

**MUSCULAR WORK: A
METABOLIC STUDY WITH
SPECIAL REFERENCE TO THE
EFFICIENCY OF THE HUMAN
BODY AS A MACHINE**

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Muscular Work: A Metabolic Study with Special Reference to the Efficiency of the Human Body as a Machine by Francis G. Benedict & Edward P. Cathcart

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FRANCIS G. BENEDICT & EDWARD P. CATHCART

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BICYCLE ERGOMETER AND UNIVERSAL RESPIRATION APPARATUS.

The subject riding bicycle ergometer with an electric brake breathes through a mouthpiece into a current of air passing through a pipe system. The expired air is forced by a rotary blower through sulphuric acid and soda-lime to remove respectively carbon dioxide and water. The carbon-dioxide absorbers may be weighed. Measured amounts of oxygen from a cylinder are passed through an accurate meter and introduced as needed.

MUSCULAR WORK

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BODY AS A MACHINE

BY

FRANCIS G. BENEDICT AND EDWARD P. CATHCART



WASHINGTON, D. C.

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PREFACE.

The experimental evidence secured in connection with this research was made possible only through the active co-operation and personal interest of the gentlemen who acted as subjects. Our thanks are due to Mr. Kurt H. Arndt, Mr. J. J. Currie, and especially to Mr. H. L. Higgins and Mr. J. E. Fitzgerald, all of the laboratory staff. Mr. Fitzgerald furthermore assisted in practically all of the experiments on others than himself.

We are indebted to Dr. W. G. Anderson, Director of the Yale University Gymnasium, not only for the physical measurements on some of our subjects, but likewise for his co-operation in certain of the tests.

The extraordinary interest and fidelity to the routine exhibited on the part of the professional subject, Mr. Melvin A. Mode, should not pass without special comment. It would have been impossible to conduct a series of experiments of this type without the intelligent co-operation of the subject.

The complicated tables in the report have received the careful preparation of Mr. W. H. Leslie, and the entire manuscript has had the editorial supervision of Miss A. N. Darling. To all of these co-workers we wish to express our thanks.

NUTRITION LABORATORY, CARNEGIE INSTITUTION OF WASHINGTON,
Boston, Mass., April 18, 1915.



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