

**CIBA FOUNDATION COLLOQUIA
ON ENDOCRINOLOGY**

Vol. II. Steroid Metabolism and Estimation

Ciba Foundation Symposia

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CIBA FOUNDATION COLLOQUIA ON ENDOCRINOLOGY

VOLUME II

Steroid Metabolism and Estimation

General Editor for the Ciba Foundation

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With 96 Illustrations



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PREFACE

THE Ciba Foundation is an international centre where workers active in medical and chemical research are encouraged to meet informally to exchange ideas and information. In the two and a half years since its opening in June, 1949, in addition to many part-day discussions, there have been 13 international symposia, each lasting two to four days, attended on invitation by outstanding workers from many countries.

The informality and intimacy of these meetings have permitted discussion of current and incomplete research and stimulated lively speculation and argument. They have also been the occasion for reference to much published and unpublished work throughout the world. The proceedings are now being issued in full, with only the minimum of editing, in order to pass on to a far wider audience the benefits of these meetings. Assembled in book form they present very readably much information not readily available elsewhere.

Nine of the first 13 Symposia form a series of "Colloquia on Endocrinology," dealing mainly with steroid hormone problems. One of these, on Nomenclature of Steroids, has had its conclusions published separately;* of the remaining eight, two are now combined in each of four volumes.

Volume II contains the proceedings of two conferences on closely related subjects, held within a few weeks of each other, and attended for the most part by the same people. The first Book, on Estimation of Steroid Hormones, covers chiefly the determination of urinary metabolites of progesterone, oestrogens, and corticosteroids. The second conference, in Book II, was concerned with the Metabolic Breakdown of Steroids, and attention here was turned mainly to androgens, progesterone and corticosteroids.

*Chemistry and Industry, June 23rd, 1951.

In Volume II the steroid nomenclature used by the Editors has been based on the recommendations of the international group of distinguished steroid chemists at the meeting referred to above. The Editors are greatly indebted to Dr. W. Klyne for help in producing some conformity in nomenclature in this volume, and also for the explanatory note which follows.

STEROID NOMENCLATURE

IN any group of naturally occurring compounds, the members first isolated are given trivial names based on their origin (e.g. cholic acid) or their biological activity (e.g. androsterone). Compounds derived from such natural products by degradation, or related compounds, are then given names based on these (e.g. dehydrocholic acid, dehydro*iso*androsterone). Sooner or later, the organic chemists working in such a field find it necessary to introduce a systematic nomenclature. The two names "dehydrocholic acid" and "dehydro*iso*androsterone" illustrate the need for this; the prefix "dehydro" in dehydrocholic acid implies the oxidation of the three hydroxyl groups of cholic acid to keto groups, whilst the same prefix in dehydro*iso*androsterone indicates the presence of an olefinic double bond. The systematic nomenclature usually takes the form of a few basic names for the fundamental hydrocarbons or heterocyclic structures, to which prefixes and suffixes are added in accordance with the general rules of organic nomenclature. Such names, although necessary for systematic chemical work, are often clumsy, and the old trivial names remain in use as well, chiefly for those compounds which have a biological origin or activity.

In a book such as this, it seems desirable to use both the systematic and the trivial names. Some readers will be more interested in the structures of the compounds discussed; others will be more interested in their biological functions. All must, however, have some interest in the connexion between structure and function, otherwise they would hardly be reading the book.

There is, at present, no internationally agreed system of nomenclature for the steroids, but an attempt was made to draft a system at a Conference held at the Ciba Foundation in May-June, 1950. The draft rules have been published in

English (*Chem. and Ind.*, 1951, p. SN1), in German (*Helv. chim. Acta*, 1951, 34, 1680) and in French (*Bull. Soc. chim. Fr.*, 1951, p. i). These proposals were discussed during the meetings of the International Union of Pure and Applied Chemistry in New York in September, 1951; a large measure of international agreement was reached, but adoption of the proposals was deferred until full agreement could be attained. A sub-committee of the I.U.P.A.C., under the Chairmanship of Professor C. W. Shoppee (Swansea) is considering the outstanding points.

In preparing the papers in this Symposium for the Press, the staff of the Ciba Foundation have tried to introduce the "Ciba Foundation Rules" in what it is hoped will be thought a gentle and unobtrusive way. In most cases, the trivial names used by the authors, who are actually working with the compounds, have been retained, with the formal names inserted in parentheses at the first mention in each paper. It is hoped that in future Symposia and in publications elsewhere, authors will gradually forsake the use of many trivial and semi-trivial names, as, e.g., *epi*-androsterone, *cis*-testosterone, and use the systematic names as far as possible. Trivial names will certainly be retained, however, for a few compounds of the greatest biological importance, such as œstrone and progesterone, a list of which is given in the "Ciba Foundation Rules".

3 JAN., 1952

W. KLYNE

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List of those participating in or attending the Conference
on the Estimation of Steroids in Body Fluids, and of their
Excretory Products, 31st July to 2nd August, 1950

R. W. BATES	E. R. Squibb, New Brunswick, N.J.
W. S. BAULD	University of Edinburgh
R. BORTH	Hôpital Cantonal, Geneva
R. J. BOSCOFF	University of Birmingham
E. BOYLAND	Chester Beatty Research Institute, London
H. BRAUNSBURG	University College Hospital, London
J. B. BROWN	Royal Infirmary, Edinburgh
I. E. BUSH	National Institute for Medical Research, London
W. R. BUTT	United Birmingham Hospitals
R. K. CALLOW	National Institute for Medical Research, London
B. E. CLAYTON	St. Thomas' Hospital, London
O. CRÉPY	Faculté de Médecine, Paris
A. C. CROOKE	United Birmingham Hospitals
K. DOBRINER (deceased)	Sloan-Kettering Institute, New York
R. I. DORFMAN	Worcester Foundation for Experimental Biology, Shrewsbury, Mass.
L. L. ENGEL	Massachusetts General Hospital, Boston
S. J. FOLLEY	National Institute for Research in Dairying, University of Reading
H. S. GUTERMAN	Michael Reese Hospital, Chicago
A. M. HAIN	University of Manchester
G. A. D. HASLEWOOD . . .	Guy's Hospital, London
A. A. HENLY	Hospital of St. John and St. Elizabeth, London
M. F. JAYLE	Faculté de Médecine, Paris
A. E. KELLIE	Courtauld Institute of Biochemistry, Middle- sex Hospital, London
C. P. LEBLOND	McGill University, Montreal
G. LORRIMAN	Ciba Laboratories, Horsham, Sussex
O. LIBERT	Geneva
R. LUFT	Serafimerhospital, Stockholm

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M. H. I. MACAULAY	.	.	Gatty Marine Laboratory, St. Andrews
(now Mrs. M. H. I. DODD)			
M. MARTI	.	.	Kantonsspital, Zürich.
C. J. O. R. MORRIS	.	.	London Hospital
O. MÜHLBOCK	.	.	Netherlands Cancer Institute, Amsterdam
J. Y. F. PATERSON	.	.	University of Edinburgh
W. H. PEARLMAN	.	.	Jefferson Medical College, Philadelphia
G. S. POPE	.	.	National Institute for Research in Dairying, University of Reading
A. M. ROBINSON	.	.	St. Bartholomew's Hospital, London
E. F. SCOWEN	.	.	St. Bartholomew's Hospital, London
M. J. H. SMITH	.	.	King's College Hospital, London
I. F. SOMMERVILLE	.	.	University of Edinburgh
A. W. SPENCE	.	.	St. Bartholomew's Hospital, London
G. I. M. SWYER	.	.	University College Hospital, London
E. H. VENNING	.	.	Royal Victoria Hospital, Montreal
F. VERZÁR	.	.	Physiology Institute, University of Basle
F. L. WARREN	.	.	University College, London

List of those participating in or attending the Conference
on the Metabolic Breakdown of Steroids, 9th to 11th August,

1950

G. T. BASSIL . . .	University of Manchester
R. J. BOSCOTT . . .	University of Birmingham
E. BOYLAND . . .	Chester Beatty Research Institute, London
I. E. BUSH . . .	National Institute for Medical Research, London
R. K. CALLOW . . .	National Institute for Medical Research, London
E. DINGEMANSE (deceased) .	Pharmaco-Therapeutisch Laboratorium, der Universiteit, Amsterdam
K. DOBRINER (deceased) .	Sloan-Kettering Institute, New York
R. I. DORFMAN . . .	Worcester Foundation for Experimental Biology, Shrewsbury, Mass.
L. L. ENGEL . . .	Collis P. Huntington Memorial Hospital, Boston
S. J. FOLLEY . . .	National Institute for Research in Dairying, University of Reading
H. S. GUTERMAN . . .	Michael Reese Hospital, Chicago
L. G. HUIS IN'T VELD . . .	Pharmaco-Therapeutisch Laboratorium, der Universiteit, Amsterdam
A. E. KELLIE . . .	Courtauld Institute of Biochemistry, Middle- sex Hospital, London
M. MARTI . . .	Kantonsspital, Zürich
C. J. O. R. MORRIS . . .	London Hospital
W. H. PEARLMAN . . .	Jefferson Medical College, Philadelphia
A. M. ROBINSON . . .	St. Bartholomew's Hospital, London
L. T. SAMUELS . . .	University of Utah
E. F. SCOWEN . . .	St. Bartholomew's Hospital, London
I. F. SOMMERVILLE . . .	University of Edinburgh
A. W. SPENCE . . .	St. Bartholomew's Hospital, London
E. H. VENNING . . .	Royal Victoria Hospital, Montreal
F. VERZÁR . . .	Physiology Institute, University of Basle
F. L. WARREN . . .	University College, London

BOOK II
METABOLIC BREAKDOWN
OF STEROIDS