is a bit of a mystery" how they got into the rock.

As further argument against the tampering charge, Dorn claims that doctoring samples with different-aged contaminants would make it difficult to consistently bias results and "would be insane" if cheating were his intent. Finally, he cites a 1995 double-blind test in which he and geologist Alan Watchman of James Cook University in Townsville, Australia, independently dated Portuguese rock art using varnish-trapped organics—and got similar results. However, they concluded that the art was about 4000 years old—and most archaeologists put it at about 18,000 years old. Dorn says that the Portuguese results, and his realization that his samples held different-aged materials, made him recognize "fatal flaws" in his method.

But Dorn and his challengers differ on the timing of this admission. Dorn says he began to have concerns about the method as early as mid-1995; David Whiteley, a colleague from Dorn's UCLA days and now a consulting archaeologist with W & S Consultants in Simi Valley, California, confirms that Dorn discussed the problems with him then. "My impression was that he was attempting to broadcast his doubts widely," says Whiteley. In mid-1996, Dorn says he sent a note about the method's flaws to *Nature*; after it was rejected, he published an article in the December 1996 issue of *La Pintura*, the newsletter of the American Rock Art Association. It details "critical mistakes on the radiocarbon dating of organic matter associated with rock varnish. Enough data has accumulated to put the brakes on the use of this technique." He sounded a narrower cautionary note in a March 1997 *Antiquity* paper, which described "fundamental problems in the use of radiocarbon dating" at the Portuguese sites.

Beck and Broecker, however, say Dorn began publicly backing away from his technique only after he learned of Beck's concerns in August 1996. And Malotki says that Dorn didn't warn him of problems with the method even though Malotki was preparing their paper in the spring and summer of 1996. Dorn flatly contradicts this and says that he did indeed tell Malotki that the paper needed revision. Finally, in September 1996, Broecker says he forwarded the team's preliminary findings to the NSF Inspector General's office. NSF responded to him in late 1997, asking for a list of researchers qualified to review the issue. And in April, ASU moved ahead with its own inquiry, asking Beck to testify before a review committee.

Some researchers who know Dorn say that they don't believe the charges of tampering. Whiteley, for example, calls them "absurd." Ken Hedges, editor of *La Pintura* and an archaeological curator at the San Diego Museum of Man in California, says that "most of us who know Ron don't think they hold any water."

No matter how the NSF and ASU inquiries turn out, Dorn agrees that dates included in more than 20 of his publications over the last dozen years must now be viewed with skepticism. However, many archaeologists have long been skeptical of rock art dating anyway, notes archaeologist Benjamin Swartz Jr. of Ball State University in Muncie, Indiana. Thus, although Dorn estimated some southwestern rock art to be more than 15,000 years old—implying an early peopling of the Americas—"his dates weren't any better than any others," Swartz says. "The general consensus remains that the earliest [North American] rock art is about 12,000 years old."

The controversy is likely to cast a cloud over rock-varnish science, says geologist Fred Phillips of the New Mexico Institute of Mining and Technology in Socorro, who published a number of papers with Dorn. Says Phillips: "I would not submit any type of proposal involving rock varnish at this point."

–David Malakoff

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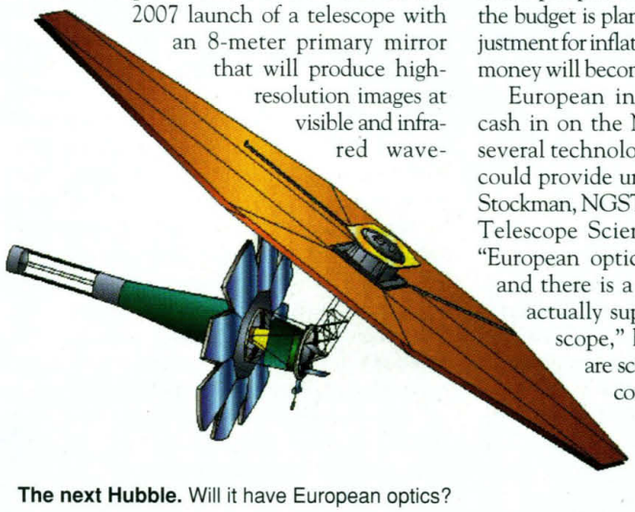
ASTRONOMY

ESA Commits to Hubble's Successor

The prospect that the United States and Europe will collaborate on building the Next Generation Space Telescope (NGST)—the successor to the Hubble Space Telescope—moved a step closer last week. During a meeting in Liege, Belgium, European and American astronomers and space scientists honed their plans for the $900 million instrument, and Roger Bonnet, director of science at the European Space Agency (ESA), announced that the agency has earmarked about $200 million from its science budget to collaborate on the NGST. Bonnet said ESA will soon start discussing the collaboration with NASA.

Current plans for the NGST call for the 2007 launch of a telescope with an 8-meter primary mirror that will produce high-resolution images at visible and infrared wavelengths. Its sensitivity will be several orders of magnitude greater than that of ground-based telescopes. Rather than orbiting Earth as Hubble does, it will observe space from Lagrangian point L2, a position on the Earth-sun axis about 2 million kilometers further from the sun than Earth. Compared to a similar meeting held at NASA's Goddard Space Flight Center in Greenbelt, Maryland, last year, the scientific goals of the mission were much more focused this time, reports Piero Benvenuti, NGST project scientist at ESA's European Coordination Facility for the Space Telescope in Garching, Germany. The NGST will serve to "discover the first galaxies and the first star-formation processes in the so-called 'dark ages' of cosmology, and also star formation in our galaxy," he predicts.



NASA

The next Hubble. Will it have European optics?

ESA's contribution to the NGST will put a severe strain on the science program's already stressed budget. ESA hopes to save money by putting two future astronomy missions—the FIRST and Planck telescopes, which will survey space at infrared and millimeter wavelengths—on a single launcher around 2007, but future prospects still look grim. No increase in the budget is planned, and there will be no adjustment for inflation. "We cannot say when this money will become available," says Benvenuti.

European industry, however, hopes to cash in on the NGST program. "There are several technological areas where Europeans could provide unique assistance," says Peter Stockman, NGST project scientist at the Space Telescope Science Institute in Baltimore. "European optics manufacturing is superb, and there is a serious possibility they can actually supply the optics for this telescope," he says, adding, "other areas are science instrumentation and, of course, the Ariane 5 launcher."

European astronomers also hope to reap rewards, just as they have done in the Hubble collaboration in which ESA contributed instruments for the telescope. For the Europeans, "the minimum agreed return on Hubble is 15%, but we are getting over 20%," says Benvenuti. The current collaboration agreement between NASA and ESA on the Hubble will end in 2001. Bonnet said at the meeting that the continuation of this agreement is now linked with the NGST.

–Alexander Hellemans

Alexander Hellemans is a science writer in Naples, Italy.