



The Human Genome Project and Chemists' Future Jobs

ACS DEPARTMENT OF CAREER SERVICES

Decoding the Human Genome Might Spell Future Jobs for Chemists

While the recent cracking of the human genetic code ranks as a monumental scientific landmark, in itself the sequence of A's, C's, G's and T's is of little practical value. Still, the impact that this discovery is likely to have on the practice of medicine is immense. In order to develop an understanding of the human genome and explore its impact on every aspect of our lives, legions of scientists will be kept busy for decades to come. Although current projections are preliminary, chemists are expected to play a vital role in the ensuing exploration of the genome, according to researchers, executive search firms and pharmaceutical company officials.

Nobel laureate and noted molecular biologist David Baltimore may have spoken for a lot of other scientists when he was quoted as saying what a formidable task it will be to interpret the genome sequence. "We've got another century of work ahead of us to figure out how all these things are related to each other," he told *The New York Times*.

Few data exist, but experts in a variety of fields project that chemical professionals will find increased job opportunities in the following related fields: biochemistry, bioinformatics (the merger of biology, computer science and information technology), computational chemistry (using computational methods to understand chemical properties of molecules), genomic technology (the sequencing and understanding of DNA), microbiology, microbial genomics (the study of genomes of microorganisms) and proteomics (the study of the structure and function of proteins).



All photos from ACS stock photo file

"I see a much stronger marriage between biology and chemistry," said Ken Herfret, vice-president of process sciences at Genencor International, a Palo Alto, Calif.-based firm that is working to interpret genomic information. The importance of "those skill sets will only increase, whether microbial or whatever. It will increase and it will continue to increase."

Genencor now employs up to five chemists out of a couple of hundred researchers — more than it ever has, Herfret said. He said that chemists would be most likely to be hired if they rounded out their chemistry education with a background in biology. "That sort of marriage can be powerful," he advised.

Herfret noted that the firm covers a wide span of science, and the need for

an understanding of biochemistry has increased. "Will that increase because of genome sequencing? I think so. Genomic sequences are more available. It's one thing to have the data and another to make sense of it," he said. "Does it increase the opportunity for chemists? I would think it creates more opportunity (for scientists) in general."

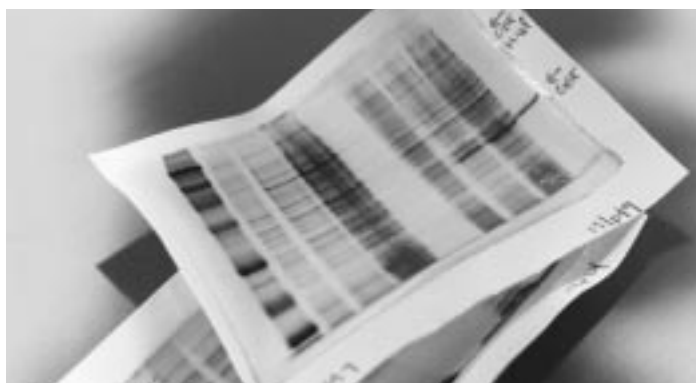
The U.S. Bureau of Labor Statistics also backs up this assertion. In 2008, projected employment of chemists in all industries is expected to be 109,732, or 14% higher than in 1998. The research and testing service portion in 2008 is expected to include 25,433 chemists, for a 74% growth over 1998 levels.

The human genome project will be a "bonanza" for chemical professionals, particularly chemical engineers, predicted Richard Judson, senior vice-president at Genaissance Pharmaceuticals, Inc. The firm is a leader in developing technology to apply population genomics and informatics to improve the development, marketing and prescribing of drugs.

"What have been the most useful (backgrounds) are informatics or bioinformatics," he said. "The most useful would be someone with a good analytic background that is able to think quantitatively and in the abstract."

Judson said that the majority of the science stemming from the genome project will involve understanding what the new access to sequence data implies and what are its ramifications, for example, for human health or agriculture.

"The other skill that a good chemist brings to bear is a synthesis of lots of different kinds of ideas, especially someone who has training in chemical engineering. Those people are very important — they think in big data sets and in many differ-



ent kinds of data,” he said.

In addition to bioinformatics, other major growth fields will be biochemistry and proteomics, said Damon Hostin, a team leader at Celera Genomics. In June, the Rockville, Md.-based firm made the historic announcement that it had produced a “first assembly,” or rough draft, of the human genetic code. He said chemists will play a vital role in future genome research.

“The big job ahead is understanding what will all these genes do on a molecular level, and that is where (a background in) biochemistry would be key to having that understanding,” Hostin said.

“The big news is that it is a draft sequence of the genome project. It’s not an ultimate perfect sequence,” noted Robert Robbins, a biologist who is vice-president of information technology at Seattle’s Fred Hutchinson Cancer Research Center. This means that chem-

ical professionals will continue to be employed to refine our understanding of the sequence.

He foresees an expanded role for the following specialties as the genome project works to perfect and apply the data: microbial

genomics, the interaction of biology and chemistry, computational chemistry and particularly strong growth in bioinformatics.

A Sedona, Ariz.-based recruiter believes the demand for chemists is already strong, and the expansion of human genome research will point to new opportunities for chemists.

“As a recruiter, good chemists have been harder and harder to find over the last couple of years,” noted David Jensen, managing director of Search Masters International Inc.

A key factor in growth opportunities for chemists is the expansion of medicinal chemistry research to include both small and large molecule products. Traditionally, pharmaceutical firms have been a haven for small molecule research and now biotech firms have opened further opportunities for synthetic and medicinal chemists, he noted.

“The genome project makes clear, new targets over the next couple of years for potential drug products. That definitely will open doors because many of these will be attacked with small molecules as opposed to large molecules. There is definitely an increased need for chemists,” Jensen said.

At pharmaceutical giant Eli Lilly and Co., officials haven’t waited for the genome project to begin accelerating their own recruitment of top chemical professionals. Last spring, the company announced a doubling of its chemists’ recruitment from 300 to 600 during a three-year period.

“I think the employment picture for chemists is so bright that all recent talent discoveries will only increase further,” said Celia Whitesitt, Lilly research scientist.

Applicants for positions in the burgeoning human genome project typically have a strong background in molecular biology, solid analytical skills and attention to detail. They are also known to have “a good pair of hands” and an ability to excel in a microscale environment.

To gain access to these opportunities, applicants should develop their skills in targeting the job market, résumé writing and interviewing. For more information, see www.acs.org/careers/empres/pubs01.html. For more information about opportunities surrounding the human genome project, a helpful site is

www.genome-jobs.com.