

## Bioclusters: Western U.S.

## Western U.S. Bioclusters: The Pioneer Spirit

Scientists, entrepreneurs, and educators in the western U.S. bioclusters are trailblazers: energetic, enthusiastic, and optimistic. They live in hubs of creative research institutions and bold life sciences companies. As one biotech investor says, “the fear of failure here is zero.” Bioclusters enliven their communities, raising scientific awareness and diversifying economic opportunities. Each western U.S. biocluster has its own history, unique personality, and distinct area of focus. Find your place in the pioneering West, whether your field is research, business, education, or global health. **By Chris Tachibana**

California rules. It's the most populous state, and its bioclusters, particularly the Bay Area, dominate U.S. biotech. Common advantages of western bioclusters are diverse job options, opportunities for dual career couples, entrepreneurial support, and proximity to Asian collaborators and markets. However, since each biocluster is different, here's a guide to three of them.



**Gail Maderis**

### THE BAY AREA: GOLD RUSH GRANDDADDY

Los Angeles has the Rose Bowl, the granddaddy of college football contests. San Francisco has Genentech, the granddaddy of biotechnology. But the Bay Area was an entrepreneurial hub long before Genentech's founding in 1976, says **Gail Maderis**, president and CEO of BayBio, the region's life sciences industry organization. “The entrepreneurial spirit is in our culture, our history, and our DNA, starting from the risk-takers of the Gold Rush,” she says. “They came to mine gold, we're now mining the genome.”

Across the biotech and medtech spectrum, says Maderis, it's happening in the Bay Area: personalized medicine, stem cell therapy, molecular diagnostics, health information technology (IT), and industrial biotechnology, all supported by a strong academic environment and knowledgeable venture capitalists. And it's not just researchers and wine grapes thriving in the California climate. For every bench scientist, there are five other life science-related jobs such as patent agents, technical writers, and project managers.

If you're in the job market, Maderis has suggestions. The Bay Area has an acute shortage of certified clinical laboratory technicians. Consider going into green tech—bioremediation, biofuels, and bio-based chemicals—a field that saw 8 percent annual job growth over the last five years in California. In stem cell research, a 2004 state initiative is directing \$3 billion over 10 years to regenerative medicine research. Intel, Apple, and Google all have venture funds for health IT, says Maderis, signaling potential expansion in that area, especially with the Affordable Care Act (President Obama's 2010 health care reform) promoting electronic health records and online government health services. Investors hope that health IT products will reach the market faster than drugs and devices that require a lengthy regulatory approval process.

Consumer digital health care is also growing, says **G. Steven Burrill**, founder and CEO of Burrill & Company, a San Francisco-based financial services firm for the life sciences industry. “We have seven billion people now, and six billion have a cellphone. We're going to live in a world where we spit on our BlackBerry and a microfluidics chip will do the same thing we do today in a diagnostic lab. This is how health care will be delivered.” Burrill believes this revolution means big pharmaceutical companies will have a smaller impact in the future, paving the way for small, nimble biotechnology entrepreneurs.

Entrepreneurs have a home—or rather a garage—at QB3 in the Mission Bay area, a partnership of the University of California campuses of Berkeley, Santa Cruz, and San [continued](#)>

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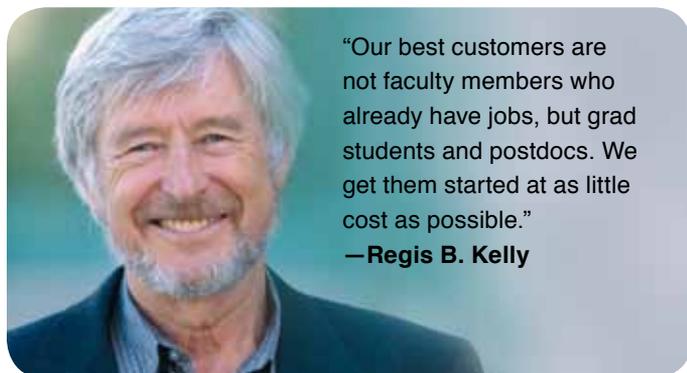
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Francisco. Its incubator system, the QB3 Garage/Innovation Network, currently houses 45 startups, some in microlabs as small as 200 square feet. Director **Regis B. Kelly** says, “We’re down in the weeds doing early lean startup with people who just have an idea and a credit card. Our best customers are not faculty members who already have jobs, but grad students and postdocs. We get them started at as little cost as possible.” Resources are geared toward novices, such as QB3 Startup in a Box, a package of services for new entrepreneurs that includes mentoring, legal and business support, and assistance in getting small business grants. In its five years of existence, QB3 has had 10 companies graduate from the incubator, with an 80 percent success rate. QB3 also does funding through Mission Bay Capital, a seed-stage venture fund of which Kelly is a director. So far, QB3 companies have brought in \$230 million in small business grants and venture funding and created about 250 jobs.

Graduate students and postdocs can take advantage of biocluster opportunities now, says Kelly, who was executive vice chancellor at the University of California, San Francisco before directing QB3. He says that 15 years ago, faculty members at Bay Area academic institutions noticed that more than half of their graduate students and postdocs were going to industry and changed their curriculum in response.

**Dana Andersen** benefitted from this change. He participated in Stanford University’s NIH-funded graduate training program in biotechnology, including an internship at Genentech, where he is now senior director, pharmaceutical development. Seeing the contrast between academia and industry helped him refine his career goal of working on scientific problems with practical relevance, and brought him back to Genentech after postdoctoral research in Switzerland. The benefits of a biotechnology training program go beyond finding a potential job, he says. The program gave him experience in the multidisciplinary teams that are typical in life science industries. He says, “The training gave me regular meetings with people across the spectrum of biotech disciplines, and I worked with people in a lot of different fields. That’s important because industry teams are highly cross-functional.”



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—**Regis B. Kelly**

No matter what your role on a life sciences team, Andersen stresses the advantages of an education in science, technology, and engineering. “I run into people all the time with a science or engineering Ph.D. who are in marketing, planning, commercial analysis, project management, patent law—there are always opportunities for people with good scientific fundamentals and a technical background, at Genentech and similar companies.”



Torrey Pine Trees in San Diego

### SAN DIEGO: A GROWING FAMILY TREE

South of the Bay Area is the San Diego biocluster, whose history goes back not to the Gold Rush, but to a single company: Hybritech, which made monoclonal antibody-based diagnostics and therapies. Steven Burrill explains that when Hybritech was acquired by Eli Lilly in 1986, “former employees began starting other companies that emanated around Hybritech like a family tree.”

One Hybritech alum with deep roots is **Abhay Kumar**, who started at Hybritech in 1992 as a research scientist. He is now associate director of corporate development at Life Technologies, a global biotechnology products, equipment and services company based in nearby Carlsbad, which he says maintains the culture of innovation that he remembers from Hybritech. San Diego still feels like a small town, he says. “When I attend a seminar, I spot dozens of familiar faces. It’s sort of a reunion. The industry has grown but still has that family feel.” Life Technologies is part of that family, sponsoring regional conferences and meetings and donating reagents to local school laboratories. The company hosts a global volunteer day, when the entire Life Technologies workforce worldwide does community volunteer work.

Family trees grow, and the San Diego biotech industry is now so large and diverse it’s hard to keep track of, says **Duane Roth**, CEO of Connect, a regional life sciences networking organization. Connect held 300 educational and mentoring events last year and Biocom, the regional life science trade association, has nearly 500 member organizations. Despite these numbers, Roth says, the San Diego biotech community is unique for its compactness. “The Torrey Pines Basin has 81 research institutions in a three-mile radius,” he says. These include the Sanford-Burnham Medical Research Institute, the Salk Institute for Biological Studies, the Scripps Research Institute, and the University of California, San Diego (UCSD). “You can almost walk across the street to meet with **continued**>

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Mary Walshok

your external collaborators,” says Roth. “We’re all right on top of each other.” Moving into the neighborhood in 2013 is a new building for the J. Craig Venter Institute for research on human and microbial genomics and synthetic biology.

Common roots, close proximity, and networking have resulted in stellar collaborations. An example is the Sanford Consortium for Re-

generative Medicine, part of the state’s stem cell research efforts, which required coordination between Salk, Scripps, Sanford-Burnham, UCSD, and the La Jolla Institute for Allergy and Immunology. “They got together to put up one building for scientists from five different organizations to work together,” says Roth. “That’s the kind of thing we’re able to do here.”

The San Diego life sciences industry is influenced by the local military base and wireless communications industry, says Roth, making wearable, wireless health sensors a growing field in San Diego. Like health IT, these fit national priorities to reduce health costs, allowing patient monitoring outside of hospitals, and creating opportunities for cost-saving preventive medicine.

**Mary Walshok**, UCSD associate vice chancellor of public programs, says interaction between local technology experts and business leaders to address national needs shows how San Diego is an innovation ecosystem. This includes academic institutions such as UCSD and San Diego State University, whose faculty enter research partnerships with industry and whose graduates provide businesses with educated employees. In turn, local biotech expands the job market, and gives universities insights into future technologies to guide the curriculum, especially for continuing education. Walshok is also UCSD dean of extension, which has 57,000 enrollees annually in practical programs such as clinical trials management and biotechnology production. She says these are “bridges to tech jobs—they respond directly to life science industry needs, helping mid-career adults retool their skills or new graduates gain the training they need for a job not only in biotech but in areas like marketing, management, and international trade.”

Walshok, who has been involved in the San Diego technology culture for four decades, says the local innovation ecology includes the general public. “Industry and academia are connected to the larger community and our presence raises the public appreciation of science and understanding of the value of research.”

### SEATTLE: GOING GLOBAL

The core strengths of the Seattle biocluster also stem from its history, but the story is different from the California Gold Rush or the Hybritech family tree. Successful bone marrow transplantation was developed at Fred Hutchinson Cancer Research Center, so Seattle is strong in medical therapies,

## Featured Participants

### BAY AREA

**Baybio**  
www.baybio.org

**Burrill & Co**  
www.burrillandco.com

**Genentech**  
www.gene.com

**QB3**  
www.qb3.org

**Stanford University**  
www.stanford.edu

**University of California, San Francisco**  
www.ucsf.edu

### SAN DIEGO

**Connect**  
www.connect.org

**Life Technologies Corporation**  
www.lifetechnologies.com

**University of California San Diego**  
www.ucds.edu

### SEATTLE, WASHINGTON

**Novo Nordisk**  
www.novonordisk.com

**Washington Biotechnology and Biomedical Association**  
www.washbio.org

**Washington State University**  
www.wsu.edu

### OTHER AREAS

**Deloitte LLP**  
www.deloitte.com



Mt. Rainier near Seattle

devices, and health research. “Three of 21 drugs approved by the FDA in 2010 were discovered and developed in Seattle,” says **Chris Rivera**, president of the Washington Biotechnology & Biomedical Association, the Washington State life science trade association. The University of Washington has a top medical school, nearby Bothell is a medical development and manufacturing hub, and Lee Hood’s Institute for Systems Biology leads in personalized medicine.

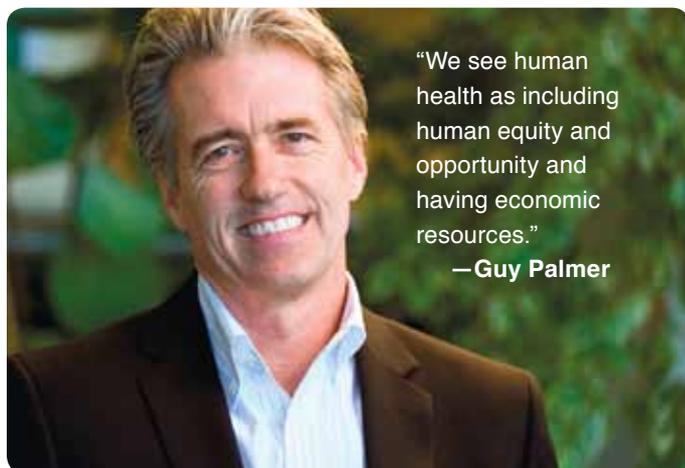
Seattle has two new research centers funded by international pharmaceutical giant Novo Nordisk, known for insulin formulations and delivery systems. In 2009, the company opened an Inflammation Research Center investigating conditions such as chronic inflammatory bowel disease and rheumatoid arthritis. These are autoimmune diseases, so in summer 2012, Novo Nordisk is opening a complementary research center for type 1 diabetes, also an autoimmune condition. Eventually the two centers,



Chris Rivera

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“We see human health as including human equity and opportunity and having economic resources.”

— Guy Palmer

housed together in the South Lake Union neighborhood, will have over 100 employees. Novo Nordisk Chief Scientific Officer **Mads Krosgaard Thomsen** says, “If we hit our milestones—our intention with type 1 diabetes is two projects in clinical trials in the first five years—we’re willing to expand.”

Novo Nordisk began autoimmunity research because of the company’s expertise in therapeutic proteins and chronic conditions with injected therapies, says Thomsen. Seattle was chosen because the company had a connection to Zymogenetics in the 1980s, and the city has the Benaroya Research Institute studying autoimmune diseases and an autoimmune therapy success story in ENBREL from Immunex (acquired by Amgen in 2002). Thomsen says, “Type 1 diabetes research is part of our vision. Our scientists helped discover that it’s an autoimmune disease and we’re perceived as a diabetes leader, so we needed to do something about type 1.”

Many bioclusters have outstanding research and development, though. A unique feature of the region, says Rivera, is that outside of Geneva, Switzerland, home of the World Health Organization, Seattle has the world’s highest concentration of global health institutions. Besides the Novo Nordisk research centers, South Lake Union has Seattle Biomed, a nonprofit infectious disease research institute; PATH, an international global health organization; and the Bill & Melinda Gates Foundation, the global health and development philanthropy directed by the family of the Microsoft cofounder, Bill Gates, and the businessman Warren Buffett.

The global health focus extends 300 miles east of Seattle, to Washington State University. There, a \$25 million Gates Foundation grant contributed to a new building for the Paul G. Allen School for Global Animal Health, named for the other Microsoft founder who contributed \$26 million to the enterprise. Research focuses on livestock diseases that impede economic progress in developing countries, and the 70 percent of human infectious diseases that are transmittable from animals to humans, such as influenza.

Graduate programs at the Allen School for Global Animal

Health include a traditional infectious disease and immunology degree, and an interdisciplinary option that reflects a broader goal, expressed by **Guy Palmer**, the school’s director. “We see human health as including human equity and opportunity and having economic resources,” he says. The interdisciplinary degree encourages students to explore science implementation and policy, and become social entrepreneurs, for example, developing both effective vaccines and sustainable programs to introduce them into low-income countries. The school, which is less than 10 years old, plans to grow to more than 100 graduate students by 2020. Half of the current 35 students are international. Many are scientists and veterinarians who will take their new expertise to their home country. On the dry, eastern side of the Cascade Mountains, Palmer says the School for Global Animal Health is connected to the drizzly Seattle biocluster in western Washington through partnerships with its infectious disease institutes and a complementary relationship to the biotech sector. With a focus on animal vaccines and health, says Palmer, “we fit into a different but related market sector.”

## AWAY FROM THE EPICENTERS

The biocluster epicenters of San Francisco, San Diego, and Seattle offer the excitement of a high concentration of people with common interests, professions, and goals. However, opportunities—and sometimes a lower cost of living—are found nearby, at Washington State University, or in California at UC Irvine, a hub for medical devices, or UC Davis, with expertise in agricultural biotechnology. **Matthew Hudes**, U.S. managing principal, biotechnology for Deloitte Consulting, says the Bay Area biocluster extends to San Jose and Santa Cruz, and Orange County has a significant medtech industry. “There are tremendous pockets of innovation across California,” he says, “And a great deal going on at Oregon Health & Science University. These all have different characters and that diversity is important for the future of science.” Another area to watch is the University of Utah. Its successful startup initiation program could seed a local biocluster.

You can tap into the western U.S. biocluster energy from anywhere. Gail Maderis advises scientists to get experience in managing outside contractors, especially in another city or country. Working with someone across the globe to design protocols and interpret data is a valuable skill with the growth in international collaborations and outsourcing. For now, however, a western biocluster is still the best place for a life sciences trailblazer to explore new territory. Even a true believer in cloud connections like Steven Burrill says, “I still have to go see people. Personal relationships are important and nothing is better than being in the Bay Area where you have everything around you.”

*Chris Tachibana is a science writer based in Seattle, USA, and Copenhagen, Denmark.*

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