

GASTRO- INTESTINAL PATHOLOGY

**BASIL C. MORSON
I.M.P. DAWSON**

**Blackwell
Scientific
Publications**

Oxford

London

Edinburgh

Melbourne

Second edition

GASTROINTESTINAL PATHOLOGY

Basil C. Morson

*V.R.D., M.A., D.M., F.R.C.P., F.R.C.S., F.R.C.PATH.
Consultant Pathologist and Director of Research Department,
St. Mark's Hospital, London
Consultant in Pathology to the Royal Navy*

Ian M.P. Dawson

*M.A., M.D., F.R.C.P., F.R.C.PATH.
Professor of Pathology, University of Nottingham Medical School,
Queen's Medical Centre, Nottingham
Honorary Consultant Pathologist, Nottinghamshire Area Health Authority (Teaching)*

with a contribution by

Arthur I. Spriggs

*D.M., F.R.C.P., F.R.C.PATH.
Consultant Cytologist, Laboratory of Clinical Cytology,
Churchill Hospital, Oxford*

Foreword to the First Edition by

Sir Francis Avery Jones

*C.B.E. M.D.(Lond.), Hon. M.D.(Melbourne), F.R.C.P.
Physician, Central Middlesex Hospital
Consulting Gastroenterologist to St. Mark's Hospital for Diseases
of the Rectum and Colon, and to the Royal Navy*

SECOND EDITION

BLACKWELL SCIENTIFIC PUBLICATIONS
OXFORD LONDON EDINBURGH MELBOURNE

© 1972, 1979 Blackwell Scientific Publications
Osney Mead, Oxford,
8 John Street, London WC1
9 Forrest Road, Edinburgh,
214 Berkeley Street, Carlton, Victoria 3053, Australia

All rights reserved. No part of this publication
may be reproduced, stored in a retrieval system,
or transmitted, in any form or by any means,
electronic, mechanical, photocopying, recording
or otherwise without the prior permission of
the copyright owner.

First published 1972
Revised reprint 1974
Second Edition 1979

Morson, Basil Clifford
Gastrointestinal pathology.—2nd ed.
I. Gastroenterology
I. Title II. Dawson, Ian Michael Pudsey
616.3'3'07 RC803
ISBN 0-632-00284-0

Distributed in U.S.A. by
Blackwell Mosby Book Distributors,
11830 Westline Industrial Drive,
St. Louis, Missouri 63141,
and in Canada by
Blackwell Mosby Book Distributors,
86 Northline Road, Toronto,
Ontario, M4B 3E5
and in Australia by
Blackwell Scientific Book Distributors
214 Berkeley Street, Carlton
Victoria 3053

Printed and bound in Great Britain by
Spottiswoode Ballantyne Ltd.
Colchester and London

GASTROINTESTINAL PATHOLOGY

DEDICATED to our wives and children
from whom we stole the necessary
time and energy to write this book.

Foreword to the First Edition

This book is the first comprehensive account of the pathology of the gastrointestinal tract, and it has been written by two pathologists whose work brings them in close daily contact with the clinical problems which concern their medical and surgical colleagues. The result is a book which sets out the basis of gastroenterology in terms of macroscopic and microscopic changes which have been put in a setting of clinical perspective. Undoubtedly pathologists will find this book valuable but those who will also benefit from it are younger clinical gastroenterologists building up their speciality and this book will give them the essential foundations for their further knowledge. It will be of value for practising clinical gastroenterologists particularly when confronted with either problem cases or before taking part in staff rounds. The references are particularly recent, with a notable number coming from the clinical journals, and these will be much welcomed by those who are writing papers. In spite of their number they do not dominate the text which comes through as the personal record of the two authors, based on their immense experience. Gastroenterology has progressed extremely rapidly in recent years, largely as the result of new techniques of investigation, but it is good to see in this volume that the pathologists as well as the clinicians have now caught up with those who have been pushing forward the frontiers of gastroenterology by advances in alimentary physiology and pharmacology. Today, indeed, in some areas the field of research is now being led by the histopathologists. This book is a most valuable contribution to the present-day practice of gastroenterology.

F.A.J.

Preface to the Second Edition

We began the Preface to the First Edition by saying 'Gastroenterology is a rapidly developing and expanding branch of medicine'. This has proved so true over the last seven years that we have felt compelled to make a major revision of the entire book. Few chapters have remained even marginally unchanged. There has been a large increase in histological descriptive content and in the number of illustrations and references and we have added a chapter on Technical Procedures. Even then, by the time of publication, some sections will be less than up to date.

Once again we would like to record our sincere thanks to all our colleagues and friends, clinicians and pathologists, who have supplied us with the material on which this book is based. In particular we would like to thank the following for their help with part of the text and in providing illustrations: Dr. M. Al-Jafari, Dr. I. D. Ansell, Dr. A. Blackshaw, Dr. Jane Burnett, Dr. H. J. R. Bussey, Dr. T. Chambers, Dr. D. W. Day, Dr. B. Heard, Dr. P. D. James, Dr. R. O. C. Kaschula, Dr. A. Katz, Dr. H. Lederer, Dr. T. Muto and Dr. N. Nakamura of Japan, Dr. A. B. Price, Dr. R. W. Riddell, Dr. G. Robinson, Dr. R. J. Sandry, Dr. G. Sclare, Dr. D. C. Shove, Dr. D. Spencer, Dr. Barbara Smith, Dr. H. Thompson, Professor R. Whitehead and Dr. G. Williams. If we have inadvertently omitted any acknowledgment, we offer our sincere apologies.

Our special gratitude is due to the technical staff of St. Mark's Hospital, especially Mr. Lloyd Soodeen, and of the University Department of Pathology, Nottingham, who so competently processed our routine and research material; to Mr. Bill Brackenbury and Mr. Norman Mackie for their visible photographic skills and invisible but ever-present tolerance; to Miss Dorinda Harwood and Mrs. Joy Nice who have so competently and patiently reduced a litter of hand-written sheets and corrections to an orderly typescript; to Mrs. Margaret Dawson who read the proofs and checked references into the small hours, and lastly, but by no means least to Miss Laila Grieg-Gran and Mr. Peter Saugman of Blackwell Scientific Publications who made publication a much lighter task than it might otherwise have been.

B.C.M.
I.M.P.D.
LONDON, 1979

Preface to the First Edition

Gastroenterology is a rapidly developing and expanding branch of medicine in which histopathology plays an important role in diagnosis and treatment no less than in research. Surgical specimens and biopsy material from the gastrointestinal tract account for a considerable proportion of all the material seen in any department of general histopathology. This book is the outcome of our special interest in both the histopathology and histochemistry of the gastrointestinal tract over the last 20 years during which we have been fortunate enough to have access to a large amount of surgical and biopsy material related to our earlier appointments at the Bland-Sutton Institute of Pathology, the Middlesex Hospital, London, the Department of Pathology in the University of Leeds, and particularly to our current posts at St. Mark's Hospital and within the Westminster Hospital Group. We have directed our attention particularly to Pathologists who require a reference book for use in the laboratory but we hope this book will also be useful to those studying for the final M.R.C.Path or its equivalent. It contains sufficient related clinical and radiological detail, with references, to interest physicians, surgeons and radiologists who either require ready access to information on pathology for diagnostic, teaching or research purposes, or are interested in pathology for its own sake.

Progress in gastroenterology has been so rapid that a textbook can become out of date in some aspects between writing and publication. We have provided lists of references for diseases or groups of diseases at the end of each chapter which are reasonably comprehensive up to the end of 1970; where possible we have selected those references which themselves contain valuable reviews or give a more detailed account of the subject. No one however, can, entirely encompass the rapidly growing literature in gastroenterology and there may inevitably be some omissions.

We would like to record our sincere thanks to all those clinical colleagues without whose help we could not have documented our experience; and we are grateful to all the pathologists, physicians and surgeons who have referred difficult or interesting material to us over the years, providing experience of a special character. We owe particular thanks to Dr. Arthur Spriggs who has contributed the chapter on Cytology from his own vast experience; to Dr. H. J. R. Bussey who has given such stalwart support over many years and to Mr. Norman Mackie, Senior Photographer at St. Mark's Hospital whose technical and artistic skill is evident in many of the photographs. Every histopathologist and histochemist is dependent on the skill of his laboratory technicians and we would like to thank all those who have helped, especially Mr. Lloyd Soodeen, A.I.M.L.T., Mrs. Bhanu Patel, A.I.M.L.T., and Miss Jane Hepple.

We are grateful to the following for providing illustrations: Dr. R. J. Sandry, Dr. Barbara Smith, Dr. R. Whitehead, Dr. Jane Burnett, Dr. H. Lederer, Dr. D. Spencer and the photographic department of Westminster Hospital Medical School. Dr. J. Gleeson kindly

advised us on the value of radiology in malabsorption syndromes. The photographs and charts of carcinoma of the stomach are reproduced by permission of the Editor of the *British Journal of Surgery*. If we have inadvertently omitted any acknowledgment we offer our apologies. Our special thanks must go to Miss Jill Ashby (now Mrs. Griffith-Jones) who typed and retyped the seemingly endless pages of semi-legible manuscript efficiently and cheerfully; and to Mrs. Marion Cook who compiled the index for us. We are indebted to Mr. Per Saugman and Mr. J. L. Robson of Blackwell Scientific Publications for their courteous and enthusiastic cooperation. Finally, as our dedication appropriately indicates, we thank our wives and children who will be no less glad than we are that twelve years of reading, writing and proof reading have come to an end.

B.C.M.
I.M.P.D.
LONDON, 1972

Contents

Foreword to the First Edition ix

Preface to the Second Edition xi

Preface to the First Edition xiii

SECTION 1 OESOPHAGUS

- 1 Normal Oesophagus 3
- 2 Developmental Abnormalities 8
- 3 Muscular Disorders 15
- 4 Oesophagitis 21
- 5 Tumours 33
- 6 Miscellaneous Conditions 58
- 7 Biopsy Interpretation 61

SECTION 2 STOMACH

- 8 Normal Stomach 67
- 9 Developmental Abnormalities 77
- 10 Gastritis 91
- 11 Peptic Ulceration 123
- 12 Benign Epithelial Tumours and 'Polyps' 140
- 13 Malignant Epithelial Tumours 148
- 14 Non-Epithelial Tumours 187
- 15 Miscellaneous Conditions 200
- 16 Gastric Biopsy Interpretation 207

SECTION 3 SMALL INTESTINE

- 17 Normal Small Intestine 211
- 18 Developmental Abnormalities 234
- 19 Mechanical Disorders 267
- 20 Inflammatory Disorders 272
- 21 Intestinal Malabsorption 337
- 22 Vascular Disorders 380
- 23 Tumours 400

24	Miscellaneous Conditions	433
25	Biopsy Interpretation	442
SECTION 4 APPENDIX		
26	Normal Appendix	449
27	Developmental Abnormalities	452
28	Inflammatory Disorders	455
29	Tumours	466
30	Miscellaneous Conditions	480
SECTION 5 LARGE INTESTINE		
31	Normal Large Intestine	485
32	Developmental Abnormalities	494
33	Inflammatory Disorders	512
34	Mechanical Disorders	575
35	Muscular Disorders	581
36	Vascular Disorders	594
37	Differential Diagnosis of Polyps and Polyposis	607
38	Adenomas and the Adenoma-Carcinoma Sequence	615
39	Adenocarcinoma and Other Malignant Epithelial Tumours	648
40	Non-Epithelial Tumours	681
41	Miscellaneous Conditions	693
42	Biopsy of the Colon and Rectum	708
SECTION 6 ANAL REGION		
43	Normal Anal Region	715
44	Inflammatory Disorders	719
45	Vascular Disorders	730
46	Tumours of the Anorectal Region	735
SECTION 7 CYTODIAGNOSIS		
47	Cytodiagnosis in Gastroenterology, <i>A. I. Spriggs</i>	759
SECTION 8 TECHNICAL METHODS		
48	Technical Methods	781
	Index	791

SECTION 1
OESOPHAGUS

Chapter I

Normal Oesophagus

ANATOMY AND PHYSIOLOGY

The oesophagus is a muscular tube about 25 cm long extending from the pharynx at the cricoid cartilage opposite the sixth cervical vertebra to the cardia about 2.5 cm to the left of the midline opposite the tenth or eleventh dorsal vertebra. For oesophagoscopists, the distance from the incisor teeth to its beginning is about 15 cm, and to the cardia about 40 cm. It pierces the left crus of the diaphragm and has an intra-abdominal portion about 1.5 cm in length. Its principal relations, important to the pathologist in the local spread of cancer, are with the trachea, the left main bronchus, the aortic arch and descending aorta, and the left atrium. It is supplied by the inferior thyroid, bronchial, left phrenic and left gastric arteries as well as by small twigs direct from the aorta, while its veins form a well-developed submucous plexus draining into thyroid, azygos, hemiazygos and left gastric veins, so providing an important link between systemic and portal systems. Lymphatic channels from the pharyngeal region and upper third drain to the deep cervical nodes either directly or through paratracheal nodes; some also drain to the infrahyoid nodes. From the lower two-thirds they drain to posterior mediastinal (para-oesophageal) nodes and thence to the thoracic duct, while from the infradiaphragmatic portion they drain to the left gastric nodes and to a ring of nodes around the cardia. Some lymph vessels may reach the thoracic duct directly. In its upper part the oesophagus receives a nerve supply from the glossopharyngeal nerve, and throughout its length it is supplied by fibres from the vagus and local sympathetic ganglia.

The mechanisms of swallowing food and drinking are not fully understood: they involve the musculature at both ends of the tube. The action of the cricopharyngeal sphincter has been fully investigated in humans and dogs [1]. The two cricopharyngeus muscles arise anteriorly from the cricoid cartilage, probably as a modification of the circular muscle coat of the upper oesophagus, which is here striated, and interweave posteriorly to form a sling: there is good evidence that their nerve supply is from the pharyngeal branch of the vagus rather than the recurrent laryngeal branch, since they are not affected in vocal cord paralyses. On swallowing, there appears to be an initial relaxation of this normally tonic sling, then a marked contraction, followed by a partial relaxation to the resting state,

though it remains sufficiently tonic to resist oesophageal regurgitation. The bolus of food passes through in the initial relaxation phase, propelled by the tongue and assisted normally by gravity, and the tonic wave then passes along the pharynx to clear the hind part of the bolus. The whole reflex is mediated by the pharyngeal vagus.

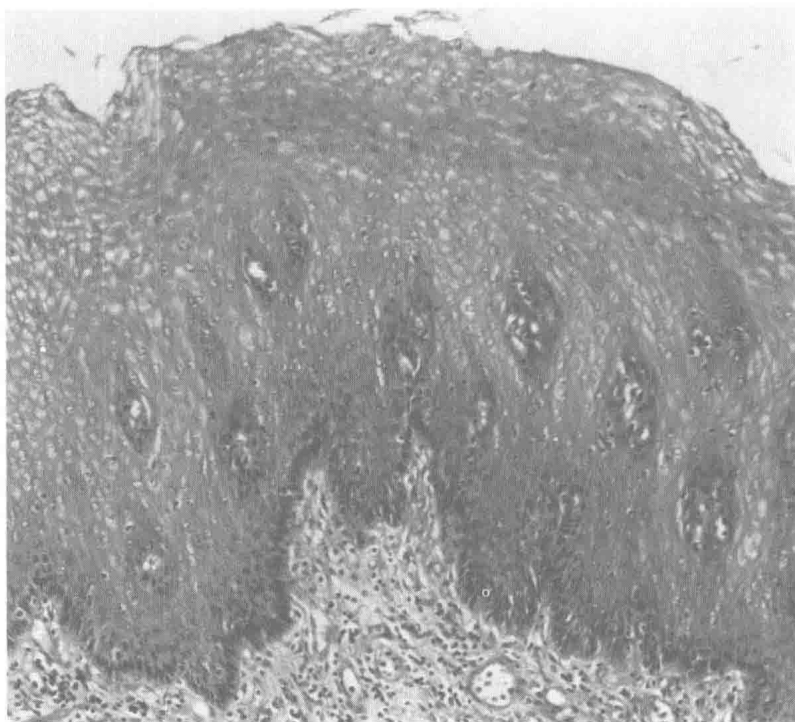


FIG. 1.1. Normal oesophageal squamous epithelium in biopsy specimen. Note the thickness of the basal cell layer and the height of the papillae. Compare with Fig. 4.2.

The lower end of the oesophagus is anchored posteriorly to the pre-aortic fascia and is surrounded by the phreno-oesophageal ligament, which blends with the muscle of the oesophagus. This system allows some degree of movement and rebound. Dissection studies seem to indicate that no anatomical sphincter is present [2], but a functional sphincter or sling exists and the lower end functions as an efficient one-way valve of flutter type [3]. Cineradiography shows that following a single swallow there is hold-up at the oesophago-gastric junction associated with raised oesophageal pressure; this relaxes to allow emptying before the peristaltic wave reaches the junction [4]. In continuous drinking no such hold-up occurs. This also suggests a functional sphincteric mechanism, active during swallowing but inhibited during drinking, perhaps by preliminary diaphragmatic movement. Considerable doubt exists as to how much the angle at which oesophagus and stomach meet contributes to the control of gastro-oesophageal reflux [5]. The problem has been extensively reviewed [6].

HISTOLOGY

Virtually the whole of the oesophagus is lined by stratified, non-keratinising squamous epithelium, in which melanoblasts are present [7]. There is a recognisable basal cell layer which forms up to 15% of the total epithelial thickness and papillae of connective tissue which project upwards into the epithelium to a distance of 65% of the total epithelial thickness (Fig. 1.1). These measurements have some significance in the detection of early reflux oesophagitis [8, 9] (see p. 25). Argyrophil cells are present in the basal cell layer but not in ducts or glands [9a]. At its lower end the papillae and rete pegs are arranged longitudinally to form visible surface ridges and there is an abrupt change to cardiac mucosa [2], which does not normally contain peptic or oxyntic cells [10] and forms a transitional zone at the junction with the stomach. This change occurs at about diaphragmatic level—that is, about 1.5 cm above the lower end of the anatomical

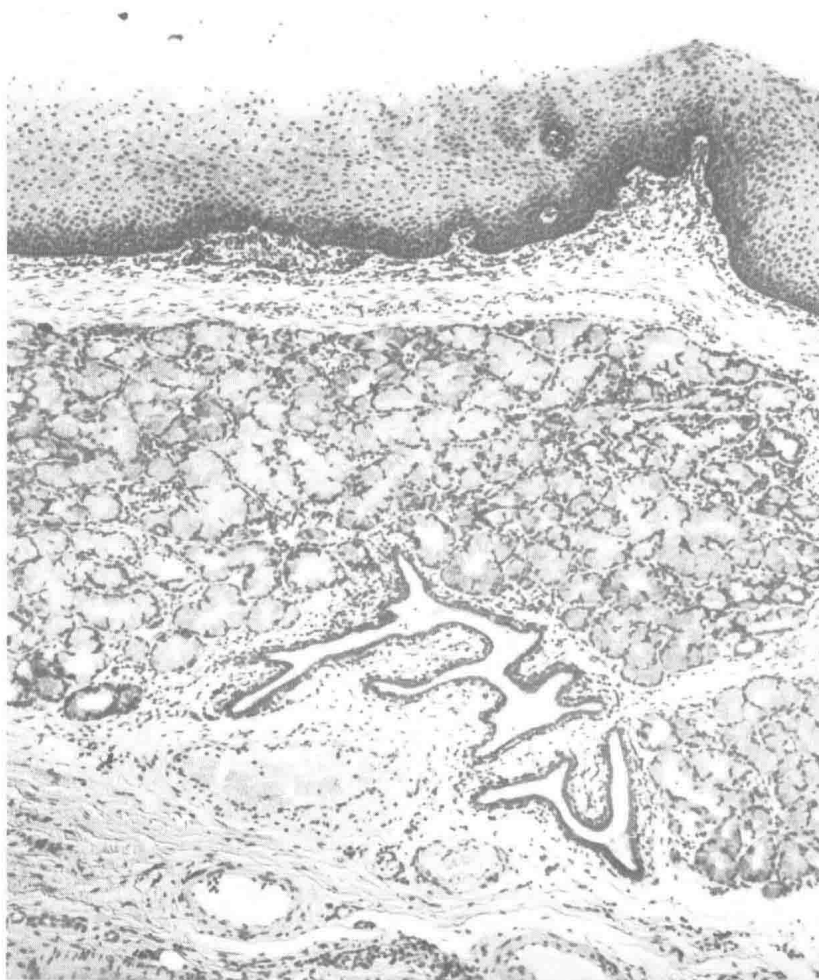


FIG. 1.2. Normal oesophageal mucous gland and duct. H & E, $\times 40$.

oesophagus—and shows as an irregular junctional line of grey and pink mucosa visible to the naked eye. Distally the simple cardiac glands gradually blend with those of normal fundal type. The muscularis mucosae has a variable pattern. Commonly, in the upper part it consists of isolated or irregularly arranged muscle bundles rather than a continuous sheet, but in the middle and lower thirds it forms a continuum of longitudinal and transverse fibres, often thicker than elsewhere in the gastrointestinal tract. It may become thinner again at the cardia.

The submucosa is wide. It contains the oesophageal mucous glands (Fig. 1.2) and a ramifying lymphatic plexus in a loose connective-tissue network, which accounts for the early and extensive submucosal spread of oesophageal carcinoma. The glands tend to be arranged in rows parallel to the long axis [11]. They are acinar, tubular and mucus-secreting, and form lobules; from two to five lobules drain into a common duct lined by stratified columnar epithelium which passes obliquely downwards through the muscularis mucosae into the lumen; their number and position appear to be subject to wide variation. Aggregates of lymphoid tissue, which are variable in number in the oesophageal submucosa, are found surrounding mucous gland ducts. No polymorphonuclear leucocytes are normally present.

The main muscle layer of the oesophagus is composed of well-developed circular and longitudinal coats. In the upper part these are striated, with a gradual change to smooth muscle in the middle part; in the lower third both coats are entirely smooth muscle and continue into gastric muscle without evidence of a sphincter [2]. A well-marked myenteric plexus is present between the circular and longitudinal coats at all levels, but there does not appear to be any submucosal plexus [2]. There is good evidence, based on studies of thick sections using silver impregnation and cholinesterase techniques, that two types of neurone are present [11, 12]. One is argyrophil, multi-axonal and sends numerous dendrites and axons to surround other neurones in the same and adjacent ganglia, but does not supply muscle cells directly. The second is non-argyrophil and cholinergic and supplies the muscle of the oesophagus; it is probable that the first acts as a controlling mechanism to coordinate muscular movements in swallowing, while the second is motor in function. There are two sets of oesophageal lymphatic channels, one in the submucosa, and one in the muscle coats [13]. This dual drainage is important in the early submucosal spread of oesophageal cancer.

REFERENCES

ANATOMY AND PHYSIOLOGY

- [1] LUND W.S. (1965) A study of the cricopharyngeal sphincter in man and in the dog. *Ann. R. Coll. Surg.*, **37**, 225.
- [2] LENDRUM A.C. (1937) Anatomic features of the cardiac orifice of the stomach. With special reference to cardiospasm. *Archs intern. Med.*, **59**, 474.
- [3] COLE G.J. (1968) Oesophagitis. *Hospital Medicine*, **2**, 1321.
- [4] CREAMER B., PIERCE J.W. (1957) Observations on the gastrooesophageal junction during drinking and swallowing. *Lancet*, **ii**, 1309.