Preface to the Edition in Portuguese

The idea of writing this book has been long-standing. The first real opportunity came in 1999, when our yoga teacher, Marcos Rojo, invited us to give a few physics classes to students of the Specialization Course in Yoga. Students came from different areas, such as journalism, medicine, architecture, and physical education. We prepared ten classes with the intention of teaching a topic of physics in each class and wrote class notes so that students could follow the lessons. At each class, we presented a theoretical part which was accompanied by a practical activity carried out with simple material in class. These classes served to calibrate the level and language being used: scientifically correct, without jargon, and easy to understand for non-physicists. To transform the notes into a book was a very long process.

We started from the premise that the human body is a laboratory that we have and that follows us wherever we go. So each person can test the concepts of classical mechanics, discussed here, in his or her own body. Furthermore, we have chosen to present the concepts in an objective manner and with a mathematical formalism suitable to a reader who has a high school education.

This book is designed to be used by undergraduate students in physical therapy, physical education, and other courses for those who have biomechanics in their curricula. High school teachers can also use this book as an alternative or as complementary material.

The mathematical language used in physics has always been blamed for the difficulties that students encounter in their studies. Therefore, in this book, every concept presented is followed by illustrative examples and in the sequence applications and exercises are proposed.

The content of the book is organized into eight chapters to allow a conceptual evolution of the student. Let's start with the last one, Chap. 8, of practical applications with simple experiments related to the concepts covered in each chapter that can be performed with materials easily found. It should not be left to the end, but rather we recommend its use at the end of or concurrent to each topic covered. Chapter 1 defines force, a vector quantity, and procedures necessary to carry out fundamental operations with this quantity and presents some specific

types of forces. Chapter 2 introduces the concept of torque that, unlike the concept of force, is usually new to the student. This concept allows establishing the equilibrium conditions of a body. In this chapter, the student begins to envision new concepts, which he did not learn in high school. The torque of the weight force is discussed in Chap. 3, for the study of center of gravity, and how to determine it and the study of the stability of the human body, important for yoga practitioners, dancers, and practitioners of various sports. Chapter 4 complements the study of rotations introducing new concepts such as moment of inertia, radius of gyration, and angular momentum. Here the reader comes to understand numerous maneuvers performed by gymnasts and acrobats. Simple machines have been specially treated for physical therapists in Chap. 5: levers and pulleys used in treatments. In Chap. 6, the muscle forces associated with pain in the spinal column due to incorrect postures are determined, showing how to reduce their intensity quantitatively with the correct posture. Chapter 7 discusses the elastic properties of bone, stress and strain, pressure on the vertebrae, and broken bones in collisions.

Thus, we believe that this book will be useful and help to unravel the physics of the human body which is important for physical therapists, practitioners of sport in general, students of life sciences in a more broad sense, and non-physicists, who are curious and interested in learning. We would also recommend that high school teachers use examples from the book in order to motivate students to realize the importance of physics and start to like it and, who knows, love it.

Acknowledgments

We would like to thank the many colleagues who encouraged us and the students who tested our course. We could not fail to mention our dear yoga teacher, Professor Marcos Rojo, responsible for the groundbreaking of the process and Professor John Cameron of the University of Wisconsin, who, from afar, gave much support through e-mail.

We are also grateful to Daniela Pimentel Mendes and the team at Editora Manole for their commitment and dedication in editing the book in Portuguese version with utmost perfection. Finally, we thank our family for the love and understanding.

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Preface to the Edition in English

This book is a translation from the Portuguese of "Desvendando a Física do Corpo Humano: Biomecânica" published by Editora Manole Ltda. The publication of this English version is due to the patience, understanding, and efforts of Christopher T. Coughlin, physics publishing editor at Springer, and Fan, HoYing to whom we extend our sincere gratitude.

We are especially indebted to Renato Fratin who redid all of the drawings neatly for this edition.

We are also grateful to Prof. Eduardo Yukihara (Oklahoma State University) who made the first corrections of the English translation. Our deep gratitude goes to Prof. Wayne Seale (Instituto de Física/USP) for the comments, suggestions, revisions, and considerable improvements in the English translation, transforming brilliantly our Brazilian English constructions into proper English.

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http://www.springer.com/978-1-4614-8575-9

Biomechanics of the Human Body

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2014, XII, 164 p. 128 illus., Softcover
ISBN: 978-1-4614-8575-9