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A prize for the foreign-born

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Here at our sea-washed, sunset gate shall stand

A mighty woman with a torch, whose flame

Is the imprisoned lightning and her name is

Mother of Exiles. From her beacon hand

Glows world-wide welcome; her mild eyes command

The air-bridged harbor that twin cities frame ...

"*... I lift my lamp beside the golden door*."

Emma Lazarus "The New Colossus" (1883)

HOW GOLDEN WOULD AMERICAN SCIENCE BE WITHOUT OUR FOREIGN-BORN SCIENTISTS?

There are no simple yardsticks to measure the contribution of foreign-born scientists to the biomedical research enterprise in America. Ideally, we should be able to take a listing of all papers in the life sciences originating from laboratories located in the U.S. and published in the last twenty or thirty years, and then let a computer figure out what percentage of the authors listed on these publications was born outside the U.S. Of course, this is not a realistic option because publications do not reveal the places of their authors' births.

To get some objective measure of the contribution of foreign-born scientists to U.S. biomedical research, we analyzed the list of all Nobel Prizes in Medicine and Physiology awarded between 1901 and 2005 (1, 2). The total number of winners and co-winners of this prize from the U.S. is 87. (Parenthetically, there is a much higher proportion of Americans among the winners after 1950 than in the first half of the 20th century: we counted a total 11 U.S. winners between 1901 and1949, and 76 between 1950 and 2005. This is undoubtedly a reflection of the growing importance of the U.S. biomedical research enterprise after World War II.) For the purpose of our analysis, it is noteworthy that at least 27 of the 87 American Nobel Prize winners—over thirty percent—were born outside the U.S.! This count includes individuals who were not U.S nationals but lived permanently in this country at the time they had produced the work for which they received the Nobel Prize (e.g., the immunologist Susumu Tonegawa, who is usually considered Japanese, the Italian biologist, Rita Levi-Montalcini, and Swedish-born Torsten Wiesel). Not included in the count are Nobel Prize winners who had moved to this country after completion of the work for which they were honored. The latter category includes Albert Szent-Györgyi, the Hungarian-born discoverer of vitamin C, who had received the Prize in 1937, but moved to the U.S. in 1947. Other examples are Sir Paul Nurse, the British 2001 Nobel Prize recipient who has recently become President of The Rockefeller University in New York City, and the immunologist Peter Doherty, co-recipient of the 1996 Nobel Prize for work done in Australia in the early 1970s, who subsequently moved to the U.S. With the latter individuals included, more than one in three Nobel Prize winners in Medicine and Physiology active in the U.S. in the last 105 years are foreign-born.

To put these numbers in perspective, it is obvious that the proportion of foreign-born scientists among U.S. Nobel Prize winners is much higher than the percentage of foreign-born individuals among the general population in this country, which in 2003 was estimated to be 11.7 % (3). It may come as a surprise to some that immigrants abound not only in low-paying, unskilled jobs, but also in the most intellectually demanding professions.

Assuming that the proportion of Nobel Prizes in Physiology and Medicine awarded to scientists born abroad reflects the contribution of foreign-born scientists to U.S. biomedical sciences as a whole—not an unreasonable assumption—scientists born abroad would account for about one-third of all scientific production in biomedicine in the U.S. from the beginning of the 20th century up to the present.

Over the years, the contribution of foreign-born scientists to the biomedical research enterprise in the U.S. has been steadily increasing. In the first decades of the 20th century there were more American scientists who studied and worked abroad than foreign scientists who came to the U.S. In those days, the leading centers of scientific research were in Europe, especially Germany, France, and England. However, with Hitler's rise to power in Germany in the 1930s and the outbreak of World War II, the epicenter of scientific activity has dramatically shifted across the Atlantic. An important factor was the emigration to the U.S. of many scientists (mainly Jewish, but also non-Jewish) fleeing Nazi Germany and other European countries occupied by the Nazis. Another wave of scientific immigration occurred after the end of World War II when European countries, still recovering from the ravages of the war, were unable to offer adequate opportunities to young scientists eager to build their careers. Opportunities for foreigners in science became quite plentiful in the 1960s and 1970s as the federal government, responding to the successes of the Soviet space program, substantially increased financial support for scientific research in the U.S.

As the U.S. became an undisputed world leader in scientific research in the second half of the 20th century, it has become a magnet for foreign students seeking to pursue their graduate or postdoctoral studies. The work of foreign graduate students and postdoctoral fellows further strengthened the leadership position of American science. In addition, after completing their studies, many foreign students and fellows have opted to build their careers here rather than returning to their home countries, thus adding even more strength to the U.S. scientific enterprise. That the number and contribution of foreign postdoctoral fellows in the life sciences in the U.S. is steadily increasing was recently discussed in an editorial in *The FASEB Journal* (4). In the year 2000, 37% of all scientists and engineers with doctoral degrees living in the U.S. were born abroad, compared to only 23% in 1990 (5).

HOMAGE TO CATALONIA: JOAN MASSAGUÉ, FIRST RECIPIENT OF THE VILCEK PRIZE

To honor the accomplishments and contributions of foreign-born scientists in the U.S., The Vilcek Foundation, a recently established private foundation, has initiated a program of annual prizes awarded to biomedical scientists who moved to the United States and made extraordinary contributions to their field. Each prize is accompanied by a $50,000 cash award.

The recipient of the inaugural Vilcek Foundation Prize in Biomedical Research, awarded in March 2006, is Joan Massagué, Ph.D., Chairman of the Cancer Biology and Genetics Program at the Memorial Sloan-Kettering Cancer Center, Professor at the Cornell University Graduate School of Medical Sciences, and Investigator of the Howard Hughes Medical Institute in New York. He is internationally recognized for his work on the control of cell growth and fate by the TGF-ß family of growth factors and for elucidating the role of the TGF-ß signaling pathway in cell regulation and disease. TGF-ß functions as a growth inhibitor, immunosuppressant, cell matrix remodeling factor, and blood vessel-forming agent. TGF-ß and the related factors activin, nodal, and the bone morphogenetic proteins are pivotal regulators of many cell functions, from embryogenesis to adult life. The integrity of this signaling network is essential for normal development and tissue maintenance, and its disruption by mutation can lead to several inherited human disorders, cancer, and other diseases.

Dr. Massagué and his colleagues elucidated the fundamental machinery that conveys growth inhibitory signals from the cell membrane to the nucleus. Combining the tools of biochemistry and genetics, Dr. Massagué identified the TGF-ß receptors and their mechanism of activation. Building on these discoveries, he found that a family of TGF-ß receptor kinase substrates, Smad proteins, are transcriptional activators, thereby establishing the central concept of how this pathway operates (6). The end result of this process, Massagué found, is the inhibition of cyclin-dependent protein kinases through novel inhibitors that he co-discovered, thus providing a direct explanation of how TGF-ß negatively controls the cell cycle. More recently, Dr. Massagué and his colleagues have begun to investigate the identity and nature of genes that impart on tumor cells the ability to metastasize to distant organs. Through a variety of approaches they have identified a set of genes that marks and mediates breast cancer metastasis to the lungs (7). They have also made the surprising discovery that Smad proteins, though usually acting as tumor suppressors, in some situations can mediate pro-metastatic action (6).

Born in 1953 in Barcelona, in the Catalonian Region of Spain, Dr. Massagué received a Ph.D. degree in Biochemistry in 1978 from the University of Barcelona. He was a Research Fellow at Brown University until 1982 when he joined the Department of Biochemistry at the University of Massachusetts Medical School. He assumed his current position at the Memorial Sloan-Kettering Cancer Center in New York in 1989. Dr. Massagué served on advisory boards of the National Institutes of Health, National Cancer Institute, MD Anderson Cancer Center, Fox Chase Cancer Center, Searle Foundation, and the General Motors Prize Foundation, and on the editorial boards of the Journal of Biological Chemistry, Journal of Cell Biology, and Proceedings of the National Academy of Sciences. Dr. Massagué is a Member of the U.S. National Academy of Sciences, Fellow of the American Academy of Arts and Sciences, and a Foreign Associate of the European Molecular Biology Organization. He is the recipient of the King Juan Carlos I Research Award, the 2004 Prince of Asturias Award for Scientific Research, the 2005 New York Mayor's Award for Excellence in Science and Technology, and he was recently named "Catalonian of the Year" by the daily newspaper *El Periódico de Catalunya*.

THE VILCEK FOUNDATION

The Vilcek Foundation was established by Jan Vilcek, MD, PhD, Professor of Microbiology at NYU School of Medicine, and his wife Marica Vilcek, an art historian, who immigrated to the U.S. in the 1960s from former communist Czechoslovakia. Jan Vilcek's work at NYU contributed to the development of the therapeutic drug infliximab (Remicade®), widely used for the treatment of inflammatory disorders including rheumatoid arthritis, Crohn's disease, and psoriasis. Programs of the Vilcek Foundation are funded by Jan Vilcek's gift of a portion of royalties due to him for his role in the development of infliximab.

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Figure 1.

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Figure 2. (Courtesy of private stamp collection, Gerald Weissmann.)

FOOTNOTES

Title photo courtesy of Memorial Sloan-Kettering Cancer Center.

REFERENCES

1. . Nobel Prize Foundation () http://nobelprize.org/index.html
2. About.com, http://history1900s.about.com/library/misc/blnobelmed.htm. Accessed May 2006.
3. Larsen, L. J. (2004) The Foreign-Born Population in the United States: 2003. *Current Population Reports* U.S. Census Bureau Washington, D.C.. http://www.census.gov/prod/2004pubs/p20–551.pdf. Accessed May 2006.
4. Weissmann, G. (2006) Postdocs without borders: science goes global. *FASEB J.* **20**,193-196[Free Full Text]
5. . National Science Board and National Science Foundation. Division of Science Resources Statistics (2004) *Science and Engineering Indicators 2004, Foreign-Born S&E Doctorate Holders* http://www.nsf.gov/statistics/seind04/. Accessed May 2006.
6. Massagué, J., Seoane, J., Wotton, D. (2005) Smad transcription factors. *Genes Dev.* **19**,2783-2810[Abstract/Free Full Text]
7. Minn, A. J., Gupta, G. P., Siegel, P. M., Bos, P. D., Shu, W., Giri, D. D., Viale, A., Olshen, A. B., Gerald, W. L., Massagué, J. (2005) Genes that mediate breast cancer metastasis to lung. *Nature* **436**,518-524[CrossRef][Medline]

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