

NEWS

Long Hours Aside, Respondents Say Jobs Offer 'as Much Fun as You Can Have'

Salaries edge upward as 2004 survey polls a younger, more international pool of life scientists

They're not making a lot of money, but they like their work. That seems to be the message of the second AAAS salary survey of U.S.-based life scientists.

Three years ago, those who answered the inaugural survey (*Science*, 12 October 2001, p. 396) said much the same thing. The biggest difference between the two surveys is the slower rise in salaries—an average of 4% over last year compared with a 7% rise between 2000 and 2001.

The reasons aren't hard to find. The U.S. economy has gone through some wrenching times since the first survey, completed shortly before the 11 September terrorist attacks. The biotech industry remains volatile. The recent stock market rally has petered out, reviving unpleasant memories of three straight years of double-digit declines. The corresponding drop in endowments hurt everybody, and distressed state budgets have put an extra squeeze on public universities. But despite it all, most scientists are still reaping the payoff of their long years of training, with jobs they enjoy.

Respondents

We abandoned the mails this year and offered the survey exclusively online. Of 42,000 AAAS members who were contacted, a little over 8000 responded. The result was 6124 valid surveys, including 1773 from postdocs. That 29% share is nearly 10 times the share of 2001 respondents who were postdocs. But even with postdocs excluded, the respondents are younger than in 2001, with the majority under 50. About two-thirds work in academia and 15% in industry. About 30% of the academics are in medical schools—one-quarter if postdocs are excluded.

Another difference from the first survey is the increasing presence of foreign-born scientists: Those from China make up 8% of the respondents, followed by those from India. Women make up 34% of the total, compared with 27% in 2001. Although the respondents come from all fields in the life sciences, the survey does not claim to be representative of biology as a whole. And, as one respondent pointed out, "this survey is a survivor survey, since many of my fellow students [from graduate school] are no longer accessible to AAAS."

Salaries

As before, salaries in industry on average top those in academia. Although the 4% overall growth is modest, it's still higher than the norm: This spring the American Association of University Professors reported that full-time faculty members received a 2.1% increase this year, the

smallest in 30 years.

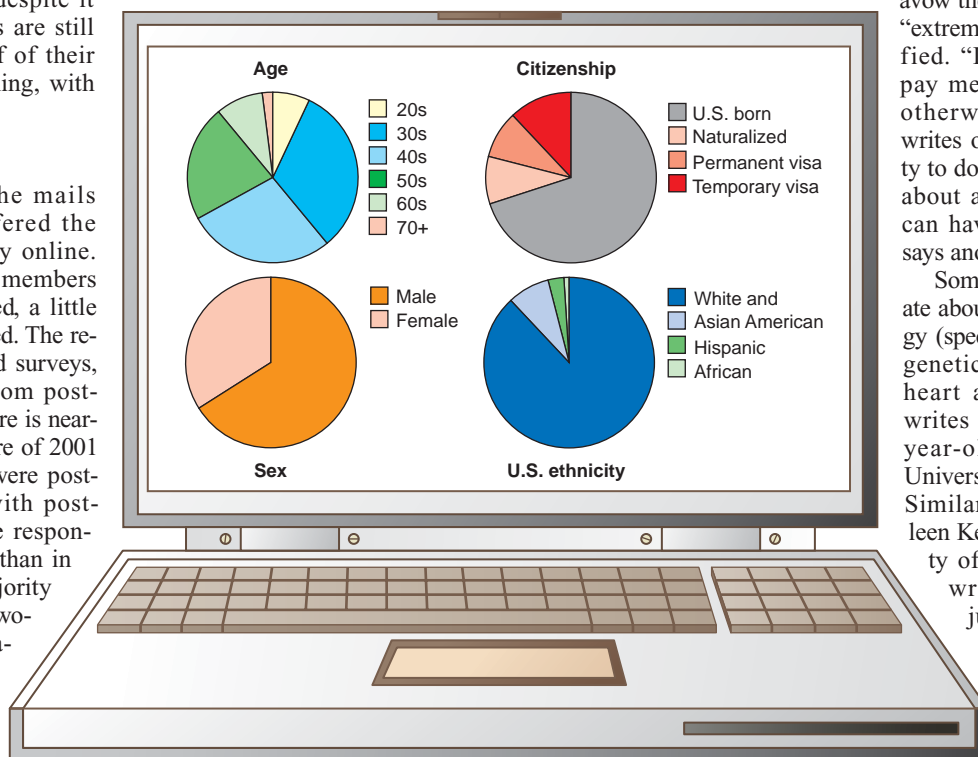
The median salary for life scientists in academia, according to the survey, is about \$76,000. Full professors and administrators are the only groups of respondents whose salaries average in six figures. Adjuncts and other non-tenure-track workers average \$50,000, and postdocs rank lowest, averaging \$39,000. (It's \$36,000 at doctoral-granting institutions.)

For nonacademics, who make up about one-third of the sample, the median salary is about \$88,000. Industrial salaries hover around \$90,000. Physicians make the most: \$170,000 this year, a 36% increase from 2001. (This year's pool of physicians was slightly older than the 2001 cohort.) Those holding both a Ph.D. and M.D. have a median income of \$110,000.

Happiness

But money isn't everything, say respondents. Being an academic researcher seems to suit a lot of people—especially those in doctoral-granting institutions, where 70% avow themselves to be either "extremely" or "very" satisfied. "I can't believe they pay me to do what would otherwise be my hobby," writes one. "The opportunity to do science every day is about as much fun as you can have over a lifetime," says another.

Some are frankly passionate about their work: "Biology (specifically conservation genetics) has grabbed my heart and won't let go," writes Cedric Muir, a 40-year-old ecologist at the University of Hawaii, Hilo. Similarly, ecologist Kathleen Keeler of the University of Nebraska, Lincoln, writes that she loves just about everything about her field, its "plants and the outdoors and tables of data and computers with colored graphics mixed in with grand ideas."



Young and well-traveled. Respondents are much younger than those in the 2001 survey, most of whom topped 50. More of them were born outside the United States, and more are women. The share of U.S. underrepresented minorities hasn't changed, however.

Median Salary 2004 (in \$ thousands)

Main discipline	n	Academic	Nonacademic
Medicine	395	\$152	\$140
Toxicology	113	\$83	\$102
Pharmacology	204	\$88	\$100
Biophysics	61	\$79	n/a
Biotechnology	320	\$72	\$90
Bioinformatics	93	\$73	\$90
Genomics	92	\$69	\$91
Agricultural sciences	169	\$84	\$90
Immunology	265	\$81	\$87
Biochemistry	452	\$77	\$91
Neuroscience	452	\$82	\$92
Virology	123	\$80	\$81
Cancer biology	166	\$80	\$85
Structural biology	68	\$76	n/a
Physiology	177	\$76	n/a
Microbiology	283	\$73	\$85
Genetics	219	\$70	\$105
Cell biology	332	\$70	\$85
Molecular biology	438	\$70	\$82
Developmental biology	104	\$70	n/a
Environmental sciences	102	\$63	\$84
Botany	69	\$69	n/a
Marine biology	69	\$63	n/a
Ecology	258	\$60	\$71
Zoology	89	\$60	n/a
Other	290	\$71	\$95

Self-employed people—including those well-paid physicians—seem to be among the happiest of all, with 73% rating themselves “extremely” or “very” satisfied. Thomas Snyder, 56, of Wellesley, Massachusetts, is one who has generated his own successful reality. Trained at Stanford University in chemistry, neuroscience, and psychiatry, Snyder founded Emotion Mining, a company that sells software to help individuals and businesses fulfill their aspirations. “Happiness and balance flows from dedicating yourself to a 100-year project and working to make it happen in one’s lifetime,” he says.

Achieving that state seems to come hardest to those in the pharmaceutical industry. Only 22% give themselves high marks for job satisfaction, compared with 62% in the biotech industry. One reason may be the sector’s extensive downsizing and layoffs in recent years.

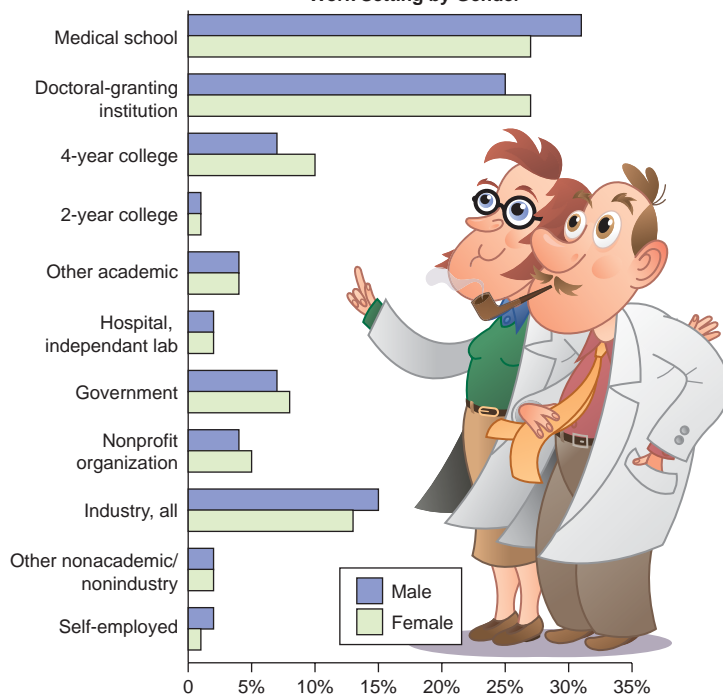
Time

Scientists in our survey say that intellectual challenge is far more important to them than comfortable working hours. In fact,

Chicago, says she works 70 to 80 hours a week. So does Devendra Agrawal, 50, a basic researcher in the clinical department of the medical school of Creighton University in Omaha, Nebraska. Hawaii’s Muir says he spends almost the equivalent of a full-time job teaching—at least 9 hours in the classroom and 30 in related chores. On top of that comes research, grant writing, publishing, committee work, and community service. “Everyone is terrified they’re not going to get tenure so they’re putting in these silly hours,” says Muir, who is currently in a temporary position. Nonetheless, “it’s the best job I’ve ever had.” But it’s easy to see why one respondent laments: “Is it even possible to have a successful research career that doesn’t decimate your personal life/time?”

Many find the nonacademic environment more humane. “Academic hours is one reason I went into industry,” says Peter Griffith, a NASA contractor at Goddard Space Flight Center in Greenbelt, Maryland, who studies deforestation in the Amazon. A young biochemist and molecu-

Work Setting by Gender



Where the Ph.D.s are. (Above) Strong representation in medical schools and Ph.D.-granting institutions includes a heavier presence of postdocs in this year’s sample. (Left) Nonacademic salaries tend to be higher in most fields, especially genetics, although the opposite is true in medicine.

punishing hours seem to be part of the price of contentment, at least within academia.

Brenda Russell, 60, who does research on cardiac physiology at the University of Illinois,

lar biologist says academia—where she was doing HIV research—was “too competitive. ... I worked weekends and nights as a postdoc, and even that was never enough as far as my boss was concerned.” Now she’s doing infectious disease research at a large international drug company. She works about 50 hours a week, and “my boss here says, ‘Don’t forget to take your vacation!’”

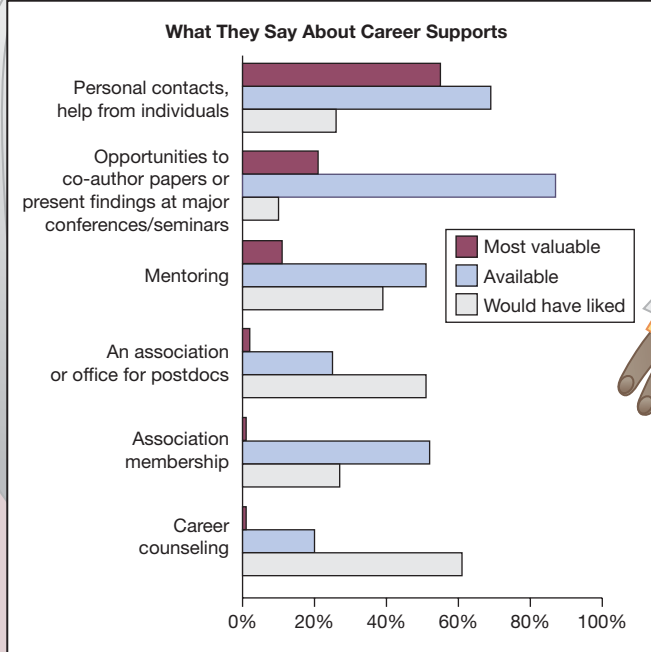
Another benefit to being in industry is the opportunity to spread one’s research wings. Paul Wu, 33, of Wyeth Research in Cambridge, Massachusetts, never got a Ph.D., but after 7 years at Wyeth he is “approaching the level of Ph.D. work” in research on inflammation and immune-related targets. Wyeth also allows employees to take courses to develop an array of skills, he adds.

Gender

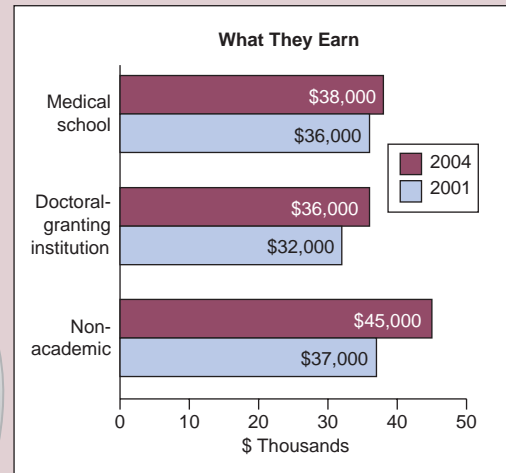
Despite the advances in recent years, many women feel that the scientific workplace is still a forum for chronic, low-level discrimination. One woman, a government employee who asked not to be identified, is downright bitter: “The only women in science I know who are happy are married to or have been married to men with good incomes,” she writes. Says another: “It’s nearly impossible to be competitive and to have a family if you’re female.”

Entomologist Marjorie Hoy, 62, of the

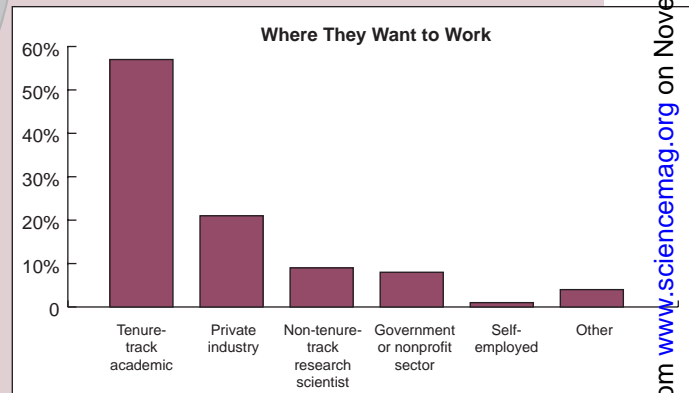
A Closer Look at Postdocs



No substitute for a friend. Postdocs rank personal contacts as far and away the most valuable career support. Although many say they want career counseling, the answers suggest that what's offered is not very useful.



Out of serfdom? Postdoc salaries are higher than they were 3 years ago, but the people earning them may have unrealistic career aspirations.



University of Florida in Gainesville recalls being the first woman Ph.D. hired in a couple of state jobs and the first tenure-track woman in her department at the University of California, Berkeley. But she thinks men still prefer colleagues they feel comfortable with—that is, other men.

Certainly, the disparity in pay persists, although it has shrunk. The income gap narrowed between 2001 and 2004 in academia—with females earning a median salary of \$67,000 versus \$83,000 for males. That's a 24% difference, compared with 35% in 2001, reflecting both pay discrepancies at some levels as well as the fact that fewer women occupy high-level positions. (The men in 2001 were also slightly older than the 2004 cohort.) In nonacademic settings, however, the gender gap hasn't budged in 3 years, with men outpacing women by \$98,000 to \$78,000. As before, the biggest discrepancies are at the highest executive levels.

Postdocs

Hired as apprentices, many postdocs say they often feel more like sharecroppers. Doing a postdoc is “degrading, rewardless, and frustrating,” says a former one. But in this survey, disaffected postdocs were substantially outnumbered by those who like their jobs. “It is my passion,” as one says.

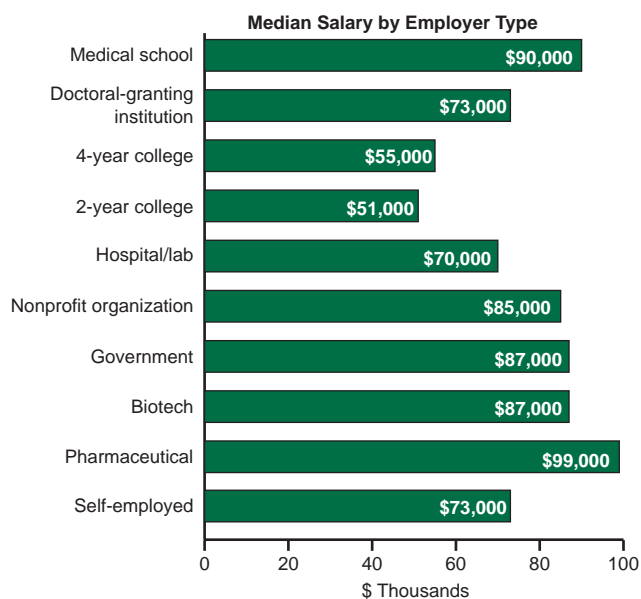
Postdoc salaries seem to be a bit healthier than reported 3 years ago, showing a 15% increase, for a median income of \$39,000. Fewer postdocs seem to be in a multiple-postdoc holding pattern while waiting for a job to open up. Only 29% of those who had done postdocs held two such positions, compared with 42% in 2001. Only 7% of this year's pool are on their third—or more—postdoc.

If anything, postdocs are even more optimistic about their futures. Some 57% hope to land a tenure-track position in academia, compared with 46% of our (much smaller) 2001 sample. That may be unreal-

istic, given statistics showing that only about 30% of biomedical science Ph.D.s held tenured positions in 2001. Or maybe their expectations just go with the territory. “If I don't get on the associate professor track at Harvard, it's no big deal,” says a postdoc at a large state university. “I'll hopefully get something somewhere.”

The large number of foreign-born scientists holding postdocs may help explain why so many wish for more career counseling, including training in grant writing. As Nigerian-born Aswihel Undie, 47, an associate professor of pharmacology who studies dopamine signaling at the University of Maryland, Baltimore, points out, those from abroad face not only language obstacles but also gaps in their knowledge of U.S. culture. Yet sometimes “it's simply expected that after hanging around for a while you somehow know what to do.”

Career counseling is something many



Health makes wealth. Those working in medical schools and for drug companies lead the pack in salaries.

postdocs both foreign and domestic think they need more of. So is a campus-based organization for postdocs—there are now more than 45 postdoc associations and several dozen postdoc offices around the country. Ultimately, however, as in our earlier survey, personal contacts are regarded as far and away the most important resource for professional support and job-hunting.

Trends

• **More teaching:** Faculty hiring is not keeping pace with rising enrollments at many schools, resulting in complaints of heavier teaching loads. “The student to faculty ratio has increased dramatically over the decades,” complains one respondent at a state university.

At Gainesville, for example, says Hoy, new faculty members will be required to give 50% of their time to teaching—compared with a typical load of 30% for current faculty members at her institute—because budget growth has failed to keep pace with enrollment. With increased loads come greater concern with—or at least lip service to—pedagogy. Writes one academic respondent: “We are required to complete more surveys and create exit exams. ... Our syllabi must

now contain learning goals and all sorts of ‘eduspeak.’”

While upper-tier schools may be putting more emphasis on teaching, those trying to move up in the rankings expect tenure-track faculty members to do more research, says Brian Tsukimura, an endocrinology researcher and associate professor at California State University, Fresno. “There’s a whole slew of campuses that were primarily teaching institutions that are now into research,” he says. It’s a problem, says Clifton Jenkins, a postdoc in conservation biology at Michigan State University in East Lansing: “Everyone wants more research, but the teaching load has not been reduced.”

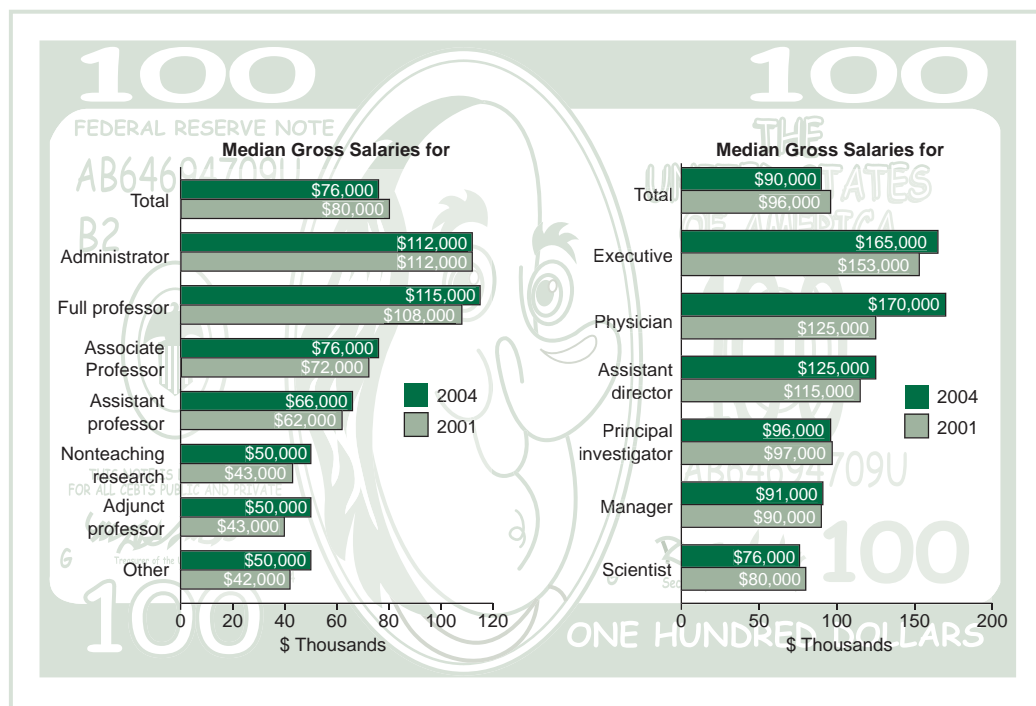
Most respondents are still reasonably happy with their teaching loads, although 60% say they would like to have more time for research.

• **More nontenured faculty:** Another trend is the growth in non-tenure-track faculty. In this survey, 65% of academic respondents (excluding postdocs) are tenured or on the tenure track. “Here, almost 1/3 of

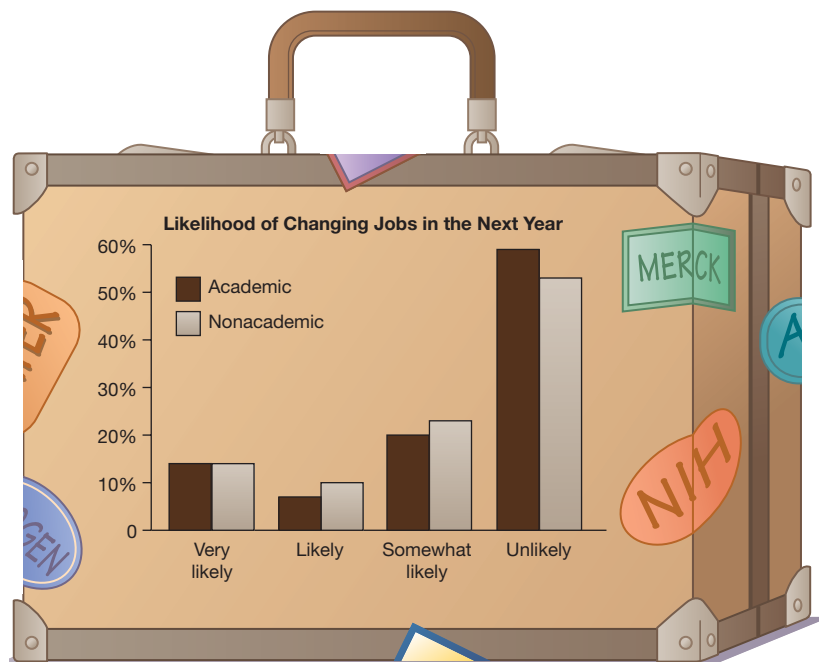
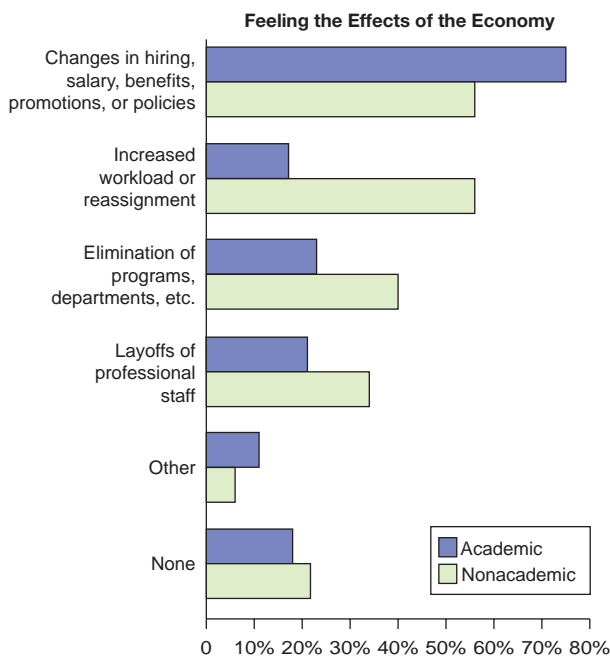
full-time faculty are temporary,” writes one academic scientist, who calls it a “serious problem” and “one major reason why I would not recommend this career path.” According to the most recent U.S. statistics from the Federation of American Societies for Experimental Biology, the number of tenured faculty members in the biomedical sciences—23,198 in 2001—and the number of tenure-track faculty members—just over 9000—have barely budged since 1997. But nontenured bio faculty grew 17%, from 14,530 in 1997 to more than 17,000 in 2001.

• **Delayed retirement:** The uncertain economy may also be pushing scientists to delay their retirement. Academics intend to retire significantly later than do those in industry, with almost twice as many academics envisaging that they will continue to work at least part-time after the age of 70. And whereas 38% of respondents under 40 indicate plans to work after 65, the proportion leaps to 48% among the over-60 crowd.

With Social Security in jeopardy and the stock market unpredictable, people have an added economic incentive to keep bringing home a paycheck. “Since we do not begin our careers until later in life, it is impossible to retire at 65,” writes one university scientist. “The stock market during the ‘90s was so good people could retire,” says Kenneth Kellar, 60, a pharmacology professor at



Inching ahead. Salaries have changed little in the past 3 years. But people in the lower ranks of academia are doing proportionately better, because the 2001 median salary statistics reflect an older workforce.



Economic perturbations. (Left) Academics have more job stability than other life scientists, although job perks may be more at risk in hard times. (Right) The survey did not find increased mobility, despite the rising proportion of temporary positions in academia.

Georgetown University in Washington, D.C., who does research on nicotinic receptors. “Now, I’m guessing that anyone who can keep on working will.”

For many academics, showing up has more to do with self-fulfillment than money. “I’ve always planned to continue working up until the end,” says Kellar, who says he works 75 hours a week. “I like what I do.” Industry scientists are less inclined to devote their lives to the firm. “I do NOT want to work forever,” says a drug company researcher. “There are too many other things I want to do.”

• **More career advice:** With a growing scientific workforce and little expansion

of university positions, scientists seem more aware of the need to give students a realistic assessment of their prospects. Florida’s Hoy says she tells students that in the nonexpanding field of entomology, “you have to be in the top 5% or 10% to be seriously considered for a faculty position at a university.” One scientist invokes the model of the Zen master: “Discourage them from this path. If they really like biology, they’ll do it without encouragement from anyone.”

But many say this kind of realism is rare. “All I heard in school was, ‘The best people will always be able to get an academic job,’” writes one respondent. “It’s the great injustice perpetrated on virtually

all grad students.” Another complains of “a complete lack of understanding on the part of most current tenured faculty of the realities of the present job market.” As a result, writes one university researcher, “career counseling for grad students is terrible. We’re perpetrating a pyramid-sales scam on every grad student. ... They give us their time and enthusiasm on the

supposition that once they get out, they’ll land faculty jobs and get graduate students to give them their time and enthusiasm.”

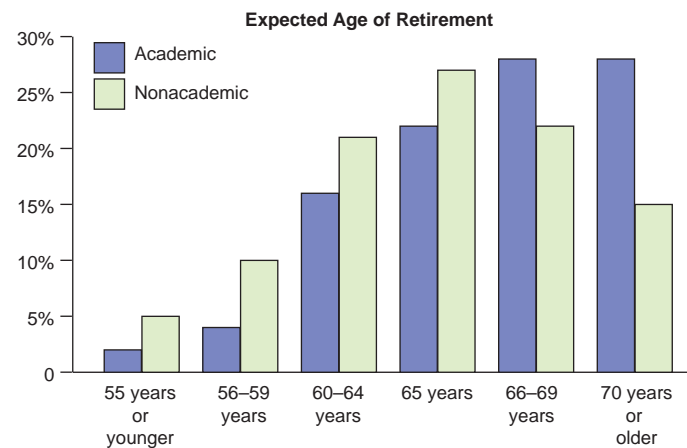
In addition to more realistic expectations, many respondents say what graduate students and postdocs need most is training in filling out grant applications. As Goddard’s Griffith put it, he would have liked “better training as a graduate student in the true responsibilities of a professor, which, in order of importance, are: 1) successful grant writing; 2) successful grant writing; 3) successful grant writing.”

Follow your bliss

A clear message from respondents is “Love conquers all.” “It is a lot of hard work and almost a thankless job,” writes one academic. “I am underpaid,” says another. “I get little respect. I have to deal with many snotty and unprepared undergraduate students who can barely read.” Yet another finds the competition too rough: “Like entertainment or professional sports, science is a ‘winner take all’ profession.”

So following your bliss is the only sure way to be happy in the job, say many of those surveyed. “I changed careers in my 40s,” recalls one industrial analytical chemist. “Although I am making about one-third of what I made as a director for computer software development, I am happier doing science.”

—CONSTANCE HOLDEN



Hanging around. Academics are significantly more likely than nonacademics to work past the age of 65, and the expected age of retirement is higher among older workers.

... They give us their time and enthusiasm on the