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NS Program

by

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TO: Chester I. Barnard
FROM: Warren Weaver
SUBJECT: NS Program

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I. Introduction

In 1925 Mr. Rockefeller, Jr., wrote to Mr. Raymond B. Fosdick, "We get so used to following a particular line of activity that the routine and machinery by which it is accomplished takes on a certain sanctity..."

In that same year the Trustees passed a resolution which said:

"RESOLVED, that the officers be requested to keep in mind the importance of constant vigilance in the appraisal of work already in progress, in withdrawal from projects as soon as these are in a position to develop independently, in the termination of administrative units, whether Boards or Divisions, when conditions justify, and in the consideration of new opportunities whether these are closely related to present activities or extend into other fields."

There are reasons why the officers and Trustees of the RF should be specially careful about examining our own procedures. Unlike academic institutions, the decisions of the RF are scrutinized by no faculty, no alumni, no students, and no parents; and even the world of scholarship, being actual or potential recipients of aid from us, is likely to be a little reticent about negative criticism. Unlike business corporations, we have no stockholders, no large group of employees, no tangible balance sheet of profit or loss. Unlike governmental agencies, we are directly accountable to no congressmen, senators, or budget bureau. The power of the RF is, in fact, an almost uniquely free and flexible one.

To misuse this flexibility by showing an impatient tendency to change program frequently would be to sacrifice all the significant rewards which result only from sustained and assured effort. But to disregard the potential mobility of the RF would be to allow, through laziness, inertia, self-interest, or lack of imagination, a stagnation into an unworthy course of action.

II. The Support of Experimental Biology in the United States

The Natural Sciences division of the RF has, for nearly twenty years now, been concentrating on the various fields of experimental biology.* The RF can take some satisfaction in the fact that our emphasis on the life sciences was timely, starting a dozen years before nuclear fission and the atomic bomb made vivid and general the recognition of the gap between man's understanding and control of physical forces, and his understanding and control of animate nature. Also we can be pleased by, but certainly not take credit for, the great advances that have occurred in experimental biology over the last twenty years.

There have in fact been great scientific advances all over the world in the life sciences. In addition, it is true that in the United States there has occurred a great change in the support available for biological research.

Referring only to "external" funds granted by organizations similar to the RF, and thus completely neglecting the basic support provided by universities and research organizations ** from their own funds, the major sources of support in this area at the present time appear to be those shown in the following table.

* For specific description of the topics covered, see the one-page description of NS program as given at the beginning of each docket, or the ten-page description included in the March, 1950, Trustees' Confidential Bulletin, or the two-page classification scheme used by NS.

** There has, for example, been a great expansion of relevant support by pharmaceutical and similar firms.

TABLE I

Presently Available Support for Experimental Biology
in the United States

Granting Organization	Funds Annually Available in the U. S. for Research in the Broad Area of Modern Experimental Biology (amounts are stated in millions)
United States Public Health Service	\$ 13.7
National Science Foundation	4.0
Office of Naval Research	1.8
The Rockefeller Foundation	1.2 (U.S. only- 5 year average)
American Cancer Society*	1.0
Office of Air Research	0.7
Atomic Energy Commission*	0.5
Polio Foundation*	0.5
Nutrition Foundation	0.2
Commonwealth Fund	0.1
Donner Foundation	0.1
American Heart Association*	0.2
Research Corporation	0.05
	\$ 24.05

This table is admittedly rough. It is difficult, if not impossible, to distinguish accurately between the more basic and the more applied aspects of the work of various agencies. The sum stated for the National Science Foundation represents a hope and expectation, rather than an established fact. And there are undoubtedly many minor additions to the list - although in total these numerous small items probably would not add as much as a million dollars.

* These organizations spend, of course, much larger sums on clinical and applied aspects. The amounts listed here refer only to basic research in biology.

In spite of these inaccuracies, the over-all situation is pretty clear. At least twenty-five millions of dollars are available in the U.S. annually as grants by external organizations to universities, colleges, and other institutions for research in modern experimental biology. In 1932 or 1933, when the NS program in experimental biology began, the organizations listed in Table I were not operative in this field with the exception of the RF and the Commonwealth Fund. In other words, we started out the experimental biology program nearly twenty years ago as overwhelmingly the major source of such support. At the present time we are contributing less than 6% of the total.

It cannot be said that all of the support listed in the above table is given under terms which are as free and effective as those which characterize RF support. Nevertheless a great deal of this money is well given, and on the whole the situation is improving.

III. Geographical Distribution and General Character of NS Aid

Since World War II, the geographical distribution of NS aid has been approximately as follows:

TABLE II

Geographical Distribution of NS Aid Since World War II

<u>Region</u>	<u>Approximate Annual NS Aid</u>	<u>Percent</u>
United States	\$1,150,000	58%
Europe	400,000	20
Latin America	400,000	20
Elsewhere	<u>50,000</u>	<u>2</u>
Approximate Annual Total	\$2,000,000	100%

Certain further details will be given later, but it is useful to note now that NS activities in the U.S., Europe, and "Elsewhere" follow the standard pattern of NS program: that is to say, about 80% Experimental Biology, about 10% General Support of Science, and about 10% Special Projects (exceptions). In Latin America, on the other hand, the division over the last five years has been about: 70% Agriculture*, 20% Experimental Biology, 10% Physical Sciences.

IV. NS Grants Within the United States

In view of the fact that we have been spending nearly 60% of our NS funds within the U.S., and in view of the present existence of large support for experimental biology from U.S. sources other than the RF, it seems important to review the character of our U.S. activities to see to what extent they are justified under present circumstances.

Since World War II, the average annual total of about \$1,150,000 of NS support in the United States has been allocated as indicated in Table III. Under each heading a few illustrative examples are cited to make the heading more clear.

* This does not include any expenditures for operations in agriculture, but only grants of an agricultural character.

TABLE III

Character of NS Aid in the U.S. Since World War II

Type of Aid		Approximate Annual Amount	Percent
A) <u>General Support of Science</u>			
NRC Fellowships	\$100,000		
NRC General	<u>50,000</u>	\$ 150,000	13%
B) <u>General Support of Biology</u>			
RF Fellowships and Grants in Aid	100,000		
Woods Hole, Biological Abstracts, Amer. Inst. of Biol. Sciences, etc.	<u>60,000</u>	160,000	14
C) <u>Support of Groups of Biol. Researchers</u>			
Developmental Grants			
Amherst, Genetics at Columbia, Virus Research at California, Enzyme Inst. at Wisconsin, Electron Microscope at Cornell, etc.	70,000		
Non-Developmental Grants			
C.I.T., M.I.T., Indiana Genetics, Texas Genetics, Yale Botany, Jackson Memorial Lab., Stanford Biology, etc.	<u>270,000</u>	340,000	30
D) <u>Support of Men and Projects</u>			
van Niel, Neurath, Cori, Lipmann, Heidelberger, Fruton, etc.		300,000	26
E) <u>Exceptions</u>			
200" Telescope, Statistics, Iceland Inst. of Experimental Pathology, Meteorology, Philosophy of Science		200,000	17
		<hr/>	<hr/>
		\$1,150,000	100%

In explanation of this table four remarks are in order.

First, the figure stated for NRC Fellowships includes both the regular NRC fellowships (at about \$60,000 a year), and the special postwar predoctoral fellowships.

Second, in listing the aid to groups of biological workers, a somewhat artificial distinction is made between grants of a developmental character, often made to help launch a new enterprise or to develop the departmental strength in biology, and other grants to well-established and presumably stabilized groups. This distinction is made here because the former grants sometimes involve a larger element of risk, and would be less likely to be made by some other institutions.

Third, it is impossibly difficult to separate the support of men from the support of projects, because it has been our policy not to support projects unless the leadership was outstanding.

Fourth, the annual level for "exceptions" is high during this period, because of the abnormally large special grants (\$550,000) to finish the 200-inch telescope.

V. The Future of NS Grants Within the U.S.

In the light of existing circumstances of support within the U.S., and in the light of the large, pressing, and significant opportunities elsewhere, it seems sensible to modify substantially the pattern of support set forth in Table III.

* The general principles which should guide this change seem to me to be:

- i) We should discontinue support of activities which have successfully been carried through the pioneering stage by us, and which now are receiving adequate support from other sources.

- ii) There is no sense in competing with other agencies for the privilege of supporting men or projects unless there is some important reason why support from us is materially better than support from other sources.
- iii) In spite of improvement in the conditions of support from other agencies, it continues to be important to have at least potentially available the free, stable, and flexible kind of support for science which is furnished by the RF.
- iv) There are certain types of desirable and important ventures which would have a hard time to get support, even in the presence of large sums for other purposes; and we should continue to handle such items. Perhaps the most important of these opportunities will be of a more venturesome and imaginative character, may require particular flexibility or promptness in handling, and may involve totals and terms of years which are not available to other organizations.

These principles, it seems to me, indicate that we ought to reduce considerably certain of the categories of U.S. support shown in Table III. The pressure to carry out such reductions is increased by three other convictions. First, our European NS activities are, in my judgment, being exceedingly competently handled by Dr. Pomerat, and the opportunities and needs there are so great that I would urge a modest increase to our annual appropriations there - say an increase from the present annual level of \$400,000 up to \$500,000-\$600,000. Second, we have almost unlimited possibilities for the development of science in Latin America, a great deal of this opportunity involving grants in the agricultural sciences. Third, there are great opportunities for the RF in the expansion of its operating program in agriculture.

In particular, I would recommend that we discontinue support of NRC fellowships in the natural sciences*, and that we also discontinue any program of U.S. fellowships administered directly by ourselves. After

* Through joint recommendation of DMPH and NS, a final grant for RF support of NRC fellowships is to be recommended to the Trustees at their meeting on September 28, 1951.

having retired from the field in an orderly and constructive way (see next section), I would propose to discontinue support of all of the ordinary type of "projects" in experimental biology in the U.S., reserving our support for those exceptional types of ventures which are broadly indicated by Principle iv above. In total I estimate that we should at an early stage reduce expenditures within the U.S. by approximately \$500,000. I am not at all sure but that, after a few years of experience, we will wish to reduce these Table III expenditures in the U.S. by a further amount of \$100,000-\$250,000.

I have here referred to reducing "Table III expenditures in the U.S.," because I think that some of this money (probably not much) should continue to be expended in the U.S. but for purposes not listed in Table III and not now in the NS program at all - namely, for fundamental research in agriculture in the U.S.

VI. Transition: The Responsibilities and Opportunities of Existing Program

If we are to discontinue the existing and recognized support of experimental biology in the United States, and operate here on a much reduced and frankly opportunistic and exceptional basis, then it is necessary to consider the problems, and the opportunities, involved in discontinuing this existing support.

The various items of existing NS program in the United States fall, from this point of view, into five categories.

First, there are at present under active study several proposals which should not be dropped, both because they are at a fairly advanced stage of discussion, and because they fall under the "Principle iv" type, discussed on Page 8, which we would propose to continue to handle in the

U.S. These are not listed here as to amounts of money, because such projects have no relevance to the problem of transition financing. The proposals of this memo by no means wipe out U.S. money in experimental biology. It is only proposed that this be reduced from something over one million annually to something like half that sum. And projects in this first category would be financed out of the remainder.

Second, there are a considerable number of existing grants, such as exceptions to program and grants explicitly of a "one-shot" character, if the program is to be changed, which raise no questions relative either to obligation or opportunity.

Third, there are a number of current grants which can perfectly decently be dropped at their presently established termination, simply by giving a warning that there is no hope of renewal. This remark applies to about forty current or recent grants.

Fourth, there are some instances of grants which should be terminated by giving one further final grant. The principal ones of these appear to be:

<u>Investigator</u>	<u>Institution</u>	<u>Approximate Final Grant</u>
Blakeslee	Smith College	\$ 25,000
Cori	Washington Univ.	50,000
Dunham	Univ. of Rochester	75,000
Fruton	Yale	85,000
Hamburger	Washington Univ.	50,000
Harker	Brooklyn Polytechnic	200,000
Lipmann	Harvard	50,000
Neurath	Univ. of Washington	100,000
Stanley	Univ. of California	<u>100,000</u>
		\$735,000

Finally, and most importantly, there are a few specially important situations which have been developed under a considerable amount of NS aid, and which are of such outstanding quality that it would seem both proper and

desirable to make to each of them a definitive final grant of a size which would recognize the magnitude of our past interest, and which would play some significant role in stabilizing the gains we have helped to win. The outstanding cases here are:

<u>Field</u>	<u>Institution</u>	<u>Proposed Grant</u>
Biology and Chemistry	CIT	\$1,000,000 to \$2,000,000
Biology	MIT	\$500,000
Biology, Biochemistry, and Microbiology	Stanford	300,000
Biochemistry and Genetics	Wisconsin	200,000
Genetics	Indiana	250,000
Genetics	Texas	150,000
Genetics	Columbia	200,000
		<hr/>
		\$2,600,000 to \$3,600,000

See chart
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Thus if we are to withdraw, as I am recommending, from the regular support of experimental biology projects in the United States, it would require in all upwards of \$4,000,000 to close this activity out in a way which is orderly and constructive, and which would consolidate some of the major gains.

This tapering out does not have to be done in one year, but it would be more clean cut and would save a lot of administrative time if it were.

If the present United States experimental biology program were to be reduced by \$500,000 or eventually more, this reduction should occur in steps for one to three years, for the alternative use of this money would build up gradually over a similar period.

VII. New Program

I do not want to prejudice my comments on new program by any phraseology which implies the character of the future administrative

mechanism for handling operational work in agriculture. Quite independent of what the administrative set-up is, it is my conviction (present NS program in Europe being not only maintained but modestly expanded) that present NS program in the United States should be reduced; that the fellowship and grant activity in Latin America should be considerably expanded; and that any remaining sum should be devoted to operational agriculture, along with other moneys to be described presently.

Thus after one to three years' taper into the new and out of the old, I would hope the distribution, in contrast with that shown in Table II, would be approximately:

TABLE IV

Proposed Distribution of NS Budget

One to Three Years From Now**

<u>Country or Subject</u>	<u>Amount</u>	<u>Percent</u>
United States	\$ 500,000	23%
Europe	500,000	23
Latin America	700,000	31
Operating Agriculture**	<u>500,000</u>	<u>23</u>
	\$ 2,200,000	100%

* This Table assumes a continuation of the present NS budget figure of 2.2 millions.

** Although the Table ostensibly reads that way, I am not assuming that this sum will necessarily be administered by NS.

VIII. The Financing of a Program in Agricultural Operation

You have recently been given a report which urges that the RF recognize an operating program in agriculture throughout Latin America, using the Mexican project as a main base of activity and the center for the expansion; and that we also recognize an opportunistic interest in agricultural operations and projects in other parts of the world.

That report was written by persons who have special interest in agriculture, and who are earnestly convinced, as I certainly am, that the RF has a great opportunity in this area. It is only natural that that report vigorously presented the case for enlargement of RF interest in agriculture. But there surely was no intention to say, or to imply, that food presents the one single global problem whose solution would cure all the ills of the world. On the contrary, we all know by now that there is a set of basic problems which are intimately interlocked.

If one is thinking chiefly about the physical aspects of life*, then health, food, and population perhaps constitute the present minimum list of items which must receive joint attention. Complete concentration on any one of these would not only be foolish, it might well be dangerous.

Thus what is needed is not at all a dumping of any older interests and the exclusive glorification of some new one. What is needed is merely a readjustment of emphasis into better correspondence with our present knowledge of the interrelated nature of human needs.

* This is not the occasion for discussing the point, but as the director for science (and hence perhaps suspect in this regard) I want at least to record my personal conviction that the physical aspects of life are not, in the long run, the most significant. The relation of agriculture to philosophy, aesthetics, etc. seems to me really pretty simple. If a man is dead of starvation, then the problem of his living a good and beautiful life on this planet has collapsed. If he is starving, then it is certainly difficult (but not impossible) for him to live a good and beautiful life. Unfortunately it does not follow that well-fed persons necessarily live good and beautiful lives. But I think it does follow that a society of poorly-fed individuals is most seriously and fundamentally handicapped.

The distribution of emphasis that has obtained up to now is perhaps of some interest and relevance. Lumping together The Rockefeller Foundation (from its founding in 1913 to the present), the General Education Board (from its founding in 1902 to the present), The Rockefeller Foundation Sanitary Commission (1909 - 1914), the Laura Spelman Rockefeller Memorial (1918 - 1928), and the International Education Board (1923 - 1938), the total of grants to the end of 1950 was very close to 820 million (actually \$819,941,290.37). The following table shows the distribution of this total:

TABLE V

Distribution By Fields of Total Grants
of GEB, RF Sanitary Commission, RF, LSRM, and IEB
from their dates of founding to December 31, 1950

<u>Field</u>	<u>Grants in Millions</u>	<u>Percent</u>
Agriculture	9.7	1.2 %
Humanities	38.5	4.7
Natural Science	66.3	8.1
Social Science	117.1	14.2
Administration*	259.6	31.8
Public Health and Medicine	328.6	40.0

* Including a considerable amount of general and otherwise unclassified grants.

IX. Recommendations

What I suggest is this:

That NS contribute from its present budget approximately 0.5 million annually toward the support of operating activities in agriculture.

That this amount, plus the approximately \$350,000 now coming annually from general funds for operations in agriculture, be supplemented by approximately \$650,000 of new money so as to furnish an annual budget for operation in agriculture of approximately 1.5 million annually.

This recommendation would provide a budget for operations in agriculture which, I am convinced, would finance a really significant program in this area. The recommendation involves a substantial reduction in the present level of appropriations for experimental biology in the U.S.; and does not make explicit provision for expansion of grants in agriculture. To some extent this expansion can also come out of the regular NS budget; and it will doubtless be desirable, at least over the next five years or so, to take some of the 1.5 million primarily intended for operations and use this money for grants which pave the way for future operations.

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