ECOLOGY

Chernobyl: Life Abounds Without People

After the Chernobyl nuclear reactor almost melted down 9 years ago, people fled that section of Ukraine, which is contaminated by some of the highest background radiation levels in the world. This exodus now appears to have been—for the wild boar, otters, wildfowl, and rodents left behind—a boon more powerful than the bane of radiation.

The animals are experiencing a population boom—although they are also paying a genetic price in terms of mutation rates. But for now, "the benefit of excluding humans from this highly contaminated ecosystem appears to outweigh negative factors associated with radiation," says Ron Chesser, an ecologist at the Savannah River Ecology Laboratory in South Carolina who has been studying the Chernobyl area. He and his colleagues reported their findings last week in Montreal at the annual meeting of the Society for the Study of Evolution.

After the accident, more than 100,000 people living around the plant were evacuated. Radiation levels at sites within 10 kilometers of the plant are as high as 100 millirads per hour—about 3000 times higher than background levels in the southeastern United States near the Savannah River nuclear reactor.

This abandoned land has become a focus for research on the ecological effects of radiation. And during the past 3 years, scientists have begun to notice that animals are thriving. "The wild boar population has grown 10-fold over this time," says Vitaly Gaichenko, head of the zoology department at the Ukrainian National Academy of Sciences. Birds, deer, and rodents are also having a field day—as are predators such as wolves. And this probably isn't the effect of immigration: Most of the contaminated zone is fenced.

This fits with observations of other human-free zones, says ecologist John Lawton of Imperial College, London: "The fenced zone along the border between East and West Germany during the Cold War boosted animal populations, notably the wolf."

Yet the animals have not entirely escaped the consequences of a radioactive landscape. "They are highly contaminated," says Chesser. He and zoologist Robert Baker of Texas Tech University have been examining sequences of the *cytochrome b* gene, which is found in mitochondria, cellular organelles, in two species of voles inside and outside the Chernobyl zone. Comparing these genes to reference sequences, they found a total of 46 mutations in nine animals inside the zone and only four mutations in 10 animals outside the zone. "This suggests an extraordinarily high mutation rate at Chernobyl," says Chesser.

It's puzzling, the scientists say, that a high mutation rate hasn't crippled population growth. Perhaps, Baker suggests, this downside hasn't shown up yet. "It's remarkable how healthy the animals look," he says, "but they are probably paying a price." Figuring out that reproductive cost is the next challenge.

–Nigel Williams

ARCHAEOLOGY

Portuguese Rock Art Gets Younger

Two dozen Stone Age rock art specialists couldn't be wrong—could they? After drawings of horses, ibexes, and other animals were found engraved on rock walls in Portugal's Côa Valley 2 years ago, specialists journeyed to the site, eyed the etchings, and, based on their style and content, estimated their age at perhaps 20,000 years. The site "really does look Paleolithic," contends rock art expert Jean Clottes of the French Ministry of Culture in Paris.

Looks may be deceptive. Just-completed reports from two dating experts, who used radiocarbon dating and other methods, put the engravings at less than 3000 years old. Any thought that the art could be older is "totally wrong," says Robert Bendarik, one of the researchers and the editor of *Rock Art Research* in Melbourne, Australia.

The new dates may take the wind out of a protest movement aimed at stopping a dam that would flood the Côa Valley and obliterate the engravings. Beyond Portugal, "the consequences for Paleolithic art are enormous," Bendarik says. "All Paleolithic dating is stylistic, with a few exceptions. All such sites have to be under considerable doubt now." That even includes the famous cave wall art at Lascaux in France.

Because of the dam, Portuguese authorities had asked several dating specialists to examine the engravings earlier this year. One, Alan Watchman of the firm Data-Roche Watchman in Quebec, has developed a dating method based on millimeter-thick silica "skins" deposited on engraved rock by flowing water. "Fungi and algae living on the rock surface become fossilized in these skins and can be carbon-dated, giving a minimum age for the art," he says. Skins on adjacent rock give a maximum age.

ALAN WATCHMAN

Graven error? New dating methods indicate this engraving is no Stone Age image, but a fairly modern one. (Scale is 10 centimeters.)

Even before he tried this technique on the Côa engravings, Watchman says, "several bells went off in my head saying these things are young." The images showed little weathering and had sharp edges, as if freshly incised. And although adjacent rocks had the usual silica skin, the engravings did not. They were covered only by a much thinner layer of silty brown material. Puzzled, he took samples for dating from the engravings and surrounding rocks.

He was still puzzled when the numbers came back: They ranged between about 650 and 7000 years, with the skins on the engravings actually older than the silica on surrounding rock. Microscopic examination of the silty material pointed to an explanation: It contained particles of graphite weathered out of the rock. Graphite is formed from ancient carbon, and it made the engravings look anomalously old.

A clue to their true age came when Watchman learned that the remainder of the brown layers consisted of silt probably eroded from the hillsides above when farmers began cultivating. That happened about 1700 years ago—which he thinks is the maximum age of the images, nowhere near a Stone Age date.

Bendarik has come to similar conclusions—although with a maximum age of 3000 years—from microscopic examination of the etchings. Among other findings, he saw marks of metal tools—U-shaped marks with a consistent depth—on some engravings. Stone Age artists, of course, used no metal.

Even Clottes is somewhat swayed by this evidence. "The fact that different specialists working independently of each other with different methods reach similar, if not the same, results makes the results much more believable," he notes. Still, stylistic dating for some of the well-known cave sites is viable, he thinks. But for the Portuguese site, the flood of bad news may be just beginning.

–Joshua Fischman