



Benchmark Papers in Human Physiology

V. 14

HYPOTHALAMIC HORMONES

**Edited by
James R. Sowers**

Dowden, Hutchinson & Ross, Inc.



**Benchmark Papers
in Human Physiology / 14**

A BENCHMARK[®] Books Series

**HYPOTHALAMIC
HORMONES**

Edited by

JAMES R. SOWERS

University of Missouri
at Kansas City



Dowden, Hutchinson
& Ross, Inc.

STROUDSBURG, PENNSYLVANIA

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Benchmark Papers in Human Physiology, Volume 14
Library of Congress Catalog Card Number: 79-19856
ISBN: 0-87933-358-8

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82 81 80 1 2 3 4 5

Manufactured in the United States of America.

LIBRARY OF CONGRESS CATALOGING IN PUBLICATION DATA

Main entry under title:

Hypothalamic hormones.

(Benchmark papers in human physiology; 14)

Includes indexes.

1. Hypothalamic hormones—Addresses, essays, lectures. 2. Hypothalamo-hypophyseal system—Addresses, essays, lectures. 3. Neuroendocrinology—Addresses, essays, lectures. I. Sowers, James R., 1942–

QP572.H9H92 612.8 79-19856

ISBN 0-87933-358-8

Distributed world wide by Academic Press,
a subsidiary of Harcourt Brace Jovanovich,
Publishers.



Benchmark Papers in Human Physiology

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SERIES EDITOR'S FOREWORD

James R. Sowers, a young physician trained in endocrinology, is destined to become important in the field of hypothalamic hormones. I had the pleasure, and the good fortune, to recruit Dr. Sowers to join our faculty. He had just finished his fellowship in endocrinology under Jerome Hershman at UCLA. Solidly trained, he has continued his investigations here at the University of Missouri, Kansas City School of Medicine. He knows and loves this subject.

This subject is dear to my heart as well. In 1942 I published a paper about the influence of stress on the adrenal cortex. At that time a plethora of reports was appearing about the influence of various types of stress on the adrenal and about emotional trauma on the thyroid and the gonads. There was thus the strong implication that the nervous system and the endocrine system were linked. But no one, at that time, knew how. I had plans to repeat my procedures after placing lesions in the hypothalamus, but I never got around to it. In retrospect, that series of experiments may well have provided an important clue. The fact of the matter is that Dr. Geoffrey Harris published his perceptive paper in 1947; the rest of the story, a fascinating one that has spawned Nobel prizes, is related in this volume. It is an unfinished story, one that is changing with remarkable speed and acceleration. Certainly additional Nobel Laureates will emerge in this field. A second volume will be needed very soon.

L. L. LANGLEY

PREFACE

This book represents an attempt to choose and elucidate some of the more important articles that have contributed to development of the relatively new but rapidly expanding field of neuroendocrinology. The emphasis in this review has been placed on the earlier studies that laid the foundation for understanding the role of the brain in controlling the integration and selectivity of hypophysial hormone secretion.

I am indebted to two people who played an integral role in the preparation of this book. Mark Funk, an outstanding clinical medical librarian at the University of Missouri-Kansas City School of Medicine, contributed greatly to the extensive literature review and subject indexing that were necessary to write this book. Jean Grider has done a remarkable job in putting this manuscript together. She is to be complimented for her perseverance and excellent judgment in coordinating my efforts and those of Mr. Funk and the series editor, Dr. Lee Langley.

This book is dedicated to two superb investigative endocrinologists from different eras, both of whom have been inspirations to me in my studies in neuroendocrinology and in writing this book. They are Dr. Geoffrey Harris, whom I consider the father of neuroendocrinology and whose death prevented him from receiving a Nobel prize, and Dr. Jerome Hershman. Dr. Hershman has not only been a friend as well as my mentor; he gave me the latitude to pursue studies of my own interest and helped me achieve the discipline needed for academic and investigational excellence, which he personifies.

JAMES R. SOWERS

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INTRODUCTION

For centuries psychiatric and neurological conditions were thought to be secondary to endocrine dysfunction: That emotional stress might precipitate diabetes or hyperthyroidism lead to amenorrhea or false pregnancy and that psychiatric symptoms seen in patients with primary endocrine disease were secondary to hormonal effects on the central nervous system. The first experiment of any significance in the entire field of endocrinology, reported 130 years ago, demonstrated a relationship between the brain and hormone secretion. In 1849, Professor A. A. Berthold of Göttingen showed that the testes of cocks required no specific nerve connections to exert masculinizing effects. He found that the functional testes, through the secretion of a substance into the bloodstream, acted on the brain so as to produce a rooster that had wattles, crowed, fought, and took a noticeable interest in hens, whereas, castrated roosters did not display this type of behavior (Berthold, 1849).

The two systems that coordinate and integrate the functions of the body and are responsible for homeostatic adjustments to meet environmental changes are the nervous and the endocrine systems. However, the closeness and intricacy of this relationship and the recognition that neuroendocrine mechanisms, functions involving the interaction of the nervous system and the endocrine system, regulate a wide variety of body mechanisms has only come about in the last forty years.

The science of neuroendocrinology had its real beginning in the late 1940s and early 1950s with the studies of G. W. Harris, which stressed the significance of the observation that virtually all blood reaching the adenohypophysis via the hypophysial-portal system has been in contact, via a primary capillary plexus, with the median eminence area of