

bar. Important work gets done in buttoned-up fashion in buttoned-up labs. But why not imagine science another way, they say, an approach that retains the personal spirit of the scientists involved? Why not see what happens when science is done in style? This approach is not merely an attempt to project a little hacker chic, although fashion does play a part in the appeal. Playfulness, fashion, and a direct appeal to fun all play a part in an attempt to use style to draw people toward the substance of science.

This unorthodox approach to something as traditionally buttoned down as biology catches many people off-guard. Charlie Schick, a Finnish biohacker based in Boston, described in a blog post the problem of explaining to his father what exactly he does.

“Being a biz guy, he kept asking me what was the ‘end goal’ to help him wrap his head around what would motivate folks to tinker with biology,” Schick wrote. “He wanted to know if there was a scientific goal or if there were products folks wanted to build.”

Schick, who goes by the Twitter handle @molecularist, did not have a clear answer. The talk went round and round, he wrote. Finally, Schick’s father hit upon a phrase that was as modest in describing the movement’s short-term goals as it was bold in predicting its long-term implications. He told Schick that he and his friends were trying to “increase the tinkerability” of biology.

Noninstitutional biologists are not on the brink of major scientific breakthroughs as conventionally measured. They are not about to cure cancer when an eleven-thousand-employee, \$80 billion company like Genentech has so far failed. They are not going to unleash the world’s first artificial amoeba tomorrow or graft wings onto house cats.

What they are doing is something more subtle, Schick implies, something that could make all those scenarios more plausible sooner than if biotech were left solely to the more rigid institutional patterns of innovation. Biohacking is about what Schick calls “simplifying and domesticating” biology.

And that loosening of codes would not in the biohacker vision serve

only those already in the game. Making biotech more user-friendly—whether technically, financially, or aesthetically—will ideally make it more engaging for people far outside science’s traditional institutional boundaries, Cowell says. Outsiders should be shown that they can have fun with science, can play with these tools and ideas that are treated with such gravitas, and that in doing so, they may begin to feel closer to themselves as they unlock the mysteries of their own organic being.

“Those people on the fringe without an agenda doing it for themselves . . . I expect every now and then, they [will] have a great idea that really works,” Cowell said. In science as in most things, he says, he subscribes to the ideal of “let a thousand flowers bloom.”

“The more actors you have, the more innovation can occur.”

Bryan Bishop was sitting in Sprout with a mostly eaten bag of tortilla chips, salsa, and empty bottles of off-brand soda. At twenty years old, Bishop was technically too young to drink at the beer party he was hosting. But unlike most people his age, drinking seemed low on his list of interests anyway. On this muggy June night he had other things on his mind, like what to do with the industrial-strength robotic arm he had just bought off Craigslist.

“Check it out,” he said, showing off a smartphone photo of the arm in the bed of a pickup truck like a proud dad showing off pictures of his new baby. “We drove around with it in the back of the truck for a while just to mess with people. Do you know what kind of looks you get when you’re hauling around a robotic arm?”

The arm was the latest prize in Bishop’s quest to build a first-rate hacker space in his hometown of Austin. He had a four-thousand-square-foot space, he said, about a mile from home, close enough for him to ride his bike. From the sound of it, however, Bishop did not have much interest in spending time at home. Not when he could be playing with the factory-grade laser cutter he had also found on Craigslist to trick out his new space.

On the DIYbio list, Bishop is a prolific source of insight and opinion, links and transcripts. He is also the youngest of the core group of biohackers who have ventured beyond the idea stage and are trying to back their enthusiasm with lab work. (In one of his best known hacks, Bishop used little more than a piece of paper, two sheets of glass, and a Sharpie marker to create a primitive microfluidics device.) His self-assurance, his easy command of scientific jargon, and his ability to articulate his interests and ideas command his peers' respect. While many do-it-yourself biologists have Ivy League degrees, Bishop dropped out of the University of Texas as a sophomore. He needed time to pursue "other opportunities," he said.

Bishop is a little cagey about what all those opportunities might be. He would not say, for instance, where the money came from to buy the robotic arm, which he says retails for \$2 million. His funder wanted to keep a low profile. Because he bought it used on Craigslist, he paid considerably less. But he said he couldn't say how much.

Yet he has no problem talking about his goal, which is why he's hosting this party. Bishop had come to town for an event called the Humanity-Plus Summit, H+ for short, the latest incarnation of a movement known since the 1980s as transhumanism. As Bishop himself described it, transhumanism broadly defined is focused on "human advancement." In practice, this means a near obsession with the promise of technology not only to solve the most basic human challenges but also to strip away human limitations. According to transhumanist orthodoxy, aging is an engineering problem to be solved. The brain is merely the world's most advanced computer. Fusing organic gray matter with digital processing power should require just a few more decades of research at most, according to the transhumanist faithful. When that happens, expanding your brain power would take no more effort than upgrading the RAM on your laptop. Similarly, consciousness amounts to a collection of algorithms. With the right interface between flesh and silicon, the right brain-imaging equipment, and a clear map of the brain's billions of synaptic connections, downloading your mind—which transhumanists equate with

yourself—to a hard drive or uploading it to the Internet becomes a mere matter of having enough digital storage space and bandwidth. Bishop described his goal as creating a hacker space in the form of a "transhumanist tech co-op." He wants to be the guy who makes transhumanist dreams real.

Right now he still has far to go. But he has no doubt that the one sure way not to get there is to waste time asking other people for permission to try. A strong libertarian streak runs through the transhumanism movement, earning it both liberal and conservative critics who chastise its followers for ignoring or failing to see the moral and political implications of their techno-utopian ambitions. Certainly the speakers at the summit were more interested in promoting their idealized vision of the future than mulling how their goals fit into a broader historical or cultural context. Their bias was toward action.

"You should go out and build the transhumanist dream," he urged the audience during his summit talk. "Join the narrative. Make stuff."

Biohackers want to make the rest of us okay with the counterintuitive coming together of biotech and basements, of DNA and dinner tables. They not only believe the mass migration of biotech out of the lab and into the home should happen. They believe it will happen soon and that we all should pretty much not worry. But the sell may not be easy.

"When we happen upon a technology such as stem cell regenerative therapy, we experience hope," economist W. Brian Arthur wrote in his 2009 book, *The Nature of Technology*. "But we also immediately ask how natural this technology is. And so we are caught between two huge and unconscious forces: Our deepest hope as humans lies in technology; but our deepest trust lies in nature. These forces are like tectonic plates grinding inexorably into each other in one long, slow collision."