## Contents

1 **Introduction** ................................................................. 1
   References .............................................................................. 6

2 **A Scientific Genealogy: Early Development of Fetal–Neonatal Research** ...................................................... 7
   2.1 The Beginnings and Some Definitions ................................. 7
   2.2 Arthur St. George Huggett and Early Studies of Fetal Physiology .......................................................... 9
   2.3 Late Nineteenth and Early Twentieth Century Contributions by German Physiologists and Others ................. 10
   2.4 Nicholson J. Eastman, Huggett, and Others of the 1930s to 1950s ................................................................. 15
   2.5 Joseph Barcroft and a Widening of Interest in Physiology of the Fetus ......................................................... 21
   References .................................................................................. 34

3 **Oxford and the Development of Physiology, with Notes on the Nuffield Institute for Medical Research** .................. 43
   3.1 William Harvey and Seventeenth Century Physiology ............ 43
   3.2 Other Early Oxford Physiologists .......................................... 47
   3.3 Founding of the Royal Society ............................................... 49
   3.4 The Oxford Medical School and Further Developments in Physiology ......................................................... 51
   3.5 The Nuffield Institute for Medical Research ............................ 56
   References .................................................................................. 59

4 **Geoffrey S. Dawes: A Life in Science** ................................. 63
   4.1 Early Life and Work ............................................................. 63
   4.2 Dawes and the Fetal Cardiovascular System: The 1950s and 1960s .............................................................. 68
   References .................................................................................. 75
5 Fetal Asphyxia and the Primate Colony in Puerto Rico
5.1 Historical Perspective
5.2 Eastman and “Mt. Everest In Utero”
5.3 William F. Windle and the Primate Colony at Cayo Santiago
5.4 The Puerto Rico Studies of Asphyxia
5.5 Virginia Apgar and Evaluation of the Newborn Infant
5.6 In Summary
References

6 The Pulmonary Vasculature and Dawes’ Foetal and Neonatal Physiology
6.1 The Pulmonary Vasculature of the Fetus and Newborn
6.2 Dawes’ Foetal and Neonatal Physiology
References

7 Embryology and Early Developmental Physiology
7.1 Origins
7.2 Stazione Zoologica di Napoli
7.3 The Discovery of Genetics
7.4 Embryology Becomes a Science
References

8 Some Aspects of the Physiology of the Placenta
8.1 Late-Nineteenth and Early-Twentieth Centuries
8.2 Mid-Twentieth Century to the Present: Placental Fine Structure and Function
8.3 The Uteroplacental Circulation, Transplacental Exchange, and an Introduction to Placental Endocrinology
8.4 Pathology of the Placenta
References

9 Governmental Support of Research in Fetal and Newborn Physiology
9.1 The Medical Research Council of Great Britain
9.2 The Medical Research Councils of Canada and Australia
9.3 The US National Institutes of Health
References

10 Fetal–Neonatal Growth and Metabolism
10.1 Early Studies
10.2 Robert A. McCance, Elsie May Widdowson, and Continued Studies of Growth and Metabolism
10.3 Neonatal Birthweights and the Small for Gestational Age Infant
10.4 Metabolic Rate
References
11 Epigenetics and the Fetal Origins of Adult Health and Disease .... 207
  11.1 Overview ........................................................................................ 207
  11.2 A Brief Introduction to Epigenetics and Development .............. 209
  11.3 The Dutch “Hunger Winter” of 1944–1945: A Case Study .......... 212
    11.3.1 Maternal and Infant Characteristics ........................................ 212
    11.3.2 Metabolic Sequelae ................................................................. 214
    11.3.3 Cardiovascular Sequelae .......................................................... 214
    11.3.4 Related Sequelae ................................................................. 216
    11.3.5 Neuropsychological Sequelae ........................................... 217
  11.4 Other Antenatal Maternal Starvation Studies ......................... 219
  11.5 A Perspective on the Fetal Origins of Adult Health and Disease .. 219
  11.6 Critiques of the “Fetal Origins” Hypothesis ...................... 222
  11.7 Malnutrition During Pregnancy as a Global Health Problem .... 223
    References .......................................................................................... 224

12 Some Aspects of the Developing Brain and Nervous System ......... 235
  12.1 Overview ........................................................................................ 235
  12.2 Developmental Neurogenesis ......................................................... 238
  12.3 Cognitive Development ................................................................. 242
  12.4 Cerebral Blood Flow in the Fetus and Newborn ....................... 245
    References .......................................................................................... 249

13 Related Developments in Fetal and Neonatal Endocrinology ....... 257
  13.1 The Beginnings of Reproductive Endocrinology and Medicine .... 258
  13.2 Fetal–Neonatal Endocrinology ...................................................... 260
  13.3 Developmental Neuroendocrinology ............................................. 264
  13.4 Hormonal Regulation of the Timing of Birth ............................. 267
    References .......................................................................................... 272

14 Further Developments in Fetal and Neonatal Physiology ........... 281
  14.1 Pulmonary Physiology and Respiratory Distress Syndrome ...... 281
  14.2 Corticosteroids and Maturation of the Fetal Lung ..................... 294
  14.3 A Tribute to “Mont” Liggins .......................................................... 297
  14.4 Blood and Hematology ................................................................. 300
  14.5 Hyperbilirubinemia and Kernicterus in the Fetus and Newborn ... 305
  14.6 Immunology ................................................................................... 306
  14.7 Chronic Catheterization of the Fetus ............................................. 308
  14.8 Cardiovascular Physiology ........................................................... 310
  14.9 Related Fields of Research ........................................................... 313
    References .......................................................................................... 313

15 Additional Clinical Aspects of Developmental Physiology .......... 327
  15.1 Preterm Birth and Neonatal Intensive Care .............................. 327
  15.2 Retinopathy of Prematurity ............................................................ 340
  15.3 Transcutaneous O₂ Measurements ............................................. 344
  15.4 Thermoregulation ....................................................................... 346
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.5 Some Aspects of the Development of Maternal–Fetal Medicine...</td>
<td>347</td>
</tr>
<tr>
<td>15.6 Pathology of the Fetus and Newborn</td>
<td>354</td>
</tr>
<tr>
<td>References</td>
<td>355</td>
</tr>
<tr>
<td>16 Bioethical Issues in Research on the Fetus and Newborn Infant .....</td>
<td>367</td>
</tr>
<tr>
<td>16.1 An Awakening of Responsibility</td>
<td>367</td>
</tr>
<tr>
<td>16.2 The Emergence of Bioethics</td>
<td>368</td>
</tr>
<tr>
<td>16.3 The Massachusetts Experience</td>
<td>370</td>
</tr>
<tr>
<td>16.4 Later Developments</td>
<td>372</td>
</tr>
<tr>
<td>References</td>
<td>374</td>
</tr>
<tr>
<td>17 Textbooks, Monographs, and Other Volumes on Fetal and Newborn Physiology</td>
<td>379</td>
</tr>
<tr>
<td>17.1 Volumes on Physiology of the Fetus and Newborn Infant</td>
<td>379</td>
</tr>
<tr>
<td>17.2 The Josiah Macy, Jr. Foundation Conferences on Gestation</td>
<td>384</td>
</tr>
<tr>
<td>17.3 New York Academy of Sciences Conferences on Fetal Homeostasis</td>
<td>385</td>
</tr>
<tr>
<td>17.4 Essays in Perinatal Medicine</td>
<td>387</td>
</tr>
<tr>
<td>References</td>
<td>388</td>
</tr>
<tr>
<td>18 Fetal “Breathing” in the 1970s, and Fetal Heart Rate Analysis in the 1980s and Early 1990s</td>
<td>391</td>
</tr>
<tr>
<td>18.1 Early Studies of Fetal Breathing Movements</td>
<td>391</td>
</tr>
<tr>
<td>18.2 Fetal Breathing in Humans</td>
<td>398</td>
</tr>
<tr>
<td>18.3 Early History of Fetal Heart Rate Monitoring</td>
<td>402</td>
</tr>
<tr>
<td>18.4 Subsequent Studies on Electronic Fetal Heart Rate Monitoring ...</td>
<td>405</td>
</tr>
<tr>
<td>18.5 Some Contemporary Developments</td>
<td>407</td>
</tr>
<tr>
<td>References</td>
<td>410</td>
</tr>
<tr>
<td>19 Dawes’ Contributions to Symposia and a Summing Up</td>
<td>421</td>
</tr>
<tr>
<td>19.1 Ciba Foundation Symposia</td>
<td>421</td>
</tr>
<tr>
<td>19.2 The Barcroft Centenary Symposium</td>
<td>425</td>
</tr>
<tr>
<td>19.3 The “Dawes Symposium” and Others</td>
<td>426</td>
</tr>
<tr>
<td>19.4 A Summing Up by Dawes</td>
<td>428</td>
</tr>
<tr>
<td>References</td>
<td>430</td>
</tr>
<tr>
<td>20 Dawes as a Mentor: Reminiscences of Former Graduate Students, Postdoctoral Fellows, and Associates</td>
<td>433</td>
</tr>
<tr>
<td>References</td>
<td>460</td>
</tr>
<tr>
<td>21 Early Years of the Society for Gynecologic Investigation, the Fetal and Neonatal Physiological Society, and Several Other Groups</td>
<td>463</td>
</tr>
<tr>
<td>21.1 Beginnings of the Society for Gynecologic Investigation</td>
<td>463</td>
</tr>
<tr>
<td>21.2 Journal of Gynecologic Investigation/Reproductive Sciences</td>
<td>465</td>
</tr>
<tr>
<td>21.3 The Fetal and Neonatal Physiological Society</td>
<td>470</td>
</tr>
<tr>
<td>References</td>
<td>476</td>
</tr>
</tbody>
</table>
22 Epilogue ................................................................................................... 477
  22.1 The Adventure of Science................................................................. 477
  22.2 Fundamental Research, Clinical Medicine
      and the Role of the Physician–Scientist ......................................... 483
  22.3 Fetal and Neonatal Physiology and Its Relation
      to Physiology in General................................................................. 485
  22.4 Fetal–Neonatal Physiology and the Future .................................... 487
  22.5 What Lessons are to Be Learned?.................................................... 489
  22.6 Conclusion ..................................................................................... 495

References................................................................................................. 495

23 Bibliography of Geoffrey S. Dawes ....................................................... 499

Name Index.................................................................................................. 513

Subject Index............................................................................................... 521
The Rise of Fetal and Neonatal Physiology
Basic Science to Clinical Care
Longo, L.D.
2013, XXVII, 533 p. 52 illus., 18 illus. in color., Hardcover
ISBN: 978-1-4614-7920-8