

Baruj Benacerraf

(1920–2011)

Immunologist who won Nobel for genetics of T-cell antigen recognition.

Baruj Benacerraf bestrode immunology for five decades. He created the intellectual framework leading to our present understanding of how T lymphocytes recognize antigens, for which he received the 1980 Nobel Prize in Physiology or Medicine. He crafted world-renowned centres of immunology at multiple institutions, oversaw the flowering of a premier cancer centre, and was a remarkable mentor to generations of immunologists. He died, aged 90, on 2 August 2011.

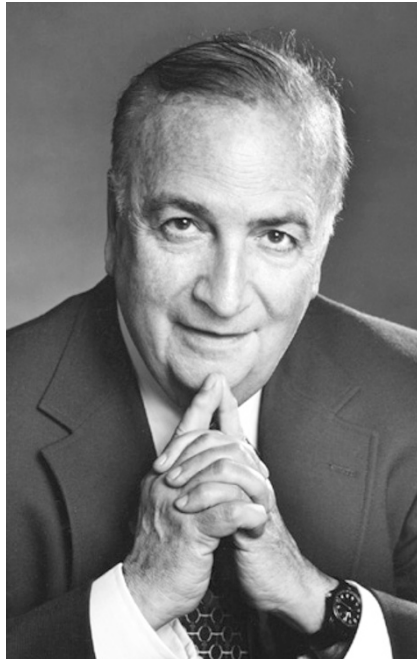
Born in 1920 in Caracas, Venezuela, to Sephardic Jewish parents, Benacerraf spent his youth in Paris and emigrated to the United States in 1940. He did his undergraduate studies as a premedical student at Columbia University in New York, where he met Annette Dreyfus, also a French Jewish émigré. They married in 1943, a love match that ended only in June this year with Annette's death. She travelled everywhere with him and was a constant presence in the lab, softening his rough edges, reminding him to take his medicines, pampering him with his favourite French cookies and tea.

After completing his MD at the Medical College of Virginia in Richmond, Benacerraf served in the US Army in France and returned to New York City in 1947. He began his scientific career in 1948 at Columbia with Elvin Kabat, a leading figure in immunochemistry. Family business responsibilities took him to Paris in 1949 where, at the Broussais Hospital, he carried out groundbreaking studies on the 'reticuloendothelial system', then the term for the system of white blood cells (phagocytes) that ingest foreign particles and cell debris. Recruited to New York University (NYU) in 1956, he became the intellectual centre of a distinguished group of scientists and began the training activities that were to be one of the great achievements of his life.

At NYU, Benacerraf proved to be an immunological polymath, uncovering the existence and diverse functions of antibody subclasses, identifying cellular receptors for these proteins and establishing the distinctive antigen-recognition properties of B and T lymphocytes. He also continued the theme of combining business and scientific responsibilities, serving as a bank director for most of his NYU tenure.

His great work was the discovery that in a population of outbred guinea pigs, immune responses to simple antigens could

be mounted by some animals but not by others. He showed that responsiveness was controlled by a genetic locus that determined whether the immune system could perceive the material and generate a functional response — a fundamental insight that led to his Nobel prize. These immune response (Ir) genes were later shown to be linked to the major histocompatibility complex (MHC) — which contains many immunity-related genes — and were eventually determined to code for the MHC molecules themselves.



Benacerraf left NYU in 1968 and led the National Institute of Allergy and Infectious Diseases's Laboratory of Immunology in Bethesda, Maryland, for two years, where his studies led to a fuller understanding of how Ir gene products mediate immunity. He also took the first steps that led to the laboratory becoming a major centre of immunology research. In 1970, he became chair of the pathology department at Harvard Medical School in Boston, Massachusetts, a position he held until 1991.

On his arrival, the faculty included some immunological luminaries, but the school was not the world-leading centre of immunology it is today. Benacerraf recruited outstanding immunologists to various Harvard hospitals and centres in addition to the 'Quadrangle' faculty he led. His own efforts

to understand the significance of T-cell recognition of peptide MHC complexes flourished and he continued his extraordinary record of training young scientists who later would become leaders in the field. In 1980, Benacerraf was appointed president of the Sidney Farber Cancer Institute in Boston, now the Dana-Farber Cancer Institute. His leadership transformed it into one of the premier cancer centres and medical research organizations in the world. He stepped down from the presidency in 1992.

Those of us who passed through his laboratory at Harvard were invited to spend idyllic summer days at Woods Hole in the time before e-mail and the web. We shared ocean breezes and excellent food with Baruj and Annette and had intense scientific discussions that he expected to be translated into concrete experiments immediately on our return.

A rare combination of capacities made Benacerraf such a successful scientist and leader. His joy at uncovering some new aspect of the immune system was almost childlike: his impish smile, finger snapping and jiggling footwork at 'Aha!' moments were well known to his colleagues and trainees. He had enormous native intelligence, remarkable scientific intuition and a tremendous capacity to recognize latent talent, as well as to inspire, motivate and guide the careers of those in whom he identified such potential. It was sometimes uncomfortable in the moment when one's 'buttons' were being pushed, but in retrospect the value of such productive manipulation was always apparent.

Indeed, Benacerraf was a man of enormous personal warmth — an attribute not always appreciated by those outside his close scientific family. As pleased as he was with his achievements in science and scientific administration, he took every opportunity to remind those close to him that his main pride was in the cadre of scientists he trained. Their continuing scientific achievements are his greatest legacy. ■

Ronald N. Germain and William E. Paul are at the Laboratory of Systems Biology and Laboratory of Immunology, National Institute of Allergy and Infectious Diseases, National Institutes of Health, Bethesda, Maryland 20892, USA. RNG worked closely with Benacerraf from 1972 to 1981; WEP did so from 1964 to 1970.
e-mails: rgermain@nih.gov;
wpaul@niaid.nih.gov