# Science Blog

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**Study reveals enzyme that behaves like a 'quantum inchworm'**

Little is known about the actions of the tiny, critically important machines that maintain DNA, the chemical code coiled inside all living cells. Now UC Davis researchers have peered under the hood of one such machine to reveal new details about the workings of these essential housekeepers.

RecBC is an enzyme that works inside the E. coli bacterium. This nanomachine, one one-billionth of a meter in size, is a molecular motor. It moves along DNA, separating the two sides of the ladder-shaped DNA so that its rungs can be repaired, their code can be read or they can be paired with another DNA partner.

Most DNA investigators expected that RecBC would move along one to five rungs, or nucleotides, at a time -- a respectable step size for enzymes. But in Thursday's issue of the journal Nature, microbiologists Stephen Kowalczykowski and Piero Bianco report that RecBC has the longest stride yet seen. It is an enzymatic Paul Bunyan, striding ahead 23 rungs every advance.

That kind of workout burns a lot of fuel, and the new finding will require researchers to think differently about how such

enzymes use cellular energy sources.

The researchers also found that RecBC has a unique gait. Its front end completes its 23-rung advance, anchors itself to the DNA, and then pulls its back end forward, separating the DNA behind it in a plowlike fashion. Because of this novel mechanism, the researchers dubbed RecBC the "quantum inchworm."

"Overall, understanding this protein will further our understanding of how to maintain chromosomes and to correct genetic defects," said Kowalczykowski. On a smaller scale, literally, the new findings may help engineers who are trying to build nanomachines for jobs such as delivering new genes to DNA or drugs to specific genetic targets in cancer cells, he said.

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