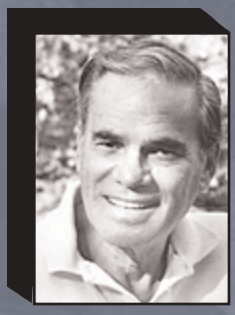
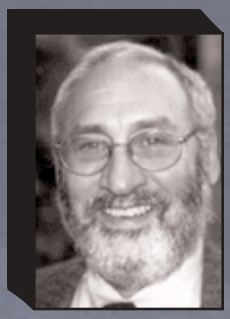
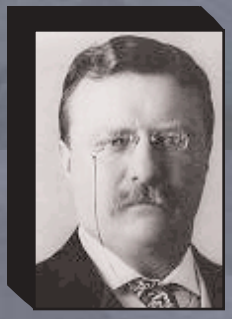






The Federal Government: A Nobel Profession

A Report on Pathbreaking Nobel Laureates in Government

1901 - 2002

PARTNERSHIP FOR PUBLIC SERVICE

INTRODUCTION

The Nobel Prize is synonymous with greatness. A list of Nobel Prize winners offers a quick register of the world's best and brightest, whose accomplishments in literature, economics, medicine, science and peace have enriched the lives of millions.

Over the past century, 270 Americans have received the Nobel Prize for innovation and ingenuity. Approximately one-fourth of these distinguished individuals are, or were, federal employees. Their Nobel contributions have resulted in the eradication of polio, the mapping of the human genome, the harnessing of atomic energy, the achievement of peace between nations, and advances in medicine that not only prolong our lives, but improve their quality.

"This report should serve as an inspiration and a reminder to us all of the innovation and nobility of the work civil servants do every day and its far-reaching impact."

During Public Employees Recognition Week (May 4-10, 2003), in an effort to recognize and honor the ideas and accomplishments of federal workers past and present, the Partnership for Public Service offers this report highlighting 50 American Nobel laureates whose award-winning achievements occurred while they served in government or whose public service work had an impact on their career achievements. They were honored for their contributions in the fields of Physiology or Medicine, Economic Sciences, and Physics and Chemistry. Also included are five Americans whose work merited the Peace Prize.

Despite this legacy of accomplishment, too few Americans see the federal government as an incubator for innovation and discovery. A nationwide public opinion poll commissioned by the Partnership for Public Service found that only one in four college educated Americans expresses significant interest in working for the government. Talented citizens often overlook government when making employment choices, looking first to the private sector for financial reward or to the nonprofit world to make a meaningful contribution.

That's not the government's only workforce challenge. In the next five years, over half of all federal employees may qualify for retirement, including 71 percent of the government's senior managers. In spite of an economy that is

generally growing more slowly than during the 1990s, the search for talent, particularly for highly skilled, high-performing talent, remains as competitive as ever given the ongoing mobility of the workforce, the increasing demand for skill-specific employees, and the decreasing supply of workers in critical occupations and industries. Future scientists, peacemakers and even presidents have to be nurtured and trained, and they must be encouraged to look at the federal government as a place where the search for knowledge knows no bounds.

The Partnership looks to this list of laureates as a clarion call for dialogue with key decision makers and opinion leaders on how we can ensure that America's tradition of groundbreaking government work is continued and strengthened. Closing the talent gap will require positive action to inspire a new generation of discovery and service.

- We need to implement programs supporting education in math, science and technology and encouraging top-caliber graduates to enter government service. A key employment factor for many young people is student debt -- now estimated at $16,000 for the average undergraduate borrower. The government has new authority to offer loan-forgiveness as part of a recruitment package, though this is rarely used. We must enact legislation that can make this tool tax-free and potentially more effective.

- Within the government, we must move personnel systems toward a performance management model that rewards excellence. We should make federal executive pay as competitive as possible.

- Less tangible, but equally crucial, there must be a sea change in the way Americans themselves regard their government employees. This will require careful examination of the way politicians think and talk about our government. To be effective, it will require strong support from the President, a focused, nonpartisan effort by Congress, and innovation among federal agencies.

Today, hundreds of thousands of government workers are doing exceptional and cutting-edge work that shapes our world -- often without the praise and notoriety that comes with a Nobel Prize. They are performing genetic research, developing new vaccines and medicines, creating new economic models and planting the seeds of peace. They do this in anonymity, but their work is truly noteworthy.

This report should serve as an inspiration to us all of the innovation and nobility of the daily work of civil servants and its far-reaching impact. But it should also serve as an important reminder of the challenges we face in building excellence in service to America.

Methodology

The research presented in this report was compiled by Partnership for Public Service staff, who surveyed lists of the 270 American Nobel laureates between 1901 and 2002 made available online at the Nobel e-Museum (*www.nobel.se*) and *Encyclopædia Britannica's Guide to the Nobel Prizes*. This database was used to ascertain those who worked for the U.S. government at some point during their careers. Some of these winners were in the military; some were members of presidential advisory committees; and others worked on government-sponsored programs, including the Manhattan Project.

This report includes Nobel winners from the fields of science, medicine, world leadership and economics. The list of 50 we honor in this report is not exhaustive. Initially, Partnership research revealed more than 70 laureates with ties to the federal government or whose work was supported by government funding.

Nearly all of the 50 winners profiled in this report were full-time government employees at some point in their careers. They were selected because their experiences in public service contributed to the accomplishment that earned them the Nobel Prize.

About the Partnership for Public Service

The Partnership for Public Service (*www.ourpublicservice.org*) is a nonpartisan, nonprofit organization dedicated to recruiting and retaining excellence in the civil service through an aggressive campaign of public-private partnerships, focused research, communications and educational efforts, and legislative advocacy.

PHYSIOLOGY/MEDICINE

FERID MURAD & LOUIS IGNARRO (1998)

Murad and Ignarro received the prize for their discovery that the body uses nitric oxide to regulate blood vessels. Nitric oxide plays a critical role in blood pressure, heart function, infections, lung problems and the body's defense against tumors.

Both men spent several years at the National Institutes of Health (NIH) early in their professional careers. Working with NIH scientists fueled their continuing interest in medicine and research.

STANLEY B. PRUSINER (1997)

Prusiner was awarded for his discovery of an unusual class of infectious particles called prions. Prions are believed to be responsible for a group of degenerative diseases of the central nervous system that includes 'mad cow' disease.

Prusiner experienced what he called "the privilege of serving in the U.S. Public Health Service" when he worked at the National Institutes of Health early in his career. He received $56 million in NIH research grants during the three decades leading up to his award.

"Many…at NIH influenced my thinking and career planning. I soon learned that I had numerous role models and attempted to extract the best features of each as I planned my career path and future."

- Ferid Murad

MARTIN RODBELL (1994)

Rodbell was awarded for his discovery in the 1960s of G-proteins, signal transmitters in the body that help cells communicate with each other.

He worked at various components of the National Institutes of Health for 42 years. His research on G-proteins was conducted at NIH's National Institute of Arthritis and Metabolic Diseases.

JOSEPH E. MURRAY (1990)

Murray received his award for his studies of organ and tissue transplantation. He showed that it was possible to transplant organs between non-identical relatives and from deceased persons to the living.

Murray's interest in the biology of transplantation stemmed from caring for burn victims during his U.S. military experience at Valley Forge General Hospital. It was there that he became interested in the body's response to foreign skin grafts. Building upon this knowledge, he was encouraged to study similar procedures with human organs.

HAROLD E. VARMUS & J. MICHAEL BISHOP (1989)

Varmus and Bishop were awarded for their work on the genetic basis of cancer. Their discoveries led to the isolation of many cellular genes that normally control growth and development and are frequently mutated in human cancer.

Before teaming up with Varmus in 1970, Bishop was a research fellow with the National Institutes of Health's Research Associate Training Program.

Varmus entered public service in 1993 as NIH director, a position he held until 1999. As director, he recruited new leaders for important positions, planned new buildings on the NIH campus and helped increase the agency's funding.

"The Research Associate Training Program was a unique resource, providing U.S. medical schools with many of the most accomplished faculty. Without the Program, it is unlikely that I could have found my way into the community of science."

- J. Michael Bishop

MICHAEL BROWN & JOSEPH GOLDSTEIN (1985)

Goldstein and Brown were awarded for their discoveries on the regulation of cholesterol metabolism. Their work led to new methods for treatment and prevention of atherosclerosis, the medical condition in which deposits of cholesterol and other substances build up in the inner lining of an artery causing heart attack or stroke.

Their government service at the National Institutes of Health during the late 1960s and early 1970s proved highly influential in shaping their careers and established the foundation of their long-term scientific collaboration.

BARUJ BENACERRAF (1980)

Benacerraf shared the prize for his discovery of the genetic basis of autoimmune diseases. His work led to a better understanding of the mechanisms and genetic basis of the body's immune system response.

Benacerraf's government service began with a two-year stint in the U.S. Army Medical Corps. From 1968-70, he was chief of the immunologic laboratory of the National Institute of Allergy and Infectious Diseases at the National Institutes of Health, and throughout his professional career he received NIH funding for his research.

ANDREW V. SCHALLY (1977)

Schally received the prize for discoveries in the field of peptide hormone production in the brain that laid the foundations for continuing research into the hypothalamus, a part of the brain that regulates body temperature, the cardiovascular system, and food and water intake.

Schally served as a Senior Research Fellow of the U.S. Public Health Service from 1957 until 1962, when he became head of a new Veterans Administration laboratory devoted to hypothalamic research. He later worked at the VA Medical Center and was made a VA Senior Medical Investigator in 1973.

ROSALYN YALOW (1977)

Yalow was awarded for developing a method of quantifying minute amounts of peptide hormones in the body using radioactive-labeled material. The method she helped develop is currently used to measure hundreds of biological substances in laboratories worldwide.

As a consultant, Yalow helped the Bronx Veterans Administration Hospital set up radioisotope services. She remained at the VA for the rest of her career, contributing greatly to work on the application of radioisotopes in measuring hormone occurrence in blood.

BARUCH S. BLUMBERG (1976)

Blumberg was awarded for his major contribution to the science community's knowledge of Hepatitis B. In his study of the variation between types of proteins, he discovered a unique protein that indicated the infection.

Blumberg finished college as a Deck Officer with the U.S. Navy, where he learned techniques that served him in his scientific research. Years later, he returned to public service at the National Institutes of Health, where he worked closely with colleagues who would play crucial roles in Blumberg's later discoveries, including his Nobel-winning contribution.

D. CARLETON GAJDUSEK (1976)

Gajdusek's discovery of a unique central nervous system disorder known as kuru which occurred among a Neolithic people in New Guinea earned him the Nobel Prize, which he shared with Blumberg. His findings prompted further study of other degenerative diseases of the central nervous system.

Gajdusek completed his military service at Walter Reed Army Medical Service Graduate School as a research virologist and soon after began working as a visiting scientist at the National Institutes of Health. His work in its Laboratory of Slow, Latent and Temperate Virus Infections developed an entirely new field of medicine.

"For about two decades I have enjoyed at the National Institutes of Health the base and haven for our diverse studies."

- D. Carleton Gajdusek

JULIUS AXELROD (1970)

Axelrod was honored for his discoveries about the formation and activation of noradrenaline, a neuro-transmitter that produces strong emotions in the brain. His findings formed a basis for understanding the effects of various drugs on the central nervous system.

Axelrod spent his career at the National Institutes of Health, first in the National Heart Institute and then in the National Institute of Mental Health.

MARSHALL W. NIRENBERG (1968)

Nirenberg won the prize for his work in deciphering the genetic code. His discoveries were an important early step in the exploration of the genetic process.

Nirenberg has spent his entire career at the National Institutes of Health and he continues to work on understanding how genetic information controls the development and metabolism of living organisms.

ARTHUR KORNBERG (1959)

Kornberg's Nobel-winning explanation of DNA replication provided a crucial component in understanding the molecular biology of a cell.

Kornberg was a commissioned officer in the U.S. Public Health Service for nine years, during which he served briefly as a doctor in the U.S. Coast Guard and then at the National Institutes of Health. His time at NIH laid the groundwork for his later contributions at research universities.

FREDERICK ROBBINS (1954)

Robbins received the prize after growing polio virus in culture, which led to the development of both the Sabin and Salk vaccines against poliomyelitis that brought an end to the polio epidemic in the U.S. and eventually abroad.

Most of his public service work took place in the military. Robbins served stateside and in North Africa and Italy as Chief of the Virus and Rickettsial Disease Section in the 15th Medical General Laboratory until 1946.

PHILIP SHOWALTER HENCH (1950)

Hench was awarded for pioneering work in the treatment of rheumatoid arthritis with cortisone and ACTH, an adrenal hormone.

Hench served in the Medical Corps of the military during World War II, rising to Chief of the Medical Service and Director of the Army's Rheumatism Center at the Army and Navy General Hospital. After leaving the army to return to teaching, he retained a role in public service as expert consultant to the Army Surgeon General.

PHYSICS/CHEMISTRY

ERIC A. CORNELL (PHYSICS - 2001)

In 1995, Cornell and a colleague created an entirely new form of matter called a Bose-Einstein condensate that allows scientists to study the tiny world of quantum physics as if they are looking through a giant magnifying glass. This new branch of atomic physics has resulted in a treasure-trove of scientific discoveries. For this groundbreaking work, Cornell was awarded the Nobel Prize in 2001.

Cornell is a staff scientist at the National Institutes of Standards and Technology (NIST) and a fellow at JILA, a joint endeavor of NIST and the University of Colorado at Boulder.

WILLIAM D. PHILLIPS (PHYSICS - 1997)

Phillips, a physicist at the National Institutes of Standards and Technology since 1978, was awarded for his work on the development of methods to cool and trap atoms with laser light.

"Current applications of importance to science and technology include atomic clocks, atom lasers, atom optics and atomic lithography," said Katharine Gebbie, director of NIST's Physics Laboratory and winner of the Partnership for Public Service's 2002 Service to America Medal for Career Achievement.

"The vitality of the research environment at NIST and the scientific quality of my group have been essential to what we have accomplished."

- William D. Phillips

JEROME KARLE (CHEMISTRY - 1985)

Karle was awarded for his development of mathematical methods for deducing the molecular structure of chemical compounds from the patterns formed when X-rays are diffracted by their crystals.

After working on the Manhattan Project in 1943 and 1944, he joined the Naval Research Laboratory, becoming its chief scientist for research on the structure of matter in 1967.

CHRISTIAN ANFINSEN (CHEMISTRY - 1972)

Anfinsen's Nobel Prize-winning research helped to explain the relationship between the structure and function of proteins. Specifically, he increased our understanding of how the enzyme ribonuclease breaks down the ribonucleic acid (RNA) present in food.

His career of government service at the National Institutes of Health spanned more than three decades. From 1963 to 1981, he was chief of the Laboratory of Chemical Biology in the National Institute of Arthritis and Metabolic Diseases.

STANFORD MOORE (CHEMISTRY - 1972)

In 1963, Moore and a colleague became the first to ascertain a complete description of the chemical structure of an enzyme. For this discovery, they were awarded the 1972 Nobel Prize in chemistry.

During the Second World War, Moore was a technical aide at the National Defense Research Committee of the Office of Scientific Research and Development, a scientific body created by President Roosevelt to strengthen the scientific presence in the federal government.

ECONOMICS

JOSEPH E. STIGLITZ (2001)

Stiglitz shared the prize with two other economists for their analyses of markets with asymmetric information. Stiglitz showed that asymmetric information (participants on one side of the market have much better information than those on the other) can provide the key to understanding many observed market phenomena, including unemployment and credit rationing.

He was a member of the Council of Economic Advisors from 1993-95 and was chairman from 1995-97.

JAMES TOBIN (1981)

Tobin was awarded for his research on the financial system and its effects on inflation and employment. His work inspired further research into the effects of monetary policy, the implications of government budget deficits and stabilization policy in general, and his ideas continue to play a role in economic debate.

Tobin worked in public service at the Office of Price Administration and then on the Civilian Supply and War Production Board. He served on President Kennedy's Council of Economic Advisers in 1961.

MILTON FRIEDMAN (1976)

Friedman is best known for "monetarism," an economic model that stresses the importance of control of the money supply to control inflation and recessions.

During World War II, he worked on wartime tax policy at the U.S. Treasury Department. He has been active in public policy in the decades since as an advisor to three presidential candidates and as a senior research fellow at the Hoover Institution.

KENNETH ARROW (1972)

Arrow received the prize for his contributions to general equilibrium theory (the question of how a market economy allocates resources) and welfare theory. He studied the economics of public choice, proving mathematically that under certain assumptions about people's preferences between options, it is always impossible to find a voting rule under which one option emerges as the most preferred.

Arrow served the public as a weather officer in the U.S. Army Air Corps and in 1962 as a member of the Council of Economic Advisors.

WORLD LEADERSHIP/PEACE

JIMMY CARTER (2002)

Former President Carter received the 2002 Nobel Peace Prize for his work as president and after leaving the White House to peacefully resolve international conflicts, advance democracy and human rights, and promote economic and social development.

As president he helped forge the historic Camp David agreement between Egypt and Israel, established full diplomatic relations with the People's Republic of China and negotiated a nuclear limitation treaty with the then-Soviet Union. Since leaving the White House, the former U.S. naval officer has used his status to help broker peace and fight disease worldwide through the Carter Center.

GEN. GEORGE C. MARSHALL (1953)

The only soldier to win the Peace Prize, Secretary of State George Marshall is best remembered as originator of the "Marshall Plan" of U.S. economic aid to rebuild Europe after World War II. Between 1947 and 1952, the Marshall Plan allocated over $13 billion to 16 European nations. Churchill called the plan "the single most unsordid act in the history of nations."

RALPH BUNCHE (1950)

Bunche was awarded for brokering a 1948 truce between the new nation of Israel and four of its Arab neighbors, Egypt, Syria, Lebanon and Jordan, becoming the first person of color to win the Peace Prize.

He served in the U.S. War Department and State Department during World War II and was active in planning of the United Nations, where he worked from 1947 until shortly before his death in 1971.

WOODROW WILSON (1919)

President Wilson received the first Peace Prize awarded after World War I for his "Fourteen Points" peace program that included the concept of a League of Nations and his work in achieving the League's creation as part of the 1919 Treaty of Versailles. Despite his success at Versailles, Wilson fell seven votes short of securing U.S. Senate approval for the treaty.

THEODORE ROOSEVELT (1906)

A former president of the federal government's Civil Service Commission, President Roosevelt became the first American to win the Peace Prize for his role in ending the Japan-Russia war of 1904-1905. He served as mediator at a peace conference in New Hampshire that concluded in September 1905 with the Treaty of Portsmouth ending war between the two nations.

MANHATTAN PROJECT

About the Manhattan Project

The Manhattan Project was a monumental undertaking that brought together the nation's brightest scientific minds under the direction of the federal government's Office of Scientific Research and Development and the U.S. Army's Manhattan Engineer District. Between 1942 and 1945, an extraordinary group of scientists and technicians worked at a desert laboratory in Los Alamos, New Mexico, and other locations around the nation to design and build the world's first atomic bomb. In the end, they produced three, two of which are credited with bringing about the end of World War II.

This U.S. government incubator of innovation included many Nobel laureates whose groundbreaking work continues to shape our world. For many, their experiences in the Manhattan Project had a profound impact on their careers.

NORMAN F. RAMSEY (PHYSICS - 1989)

Ramsey was co-laureate for his development of a technique to induce atoms to shift from one specific energy level to another. His innovation, called the "separated oscillatory fields method," found application in the precise measurement of time and frequency.

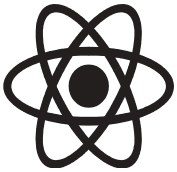
Ramsey joined the Manhattan Project in 1943 and served as Head of the Delivery Group at Los Alamos when the first atomic bomb was built and tested.

VAL LOGSDON FITCH (PHYSICS - 1980)

Logsdon was co-recipient for an experiment conducted in 1964 that disproved the long-held theory that particle interaction should be indifferent to the direction of time.

"The most significant occurrence in my education came when...I was sent to Los Alamos, New Mexico, to work on the Manhattan Project."

- Val Logsdon Fitch



LEO JAMES RAINWATER (PHYSICS - 1975)

A few years after his work on the Manhattan Project, he began formulating a theory that not all atomic nuclei are spherical, as was then generally believed. The theory was tested and confirmed by two Danish physicists, with whom Rainwater shared the award.

LUIS W. ALVAREZ (PHYSICS - 1968)

Alvarez was awarded for his discoveries in the field of high-energy physics.

He designed the complex detonator for the plutonium bomb that was used in World War II, and was aboard the trailing aircraft for both the Hiroshima and Nagasaki missions to observe the blast effects. He was later a consultant to numerous federal agencies and was a member of the President's Science Advisory Committee.

HANS ALBRECHT BETHE (PHYSICS - 1967)

Bethe received the award for his contributions to the theory of nuclear reactions and his discoveries involving energy production in stars.

At Los Alamos, he worked on assembling the atomic bomb. Later in his career, he was a member of the President's Science Advisory Committee and headed a presidential study on nuclear disarmament.

RICHARD P. FEYNMAN (PHYSICS - 1965)

Feynman was awarded for developing a theory called quantum electrodynamics that has been proved to be the most accurate scientific theory created.

Forty years after helping develop the atomic bomb, he found that a faulty O-ring caused the space shuttle Challenger to explode shortly after liftoff. His findings formed the basis of a presidential commission's report on the disaster.

EUGENE PAUL WIGNER (PHYSICS - 1963)

Wigner shared the prize for work on the structure of the atomic nucleus.

A Hungarian refugee, he urged the U.S. to build an atomic bomb and made important contributions to the Manhattan Project between 1942 and 1945.

WILLARD FRANK LIBBY (CHEMISTRY - 1960)

Libby was awarded for developing radiocarbon dating techniques used by earth scientists, anthropologists and archaeologists to determine the age of organic artifacts and archaeological sites.

Libby worked on the Manhattan Project at Columbia University and later served as a member of the U.S. Atomic Energy Commission (a forerunner of the U.S. Department of Energy and the Nuclear Regulatory Commission).

OWEN CHAMBERLAIN (PHYSICS - 1959)

Chamberlain shared the prize with Emilio Segrè for their discovery of the antiproton. This previously postulated subatomic particle was the second antiparticle (a subatomic particle identical to another subatomic particle in mass but opposite to it in electric and magnetic properties) to be discovered and led directly to the discovery of many additional antiparticles.

Within the Manhattan Project he worked under Segrè investigating nuclear cross sections for intermediate-energy neutrons and the spontaneous fission of heavy elements.

EMILIO SEGRÈ (PHYSICS - 1959)

Segrè was co-winner with Owen Chamberlain for their discovery of the antiproton. From 1943 to 1946 Segrè was a group leader in the Manhattan Project's Los Alamos laboratory.

FELIX BLOCH (PHYSICS - 1952)

The Swiss-born American physicist shared the prize for developing the nuclear magnetic resonance method of measuring the magnetic field of atomic nuclei.

He worked on atomic energy at Los Alamos and radar countermeasures at Harvard University during World War II.

GLENN THEODORE SEABORG (CHEMISTRY - 1951)

The co-discoverer of plutonium, Seaborg received his prize for discoveries in the chemistry of the transuranium elements. The Nobel Committee for Chemistry noted, "At a time when the possibilities of finding new elements appeared to be exhausted, you have produced a whole row of them."

Seaborg's work in the Manhattan Project was the beginning of a life of scientific research in service to his country. He advised every president from Truman to George H.W. Bush and was chairman of the Atomic Energy Commission.

EDWIN MATTISON McMILLAN (CHEMISTRY - 1951)

McMillan shared his award with Seaborg for discoveries in the chemistry of the transuranium elements.

He served as the principal advisor to J. Robert Oppenheimer, the Manhattan Project's director of the Los Alamos weapons laboratory. McMillan served on the General Advisory Committee to the Atomic Energy Commission from 1954 to 1958.

ISIDOR ISAAC RABI (PHYSICS - 1944)

Rabi won the prize for his 1937 invention of the atomic and molecular beam magnetic resonance method of observing atomic spectra. Rabi was a senior advisor to Los Alamos laboratory director J. Robert Oppenheimer, successfully advising Oppenheimer to maintain civilian control over the lab. He was a member of the General Advisory Committee of the Atomic Energy Commission from 1946 to 1956 and succeeded Oppenheimer as its chairman from 1952 to 1956.

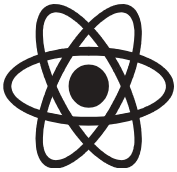
ERNEST ORLANDO LAWRENCE (PHYSICS - 1939)

Lawrence received his award for his invention and development of the cyclotron, critical to production of artificially radioactive substances.

He made vital contributions to the development of the atomic bomb, holding several official appointments in the Manhattan Project. After the war he worked to obtain international agreement to suspend atomic bomb testing as a member of the U.S. delegation to a global conference on the subject.

HAROLD CLAYTON UREY (CHEMISTRY - 1934)

Urey received the prize for his discovery of heavy hydrogen. He led isotope separation studies at Columbia University as part of the Manhattan Project.



ARTHUR HOLLY COMPTON (PHYSICS - 1927)

Compton was honored for his discovery and explanation of the change in the wavelength of X-rays when they collide with electrons in metals.

His investigations with other key scientists led to the establishment of the first controlled uranium fission reactors, and, ultimately, to the large plutonium-producing reactors in Hanford, Washington, which produced the plutonium for the atomic bomb dropped on Nagasaki in August 1945.

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