

News

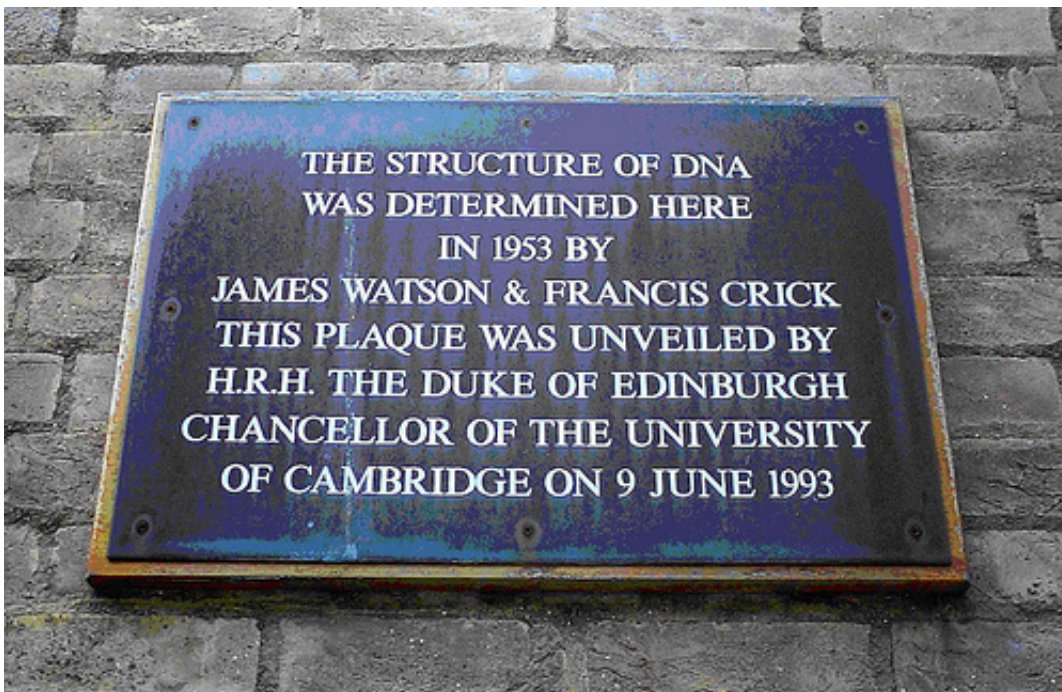
COMMENTARY Cambridge vs. Cambridge: a personal comparison

An MIT researcher who recently completed a Guggenheim fellowship at the University of Cambridge explains the cultural differences between the two scientific powerhouses.

25 May 2007 Shuguang Zhang [1 comment](#)

The roots of many scientific and technological breakthroughs can be traced to discoveries made in one of the two Cambridges: the Cambridge, on the River Cam in Cambridgeshire, U.K., and its American namesake, situated on the Charles River in Massachusetts. Both have rich histories of higher learning and played pivotal roles in the development of knowledge, particularly in science and technology, not only for Britain and the United States, but also for the rest of the world. After spending 19 years in Cambridge, MA, at MIT, I had the opportunity recently to experience life in that other Cambridge, doing research for six months at the University of Cambridge as a Guggenheim fellow. I couldn't help but notice the differences in research culture between the two.

The two Cambridges do nevertheless share much in common; they have undoubtedly made scientific history in many ways. The original Cambridge was home to many scientific luminaries: Francis Bacon, Isaac Newton, William Thomson Kelvin, Charles Darwin, J. J. Thomson, Ernest Rutherford, Alan Turing, Fred Sanger, Francis Crick, Max Perutz, John Kendrew, Sydney Brenner, and many others. They established fields that we still pursue today.





These plaques at the University of Cambridge, among many others across the campus, commemorate some of the school's significant contributions to scientific history.

Across the ocean, MIT made enormous contributions to the development of modern computing. (Harvard University has, of course, also been the site of many scientific firsts, but I will focus only on MIT, since that is where I carry out my research and teaching.) Claude Shannon formulated information theory and Marvin Minsky developed artificial intelligence. Robert Langer almost single-handedly created the fields of controlled drug delivery and tissue engineering. Wolfgang Ketterle and others discovered a new form of matter, the Bose-Einstein condensate.

Biology at MIT has also had a large impact. Phillip Sharp discovered RNA splicing; Susumu Tonegawa discovered antibody gene recombination; Robert Horvitz discovered programmed cell death. Alexander Rich discovered double-stranded RNA and DNA-RNA hybridization, the foundation for PCR and gene arrays. Robert Weinberg discovered the first human cancer gene. Eric Lander was instrumental in the public effort to sequence the human genome.

A tale of two cities

Today, however, the research cultures of the two Cambridges are somewhat different. During my six months in England, I found that scientists there tend to think first, often through informal and very lively discussions, before doing. For example, morning coffee and afternoon tea are popular times for discussion. People from different laboratories, often from the same department or institute, gather to share new ideas, results, unsolved problems, and speculations.

On the other hand, in Cambridge, MA, and especially at MIT, researchers with an idea immediately take action; they try preliminary experiments, sometimes without much planning or forethought. From my experience, I've found that MIT students and postdocs take greater risks, conducting seemingly impossible experiments without fear of failure.

One reason for this is probably that research funding at MIT is somewhat less constrained, with money coming in from a variety of sources, including private industry and philanthropic donors (this is changing with the recent downturn in funding from the major U.S. federal granting agencies). The University of Cambridge has a government-funded three-year Ph.D. program, which often deters students from tackling high-risk projects that require more unrestricted exploration.

In Cambridge, U.K., I found it difficult to start cross-disciplinary collaborations. There are more safety and laboratory regulations and more required paperwork that sometimes restrict collaborations. And access to academic buildings is tightly controlled; people can access only the building in which they work and not those next door. People in materials science or engineering, for example, cannot go into the biochemistry or physiology buildings without a pre-arranged meeting or an escort. Likewise, people in biochemistry cannot wander into the tearoom in the Cavendish Lab or the Institute for Nanoscience, and vice versa. This limited access sometimes

hinders cross-disciplinary collaborations.

At MIT, researchers are free to enter any academic building they wish to attend a seminar or visit a lab, thereby increasing the likelihood of chance encounters with potential collaborators.



Many of MIT's academic buildings, like this one at 77 Massachusetts Ave., are open to the public.

The business of science

I have found MIT researchers to be in general more adventurous and innovative in their efforts to translate their research into products. Many undergraduate and graduate students at MIT would consider founding start-up companies. At the University of Cambridge, researchers may be more cautious in launching a venture to commercialize their inventions, perhaps due to the lack of venture capital investment and a culture that doesn't encourage fearless entrepreneurship as much as MIT. (To be fair, MIT exceeds most universities in the U.S. in technology transfer and spin-off companies.) But the University of Cambridge is catching up through its alliance with MIT, the Cambridge-MIT Institute, which seeks to stimulate entrepreneurship.

It is remarkable that the two Cambridges, although geographically small, with a combined population of about 225,000, together have made a disproportional contribution to human knowledge. Scientists in the two cities have been able to form tightly knit, vibrant communities that foster high levels of curiosity and ingenuity. Cantabrigians have asked questions both simple and profound, such as:

- What is gravity?
- What is an atom made of?
- What is the structure of the universe?
- What is the origin of species?
- Can we build a machine that computes?
- What is the structure of genetic material?
- How do cells live and die?

Such questions have not only propelled discoveries and inventions in the past but will certainly continue to do so in the future.

Shuguang Zhang is the associate director of the Center for Biomedical Engineering at MIT.

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Comments

Thursday, 31 May 2007 04:26 EDT
Paul Wicks **said:**

Great article. The website I work for, www.patientslikeme.com is based in Cambridge with me and another member of staff working remotely (LA and London). Interestingly there is another "Web 2.0" site split between the UK and US, the excellent Traineo.com.

Anyway, I found a few of Prof Zhang's comments particularly interesting. First off, the increased level of bureaucracy, red tape, and restrictions on funding that we face in the UK. If this is really true then we need to be flagging this up if we're going to be competitive within Europe following the completion of the Bologna process in 2010, and also against the US.

Secondly campus security hindering interdisciplinary collaboration and cross-fertilisation is a great insight that I hadn't noticed before. It's true, I can't get into Old Age Psychiatry and they can't get into Psychology. That's why institute-wide events should be given more focus.

The third and perhaps most important point to me though was this: "I have found MIT researchers to be in general more adventurous and innovative in their efforts to translate their research into products." The company I work for was founded by MIT graduates, Facebook & Traineo started at Harvard, etc. and whilst these companies are for-profit, they have had beneficial effects greater perhaps than initiatives launched by non-profits or educational entities. However in the UK we continue to be stifled by the notion that making money is "dirty" somehow.

I wonder if a more systematic approach to survey the two cultures could be helpful to develop some strategy....

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