LABORATORY MEDICINE—HEMATOLOGY

JOHN B. MIALE

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JOHN B. MIALE, M.D.

Professor of Pathology, University of Miami School of Medicine, and Director of Clinical Pathology, Jackson Memorial Hospital, Miami, Florida

One Hundred Ninety-two Illustrations and Nine Plates, Including Five in Colour

HENRY KIMPTON *LONDON* *1958*

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To
Marjorie and Beth

FOREWORD

That the practice of medicine is both an art and a science is a truism often repeated, but usually without thoughtful interpretation of its real meaning in terms of current life and medical practice. It is true now, as through recorded ages, that the physician is good only to the degree that he can apply skill and knowledge in relation to an individual's life, health, and disease. The physician's skill in the art of applying his knowledge to an individual, based on unchanging human nature, is dependent largely on human and humane personal relationships between physician and patient. In this skillful art there is probably little difference between ancient and modern medical practice, and perhaps not too much difference between the medicine man and the physician.

The practice of the modern physician differs in the knowledge and science he has at his command. Knowledge of the individual's illness gained by sight and sound and feel has been incomparably deepened, broadened, and sharpened by laboratory procedures of great variety. Some are simple and easily performed, some require expert and specialized technical skill, and many are dependent upon special instrumentation. Therapy likewise has advanced from bloodletting and exhibition of herbalistic concoctions to transfusion of blood and its derivatives and use of antibiotics, hormones, vitamins, synthetic chemicals, and radioisotopes. Modern therapy, and its wise control by the physician, is often dependent on laboratory procedures.

Medical research and the advances in knowledge and science of the last few decades have revolutionized the practice of medicine within a generation. The physician must have an understanding of many laboratory procedures, and particularly how they are to be used and interpreted in their application to an individual, his life, his continued health, or his illnesses. It is no exaggeration to say that this is a sine qua non for good practice by a physician. The essential role of the laboratory in modern practice seems destined to increase and be more widely recognized.

Laboratory medicine has lagged behind its true role in medical practice in both the general education of physicians and in the evolution of laboratory medicine (or clinical pathology) as a specialty of medical practice. This is not due alone to belated recognition of its role and importance in clinical medicine. It is due also to the depth of scientific and technical training necessary to master various aspects, which has tended to partition laboratory medicine into isolated narrowed areas,

such as chemistry, microbiology, radioisotopes, etc. Despite the difficulty of technical mastery of all the various aspects, it is quite necessary to have unified the concepts, teaching, and use of laboratory procedures applicable to clinical medicine from the correlative and interpretive standpoint. Such cannot be achieved without a broad knowledge of the various laboratory disciplines, and also of clinical medicine in its application and practice.

The present volume on *Hematology,* the first of a series of books on *Laboratory Medicine,* is intended to present laboratory aspects of medical practice for students and physicians. In the best interests of the patient, it is necessary to know what laboratory procedures are available, when they should be used, and how they are to be interpreted. This requires a knowledge both broad and correlated. Lacking this, there tends to be excessive "shotgun" use of laboratory procedures, interpreted by rote, to the detriment of the best practice of medicine. Medical education, whether undergraduate or the continuing education that must be a part of the life of all good physicians, needs a solid knowledge of laboratory medicine. These volumes on *Laboratory Medicine* are a contribution to this objective. Although evolving as a specialty, the practice of clinical pathology is a part of the skill of every modern physician, an essential component of his art and science.

W. A. D. Anderson, M.D.

Miami, Florida

PREFACE

Clinical pathology is the practice of laboratory medicine, a technical and correlative science. As a specialty it is the logical outcome of an increasing dependence on laboratory studies by all branches of medicine.

The early physicians, having mastered the limited medical knowledge of their day, felt equally competent whether cutting, thumping, compounding drugs, or performing simple tests on body fluids. During the last thirty or forty years, however, the accumulation of knowledge has so enlarged the field of medicine as to encourage concentration on special interests. Hence the evolution of medical specialties, which has been regarded by some critics as an undesirable fragmentation both of the physician as a scientist and of the patient as a man. The alarming implication is that eventually neither will exist as a recognizable whole. Actually, subdivisions in medical science are more apparent than real, a convenience rather than a philosophy. Each specialty has been enriched by the simultaneous growth of the others, and each has aided diagnosis and treatment by both specialist and general practitioner.

As they serve each other, pathology serves them all. In this service, laboratory studies play an increasingly important role. The clinical pathologist has the unusual opportunity of coming in contact with the entire field of medicine—at the bedside as well as in the laboratory. He is a specialist who has unlimited scope, a laboratory scientist whose problems originate at the bedside. As a pathologist, his function is to correlate pathologic anatomy, pathologic physiology, and laboratory science with clinical diagnosis and therapeutics and to serve as a consultant to all who seek his help.

This book on *Hematology* and two others in preparation on *Chemical Pathology* and *Microbiology* emphasize the correlation between laboratory and clinical data. It ranges from basic mechanisms to the interpretation of laboratory data in diagnosis and therapy. Only tests which are ordered with discrimination, performed with skill, and interpreted with understanding yield significant data. With this in mind, the present and companion volumes are directed to medical students both in clinical pathology and in the transition to clinical medicine; to clinicians who must appreciate the value and limitations of laboratory data in ordering tests; to pathologists for reference and teaching; and to medical technologists, in whose integrity and skill physicians and patients place their trust.

Following the general introduction in Chapter 1, each chapter represents a convenient unit. The morphology of blood cells is discussed and illustrated in Chapter 2. Most of the cells shown in the plates and illustrations have been photographed from our own material and reproduced at the standard magnification of ×950. The stained cells are from Wright-stained smears. The value and limitations of bone marrow biopsy are discussed in Chapter 3, and the morphology of blood cells is further illustrated by typical cases. Chapter 4 covers the peripheral blood as a whole, followed by individual chapters devoted to erythropoiesis, the structure and function of the erythrocyte, and blood transfusions. Iron-deficiency and macrocytic anemias are considered in Chapter 8 and the pathogenesis and diagnosis of hemolytic anemia in Chapter 9. In Chapter 10 a unified concept of aplastic anemia, polycythemia, and the myeloproliferative syndromes is given to which the discussion of leukopoiesis and diseases of leukopoiesis in Chapter 11 is closely related. Chapter 12 discusses the disorders of hemostasis, a subject of particular interest to me. The methods outlined in the appendix have been carefully selected. They are the methods with which we are most familiar and the discussions reflect our experience with them. This section is meant to provide a ready source of methodology parallel to the discussion in the text, not to replace the standard works which deal primarily with laboratory technic.

It is the function of this book not only to catalog but also to integrate these facts, and, of greater importance, to induce a system of thinking. If an apology is needed for requiring three books in which to cover laboratory medicine, it would be the modern physician's need in a rapidly developing field. This need is for a complete but readable synthesis. The references following each chapter are not meant to authenticate the subject matter or justify the synthesis, but to encourage and guide exploration in the library.

My secretarial staff, particularly Mrs. Sue Newbrey, deserves special mention for the skillful and devoted typing of the manuscript. The technical staff and my colleagues have helped with the section on methodology and with the proofreading. I am particularly indebted to my wife for invaluable editorial assistance.

John B. Miale

Miami, Florida

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