



OXFORD MEDICAL PUBLICATIONS

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# PHARMACOLOGY

BY

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PROFESSOR OF PHARMACOLOGY IN THE

*FOURTH EDITION*

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# PHARMACOLOGY



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## PREFACE TO THE FOURTH EDITION

POWERFUL new drugs continue to be discovered and this book continues to grow. The whole text has been revised and there are few pages which remain as they were. The main additions and alterations deal with the anterior pituitary, synthetic analgesics, the blockade of autonomic ganglia and neuromuscular junctions, vitamin B<sub>12</sub>, nuclear poisons and antibiotics; there are 18 new figures. The number of references has been increased and I hope these will be used. They are mostly easily accessible and could serve as an introduction to an interesting literature, which can only be briefly summarized in a book of this size.

A number of improvements are the result of criticism by friends (and by others); it is hoped this help will continue. I am especially grateful to Dr. F. Alexander, who gives pharmacological instruction to veterinary students and who has suggested various changes to make the book more suitable for this purpose. I am again grateful to my wife for the index, and to Dr. T. B. B. Crawford for improving the chemical formulae.

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*March 1953*

## PREFACE TO THE FIRST EDITION

THIS textbook of pharmacology is intended to be used by medical students at a stage in their education before general principles become obscured by a mass of practical details, but may also interest others. Facts with immediate practical applications receive especial emphasis, but some other facts are included, since one purpose of the book is to give an account of the experimental methods which have led, and are leading, to the introduction of so many new therapeutic measures and to the use of so many potentially dangerous drugs. Medical men are constantly being asked by manufacturers and others to try the effect of new drugs on patients, and it is therefore important that they should know something of the kind of evidence that justifies the trial of new drugs. This book tries to give them this knowledge.

The information sought by examiners has been included as completely as possible. Most of the information given is worth remembering, but some mathematics, chemical formulae, synonyms, and other such details have been included only for reference, or because some people like them.

I am grateful to all the authors and publishers who have given permission for the reproduction of figures. Their names are mentioned in the appropriate places.

I am also grateful to Prof. G. R. Cameron and to Doctors G. Brownlee, G. A. H. Buttle, K. H. Coward, and R. Wien, who have read parts of the manuscript, and to Doctors G. H. Faulkner and H. R. Ing, who have been through the whole book and eliminated a number of errors. I shall be grateful to anyone who will help me to eliminate more errors. I am grateful to the Oxford University Press for their very helpful collaboration.

J. H. G.

COLLEGE OF THE PHARMACEUTICAL SOCIETY  
OF GREAT BRITAIN, LONDON, W.C.1

*October 1940*

# WEIGHTS AND MEASURES

## AVOIRDUPOIS

*Approximate equivalents*

1 grain	65 mg
1 ounce (oz.) = $437\frac{1}{2}$ grains	28 g
1 pound (lb.) = 16 oz. = 7,000 grains	454 g

## IMPERIAL MEASURE

1 minim (℥)	1 drop (very variable)	
1 fluid drachm (ʒ) = 60 ℥	1 teaspoonful	3.5 ml
1 fluid ounce (ʒ) = 8 ʒ	2 tablespoonfuls	28 ml
1 pint = 20 ʒ	2 tumblerfuls	568 ml
1 gallon = 8 pints	—	4.54 litres

1 fluid ounce of water weighs 1 ounce.

A pint of pure water weighs a pound and a quarter.

## METRIC SYSTEM

Mega (M) $10^6$	Milli (m) $10^{-3}$
Kilo (k) $10^3$	Micro ( $\mu$ ) $10^{-6}$
	Nano (n) $10^{-9}$

In prescriptions the abbreviations are G. for gramme and mg. for milligramme.

1  $\mu$  = 0.001 mm.

1  $\mu$ g. = 1 microgram = 0.001 mg (the undesirable sign  $\gamma$  is sometimes used for this),

1 millilitre = 1 ml = 1 c.c. (approx.).

$x\%$  w/v =  $x$  per cent. weight/volume =  $x$  g in 100 ml

### *Other equivalents*

1 inch = 2.54 cm
1 grain = 64.8 mg
11 stone = 70 kg
2.2 lb. = 1 kg

### *Error per cent.*

<0.01
<0.01
0.2

In fundamental work doses and concentrations are sometimes calculated in mols. The following equations may be helpful in this connexion:

If  $x$  is the molecular weight and  $y$  is the valency, then

1 mM (1 millimol) =  $y$  m.eq. ( $y$  milli-equivalents) =  $x$  mg

mM solution (millimolar solution) =  $x$  parts per million.

## TEMPERATURE

To convert  $^{\circ}\text{C.}$  to  $^{\circ}\text{F.}$  multiply by 9, divide by 5, and add 32.

To convert  $^{\circ}\text{F.}$  to  $^{\circ}\text{C.}$  subtract 32, multiply by 5, and divide by 9.

## PHARMACOLOGICAL LITERATURE

PHARMACOLOGY is too large a subject to be compressed into one small book, and it is therefore important that those who seek more detailed knowledge should know where to find it.

### TEXTBOOKS OF PHARMACOLOGY

The richest source of information in the English language is Sollmann's *Manual of Pharmacology*, the first edition of which was published in 1918, but it is naturally less complete than the German *Handbuch* known by the name of its first editor, Heffter, many volumes of which have been written by many different writers.

*The Pharmacological Basis of Therapeutics* by Goodman and Gilman (1941) gives a detailed account of the action of drugs on man, and is an invaluable book for the serious student. *The Pharmacologic Principles of Medical Practice* (1951) by Krantz and Carr is another good American general textbook.

Clark's *Applied Pharmacology*, to which we all owe much, is really a textbook of therapeutics from the point of view of a pharmacologist. It was revised by Wilson and Schild in 1952.

*Recent Advances in Pharmacology*, by Robson and Keele, is an interesting review of some modern work.

*Biological Standardization*, by Burn, Finney, and Goodwin, gives a full account of the standard methods with detailed instructions for carrying out the tests.

Most of these books contain references to the original literature.

### EXPERIMENTAL METHODS

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## MEDICAL TREATMENT

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- Dunlop, Davidson, and McNee (1946), *Textbook of Medical Treatment*. Livingstone.
- Evans, G. (Editor) (1951), *Medical Treatment*. Butterworth.
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## REVIEWS

A dozen selected topics are discussed each year in *Pharmacological Reviews*, and a dozen more in the *Journal of Pharmacy and Pharmacology*. *Medicinal Chemistry* (Editor, C. M. Suter), is a periodical publication containing more or less complete reviews of selected subjects from the chemical point of view.

## OFFICIAL BOOKS WRITTEN BY COMMITTEES

A *Pharmacopoeia* is published every few years in each of the more important countries of the world. It contains a list of officially approved drugs with their doses, and regulations designed to ensure that the drugs shall be uniform in potency and reasonably pure. The pharmacopoeia cannot always be kept up to date because it is not published often enough, but addenda are published at intervals. The first *International Pharmacopoeia* was published in 1951. The committee of the World Health Organization which prepares it also selects non-proprietary names put forward by national organizations. These names are marked in this book with the letters I.N.N. (International Non-proprietary Names); it is hoped that they will be universally adopted.

The *British Pharmaceutical Codex* (B.P.C.) is essentially an expansion of the *British Pharmacopoeia* (B.P.), less exclusive in its list of drugs and less cautious in its expressions of opinion. Unlike the *Pharmacopoeia*, it includes a discussion of the action and uses of each drug and a large number of formulae for mixtures of drugs. The British Pharmacopoeia Commission also publishes lists of approved names (A.N.) for drugs which have not yet been admitted to pharmacopoeial status.

The *Extra Pharmacopoeia* (Martindale) is published in two volumes, each of which appears at intervals. It is very catholic in its scope and contains a great deal of information on pharmacy and therapeutics, with a fairly complete list of both official medicines and

proprietary medicines, good, bad, and indifferent, numerous abstracts of clinical papers, a useful guide to the understanding of chemical formulae, methods for the analysis of food and drugs, and much else besides.

The British *National Formulary* is a compact guide to prescribing.

The American *National Formulary* corresponds in scope very roughly with the *British Pharmaceutical Codex. New and Non-Official Remedies* (N.N.R.), which is well described by its title, is published each year and kept up to date during the year by the publication of addenda in the *Journal of the American Medical Association*. Applications from manufacturers for the inclusion of their products in this book are considered by a committee, which has to be satisfied, by evidence, that the product is likely to be valuable. The book contains authoritative general statements on the therapeutic value of different classes of new drugs and is a very useful guide to recent advances in therapeutics.

The *U.S. Dispensatory* is a large book which covers a wide range of drugs, including the extracts of many obscure plants, with references to original literature.

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