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The Rockefeller Foundation

The Program of the Division of  
Natural Sciences and Agriculture

by

Warren Weaver

July 19, 1953

Revised August 27, 1953

INTER-OFFICE CORRESPONDENCE

FROM: WW

DATE: November 16, 1953

TO:

DR		KR
HMM	5/1/53	HMM
WW	CCF 5/1/53	MS

COMMENTS:

*muito obrigado.*

SUBJECT: Description of NSA Program

On July 19, 1953, with a revision on August 27, 1953, I furnished you with a draft of a description of the program of the Division of Natural Sciences and Agriculture. There is one aspect of this statement which I think is inaccurate and incomplete, and therefore unsatisfactory.

As George Gray's excellent article in the November Confidential Monthly Report so well indicates, the situation in Latin America does not lend itself sensibly to a strict and rigidly applied definition of program. Page 5 of Mr. Gray's article, particularly as amplified and illuminated by the opening paragraph on page 1 of his article, well describes the actual situation. Thus I would like to suggest some change in the first paragraph which begins on page 3 of my August 27, 1953, statement. I would hope that this paragraph might be corrected and amplified to read as follows:

In Latin America the primary emphasis in the program involves a complete and inseparable mixture of biology and agriculture, ranging from basic research in "pure" experimental biology (example: research in biophysics under Chagas at the University of Brazil in Rio) through numerous grants for agricultural research (example: research equipment and supplies for the National School of Agricultural of Peru) to the agricultural operating programs (Mexico and Colombia). But because of the state of advancement of science in Latin America, it is desirable that the program there have sufficient flexibility to permit occasional assistance to scientists of outstanding promise even though their fields of research are not in experimental biology or agriculture. Over the past ten years more than 80% of the money recommended for Latin America has been devoted to experimental biology and agriculture. At the present time there is an even higher percentage of emphasis upon these two main program fields. But the Division feels it important to continue, in Latin America, somewhat greater flexibility than characterizes our activities elsewhere.

W.W.

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THE PROGRAM OF THE DIVISION OF NATURAL SCIENCES AND AGRICULTURE

by Warren Weaver

For just over twenty years this Division of The Rockefeller Foundation has heavily concentrated its activities upon the life sciences as contrasted with the physical sciences. Until recently the program has emphasized modern experimental biology (genetics, cytology, cellular physiology, experimental embryology, chemical histology, etc.) and those fields in which the techniques of the physical sciences are applied to biological problems (biochemistry, organic chemistry of natural substances, physical biochemistry, biophysics, etc.). More recently the range has been broadened to include one of the most important applied aspects of biology, namely agriculture.

The century from 1825 to 1925, from Ampere, Oersted and Faraday, through Maxwell, Kelvin and Rutherford, to Bohr, Planck and Einstein, saw a tremendous development of the physical sciences. The time was ripe for a great forward movement in the biological sciences. The Rockefeller Foundation can take some satisfaction in having been early rather than late in sensing the need for, and the opportunities of, increased aid for biological research. We can, with all proper modesty in an internal document, recognize that Rockefeller Foundation stimulation and support for this field came at an important juncture and has played an important role.

But we must not think that this opportunity is less attractive today, or that large changes are in order, simply because we have been at this task for some time.

One of the thoughtful leaders of American biology has very recently said:

\*This is the century of the biological sciences. The physical sciences have already achieved a high degree of consistency and conceptual maturity. In the life sciences, on the other hand,

"analytical understanding is still no more than rudimentary, unifying concepts are still scarce, and many fundamental principles remain to be discovered. The major job still lies ahead. At the same time, the urgency of the task grows, as mankind looks expectantly to new advances in agriculture, public health, and medicine, whose rational development depends on biological knowledge and understanding." \*

Of all of this, this Division would wish to emphasize the sentence,

"The major job still lies ahead."

It is useful to describe the program of this Division under four geographical categories: North America, Latin America, Western Europe, and "the rest of the World." It is inevitable that the emphasis should be rather different in these different regions.

In North America - that is to say, primarily in the United States with very minor emphasis on Canada - we are now cutting about in half our previous level of support for experimental biology. Short term and specified aid has, at least until now\*\*, been increasingly available, largely from governmental sources. Thus our aid to experimental biology in the United States has recently shifted almost entirely away from short term aid to specific projects, and over to another form of support which is sorely needed - namely, long term and flexible support for outstanding men and for work in general fields. At the same time we are rather rapidly building up, in the United States, activities which are either explicitly in the field of agriculture, or which are in those aspects of biology (such as genetics, plant biochemistry, and plant physiology) which closely relate to agriculture. In strictly agricultural projects within the United States we

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\* The Challenge of Biology, by Paul Weiss, "Science," July 10, page 33.

\*\* The present threatening and unpredictable situation with respect to government support of pure science may presently force a reconsideration of our United States policy.



plan to stay away from short-term and applied problems (which are well supported from Federal and other funds) and restrict ourselves to basic long-range researches which would otherwise lack support (example: long-term research at Cornell and Minnesota on the ultimate yield potentiality of important field crops as determined by the whole complex of external and internal factors).

In Latin America our program involves a complete and inseparable mixture of biology and agriculture, ranging from basic research in "pure" experimental biology (example: research in biophysics under Chagas at the University of Brazil in Rio) through numerous grants for agricultural research (example: research equipment and supplies for the National School of Agriculture of Peru) to the agricultural operating programs (Mexico and Colombia).

In Western Europe we are continuing with little change our previous program in experimental biology, and we are just beginning to develop possibilities which connect more closely with agriculture (example: research under Muntzing in Sweden on genetics of crop plants).

In "the rest of the World" we have in the past made only a very occasional grant in those exceptional cases in which, despite no schedule of regular visits, we nevertheless had a basis of direct personal knowledge of the circumstances. With our present greatly enlarged interest in the food problem, we have a much more lively interest in "the rest of the World." This has led to reconnaissance trips by Dr. Harrar and Dr. Weaver to Lebanon and India, and later to the Orient, including Southeast Asia and a second visit to India. We have at present under active study the possibility of some major move to assist in increased production and better distribution of rice, the largest cereal crop of the world (180,000,000 tons annually), and a principal part of the daily diet of about one and a half billion persons.

The appropriations, grants-in-aid, and fellowships recommended by this Division are, for our internal purposes, thought of as occurring within the following overlapping scientific fields:

Experimental Biology

Biological Researches Fundamental to Agriculture

Agricultural Research

Operating Agriculture

Non-Conventional Agriculture

The first four of these titles spread over the spectrum from basic research in pure biology to the actual practical raising of field crops in agriculture. The last title deserves brief description.

Improved plant materials and better agronomic practices can substantially increase the world's supply of food. It seems altogether likely, however, - and specially unless there can be reasonably rapid progress in the control of birth rates - that it may be desirable, or even necessary, to affect man's total food supply through certain developments which lie outside conventional agriculture. The points of chief interest and promise seem to be:

- 1) The possibility of making vastly greater use of the potential food resources of the seas.

- 2) The possibility of increasing the supply of water available for agricultural purposes (often the limiting factor on crop yields) either by learning how to affect the time and place of rainfall, or by developing economically feasible methods for purifying brackish or salt water.

- 3) The possibility of utilizing the extraordinary chemical powers of microorganisms to assist man's food supply. This might in part involve the mass

culture of such organisms as chlorella as a source of food; and it might also involve the use of microorganisms as the agency for carrying out certain organic synthetic reactions which they can effect at normal temperatures and with high yields. This whole possibility is importantly influenced by modern developments in biochemical genetics, involving the possibility of mutant strains adapted for special chemical service.

4) The possibility of accelerating research in photosynthesis, and of developing alternative ways in which the radiant energy from the sun can be transmuted into a stored chemical form ultimately utilizable by man as a source of physiological energy.

This division is actively studying all four of these areas of non-conventional agriculture; has made exploratory grants in three of the four areas; and plans to bring in further recommendations.

\* \* \*

All of these remarks can now be made somewhat more definite by indicating the budgetary allotment which this Division contemplates, for the immediate present at least, for the various phases of the work.

	Experimental Biology	Biology Basic to Agriculture	Agricultural Grants	Operating Activities in Agriculture	Non- Conventional Agriculture	Total
United States	\$ 500,000	\$ 300,000*	\$ 250,000*	-	-	\$ 1,050,000
Latin America	300,000	200,000	250,000	\$ 700,000*	-	1,450,000
Europe	400,000	100,000*	- *	-	-	500,000
Rest of World	-	-	200,000**	200,000**	-	400,000
					(See footnote)	100,000
Totals	\$1,200,000	\$ 600,000	\$ 700,000	\$ 900,000	\$ 100,000	\$ 3,500,000

Footnote: A figure of \$100,000 is included, in the total, for non-conventional agriculture, but without commitment as to geography.

Several of the figures in this table represent, at least at the moment, what the Division thinks of as a satisfactory level of support, which we are not particularly anxious to increase. The items with one star could effectively be increased; while the items with two stars represent very large opportunities to which much larger funds could profitably be devoted.

W. Weaver  
July 19, 1953  
Revised August 27, 1953

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