

# CSU researcher delving into mystery of DNA packaging

## Scientist uses X-rays to create pictures of how gene materials work together

X-By SONJA BISBEK WULFF  
The Coloradoan

Imagine trying to roll up a six-foot-long computer tape so it fits inside a spherical compartment less than a thousandth of an inch across.

Impossible, right?  
Wrong.

All the cells in your body did just that when they packaged your genetic material.

Now, Colorado State University professor Karolin Luger is trying to figure out how.

"The fate of every cell in every organism ... depends on the ordered read-out of the genes," Luger said, in a lilting accent.

"It's like a really complicated building plan," she said. "If that plan isn't read accurately and at the right time, we have a problem."

Luger, 36, joined the Depart-

ment of Biochemistry and Molecular Biology six months ago after eight years of post-doctoral research in her native country, Switzerland.



She is one of 15 U.S. scientists selected for the 1999 Searle Young Scholars Program, which will provide \$60,000 each year for the next three years to help fund her research at CSU.

In her previous work, Luger used a technique called X-ray crystallography to determine the three-dimensional position of every atom in a piece of DNA wrapped around a protein spool — the way scientists think it occurs in living cells.

But understanding how the cell packages the DNA is only part of the mystery, she said.

Cells constantly need to access information at highly specific locations in that DNA, Luger said.

When people get a bacterial infection, for instance, their cells may send a protein to find the tiny section of DNA that tells them how to fight the problem

bacterin.  
But that's not an easy task when the DNA is wrapped so tightly, Luger said.

"It's like looking for a needle in a haystack," she said.

Luger and her research team — two post-doctoral researchers, a graduate student, an undergraduate and a computer expert — are trying to better understand this process as well.

The team's first step is to make a crystal containing billions of tiny protein-DNA complexes. Then, the group will zap the crystal with X-rays and analyze the resulting images to piece together a three-dimensional picture of how the protein and DNA interact.

The X-ray crystallography machine used in the process, cost

### Did you know?

If you strung all your DNA end to end, it would wrap around the Earth 100,000 times.

\$500,000 and is a first for CSU. The Chemistry Department has a similar machine, but it can't handle complexes as large as the ones Luger is studying.

"The crucial point here is that if the wrong regions (of DNA) are read off at the wrong time, the result can be cancer or a developmental disorder," Luger said.

Luger has gotten initial positive results, which she will use to garner larger, more long-term grants to support her work.



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**CLOSER LOOK:** Professor Karolin Luger of Colorado State University adjusts a X-ray crystallography machine used in the study of DNA.

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