

The post-WW2 Strategy of the Rockefeller Foundation in Molecular Biology and Genetics

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International Conference on "Medical Genetics & Eugenics in its International Context, 1910-1960"

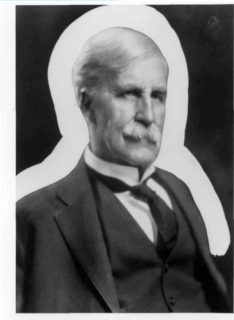
University of Giessen
(Organizers: V. Roelcke & A. Cottebrune)
June 28-30, 2007

Introduction

- v The purpose of this presentation is to explore changes in RF's funding strategies **after WW2**, (1945-60) and assess their impact upon molecular biology and genetics.
- v This task may be contrasted with work on RF & science in the **inter-war period**, which will soon mark its **silver anniversary**. (Abir-Am, *Soc. Stud. Sci.* **Aug 1982**)

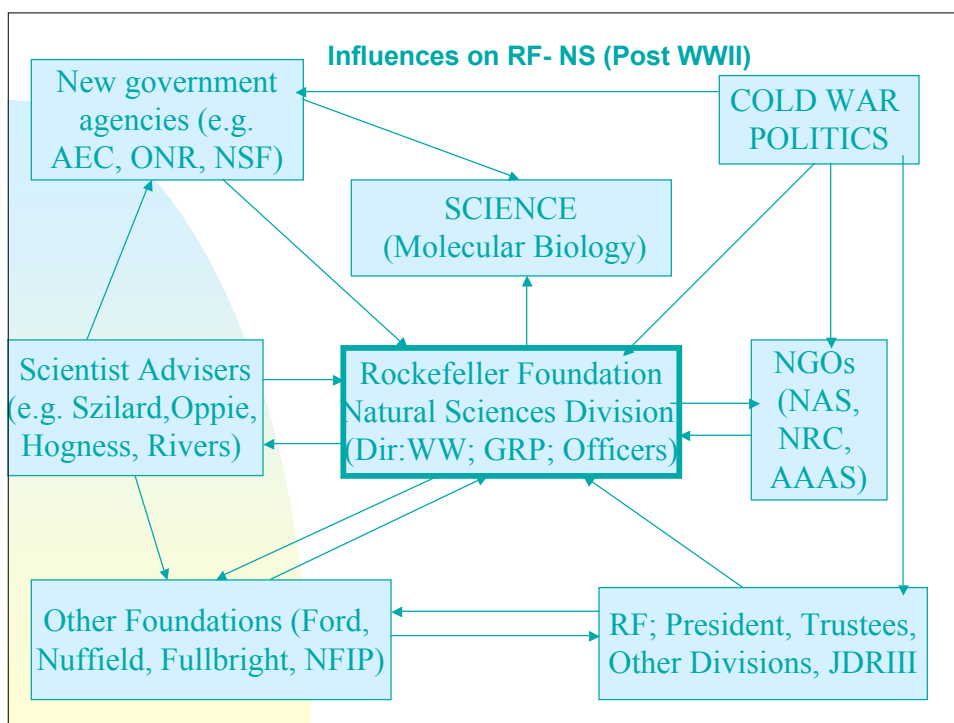
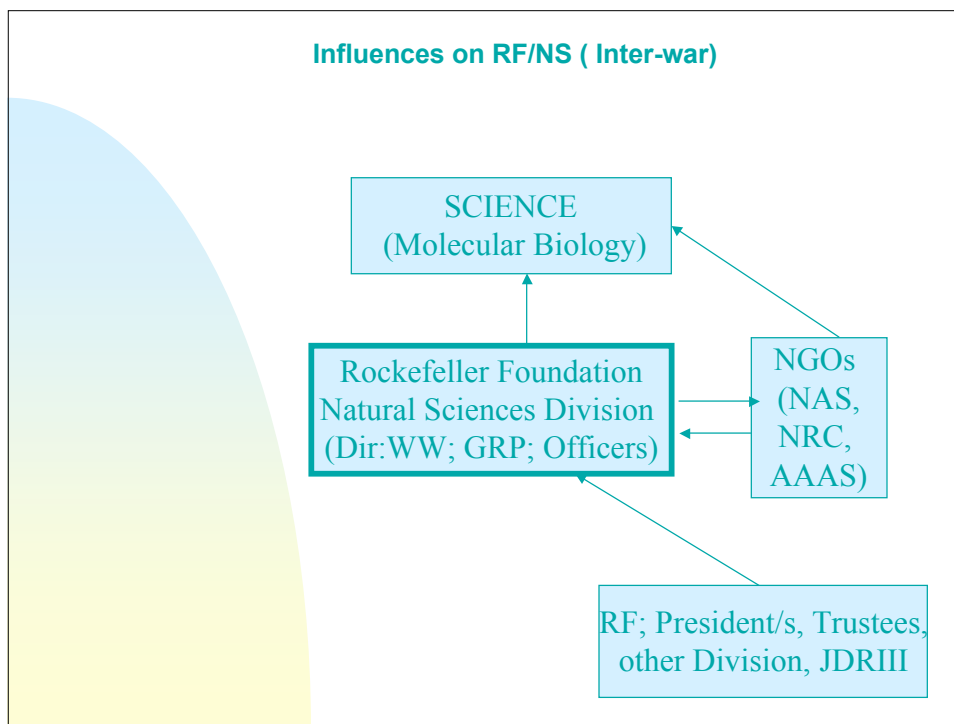
JDR-Sr & Jr & early advisers

F. Gates & W. Rose (1910s-20s)



Topics of Discussion

- ▼ RF's policy in the inter-war period; how funding may impact science?
- ▼ The context of science funding after WW2: **many new players** (agencies, new foundations, NGOs; Cold War geopolitics).
- ▼ Did molecular biology & genetics benefit from post-WW2 RF funding? Some **key case-studies**.



RF policy's special & enabling features in the inter-war period; (I-IV)

- ✓ Transdisciplinary (physico-chemical biology) to remedy the flaws of rigid academic boundaries;
- ✓ Transnational research (EU & US) to remedy geopolitical isolationism;
- ✓ Diversity of funding mechanisms: large/ small, long/ short term, sole/ joint, HRD/ equipment; exceptions;
- ✓ Rare infrastructure investments;

RF policy's special & enabling features in the inter-war era (V-IX)

- ✓ Liberal definition of eligibility for grantees; (i.e. no restriction by politics, religion, race)
- ✓ No solicitation; (favored established figures)
- ✓ Institutional mediation (so as to avoid charges of interference; quest of approval from highest univ. authorities meant no support for radical scientists or Independent Scholars);
- ✓ Latitude; (exceptions to RF-NS designated programs allowed by RF President, for reasons of general RF interest or intnt. rels)
- ✓ Collaborative financing; (eg w MRC & Nuffield F in UK; with Rothschild F in France)

RF policy's major constraints (X-XII)

- v Obsession with its grantees' institutional standing tended to favor power brokers, thus increasing hierarchy in science; (e.g. DNA at KCL)
- v Risk aversion, due to officer-trustee tension, often led to "chicken feed" that could not have a structural impact;
- v Excessive use of advisers exposed innovative scientists to neg. evaluations.

RF policy's constraints; XIII - Technological definition of biological progress

- v Narrow technological definition of scientific progress made biology captive of physico-chemical instrumentation, thus reducing interest in theoretical problems; e.g. major RF grantee HJ Muller complained ('49) that since RF's grants are given for radiation genetics, he (& others) cannot study the evolutionary ramifications of genetics.

I-a: RF's changing strategy in the 1930s versus the 1920s

- v RF in the 1920s: "making the peaks higher";
- v RF in the 1930s: "networking the secret of life" (key projects in UK, US, Sweden, Denmark, Fr):
 - Carlsberg Laboratories/Copenhagen;
 - Uppsala University/ Phys-Chem/Svedberg;
 - Institut de Biologie Phys-chimique/ Paris;
 - Cambridge University/ Biochemistry/ JN et al;
 - Leeds University/ Biophysics/ Astbury;
 - Muller/ **Genetics**/Edinb, Amherst, Indiana U.

The Rockefeller F.'s "ecology" after WW2: New institutions & geopolitics

- v Physico-chemical Techniques in Biology; (A)
- v Scientist advisers & leaders; (B)
- v Federal government esp. new agencies; (C)
- v NGOs (non-governmental agencies); (D)
- v New & old private foundations; (E)
- v Rockefeller Foundation's officers; (F)
- v New geopolitics: Cold War; new areas of interest/Latin America, Indonesia; (G)

RF, NGOs, & the Public Understanding of “biologist” vs “physicist”

- AAAS Executive Cmte. concerned about their rels. with AIBS; AIBS would like to raise “biologist” to the same level of public understanding and appreciation as “physicist”, especially since the last war. (WW diary, 12-27-1950) [biology in the shadow of physics after WW2]

Scientific Areas of Emphasis;(A) Physico-Chemical Techniques in Biology

- Instrumentation; (e.g. electron microscope, analytical ultracentrifuge, X-ray dif.)
- Molecular Biology; (protein structure)
- Radiobiology; radiochemistry;
- Biochemistry & biophysics;
- Structural chemistry;
- Biology & biological engineering;
- Genetics. (radiation-classical, biochemical, bacterial, phage, human)



Scientific Advisers to Fed. Govt.; leaders of sci. com; (B)

- ✓ WW2 scientific advisers to key Generals (Arnold, MacArthur, Mountbatten), to Air Force, to Navy;
- ✓ Leaders of the Manhattan Project;
- ✓ Chmns of Dept./major universities;
- ✓ Chmns of Key Sci. Organizations;
- ✓ Nobel Laureates;
- ✓ Foreign science policy makers.



New Agencies in the Federal Government (Table C)

- ✓ ONR=Office of Naval Research;
- ✓ OAR=Office of Air Research;
- ✓ AEC=Atomic Energy Commission;
- ✓ NSF=National Science Foundation;
- ✓ National Laboratories; (Oak Ridge, Brookhaven, Los Alamos, Fermilab)
- ✓ Foreign govt. agencies; (CNRS in France; MRC in UK)



Non-govt. organizations (NGOs) (Table D)

- ∨ AAAS; (Am.Assoc.Adv. Sci.)
- ∨ Am.Federation of Atomic Scientists
- ∨ NAS; (National Academy of Sci.)
- ∨ NRC; (National Research Council)
- ∨ Am.Acad.(Am.Academy,Arts&Sci)
- ∨ Am. Assoc. Scientific Workers;
- ∨ US-SU Scientific Society.



New (& Old) Philanthropic Foundations (Table E)

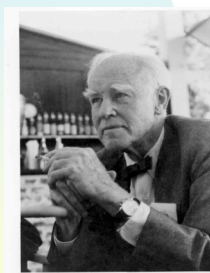
- ∨ Carnegie (WDC&CSHL)
- ∨ Ford;
- ∨ Fullbright;
- ∨ NFIP;
- ∨ Nuffield; (UK)
- ∨ Research Corp.
- ∨ Vanderbilt.

Rockefeller Foundation's staff (Table F)

- v Division Directors (NS,MS&E,SS,HS)
- v Other officers (assoc & assist dir; field officers stationed outside the US)
- v Presidents (Max Mason, 28-36; scientist; Raymond Fosdick,36-48; Chester Barnard, 48-52; Dean Rusk, 52-61)
- v Trustees.
- v John D. Rockefeller III (Chmn, BT)

RF Directors of Medical & Natural Sciences Divisions:

Alan Gregg (1930-51), (left) Warren Weaver (1932-53), (right) Gerald Pomerat (1945-1960) (middle w WW, 1948)





The Rockefeller Foundation's Nat.Sci. Div. 'new' strategy, 1945-60

- ▾ Gradual shift from science to agriculture in developing countries, e.g. Mexico, S. America, India, Indonesia
- ▾ Change toward long term (5-7y) and larger grants; (\$1-2 millions)
- ▾ Obsession with non-govt. niches;
- ▾ Enhanced desire to cooperate with other foundations and agencies;
- ▾ Inertia toward previous grantees.



MS Program- Areas of Emphasis (*Trustee Bulletin*, 1950)

- ▾ Psychiatry and Neurology;
(Neurophysiol./pathol./ psychology)
- ▾ Preventive Medicine & Public Health
- ▾ Endocrinology;
- ▾ **Human Heredity/ Medical Genetics**
(NRC Cmte on Research in Problems of Sex, mainly reproduction)
- ▾ Medical Education



NS Program – Areas of Emphasis -*Trustee Bulletin*, 1950

- ✓ Biology; (incl. Cytology, ecology, embryology, genetics, histology, microbiology, molecular biology)
- ✓ Chemistry & Biology; (biochemistry bio-organic chemistry, phys.chem.)
- ✓ Physics & Biology (radiation biology, biophysical instrumentation)
- ✓ Mathematics & Biology (mathematical biophys.; statistics)



NS Program - Subjects of Present Special Interest/ 1950

- ✓ Biochemical Genetics;
- ✓ Enzyme Chemistry;
- ✓ Cytochemistry;
- ✓ **Protein Structure**;
- ✓ Microbiology;
- ✓ Human Ecology. (Population problems, biochemistry of nutrition, conservation, agriculture/ in Mexico, Colombia)

Social Science Program –*Trustee Bulletin*, 1950

Areas of Emphasis:

- International Relations;
 - Healthy Society in the United States;
 - Social & Personal Problems of Old Age
- Organization and Administration.

NS Division, *Trust. Bull.* 1950 Concluding Remarks by WW

- v “Thus, today’s biologists state the matter in terms almost identical with those which were used in first presenting the Natural Sciences Program to the Trustees eighteen years ago” [self-ref. to Weaver’s “Program & Policy”, April 1933, as in no need of major change; see critical analysis in Abir-Am’s “...RF’s ‘new policy’ in molecular biology in the 1930s”, *Social Studies of Science*, August 1982.

Examples of post-WW2 projects: **Positive effects of RF's strategy**

- v Leo Szilard: travel grant for an informal seminar on phage genetics, every 6 weeks, to be shared by U. Chicago (Wright), WU-St. Louis (Hershey), Indiana U. (Luria, Muller) et al. [transdisciplinary, regional collaboration; mid-west] (6/27/1949; WW diary, RAC)

Negative effects of RF's strategy: Muller at Indiana U.

- v ...”These grants (RF, ACS, PH, NCC) tend to force him [Muller] to work on the UV and more penetrating radiation – mutation problem. [But] He really wants to study more deeply the nature of mutations, and more broadly the application of all this mutation theory to evolutionary theory, speciation and the analysis of human populations.” (WW Diary, 11-27-1950, RAC)

RF and radiobiology as microbiology

- v Hogness/ Chmn. of Biology Dept. at U. Chicago reveals to RF that the **institute of radio-biology is in fact a program in microbiology**. (WWD-2/27/1951, RAC)
- v Bacterial genetics at University of Wisconsin-Madison; (Lederbergs)
- v Biochemical genetics at Caltech (Beadle) & Stanford (Tatum)

RF, Govt. & Biochemistry, incl. DNA at Columbia

- v [Chmn] Clarke ...to discuss a blanket grant for the entire dept. for 5y, which is exactly the remaining time before retirement. WW says that it will be flexible but also modest because men of the caliber of Chargaff, Rittenberg, Shemin, & others are able to get grants from government sources. (WWD,3/21/52)



RF & the transition from classical to biochemical genetics

- After WWII, Plough, (Amherst) a classical geneticist decided to take up a new line of work in bacterial genetics and in biochemical genetics. RF provides 7K out of 63K, which includes money from AEC, “since [Plough] in a general sense is doing “radiation biology”. (WW diary, 1-12-1951, RAC)



RF & the transition from classical to human genetics

- L. Dunn & T. Dobzhansky (Columbia U) received funds from Ford F. for an institute of Human Biology
- D&D indicate how their current work in mouse and fruit fly genetics can be applied to Human Genetics.
- They seek 50-100K for equipment, fellowships, & money for “bread & butter”. (WW diary, 2/7/51, RAC)

Dunn's progress report on new project in Human Genetics at Columbia (WW Diary, 2/7/1951)

- ✓ Monthly Seminar;
- ✓ Graduate Students in Human Evolution; (Blood groups in India; twin somatotypes ;anthropology & serological genetics)
- ✓ Plan submitted to Univ. Cmte & funds allocated (50K) from Ford F grant to CU;
- ✓ WW: Does item (req for matching funds) belong to NS or to RF's "broad interest in human ecology"?... a project in 'sub-human genetics' [Dunn's mice & Dobz's flies] motivated by an interest in human genetics.

RF & Human Genetics at Columbia (Dobzhansky)

- ✓ **..."Having been very skeptical about such work for many years and critical of it, Dobzhansky has now gone over whole heartedly to certain aspects of human genetics and is in fact taking primary responsibility for the development of that side... (WWD, 5/7/1953, RAC)**

Dobzhansky's (1900-75) shifting views of Human Genetics, 1940s-70s; (Diane Paul, 1994, 220, 224)

- ▼ "TD believed that human variation in ... every trait was genetically influenced".
- ▼ *Heredity, Race & Society*, (1946) w Dunn;
- ▼ *Heredity & the Nature of Man*; ('64)
- ▼ *Genetic Diversity & Human Equality*; ('73)
- ▼ TD - influential critic of Muller's *Our Load of Mutations* ('49) notion of genetic deterioration of the human species.
- ▼ The social context of behavior genetics changed in the politically charged 1970s.

Dunn's (1893-1974) short lived impact on Human Genetics

- ▼ Early interest in hum.gnt & anthropology: ...*Results of Race Mixture in Hawaii*; (23)
- ▼ Dunn attempted to organize an Institute for the Study of Human Variation... The idea won the enthusiastic support of some of his colleagues, but met with antagonism from others... The opportunity to do research on human materials came simply too late in his scientific and personal life. [early 1950s] The Institute was closed after some 6 years. (TD, 1978, 85)

RF & Human Genetics at Columbia (Dunn & Dobz)

- “Dunn on the other hand is concerning himself primarily with the serological aspects of human genetics variation... Under these 3 aspects of human genetics, Dunn emphasizes, continues to exist a rather broad base of their animal work, Dunn’s in mammalian genetics and Dobz in fruit fly genetics.” ... They compare statistically techniques of serological genetics and physical anthropology in classifying human populations. (5/7/53)

On Relationships between Air Force & Navy (11-23-1949)

- Philip Frank (Am Acad./ Unity of Science grantee of RF to WW):” ...The Air College in the South... they were very much concerned to train the top future air officers...to have more tolerance; F asked if they meant tolerance toward the Negroes. The officer laughed and replied that he meant tolerance toward the Navy.



To have or not have a policy? Views of RF Trustee & Officer

- “In the early days of the Rockefeller Foundation there was an imaginative and vigorous Trustee who used to say, “Our policy should be to have no policy”... there are times...when no policy is in fact the best policy...a large foundation is far more in the public eye [than a small foundation] (WW, 1962, 1)



The challenge of evaluating grantees, advisors, opportunities - a philanthropoid's view (WW, 1962)

- “A really good philanthropoid is an expert advisor on advisors”. Any foundation which relies on uncorrected advice is asking for ...trouble...(WW, 1962, 2)
- “Large foundations, in fact, are sometimes too timid...It ... takes very little to frighten a large foundation; (ibid, 3)
- Philanthropoids...need not be the world's most eminent scholars...but they must stay intellectually alert. How else could they... sense opportunities? (ibid, 4)

Conclusions

- ✓ After WW2, RF was petrified by the large scale of govt. support of science, (even though NSF did not start until 1950) stuck to its inter-war strategy, & adapted slowly to the post-WW2 new “ecology”.
- ✓ RF phased out support for science (for agriculture in the Developing World in 1953), just as biology took a new turn;
- ✓ RF lost its edge; its slow withdrawal (1945-60) was to benefit some grandee grantees, often by default, while missing the boat in other cases; (fiascoes at CU-MB, CIT, KCL, LU-B, BPI, RI-L)
- ✓ RF had limited impact on human genetics.

Conclusions on HG

- ✓ RF's impact on human genetics appears to have been and remained limited for several reasons:
- ✓ Topic overlapped with Medical Division and hence NS avoided it;
- ✓ Geneticists were lured by RF into radiation research at the expense of human, theoretical, develop. Genetics;
- ✓ Columbia (or other) group was “too late” in tapping RF in the 1950s.



Secondary Sources on RF's impact on science (more items in Abir-Am 2002)

- ∨ Abir-Am 2002, 2001, 2000, 1995, 1993, 1988, 1984, 1982;
- ∨ Gemelli 1999, 2000, 2001, 2003;
- ∨ Schneider 2003; (ed.) 2002;
- ∨ Stapleton 1999, 2003; ed. 2004;
- ∨ Tournes 2006;
- ∨ Weaver 1960, 1962;
- ∨ Weindling 2000, 2003;



Real Life

- ∨ Give an example or real life anecdote
- ∨ Sympathize with the audience's situation if appropriate



What This Means

- ▼ Add a strong statement that summarizes how you feel or think about this topic
- ▼ Summarize key points you want your audience to remember



Next Steps

- ▼ Summarize any actions required of your audience
- ▼ Summarize any follow up action items required of you