SCIENCE'S "FOURTH ESTATE"

# Signing Up for Contract Research And Development

Last year, atmospheric chemist Charles Kolb gave a talk that engaged the rapt attention of a gathering of Harvard University postdocs and graduate students. Kolb wasn't talking about the ozone hole. He was at a careers symposium, describing an often-ignored job option: contract research and development.

In today's job market, where prospects in other areas—academia, industry, and government—look dim, Kolb's talk about what he calls the "fourth estate of research" came as a small ray of hope. Contract R&D firms, like everyone else, are threatened by the dwindling of research funds. Still, such companies do offer career possibilities that few budding scientists have considered. "The primary response [at the Harvard gathering] was how come nobody ever told us about this segment of the world," recalls Kolb, president of Aerodyne Research Inc., a contract R&D firm in Billerica, Massachusetts, that focuses on environmental and atmospheric research for a variety of government agencies.

**The contract universe.** The contract R&D world spans a broad spectrum of enterprises. There are huge enterprises like SAIC, a $1-billion-a-year employee-owned outfit that has been called the "McDonald's of contract R&D" because of its more than 15,000 workers in hundreds of branches around the country. Other contract titans are the half-dozen or so major not-for-profit research outfits like Battelle Memorial Institute, SRI International, and Research Triangle Institute (RTI), home to thousands of scientists working on government and industry contracts. Then there are smaller for-profit firms like Aerodyne and A. D. Little—considered the founding father of contract R&D. In the same class are the swarms of small "Beltway Bandits" located near the highway circling Washington, D.C., and known for feeding off of the National Aeronautics and Space Administration (NASA). All told, says Kolb, these enterprises contract for an estimated $4 billion to $5 billion a year.

A typical objection to contract R&D, however, is that it combines low job security with a humdrum research environment, one where lesser scientists go to scrape out a living. "If you were really good, you would have a tenured position in a university" is a not uncommon sentiment, says physicist Richard Harms of Applied Research Corp. in Landover, Maryland. But there's a lot of topnotch science to be done at contract R&D firms, according to Harms, who moved to Landover 9 years ago. He left a research position at the University of California, San Diego to work with the faint object spectrograph on the Hubble Space Telescope. He recently collaborated with a team of university astronomers, using Hubble to provide evidence for the presence of a giant black hole at the center of a distant galaxy, research that landed his name in front-page articles nationwide.

Another advantage of contract R&D, say its supporters, can be involvement in a broad range of research. Unlike university professors who may devote a lifetime to a specialized topic, contract researchers must be flexible and opportunistic. "You're offered the opportunity to work on a large diversity of problems. It certainly keeps you on your toes," says Doris Rouse, director of RTI's center for technology applications, who has been involved in research ranging from health-care technology to tracking the Hubble Space Telescope. "You're always exposed to new problems. In academia, you can kind of get stuck" on just one or two projects, agrees Steven Piccot, an environmental scientist at Southern Research Institute in Durham, North Carolina. Although he has only a bachelor's degree, Piccot has been doing atmospheric research for years and now heads the institute's division dealing with air pollution and global climate research. He had intended to pursue his doctorate but decided that contract R&D offered him an opportunity to learn faster.

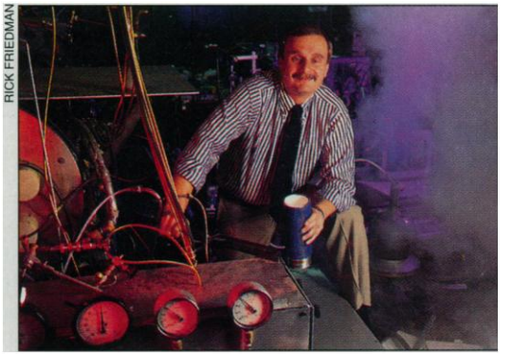
**Insecurity.** Life in the contract world isn't necessarily easy, however. "You always know it's going to be a roller coaster ride. It's probably not for everyone," acknowledges Piccot. Scientists usually have little formal job security and are constantly scrambling for money. Typically, they work on several contracts at once, many of shorter duration than the average basic research grant. As a result, they're always looking to scare up new clients or talk existing ones into extending contracts.

But "the perception of risk in the contract world is, although real, very exaggerated," says molecular physicist Tom Dillon, a vice president at SAIC. Indeed, contract researchers argue that their lives are little different from those of the growing number of academic researchers who survive only on their grants. "My position is probably less tenuous than an untenured professor who could get his rug pulled out from under him," says Aerodyne atmospheric chemist David Nelson, explaining that if one of his contracts is not renewed, he can probably find work on someone else's contract while he looks for a new client.

In some ways, a young scientist at a contract R&D firm faces less pressure than a new assistant professor, who must juggle teaching and other duties while trying to launch research. Workers are usually hired when an outfit needs more help to complete an existing contract, so the new researcher comes in with a clear task and money guaranteed for a period of time. "We only hire when we have work to support them for a couple of years," says Kolb. As a result, most new hires are not expected to immediately start generating their own funds.

**The contract breed.** Contract R&D is not for everyone. Best suited to the game, believes Kolb, are aggressive types who combine an entrepreneurial streak with the desire to tackle a variety of technical problems with relevance to the real world. To them, he says, contract research is a fast-paced, rapidly changing, and intellectually challenging career. Most contract researchers also see the interdisciplinary collaboration that's usually required as an important plus. "The people that thrive tend to be more gregarious and outgoing," says Dillon.

**Beyond academia, industry, and government, you can work for a "Beltway Bandit" or the "McDonald's of contract R&D."**



RICK FRIEDMAN

**Another world.** Charles Kolb, president of a contract R&D firm, says the company looks for aggressive and nimble scientists.

**Learning the ropes.** For a new scientist at a contract R&D outfit, there's a lot to learn. Firms usually have to teach their employees how to write proposals and beat the bushes for clients. Nelson, for instance, has been working on atmospheric research contracts obtained by other Aerodyne scientists, but is starting to develop his own. Recently he learned that NASA had some funding for general atmospheric research. He quickly wrote up a proposal and won a contract to study oxygen-hydrogen molecules in the mesosphere.

Places like Aerodyne have staffers who monitor listings of research opportunities sent out by various government agencies and notify the firm's scientists of potential clients. "It's quite a web of opportunity that I had no idea about how to access when I first came here," says Nelson. It's a matter of learning which agencies, and which divisions within those agencies, fund your discipline and then keeping in constant contact with officials there about their future needs, he says.

**Know the customer.** There's no exaggerating the service aspect of contract R&D. Investigators must be keenly attuned to the needs of their clients. "You have to be good to survive, but being good may not be sufficient," stresses Anthony Andrady, who heads the polymer science program at RTI. You also have to be ready to compromise your own research agenda in order to give clients what they're willing to pay for. There have been times, for instance, when Andrady has wanted to pursue some fundamental investigations into polymer physics but was unable to find funding. While this is frustrating, he admits, such rejection can serve to keep researchers grounded: "It tells you that there is little demand in the outside world for the research at the time."

**Getting hired.** How does one find a job in contract research? "One way to identify these organizations is to simply look at the literature," says Kolb, and check the authors on papers in your discipline. There are also a number of general and field-specific directories that list contract organizations, such as the *Directory of American Research and Technology*. Once you've identified some potential candidates, it's like most job searches. Call up or visit, and even if there are no openings, send a resumé. The contract R&D world changes quickly, and so do the needs of the companies doing the work. Nelson, for instance, was finishing a postdoc when he called Aerodyne. Nothing was available, but a few months later, they called him up out of the blue.

The prospects today for snaring a job in contract R&D are probably no better than in other sectors. Some observers believe, however, that such organizations—with their flexibility and experience in collaborating with industry, academia, and government—are well suited to thrive in an era where there is increasing focus on rapid technology transfer. "The trend of public policy towards taking better advantage of basic research creates a logical and important role for contract research and development," says RTI's Rouse. That belief encourages her and others to predict that the world of contract R&D will grow in the years to come.

**–John Travis**

# Grant Limits Irk Young Scientists

**Some non–tenure-track researchers can't apply for grants.**

Planetary scientist Roger C. Wiens received his Ph.D. in physics from the University of Minnesota in 1988, and has collaborated on at least 10 grant proposals since then. Not once, however, did Wiens submit one as a principal investigator (PI). The reason? He has held non–tenure-track positions at the California Institute of Technology and the University of California, San Diego, which reserve that status largely for tenure-track academics. In his last year, says Wiens, "I ghostwrote for five different proposals."

Wiens, and other young investigators in his position, believe they are in a Catch-22: They can't apply for grants because they don't have regular faculty jobs, therefore they can't demonstrate they are "fundable," and that makes it harder to secure such jobs. Many universities, such as Cornell, Stanford, and the University of California, Berkeley, make it almost impossible for non–tenure-track researchers to apply for grants. The growing proportion of such scientists may be one reason for the National Research Council's recent finding that applications to the National Institutes of Health from young scientists have declined.

But university officials say their rules exist for good reasons. "Faculty...ought to set the direction of research and scholarship," explains Charles H. Krueger, dean of research and graduate policy at Stanford University. The policy is necessary "to maintain the reputation and quality of research and to assure the appropriate use of university facilities," says Marion Lentz, assistant director of sponsored projects at Berkeley.

Yet people on multiple postdocs and faculty members with research associate–type positions are becoming increasingly frustrated. The American Astronomical Society (AAS) has taken note of the discontent and is discussing strategies to address the problem. "We realize it will be difficult to do," says Roger Bell of the University of Maryland, who is on AAS's governing council. "We're considering asking agencies to help young people by issuing statements that universities should allow non-tenure scientists to apply for grants."

Some scientists are taking matters into their own hands. For example, when Berkeley astronomer Carol Christian was barred from submitting an application to the National Aeronautics and Space Administration that would allow observations on the Extreme Ultraviolet Explorer Satellite—even though she was a top member of the team that designed and built it—she and her colleagues decided on an end run. They formed a company, Eureka Scientific Inc., as a conduit for proposals. Now this successful grant goes to Eureka, not Berkeley. Eureka treasurer John Vallerga, an associate research physicist at Berkeley, believes that "scientists should have the opportunity to act as free agents" and, like top athletes, "negotiate the best deals." Lentz says Berkeley has no problem with such arrangements "as long as they don't interfere with the university job and don't use university facilities."

**–Anne Simon Moffat**