

William F. Neuman PhD

<https://www.atomicheritage.org/profile/william-f-neuman>

<https://www.urmc.rochester.edu/biochemistry-biophysics/awards/neuman-award.aspx>

<https://www.nytimes.com/1981/01/06/obituaries/dr-william-f-neuman-authority-on-bone-tissue.html>

Bill Neuman got his degree in 1942 at the University of Rochester in the laboratory of [Harold Hodge PhD](#). He became head of the biochemistry section of the Atomic Energy Project, eventually becoming the co-director of the program and co-chair of this large department with Aser Rothstein. He published more than two hundred publications, including a landmark text with his wife [Dr. Margaret Neuman](#) with whom he collaborated in many endeavors. Margaret Neuman (1917-2015) was the first PhD in Pharmacology from the University of Rochester, publishing more than 30 papers and a book:

Neuman, William F.; Margaret W. (1958). The Chemical Dynamics of Bone Mineral. Chicago: The University of Chicago Press. ISBN 0-226-57512-8. [1]

Bill made a wide variety of seminal contributions to bone biochemistry of bone seeking isotopes, osteoblasts and osteoclasts, and vitamin, mineral and hormonal regulation of bone homeostasis. There were multiple important foci of interest, including

- parathyroid hormone [2-35]
- uranium [36-54]
- strontium e.g. [55, 56] (note senate hearings)
- beryllium [57-65]
- thorium [66]
- yttrium [67]
- vitamin D [18, 20, 68-73]

He was radiological monitor for the Bikini bomb tests, represented the Atomic Energy Commission in visits to European installations in 1952, and was scientific adviser to the State Department at the 1955 Geneva Conference on Atoms for Peace. [74] He received the Eli Lilly award in 1955 for research in biochemistry, the Claude Bernard Medal of the University of Montreal in 1962, the Kappa Delta research award of the American College of Orthopedic Surgeons in 1964 and the Mineralization award from the International Association for Dental Research in 1965. The American Society for Bone and Mineral Research recognized his accomplishments by establishing the William F. Neuman Award in 1981.

A subsequent Neuman award recipient, [Herbert Fleisch MD](#), was a 1962 postdoctoral fellow and collaborated with Bill for two decades, including a sabbatical at the University of Berne. They studied inhibitors of mineralization in bodily fluids led that led to work on polyphosphate inhibition of hydroxyapatite crystal growth [75] and the eventual development of **bisphosphonates as medications** [76-85].

Radioactive Fallout and the nuclear test ban treaty

The Atomic Energy Project had an intense focus on describing the toxic hazards of nuclear weapons manufacture including the toxicokinetics of the radionuclides, new hazards about which nothing was known but were being spewed into the atmosphere during atmospheric testing. Bill testified before the Joint Congressional Subcommittee on Atomic Energy in 1957 [86] and 1959 [87], scholarly work with a major focus on strontium 90 that eventually led to the nuclear test ban treaty in 1963. Bill argued repeatedly that



[“Our ignorance in this field is so great that we cannot say with any certainty that we have not already put so much strontium-90 into the stratosphere that harmful fall-out is now inevitable.”](#)

[Test Moratorium Extended; Geneva Negotiations Analyzed in Senate](#)

A glimpse into what confronted mankind at the time appeared in the January 1958 Bulletin of the Atomic Scientists is a special volume on [Radiation and Man](#) . He contributed two of the articles: [Somatic Effects of Fission Products](#) [88] and [Uncertainties in Evaluating Effects of Fall-out from Weapons Tests](#) [89] .

Convinced that the public needed to know, he wrote extraordinary public outreach articles:

- Why nuclear bomb tests must cease. Unitarian Register 136:6, 1957. (Bill was a trustee of the First Unitarian Congregational Society of Rochester.) [74]

“...Atom testing is immoral

How does the atom-testing program improve our true defense? I can only conclude it is quite impractical. And it is immoral. The radioactive ashes that we scatter into the air fall to earth and concentrate in the bones of growing children. Children will be the first to show ill effects from fall-out. Not only our children are exposed, but children all over the world - irrespective of nationality, color, or creed.

We all thrill at the self-sacrifice of our forefathers in the causes of liberty and freedom. Will future generations thrill at the stories of how we valued freedom and liberty so highly that we were willing to risk injury to the world's children?

Here is an immoral act of truly great proportions. If we choose to destroy ourselves - all well and good. If we choose to pollute our own cities, towns, and fields - well and good. But have we the right, in our own self-interest, to pollute the atmosphere of the world? Has any one nation such a right?

If we stop testing now, little harm can have been done. But if we contribute, by word and deed, to the continuance of this pollution of the biosphere, we shall be held responsible in the judgment of all nations, in the eyes of the injured and malformed children, in the memories of the dead.

I propose for these reasons and for reasons unsaid that the United States join other nations in pressing for an international ban on nuclear tests. The chance to lead, to initiate, has already slipped away.

I propose that every conceivable effort be made to reach agreements on disarmament. No nation on earth can carry the economic burden of an arms race. In this area, we cannot afford to be headstrong and militant. Of course we can do everything better than the Russians. We can outbuild them. We can even knock ourselves out better than they can. Literally.

I feel that we should do all we can to create under UN jurisdiction a police force powerful enough to meet armed aggression anywhere in the world. Until such a force is available, we should rely less on atom weapons, more on a highly mobile, professional police force of our own. We should place more emphasis on interception and on truly defensive measures -on civilian defense.

“...The long-range problem

Over-riding these important problems is the battle for men's minds, the minds of uncommitted millions the world over. We must:

- (1) Clean house at home. Freedom and opportunity must be available to all. Integration must be made a reality, not a dream.
- (2) We must improve our educational system. Our hope for the future lies in our children. We will need more and better scientists and engineers. More sociologists, economists. More thinkers.
- (3) We need to embark, on an unprecedented scale, to promote cultural exchange with the non-western world; economic aid in the form of men, money and equipment to backward economies to help themselves, help them build schools, and train teachers. Encourage free trade....”

- To test or not to test. New Republic 138: 17, 1958 [90]

“...Tests are clearly immoral, are clearly hazardous (though not frighteningly so), and are instrumental in increasing the likelihood of global conflict because they serve to increase the pace of a fantastic arms race. For these reasons, all good men can hope that our elected government will show the good sense to strive to bring these tests under an international control with adequate safeguards. The world today needs a program of action, of workable ideas by which the march toward near-global suicide can be averted (Teller and Latter’s book) *Our Nuclear Future* does not offer such a program....”

- 23 Went Fishing. New Republic 138:20, 1958 [91]

“...Plagued by engine trouble, storms, loss of fishing lines and poor catches, the fishermen worked their way "across thousands of miles of the vast Pacific to [their] date with destiny near a tiny atoll." There, through a caprice of nature, an unexpected shift of wind, the trawler was thoroughly dusted with intense fallout from the superbomb exploded almost ninety miles away by the Atomic Energy Commission in cooperation with the US Armed Services...

“...The moral of the fishermen's story is that war **must** be banned. But how many more "fishermen" will become dusted with ""Shi No Hai" before men, in sufficient numbers to break the web of fate, are moved to action? ...”

- Fallout Fable: Thus spake the magician. New Republic 138:8, 1959 [92]

The fable concludes:

“...The man who wielded the sword unwisely does not suddenly become wise when given a more powerful weapon. On the other hand, the hazards to man of oobleck (fallout) cannot be judged. With several kingdoms causing oobleck to fall, who in one kingdom can say how much oobleck will come from the several? We do not know how oobleck makes men sick and, therefore, also we know not how much oobleck will cause how much harm. To choose a road of unknown dangers which returns again to the starting place, is an action born of compulsion, the folly of an animal devoid of wit." "Is it not strange," thought the archeologists, "that a people having such wise and perceptive writings should have vanished from the earth?"

- A sponsor of [SANE](#), National Committee for a Sane Nuclear Policy

There was intense internal controversy about the use of scientific programs of the agency in support of nuclear weapons development. This was captured by Dr. Neuman, quoted on page 665 of the [Final Report of the Advisory Committee on Human Radiation Experiments](#) in correspondence between Dr. Neuman and Dixie Lee Ray, the last AEC chairman in which he captured internal opposition during the Eisenhower administration to providing “...biological justification for some other agency’s political decision... (and hence their responsibility to) ... convince the public that fallout was good for them and environmental Sr-90 contamination was accordingly expressing in ‘Sunshine Units’ if you recall...” The internal disquiet dissipated with the passage of the [Nuclear Test Ban Treaty](#):

143. Hal Hollister, Environmental Sciences Branch, Division of Biology and Medicine, to Dunham et al., 27 February 1958 ("Reporting Sunshine") (ACHRE No. DOE-012595-B), 2. Other participants in AEC-sponsored biomedical research had a different perspective on the fallout research.

In 1995, Dr. Kulp recalled that, from the perspective of the researchers at Columbia, the goals were clear--"defining the amount of SR90 in the stratosphere to its mechanism of descent in the ground to the movement through the food chain to man."

The work of Sunshine, he recalled, "provided the scientific basis for the International Treaty banning atmospheric tests." J. Laurence Kulp, letter to Dan Guttman (ACHRE), 21 July 1995.

Another perspective is contained in a 1973 letter to Dixie Lee Ray, the last AEC chairman before its separation into agencies responsible for regulating (the Nuclear Regulatory Commission) and promoting (the Energy Research and Development Administration) nuclear energy. Dr. William F. Neuman, director of the Atomic Energy

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Project at the University of Rochester, suggested that the difficulties leading to the agency's breakup were not limited to the conflict between its responsibilities to promote and regulate atomic energy. In addition, "the AEC (its Division of Biology and Medicine in particular) has been put in the position of providing a biological *justification* for some other agency's political decision." He explained to Chairman Ray:

Some years back, before the Test Ban, the military wished to test various weapon designs. The Eisenhower Administration concurred. Admiral Strauss was instructed to have the AEC provide the basis for public acceptance. This meant of course that the Division of Biology and Medicine was supposed to convince the public that fallout was good for them and environmental Sr-90 contamination was accordingly expressed in 'Sunshine Units' if you recall. This very nearly tore the Division apart and we were rescued from potential disaster only by the timely signing of the big power Test Ban Treaty.

Neuman had been a participant in the fallout debate and was the spokesperson for a panel that included Libby, Eisenbud, Dunham, Langham, and other AEC-connected experts at the 1959 congressional hearings. William F. Neuman, Wilson Professor and Director, Atomic Energy Project, University of Rochester, to Dixie Lee Ray, Chairman, Atomic Energy Commission, 12 November 1973 ("When you visited the Rochester Biomedical Research Project . . .") (ACHRE DOE-011895-B), 1.

Bill was a member of a team of scientists that studied the effects of space flight on the muscles and bones of the astronauts Frank Borman and James A. Lovell Jr. during the 14-day flight of Gemini 7 in 1965. [93, 94]

Development of two pioneering graduate degree programs

There was a national shortage of talent in industrial hygiene, health physics, and toxicology and training personnel emerged as a national priority. The nation's first toxicology training program was established at the University of Rochester during his tenure, evolving into the division of toxicology and eventually the department of environmental medicine. The NIEHS-funded Toxicology training program continues to this day, and is an active component of the NIEHS Environmental Health Sciences Center. The nation's first degree program in Radiation Biology also was established in this interval. Dr. Neuman captured the first three decades of the Department of Radiation Biology and Biophysics in his chapter in **To Each His Farthest Star** [95].

Sustained work at Rochester in the interest of national security from World War II to the present day



*In August 1945 Colonel Groves presented to President Valentine an award from Manhattan District for services of Project to war effort
Looking on - L to R: Dr. Hodge, Dr. Dowdy, Col. Warren and Dr. Bale*



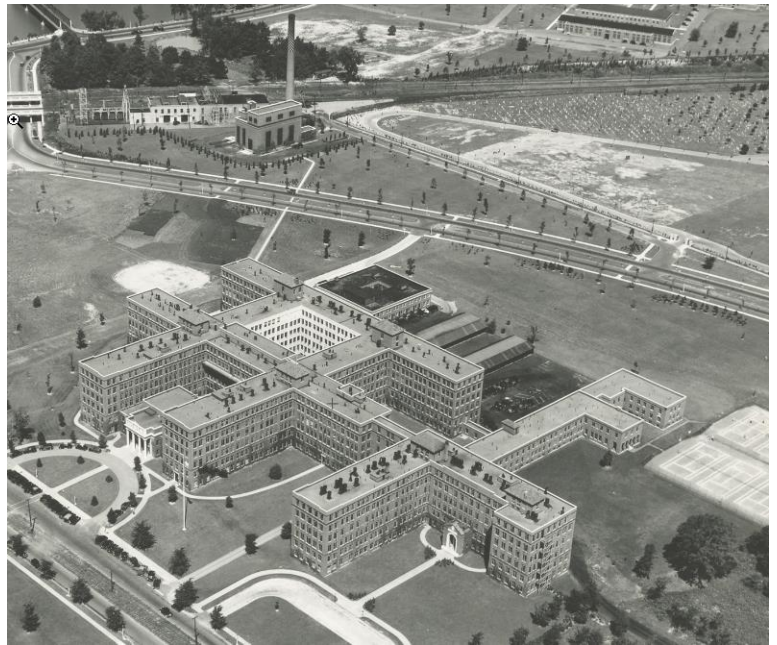
1919	George Hoyt Whipple appointed Dean UCSF (Berkeley and SF)	
1920	Flexner and Rush Rhee approach George Eastman with a plan for a new medical school and hospital	https://www.urmc.rochester.edu/about-us/history-of-urmc.aspx
1921-1922	Whipple recruited as first Dean; Whipple moves laboratory animals from California to first building	 <p><i>Research Laboratory (Animal House), December, 1922</i></p> <p>Pp 379-380 [96]</p>
1925	Hospital opens	https://www.urmc.rochester.edu/about-us/history-of-urmc.aspx
1922-1931	Roentgen irradiation dog studies by Whipple and Stafford Warren	[97-104]
1929-1930	E. O. Lawrence invents cyclotron at UC Berkeley	Nobel Prize in Physics 1939
	Whipple Nobel Prize	
1934	Rush Rhee brings Lee A. DuBridge to Rochester as first chair of physics. E.O. Lawrence suggests DuBridge build a cyclotron...	https://www.aip.org/history-programs/niels-bohr-library/oral-histories/4583
1936	DuBridge and Barnes cyclotron operational	http://www.rochester.edu/pr/releases/phys/mand.htm
1937-1939	Radioactive iron experiments commence by P. F. Hahn, W. F. Bale, E. O. Lawrence, and GH Whipple	[105, 106]
1941-1942	Wallace Osgood Fenn uses potassium isotopes from UR cyclotron	[107, 108]
1942	Million volt X-ray facility in new A wing to examine castings for armed forces	9700 square feet

February-March	Kodak VP invites Stafford to lunch at Rochester Club with General Groves	“... The primary reasons for choosing Rochester as a research center were that Drs. George Whipple and Stafford Warren had done pioneer work on the injurious effects of X-rays in dogs some 15 years previously and that early applications of cyclotron-produced radioactive isotopes to biological problems had been made in the Medical School, especially through the efforts of Dr. William Bale who had developed the necessary instrumentation. The new program in Rochester was called the Manhattan Project, a name designed to conceal its mission, which was very highly classified in those days, and a name already adopted by the Manhattan District for the same reason....”[109]
1943	Rochester Manhattan Project commences	
June 2 - September 1943	B Wing (the Annex) constructed	15,000 square feet
November 3, 1943	Dr. Warren commissioned Colonel and appointed Chief of the Medical Section of the Manhattan District with headquarters in Oak Ridge., Tennessee. Dr. Andrew Dowdy succeeds Warren as head of Project.	“... In its service function the Rochester group analyzed the periodic reports on medical examinations of personnel in the Manhattan District plants all over the country. It also advised these plants on how to protect their employees by: (a) determining "tolerance standards" for exposure to radiation and toxic chemicals; (b) developing instruments to measure exposure; (c) measuring intensities of radiation and concentrations of toxic dusts in plants; and (d) suggesting measures to make operations safer..”[109]
1944	C-Wing constructed	19,000 square feet
1946	Division of Pharmacology transferred from Biochemistry to Manhattan Project	Dr. Harold Hodge, Director
January 1, 1947	Atomic Energy Commission takes control, Rochester activity renamed Atomic Energy Project (AEP)	
January 1948	Henry Blair appointed chair of the new Department of Radiation Biology and Director of AEP	Fellowship program in Health Physics inaugurated.
1949-1950	Industrial medicine	AEC fellowship; program in collaboration with Eastman Kodak and other industries
1958	Department of Pharmacology formed from Division	Dr. Harold Hodge, Chair Industrial Medicine moved to Dept. of Preventive Medicine
1960	O- Wing (6700) constructed	53,000 square feet

1961	Index of reports and publications by the University of Rochester Atomic Energy Project [110]	Index of declassified and unclassified work of the University of Rochester Atomic Energy Project from its beginning in 1943 until July 1960. Contains titles of the work described in Manhattan District and Atomic Energy Commission reports as well as of material published in books and journals.
1962	Third floor added to B-Wing	
June 1965	<p>Drs. William F. Neuman and Aser Rothstein succeed Blair on his retirement as co-chairs and co-directors</p> <p>OO-Wing (6800) constructed</p> <p>Toxicology Graduate Program commences</p>	
1966	<p>Reports continue with UR report numbers acknowledging AEC/ERDA/DOE contracts through late 1970s, overlapping with the creation of the Laboratory for Laser Energetics.</p> <p>(exact termination date TBD)</p>	<p>By 1967, a total of 160,000 square feet.</p> <p>All additions were built by the Atomic Energy Commission.</p>
1970	<p>The Laboratory for Laser Energetics (LLE) of the University of Rochester is a unique national resource for research and education in science and technology. LLE was established in 1970 as a center for the investigation of the interaction of intense radiation with matter.</p> <p>The Department of Energy's National Nuclear Security Administration funds LLE as part of its Stockpile Stewardship Program.</p>	<p>http://www.rochester.edu/news/show.php?id=2153</p> <p>http://www.lle.rochester.edu/timeline/</p>

University research infrastructure enhancements from AEC/ERDA/DoE prior to 1970

Aerial view of medical center 1931. Low building with black roof is the first medical center building, the animal house for laboratory animal colony of Dr. Whipple, moved from UCSF/UC Berkely



The triangular land bordered by the power plant, cemetery, and Elmwood Avenue was developed as the Manhattan Project (Annex Wings A,B,C). Wing A (left) was built a year earlier to accommodate a million volt X-ray instrument for inspection of military castings. After WWII, high voltage source was mothballed and space used for project photography and illustration studio before repurposing as 9.4T MR preclinical imaging facility.



Annex (ca 1962) after addition of third floor to B Wing

1967 Aerial photograph shows footprint of AEP after AEC construction of O Wing (top right), before OO wing construction



Foundation of O-Wing during construction Cesium source location, adjacent to tunnel excavation crossing Elmwood Avenue. Vault for Cobalt 60 source constructed off tunnel under parking lot. Source failed to return to enclosure on first pneumatic activation, required robotic intervention and removal by Oak Ridge years later.



Wing O under construction—April 8, 1949—showing the Radioactive "Hot" Laboratory for the Atomic Energy Commission Project.

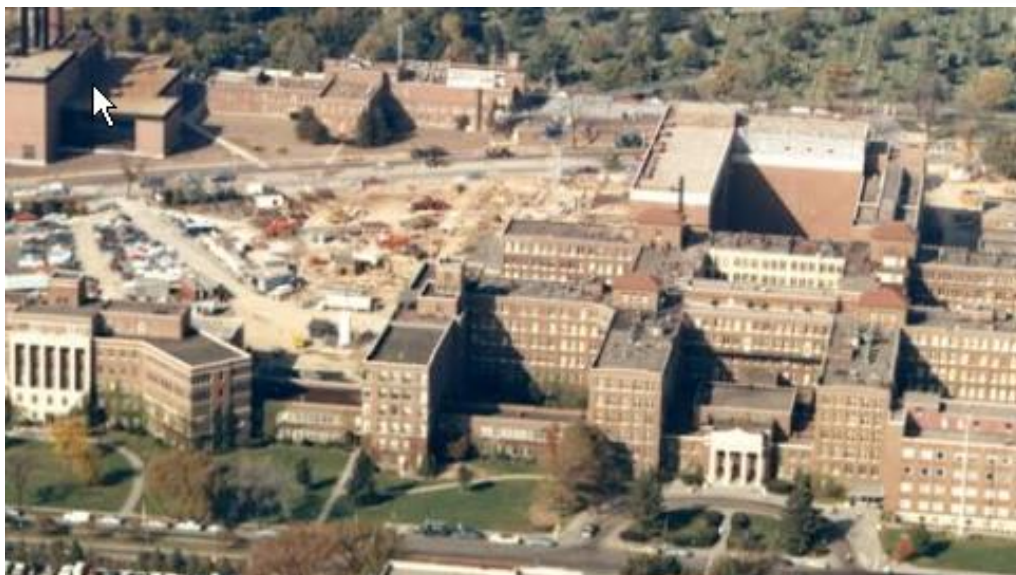


Wing O from the northwest—January 30, 1950.

1967 aerial photograph was taken as construction of the education (S) wing was getting underway. The Radiation Oncology clinical operation was built in the courtyard between O and GG wings; note there was no construction over this courtyard facility. GG wing adjacent to OO was built as a new animal research facility



OO Wing - constructed in 1966, adjoining O Wing



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