Book Review


This volume, which honors Shiro Kondo on the occasion of his retirement, provides a biological-behavioral data base for assessing what makes human bipedalism unique among primates and how it evolved. Japanese researchers have been among the leaders in taking a multifaceted approach to the analysis of human and nonhuman primate locomotion and posture. *Primate Morphophysiology, Locomotor Analyses and Human Bipedalism* brings together recent work by many of these researchers and also includes work by several of their European and American colleagues. The volume, as a whole, presents a wide range of data and ideas on human and nonhuman primate locomotion. Contributors use a variety of methods to examine morphology, physiology, and the dynamics of movement at many levels of analyses. The book thus lives up to its title.

The 15 chapters can be organized as follows: (1) two chapters that analyze human bipedal walking by integrating information on kinematics, muscle activity, foot contact, and, for adults, force-plate data (Suzuki, adults; Okamoto and Goto, children); (2) three chapters that provide complementary comparative data on primates (Okada, kinematics; Ishida, Kumakura, and Kondo, EMG studies; Kimura, dynamics) and a chapter by Yamazaki that uses data on morphology, movement, and forces in living individuals to calculate internal muscle and joint forces and energy expenditure in primate bipedal walking; (3) four chapters that “dissect” the primate body into parts, including two about muscles (Hamada, hip and thigh; Inokuchi, hands and feet) and two about bones (Moriyama, foot; Baba, hindlimb); (4) three chapters that provide integrated examples of positional adaptations in nonhuman primates (Jouffroy and Günther, galago; Niemitz, tarsier; Tuttle and Watts, gorilla); and, finally, (5) two chapters based on both theory and studies of nonhuman primates that consider bipedalism and its origins more directly (Iwamoto, bipedalism and the role of carrying; Prost, morphological-behavioral models in a mathematical context).

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I find this volume most useful as a reference book. An edited volume with data-packed chapters generally is not an "easy read." I read many chapters twice and some deserve more than even a second reading. Excellent and abundant line drawings and other illustrations throughout the volume clarify the text. The chapter on human infant walking by Okamoto and Goto has especially nice illustrations showing body proportions and walking patterns, EMG data for hindlimb muscles, selected joint angles, and footprints. Some chapters, however, are more difficult than others to follow. For example, I had to construct my own separate list of measurements used by Baba in his interesting chapter on comparative hindlimb osteometry in order to read the section on osteometric ratios without constantly flipping pages back and forth. I did the same for Moriyama's chapter dealing with morphology of the foot. In other cases, tables were difficult to decipher. On the whole, although not an easy read, this book contributes to the study of primate positional adaptation in significant ways.

The chapters on human bipedalism are particularly useful since they integrate data collected simultaneously using a number of techniques. Suzuki ("Human Adult Walking") gives us an excellent, well-illustrated description of the economic gait of adults. The chapter that follows, by Okamoto and Goto, is even more interesting since it details the development of walking patterns in young children. Children learn to move bipedally, progressing from unstable walking to the more stable adult gait (associated with use of erect posture and changes in body proportions and hindlimb morphology). Since many earlier articles that report results of EMG studies of infant walking are in Japanese, this chapter is a welcome addition to the book.

The next eight chapters focus on nonhuman primates and, in some cases, other mammals, from both comparative and functional perspectives. The collection of these articles in a single volume is useful, since data from one method cannot tell the whole story about positional adaptation. The laboratory studies use live animals to investigate joint movement, muscle activity, and ground reaction forces in different species. Cadaver dissections provide information on hindlimb muscle weights, origins and insertions, cross sections, and fiber size and counts. Osteometric studies analyze the hindlimb via angular and linear measurements of bones.

The two back-to-back chapters on leaping galagos and tarsiers provide a nice comparison of locomotor adaptations in different groups. But Tuttle and Watts ("The Positional Behavior and Adaptive Complexes of Pan gorilla") do the best job of these three chapters of presenting the whole animal. They integrate important new quantitative data on expressed positional behavior in gorillas with a review of musculoskeletal adaptations, including those related to knuckle-walking.