

an animal and throw it into relief.

Few other cave-painting sites contain depictions of woolly rhinoceroses, notes Randall White, an archaeologist at New York University who has seen a videotape made by investigators of many of the new cave paintings.

"Caves [with prehistoric paintings] tend to have one thematic animal, and it may be rhinos at this location," White suggests. "There's no indication that rhinos were hunted or eaten."

Other artwork at the new site includes tracings of human hands and various geometric signs, such as large dots and bars. One panel shows three horses' heads, two painted yellow and one red, next to red dots that form several semi-circles and a number of bars.

The meanings attached to such symbols remain unknown, White says.

Three people, including a government official who helps guard prehistoric sites in the region, uncovered the art gallery while exploring gorges known for their ancient, decorated caves. They cleared

rocks from an opening that emitted a tell-tale current of air and exposed a 21-foot-deep tunnel that led to the underground chambers. The tunnel had served as a chimney for the cave site, Clottes says. Natural processes have sealed off the cave's original entrance.

A network of art-bedecked chambers lay within. Some wings of this ancient art gallery cover the area of a living room, while others are as large as 70 yards long and 40 yards wide. The entire cave extends about 1,500 yards.

Investigators have found remnants of fires, pieces of flint, human footprints, and numerous bear bones on the floor of the cave. A bear skull had been deliberately placed on a thick rock in one chamber, although Clottes does not know whether this reflects a ritual practice.

Archaeologists will collect samples from the cave for radiocarbon analysis within the next few months, Clottes says. For now, he and White agree that the site is probably between 17,000 and 20,000 years old. — B. Bower

Enzyme error behind neural tube defects

Women who supplement their diet with folic acid from the time they conceive through the first few months of pregnancy reduce the risk that their baby will develop a devastating neural tube defect. A new study shows why this B vitamin may work and suggests how to identify some of the women who need it most.

The brain and spinal cord develop from a single pancake of cells that first folds into a tube. If this neural tube does not fuse completely during the first 3 to 6 weeks of human life, the brain may fail to develop fully (anencephaly), certain protective structures may fail to shield the spinal cord (spina bifida) from paralyzing and potentially lethal injury, or both.

Recent studies have also linked neural tube defects to mothers deficient in another vitamin, B₁₂, notes James L. Mills of the National Institute of Child Health and Human Development in Bethesda, Md. Only one chemical reaction in the body requires both B₁₂ and folic acid. This reaction recycles an amino acid that does not go into proteins (homocysteine) into one that does (methionine). Mills and his coworkers reasoned that a defect in the enzyme driving this transformation might underlie neural tube defects.

They now offer confirmatory evidence of this from a study of pregnant women in Dublin, where the incidence of neural tube defects is nearly double that in the United States. Most of the 81 women whose babies suffered such defects had significantly higher concentrations of homocysteine in their blood than did mothers of 323 healthy babies born in the same hospitals.

Moreover, blood tests indicated that most women whose babies developed the neural tube defects were not deficient in either folic acid or B₁₂. The group published its findings in the Jan. 21 LANCET.

This study "is the first to really suggest a mechanism" for neural tube defects, notes Norman W. Klein of the University of Connecticut in Storrs. It also points out the value of someday screening women for a defect in homocysteine metabolism, he says.

Mills and his colleagues say their data reinforce the idea of supplementing women of childbearing age with folic acid and probably vitamin B₁₂. Klein argues instead that "what [women] need is methionine" — an essential amino acid most abundant in animal proteins. For now, the Food and Drug Administration is reviewing plans to ensure that women receive enough folic acid by requiring — perhaps as early as this year — that manufacturers add the vitamin to all "enriched" grain-based products. — J. Raloff

New alloys: Mixing it up on metal surfaces

Normally, gold and nickel don't mix to create an alloy. The atoms of these two elements are sufficiently different in size that they tend to remain segregated.

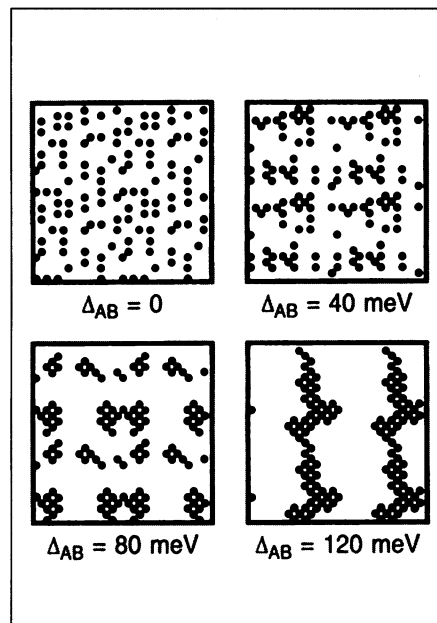
However, researchers have discovered recently that pairs of incompatible elements can readily mix to form an alloy — as long as the mixture is confined to a single layer of atoms on the surface of a crystal of one of the two metals. These novel, two-dimensional alloys include mixtures of gold and nickel on a nickel surface, silver and platinum, antimony and silver, and sodium or potassium and aluminum.

"The fact that you can form an alloy at a surface of something that won't form one in the bulk is interesting and striking," says Jerry D. Tersoff of the IBM Thomas J. Watson Research Center in Yorktown Heights, N.Y. "It gives you the opportunity for creating materials that couldn't otherwise exist."

Now, Tersoff proposes that such surface alloys are likely to form whenever a mismatch of atomic sizes is the main factor determining the behavior of a mixture of two elements. He describes his theoretical argument in the Jan. 16 PHYSICAL REVIEW LETTERS.

"This explains why the phenomenon is surprisingly common," Tersoff says. Remarkably, the same effect that suppresses intermingling within a crystal — atomic size mismatch — favors intermingling at its surface.

Mixing atoms of different sizes creates mechanical strains in the material, and the atoms tend to arrange themselves to minimize the strain energy. Tersoff's calculations and computer simulations show that on a surface, mixing represents



Computed distribution of gold atoms (black dots) within a gold-nickel surface layer. When only atomic size differences matter, gold atoms disperse themselves as widely as possible (top left). As the tendency of gold atoms to segregate increases, they form larger clusters on the surface.

a good strategy for reducing the strain.

For example, to minimize strain, gold atoms resting on a nickel surface tend to stay as far apart from each other as possible (see illustration). This allows nickel atoms to fill in the gaps to create a surface alloy.

These alloys may prove useful in processes such as catalysis. — I. Peterson