

ヴァンネヴァー・ブッシュに関する書誌的覚え書き：
ダニエル・コイト・ギルマン研究をとおして
Bibliographical essay and bibliography on Vannevar Bush in Japan
and the United States of America: through my master thesis research
on Daniel Coit Gilman as an American academic librarian.

松林正己*

Masaki MATSUBAYASHI

Abstract

An old biographical book on Daniel Coit Gilman of the first President of Johns Hopkins University was brought to me by the Internet bookshop in the United States. A memorandum inserted in the book is suggested a relation between Johns Hopkins University and Vannevar Bush who was the University's trustee. So I tried to compiled a bibliography on Vannevar Bush for the research on the history of science and technology, history of the computer science and library and information science.

* 愛知淑徳大学大学院図書館情報学専攻

Graduate School of Library and Information Science, Aichi Shukutoku University
JOURNAL OF LIBRARY AND INFORMATION SCIENCE. Vol. 14, p. 73-97(2000)

1. ダニエル・コイト・ギルマンとの出会い

ダニエル・コイト・ギルマン (Daniel Coit Gilman) がどんな人物かを知る人は日本では決して多くなかろう。筆者もアメリカ大学図書館史を研究する可能性は50%程度にしか考えていなかった。というのは筆者が大学院で図書館情報学を体系的に修めたいと思った理由は、自らの経験にもとづく。

1994年の夏に勤務先からの長期出張でオハイオ大学ヴァーノン・ロジャー・オールデン図書館 (Vernon Roger Alden Library, Ohio University) に日本語資料のキャタログガー [1] として約3ヶ月赴任したときの経験に端を発している。オハイオ大学で経験したことは、日本の大学図書館を見つめなおす実に良い経験であった。赴任中の上出張でミシガン大学、オハイオ州立大学、ジョージタウン大学や米国議会図書館などの図書館とCAS (Chemical Abstracts Services), OCLC (Online Computer Library Center) や UMI (University Microfilm International) 等の学術情報機関も見学できたのも出張の余録である。

帰国後インターネットが日本で情報技術 (IT) 革命をもたらし、図書館界におけるコミュニケーション・ツールが大躍進を遂げる。その中で特に業務への貢献が大きいのはメーリング・リスト (以下ML) である。日本の図書館関係MLは数種しかないが、そのうちの2種類を利用している。これらのMLの一つで「大学図書館員のためのメーリング・リスト (lul)」がある。このlulで数ヶ月に渡り大学図書館員の専門職制に関する議論が続いた。特に私立大学図書館の図書館員の議論と発言が多かった。私はオハイオ大学での経験をもとにアメリカの専門職制度の現状について報告と議論を展開した。数ヶ月の議論が終わって、関東地区の大学図書館員の友人たちと話をしていたら、あの長期のディスカッションのなかで大半の人が私の意見 (すなわちアメリカの専門職制と同等の資格制度が必要という持論) を支持しているというこ

とが伝えられた。一面でたいへん嬉しい知らせだった。発言した以上、自らの発言を実行すべく大学院へ進学した。幸い上司の理解ある見識で進学が実現した訳である。

専門職制自体が、医学界、法曹界などごく一部でしか社会的に確立・定着していないに等しい日本で図書館員の専門職制を議論するのは哲学的なアポリアを議論するのに似ている。しかし議論しなければ確立できない。そこで専門職制度の先進国アメリカの事情を調査し、起源と制度の成立過程を明らかにするために、自ら設定した仮説がダニエル・コイト・ギルマン研究である。ギルマンは初代ジョンズ・ホプキンス大学学長である。メリーランド州ボルティモアに1876年に建学されたこの大学の特徴は、研究大学 (Research University, 日本的に言えば大学院大学) としてアメリカで最初に創設されたことである。この年はアメリカ建国百年にあたるし、アメリカ図書館協会が創設された年でもある。専門職制と研究大学は、どこで接点を持つのか。既に定式化された知識体系を学習する過程を学部教育 (undergraduate) と見なせば、未知の知識の発見や創造に踏み込む大学院教育を支援する図書館サービスであるレファレンス・サービスの発生と充実は、大学院教育には必須と考えられるからだ。このような発想でアメリカ大学図書館史研究を進めている研究者にシフレットがいる。シフレットもアメリカの大学図書館史の中でギルマンが果たした役割の大きさをたびたび指摘している。なかでもギルマンの大学論に決定的な影響を与えているのは、ドイツ留学の経験であると指摘している。そこで筆者は世界で最初に図書館学 Bibliothekswissenschaftを19世紀初頭に命名したドイツがアメリカに与えた影響をギルマン研究をつうじて具体的に検証する研究テーマを選択した。

2. 文献調査と文献収集

テーマが決まったので、文献調査に入った。20数年前の学生時代とちがい自宅から国内外の

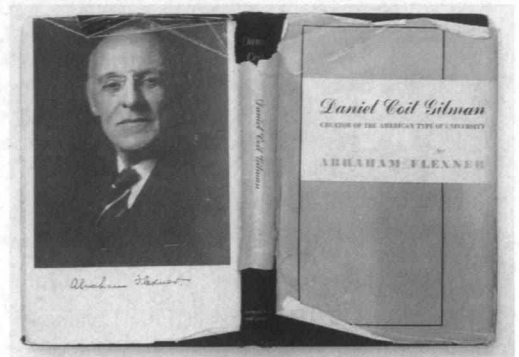
大学や書誌ユーティリティのOPACsに接続して、文献調査ができるのは非常にありがたい。ダニエル・コイト・ギルマンに関する基本資料は、ジョンズ・ホプキンス大学、カリフォルニア大学、エール大学とハーバード大学が各々ギルマン・アーカイヴを持ち、一次文献が豊富にあることが判った。しかし私の研究テーマに好都合の史料が眠っているか否かは、現在は定かではない。今の私が進めているのはギルマンが自らしたための著作を精読することが要求される。一方で効率的な史料読みを進めるためにギルマンの評伝とギルマン研究の文献を調査し、入手につとめた。

国内の大学図書館には、ギルマンやジョンズ・ホプキンス大学に関する史料は極めて限られた文献しか所蔵していない。比較的多く所蔵しているのは東京大学教育学部の図書館であるが、意外にオリジナル版が少なく電子複写版であった。それでもなお不足する資料をアメリカの大学図書館から取り寄せることは可能だが、基本的な一次文献は手許におかねば作業が進まない。ネット上のインターネット書店をとおして必要文献の収集に努めている。この過程で入手した文献の中に本稿で紹介するヴァンネヴァー・ブッシュと出会うことになる。

3. アブラハム・フレックスナー (Abraham Flexner) とヴァンネヴァー・ブッシュ

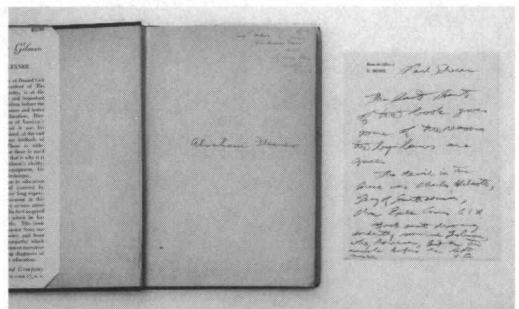
ギルマンに関する評伝は数種類が刊行されている。中でもファビアン・フランクリン (Fabian Franklin) の *The Life of Daniel Coit Gilman* は最も浩瀚でその嚆矢とされるが、生憎国内での所蔵は現在のところ確認できない。しかし、ギルマンの高弟であった高等教育学者のアブラハム・フレックスナーが戦後書いた *Daniel Coit Gilman: Creator of the American Type of University* をインターネット書店を通じて幸い入手することができた。(写真①)

ところが現物が届いて筆者にはある種の知的興奮を抱かずにはおれない事実が目の前にあ



写真①

た。オンライン発注時には著者署名本であることを確認して発注した。ゆえに多少高額な買い物だとは思った。半世紀も前の本ながら、辛うじてカバーもあり、著者の肖像を確認できた。もちろん著者の署名を前見返紙に確認できる。ところがさらに驚いたのは、恐らく古書店主が記入した鉛筆の書き込みが右肩にある。そこにはこう書かれている。Signed by author and note from Vannevar Bushとある。ヴァンネヴァー・ブッシュ、あのメメックスのブッシュ、なにか宝くじにでも当たったような、嬉しい好奇心と驚愕が同時に訪れた瞬間だった。そして標題紙の前にFrom the Office of V. Bushと左肩に印刷されたメモ用紙に一部判読できるだけのブッシュ肉筆のメモが挟まれていた(写真②)。メモの内容は判読しがたい達筆だった。



写真②

理解できるのは、ブッシュがギルマンとドライブしたという一行と、二人ともその要職を勤めたワシントンのカーネギー研究所を意味するC. I. W.と最終行に自らの署名V. B.である。解読は今後の課題である。

4. ジョンズ・ホプキンス大学とヴァンネヴァー・ブッシュ

ジョンズ・ホプキンス大学とブッシュ、一体どんな関係があったのか。素朴な疑問だがギルマン研究を始めたばかりの筆者には推理小説を読むような楽しみが突如浮かび上がった。とりあえず手許にあるジョン C. フレンチ (John C. French) 名誉図書館長執筆の *A History of the University founded by Johns Hopkins* の索引を検索してみると、ブッシュは二カ所にその名前を記されている。最初は大学評議会の評議員名簿にその名前を確認できる。1943年から評議員 (trustee) を勤めている。もう一カ所はジョンズ・ホプキンス大学での原子力研究に関する記録である。原子力研究はもちろんマンハッタン計画として遂行されたわけだが、膨大な軍事研究費を投入して遂行されたマンハッタン計画は6千人とも言われる科学者を動員して進められたが、その統括指揮官はブッシュであった。よってブッシュはBig Scienceの生みの親とも言われている。

5. ヴァンネヴァー・ブッシュのプロファイル

ギルマンとブッシュ、異色の出会いに興味があり、とりあえず百科事典で調べてみる。3種類の百科事典で調べてみると記述のあるのは2種類のみ。一松が記述したブッシュは数学者としての業績のみを記述しており、全体像の記述とは言い難い。一方奥山が記述したブッシュ像はほぼ全生涯を描いている。

さらにアメリカの百科事典ブリタニカの15版をインターネット版で検索するとNathan Reingoldの丁寧な記述を読める。アメリカ研究で人物情報を探すには *Dictionary of American Biography* などが著名だが、これにはブッシュは記述されていない。そこで1999年に刊行された *American National Biography* を紐解いてみると十二分な記述と詳細な関連文献ガイドが付されている。5頁にわたり記述さ

れ、アメリカ研究大学の父ギルマンの2倍近い記述があり、アメリカ史におけるブッシュの重要性を改めて再認識させられる。

6. Vannevar Bush書誌の試み

私はブッシュ研究を進める予定はないが、好奇心から日本語で書かれたブッシュ研究は大半を読んでみた。まとまった評伝といえるのは現在歌田が書いたもののみであろう。併せてブッシュの書誌情報をまとめてみた。集めた情報を私蔵するのは、この数ヶ月の資料読みの意味にあてた時間の浪費になるので以下に公開し、好士の利用に供することにした。遺漏も多々あろうが、科学技術史、図書館情報学、コンピュータ科学の歴史を知る上ではなんら指針となることを願う次第である。

検索した索引・目録は以下のとおりである。なお米国議会図書館、Melvyl、OhioLINKを検索するにあたって、国際標準情報検索プロトコルZ39.50のインターフェイスを搭載した書誌作成ソフトウェアEndNote (ISI Software) を利用している。

- ・国立情報学研究所
- ・国立国会図書館
- ・日外ウェブサービス、雑誌記事索引
- ・米国議会図書館
- ・Melvyl
- ・OhioLINK
- ・OCLC/FirstSearch

- (1971). "A letter from Vannevar Bush." *Bull. N. Y. Acad. Med.* 47 (11):1274-5.
- (1990). *Bush-Conant file relating to the development of the atomic bomb, 1940-1945*. Washington, [National Archives and Records Administration].
- (1993). "Washington Reports. Hopeful talk on science as Press leaves Academy...Updating Vannevar Bush: Academy panel calls for new strategy for science." *Physics Today*. 46 (7):61.
- (1995). "THE NATIONAL SCIENCE FOUNDATION -has bestowed two of its highest honors on physicists:Matthew P.A. Fisher has received the Alan T. Waterman Award,and Norman Ramsey has been given the Vannevar Bush Award." *The Scientist* 9 (13):15.
- (1999). "PERSPECTIVE VANNEVAR BUSH:- This legendary figure is overly credited with current research paradigms." *Chemical and engineering news: "news edition" of the American Chemical Society* 77(3):43-51.
- (1999). *Vannevar Bush*.
Profiles American mathematician Vannevar Bush (1890-1974), a pivotal figure in hypertext research. Details his career and his conception of Memex. The information is part of the Electronic Labyrinth, a study of hypertext technology, compiled by Christopher Keep and Tim McLaughlin.
URL:<http://jefferson.village.virginia.edu/elab/hf10034.html>
- Barfield, C. E. (1997). *Science for the twenty-first century:the Bush report revisited*. Washington, D.C., AEI Press.
- Bauer, A. F. S., Lucile B. (1959). *A keepsake in honor of Vannevar Bush*. [Cambridge, Mass.], Massachusetts Institute of Technology.
- Baxter, J. P., *Scientists against time.*; Bush, Vannevar, *Science, the endless frontier*. (1983). Science in World War II. Wilmington, Del., Scholarly Resources.
TOC:1. Scientists against time/by James Phinney Baxter (6 fiche)--2. New weapons for air warfare (4 fiche)--3. Combat scientists (5 fiche)--4. Advances in military medicine. v. 1 (6 fiche)--5. Advances in military medicine. v. 2 (5 fiche)--6. Rockets, guns and targets (6 fiche)--7. Chemistry (6 fiche)--8. Applied physics (6 fiche)--Organizing scientific research for war (4 fiche)--Science, the endless frontier/Vannevar Bush (3 fiche)
- Bayley, S. (1989). *Commerce and culture:from pre-industrial art to post-industrial value*. London, Fourth Estate.
TOC:Museum without walls/Andre Malraux--Modernism/Dan Cruickshank--The work of art in the age of mechanical reproduction/Walter Benjamin--Chester Gould versus Roy Lichtenstein/Tom Wolfe--commercial art/Milton Glaser--Au Bonheur des

dames/Emile Zola -- The Bon Marche/Georges d'Avenel -- Museums in the industrial world/Richard F. Bach -- De-skilled architecture/Peter Murray -- The aristocracy of culture /Pierre Bourdieu -- Commodity aesthetics/W.F. Haug -- As we may think/Vannevar Bush -- The habit of pleasure/John Thackara -- Teleshopping/James Woudhuysen.

Beckerman, L.; production.; direction.; Friendly, Alfred.; production.; editing.; Jones, Tom.; production.; Saylor, Hal.; camera/lighting.; Shultz, Ralph.; camera/lighting.; Schatz, Bert.; camera/lighting.; Graham, Philip L.; 1915-1963.; narration. (1995). *VE plus 10*. Washington, D.C., WTOP-TV.

Abstract: "Exactly 10 years after the close of the war in Europe, WTOP felt it would be interesting to interview the architects of that victory. Through a series of interviews woven together with narration, the public was shown and heard the remarks of these leaders, their thoughts at the conclusion of the war, their aspirations and in some cases a verbal record of the actual events of the past 10 year [sic]. The pictorial journalism of 'VE plus Ten' is history as seen through the voices of these men."--1955 Peabody Digest. Those interviewed include Harry Truman, Walter Bedell Smith, Omar Bradley, Alan Kirk, Carl Spaatz, Milton Caniff, Vannevar Bush, Wernher Von Braun, Averell Harriman, John Foster Dulles, Bill Mauldin, and Dwight D. Eisenhower. The Cold War and the threat of nuclear war are discussed generally.

Bowles, E. L., G. L. Archer, [et al.] *Papers of Edward Lindley Bowles*.

Correspondence, memoranda, diaries, mss., speeches, transcripts of Bowles's recorded recollections, reports, minutes, subject files, notes, legal documents, printed material, photographs, and other papers relating primarily to Bowles's career as consultant with Raytheon Company and Whitin Machine Works, later White Consolidated Industries, and its subsidiaries; as a government consultant to the U.S. War Dept. during World War II, to the U.S. Dept. of Defense during the Korean War, and on the National Defense Research Committee (NDRC); and as private consultant for companies and individuals securing or defending patents, including Radio Corporation of America, Samson Electric Company, Sperry Gyroscope Company, inc., Stockton Profile Gauge Corporation, United Artists Corporation, and Ernst F. W. Alexanderson, Edwin H. Armstrong, Walter G. Cady, Alexander M. Nicholson, and George Washington Pierce. Includes material concerning Bowles's association with Bentley College, Kodály Musical Training Institute, Massachusetts Institute of Technology (M.I.T.), and other educational facilities.

Topics include Bowles's youth in Westphalia, Mo.; M.I.T.'s electrical engineering program, NDRC Radiation Laboratory, the Round Hill Research Division, and the School of Industrial Management, later the Sloan School of Management; military research and strategy, anti-submarine warfare, and development of radar, torpedoes, and other weapons; reform of the patent system; Rand Corporation and the United

States Air Force Project Rand; Raytheon Company's Submarine Signal Division; telephone systems and Bell Telephone Company; television frequency allocations; and individuals such as Vannevar Bush, Carlo Luigi Calosi, Karl T. Compton, Charles S. Draper, Ernst A. Guillemin, Ernest J. King, Samuel E. Morison, David Rines, and Robert A. Watson-Watt. Also includes papers of Gleason L. Archer, George A. Campbell, Hammond V. Hayes, and Harry E. Yarnell. Correspondents include Charles F. Adams, Jr., Henry H. Arnold, Harold Gardiner Bowen, Vannevar Bush, Carlo Luigi Calosi, Alfred L. Loomis, Julius Adams Stratton, and Robert A. Watson-Watt.

Brode, W. R. *Papers of Wallace R. Brode*.

Correspondence, diaries, memoranda, speeches and writings, academic, travel, and subject files, awards, patents, theater programs, printed material, and photographs chiefly relating to Brode's tenure as director (1951-1960) and foreign secretary (1965-1967) of the American Chemical Society, associate director (1947-1958) of the National Bureau of Standards, and science advisor (1958-1960) to U.S. Secretary of State John Foster Dulles. Includes material on the dismissal of Allen V. Astin, director of the Bureau of Standards, by Sinclair Weeks, U.S. Secretary of Commerce during the Eisenhower administration. Also documented are Brode's World War II positions with the Office of Scientific Research and Development and the Alsos mission to collect information on enemy scientific research (particularly on atomic energy) and on his postwar advisory positions with rocket research laboratories at the Naval Ordnance Test Station, Inyokern, Calif. Other papers document his work as a chemist regarding internal reflection spectroscopy and applied optics, particularly relating to colors and dyes. Also includes material on handcrafted rugs and Indian culture of the American Southwest, an interest Brode shared with his wife, Ione Sundstrom Brode.

Correspondents include John Brademas, Robert B. Brode, Detlev W. Bronk, Vannevar Bush, William O. Douglas, Ora S. Duffendack, Novice G. Fawcett, Angel Hernaiz, Christian Archibald Herter, Hubert H. Humphrey, Foy D. Kohler, Douglas MacArthur, George S. McGovern, W. P. Mitchell, G. Francis Nauheimer, Edgar L. Piret, Herman W. Pollack, Walter L. Reynolds, B. R. Stanerson, and Dael Lee Wolfle.

URL: gopher://marvel.loc.gov/00/.ftppub/mss/msspub/fa/b/brode.txt

Burke, C. B. (1994). *Information and secrecy: Vannevar Bush, Ultra, and the other Memex*. Metuchen, N.J., Scarecrow Press.

Burke, C. and N. Reingold (1995). "Information and Secrecy: Vannevar Bush, Ultra, and the Other Memex." *Technology and culture* 36(4):1051-1053.

Burke, C., E. B. Jackson, et al. (1995). "Information and Secrecy: Vannevar Bush, Ultra, and the Other Memex." *Libraries & culture* 30(4):434-437.

Bush, V. *Papers of Vannevar Bush.*

Correspondence, drafts of writings, speeches, laboratory and other notes, articles, book file, scientific papers, memoranda, reports, minutes, financial papers, biographical data, family papers, diagrams, patents, press releases, clippings, printed matter, photographs, and other papers, chiefly 1932-1955. The collection primarily relates to Bush's role in coordinating the scientific community for defense efforts during and after World War II as chairman of the National Defense Research Committee and director of its successor, the Office of Scientific Research and Development, where he supervised the Manhattan Project and other programs. Other agencies represented include the National Advisory Committee for Aeronautics, Joint Commission on New Weapons of the Joint Chiefs of Staff, National Science Foundation, National Research Council, and National Academy of Sciences.

Bush's corporate and academic affiliations are documented by files on American Telephone and Telegraph Company, Merck & Co., Johns Hopkins University, Massachusetts Institute of Technology, and Tufts University. Also represented are the Brookings Institution, Carnegie Institution of Washington, Franklin Institute, Metals & Controls Corporation, Smithsonian Institution, and U.S. Patent Office. Also documented are Bush's views on the interrelationship between science and government, technological influences on postwar U.S.-Soviet relations, international control of nuclear energy, and the loyalty controversies during the McCarthy era.

Correspondents include Dean Acheson, Henry Harley Arnold, Omar Nelson Bradley, Niels Henrik David Bohr, Robert A. Choate, K. T. Compton, James Bryant Conant, Bradley Dewey, Charles Dollard, Dwight D. Eisenhower, James Forrestal, W. W. Garth, Caryl Parker Haskins, D. C. Josephs, James Rhyne Killian, R. C. Leffingwell, David Eli Lilienthal, F. Alexander Magoan, Robert Porter Patterson, Don Krasher Price, Redfield Proctor, Palmer Cosslett Putnam, Alfred N. Richards, Elihu Root, Oscar M. Ruebhausen, John T. Rule, Orville J. Schell, Leslie Earl Simon, Carl Spaatz, W. H. Timble, Harry S. Truman, Tracy S. Voorhees, Warren Weaver, Bethuel Matthew Webster, Carroll L. Wilson, and Robert E. Wilson.

URL: <http://hdl.loc.gov/loc.mss/eadmss.ms998004>

Bush, V. *Frederick Gardner Cottrell, 1877-1948.* Washington, [n. d.]

Bush, V. (1916). *Oscillating-current circuits; an extension of the theory of generalized angular velocities, with applications to the coupled circuit and the artificial transmission line.* Boston?: 15.

Bush, V. (1917). *The coupled circuit.* Tufts College, Mass..

Bush, V. and F. S. Dellenbaugh (1922). *A simple harmonic analyser.* Electromechanical device for rapid schedule, harmonic analysis of complex waves. Alignment chart for circular and hyperbolic functions of a complex argument in rectangular coordinates.

Boston.

- Bush, V. and L. H. Connell (1922). *The effect of absorbed gas on the conductivity of glass*. Boston.
- Bush, V. (1923). *Transmission lines transients*. Boston.
- Bush, V. (1924). *Note on operational calculus*. Boston.
- Bush, V. and R. D. Booth (1925). *Power system transients*. Boston.
- Bush, V. (1925). *Transmission line transient investigations*. Boston.
- Bush, V. (1926). *The force between moving charges*. Boston.
- Bush, V., F. D. Gage, [et al.] (1927). *A continuous integraph*. Boston.
- Bush, V. and H. L. Hazen (1927). *Integraph solution of differential equations*. Boston.
- Bush, V. and P. H. Moon (1927). *A precision measurement of puncture voltage*. Boston.
- Bush, V. and N. Wiener (1929). *Operational circuit analysis*. New York, London, J. Wiley & sons inc.; Chapman & Hall limited.
- Bush, V. (1936). *Biographical memoir of John Ripley Freeman, 1855-1932*. Washington, The National academy of sciences.
- Bush, V. and N. Wiener (1937). *Operational circuit analysis*. New York, London, J. Wiley & Sons Inc.; Chapman & Hall Limited.
- Bush, V. (1937). *Biographical memoir of John Ripley Freeman, 1855-1932*. City of Washington.
- Bush, V. (1943). *Biographical memoir of Arthur Edwin Kennelly, 1861-1939*.
- Bush, V., United States. Office of Scientific Research and Development, [et al.] (1944). *OSRD and World War II*. Washington, D.C., Field Engineering Group in the Bureau of Ships.
- Bush, V. (1945). *Science, the endless frontier: a report to the President*. Washington, Govt. Print. Off.
- Bush, V. (1946). *Endless horizons*. Washington, D.C., Public Affairs Press.
- Bush, V. (1949). *Modern arms and free men: a discussion of the role of science in preserving democracy*. New York, Simon and Schuster.
- Bush, V. (1950). 新兵器と自由人/ヴァネヴァー・ブッシュ著; 千葉雄次郎訳. 東京, 朝日新聞社.

- Bush, V. (1950). *Les armes d'aujourd'hui et de demain* (Modern arms and free men). Paris, Calmann-Levy.
- Bush, V. (1950). Hsien tai wu ch'i yü tzu yu jên.
- Bush, V. (1952). *Scientific research and development*. Manila, Bureau of Printing.
- Bush, V. (1953). *Address by Vannevar Bush, President, Carnegie Institution of Washington before the Opening School Convocation, Massachusetts Institute of Technology, Cambridge, Massachusetts, October 5, 1953*. Massachusetts Institute of Technology.
- Bush, V. (1954). *Gano Sillick Dunn, 1870-1953*. Washington, National Academy of Sciences.
- Bush, V. (1956). *Proposals for improving the patent system*. Washington, U.S. G.P.O.
- Bush, V. (1957). *Proposals for improving the patent system*. Washington, U. S. Govt. Print. Off.
- Bush, V. (1959). *The gentleman of culture*. [n.p.]
- Bush, V. (1961). *Education, wisdom & happiness*. Cambridge, Centennial Committee Massachusetts Institute of Technology.
- Bush, V. (1965). *Comfort Avery Adams*. New York, Published for the Academy by Columbia University Press.
- Bush, V. (1967). *Science is not enough*. New York, Morrow.
- Bush, V. (1968). *Modern arms and free men: a discussion of the role of science in preserving democracy*. Cambridge, Mass., M.I.T. Press.
- Bush, V. (1969). *Focus on Vannevar Bush a modern scientist assesses the impact of technology on mankind*. Tucson, Learning Plans.
- Bush, V. (1970). *Pieces of the action*. New York. Morrow.
- Bush, V. (1975). *Endless horizons*. New York, Arno Press.
- Bush, V., R. C. Atkinson, [et al.] (1980). *Science – the endless frontier: a report to the President on a program for postwar scientific research*. [Washington, D.C.], National Science Foundation.
- Bush, V. and Library of Congress. Manuscripts Division. (1985). *Vannevar Bush: A Register of His Papers in the Library of Congress* prepared by Carolyn Sung; revised and expanded by Allan J. Teichroew, Library of Congress.

Collection Summary :

Creator: Bush, Vannevar, 1890-1974

Title: Papers of Vannevar Bush 1901-1974 (bulk 1932-1955)

Size: 55,000 items; 174 containers; 69.6 linear feet

Repository: Manuscript Division, Library of Congress

Abstract: Physicist, engineer, government official, and science administrator. The collection relates primarily to Vannevar Bush's role as coordinator of the scientific community for defense efforts during and after World War II when he served as chairman of the National Defense Research Committee and director of its successor, the Office of Scientific Research and Development, where he supervised the Manhattan Project and other programs.

Bush, V. (1985). *Modern arms and free men: a discussion of the role of science in preserving democracy*. Westport, Conn., Greenwood Press.

Bush, V., E. Bloch, [et al.] (1990). *Science--the endless frontier: a report to the President on a program for postwar scientific research*. [Washington, D.C., National Science Foundation.

Bush, V., J. M. Nyce, [et al.] (1991). *From Memex to hypertext: Vannevar Bush and the mind's machine*. Boston, Academic Press.

Bush, V., Sigma Xi, the Scientific Research Society, [et al.] (1996). *Vannevar Bush II: science for the 21st century: current and future challenges for federal support: a report*. Research Triangle Park, NC, Sigma Xi, the Scientific Research Society.

Bush, V. (1997). *As We May Think*. Duchier, Denys, 2000.

Contains Vannevar Bush "As We May Think," an article originally published in the July 1945 issue of *The Atlantic Monthly*. Calls for a new relationship between thinking man and the sum of our knowledge. Discusses the lasting benefit of science and the new instruments that research has brought into existence. Examines the evidence that scientists are being bogged down today as specialization extends. Describes the mechanical aids that will effect a transformation in scientific records.

URL: <http://www.theatlantic.com/unbound/flashbks/computer/bushf.htm>

Bush, V. (1989). "人の思考のように: Memex". 情報学基本論文集 I: 情報研究への道. 上田修一編. 東京, 勁草書房. p.3-24.

Bush, V. (1994). 「思うがままに」. リテラリーマシン: ハイパーテキスト原論/テッド・ネルソン著; ハイテクノロジー・コミュニケーションズ訳. T. H. Nelson. 東京, アスキー. p.110-132

Bush, V. (1997). われわれが思考するごとく. 思想としてのパソコン = Personal Computers as ideas. 東京, NTT出版. p. 65-89.

Bush, V. (1999). *Vannevar Bush*.

Features a biographical sketch of the American electrical engineer Vannevar Bush (1890-1974), presented by Sammy Joe Chapman. Highlights his contributions to the field of information science and his publication "As We May Think." Describes his work as a teacher, original researcher, engineer, and administrator.

URL: <http://web.utk.edu/~samchap/SAM.HTM>

Chapman, S. J. *Vannevar Bush*.

Features a biographical sketch of the American electrical engineer Vannevar Bush (1890-1974), presented by Sammy Joe Chapman. Highlights his contributions to the field of information science and his publication "As We May Think." Describes his work as a teacher, original researcher, engineer, and administrator.

URL: <http://web.utk.edu/~samchap/SAM.HTM>

Compton, K. T., R. W. Trullinger, [et al.] (1942). *Scientists face the world of 1942*. New Brunswick, Rutgers University Press.

Compton, A. H. (1968). *The cosmos of Arthur Holly Compton*. New York, Knopf.

Davenport, E. (1992). "James M. Nyce and Paul Kahn. From memex to hypertext: Vannevar Bush and the mind's machine." *Hypermedia* 4(2):138-139.

Davis, T. (1998). "As we may teach." *Education + Training* 40(8):347.

Dennis, M. A. (1973). Bush, Vannevar. *Britannica*.

URL: <http://www.britannica.com/bcom/eb/article/0,5716,18540,00.html>

Doctor, R. D. (1995). "Colin Burke, Information and Secrecy: Vannevar Bush, Ultra, and the Other Memex." *The Library quarterly* 65(1):126.

Druckrey, T. (1996). *Electronic culture: technology and visual representation*. New York, Aperture.

Furer, J. A. *Papers of Julius Augustus Furer*.

Correspondence; diary (1941-1945); subject file; speech, article, and book file, including numerous articles on naval and maritime subjects, published in the Encyclopedia Americana; and miscellaneous material, chiefly 1915-1961, relating to Furer's activities as director of the salvaging of the submarine U.S.S. F-4, as assistant naval attaché at London, as secretary of the U.S. Naval Academy's Class of 1901, and as coordinator of naval research and development. Correspondents include Arleigh Burke, Vannevar Bush, Karl T. Compton, John Foster Dulles, Ernest M. Eller, Albert Furer, Kurt Furer, William F. Halsey, John B. Heffernan, Jerome C. Hunsaker, Dudley W. Knox, Charles Little, Samuel E. Morison, and Clifton Toal.

Goldberg, S. (1992). "Inventing a Climate of Opinion: Vannevar Bush and the Decision to Build the Bomb." *Isis* 83(3):429-452.

Guston, D. H. (1997). "Critical appraisal in science and technology policy analysis: the example of science, the endless frontier." *Policy Sciences* (The Netherlands) 30(4):233-255.

Harrison, M. A. (1992). *Defining hypermedia: the essential elements*. Berkeley, Calif., University of California, Berkeley, Computer Science Division.

"Over fifty years ago, Vannevar Bush hypothesized about what are now called hypertext and hypermedia systems. He and later visionaries discussed a number of applications which could revolutionize the way organizations and individuals access information in its various embodiments. In spite of the great attention currently being paid to this area, there are few, if any systems which fulfill the vision. In this report, we try to isolate the essential character, the sine qua non, of hypermedia systems. Our methodology is to offer twelve criteria or rules about hypermedia systems. It is our thesis that any robust, or industrial strength, system must meet these criteria if we are to realize the full potential of hypermedia. Some of the criteria serve as a challenge to the technical community. Others are of a social and political nature. Companies need to cooperate in deriving standards to enable the exchange of hypermedia information or to agree on APIs to achieve interoperability. These issues involve networking, computer hardware and software, as well as formats for certain consumer electronics products such as analog and/or digital HDTV."

橋本典明 (1993). ヴァネヴァー・ブッシュ. メディアの考古学. 東京, 工業調査会. p.77-82.

Hastings, A. B. *Papers, 1915-76*.

Hoover Medal Board of Award. (1946). *Vannevar Bush, ninth Hoover medalist*. New York.

一松信 (1988). ブッシュ Vannevar Bush 1890-1974. 日本大百科全書. 東京, 小学館. p.389-390.

International Solar Energy Society. (1954-1974). *International Solar Energy Society collection, 1954-1974*. Sun at work. I. S. E. S.--. A. S. International. and A. World Symposium on Applied Solar Energy (1955: Phoenix).

The bulk of the collection pertains to the early history of the Society when it was known as the Association for Applied Solar Energy.

Jackson, J. E. and V. Bush. (1960). *The amateur scientist: how two distinguished amateurs set about refining the accuracy of a pendulum clock*. [New York, Scientific American].

John Fritz medal. Board of Award. (1951). *John Fritz medal. Biography of Vannevar Bush, medalist for 1951*. New York.

Joyce, M. (2000). *Othermindedness: the emergence of network culture*. Ann Arbor, University of Michigan Press.

Kaempffert, W. and National Science Foundation (U.S.) (1946). *Should the government support science?* [New York, Public affairs committee, inc.

Kenner, H., J. Unger, [et al.] (1992). "Book and CD-ROM Reviews: The Origins of Hypertext. Vannevar Bush and hypertext, street maps on CD-ROM, and Unix primers." *Byte* 17(9):286.

Koistinen, P. A. C. and G. Pascal Zachary (1998). "Bush's Elite League - Endless Frontier: Vannevar Bush, Engineer of the American Century." *Reviews in American history* 26(3):606-614.

Krim (1993). "Vannevar Bush & Raytheon." *IEEE aerospace and electronic systems magazine* 8(10):3.

Langmuir, I. *Papers of Irving Langmuir*.

Correspondence, diaries, experimental notebooks, articles, speeches, card reference file, clippings, printed material, awards, and photographs. The notebooks (1894-1957) contain data which led to the development of the gas-filled incandescent lamp, the high vacuum power tube, atomic hydrogen welding, and screening smoke generators for the Armed Forces. Includes material on cloud seeding experiments and smoked bathythermograph records obtained at Lake George, N.Y. Also includes material pertaining to Langmuir's years, 1903-1906, as a student at Universitaet Goettingen, Goettingen, Germany. Correspondents include Niels Bohr, Vannevar Bush, Leopold Stokowski, and Willis R. Whitney.

Marcus, D. T., Edward, G. Kistiakowsky,; Marcus, David,; Segre, Emilio,; Rabi Isidor Isaac,;, [et al.] (1971 1982). *Collection of correspondence sent to and from David Marcus regarding the bombing of Nagasaki: 1971-1982*. 8 letters, plus clippings and magazine articles.

In 1971 Marcus wrote to physicist Edward Teller regarding his role in the decision to bomb Nagasaki. Teller's response is here included, as well as letters by scientists and others who describe their understanding of why the bomb was dropped on Nagasaki after Hiroshima. Correspondents include: Emilio Segre, Isidore Rabi, Vannevar Bush, Luis Alvarez, Ralph Lapp, Hitoshi Matoshima (Mayor of Nagasaki 1982) and George Kistiakowsky (head of explosives at Los Alamos). Contains April 3, 1944 issue of Time Magazine with Vannevar Bush on cover, and a copy of Luis Alvarez's paper "Adventures in Nuclear Physics," signed by him.

- Martin, B. and P. Nightingale (2000). *The political economy of science, technology, and innovation*. Cheltenham, UK; Northampton, Mass, E. Elgar.
- Martino, J. P. (1992). *Science funding: politics and porkbarrel*. New Brunswick, N.J., U.S.A., Transaction Publishers.
- 丸山昭二郎 (1983). “MEMEXと情報ユティリティー—Dr.Bushのワークステーション.” 科学技術文献サービス [ISSN:00227633] (国立国会図書館)(63):p.33-39.
- Massachusetts Institute of Technology. Radiation Laboratory. and K. Henney (1953). *Index*. New York, McGraw-Hill.
- Mather, K. F. (1944). *The future of American science*. [New York], United Office and Professional Workers of America, CIO.
- McMahon, M. (1994). “James M. Nyce and Paul Kahn, eds., From Memex to Hypertext: Vannevar Bush and the Mind's Machine.” *Technology and culture* 35 (2):441.
- McMath, R. R., Adams, Randolph Greenfield,; Adams, Walter Sydney,; Adel, Arthur,; Allen, Irwin,; Avila Camacho, Manuel,; Barker, Ernest F.; (Ernest Franklin),; Beal, Junius Emery,; Brown, P (1916-1962). *Robert R. McMath papers, 1916-1912*. 11 linear ft.
- Correspondence concerning astronomy, particularly celestial photography, and the development of the McMath Observatory, financial records, plans for telescope equipment, and printed materials. Correspondents include: Randolph G. Adams, Walter S. Adams, Arthur Adel, E. F. Barker, Junius E. Beal, Kevin Burns, George L. Burr, Vannevar Bush, Manuel Avila Camacho, Heber D. Curtis, R. H. Curtiss, A. E. Dale, F. Trubee Davison, Helen Dodson, Allen Dulles, Theodore J. Dunham, Carl Eckart, John R. Effinger, J. W. Fecker, Clyde Fisher, Erle Stanley Gardner, W. S. Gilmore, Leo Goldberg, Gilbert Grosvenor, Melville Grosvenor, Roger Heyns, Henry S. Hulbert, N. C. Johnson, Louis C. Karpinski, Remington Kellogg, Hayward Keniston, Edward H. Kraus, F. H. Learer, Roy D. McClure, C. S. McDowell, Tracy W. McGregor, Francis C. McMath, George Malesky, Donald H. Menzel, Paul W. Merrill, Orren C. Mohler, Seth Nicholson, William Norton, Charles E. Odegaard, Jesse Ormondroyd, R. M. Petrie, Edison Pettit, Alfred J. Pyke, Donald A. Quarles, Harrison G. Reynolds, Warner G. Rice, Henry N. Russell, Alexander G. Ruthven, Samuel Sass, H. E. Sawyer, Charles H. Schauer, B. A. Schriever, Harlow Shaply, Joseph W. Shirley, Shirley Smith, E. Blythe Stason, Joel Stebbins, Harlan Stetson, Julius F. Stone, T. Hawley Tapping, Alan Waterman, Alfred H. White, Charles E. Wilson, and Clarence S. Yoakum.
- Meigs, M. C. (1982). *Managing uncertainty: Vannevar Bush, James B. Conant and the development of the atomic bomb, 1940-1945*. iii, 288 leaves.
- Meyrowitz, N. (1990). “The Link to Tomorrow. As early as 1932, Vannevar Bush

anticipated the development of technology that would give individuals access to the world's knowledge through a console at their fingertips, and allow them create coherent associations between segments of this knowledge. Today, hypermedia applications are bringing us closer to this accomplishment than we have ever been." *UNIX review* 1990(8):2.

Miller, K. and United States. National Aeronautics and Space Administration. (1995). *Vannevar Bush II science for the 21st century: Why should federal dollars be spent to support scientific research? : forum proceedings, March 2-3, 1995. Sigma Xi Forum (1995: Washington, D.C.)*, [Research Triangle Park, NC]

[Washington, DC, Springfield, Va., Sigma Xi Scientific Research Society; National Aeronautics and Space Administration; National Technical Information Service distributor].

Moyer, J. A. (1929). *Steam turbines a practical and theoretical treatise for engineers and students: including a discussion of mercury and gas turbines*. New York, Wiley.

室井尚 (2000). データベースの知. 哲学問題としてのテクノロジー: ダイダロスの迷宮と翼. 東京, 講談社. p.143-151.

村主朋英 (199) Vannevar Bushと「Memex構想」－理想の情報検索システムを求めて－

URL: <http://www.aasa.ac.jp/~muransky/LIS/MEMEX.TXT>

National Broadcasting Company, Inc. and Encyclopaedia Britannica Films, Inc. (1958). *Vannevar Bush*, National Broadcasting Co.; Released by Encyclopaedia Britannica Films.

Vannevar Bush, administrator and electrical engineer, discusses his career in industry and government. Describes his work in industrial research, his contribution to the development of armaments, his work as director of the Office of Scientific Research and Development of the United States during World War II, and his role in the mobilization of scientific manpower for national defense.

Neate, G. (1987). *MEMEX, evaluation of a search engine final report*. Oxford, Bodleian Library.

Nichols, O. and M. S. Dohme. (1963). *By their fruits; some historic contributions to the chemistry of life*, with chapters by Selman A. Waksman and Vannevar Bush. [Ed. by Osgood Nichols]. Rahway, N.J., Merck.

西垣通 (1997). 軍事と科学の仲介－ブッシュ. 思想としてのパソコン = Personal Computers as ideas. 東京, NTT出版. p.15-19.

Numbers, R. L. and C. E. Rosenberg (1996). *The scientific enterprise in America: readings from Isis*. Chicago, University of Chicago Press.

Nyce, J. M., P. Kahn, [et al.] (1995). "From Memex to Hypertext: Vannevar Bush and the Mind's Machine." *Annals of the history of computing*. 17(3):82.

奥山修平 (1988). ブッシュ Vannevar Bush 1890-1974. 世界大百科事典. 東京, 平凡社. p.668-669.

Oppenheim, C. (1994). "Colin Burke, Information and secrecy: Vannevar Bush, Ultra, and the other Memex." *International journal of information and library research*. 6(1/2): 94.

Oppenheimer, J. R. *Papers of J. Robert Oppenheimer*.

Correspondents include Hans Albrecht Bethe, Raymond T. Birge, Felix Bloch, Max Born, Julian P. Boyd, Vannevar Bush, Pablo Casals, Harold F. Cherniss, Robert F. Christy, Sir John Cockcroft, Arthur Holly Compton, James Bryant Conant, P. A. M. Dirac, T. S. Eliot, Herbert Feis, Enrico Fermi, Lloyd K. Garrison, Leslie R. Groves, Wallace K. Harrison, Julian Huxley, George Frost Kennan, Shuichi Kusaka, Ernest Orlando Lawrence, T. D. Lee, Archibald MacLeish, John Henry Manley, Herbert S. Marks, Nicolas Nabokov, Abraham Pais, Wolfgang Pauli, Linus Pauling, Sir Rudolf Ernst Peierls, Eleanor Roosevelt, Franklin D. Roosevelt, Bertrand Russell, Albert Schweitzer, Julian Seymour Schwinger, Emilio Segrè, Robert Serber, Leo Szilard, Edward Teller, Norman Thomas, John Archibald Wheeler, Yang Chen Ning, and Hideki Yukawa.

Correspondence, memoranda, speeches, lectures, writings, desk books, lectures, statements, scientific notes, inventories, newspaper clippings, and photographs chiefly comprising Oppenheimer's personal papers while director of the Institute for Advanced Study, Princeton, N.J., but reflecting only incidentally his work there.

Topics include theoretical physics, the development of the atomic bomb, the relationship between government and science, organization of research on nuclear energy, control of nuclear energy, security in scientific fields, secrecy, loyalty, disarmament, education of scientists, international intellectual exchange, the moral responsibility of the scientist, the relationship between science and culture, and the public understanding of science. Includes material on Oppenheimer's World War II contributions, particularly to the Los Alamos project. Also documented are his postwar work as a consultant on the technical and administrative problems of the atomic bomb, service on the Atomic Energy Commission (including his hearing before its personnel security board that resulted in the revocation of his clearance), and his association with the Federation of American Scientists, National Academy of Sciences, and other scientific organizations, and the Twentieth Century Fund, Unesco, and other humanitarian organizations.

Includes a group of letters and memoranda written by physicist Niels Bohr to Supreme Court Justice Felix Frankfurter relating to the role of nuclear energy in international affairs, supplemented by Oppenheimer's correspondence with Bohr.

Owens, L. (1983). *Vannevar Bush and the culture of American engineering*.

Owens, L. (1984). *The text and context of an early computer: Vannevar Bush and the differential analyzer*.

Owens, L. (1987). *Straight-thinking Vannevar Bush and the culture of American engineering*.

Owens, L. (1994). "The Counterproductive Management of Science in the Second World War: Vannevar Bush and the Office of Scientific Research and Development." *Business history review*. 68(4):515.

Owens, L. (1996). "Vannevar Bush: An Engineer Builds a Book." *Science as culture* (24): 373.

Parsons, W. S. *Papers of William Sterling Parsons*.

Correspondence, journal of Parson's activities (1951-1952) as commander of Cruiser Division Six, U.S. Atlantic Fleet, articles, newspaper clippings, and other material relating primarily to his role in the development and testing of the atomic bomb (Manhattan Project, the bombing of Hiroshima, and Operation Crossroads). Correspondents include Bernard M. Baruch, Vannevar Bush, Robert B. Carney, Karl Compton, Ralph Earle, Jr., George Fielding Eliot, James Forrestal, James Gavin, Leslie R. Groves, David E. Lilienthal, Ernest K. Lindley, and Lewis L. Strauss.

Pringle, H. F. *Papers of Henry F. Pringle*.

Personal and official correspondence, subject files consisting of letters, reports, minutes, lists, research data, and printed and near-print material, and other papers, chiefly 1939-1946, relating principally to Pringle's biography of William Howard Taft and to his work in the Office of Facts and Figures (later the Office of War Information). Included are materials on OWI projects relating to the war and Afro-Americans, inflation, drinking in the service, and Axis atrocities; a study on Allied bombing operations in Europe done by Pringle while working for the U.S. Air Force and the secretary of war; and a study of Vannevar Bush and government-sponsored research done for the Office of Scientific Research and Development. Persons represented include Stephen Vincent Ben* t, Henry Steele Commager, W. E. B. Du Bois, Dwight D. Eisenhower, John Farrar, Franz Halder, Philip Hamburger, William D. Hassett, Charles Evans Hughes, Harold Ickes, Milton MacKaye, Archibald MacLeish, Allan Nevins, Chandler Owen, Paul Palmer, George S. Patton, Arthur Schlesinger, Jr., Robert Shaplen, Martin Sommer, Horace Taft, Robert A. Taft, E. B. White, and William Allen White.

Rabi, I. I. *Papers of I. I. Rabi*.

Correspondence, memoranda, reports, articles, lectures, speeches, writings, notes, notebooks, course outlines, examinations, statements, agenda, minutes of meetings,

bulletins, notices, invitations, press releases, applications, contracts, publications, charts, graphs, calculations, newspaper clippings, printed matter, and photographs, chiefly 1945-1968.

The collection documents Rabi's research in physics, particularly in the fields of radar and nuclearenergy, leading to the development of lasers, atomic clocks and magnetic resonance imaging (MRI) and to his 1944 Nobel Prize in physics; his work as a consultant to the atomic bomb project at Los Alamos Scientific Laboratory and as an advisor on science policy to the U.S. government and to the United Nations and the North Atlantic Treaty Organization during and after World War II; and his studies, research, and professorships in physics chiefly at Columbia University and also at Massachusetts Institute of Technology. Includes material on peaceful uses of atomic energy, strategic use of atomic weapons, nuclear test ban, population control, problems of underdeveloped countries, reduction of Cold War tensions, the scientific community's role in diplomatic relations with allies, and the U.S. space program. Also reflected is Rabi's work at the Aberdeen Proving Ground and with Arms Control and Disarmament Agency, Atomic Energy Commission, President's Science Advisory Committee, and the Pugwash Conference on Science and World Affairs.

Correspondents include Edouard Amaldi, Ruth Nanda Anshen, Hans Albrecht Bethe, Felix Bloch, Niels Bohr, Vannevar Bush, K. T. Compton, Edward Uhler Condon, Sir Charles Galton Darwin, Lee A. DuBridge, Albert Einstein, Enrico Fermi, Lewis Finkelstein, Polykarp Kusch, J. Robert Oppenheimer, Emilio Segrè, Lewis L. Strauss, Leo Szilard, Harold Clayton Urey, J. H. Van Vleck, Antonino Zichichi, and Sir Solly Zuckerman.

URL: <http://hdl.loc.gov/loc.mss/eadmss.ms998009>

Randell, B. (1981). *From analytical engine to electronic digital computer: the contributions of Ludgate (1883-1922), Torres y Quevedo (1852-1936) and Bush (1890-1974)*. Newcastle upon Tyne, England; Springfield, VA, University of Newcastle upon Tyne; National Technical Information Service.

Reingold, N. (1999). BUSH, Vannevar. *American National Biography*. J. A. Garraty and M. C. Carnes. New York; Oxford, Oxford University Press. vol.4:77-81.

RKO-Pathe Inc. (1952). *Men of science* Motion picture. [n.p.], RKO-Pathe.

齊藤孝 (1995). “デジタル・ライブラリの歴史的考察 —MemexからMosaicへの軌跡.” 中央大学文学部紀要 [ISSN:05296803] (中央大学 中央大学文学部) 160 : p.65-86.

Sapolsky, H. M. (1994). “Information and Secrecy: Vannevar Bush, Ultra, and the Other Memex, by Colin Burke.” *The Journal of military history* 58(4):757.

Schwartz, W. B. and D. N. Mendelson (1992). “Why managed care cannot contain hospital costs--without rationing [see comments].” *Health Aff (Millwood)* 11(2):100-

7.

- Shannon, C. E., N. J. A. Sloane, [et al.] (1993). *Claude Elwood Shannon : collected papers*. New York, IEEE Press.
- Spencer, D. D. (1996). *Great men and women of computing*. Ormond Beach, Fla., Camelot Pub. Co.
- Spencer, D. D. (1999). *Great men and women of computing*. Ormond Beach, Fla, Camelot Pub. Co.
- TOC: John Napier -- Blaise Pascal -- Gottfried Leibni -- George Boole -- Dorr Felt -- William Burroughs -- Joseph Jacquard -- Herman Hollerith -- Vannevar Bush -- Charles Babbage -- Konrad Zuse -- George Stibitz -- Howard Aiken -- John Atanasoff -- J. Presper Eckert -- John Mauchly -- Alan Turing -- John von Neumann -- Maurice Wilkes -- Norbert Wiener -- Thomas Watson, Sr. -- William Norris -- Seymour Cray -- Steven Jobs -- Stephen Wozniak -- Augusta Byron -- Grace Hopper -- Edsger Dijkstra -- John Kemeny -- Thomas Kurtz -- Niklaus Wirth -- William Gates -- Daniel Bricklin.
- Steinmetz, C. P. (1911). *Elementary lectures on electric discharges, waves and impulses, and other transients*. McGraw-Hill.
- Stewart, I. (1948). *Organizing scientific research for war; the administrative history of the Office of Scientific Research and Development*. Boston, Little Brown.
- Stewart, I. (1980). *Organizing scientific research for war*. New York, Arno Press.
- Stong, C. L. (1960). *The Scientific American book of projects for the amateur scientist*. New York, Simon and Schuster.
- 高島寧 (1996). “インターネットにおける情報の関連性に関する考察: Vannevar Bushのmemexとの比較.” *Library and information science* [ISSN:03734447] (三田図書館学会) 36: 45-50.
- 田中久徳 (1993). “図書館情報学案内—Memexという道標.” 国立国会図書館月報 [ISSN:00279153] (国立国会図書館)(389): p.31-30.
- Thompson, S. P. (1900). *Polyphase electric currents and alternate-current motors*. New York, Spon & Chamberlain.
- Timbie, W. H. and V. Bush (1922). *Principles of electrical engineering*. New York, Wiley.
- Timbie, W. H. and V. Bush (1930). *Answers to problems in Principles of electrical engineering*. New York, J. Wiley & Sons.
- Timbie, W. H. and V. Bush (1930). *Principles of electrical engineering*. New York, London, J. Wiley & Sons Inc.; Chapman & Hall Limited.
- Timbie, W. H. and V. Bush (1940). *Principles of electrical engineering*. New York,

London, J. Wiley & Sons Inc.;Chapman & Hall Limited.

Timbie, W. H. and V. Bush (1951). *Principles of electrical engineering*. New York, Wiley.

Triggle, D. J. (1999). "Rho Chi lecture. Pharmaceutical sciences in the next millennium." *Ann Pharmacother* 33(2):241-6.

Even a cursory survey of this article suggests that the pharmaceutical sciences are being rapidly transformed under the influence of both the new technologies and sciences and the economic imperatives. Of particular importance are scientific and technological advances that may greatly accelerate the critical process of discovery. The possibility of a drug discovery process built around the principles of directed diversity, self-reproduction, evolution, and self-targeting suggests a new paradigm of lead discovery, one based quite directly on the paradigms of molecular biology. Coupled with the principles of nanotechnology, we may contemplate miniature molecular machines containing directed drug factories, circulating the body and capable of self-targeting against defective cells and pathways--the ultimate "drug delivery machine." However, science and technology are not the only factors that will transform the pharmaceutical sciences in the next century. The necessary reductions in the costs of drug discovery brought about by the rapidly increasing costs of the current drug discovery paradigms means that efforts to decrease the discovery phase and to make drug development part of drug discovery will become increasingly important. This is likely to involve increasing numbers of "alliances," as well as the creation of pharmaceutical research cells--highly mobile and entrepreneurial groups within or outside of a pharmaceutical company that are formed to carry out specific discovery processes. Some of these will be in the biotechnology industry, but an increasing number will be in universities. The linear process from basic science to applied technology that has been the Western model since Vannevar Bush's *Science: The Endless Frontier* has probably never been particularly linear and, in any event, is likely to be rapidly supplanted by models where science, scientific development, and technology are more intimately linked. The pharmaceutical sciences have always been an example of use-directed basic research, but the relationships between the pharmaceutical industry, small and large, and the universities seems likely to become increasingly developed in the next century. This may serve as a significant catalyst for the continued transformation of universities into the "knowledge factories" of the 21st century. Regardless, we may expect to see major changes in the research organizational structure in the pharmaceutical sciences even as pharmaceutical companies enjoy record prosperity. And this is in anticipation of tough times to come.

Tuve, M. A. and W. G. Whitman *Papers of Merle Antony Tuve*.

Correspondence, memoranda, speeches, articles, reports, laboratory and personal notebooks, notes, personnel records, printed material, blueprints, diagrams,

photographs, and other papers relating to Tuve's administration of government-sponsored scientific projects such as the development of the proximity fuze for the U.S. Navy during World War II.

Documents his work as director (1945-1946) of the Applied Physics Laboratory at Johns Hopkins University and as director (1946-1966) of the Dept. of Terrestrial Magnetism of the Carnegie Institution of Washington, as well as his involvement with the International Geophysical Year, National Academy of Sciences, National Radio Astronomy Observatory, Greenbank, W. Va., and a conference on theoretical physics, Washington, D.C. (1939-1940). Subjects include astronomy, composition of the upper atmosphere, cosmic ray flares, geomagnetism, high voltage, conversion of war industries to peacetime uses, magnetism, physics, nuclear physics, seismology, and the Van de Graaff generator. Includes scientific notebooks (1930-1931) of his wife, Winifred Gray Whitman, who collaborated with Tuve in analyzing the effect of high frequency resonance radiation on animals.

Correspondents include Vannevar Bush, Sir J. A. Fleming, Lawrence Hafstad, John C. Merriam, Howard Tatel, Robert Jemison Van de Graaff, Carl Van Doren, and James Lloyd Weatherwax.

URL: gopher://marvel.loc.gov/00/.ftppub/mss/msspub/fa/t/tuve.txt

United States. Congress. Senate. Committee on the Judiciary. Subcommittee on Antitrust and Monopoly. (1961). *Prepared statements made for Pharmaceutical Manufacturers Association before the Senate Antitrust and Monopoly Subcommittee*. Washington, D.C., The Association.

TOC: [1] December 7, 1961/Eugene N. Beesley...[et al.] - [2] December 8-9, 1961/Vannevar Bush ...[et al.]

United States. Congress. Senate. Committee on the Judiciary. Subcommittee on Patents Trademarks and Copyrights. (1951). *Principles of electrical engineering*. New York, Wiley.

United States. Congress. Senate. Committee on the Judiciary. Subcommittee on Patents Trademarks and Copyrights. and V. Bush (1956). *Proposals for improving the patent system: study of the Subcommittee on Patents, Trademarks, and Copyrights of the Committee on the Judiciary, United States Senate, Eighty-fourth Congress, second session, pursuant to S. Res. 167, study no. 1*. Washington, U.S. G.P.O.

United States Government Printing Office. (1997). *Science the Endless Frontier*. United States Government Printing Office, Washington D.C.

Introduces a report to the President from Vannevar Bush, Director of the Office of Scientific Research and Development. Includes a table of contents, the letter of transmittal, President Roosevelt's letter, the summary of the report itself and appendices. The War Against Disease, Science and the Public Welfare, Renewal of Our

Scientific Talent, A Problem of Scientific Reconversion, the Means to the End are a few of the main chapters of the said report.

URL: <http://snorri.chem.washington.edu/ysnarchive/articles2/VBush1945.html>

United States. Office of Scientific Research and Development. and V. Bush (1945). *Science, the endless frontier*. A report to the President. Washington, U.S. Govt. Print. Off.

United States. Office of Scientific Research and Development. and V. Bush (1960). *Science, the endless frontier: a report to the President on a program for postwar scientific research*. Washington, National Science Foundation.

United States. Office of Scientific Research and Development., V. Bush, [et al.] (1980). *Science, the endless frontier: a report to the President on a program for postwar scientific research*. [Washington], National Science Foundation.

United States. Office of Scientific Research and Development. and V. Bush (1980). *Science, the endless frontier*. New York, Arno Press.

歌田明弘. (1996). デジタル・ワールドの獣道：ヴァネヴァー・ブッシュと生命科学. 環境生活としてのコンピュータ. 久保田晃弘. 徳島, ジャストシステム. p.[57]-92.

歌田明弘. (1996). マルチメディアの巨人：ヴァネヴァー・ブッシュ・原爆・コンピュータ・UFO . 東京, 青土社.

歌田明弘 (2000). 本の未来はどうなるか：新しい記憶技術の時代へ. 東京, 中央公論新社.

Van Voorhis, W., L. De Rochemont, [et al.] (1995). *Changing attitudes 1946-1948*. Los Angeles, Calif., New Line Home Video : Nelson Entertainment.

Selected news stories from the March of time, which documents the concerns of U.S. citizens after World War II. Includes films on the political situations in Russia, France, Italy and Greece and a documentary on the development of the atomic bomb.

Von Karman, T. (1871-1963). *Papers, 1871-1963*. 175 boxes (88 linear ft.).

The collection consists of personal and family papers, and documents Von Karman's professional scientific involvement, and his role in education, national affairs, scientific organizations and industry. The papers contain a great deal of information about international co-operation in science, and about the political chaos in Europe between the two world wars. Notable correspondents include: G. I. Taylor, Enrico Fermi, Richard Courant, Vannevar Bush, and Stuart Symington.

脇英世 (2000). “バンネバー・ブッシュ：「メメックス」を発明した男.” 東洋経済(5661) :82.

Walker, G. (1992). *The Information environment : a reader*. New York ; Toronto, G.K. Hall ; Maxwell Macmillan Canada ; Maxwell Macmillan International.

- Wall, M. (1992). "From Memex to Hypertext: Vannevar Bush and the Mind's Machine." *College & research libraries* 53(5):472.
- Wardrip-Fruin, N. (1999). "Endless Frontier: Vannevar Bush, Engineer of the American Century." *Hypermedia, Eternal Life, and the Impermanence Agent* 32(5):353-358.
- Waterman, A. T. *Papers of Alan Tower Waterman*.
Correspondence, diary notes (1947-1963), speeches, articles, travel itineraries, subject file, and biographical material chiefly relating to Waterman's activities as an administrator of scientific research organizations including his years as deputy chief of the U.S. Office of Naval Research (1946-1951) and as director of the U.S. National Science Foundation (1951-1963). Includes material concerning the foundation's role in fostering U.S. participation in the International Geophysical Year and the first successful launching of an American space satellite. Also documents his teaching career as a professor of physics at Yale University (1919-1942), experience as chief reader for the College Entrance Examination Board, and association with such organizations as the American Association for the Advancement of Science, Center for Advanced Study in the Behavioral Sciences, Stanford, Calif., and the Cosmos Club, Washington, D.C. Individuals represented include Detlev W. Bronk, Vannevar Bush, K. T. Compton, James Bryant Conant, Lee A. Dubridge, George Gamow, Willard Frank Libby, Sir Bernard Lovell, Margaret Mead, J. Robert Oppenheimer, Harlow Shapley, Norbert Wiener, and Jerrold Reinach Zacharias.
- Wiesner, J. B. (1979). Vannevar Bush: March 11, 1890-June 28, 1974. [*Biographical memoirs/National Academy of Sciences*; v. 50, no. 2]; Variation: National Academy of Sciences (U.S.); Biographical memoirs; v. 50 [no. 2]. [Washington, D.C., National Academy of Sciences: p. 89-117: p., port. ; 23 cm.
- Young, C. L., Carnegie Institution of Washington., [et al.] (1965). *Guide to the papers of Vannevar Bush in the Library of Congress*. [S.l.:s.n].
- Zachary, G. P. (1992). "Vannevar Bush backs the bomb." *Bulletin of the atomic scientists* 48(10):24.
- Zachary, G. P. (1995). "Vannevar Bush." *IEEE spectrum* 32(7):64-71.
- Zachary, G. P. (1997). *Endless frontier: Vannevar Bush, engineer of the American Century*. New York, Free Press.
- Zachary, G. P. and J. Wang (1998). "Books-Endless Frontier: Vannevar Bush, Engineer of the American Century." *Physics today* 51(12):49.
- Zachary, G. P. and M. Crow (1998). "Endless Frontier: Vannevar Bush, Engineer of the American Century." *Issues in science and technology* 14(2):88-96.

Zachary, G. P. and J. M. Holl (1999). "Reviews of Books-CANADA AND THE UNITED STATES -Endless Frontier:Vannevar Bush, Engineer of the American Century." *The American historical review* 104(1):216.

Zachary, G. P. and R. Bassett (1999). "BOOK REVIEWS-Endless Frontier:Vannevar Bush, Engineer of the American Century." *Technology and culture* 40(3):685.

Zachary, G. P. (1999). *Endless frontier: Vannevar Bush, engineer of the American Century*. Cambridge, MA, MIT Press.

7. 謝 辞

最初にブッシュの名前を知ったのは丸山昭二郎氏の論攷であった。今は図書館から離れられたが、筆者には前職（南山大学図書館）での大先輩でもあり、目録理論を含めて図書館情報学に関わるご教示をたえず頂いた。氏は学生時代に仙台で物理学を志されたが、ゆえあって図書館（南山大学図書館と国立国会図書館）に奉職され、後年鶴見大学で後進の指導にあられた。また筆者が南山大学勤務以来私淑していると同様の野家啓一氏（東北大学文学部哲学科）からは科学哲学、科学論、科学史に関わる優れた著書でご指導頂いている。このささやかな書誌的エッセイと書誌を、お二人の学恩に捧げたい。

注

[1] キャタロガーと書いたが、厳密にはcataloging consultantである。ALA認定のMLS（Master of Library Science）を持ち、専攻主題の修士号を持たない限り、すなわちdouble master以上の学位を持たない限り、専門職としてキャタロガーは名のれない。更に目録作業経験のない人は決して目録作業端末で作業することはできない。幸い私には十数年に及ぶ目録作業歴と英米目録規則を通じての旨の英文履歴書を送付し、インターンシップの身分で赴任したので、赴任日から端末操作を認められた。