with them will not fulfil many of the best researchers, who prefer to have scientific control over their work rather than doing the bidding of a client. Scientists seeking a career in CROs should look for jobs that will give them autonomy, agrees Jonathan Montagu, vice-president for business at Nimbus. “You have to be selective.”

DIVIDE AND CONQUER

Scientists who find jobs at virtual companies should recognize that they may soon be back on the job market. Virtual firms are often designed to be bought by pharmaceutical companies, giving investors a chance to recoup their funds without waiting for the decade or more that it can take to bring a drug to market. “If I were a young scientist, a virtual biotech is not the kind of place I would aspire to work,” says Lyman. “Even if you’re successful, you’re going to get liquidated in a couple

of years and then you’re out of a job again.”

Nevertheless, job seekers looking for stability may find options in a new breed of virtual biotechnology company. Some companies are structured to enable the sale of individual projects, leaving the rest of the firm intact and allowing employees and infrastructure to remain in place. Nimbus, for example, has

“You need to have somebody who has a 30,000-foot view of the whole process of drug development.”

David Cavalla

set up each of its projects as a separate subsidiary with intellectual property and assets that a pharmaceutical company can acquire without buying the full firm.

Similarly, when Collier and his colleagues launched Velocity Pharmaceutical Development, based in La Jolla, California, they configured each project as its own corporation. “There is a lot of experimentation now with new models,” says Collier.

Ultimately, industry scientists need to adapt to the new normal, says Justin Chakma, an analyst at venture-capital firm Thomas, McNerney & Partners in La Jolla, California. That may mean jumping from job to job. “Scientists need to be comfortable working almost as consultants,” he says. “It’s not a steady stream of income like it was years ago.” ■

Heidi Ledford reports for Nature from Cambridge, Massachusetts.

TURNING POINT

Hana El-Samad

Trained as an engineer, Hana El-Samad honed her skills to study complex systems, but ended up researching gene expression in real time. This year, she won a US\$1.4-million grant from the Paul G. Allen Family Foundation in Seattle, Washington. Unbound by conventional biology instruction, El-Samad feels free to take risks.

Who influenced you to pursue science?

I grew up in Lebanon, where my mother, a maths teacher, instilled in me a love of maths and engineering. At the American University of Beirut, I wanted to study mathematical theories of how things work. I focused on control theory, which looks at automated systems.

How did you shift into biology?

In 1999, I earned a master’s degree in electrical engineering with a focus on controlled dynamic systems from Iowa State University in Ames. In 2002, halfway through my PhD, my adviser, Mustafa Khammash, moved to the University of California, Santa Barbara, and I went with him. People were starting to talk about systems biology, and I realized that the theories I had been studying on machines would be relevant to systems created by nature. I completely switched gears.

Did your adviser support that?

He is smart and open-minded, and thought that tackling biology could be really interesting. We divided up chapters of a biology book and taught each other. My thesis was on heat-shock responses that bacteria use to adapt to temperature increases. We tried to model them to understand how they operate in real time.

Was it a difficult to move into biology?

In 2004, I earned my PhD in mechanical engineering. I faced a choice — accept an engineering position or throw myself into biology. It was not a trivial decision. I had offers for several engineering posts, but a collaborator had nominated me for the Sandler Fellows Program at the University of California, San Francisco (UCSF), which funds one person each year to start a small, independent group focused on risky research. I chose that. People thought I was crazy, but it was the best thing for my career. I’m now an experimental scientist, a hybrid of an engineer and a biologist.

How did you expand your lab?

I didn’t want a gigantic lab: I wanted six to eight people who do thorough, in-depth science, to try to understand how a small number

of systems work in predictive ways. I chose people with backgrounds in maths, physics, molecular biology and computational science.

Did that set-up have challenges?

Yes — piecing together a mosaic of disciplines left us with no common language. At early lab meetings, I wanted to pull my hair out. People were talking about the same thing using different terminology, and getting frustrated. There was also a reluctance to ask what might be considered stupid questions.

How did you get past those barriers?

I wrote a lab constitution that acknowledges that we are all from different backgrounds, that we shouldn’t all be expected to understand everything — and that we should ask questions. It is written playfully and we update it as necessary.

Is it hard to get federal grants for your multidisciplinary research?

It can be. I believe that agencies want to fund this kind of science, but they have to funnel grants through review groups that can have conservative reviewers. Still, we did get a US National Institutes of Health grant in 2010 to fund the UCSF Center for Systems and Synthetic Biology.

You have two grants from private foundations. Why do you think your work appeals to them?

The David and Lucile Packard Foundation in Los Altos, California, liked our approach to cell-to-cell variability, and the Allen Foundation liked how we decided to decipher the genetic encoding and decoding that allow cells to survive in complex environments. I think both like to fund high-risk, potentially transformative things that are not necessarily attractive to agencies, and we don’t do run-of-the-mill stuff. ■

INTERVIEW BY VIRGINIA GEWIN