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## — Noteworthy —

### A New Book on the Heart and Circulation

There are many “textbook truths” in biology: the heart is a pump, the brain thinks, the liver is a chemical factory, genes determine traits. These “truths” are a mixture of metaphor, oversimplification, and convenient models that are used to convey a picture of reality to the learner. They help a learner wrap his or her mind around something. But they are at best crutches, and they often distort the rich complexity of the living world. *The Heart and Circulation: An Integrative Model*, by Branko Furst, an associate professor of anesthesiology at Albany Medical College, tackles the “textbook truth” that the heart is to be understood as a pump that drives the blood through the entire peripheral circulation and back again.

Furst has carried out extensive research into the vast literature on the heart and circulation, including embryological development. What becomes clear in the book is that there is, in fact, no clear picture and no general agreement among researchers about how to understand circulation. This is a significant contribution of the book—it shows that when you go into the details and bring together the research that many different groups are doing from a variety of perspectives, you do not get consensus with regard to explanatory frameworks. The phenomena do not allow themselves to be captured in a simple model. There lies the untruthfulness of “textbook truths.”

The heart of a mammalian embryo develops four chambers and valves over time. Early on it is a pulsating tube. There have been two reigning perspectives on how this pulsating tubular heart relates to the blood that flows through it. Some have thought that the pulsating walls massage the blood along via peristaltic contractions. Others have thought it functions like a suction pump. Referring to many different studies, Furst shows how neither model sufficiently “saves the phenomena”—that is, neither provides an adequate picture of the relation between blood flow and heart beat in the early embryo. “After decades of intense research into the action of the embryonic heart, the observed phenomena clearly do not correspond with the existing models and call for reevaluation of the nature of the movement of blood and the role of the heart in the overall dynamics of embryonic circulation” (p. 46).

It is this service that Furst provides again and again in reference to many different aspects of the heart and circulation—development, mature activity, experimental studies,

and pathology. By showing the shortcomings of different explanatory models, he is also giving us a sense of the wondrous complexity of the human organism. What in any case becomes clear in the book is how intimately intertwined heart function, blood flow, and the metabolic needs of the organism are. The flow of blood in the embryonic heart, for example, plays a significant role in sculpting the mature form and structure of the blood vessels and heart.

Furst suggests that the paradoxes and riddles that show themselves in so many circulation phenomena could be better understood if we expanded our view of heart and blood function. Following a suggestion of Rudolf Steiner, he proposes that the heart, while of central importance in the generation of blood pressure, is not so much a propulsive pump, as (through the action of the valves and heart-beat) an organ that impedes and rhythmically regulates blood flow. Moreover, he shows how intimately connected blood flow in the periphery is with the metabolic activity of the organs and tissues it flows through. The blood is itself an organ, and Furst suggests that if we were to entertain the thought that the blood is capable of autonomous movement, the complex and ever-changing and modulating circulation could be better understood.

He summarizes,

The heart can be seen as an organ within the vascular loop which not only maintains the perfusion pressure [perfusion is the flow of blood through organs and tissues] but acts as an organ of restraint, setting itself up *against* the flow of autonomously moving blood (p. 91).

This is not a book for the lay person. It is highly technical and written for specialists. I hope it stimulates people working in the field to question some of their fundamental assumptions and to look afresh at the remarkable life that pulses within us. *CH*