

Shroud dating isn't ironed out

A stubborn wrinkle has developed in plans to date one of Christendom's best-known relics, the Shroud of Turin, a linen cloth that some believe is imprinted with the bloody form of Jesus. When carbon-14 dating experts met in Turin with church officials last fall, they specified that six postage-stamp-sized samples would be taken from the shroud to be tested in seven labs, using accelerators and radioactivity counters (SN: 4/25/87, p.265). The pope apparently agreed to this protocol in February and told the Archbishop of Turin that the testing could commence.

However, in an April interview in the Turin newspaper, the Archbishop's science adviser indicated that not more than three samples could be taken. This was confirmed three weeks ago when Garman Harbottle at Brookhaven National Laboratory in Upton, N.Y., and a co-coordinator of the Shroud of Turin Research Project received a letter from the Archbishop also informing him that only three labs — at the University of Arizona in Tucson, Oxford University in England and the Technical University of Zurich — would be involved. Moreover, only accelerator dating would be allowed, even though Harbottle notes that counters are a "more mature" technology. No reasons for these changes were given.

The protocol group had originally chosen seven labs on statistical grounds. In a recent test on other cloths, one of the six labs involved mistakenly arrived at a date that was off by 1,000 years. With only three labs, says Harbottle, it would be difficult to pick out the erroneous values. "Whatever the date that comes out, there are going to be people who aren't going to like it no matter what you do," he says. "So you have to have a result that is so secure no one could quarrel with it. What they've done now is push it back into a realm where everyone can quarrel with it. They're just asking for trouble."

Ozone hole updates

The National Science Foundation (NSF) announced last week that the second ground-based National Ozone Expedition (NOZE II) has corroborated NASA's earlier airborne and satellite results (SN: 10/10/87, p.230). This, says NSF, strengthens the conclusions of last year's NOZE team that human-made chlorofluorocarbons are implicated in the thinning of stratospheric ozone over Antarctica each spring.

One new measurement taken this year used lidar (laser radar) to count the aerosols that attract polar stratospheric-cloud formation. Scientists believe these clouds play a crucial role in ozone depletion by providing the surfaces necessary for reactions, which liberate ozone-attacking compounds. "What was really remarkable is that the polar stratospheric clouds were an omnipresent feature," says NOZE team leader Susan Solomon, from the National Oceanic and Atmospheric Administration in Boulder, Colo. "There seem to be an awful lot of particles down there — by far, more than we expected." A main focus of NOZE III will be to study the composition, distribution and chemistry of the aerosols in detail.

Also last week, Peter E. Wilkniss, director of the NSF's division of polar programs, told the Senate Environment and Public Works committee that plans are underway that would give ships and planes safe year-round access to Antarctica — in part so that researchers can study the onset of the hole as early as July. He also indicated that in the spring the depletion of ultraviolet-absorbing ozone has been so great that he is concerned for the safety of workers in Antarctica. Solomon agrees there is a need for concern. But "a bigger question," she says, "may be what the effects are on the Antarctic ecosystem." To help address this question, researchers at Palmer Station, Antarctica, have begun the first quantitative assessment of the effects of ultraviolet radiation on phytoplankton.

Preparing to pedal into history

Next spring, an experienced, trained cyclist will step into a spindly, diaphanous aircraft in preparation for a historic flight. Starting from the rocky shores of the island of Crete in the Mediterranean, the pilot will pedal the aircraft about 70 miles across open water to the Greek mainland. If all goes well, the pilot will set a new record for the longest distance flown entirely under human power.

Researchers and students at the Massachusetts Institute of Technology last month rolled out the aircraft that is to make the flight. Named Daedalus, in honor of a mythical Greek character who donned wings and is said to have made a flight over a similar course in ancient times, the plastic-skinned, foam-ribbed aircraft weighs only 68 pounds, despite its 114-foot wingspan. The plane itself is about 35 feet long and is powered by vigorously pumping a set of bicycle pedals connected to rods that turn a 12-foot-long propeller.



Donna Covey/MIT

Daedalus pilots and trainers (from left): Eric Schmidt, Glenn Tremml, Kanellos Kanellopoulos, Greg Zack and Lois McCallin. Trainers Tremml and McCallin were pilots of the Light Eagle and between them hold four world records for human-powered flight.

Although it has a longer wingspan, the Daedalus is even lighter than its prototype, the Light Eagle, which earlier this year traveled 37.2 miles to set the current world record for human-powered flight. That flight lasted 2 hours, 13 minutes and 14 seconds. The aircraft cruised along at roughly 16 miles per hour barely 6 feet above the desert floor at the Edwards Air Force Base in California.

The construction of the Daedalus marks the beginning of the third and final phase of MIT's Daedalus project (SN: 4/12/86, p.229). Three athletes, all experienced amateur cyclists, have now been selected to train as pilots. Although only one cyclist will attempt the four-hour flight, a team of three athletes, working in shifts, is needed so that one would be ready to take off at a moment's notice when weather conditions are favorable.

"Although all three candidates are skilled athletes," says John S. Langford III, project manager, "none has extensive piloting experience. Training them as pilots of an advanced human-powered aircraft is thus our top priority in the weeks to come."

Weather is not the only uncertainty facing the project. Another major concern is providing a way to keep the pilot cool and supplied with nutritious liquids to replace the three or more pounds of fluid lost during the flight. Only about 20 percent of the energy expended by the pilot goes into powering the plane. The rest of is given off as heat.