

## HASKINS LABORATORIES

A brief account of the organization and its research.\*

December 1, 1952

The Haskins Laboratories is a non-profit organization devoted to fundamental scientific investigation and education in areas which require the cooperation of more than one research discipline. Its original purpose was to bring together a group of investigators, and to undertake research, in areas in biochemistry and biophysics where a combination of disciplines might make possible exploratory attacks in "border-line" fields which appeared promising and were largely unexplored. This objective has been maintained throughout its operation, and the fields which it has selected are certain fundamental aspects of cellular physiology, with particular emphasis on the nutritional requirements of microorganisms and the physiology of cancerous tissue, on the one hand, and certain experimental aspects of psychoacoustics, involving a new approach to fundamental aspects of speech, on the other.

Haskins Laboratories were established in 1935, and were incorporated under the laws of New York State as a non-profit educational institution on May 5, 1937. They were certified as an educational institution in intent and calibre by the State Board of Regents, and were assigned a tax-exempt status by letter from the Commissioner of Internal Revenue dated October 18, 1940. The Laboratories are thus in a position to accept university and college students. A number of such students from Harvard University, the Massachusetts Institute of Technology, Columbia, and the College of the City of New York have done a portion or all of their research work looking to advanced degrees with qualified personnel in the Laboratories. The Laboratories are affiliated with Union College, where the Director is Research Professor.

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\* Provided at the request of Dr. Irving Gerring, executive secretary of the Environmental Health Study Section, USPHS, National Institutes of Health, for circulation to the Section. A more complete account will be available in a forthcoming annual report.

The physical facilities of the Laboratories occupy three floors of a building at 305 East Forty-third Street, New York, and a small building on the campus of Union College at Schenectady, N. Y. The total staff numbers approximately forty, of whom all but one senior investigator are in New York. About twenty of these persons are full-time workers, and about twenty are part-time student assistants. In addition, there are in the Laboratories several part-time guest investigators whose principal affiliations are with other college and university laboratories, but whose interests are close to those of our own group.

During the first four years of operation of the Laboratories the work was centered at Union College and in space generously made available at Harvard University and the Massachusetts Institute of Technology. The central laboratory in New York City was opened in 1939. The early work was similar in general orientation to that at present, but was more especially concerned with research in the effects of radiations on microorganisms and in problems of radiation genetics. During the war the Laboratories served as Central Laboratory for the Committee on Sensory Devices of the National Academy of Sciences and in this connection undertook a rather extensive research program on prosthetic devices to aid blinded veterans. Earlier in the war, the Laboratories carried forward a program of studies on traumatic shock and motion sickness. The Director and the Associate Director of the Laboratories served throughout the war on substantially a full-time basis with the Office of Scientific Research and Development and the National Defense Research Committee.

The Laboratories are supported by funds derived from several sources. Basic continuing support is derived from funds privately contributed. Grants in aid of specific programs have been received (or are being received) from the Carnegie Corporation of New York, the Rockefeller Foundation, the American Philosophical Society, the American Academy of Arts and Sciences, the U. S. Public Health Service, and similar bodies. In addition, the Laboratories have held several contracts for government work, and have received grants-in-aid from certain private corporations. Such funds have been made available only as grants in the true sense, carrying no restrictions of any sort on publication, nor, except in the most general sense, on the direction or character of the work prosecuted under them. In fact, and as a matter of policy, all our research results are published as promptly as possible.

The Laboratories are the entire owners of a small commercial stock corporation, the National Photocolor Corporation, which was incorporated in 1939 and developed some commercial applications of photographic techniques developed by a member of the Laboratories. The revenues from this activity, after taxes, were returned entirely to the support of the basic work of the Laboratories. This company operated actively until 1942 and again for two or three years following the war. It has not been active for some time, and although still in existence, its inventory is at present being liquidated.

The nature of our scientific work and the current level of expenditures is evident in a general way from the attached list of projects; the following account may, however, provide some further details:

Dr. Seymour Hutner heads a group of investigators and students working on the nutritional requirements of microorganisms. They have been very active in the development of assay methods and are responsible for the widely-used *Euglena* assay for vitamin B<sub>12</sub>. At present, they are concentrating on protozoa which ingest particulate foods since these may be ideal assay organisms for vitamins in bound form and for high molecular weight compounds in general. Dr. Luigi Provasoli is working closely with this group, directing his own attention particularly to the isolation and growth in pure culture of fresh-water and marine protozoa. Many of the microorganisms with which Provasoli and Hutner are working have very complex needs, but usually these can be worked out in step-by-step fashion by employing a series of related organisms with increasingly complex growth requirements. It may be possible--in this way and with a variety of organisms--eventually to provide media for tissue culture which are completely synthetic or, at least, completely defined chemically. This is one of the long-range objectives of the work.

Dr. Paul Zahl has been concerned with various phases of cancer physiology (in experimental animals) since the beginning of the Laboratories. He has worked on various radiation problems, tumor implantation techniques, tumor hemorrhage phenomena and shock, and is at present studying the marked drop in ADP- and ATP-levels in blood during the growth of implanted tumors.

Dr. Franklin Cooper, with a group covering psychology, linguistics and electronics, is studying the perception of speech sounds. They have developed instruments and methods

which, for the first time, permit the experimental manipulation and synthesis of connected speech. The results of this work are leading to a better understanding of the relations between the acoustic aspects of speech and its perception by a listener or its production by a speaker. In addition, certain practical applications to the reinforcement of speech for transmission through noise are being investigated.

The publications which have resulted from these researches during the past two years are listed by titles on an attached sheet. Reprints of any of these articles, or of earlier articles, will gladly be supplied.

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Summary of Expenditures by Projects

1951

Project	Salaries and Wages	Supplies and Expenditures	Project Total
A-1 Cancer Physiology	6796.00	1083.39	7879.39
A-2 Growth Requirements of Microorganisms	8082.00	1067.37	9149.37
A-3 Protozoan Investigations	-	66.45	66.45
A-4 Auditory Patterns	10249.47	8248.69	18498.16
A-5 Radiation Shock	9899.19	2165.26	12064.45
A-6 Protozoological Chemistry	3943.77	4147.84	8091.61
*A-7W Speech Reinforcement	20146.62	15565.80	35712.42
*A-8 Fresh Water Algae	2484.48	390.38	2874.86
*A-9 Blood Nucleotides	521.24	4.20	525.44
B-1 H.L. General (non-project non-overhead expenses, supplies and equipment)	-	1326.80	1326.80
B-2 Schenectady Laboratory (morphology and genetics)	3750.00	347.47	4097.47
C-1 Overhead	<u>18049.38</u> 83922.15	<u>17913.03</u> 52326.68	<u>35962.41</u> 136248.83

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\* Initiated during 1951.

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List of reprints for past 2 years

- "Some approaches to the study of the role of metals in the metabolism of microorganisms." S. H. Hutner, L. Provasoli, Albert Schatz, and C. P. Haskins. Proc. Am. Phil. Soc., 94: No. 2, April, 1950.
- "The Role of Algal Cultures in Research." S. H. Hutner. Introduction in "The Culturing of Algae; A Symposium", Phycological Soc. Am., 1949. Jules Brunel, G.W. Prescott, and L. H. Tiffany (eds.). Pub. by The Charles F. Kettering Foundation, 1950.
- "Anaerobic and aerobic growth of purple bacteria (Athiorhodaceae) in chemically defined media." S. H. Hutner. J. Gen. Microbiology, 4: No. 3, 1950.
- "Destruction of chloroplasts by streptomycin." Luigi Provasoli, S. H. Hutner, and Irma J. Pintner. Cold Spring Harbor Symposia on Quantitative Biology, 16, 1951.
- "Phosphorylated compounds in Euglena." H. G. Albaum, A. Schatz, S. H. Hutner, and Alta Hirshfeld. Arch. Biochem. 29: No. 1, Nov. 1950, 210-218.
- "The role of aneurin in the nutrition of Tetrahymena geleii." I. A. Tittler, M. M. Belsky and S. H. Hutner. J. Gen. Microbiology, 6: No. 1 & 2, Feb., 1952.
- "Biology of Pyrogens." Paul A. Zahl and S. H. Hutner. Trans. N.Y. Acad. Sci., 14: No. 4, Feb., 1952.
- "Incidence of Spontaneous Mammary Tumors in Mice with Lithospermum-Induced Diestrus." Paul A. Zahl and Andrew Nowak. Proc. Soc. Exptl. Biol. and Med., 77: 5-8, 1951.
- "Clasmatosis of skin mast cells as affected by moccasin venom." Paul A. Zahl and Andrew Nowak. J. Morph., 89: No. 1, July, 135-150, 1951.
- "A Rapid Technic for Demonstrating Mast Cells in Mouse Skin." Paul A. Zahl and A. Nowak, Jr., Stain Technology, 24: No. 3, July 1949.
- "Adenosine Triphosphate Levels in Mouse Blood after Whole-Body Irradiation and During Tumor Growth." Paul A. Zahl and Harry G. Albaum. Soc. Exptl. Biol. and Med., 77: 388-393, 1951.

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List of reprints for past 2 years  
(con't)

- "The Phytoflagellates " S. H. Hutner and L. Provasoli.  
In "Physiology and Biochemistry of Protozoa", Lwoff, A.  
(editor), Academic Press, N. Y., 1951.
- "Interchangeability of quinolinic and nicotinic acid as  
growth factors for a pseudomonad oxidizing nicotinic acid."  
W. B. Jakoby, A. Schatz, S. H. Hutner and M. M. Weber.  
J. of Gen. Microbiol. 6: 278-285, 1952.
- "Spectrum Analysis." Franklin S. Cooper. J. Acoust. Soc.,  
22: 761-762, 1950.
- "Two-Formant Synthetic Vowels and Cardinal Vowels." Pierre  
Delattre, Alvin M. Liberman, Franklin S. Cooper. Le  
Maitre Phonetique, No. 96, 1951.
- "The Interconversion of Audible and Visible Patterns as a  
Basis for Research in the Perception of Speech." Franklin  
S. Cooper, Alvin M. Liberman and John M. Borst. Proc.  
Nat. Acad. Sci., 37: 318-335, 1951.
- "Guidance Devices for the Blind." Franklin S. Cooper.  
Physics Today, 3: 6-14, July, 1950.