Science (LJIS) programme, one of four training programmes backed by BWF in its first round of awards. LJIS is a joint effort between UCSD, the Scripps Research Institute, the Salk Institute and the San Diego Supercomputer Center. Caltech, Rockefeller University and the Program in Maths and Molecular Biology were the other grant winners in the 1996 funding round.

Two other training programmes were funded in 1998, one in genomics, run jointly by Johns Hopkins University, Baltimore, and The Institute for Genomic Research, Rockville, Maryland, and the other in neuroscience at Brown University, Rhode Island. The submission deadline for a third round of awards, to be made this autumn, is 10 April.

Typically, the BWF programme provides $500,000 a year for five years, although this year smaller institutions can opt to come in at a lower funding level. The money can be used to support student stipends, seminar series, travel to conferences or equipment purchases, for example, but not to support faculty.

"BWF's vision for proposing such a programme was instrumental in [LJIS] achieving our goals," says Onuchic. The LJIS programme aims to provide the working environment, mentoring and financial support that will allow pre- and postdoctoral fellows to apply their quantitative skills to biological problems, and to foster research at the interface, promoting collaborations between groups on both sides.

One unique aspect of the programme is the requirement for dual mentorship, whereby each prospective fellow has to choose a mentor from both the physical and biological sciences. LJIS's steering committee believes this is key to the project's success, as the dual mentors are expected to be active participants in the programme and to bring different perspectives to a problem. At the postdoc level, they are also expected to provide matching funds to support a trainee. In return, they gain access to high-calibre scientists working at the interface on fairly risky projects they might otherwise be unwilling to support from their own funds.

Rockefeller University, New York, also received backing from BWF for its interdisciplinary training programme. It is perhaps a little unusual, as universities go, in that it has no formal departments. Instead, it exists as a collection of 75 laboratories, all reporting directly to the president. Nevertheless, in the mid-1990s, the university created two interdisciplinary centres, the Center for Studies in Physics and Biology and the Pels Family Center for Biochemistry and Structural Biology. In part, this was "to help provide a mechanism for taking advantage of funding opportunities that required a cohesive structure, as well as to promote the development of infrastructure", says Stephen K. Burley, investigator in the Howard Hughes Medical Institute at Rockefeller University and director of the Pels Center. Taken together, the centres encompass about one-third of Rockefeller faculty members.

Burley says that when the university was looking for support for its training programme, "there was nothing else available, because the programme was so young. Our success hinged on someone like BWF being willing to gamble on a nascent programme and help develop it." The programme supports graduate students and postdocs for up to two years, while trainees have access to a range of facilities for interdisciplinary studies. The Pels centre, for example, boasts a mini-supercomputer facility. Other facilities include a biophysical-tools teaching lab and an X-ray beamline for protein crystallography being built at the Brookhaven National Laboratory. ■

Crossing the divide between theory and practice

When Dan Rokhsar took an undergraduate molecular biology course in 1980, the subject made little sense to him because, he says, it was hard to see how the facts were interrelated. By contrast, physics seemed very orderly and he liked that order. He opted for a career in theoretical physics, and during his first five years on the faculty of the physics department at the University of California at Berkeley, he worked on mathematical modelling of the behaviour of materials. Five or so years ago, Rokhsar started to develop an interest in biology. He attended graduate courses in biology in his spare time, although his department was largely unaware of this.

Rokhsar found that much had changed since his original foray into biology and was quickly smitten, although at first "it was pretty clear that I didn't even know how to phrase the questions properly", he says. He spent a summer working in a biology lab, again without officially informing his department, to gain experimental experience.

"In physics you can be a theorist, and that's a perfectly respectable way to make a living," he says. "In biology, you don't have that kind of division of labour as much: everybody's a theorist, but your theories are typically much less mathematical." Of the few colleagues he did tell, Rokhsar says that at least one suggested that, rather than becoming a student again, he should go to a biology professor and say: "I'm a physics professor. Tell me your difficult problems and let me help you solve them." That doesn't work, says Rokhsar, because if you don't understand the context, nothing productive will come of it.

Rokhsar, now a professor of physics and biophysics at Berkeley, says that, having decided that he wanted to switch his research focus, he looked at three areas of study — the mechanisms of protein folding, modelling in neuroscience, and devising faster ways of analysing the vast amounts of data generated from DNA microarrays. "One of the advantages of being a theorist is that you can do a lot of different things. What they all have in common is that they use mathematical models to describe complicated systems, even though the systems themselves can be very different," he says.

Rokhsar's connections with biology have been further consolidated in that he now sits on the Chancellor's Advisory Council on Biology, which oversees the entire biology programme on campus. He says the group has been instrumental in bringing in new faculty, some through joint appointments, working at the interface between the physical sciences and biology. The biophysics group itself is expected to grow by at least three people over the next five years or so. ■

Web watch

- **Stanford University's Bio-X initiative**
  http://biochem.stanford.edu/biox/
- **UC Berkeley**
  http://www.berkeley.edu
- **Harvard's Center for Genomics Research**
  http://www.cgr.harvard.edu/
- **Genomics Institute of the Novartis Research Foundation**
  http://www.nfire.org/
- **Rockefeller University: Center for Biochemistry and Structural Biology**
  http://www.rockefeller.edu/graduate/cenbio.htm
  Director, Stephen K. Burley
- **Center for Studies in Physics and Biology**
  http://www.rockefeller.edu/graduate/cenphys.htm
  Director, Mitchell J. Feigenbaum
- **LJIS**
  http://ljis.ucsd.edu
  Co-director, Jose N. Onuchic (jonuchic@ucsd.edu)
  Co-director, Elizabeth Getzoff (edg@scripps.edu)
- **The Burroughs Wellcome Fund**
  http://www.bwfund.org
  Program officer, Nancy S. Sung
- **The Sloan Foundation**
  http://www.sloan.org/bios/teitel.htm
  Program officer, computational molecular biology, Michael S. Teitelbaum