Biology

Entombed beauty provides syphilis clues

Syphilis probably became widespread in Europe around the 16th century, but its true origins and early distribution remain a matter of heated debate among medical historians. Paleopathologists seeking the roots of sexually transmitted diseases have had only tissue-scant skeletons upon which to perform their biological analyses, leaving them longing for some fleshier specimens. Now, researchers at the University of Pisa, Italy, have such a find in the mummy of Maria d'Aragona.

Some 450 years before her 1984 exhumation from a Naples abbey, this Renaissance noblewoman — famed for her beauty — mingled in Italy's intellectual and religious circles, even rubbing elbows with Michelangelo's friends. But those elbows were rotting with tertiary syphilis, report Gino Fornaciari and others in the Sept. 9 LANCET.

On both arms of the preserved beauty, examination revealed ulcers testing positive for the spirochete *Treponema pallidum*, which causes syphilis. The findings constitute the first identification of treponemes in soft tissues of ancient human remains, say the researchers, who confirmed the diagnosis with electron microscopy and other techniques. X-rays revealed no skeletal irregularities, pointing to the difficulty of making such a diagnosis from skeletal remains.

The mummy provides a few paleotherapeutic clues, too. One ulcer was wrapped in a linen bandage intertwined with ivy leaves. And nestled within the ulcer, the researchers say, "lay an irregular spherical object with an intense aromatic smell when cut."

Precious metals: Sutures with silver . . .

Surgery patients in the 1990s may find their wounds stitched with silver-plated sutures carrying tiny electrical currents, if ongoing experiments live up to their promise. Data presented at the American Chemical Society's fall national meeting this month by polymer chemist Chih-Chang Chu of Cornell University indicate that metallic silver, when chemically bonded to nylon thread, kills at least seven types of cultured bacteria commonly responsible for wound infections. Moreover, Chu and his colleagues showed that they could significantly enhance the thread's bactericidal properties by directing a current of a few millionths of an amp through the silvered strands. They envision patients wearing direct-current generators smaller than a Walkman to provide the curative electricity to their surgical sutures. With the ability to crank up the current for more infection-prone incisions, Chu says, the system might prove superior to fixed-dose, antibiotic-drenched sutures with which others are experimenting.

The researchers, who foresee human trials within about five years, now await federal funding to begin experiments in mice. Chu says the sutures should cost about the same as other biocidal sutures so long as the price of silver — now relatively low — "doesn't go through the ceiling."

. . . and gumshoes with gold

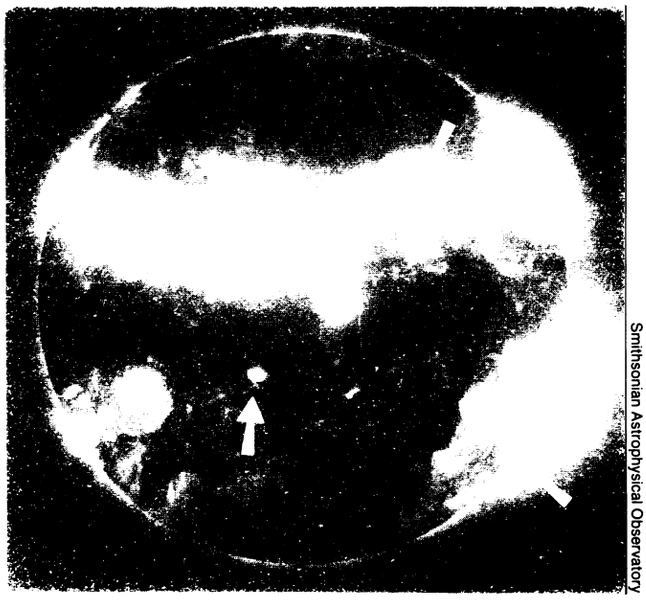
Law enforcement officials say a new method for enhancing and developing fingerprints left by careless criminals reveals the incriminating ridges with arresting clarity. The technique "works on just about anything" — even surfaces that resist traditional dusting techniques — says its developer, George C. Saunders of the Los Alamos (N.M.) National Laboratory. Gold particles suspended in a buffered citric acid solution bind to traces of skin-secreted proteins; a final bath in a silver solution enhances the image.

"It's the only method that works on the adhesive side of tape," says U.S. Secret Service agent John W. Piper. "This is a problem for the bad guys because they wrap their dope, counterfeit money and bombs in tape."

Space Sciences

Snapping the sun's sharpest X-ray image

Soaring to 150 miles above the White Sands Missile Range in New Mexico, a NASA sounding rocket on Sept. 11 carried an instrument that took what its chief scientist calls "the sharpest X-ray image so far of a solar flare and the sun's corona."



Smithsonian Astrophysical Observatory

The photo, one of 40 taken by an instrument called the Normal Incidence X-Ray Telescope, shows details as small as 1 arc-second — about twice the resolution of previous images. "I did not expect that the corona would everywhere be structured at this resolution," says Leon Golub of the Smithsonian Astrophysical Observatory in Cambridge, Mass. He had anticipated seeing only "fuzzy loops containing hot plasma, along with sharply defined regions of localized heating." Instead, he says, the images "now look as if somebody adjusted the focus knob. Going from 2 to 1 arc-sec shows us an enormous amount of detail we've never seen before."

The photos reveal bright, active regions with details as small as the telescope's resolution limit. These areas represent temperatures as high as 2 million to 3 million kelvins, their sharpness limited only by the clumping of the grains in the film emulsion. A medium-sized solar flare (top arrow) emerging from such a region is probably as hot as 10 million kelvins. A solar prominence, too cool to emit X-rays, outlines a cavity in the corona (lower right arrow). Small, bright features (lower left arrow) appear as portions of loops, and faint coronal plumes show in the north polar region.

Golub notes that Eberhard A. Spiller of the IBM Thomas J. Watson Research Center in Yorktown Heights, N.Y., produced the telescope's mirror, which had to have the capacity to accurately reflect the short (63.5-angstrom) wavelengths of X-rays emitted by multiply ionized iron.

An important factor was the need to time the rocket's launching so that its 5-minute observing period could take place when the sun was active at the proper wavelength. The National Oceanic and Atmospheric Administration's Space Environment Laboratory in Boulder, Colo., helped by providing measurements directly from the GOES 6 and 7 satellites in "real time." Researchers can seldom time rocket firings to fit rapidly changing conditions such as those on the sun. But in this case, Golub says, "the missile range allowed us to wait until T minus 2 minutes, and hold." This meant the rocket could go through most of its countdown, then pause until the sun looked just right, and take off with only 2 minutes' notice.