

BIOCHEMISTS' HANDBOOK

compiled by one hundred and
seventy-one contributors

Edited by

CYRIL LONG,

M.A., B.Sc.,

D.Phil., F.R.S.E.

Senior Lecturer in Biochemistry,
Physiology Department,
Institute of Basic Medical Sciences,
Royal College of Surgeons of England

Consultant Editors

EARL J. KING,
Ph.D., D.Sc., F.R.I.C.

Professor of Chemical Pathology,
Postgraduate Medical School
University of London

WARREN M. SPERRY,
Ph.D.

Professor of Biochemistry,
College of Physicians and Surgeons,
Columbia University, New York;
Chief of Psychiatric Research (Biochemistry),
New York Psychiatric Institute

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22 Henrietta Street, London, W.C.2

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LIST OF CONTRIBUTORS

- A. ALBERT, Department of Medical Chemistry, The Australian National University, Canberra, Australia.
- W. N. ALDRIDGE, M.R.C., Toxicology Research Unit, Carshalton, Surrey, England.
- L. ANDERSON, Department of Biochemistry, College of Agriculture, University of Wisconsin, Madison 6, Wis., U.S.A.
- P. ANDREWS, National Institute for Research in Dairying, Shinfield, Reading, England.
- G. B. ANSELL, Department of Experimental Psychiatry, The Medical School, Birmingham 15, England.
- R. H. BAUM, Biochemical Laboratories, Department of Chemistry, University of Illinois, Urbana, Ill., U.S.A.
- R. BENTLEY, Department of Biochemistry and Nutrition, University of Pittsburgh, Pittsburgh 13, Pa., U.S.A.
- N. J. BERRIDGE, National Institute for Research in Dairying, Shinfield, Reading, England.
- S. M. BIRNBAUM, Laboratory of Biochemistry, National Institutes of Health, Bethesda 14, Md., U.S.A.
- D. A. K. BLACK, Department of Medicine, The Royal Infirmary, Manchester 13, England.
- S. BLACKBURN, Wool Industries Research Association, Torridon, Headingley, Leeds 6, England.
- H. BLASCHKO, Department of Pharmacology, South Parks Road, Oxford, England.
- W. BOLTON, Poultry Research Centre, King's Buildings, West Mains Road, Edinburgh 9, Scotland.
- T. G. BRADY, Department of Biochemistry, University College, Cork, Eire.
- N. G. BRINK, Merck Sharp & Dohme, Division of Merck & Co. Inc., Rahway, N.J., U.S.A.
- J. M. BUCHANAN, Division of Biochemistry, Massachusetts Institute of Technology, Cambridge, Mass., U.S.A.
- K. BURTON, Department of Biochemistry, South Parks Road, Oxford, England.
- G. C. BUTLER, Biology and Health Physics Division, Atomic Energy of Canada Limited, Chalk River, Ont., Canada.
- G. L. CANTONI, Laboratory of Cellular Pharmacology, National Institutes of Health, Bethesda 14, Md., U.S.A.
- C. E. CARDINI, Instituto de Investigaciones Bioquimicas, Fundación Campomar, Obligado 2490, Buenos Aires, Argentina.
- B. CHANCE, Eldridge Reeves Johnson Foundation, University of Pennsylvania, Philadelphia 4, Pa., U.S.A.
- J. CHAYEN, Department of Pathology, Royal College of Surgeons of England, London W.C.2, England.
- MARGARET I. H. CHIPCHASE, Botany School, Downing Street, Cambridge, England.
- BARBARA J. COCKBURN, Boma, Mporokaso, Northern Province, N. Rhodesia.
- R. CONSDEN, M.R.C., Rheumatism Research Institute, Canadian Red Cross Memorial Hospital, Taplow, Maidenhead, Berks., England.

LIST OF CONTRIBUTORS

- C. L. COPE, Department of Medicine, Postgraduate Medical School, Ducane Road, London W.12, England.
- L. C. CRAIG, The Rockefeller Institute for Medical Research, New York 21, N.Y., U.S.A.
- R. K. CRANE, Department of Biochemistry, Washington University School of Medicine, St. Louis, Mo., U.S.A.
- M. A. CRAWFORD, Department of Chemical Pathology, Postgraduate Medical School, Ducane Road, London W.12, England.
- W. MARY L. CROMBIE, 27, Hornchurch Hill, Whyteleafe, Surrey, England.
- B. T. CROMWELL, Department of Botany, The University, Hull, England.
- A. H. DADD, Bacteriology Department, Imperial College of Science and Technology, London S.W.7, England.
- H. H. DARON, Biochemical Laboratories, Department of Chemistry, University of Illinois, Urbana, Ill., U.S.A.
- S. P. DATTA, Department of Biochemistry, University College, London W.C.1, England.
- H. E. DAVENPORT, Research Station, Long Ashton, Bristol, England.
- BERYL M. A. DAVIES, Imperial Cancer Research Fund, Lincoln's Inn Fields, London W.C.2, England.
- B. D. DAVIS, Department of Bacteriology and Immunology, Harvard Medical School, Boston 15, Mass., U.S.A.
- N. C. DAVIS, Department of Clinical Science, University of Pittsburgh School of Medicine, Pittsburgh 13, Pa., U.S.A.
- P. C. DEKOCK, The Macaulay Institute for Soil Research, Craigiebuckler, Aberdeen, Scotland.
- M. DOUDOROFF, Department of Bacteriology, University of California, Berkeley 4, Calif., U.S.A.
- J. E. EASTOE, Department of Dental Science, Royal College of Surgeons of England, London W.C.2, England.
- N. L. EDSON, Department of Biochemistry, University of Otago Medical School, Dunedin C.1, New Zealand.
- R. J. ELLIS, Agricultural Research Council, Unit of Plant Physiology, Beit Building, Prince Consort Road, London S.W.7, England.
- L. A. ELSON, Chester Beatty Research Institute, Royal Cancer Hospital, London S.W.3, England.
- A. H. ENNOR, Department of Biochemistry, The Australian National University, Canberra, Australia.
- L. FOWDEN, Department of Botany, University College, London W.C.1, England.
- G. E. FRANCIS, Department of Biochemistry & Chemistry, The Medical College of St. Bartholomew's Hospital, London E.C.1, England.
- G. FRANGLEN, Chemical Pathology Department, St. George's Hospital Medical School, London S.W.1, England.
- K. B. FREEMAN, Biology and Health Physics Division, Atomic Energy of Canada Limited, Chalk River, Ont., Canada.
- J. E. GARDINER, Royal College of Surgeons of England, Department of Pharmacology, Examination Hall, Queen Square, London W.C.1, England.
- G. A. GARTON, The Rowett Research Institute, Bucksburn, Aberdeenshire, Scotland.
- K. D. GIBSON, Department of Chemical Pathology, St. Mary's Hospital Medical School, London W.2, England.

LIST OF CONTRIBUTORS

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- R. H. GIRDWOOD, Department of Medicine, The University New Buildings, Edinburgh 8, Scotland.
- GERTRUDE E. GLOCK, Courtauld Institute of Biochemistry, The Middlesex Hospital Medical School, London W.1, England.
- T. W. GOODWIN, Department of Agricultural Chemistry, University College of Wales, Aberystwyth, Wales.
- L. M. GREENBAUM, Department of Pharmacology, Downstate Medical Center, Brooklyn 3, N.Y., U.S.A.
- J. P. GREENSTEIN (*the late*), Laboratory of Biochemistry, National Institutes of Health, Bethesda 14, Md., U.S.A.
- J. A. GRUNAU, Biochemical Laboratories, Department of Chemistry, University of Illinois, Urbana, Ill., U.S.A.
- MARIANNE GRUNBERG-MANAGO, Institut de Biologie Physico-chimique, Paris-V^e, France.
- F. S. M. GRYLLS, The Distillers Company, Ltd., Epsom, Surrey, England.
- A. K. GRZYBOWSKI, Department of Biochemistry, University College, London W.C.1, England.
- I. C. GUNSALUS, Biochemical Laboratories, Department of Chemistry, University of Illinois, Urbana, Ill., U.S.A.
- A. J. HALE, Imperial Cancer Research Fund, Lincoln's Inn Fields, London W.C.2, England.
- G. HAMOIR, Département de Biologie Générale, Université de Liège, Liège, Belgium.
- D. J. HANAHAN, Department of Biochemistry, University of Washington School of Medicine, Seattle 5, Wash., U.S.A.
- E. J. HEHRE, Department of Microbiology and Immunology, Yeshiva University, New York 61, N.Y., U.S.A.
- A. A. HENLY, Pathology Department, Little Bromwich General Hospital, Birmingham 9, England.
- KATHLEEN M. HENRY, The National Institute for Research in Dairying, Shinfield, Reading, England.
- S. HESTRIN, Laboratory of Microbiological Chemistry, The Hebrew University—Hadassah Medical School, Jerusalem, Israel.
- L. F. HEWITT, Medical Research Council Laboratories, Holly Hill, London N.W.3, England.
- R. HILL, Department of Physiological Chemistry, The University, Reading, England.
- P. N. HOBSON, The Rowett Research Institute, Bucksburn, Aberdeenshire, Scotland.
- MARGARET HOLDEN, Biochemistry Department, Rothamsted Experimental Station, Harpenden, Herts., England.
- B. L. HORECKER, Department of Microbiology, New York University—Bellevue Medical Center, New York 16, N.Y., U.S.A.
- G. F. HUMPHREY, C.S.I.R.O. Marine Laboratory, Cronulla, Sydney, Australia.
- E. F. JANSEN, U.S. Department of Agriculture, 800 Buchanan Street, Albany 10, Calif., U.S.A.
- W. T. JENKINS, Department of Biochemistry, University of California, Berkeley 4, Calif., U.S.A.
- P. C. JOCELYN, Department of Clinical Chemistry, Royal Infirmary, Edinburgh, Scotland.

- MARY ELLEN JONES, Graduate Department of Biochemistry, Brandeis University, Waltham 54, Mass., U.S.A.
- N. R. JONES, Torry Research Station, Aberdeen, Scotland.
- E. P. KENNEDY, Department of Biochemistry, The University of Chicago, Chicago 37, Ill., U.S.A.
- S. C. KINSKY, Department of Pharmacology, Washington University School of Medicine, St. Louis 10, Mo., U.S.A.
- H. KLENOW, Biokemisk Afdeling, Fibiger-Laboratoriet, Copenhagen, Denmark.
- D. L. KLINE, Department of Physiology, Yale University School of Medicine, New Haven 11, Conn., U.S.A.
- W. KLYNE, Department of Chemical Pathology, Postgraduate Medical School, Ducane Road, London W.12, England.
- C. A. KNIGHT, Virus Laboratory, University of California, Berkeley, Calif., U.S.A.
- E. KNIGHT, JR., Biochemical Laboratories, Department of Chemistry, University of Illinois, Urbana, Ill., U.S.A.
- W. E. KNOX, Cancer Research Institute, New England Deaconess Hospital, Boston 15, Mass., U.S.A.
- H. L. KORNBERG, Department of Biochemistry, South Parks Road, Oxford, England.
- H. W. KOSTERLITZ, Physiology Department, Marischal College, Aberdeen, Scotland.
- C. C. KRATZING, Department of Physiology, University of Queensland, St. Lucia, Brisbane, Australia.
- E. KUN, University of California Medical Center, San Francisco 22, Calif., U.S.A.
- H. LASER, The Molteno Institute, Downing Street, Cambridge, England.
- M. LASKOWSKI, Department of Biochemistry, Marquette University School of Medicine, Milwaukee 3, Wis., U.S.A.
- G. H. LATHE, Department of Chemical Pathology, The School of Medicine, Leeds 2, England.
- A. A. LEACH, The British Gelatine and Glue Research Association, 2a Dalmeny Avenue, London N.7, England.
- L. F. LELOIR, Instituto de Investigaciones Bioquimicas, Fundación Campomar, Obligado 2490, Buenos Aires, Argentina.
- I. LESLIE, Department of Biochemistry, Queen's University, Belfast, Northern Ireland.
- I. LIEBERMAN, Department of Microbiology, University of Pittsburgh School of Medicine, Pittsburgh 13, Pa., U.S.A.
- C. LONG, Biochemistry Division, Royal College of Surgeons of England, London W.C.2, England.
- R. M. LOVE, Torry Research Station, Aberdeen, Scotland.
- G. A. LUMB, Department of Medicine, The Royal Infirmary, Manchester 13, England.
- F. LUNDQUIST, Universitetets Retsmedicinske Institut, Copenhagen, Denmark.
- W. D. McELROY, McCollum-Pratt Institute, The Johns Hopkins University, Baltimore 18, Md., U.S.A.
- R. W. MCGILVER, Department of Biochemistry, University of Virginia School of Medicine, Charlottesville, Va., U.S.A.
- I. MACINTYRE, Department of Chemical Pathology, Postgraduate Medical School, Ducane Road, London W.12, England.

LIST OF CONTRIBUTORS

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- DWIGHT B. MCNAIR SCOTT, Cancer Chemotherapy Laboratory, University of Pennsylvania, Philadelphia 4, Pa., U.S.A.
- A. C. MAEHLY, Government Laboratory for Forensic Chemistry, Stockholm 60, Sweden.
- H. R. MAHLER, Department of Chemistry, Indiana University, Bloomington, Ind., U.S.A.
- D. J. MANNERS, Department of Chemistry, West Mains Road, Edinburgh 9, Scotland.
- L. W. MAPSON, Low Temperature Research Station, Downing Street, Cambridge, England.
- C. A. MARSH, The Rowett Research Institute, Bucksburn, Aberdeenshire, Scotland.
- N. H. MARTIN, Chemical Pathology Department, St. George's Hospital Medical School, London S.W.1, England.
- V. MASSEY, Department of Biochemistry, The University, Sheffield 10, England.
- G. A. MAW, Chemist's Laboratory, Arthur Guinness, Son & Co. Ltd., St. James's Gate, Dublin, Eire.
- A. H. MEHLER, Department of Health, Education and Welfare, National Institutes of Health, Bethesda 14, Md., U.S.A.
- C. MELVILLE, Department of Pharmacy, The University, Manchester 13, England.
- C. F. MILLS, The Rowett Research Institute, Bucksburn, Aberdeenshire, Scotland.
- M. D. MILNE, Postgraduate Medical School, Ducane Road, London W.12, England.
- C. J. O. R. MORRIS, Department of Experimental Biochemistry, The London Hospital Medical College, London E.1, England.
- R. K. MORTON, Department of Agricultural Chemistry, The University of Adelaide, Adelaide, South Australia.
- A. NAKAO, Veterans Administration Hospital, Palo Alto, Calif., U.S.A.
- A. NASON, McCollum-Pratt Institute, The Johns Hopkins University, Baltimore 18, Md., U.S.A.
- J. B. NEILANDS, Department of Biochemistry, University of California, Berkeley 4, Calif., U.S.A.
- G. D. NOVELLI, Oak Ridge National Laboratory, Oak Ridge, Tenn., U.S.A.
- H. E. NURSTEN, Department of Leather Industries, The University, Leeds 2, England.
- J. H. OTTAWAY, Department of Biochemistry, University New Buildings, Teviot Row, Edinburgh 8, Scotland.
- C. W. PARR, Department of Biochemistry, The London Hospital Medical College, London E.1, England.
- R. PASSMORE, Department of Physiology, University New Buildings, Teviot Place, Edinburgh 8, Scotland.
- G. W. E. PLAUT, Laboratory for the Study of Hereditary and Metabolic Disorders, University of Utah, Salt Lake City 12, Utah, U.S.A.
- G. POPJÁK, M.R.C. Experimental Radiopathology Research Unit, Hammersmith Hospital, London W.12, England.
- R. R. PORTER, National Institute for Medical Research, Mill Hill, London N.W.7, England.
- E. RACKER, The Public Health Research Institute of the City of New York, Inc., New York 9, N.Y., U.S.A.
- S. L. RANSON, Botany Department, King's College, Newcastle upon Tyne 1, England.

LIST OF CONTRIBUTORS

- SARAH RATNER, The Public Health Research Institute of the City of New York, Inc., New York 9, N.Y., U.S.A.
- E. REID, Chester Beatty Research Institute, Royal Cancer Hospital, London S.W.3, England.
- H. J. ROGERS, National Institute for Medical Research, Mill Hill, London N.W.7, England.
- O. ROSENTHAL, Harrison Department of Surgical Research, University of Pennsylvania, Philadelphia 4, Pa., U.S.A.
- A. B. ROY, Department of Biochemistry, University of Adelaide, Adelaide, Australia.
- K. SAVARD, Department of Medicine, University of Miami School of Medicine, Miami 36, Fla., U.S.A.
- W. C. SCHNEIDER, Department of Health, Education and Welfare, National Institutes of Health, Bethesda 14, Md., U.S.A.
- M. P. SCHULMAN, Department of Biochemistry, State University of New York, Syracuse 10, N.Y., U.S.A.
- J. J. SCOTT, Department of Chemical Pathology, St. Mary's Hospital Medical School, London W.2, England.
- H. S. A. SHERRATT, Department of Medical Biochemistry and Pharmacology, The Medical School, Birmingham 15, England.
- F. B. SHORLAND, D.S.I.R. Fats Research Laboratory, Wellington, New Zealand.
- I. W. SIZER, Department of Biology, Massachusetts Institute of Technology, Cambridge 39, Mass., U.S.A.
- E. C. SLATER, Laboratorium voor Physiologische Chemie, Universiteit van Amsterdam, Amsterdam, Holland.
- M. W. SLEIN, U.S. Army Biological Warfare Laboratories, Fort Detrick, Frederick, Md., U.S.A.
- G. H. SLOANE-STANLEY, Biochemistry Division, Royal College of Surgeons of England, London W.C.2, England.
- J. D. SMITH, Molteno Institute, Downing Street, Cambridge, England.
- PAULINE Z. SMYRNIOTIS, Department of Health, Education and Welfare, National Institutes of Health, Bethesda 14, Md., U.S.A.
- C. V. SMYTHE, Research Laboratories, Rohm & Haas Company, Philadelphia 5, Pa., U.S.A.
- W. I. STEPHEN, Department of Chemistry, The University, Birmingham 15, England.
- H. STERN, Division of Chemistry, Department of Agriculture, Ottawa, Canada.
- J. R. STERN, Department of Pharmacology, Western Reserve University School of Medicine, Cleveland 6, Ohio, U.S.A.
- B. A. STONE, Biochemistry Department, Melbourne University, Melbourne, Australia.
- H. J. STRECKER, Department of Biochemistry, Yeshiva University, New York 51, N.Y., U.S.A.
- P. TALALAY, The Ben May Laboratory for Cancer Research, The University of Chicago, Chicago 37, Ill., U.S.A.
- M. B. THORN, Department of Chemistry and Biochemistry, St. Thomas's Hospital Medical School, London S.E.1, England.
- W. V. THORPE, Department of Physiology, The Medical School, Birmingham 15, England.
- M. F. UTTER, Department of Biochemistry, Western Reserve University School of Medicine, Cleveland 6, Ohio, U.S.A.

LIST OF CONTRIBUTORS

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- RUTH VAN HEYNINGEN, Nuffield Laboratory of Ophthalmology, Walton Street, Oxford, England.
- J. B. WALKER, Department of Biochemistry, Baylor College of Medicine, Houston 25, Texas, U.S.A.
- T. P. WANG, Institute of Physiology and Biochemistry, Academia Sinica, Shanghai, China.
- G. WEBER, Department of Biochemistry, The University, Sheffield 10, England.
- A. WEISSBACH, Department of Health, Education and Welfare, National Institutes of Health, Bethesda 14, Md., U.S.A.
- W. J. WHELAN, The Lister Institute of Preventive Medicine, London S.W.1, England.
- ELSIE M. WIDDOWSON, Department of Experimental Medicine, Cambridge, England.
- A. P. WILKINSON, Department of Botany, King's College, London, England.
- M. WINITZ, Laboratory of Biochemistry, National Institutes of Health, Bethesda 14, Md., U.S.A.
- I. D. P. WOOTTON, Department of Chemical Pathology, Postgraduate Medical School, Ducane Road, London W.12, England.
- M. H. YEOMAN, Department of Botany, University of Edinburgh, Edinburgh, Scotland.

PREFACE

The aim of this Handbook is to present, in concise form, factual biochemical information of the most reliable kind. So far as possible, opinions and suggestions are not included. Many of the data are quantitative and given in the form of tables; some, however, are mainly qualitative, especially in the section devoted to enzymology, where the facts, as at present understood, are given as text.

The Handbook has been designed for the most part to serve as a source of material for research biochemists, but there are many sections which should also prove valuable to teachers of biochemistry. In addition, there is much that should interest workers in related disciplines, including physical and organic chemistry, physiology, botany, zoology, clinical chemistry, pathology, agriculture and medicine.

There are five major divisions, *viz.*, chemical (physical and organic), enzymological, metabolic, analytical and physiological (including nutritional). The contributors number one hundred and seventy-one, and are drawn mainly from the United States, United Kingdom and British Commonwealth. Unfortunately, not all the promised articles were received, but about 90% were ultimately submitted and are included. It is hoped that the most notable omissions will be made good in subsequent editions.

EARL J. KING
CYRIL LONG
WARREN M. SPERRY

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INTRODUCTION

To a large extent, the choice of topics covered by the *Biochemists' Handbook* has been dictated by their suitability for concise description in quantitative or qualitative terms. In particular, interpretations or possible explanations of data which are at present subjects for discussion or argument have been virtually excluded. It does not follow, however, that all the conclusions and quantitative information given are in any sense final. With the present rate of development of biochemical observations there is no doubt that many of the data will have to undergo modification. Nevertheless, the facts stated and views expressed are believed to represent general biochemical knowledge and opinion for the years 1958 and 1959.

Scope

The Handbook is divided into six main sections, dealing with (1) chemical data; (2) individual enzymes; (3) metabolic pathways; (4) chemical composition of animal tissues and body fluids; (5) chemical composition of plant tissues, and (6) physiological, including nutritional, data.

Most of the chemical section is devoted to physicochemical topics. The organic part is necessarily rather short because of the existence of several handbooks and dictionaries which already cover this subject. In the original plan it had been intended to include about thirty or forty tables, each devoted to one class of organic compound of biochemical importance, *e.g.* monosaccharides, amino acids, purines, pyrimidines, fatty acids, etc., together with an additional large table to cover those substances not listed in the separate tables, and which are in frequent use by biochemists. Unfortunately, this could not be achieved in time for publication, but it is hoped to include such tables in a Second Edition.

The individual enzymes, nearly 300 in all, have been classified into several sub-sections, *e.g.* hydrolases, dehydrogenases, transferases, etc. This division is not to be regarded as absolute, for many of the enzymes have reaction patterns which could place them in more than one group; thus, invertase and alkaline phosphatase could be considered either as hydrolytic or transferring enzymes. In any case, such a classification loses much of its importance in a volume of this kind, from which information will probably be sought mainly through use of the index.

Most of the well-established metabolic pathways are described, though it seems likely that this is the section of the Handbook which will receive greatest expansion in the Second Edition. In planning this section, the needs of teachers of biochemistry, as well as research workers, were borne in mind.

In the section on the chemical composition of animal tissues and body fluids, the division has been made between one tissue and another; in the plant section, however, the division has been made between one type of chemical constituent and another. It is probably fair to say that plant biochemistry, which has been over-shadowed in the past by animal biochemistry, has been given somewhat greater prominence than is customary.

The final section on physiological and nutritional topics is quite brief, but contains several concise articles which are on the fringe of biochemistry, and should prove useful to workers in allied fields.

INTRODUCTION

Conventions

Although there are a few differences, the main conventions are those of the *Biochemical Journal*. These, in general, follow the suggestions made by the various committees of the International Union of Pure and Applied Chemistry. Isotope conventions differ somewhat from those currently in use in the United States, but there should be no ambiguity. This question is referred to on pp. 176-177 in the sub-section on Organic Nomenclature. This latter article was brought up-to-date at the galley-proof stage and includes the changes introduced during 1959. However, it was not possible in the limited time available to alter the nomenclature used in the rest of the Handbook.

References

Abbreviations of periodicals given in the World List have been used. Various methods have been adopted for setting out the references in the different articles. In short sections, the reference is normally stated in full at first mention; subsequently, only the names of authors and the date are given. In this way a considerable saving of space has been achieved. With longer contributions, and with tables, the references have usually been collected together at the end of the article or table.

Not all the facts given in the Handbook are documented with references, as this might tend to make the book too cumbersome to use. Where references are given, priority of discovery has not always been indicated, the references cited having largely been chosen in order to give the greatest amount of information.

Index

The best possible use can be made of a Handbook only when the index is very complete. Nevertheless, considerable selection has been found necessary. Thus many enzymes are inhibited by fluoride ions, or activated by magnesium ions. This and other similar information is not indicated in the index, for the lists so prepared would have been too extensive, and in any case it is doubtful if any reader would require to know exactly which enzymes were affected in this way.

In spite of these limitations, the index contains about 8800 entries, and it is unlikely that any serious omissions have occurred.

C. LONG

ABBREVIATIONS

The following list comprises those abbreviations which are most frequently used. Others are explained in the text.

ACh	acetylcholine
ADP	adenosine diphosphate
AMP	adenosine 5'-monophosphate
ATP	adenosine triphosphate
BAL	2 : 3-dimercaptopropanol
CDP	cytidine diphosphate
CMP	cytidine monophosphate
CoASH	coenzyme A
CTP	cytidine triphosphate
DHAP	dihydroxyacetone phosphate
DNA	deoxyribonucleic acid
DNAP	deoxyribonucleic acid phosphorus
DNP	2 : 4-dinitrophenol
DPGA	diphosphoglyceric acid
DPN	diphosphopyridine nucleotide
DPN ⁺	diphosphopyridine nucleotide (oxidized form)
DPNH	diphosphopyridine nucleotide (reduced form)
DPT	diphosphothiamine (cocarboxylase)
EDTA	ethylenediamine tetra-acetic acid
E 4-P	erythrose 4-phosphate
FAD	flavinadenine dinucleotide
F 1 : 6-diP	fructose 1 : 6-diphosphate
FMN	flavin mononucleotide
F 6-P	fructose 6-phosphate
GDP	guanosine diphosphate
GMP	guanosine monophosphate
α-GP	α-glycerophosphate
G 1-P	glucose 1-phosphate
G 3-P	glyceraldehyde 3-phosphate
G 6-P	glucose 6-phosphate
GPC	glycerylphosphorylcholine
GPE	glycerylphosphorylethanolamine
GSH	reduced glutathione
GSSG	oxidized glutathione
GTP	guanosine triphosphate
IDP	inosine diphosphate
IMP	inosine monophosphate
ITP	inosine triphosphate
NMN	nicotinamide mononucleotide
OAA	oxaloacetic acid

PBG	porphobilinogen
PC	phosphorylcholine
PCMB	<i>p</i> -chloromercuribenzoate
PE	phosphorylethanolamine
PEP	phosphoenolpyruvic acid
6-PG	6-phosphogluconic acid
3-PGA	3-phosphoglyceric acid
Pi	inorganic orthophosphate
PP	inorganic pyrophosphate
PRPP	5-phosphoribosylpyrophosphate
RNA	ribonucleic acid
RNAP	ribonucleic acid phosphorus
R 5-P	ribose 5-phosphate
Ru 5-P	ribulose 5-phosphate
Su 1 : 7-diP	sedoheptulose 1 : 7-diphosphate
Su 7-P	sedoheptulose 7-phosphate
THFA	tetrahydrofolic acid
TPN	triphosphopyridine nucleotide
TPN ⁺	triphosphopyridine nucleotide (oxidized form)
TPNH	triphosphopyridine nucleotide (reduced form)
TPP	thiamine pyrophosphate (cocarboxylase)
UDP	uridine diphosphate
UDPG	uridine diphosphate glucose
UDPGal	uridine diphosphate galactose
UMP	uridine monophosphate
UTP	uridine triphosphate
Xu 5-P	xylulose 5-phosphate

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