H. Begemann · J. Rastetter

Atlas of Clinical Haematology

Second Edition

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Initiated by L. Heilmeyer and H. Begemann

With an Appendix on Tropical Diseases by W. Mohr

Translated by H. J. Hirsch

With 191 Figures in Color and 17 in Black and White

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HERBERT BEGEMANN, Dr. med., Prof., Chefarzt der I. Medizinischen Abteilung des Städtischen Krankenhauses München-Schwabing, München

JOHANN RASTETTER, Dr. med., Priv.-Doz., Abteilungsvorsteher an der I. Medizinischen Klinik rechts der Isar der Technischen Universität München

WERNER MOHR, Dr. med., Prof., Chefarzt der klinischen Abteilung des Bernhard-Nocht-Institutes für Schiffs- und Tropenkrankheiten, Hamburg

Translator:
H. J. HIRSCH, M. B., B. Ch., F. R. C. Path., London

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Preface to the Second German Edition

15 years have elapsed since the first edition was published. Morphology still is the centre of haematological diagnosis, although functional-dynamic aspects of disease have long since replaced the original static-morphological viewpoints. The panoptic stain of Pappenheim or Wright is still the most important and most frequently employed method for the differentiation of individual cells. But it is hardly any longer conceivable that one standard staining method should decide cytological classification. Recent morphological methods have been added and have improved cytological diagnosis. Above all mention must be made of numerous cytochemical procedures. Their application has become essential to the haematologist. Many of the newly added figures therefore refer to cytochemical findings, but we have intentionally limited ourselves to particularly important and pregnant methods which can be performed in any morphologically oriented laboratory. On the other hand, phase contrast microscopy despite its great scientific value is of no notable significance in daily routine. Excepting one instance – reproduction of phase optic pictures was omitted. Electron optic demonstration of blood cells, which heuristically has opened a new world, is likewise too costly for practical diagnosis. The electron optic pictures of blood cells reproduced in the new edition are merely intended to acquaint the reader with organoid cellular architecture, to enable him to correlate light and electron microscopic pictures thus providing easier understanding of light microscopic pictures of cells. Moreover we deliberately avoided demonstration of bone marrow histology. This has meanwhile become specialized to such an extent that atlases covering this field are now available.

Whereas blood morphology was already very widely spread when this book was first published, cytological examination of other organs has since developed in their own disciplines. To include these to their full merit would have destroyed the range of the present book and exceeded the competence of the authors. That is why we restricted ourselves to cytology of blood and blood forming organs. Furthermore those plates not related to blood in the section on tropical medicine were removed. On the other hand a major portion of tumour aspirates has been retained, this chapter even being enlarged by specially stained photomicrographs. Since spotting and recognition of tumour cells in lymphnodes and bone marrow belong to the daily task of the haematologist.

Otherwise the structure of the book remains unchanged. In the first

section individual cells are demonstrated; here we endeavour to reproduce the complete range of the different cells also in new photomicrographs. The second part is dedicated to haematological pictures of disease. This section also has been enlarged by numerous photomicrographs. Where in the first edition their didactic value was inadequate some figures have been eliminated. Colour pictures of various syndromes have been rearranged where recent experience made this necessary. We trust that the reader will benefit by the synthesis of didactically impressive paintings and objectively valuable photomicrographs.

The text was again intentionally restricted to a minimum. The introductory chapter deals with the technique of puncture and staining. Within the main section the individual syndromes are briefly sketched. Following are figures with their respective brief description. The present Atlas is now far easier to handle and, as we hope, will prove to be more useful for daily reference in the laboratory owing to the limitation to haematology, strict selection of illustrative material and printing of the text alongside the pictures.

We render our thanks to our coauthors M. Bessis in Paris and W. Mohr in Hamburg for their cooperation in the new edition. Their chapters speak for themselves. Our thanks are also extended to all colleagues who supplied original preparations or photomicrographs as supplement; they are each time named at the foot of the page. Furthermore our thanks to management and staff of the Springer-Verlag, where we should like to make special mention – pars pro toto – of Dr. Götze and Mr. Bergstedt and Mrs. Deigmöller; also of Mr. Jennewein and the chemigraphers of the Kunstanstalt Dreher in Stuttgart. Everyone assisted us with their stimulating criticism, their patience, understanding and compliance with our wishes. We also honour our teacher and cofounder of this book, Ludwig Heilmeyer. Prior to his demise in September 1969, which was so sudden and far too early for us, he offered valuable ideas for the present new edition.

Munich, October 1971

Herbert Begemann Johann Rastetter

Preface to the First German Edition

Medical practice has only to a modest degree accepted the diagnostic progress of smear cytology. Basically this is due to the available pictorial material being too stereotyped to enable the beginner to familiarize himself with this field. One of the main objects of this book is to eliminate this defect. We have therefore attempted to demonstrate the vast morphological range of individual cells pertaining to different diseases, both in the introductory figures and by numerous synoptical illustrations whilst discussing individual syndromes. Paintings were intentionally chosen by us as a basis for reproduction: the frequently praised photographic objectivity of colour photographs being extremely doubtful, chemigraphic reproduction would minimize it to a still greater extent. A further more important reason is that in the photomicrograph virtually only one plane is in focus. Furthermore the microscopist habitually alters the fine adjustment, thus scanning several planes in order to create for himself a tridimensional picture of a cell. By drawings it is however feasible to simultaneously obtain different cellular planes, thus being superior to photography in approximating to relations of subjective observation. We deliberately avoided reproducing cells in black and white; for the justifiable demands of histologists to guide the novice away from colour and towards structure are only rarely accomplished by smear cytology. The staining methods employed in haematology serve as colour foundation for the entire smear cytology to date. That is why the great majority of our figures is reproduced in the today almost universally adopted panoptic staining method of Pappenheim, but where necessary supplemented by special stains. For labelling individual cells line drawings are added in illustrations showing many different cells; in cytologically more uniform pictures certain cells are indicated by arrows, in conformity with a clock dial. E.g. "cell 6 o'cl." refers to an arrow pointing to 6 on the dial.

In the event of differences arising between the German text and foreign translations, the German text only is applicable.

To produce the colour plates we were most fortunate in obtaining the services of the University artist, Mr. HANS DETTELBACHER, Freiburg, who combines scientific gift of observation, technical precision and artistic empathy in truly genial fashion. Our foremost thanks is extended to him and to his no less gifted daughter Thea, who considerably assisted her father in his task. Without the cooperation of these two the present Atlas would probably never have been accomplished. We must further thank a number of our acquaintances

and friends among investigators for scientific collaboration and providing preparations. Above all to mention Prof. Dr. HENNING and Dr. WITTE at Erlangen, Dozent Dr. LANGREDER, Mainz, Prof. Dr. MOHR of the Tropeninstitut Hamburg, Priv.-Doz. Dr. MOESCHLIN in Zürich, Dr. UNDRITZ in Basle and Doz. Dr. KÜHN of our Freiburg clinic. We also thank our translators, namely Dr. HENRY WILDE of our Freiburg clinic for the English text, Dr. RENÉ PRÉVOT, Mulhouse, for the French text and Dr. EVA FELNER-KRAUS, Santiago de Chile, for the Spanish text. We must not omit to refer to the assistance of the scientific and technical collaborators of our haematological laboratory, among whom we should like to name pars pro toto mesdames HILDEGARD TRAPPE and WALTRAUD WOLF-LÖFFLER. Finally we wish to express our appreciation to the Springer-Verlag who initially encouraged production of this book, the technical perfection of which was assured by their famed generousness.

Freiburg, Spring 1955

LUDWIG HEILMEYER HERBERT BEGEMANN

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Illustrations

[1] Nonsegmented neutrophils are variously known as "stab cells" and "band cells".

Methodology

A. Technique of Puncture

Bone Marrow

Sternal puncture is still the simplest and most commonly used method for obtaining bone marrow. It is usually carried out level with the 2nd or 3rd intercostal space in midsternum. After cleansing the skin over the sternum and applying an antiseptic, the skin and particularly the subjacent periosteum are anaesthetized with a few millilitres of 1% Scandicain. After anaesthesia the marrow puncture needle containing its stylet and the guard set is pushed in at the abovementioned site. As soon as the needle touches the periosteum, the guard is adjusted to approximately 4–5 mm and the cortical layer is carefully pierced with a light rotatory movement. Entry of the needle is distinctly felt, at times a soft crackling is heard. With dense and hard bone a little more power may be required. Once in the bone marrow, the stylet is withdrawn, a 10 or 20 ml syringe is fitted airtight on the puncture needle and 0.5–1 ml bone marrow is aspirated. Aspiration of marrow fluid usually causes distinct pain which unfortunately is unavoidable but which very rapidly disappears again. If no marrow is obtained by this procedure, a little normal saline may be injected into the marrow and aspiration repeated; or the needle may be pushed slightly deeper into the marrow space. The procedure is free from risks with careful and correct technique. The very rarely described accidents are usually due to using needles without guard or otherwise careless handling. Special care is necessary in plasmocytoma, osteoporosis and other processes which are accompanied by bone destruction (e.g. metastases, thalassaemia major).

Instead of the sternum other bones containing bloodforming marrow may be punctured. In the last few years bone marrow has frequently been aspirated from the **iliac crest.** This procedure has the following advantages:

1. Little risk: there are no vital organs in the region of the puncture. Fracture of bone has not been described so far.

2. In case of a dry tap it is possible to obtain a bone marrow cylinder without additional anaesthesia and undue stress for the patient, which can be used both for smears and for histology.

3. The procedure at the pelvis is generally better tolerated by the patient and the traumatic experience is less than at the sternum.

Puncture of the posterior pelvic crest for aspiration of bone marrow is performed at the posterior superior iliac spine. This site is especially suitable for puncture free from risks since the ilium lies sagitally and the penetrating needle enters a wide bone marrow space which practically precludes perforation of the bone and injury to internal organs.

The patient lies prone. He is asked to relax his glutaeal muscles, which allows of finding the spine more easily. The following procedure is recommended: the physician stands on the side of the patient where he