

**Kathryn B. H. Clancy, Katie Hinde, and Julienne N. Rutherford (eds): *Building Babies: Primate Development in Proximate and Ultimate Perspective. Developments in Primatology: Progress and Prospects*, Vol. 37 (Series Editor: Louise Barrett) Springer, New York, 2013, xiii, 531 pp. ISBN 978-1-4614-4059-8, \$229.00 (Hardcover)**

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“Neither natural selection nor DNA directly explains *how* individual forms are made or how they evolved...the key to understanding form is *development*” (Carroll 2005, p. x). Most primatologists and biological anthropologists probably know that primates generally take a long time to grow up, that relative brain size in some groups is especially large, and that humans in particular wean earlier than expected. But how, and why, is this so? The existing gaps in our understanding of the developmental processes that contribute to these phenotypes, as well as the evolution of development in the primate lineage, provide some of the biggest obstacles for understanding the “hows” and “whys” in primate evolution. There is only so much that we can learn from treating observations or measurements taken as slices in time or a single generation as truly representative of patterns of development, or by hypothesizing about driving forces of evolution based on analyses of one sex or age class in either captive or wild groups, or by talking about evolutionary pressures and selective forces without a nuanced understanding of the myriad influences on patterns of development. *Building Babies* takes on the admirable mission of addressing these gaps in primatological research, by bringing together a group of authors whose research areas overlap enough to sustain a layering of understanding from chapter to chapter, but are also different enough to cover a remarkable amount of ground.

The 21 chapters of this volume are organized in 6 sections: Conception and Pregnancy, From Pre- to Post-natal Life, Milk: Complete Nutrition for the Infant, Mothers and Infants: The First Social Relationship, The Expanding Social Network,

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and Transitions to Juvenility and Reproductive Maturity. It makes intuitive sense to organize the book in this way, although a less chronological framework might have further emphasized the strong thematic threads running through much of the book. In his conclusion, Robert Martin contextualizes the chapters as broadly relating to two organizing themes: maternal investment in primate brain development and the conflict and cooperation inherent to the maternal–offspring relationship pre- and postnatally (Martin, Chapter 22). Many of the chapters provide both proximate and ultimate perspectives, as the title suggests, and most are successful in balancing their contributions along these lines.

Some notable common topical streams include the role of “stress”: components of the hypothalamic–pituitary–adrenal axis and inflammatory response system in shaping developmental trajectories, both within a lifetime and across generations (Clancy, Chapter 1; Nyberg, Chapter 6; Kinnally, Chapter 7; Hinde, Chapter 9; Machado, Chapter 12); the effects of maternal energetics, nutrition, and condition on development (Rutherford, Chapter 2; Potts, Chapter 4; Tardif, Ross and Smucny, Chapter 8; Milligan, Chapter 10; Fairbanks and Hinde, Chapter 13); the multidirectional relationships between physiology, ecology, and social behavior (MacKinnon, Chapter 17; Meredith, Chapter 18); and the role of plasticity, programming, and epigenetic mechanisms in shaping development (Rutherford, Chapter 2; Sterner, Chapter 3; Martin and Sela, Chapter 11). Evidence is derived from both experimental and captive-based work (Smith, Birnie, and French, Chapter 5; Hinde, Chapter 9; Machado, Chapter 12), and new analyses and/or comprehensive reviews of existing data from wild populations (Lonsdorf, Chapter 14; Tecot, Baden, Romine, and Kamilar, Chapter 15). Life history frameworks are used to situate much of what is covered, from a consideration of the variation in the ontogeny of positional behavior (Bezanson and Morbeck, Chapter 19), to a quantitative genetics approach to understanding reproductive tradeoffs in female macaques (Blomquist, Chapter 20). Perhaps uniquely for a book of this sort, this volume includes a detailed consideration of male care as part of a mating strategy in owl monkeys (Huck and Fernandez-Duque, Chapter 16), as well as a final chapter that takes a gene–culture coevolutionary approach to human reproduction and parenting (Newsom, Chapter 21). In addition to the impressive breadth of topics and species, I especially appreciated that careful attention was devoted in this volume to both placentas and milk; the fetoplacental unit and lactating breast are both transient structures and perhaps among the most exciting areas for future research given the relative paucity of existing studies documenting inter- or intraspecific variation in the formation, composition, function, or output of these conduits of maternal–fetal communication.

It is difficult to identify shortcomings in such an ambitious and well-executed volume. Although cost is an issue, PDFs of chapters may be available for download from institutional libraries. It is interesting to think about how a course could be designed around this book, and the accessibility of most of the chapters (helpful glossaries, tables, and illustrations are plentiful throughout) would be a positive point for advanced undergraduate or graduate students. There are other edited volumes that cover broadly similar ground (e.g., Else and Lee 1986; Pereira and Fairbanks 2002; Kappeler and Pereira 2003), including concepts of plasticity, social behavior, cognitive development, and even weaning and maternal rejection, in relationship to ecology and life history. How *Building Babies* differs from these earlier collections is that much of what is covered represents cutting edge approaches for primatology—a potentially

double-edged sword in some realms of research in which laboratory and analytical methods are rapidly changing (e.g., epigenetics, microbiomics). Martin's conclusion ties together all of the common threads running through the chapters and ends with a call for future research on specific problems that have been identified by the contributors. As useful as this is, a foreword to such a wide-ranging set of papers, or a short lead-in to each section, could have provided some balance. These minor points, however, do not detract from this overall valuable contribution from the editors and authors.

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