A comparison of DARPA and Bell Labs and the contributions of DARPA's Project Vela are presented. That Robert Louis Stevenson was depressed is questioned, but his long fingers may provide other insights to his medical history. The earliest printed star charts, published around 1094, are traced to China. An apparent contradiction, that isolated sister species can have similar niches yet sister species in the same area usually have different niches, is discussed. For the education of K–12 teachers, it is suggested that, "although a [college] major in a content area is not necessary for someone to be a teacher, it is vital if he or she is going to be a *good* teacher." And how long the Sahara region has been a desert is clarified.

DARPA in the Spotlight

The management style of the Defense Advanced Research Projects Agency (DARPA), described by David Malakoff (News Focus, 3 Sept., p. 1476), is strongly reminiscent of another highly successful research organization—the old Bell Laboratories. There also, research was directed by technologically and scientifically savvy managers whose success was judged, not by their own research, but by the accomplishments of the researchers they supported. It seems odd that this model has not been more widely emulated.

Those wishing to emulate the success of DARPA and Bell Labs might consider another important aspect: freedom from the so called "peer review" that weighs down most National Institutes of Health (NIH) and National Science Foundation efforts. In the early NIH budgets, the more-or-less randomly selected study panels worked reasonably well, much like juries. The dreadful was rejected, the competent supported, and there was even a little money left over for the truly creative, which often didn't get stellar priority scores. Alas, no longer. With tight budgets, even minor disagreements in a proposal's review result in a nonfundable rating with an effective veto power in the hands of the inevitable naysayers. Few genuinely creative proposals will elicit the necessary unanimous approval. Save for efforts of a dedicated NIH staff, most innovative research proposals would never survive the peer review gauntlet. That this model of research support has survived so long is indeed dismaying.

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The list of DARPA's highs and lows in D. Malakoff's article does not include a major DARPA "high"—Project Vela—of finite value to humankind.

Project Vela, established in 1959 at President Dwight D. Eisenhower's request, was the national program for developing an adequate capability for detecting, locating, and identifying nuclear explosions, whether underground, underwater, or at high altitudes. Contemporaneously, the project provided requisite technical support to the Department of State and the Arms Control and Disarmament Agency for the Geneva-based nuclear test ban negotiations. These diplomatic efforts eventually led to the United States signing the long-sought Comprehensive Test Ban Treaty at the United Nations in New York on 24 September 1996.

As for scientific contributions, Project Vela established the World-Wide Standard Seismological Network (125 stations in 31 countries) and funded scores of research projects concerning Earth's seismicity, both natural and artificial. From this effort came a new generation of academic seismologists, most of whom are actively involved with Incorporated Research Institutions in Seismology, which has, as of January 1999, 91 U.S. institution and 34 foreign affiliate members.

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Stevenson's Fingers

A Random Samples item of 20 August (p. 1205) reports the interesting correlation between fourth-digit length and psychiatric depression recently described by Martin, Manning, and Dowrick (*1*). The Random Samples item is illustrated with an 1887 portrait of Robert Louis Stevenson by John Singer Sargent (which was reversed in reproducing). This portrait clearly shows Stevenson's hands with his slender fingers, the fourth digit the longest. The choice of Stevenson as an example of a depressed individual can be questioned. Stevenson may occasionally have been "moody," as stated, and he became transiently and understandably depressed in 1873 when he was diagnosed with tuberculosis; however, his constant literary productivity and genial spirit throughout his subsequent years make a diagnosis of depressive illness most unlikely. In his famous words, "Glad did [he] live."

Stevenson's fingers, so elegantly portrayed by Sargent, are, however, of potential interest to medical historians for another reason. Stevenson had tuberculosis (*2*), but some have questioned this diagnosis and have suggested that his recurrent symptom of spitting up blood from his

John Singer Sargent's portrait of Robert Louis Stevenson (printed here in its proper orientation).

lungs was due to bronchiectasis (*3*). However, bronchiectasis is commonly associated with clubbed fingers, which Sargent's portrait demonstrates Stevenson did not have; tuberculosis is not or only rarely associated with clubbed fingers.

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3. S. Taylor, "Dead man's chest," *RLS Club News*, March 1996.

Support for Structural Genomics and Synchrotrons

The recent News Focus article by Robert F. Service (27 Aug., p. 1342) about the growing importance of synchrotrons in protein crystallographic data collection does not include a number of details about the support programs of the National Institute of General Medical Sciences (NIGMS). The new NIGMS initia-

tive in structural genomics is much broader than described in the article. Structure determination, by crystallographic or nuclear magnetic resonance techniques, is a crucial component of this structural genomics initiative, but the program supports all components of this new field, including high-throughput sample preparation and computational studies. The recently announced NIGMS initiative is intended to support three to six research centers, each costing up to $3 million annually. These research centers will contain the facilities to perform all the experimental and computational tasks of structural genomics and to test strategies for high-throughput operations, and they will serve as pilots for large-scale research networks of the future. In addition, methodology and technology development of individual components of structural genomics will be supported through individual research grants, program projects, and small-business innovation research awards. More information can be found on the NIGMS Web site at www.nih.gov/nigms/funding/psi.html

Regarding the discussion of synchrotron support, the NIGMS has long supported individual research projects involving synchrotron data collection, but has not supported beamlines directly. This year, however, the NIGMS has provided supplementary funds ($7 million) for five U.S. synchrotrons to increase beamline staff and to purchase detectors and x-ray optics in order to serve the growing needs of scientists in structural biology. In addition, the NIGMS and the National Cancer Institute are currently planning the future development of new beamlines at the Advanced Photon Source at Argonne National Laboratory for general users in this field.

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Conserved Ecological Niches

In their report "Conservatism of ecological niches in evolutionary time" (20 Aug., p. 1265), A. T. Peterson *et al.* demonstrate that geographically isolated sister taxa show little differentiation in ecological niche. Their results imply that ecology diverges slowly in allopatry (the geographic isolation of species), and the authors therefore conclude that speciation most commonly occurs without significant ecological change. However, this conclusion seems to contradict the observation that sympatric sister taxa (species living in the same or overlapping locations) generally do show divergent ecology. Indeed, many sympatric ecological races are so closely related that hybridization still occurs regularly (*1*).

We suggest two possible explanations for this discrepancy. First, as mentioned in the News of the Week article by Bernice Wuethrich (20 Aug., p. 1190), the analysis considered only four physical factors in defining the niche of each species. Certainly, biotic factors such as feeding strategy, host plant use (in the case of butterflies), mutualisms, and predation are also important in defining the niche of a species. Thus, it may be that the analysis was simply too crude to show ecological divergence over a relatively short time scale.

Alternatively, if Peterson *et al.* are correct and ecological divergence does in fact proceed rather slowly in allopatry, then we need another explanation for the frequent occurrence of sympatric, ecologically divergent sister taxa. Sympatric speciation, when it occurs, is likely to proceed rapidly because disruptive selection plays a direct