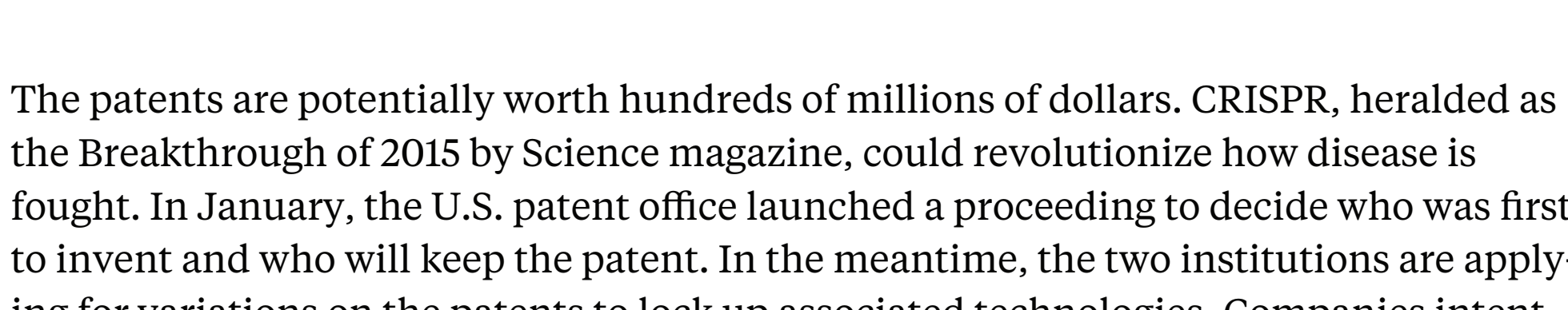


Billions at Stake in University Patent Fights

<https://www.bloomberg.com/graphics/2016-university-patents/>

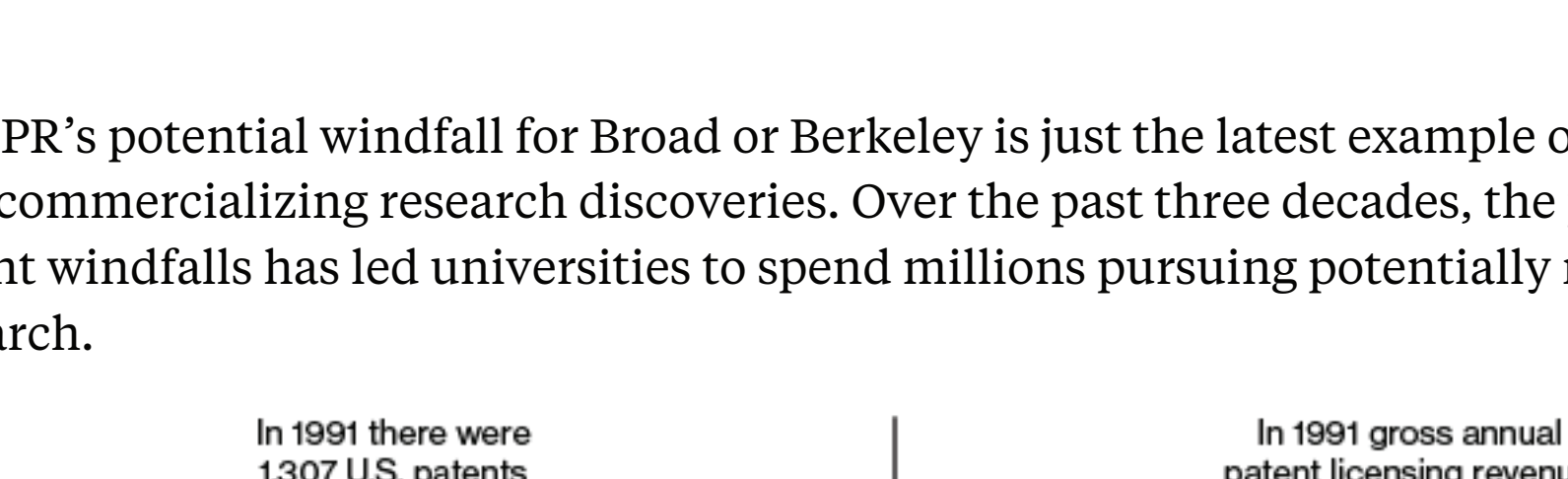
By Dave Merrill, Blacki Migliozzi & Susan Decker
May 24, 2016

A powerful and inexpensive technique for rewriting snippets of DNA — known as CRISPR-Cas9 — has two research institutions locked in a bitter patent battle. On one side is UC Berkeley, where faculty first reported using the gene-editing technology in 2012, on the other, Broad Institute of MIT and Harvard, where faculty won a special expedited patent for the technique in 2014.



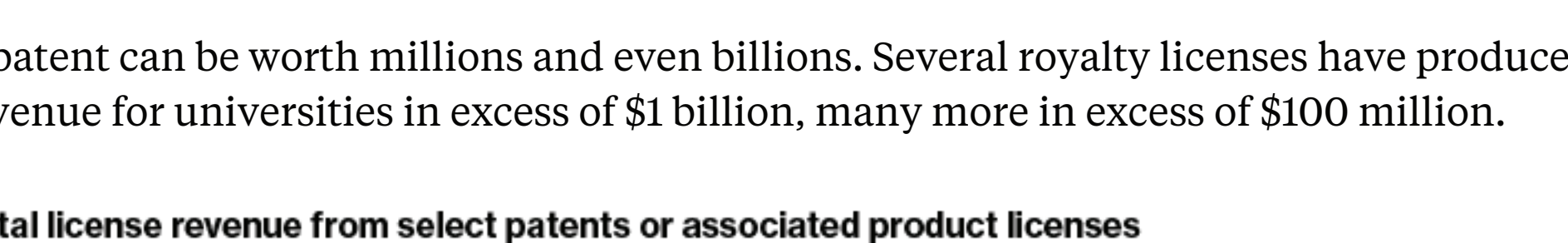
The patents are potentially worth hundreds of millions of dollars. CRISPR, heralded as the Breakthrough of 2015 by Science magazine, could revolutionize how disease is fought. In January, the U.S. patent office launched a proceeding to decide who was first to invent and who will keep the patent. In the meantime, the two institutions are applying for variations on the patents to lock up associated technologies. Companies intent on using the CRISPR technique will need to license the technology from the patent holder, Broad or UC Berkeley.

U.S. patents and applications for CRISPR gene editing



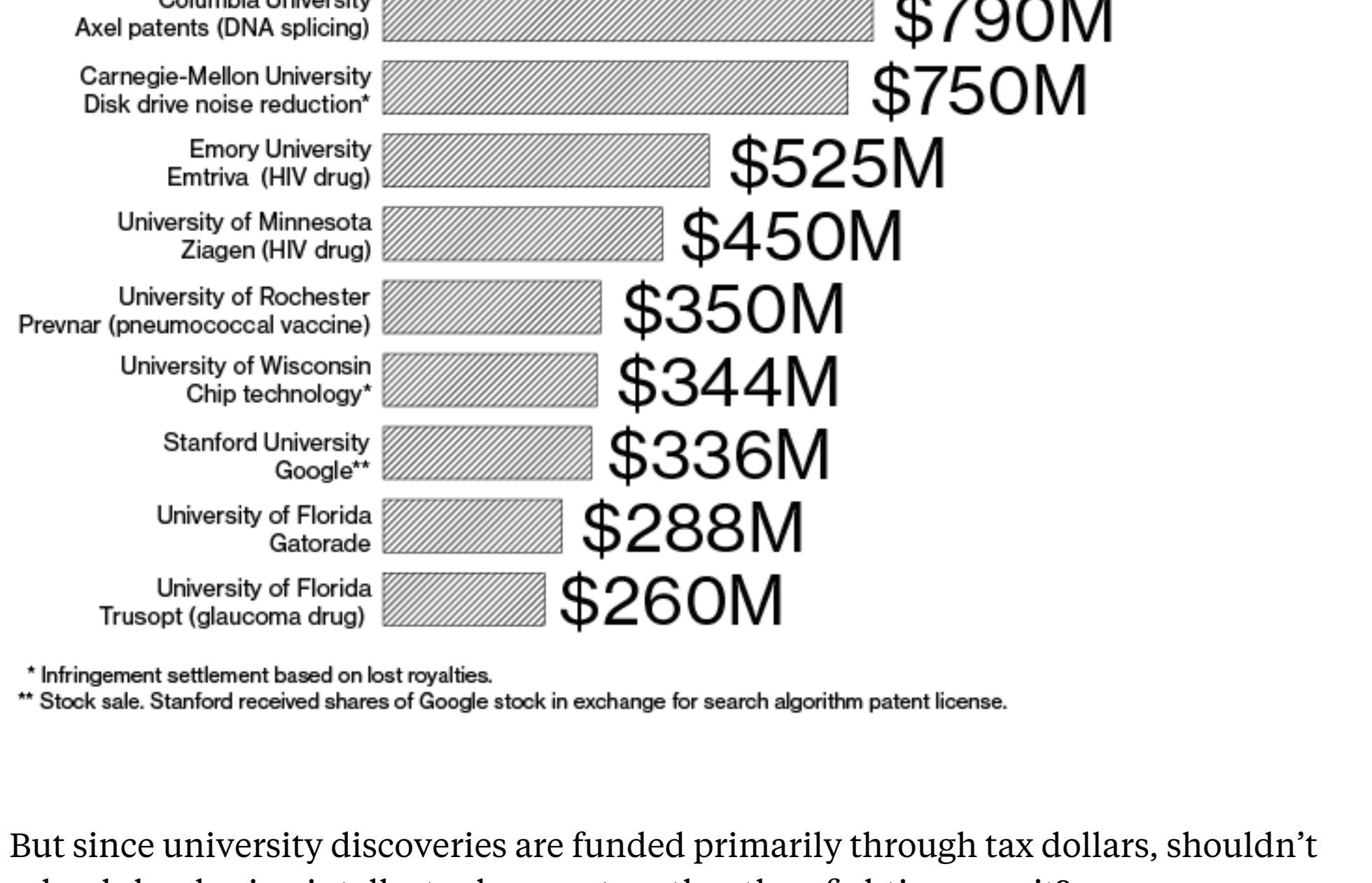
* Includes patents for Broad, MIT or Harvard, and patents held jointly by the institutions

CRISPR's potential windfall for Broad or Berkeley is just the latest example of universities' commercializing research discoveries. Over the past three decades, the promise of patent windfalls has led universities to spend millions pursuing potentially marketable research.



A patent can be worth millions and even billions. Several royalty licenses have produced revenue for universities in excess of \$1 billion, many more in excess of \$100 million.

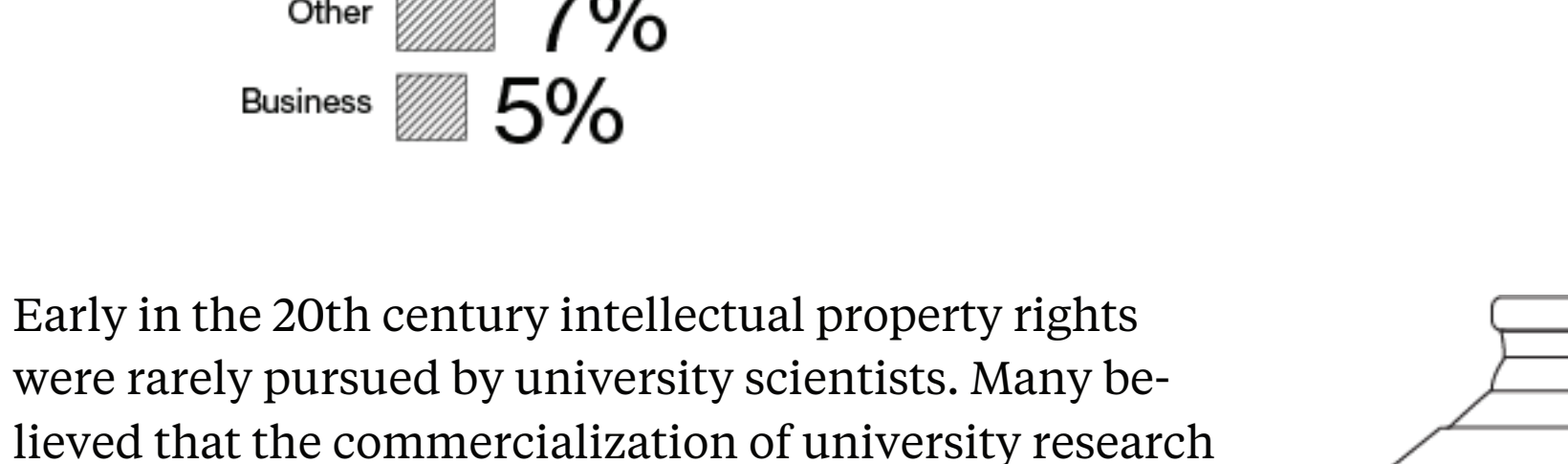
Total license revenue from select patents or associated product licenses



* Infringement settlement based on lost royalties.
** Stock sale. Stanford received shares of Google stock in exchange for search algorithm patent license.

But since university discoveries are funded primarily through tax dollars, shouldn't schools be sharing intellectual property rather than fighting over it?

Sources of university R&D funding 2012



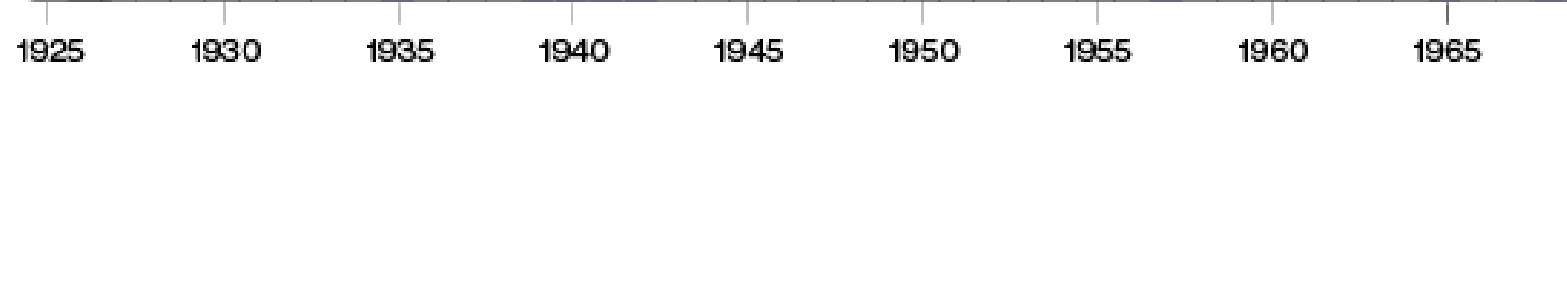
Early in the 20th century intellectual property rights were rarely pursued by university scientists. Many believed that the commercialization of university research threatened academic freedom and unfettered "basic" research. If patents were pursued, they were typically assigned to the Research Corporation for Science Advancement which distributed patent revenue through grants to schools and institutions. The first university-affiliated patent office was born ninety years ago, when a University of Wisconsin biochemist, Harry Steenbock, discovered that irradiating food increased its vitamin D content. Steenbock pursued a patent reasoning that through proper management he could grant licenses to promote healthy uses and deny licenses to products with little nutritional value — such as oleo, donuts or vitamin D beer. Quaker Oats had offered Steenbock \$1 million for the vitamin D fortification patent. He instead allowed the University of Wisconsin affiliate to make the licensing agreement with Quaker Oats. The patent revenue was returned to the school to fund research. To date, the school's vitamin D patent portfolio has raised an estimated \$300 million for the school and faculty inventors.



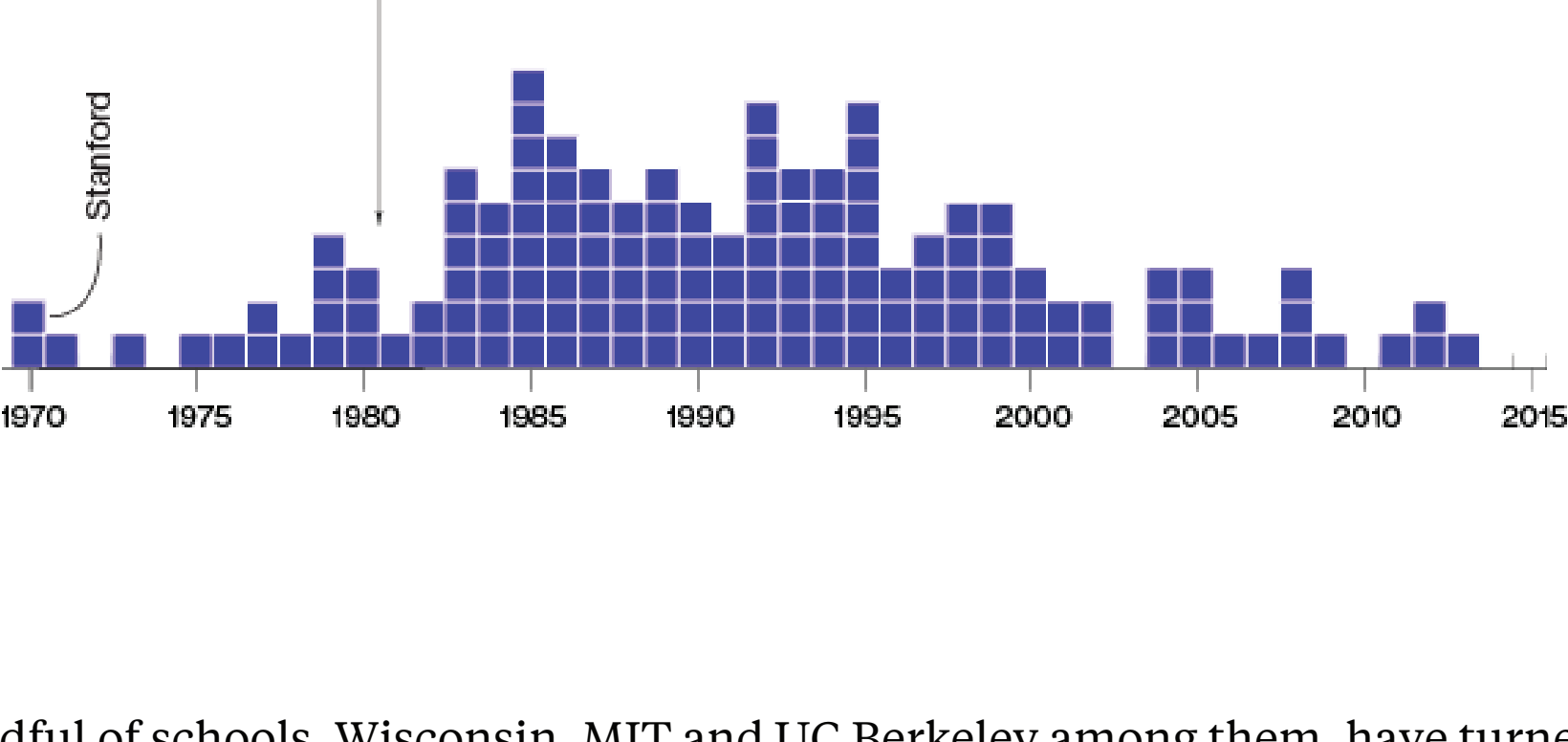
Since Wisconsin founded the first office dedicated to licensing university research in 1925, what would be known as a "tech transfer," other schools followed.

Another turning point occurred in the late 1970s when schools lobbied Congress for passage of a bill that would give universities patent rights to discoveries made as a result of federally funded research. Congress, eager to boost American's lagging competitiveness, passed the Bayh-Dole Act in 1980. Bayh-Dole cleared the way for colleges to retain patent rights for federally funded research — tech-transfer offices became the norm on U.S. campuses.

University technology transfer offices established by year



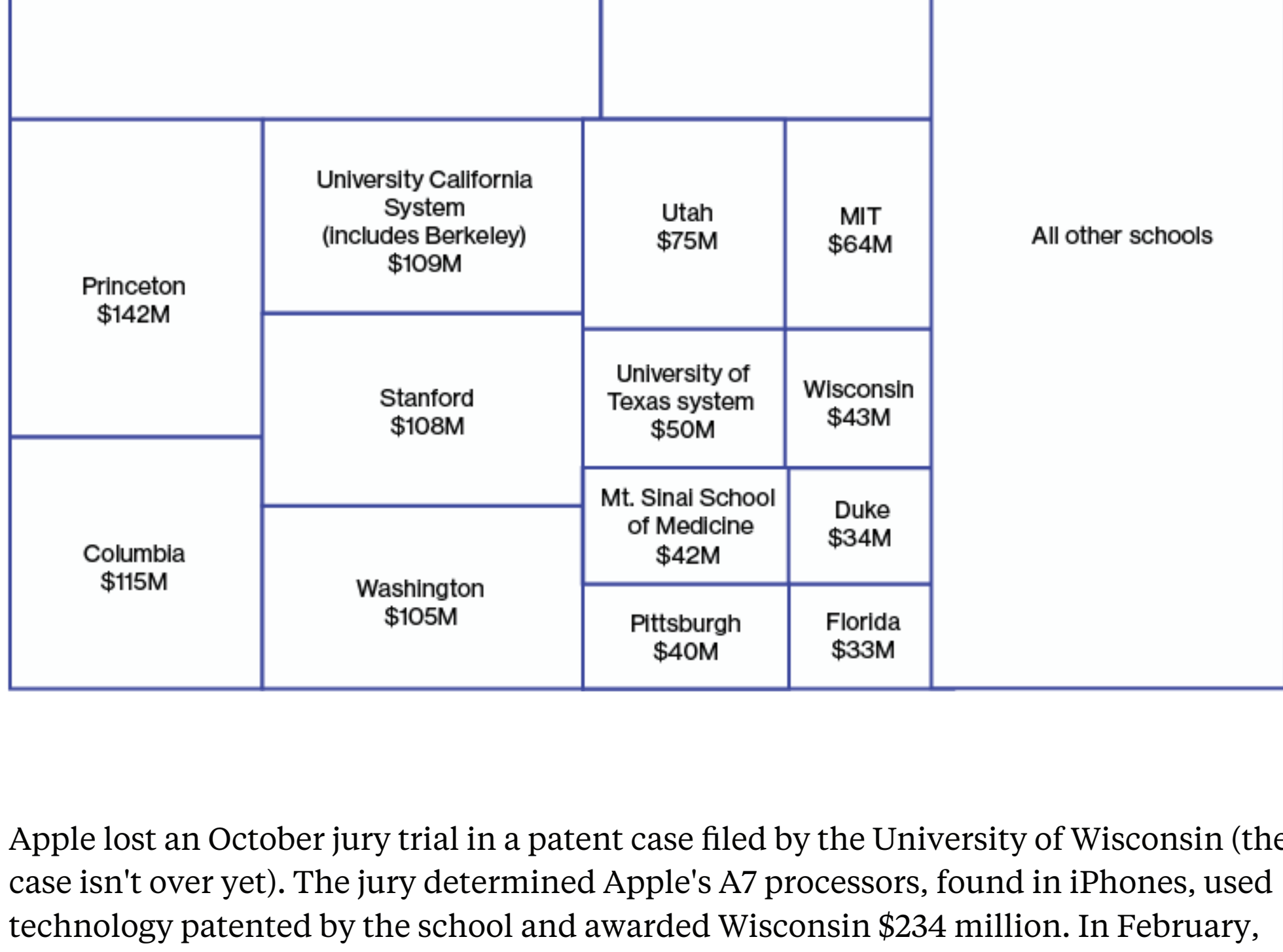
After the passage of the 1980 Bayh-Dole Act — which cleared the way for colleges to retain patent rights for federally funded research — tech-transfer offices became the norm on U.S. campuses.



A handful of schools, Wisconsin, MIT and UC Berkeley among them, have turned their tech-transfer offices into licensing juggernauts.

University patent license royalties in 2014 = \$2.2 B

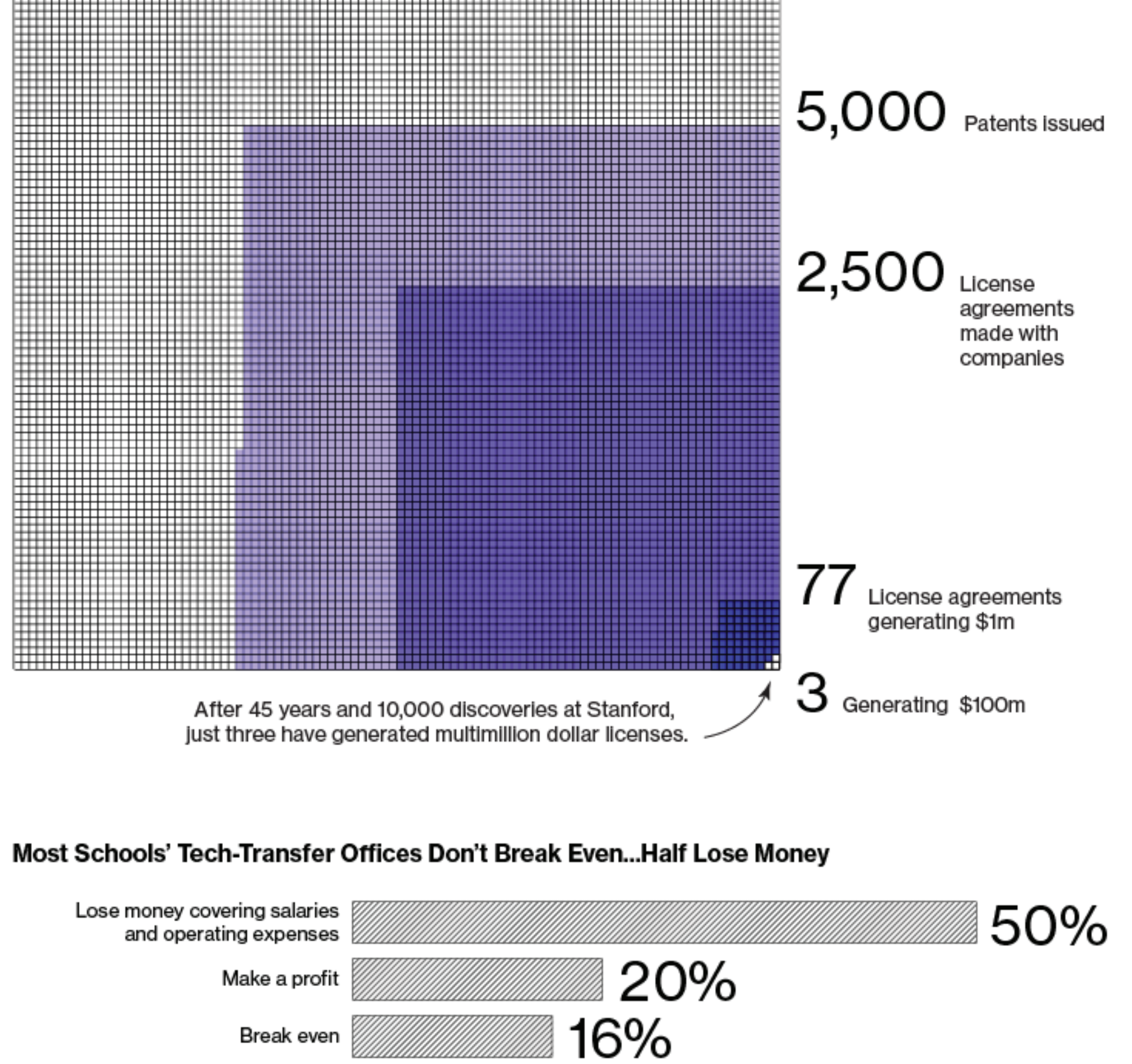
15 schools produced 70% of the total for U.S. universities.



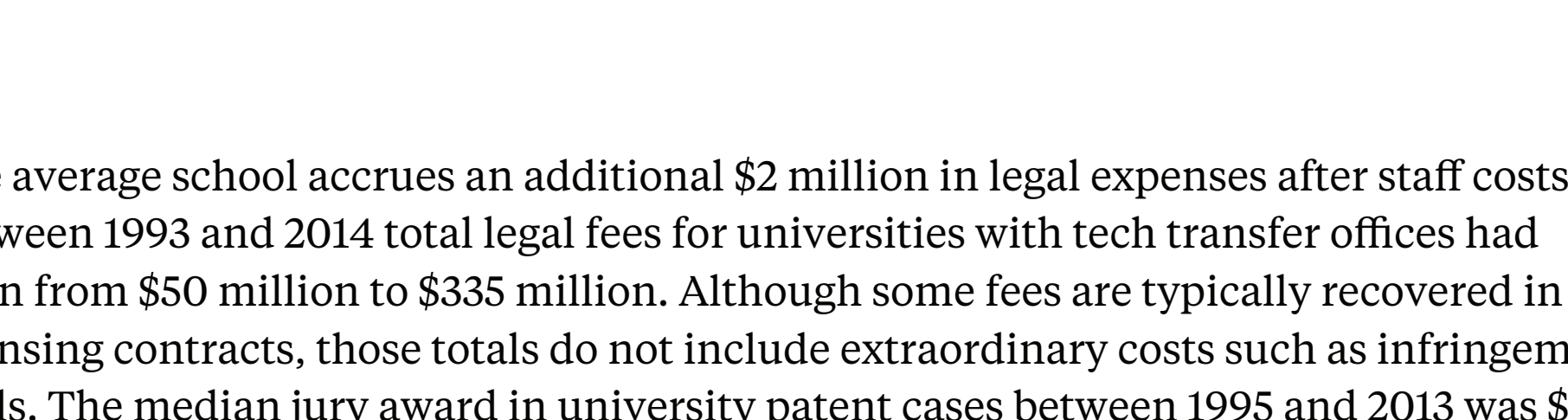
Apple lost an October jury trial in a patent case filed by the University of Wisconsin (the case isn't over yet). The jury determined Apple's A7 processors, found in iPhones, used technology patented by the school and awarded Wisconsin \$234 million. In February, Marvell Technology Group, a hard-drive manufacturer, settled a dispute arising over patents held by Carnegie-Mellon University for \$750 million, the largest royalty settlement involving a University in corporate history.

Big paydays like these have spurred the university patent boom. But in truth, most schools don't see anything like that kind of return on their investment. Multimillion dollar successes are extremely rare at well-funded research institutions like Stanford; for small liberal arts colleges they are almost non-existent.

Stanford's innovation record since 1970

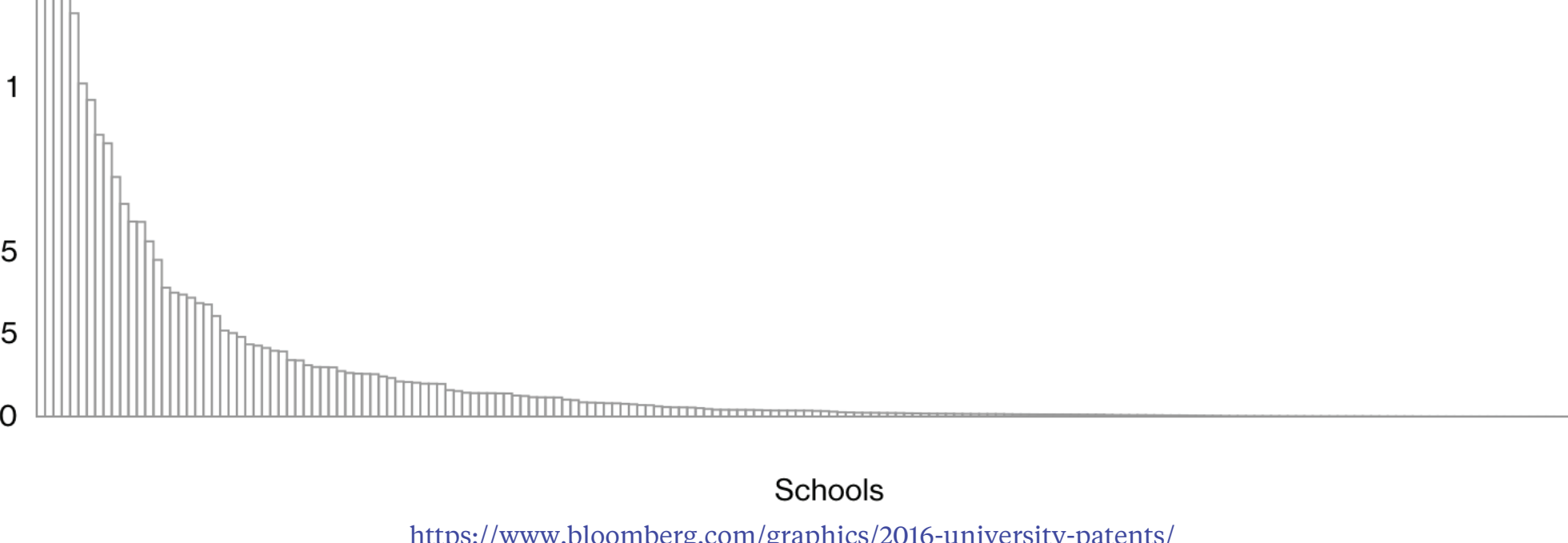


Most Schools' Tech-Transfer Offices Don't Break Even...Half Lose Money



The average school accrues an additional \$2 million in legal expenses after staff costs. Between 1993 and 2014 total legal fees for universities with tech transfer offices had risen from \$50 million to \$335 million. Although some fees are typically recovered in licensing contracts, those totals do not include extraordinary costs such as infringement trials. The median jury award in university patent cases between 1995 and 2013 was \$10.1 million. Law firms working on contingency typically take a third of those judgments. In the \$750 million Carnegie Mellon/Marvell settlement, the legal bill was likely close to \$250 million...or the equivalent of one year's tuition for 6,000 Carnegie students.

Gross Patent License Income by School, 1991-2014



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SOURCES: Licensing revenue data for research universities are from the Association of University Technology Managers (AUTM) annual surveys 1991-2014. Not all schools reported for every year. Schools with fewer than five years of data were excluded. Yale University stopped reporting after 1999. The University of Texas started reporting system-wide data in 2009. Prior year data for individual University of Texas schools are excluded. The University of California reports system-wide data. CRISPR patent application data: The Boston Consulting Group, September 2015 study; Nature.com

Select patent license revenue data: University tech-transfer offices, media accounts

Sources of university R&D: National Science Foundation

Stanford innovation data: Stanford University

Tech-Transfer office finance data: AUTM; Research Management Review; Brookings Institution

Litigation data: PricewaterhouseCoopers

All other data: AUTM