HEMATOLOGY

For the Medical Technologist

CHARLES E. SEIVERD

SECOND EDITION

HEMATOLOGY FOR MEDICAL TECHNOLOGISTS

By

CHARLES E. SEIVERD

Chief Technologist, Doctor's Clinical Laboratory,
Director of Research, The Horizon Laboratories,
Glendale, Arizona

Second Edition, Thoroughly Revised
76 *Illustrations*, 13 *Coloured Plates*

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Contents

Dedicated to the memory of a friend

MAURICE POWERS, M.D.

who lost his life in the service of the
Royal Canadian Mounted Police

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Preface to the Second Edition

THE preparation of a new edition gives an author an opportunity to re-crystallize and possibly purify a small precipitate of knowledge gathered on the filter paper of time. Such an opportunity is appreciated.

The purpose of the book remains the same, that is, to present those aspects of hematology which are significant to the medical technologist.

The material is now divided into 7 chapters. The first chapter deals with the collection and preparation of blood, the next five chapters are concerned with some 27 blood tests, and the final chapter considers the blood picture in various blood diseases.

In the first edition, the contents of the text was established by the simple process of asking students and technicians their thoughts and opinions. These surveys showed that the "consumers" wanted a functional presentation of the subject matter used in their daily work. In addition, they wanted this material presented in a manner which was interesting, clear, and concise. I endeavored to satisfy their wants.

In preparing this edition I was guided by the criticism of reviewers and suggestions from another survey.

I wish to thank the following reviewers for their criticism: Dr. C. A. Pick, Dr. Kurt Stern, Dr. Henry Kimpton, Elsa S. Kumke, Bentley Glass, and Mrs. Addine G. Erskine. I have endeavored to correct the mistakes and to make up the shortcomings mentioned in their reviews.

I appreciate the suggestions of all those who answered the survey. In particular, I wish to thank the following: Dr. R. U. Northrip, Dr. Adelaide E. Evenson, Mr. Bronnie A. Gorski, Miss Clarice Sontag, Dr. Elias Cohen, Mrs. Dale

Pierson, Anna R. Persich, Mrs. Dell Pothier, Portia M. Frederick, Mr. Jay Tannen, and Mrs. Hertz Seletzky. I am especially grateful to Dr. Elias Cohen who wrote detailed suggestions for the entire text.

I also wish to acknowledge the help of the following: Robert Pribbenow, Gerald Henderson, Valerie Mayfield, Gertrude Denning, Ann Brunner, Nick Hoehn, Ruthanne M. Schupick, Jan Kirk, C. Dean Hogarth, and Irene Samolin.

In conclusion, suggestions and criticism from students, technicians, instructors, and physicians would be appreciated.

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Contents

HEMATOLOGY FOR MEDICAL TECHNOLOGISTS

Chapter 1

Collection and Preparation of Blood

THIS book is concerned with the blood tests which are performed in the hematology section of a medical laboratory. These tests are performed to combat disease, restore health, and lengthen life. And the technician, who performs these tests, not only serves a noble cause, but also, plays a leading role in the drama of life . . . death . . . and disease.

This chapter offers a brief discussion of the function and composition of blood and then presents the methods of obtaining and preparing blood for examination.

Function of Blood

The blood may be thought of as the body's most versatile servant. It conveys the raw materials of protoplasm to countless millions of cells operating as factories to manufacture life itself. The cells empty their waste products into its everflowing stream, and this obliging servant carries them to the kidneys and other organs of elimination. Blood aids in regulating the water content, temperature, and alkalinity of the tissues. In time of danger, it serves as a mechanized army, transporting white cells and antibodies to battle infection and disease. Quite often, its factors of coagulation are called upon to help mend an abrasion, laceration, or incision. It transfers hormones from their organs of production to their organs of consumption. In order to discharge these duties, this faithful servant works day and night, traveling endless miles over the highways of an intricate system of arteries, capillaries, and veins.

Composition of the Blood

The average man has about 5 quarts of blood. This can be separated into 2 quarts of cells and 3 quarts of plasma. The cells are solids and the plasma is a liquid.

The cells are classified as white cells, red cells, and platelets. In size, the white cells are largest, next in line are the red cells, and finally the platelets. In quantity, however, the red cells greatly predominate. For every 500 red cells there are approximately 30 platelets and only 1 white cell.

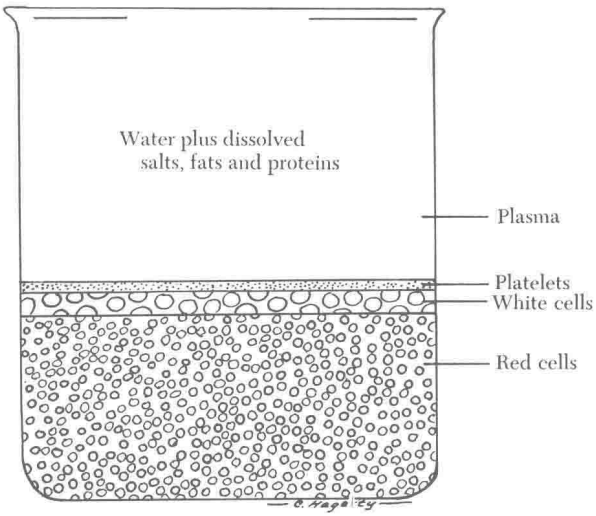


FIG. 1.—Composition of the blood.

The plasma is made up of water and dissolved materials—mainly salts, fats, and proteins. The composition of the blood is illustrated in Figure 1.

COLLECTION OF BLOOD

In order to perform some tests, only a few drops of blood are required. These few drops may be obtained by punc-

turing a finger. For other tests, however, larger amounts are needed and the blood must be obtained from a vein.

This section discusses the methods of obtaining blood from a patient. The material is presented as follows:

Reassuring the Patient
Obtaining Blood from a Finger
Obtaining Blood from a Vein
Obtaining Blood from an Infant

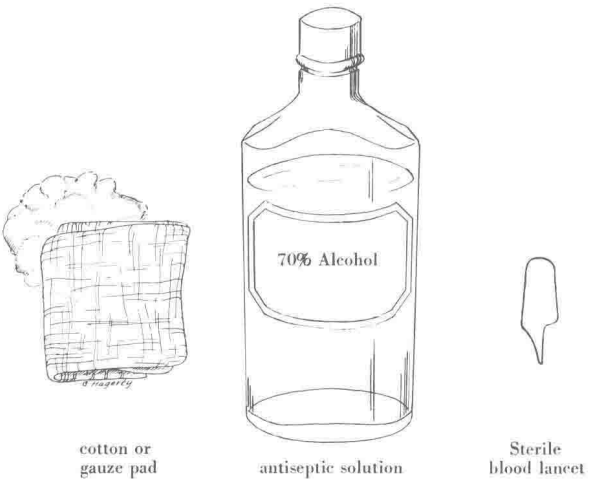


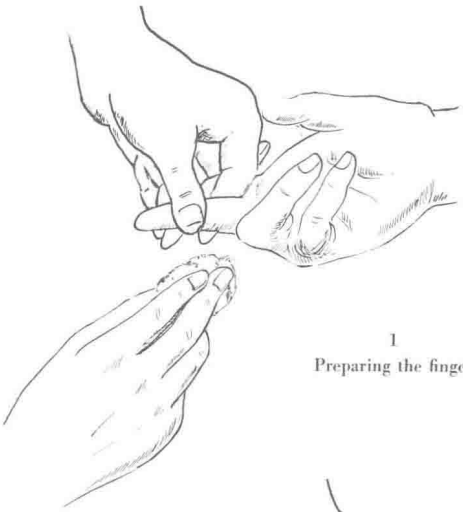
FIG. 2.—Materials needed for finger puncture.

Reassuring the Patient

Reassuring the patient is the first step in obtaining a sample of blood. With adults, this may be accomplished by a pleasant smile, an introductory remark, or simply the stock statement: "This won't hurt very much." Such thoughtful gestures take little time, and are greatly appreciated by the patient. The technician should avoid the attitude: "This is just another job. I've got to get the blood, so brace yourself."

With children, extra care should be taken. Endeavor to win the child's confidence. Ask about his school, games, or

what he wants to be when he grows up. Tell him that it won't hurt any more than being stuck with his mother's sewing needle. A considerate technician usually has little difficulty and the display of thoughtfulness helps to condition the child for any future experiences. On the other hand, a thoughtless technician not only has trouble getting the blood, but may cause the child to harbor a life-long fear of the puncture.



1
Preparing the finger

2
Puncturing the finger