The discovery of the enzyme that appears to convert 5mC to hmC is "critical," Heintz says. "It says that this modification is not a random accumulation of chemical damage without any biological process controlling it." To the contrary, it implies that hmC is performing some sort of biological function.

"The fact that [hmC bases] exist means they have some beneficial function," Bestor says. "In principal it could do anything. Every modification increases the information content of DNA." —Jef Akst

Startup on the cheap

A faded red Volkswagen dune buggy sails into the parking lot of a forgettable brown cinderblock building in Seattle with Johnny Stine at the wheel. Stine's transportation and vision for his biotechnology lab are straight out of the 1970s, when Genentech started in a warehouse, and Bill Gates and Paul Allen created Microsoft on a shoestring. Now, Stine is trying to do the same with North Coast Biologics. Most companies need only a coffee pot and eager minds to get started, but Stine's, which makes monoclonal antibodies, needs flow hoods, CO_2 incubators and high-throughput robotics. To get these pricey items, he has taken a bargain-hunting, do-it-yourself approach that fits today's new frugality.

In the cinderblock building's aggressively unglamorous storage garage, which doubles as a cell culture room, water stains on the cement floor are paired with tidy patches in the ceiling above. The nearly 100 square-meter space is all bare-bones basics, with nothing more extravagant than a black fabric sofa that wouldn't be out of place in a college dorm.

Stine, 45, isn't a born penny-pincher. With what he calls a "PPhD" (partial PhD) in cancer biology, he worked as a scientist at the biotechnology firms ICOS and Abgenix in the boom days, in "palaces," he recalls. His first start-up company had a typical structure, financed and controlled by venture capitalists. This time, Stine wants to make all the decisions himself. He used $20,000 of his own money to rent and renovate a neglected space, bargaining the owner down from $1500 to $1000 a month,

in return for Stine fixing the leaky roof himself. He "Shop-Vac'ed out about a million spiders," then he and a carpenter friend patched and painted to create the lab and office space.

Next, Stine needed furnishings. For an antibody lab, that means centrifuges, PCR machines, freezers and chemicals. Many scientists turn to giant suppliers like VWR Scientific and Sigma-Aldrich. Stine turned to eBay and Craig's List. His biggest "score" was a used automated assay robot that retails for over $90,000 that he got for $2200 from eBay, plus an upgrade with a $500 used part (some assembly required). Using eBay, scientists can save thousands when outfitting a cell biology lab, Stine says. Buying thousand-dollar equipment from a total stranger based on online photos seems risky, but Stine checks the customer ratings carefully and says, "so far, I haven't gotten any lemons." He once bought a fume hood that looked right from the picture, but the venting was wrong for the building and now it's sitting out in the parking lot. Even with the occasional mistake, Stine estimates that using the discount approach, he got his company up and running for only $40,000 and now operates at 1/30th of the usual industry cost.

Stine's approach sounds groundbreaking, but really, he is just taking a tried-and-true model to an extreme, according to Phil Ness, president and CEO of WashingtonLifeScience.com, a local website for biotechnology news, jobs, events, and educational materials. "The companies you read about are those that have lots of money and dedicated PR, but that's not how the bulk of companies operate," says Ness. Small life science laboratories often "hit the university auctions for used equipment and use Craig's List. It's more common than not." Still, Stine "is the only guy I've ever heard of who remodeled his own facility," Ness laughs.

For $40,000, you can launch a biotech.

In turn, North Coast Biologics says it is passing on the savings, offering cheaper prices through a combination of low overhead and a technique to generate monoclonal antibodies without a hybridoma step. Stine says that for less than $10 million, he can make an antibody drug that would otherwise cost a larger company $100 million. Currently, he is making therapeutic antibodies for three clients, unnamed because of confidentiality agreements, and is in the middle of several antibody discovery projects. Business is going well enough that Stine plans to hire up to six employees and move to a larger space in the coming months. Don't expect those new labs to be any more luxurious, however, Stine predicts. "If you use your imagination and lower your tastes, you can be down here in a garage, getting stuff done." —Chris Tachibana