# 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 .................. 79
   5.1 Historical Perspective ................................................................. 79
   5.2 Eastman and “Mt. Everest In Utero” ......................................... 82
   5.3 William F. Windle and the Primate Colony at Cayo Santiago ... 84
   5.4 The Puerto Rico Studies of Asphyxia ....................................... 85
   5.5 Virginia Apgar and Evaluation of the Newborn Infant ............ 89
   5.6 In Summary .............................................................................. 91
   References .......................................................................................... 91

6  The Pulmonary Vasculature and Dawes’ Foetal
    and Neonatal Physiology ................................................................. 97
   6.1 The Pulmonary Vasculature of the Fetus and Newborn ........... 97
   6.2 Dawes’ Foetal and Neonatal Physiology .................................. 106
   References .......................................................................................... 108

7  Embryology and Early Developmental Physiology ...................... 113
   7.1 Origins ....................................................................................... 113
   7.2 Stazione Zoologica di Napoli ..................................................... 118
   7.3 The Discovery of Genetics ......................................................... 120
   7.4 Embryology Becomes a Science .............................................. 124
   References .......................................................................................... 130

8  Some Aspects of the Physiology of the Placenta ......................... 137
   8.1 Late-Nineteenth and Early-Twentieth Centuries ....................... 137
   8.2 Mid-Twentieth Century to the Present:
       Placental Fine Structure and Function ....................................... 143
   8.3 The Uteroplacental Circulation, Transplacental Exchange,
       and an Introduction to Placental Endocrinology ...................... 145
   8.4 Pathology of the Placenta ......................................................... 154
   References .......................................................................................... 156

9  Governmental Support of Research in Fetal
    and Newborn Physiology ................................................................. 167
   9.1 The Medical Research Council of Great Britain ..................... 167
   9.2 The Medical Research Councils of Canada and Australia ....... 172
   9.3 The US National Institutes of Health ....................................... 173
   References .......................................................................................... 180

10 Fetal–Neonatal Growth and Metabolism ................................... 183
    10.1 Early Studies ........................................................................... 183
    10.2 Robert A. McCance, Elsie May Widdowson,
         and Continued Studies of Growth and Metabolism .............. 188
    10.3 Neonatal Birthweights and the Small for Gestational
         Age Infant ............................................................................... 194
    10.4 Metabolic Rate ....................................................................... 199
    References .......................................................................................... 200
## 11 Epigenetics and the Fetal Origins of Adult Health and Disease

11.1 Overview

11.2 A Brief Introduction to Epigenetics and Development

11.3 The Dutch “Hunger Winter” of 1944–1945: A Case Study

11.3.1 Maternal and Infant Characteristics

11.3.2 Metabolic Sequelae

11.3.3 Cardiovascular Sequelae

11.3.4 Related Sequelae

11.3.5 Neuropsychological Sequelae

11.4 Other Antenatal Maternal Starvation Studies

11.5 A Perspective on the Fetal Origins of Adult Health and Disease

11.6 Critiques of the “Fetal Origins” Hypothesis

11.7 Malnutrition During Pregnancy as a Global Health Problem

### References

## 12 Some Aspects of the Developing Brain and Nervous System

12.1 Overview

12.2 Developmental Neurogenesis

12.3 Cognitive Development

12.4 Cerebral Blood Flow in the Fetus and Newborn

### References

## 13 Related Developments in Fetal and Neonatal Endocrinology

13.1 The Beginnings of Reproductive Endocrinology and Medicine

13.2 Fetal–Neonatal Endocrinology

13.3 Developmental Neuroendocrinology

13.4 Hormonal Regulation of the Timing of Birth

### References

## 14 Further Developments in Fetal and Neonatal Physiology

14.1 Pulmonary Physiology and Respiratory Distress Syndrome

14.2 Corticosteroids and Maturation of the Fetal Lung

14.3 A Tribute to “Mont” Liggins

14.4 Blood and Hematology

14.5 Hyperbilirubinemia and Kernicterus in the Fetus and Newborn

14.6 Immunology

14.7 Chronic Catheterization of the Fetus

14.8 Cardiovascular Physiology

14.9 Related Fields of Research

### References

## 15 Additional Clinical Aspects of Developmental Physiology

15.1 Preterm Birth and Neonatal Intensive Care

15.2 Retinopathy of Prematurity

15.3 Transcutaneous O2 Measurements

15.4 Thermoregulation

### References
### 15.5 Some Aspects of the Development of Maternal–Fetal Medicine

- Page: 347

### 15.6 Pathology of the Fetus and Newborn

- Page: 354

### References

- Page: 355

### 16 Bioethical Issues in Research on the Fetus and Newborn Infant

- Page: 367

#### 16.1 An Awakening of Responsibility

- Page: 367

#### 16.2 The Emergence of Bioethics

- Page: 368

#### 16.3 The Massachusetts Experience

- Page: 370

#### 16.4 Later Developments

- Page: 372

### References

- Page: 374

### 17 Textbooks, Monographs, and Other Volumes on Fetal and Newborn Physiology

- Page: 379

#### 17.1 Volumes on Physiology of the Fetus and Newborn Infant

- Page: 379

#### 17.2 The Josiah Macy, Jr. Foundation Conferences on Gestation

- Page: 384

#### 17.3 New York Academy of Sciences Conferences on Fetal Homeostasis

- Page: 385

#### 17.4 Essays in Perinatal Medicine

- Page: 387

### References

- Page: 388

### 18 Fetal “Breathing” in the 1970s, and Fetal Heart Rate Analysis in the 1980s and Early 1990s

- Page: 391

#### 18.1 Early Studies of Fetal Breathing Movements

- Page: 391

#### 18.2 Fetal Breathing in Humans

- Page: 398

#### 18.3 Early History of Fetal Heart Rate Monitoring

- Page: 402

#### 18.4 Subsequent Studies on Electronic Fetal Heart Rate Monitoring

- Page: 405

#### 18.5 Some Contemporary Developments

- Page: 407

### References

- Page: 410

### 19 Dawes’ Contributions to Symposia and a Summing Up

- Page: 421

#### 19.1 Ciba Foundation Symposia

- Page: 421

#### 19.2 The Barcroft Centenary Symposium

- Page: 425

#### 19.3 The “Dawes Symposium” and Others

- Page: 426

#### 19.4 A Summing Up by Dawes

- Page: 428

### References

- Page: 430

### 20 Dawes as a Mentor: Reminiscences of Former Graduate Students, Postdoctoral Fellows, and Associates

- Page: 433

### References

- Page: 460

### 21 Early Years of the Society for Gynecologic Investigation, the Fetal and Neonatal Physiological Society, and Several Other Groups

- Page: 463

#### 21.1 Beginnings of the Society for Gynecologic Investigation

- Page: 463

#### 21.2 Journal of Gynecologic Investigation/Reproductive Sciences

- Page: 465

#### 21.3 The Fetal and Neonatal Physiological Society

- Page: 470

### References

- Page: 476
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