

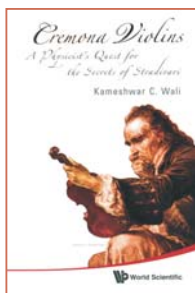
eyes; paradoxically, a very good violinist makes it difficult for the listener to judge the violin itself. The violinist knows the instrument is poor because it takes a lot of mental energy to get a good sound, which is why a professional musician strives to obtain the highest-quality violin, one that helps, rather than hinders, the production of the desired tone.

The famed luthier Antonio Stradivari and the other violin makers of his hometown of Cremona, Italy, turned out a remarkable number of outstanding violins from roughly 1500 to 1750. Can modern luthiers produce instruments that match or exceed the quality of the ones made by the Old Italians? That question is debatable, partly because of the aforementioned paradox, and partly because Cremona violins draw the interest of collectors who are willing to spend millions of dollars for them—the monetary value of those heirlooms likely boosts their perceived musical quality.

For Kameshwar Wali, however, the answer is certain. In *Cremona Violins: A Physicist's Quest for the Secrets of Stradivari*, he attempts to argue Stradivari's superiority, but the evidence he brings is anecdotal, lacking in physics, and formulated in undefined terminology: "The *general consensus* is that [modern violins] do not come close to reproducing the *distinct voices*, *carrying power* and *responsiveness* of the instruments of the old masters" (p. x, italics mine). What Wali does deliver on is an introduction to the work of William F. "Jack" Fry, the physicist in the book's title.

Fry spent most of his career as a high-energy particle physicist at the University of Wisconsin–Madison. However, half a century or so ago he became interested in what makes a good violin good. The theories and models he developed are quite elaborate, but as far as I know, he never published anything on the subject in a refereed scientific journal, nor has his work awakened much interest among professional violin makers. In fact, I think many people find it difficult to reconcile Fry's ideas on violin acoustics with his respectable career as a physicist at a major university.

However, talking coherent physics is not a prerequisite for being a good violin maker, since the proof of a violin is in the playing. Fry knows that, and so he sought out violinist Rosemary Harbison; a session with her is one of the items on a DVD that accompanies *Cremona Violins*. Fry and Harbison start out



by testing a mediocre violin: Harbison plays a few passages and tries to describe what is wrong with the instrument. Fry interprets according to his model and, using a tool that he developed, proceeds to remove microscopic amounts of wood from inside the top plate. Harbison plays again, noting improvement and commenting on what remains to be modified. The cycle repeats until finally she says, "You're done! It's now an excellent violin."

Impressive as that demonstration may be to a novice, my own observation is that during the entire session little changed, except Harbison's playing. For example, she complains at first of the scratchiness of the sound; the next time around she places her bow farther from the bridge and lightens her initial bow pressure. So what may seem like a proof of Fry's ideas looks to me more like an exercise in mutual hypnosis.

The session does offer lessons about the very essence of science: A scientist need not be the supplier of the data (in this case, it is the violinist; in others, an inanimate device) but rather the evaluator and interpreter of that data. In judging a report like Harbison's, a competent referee might look for evidence that she was not acquainted with other violinists' opinions of the instrument, but had been informed that others were, or would be, consulted, and that she was not exposed to the presence (let alone the conversation) of any person who may have worked on that violin. Without such precautions, I would not accept her testimony as scientific data.

Cremona Violins is poorly written and edited. Apart from the first two chapters, which are journalistic and historical in nature, the book is all about Fry, whom the author accepts totally at face value. As such, it forms an interesting documentation of one of science's notable aberrations.

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The Eerie Silence

Renewing Our Search for Alien Intelligence

Paul Davies
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2010. \$27.00 (241 pp.).
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After faltering in the latter part of the 20th century, the search for life and

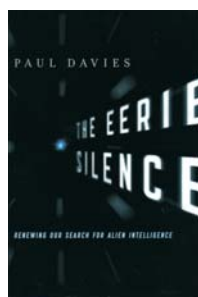
intelligence beyond Earth has quickened in the past decade. Hundreds of exoplanets have been sighted; the discovery of “extremophiles” on Earth implies that life might exist even in quite inhospitable exoplanetary environments; and the Allen Telescope Array, managed by the SETI Institute and the University of California, Berkeley, surveys the center of the galaxy for radio messages from aliens. Exolife hunters now argue that perhaps their search should focus on Mars, Titan, or Europa. In short, a new era in the search for extraterrestrial intelligence is upon us.

Giuseppe Cocconi, Freeman Dyson, Enrico Fermi, Philip Morrison, and other important thinkers paved the way for the contemporary search for extraterrestrial intelligence (SETI). Paul Davies, a scientist with roots in cosmology and director of the Beyond Center for Fundamental Concepts in Science at Arizona State University, aims to refocus the quest with *The Eerie Silence: Renewing Our Search for Alien Intelligence*; it is one of the most interesting books on SETI since the revised edition of *We Are Not Alone: Continuing the Search for Extraterrestrial Intelligence* (Plume, 1994) by legendary *New York Times* science reporter Walter Sullivan.

Many physicists don't think SETI is “true” science. Davies addresses that concern head-on in his preface, noting that “the subject of SETI is speculative to a degree far beyond that of conventional science. It is wise to take any discussion of alien civilizations with a very large dose of salt. But retaining a robust scepticism need not prevent us from approaching SETI in a methodical and penetrating way, informed by the very best science we have.”

Davies characterizes the reach of SETI by the pre-Allen Telescope norm—about one thousand light-years. That is a large distance, and leads one to ponder the eerie silence. That *Silence* suggests to some that we are alone, but there is a different perspective: At the 2010 Astrobiology Science Conference, the SETI Institute's Jill Tarter compared the sum of all SETI searches to a glass of water taken out of the ocean.

In addition to his passion for SETI, Davies is the principal advocate of looking for a second type of life, either a different handedness for DNA or a pseudo DNA with arsenic replacing phosphorus. He is also chair of the SETI post-detection task group for the Interna-



tional Academy of Astronautics. An accomplished science popularizer with many books under his belt, Davies has a light touch that is sprinkled throughout *The Eerie Silence*. Talking about intelligent machines, he cites Samuel Butler's comment from more than a century ago that “the machines are gaining ground

upon us; day by day we are more subservient to them”; he recalls President Bill Clinton's observation that all the information in the Library of Congress could be stored in a device the size of a sugar cube; and he translates *aerovirgula multivorans*, a faux case of a second form of life that exists on Earth, as an “unfussy little goat.”

Davies is clearly on top of current ideas on exobiology, as is evident from the excellent discussions in the book. He knows most of the players personally. Some are protégées, such as Felisa “Iron Lisa” Wolfe-Simon, an emerging star in the search for arsenic-based life. Regarding the search for intelligent life, Davies argues that the ability of humans to do astronomy and to travel through space sets a high bar for intelligence. “We are probably the only intelligent beings in the observable universe,” he muses, even as he discusses post-biological machine intelligence. Of course birds navigated by the stars long before mankind. Dogs survived space before us and perhaps domesticated us so they could sleep 20 hours a day.

Davies says a few surprising things in this otherwise excellent book. For example, he speculates that aliens might have sequestered monopoles. When it comes to missing monopoles, Alan Guth's idea of inflating away monopoles in the early universe beats the thrifty-aliens explanation hands down. Still, *The Eerie Silence* is the best and most current view of the search for intelligence and life elsewhere.

Supplemented by a reference list of 20 or so key scientific articles, most of them accessible to undergraduates, *The Eerie Silence* could constitute the backbone of a course on SETI, which along with other associated subjects in modern biology form a wonderful fabric of popular science. Else, for an interesting and engaging update on SETI, or something on which to base conversation with a friend at the local Starbucks, this is the place to turn.

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