The Bioengineer's Bookshelf

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Exempla Haemorheologica, "Das stroemende Organ Blut," by Holger Schmid-Schoenbein, Guenther Grunau, and Hans Braeuer, with an introduction by Hans Schaefer. Published and copyrighted 1980 by Albert-Roussel Pharma GMbH, Wiesbaden, Germany, 1980. In German.

The book opens with a quotation from Baker, 1743:

> "An observation of Mr. Leeuwenhoek is very well worth regarding: he took notice, that when he was greatly disordered, the Globules of his Blood appeared hard and rigid, but grew softer and more pliable as his Health returned."

Then from J. E. Thornton:

> "The more we treat the theories of our predecessors as myths the more inclined we shall be to treat our own theories as dogmas."

These are indeed fitting inscriptions for this most beautiful, extraordinarily well-illustrated and well-printed book on flowing blood. The title may be translated as "Examples of Hemorheology: The Flowing Blood as an Organ." Most American readers are familiar with Frank H. Netter's Ciba Collection of Medical Illustrations, a Compilation of Paintings on the normal and Pathologic Anatomy and Physiology, Embryology, and Diseases of various organs. The present book is like Frank Netter's Ciba book, equally well illustrated, much shorter, but presented with even greater exuberance and enthusiasm. Some of the paintings are covered with transparent pages on which are printed arrows, numbers, borders, to lead the reader to the explanations to the text. The paintings are thus preserved as works of art. The text is printed in two colors, black for the the main flow of ideas, green for explanation of the figures. The size of the book is large: 12 × 14 in. Using very thick sheets of paper, the 78-page book makes up a pretty thick volume. It is a luxury publication.

The book begins with a general description of the history of blood physiology, blood phylogenesis and ontogenesis, the blood vessel system, and blood function. Then there follows part B, the flow properties of blood, and part C, the microcirculation, both normal and disturbed. The theme of the book is that the fluidity of the blood is of major importance, that the flexibility of the red blood cells can vary and be controlled. This theme is illustated by the paintings collected here. The book ends with a chapter on the methods of hemorheology, with photographs of instruments used in the measurement of the flow properties of blood.

Unfortunately, this book is not generally available in the bookstores at the present time. I happened to see it on a friend's bookshelf. At a party given by Professor Arnost Fronek, he showed me this remarkable publication. I then wrote to the senior author, Professor Schmid-Schoenbein, who said that they are contemplating publishing an English version. Let us hope that this will be done, and that when it is done, the price will be reasonable so that students can afford it.

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Mechanical Properties of Bone. Proceedings of a Joint ASME-ASCE Applied Mechanics, Fluids Engineering, and Bioengineering Conference, Boulder, Colorado, June 22–24, 1981. Edited by Stephen Cowin. The American Society of Mechanical Engineers, New York. ASME Publication No. AMD-45, 238 pages, 1981.

This is a collection of several excellent papers on the mechanical properties of bone. It is one of the best ASME publications. The aforementioned conference was sponsored by the Joint Biomechanics Committee of the Applied Mechanics Division and the Bioengineering Division, ASME. The contents are as follows:

Professor Roesler's paper on the history of the Wolff's law is particularly interesting. It now appears that at the very beginning things were a bit fuzzy. Some claims were not proven, and some statements were not substantiated. Roesler relates that in 1867 G. H. Meyer published a paper called "Die Architektur der Spongiosa," in which he presented a line drawing of the cancellous bone structure he had observed in the proximal part of the human femur. When Meyer gave a lecture on his findings at a meeting of the "Züricher Naturforschende Gesellschaft" in 1866, the mathematician C. Culmann was present. Culmann had published a book on graphic statics in the same year. When he saw Meyer's drawings he pointed out that the lines resembled closely the principal stress trajectories in graphic statics. Meyer (1867) reported that, stimulated by the pleasant drawings of bone structure in the proximal end of the human femur, Culmann asked a student of his to construct the principal stress trajectories in a cranelike curved bar loaded in a fashion similar to the human femur. This construction was to become known as the Culmann crane, referred to in the many publications of the following decades.

Roesler shows that the trajectories of Culmann's crane are merely those of a straight cantilever beam loaded by shear at the free end, bent to look like a crane but without readjustment for the changed stress field. J. Wolff, convinced that Culmann's crane represented exactly the cancellous structure