSCF* 58, no. 4 (2006): 259–65; 59, no. 1 (2007): 28–36; 59, no. 2 (2007): 135–42.

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